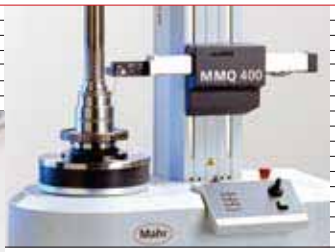
CATALOG I DIMENSIONAL METROLOGY



- 0 +

Mahr

EXACTLY

THE MAHR CATALOG

Measurement affects almost everything. Whatever your dimensional metrology needs, this catalog can help you. It includes Mahr's complete portfolio of products for precision gages, metrology systems, and services. It is also a useful source for everyone who wants to learn more about Mahr. To ensure that readers are able

to find their way around easily, we have color-coded the main sections – the precision gages section is shown in light blue and metrology systems in dark blue. At the beginning of each of the sections you'll find a table of contents that will help you locate specific products and systems.

METROLOGY SYSTEMS 14-2

Solutions tailored to your individual needs

SERVICE 21-2

Repair, training, calibration and much more

EXPERIENCE

Mahr has been producing measuring instruments for over 145 years

COMMITMENT

The perfect solution for every need

TECHNOLOGY

Top quality for absolute precision

RELIABILITY

Results you can rely on

MORE ABOUT MAHR: THE BRAND

Our yardstick is your success. Quality assurance is playing an ever greater role in the world of production. The more important repeatable precision becomes, the greater the importance of metrology to the final result. We make it our job to ensure that the results are accurate. As one of the world's largest manufacturers of measuring equipment, our leadership in the field of innovation is unrivalled.

SIZE

Continuous growth,
a global player

COURAGE

Going its own way
to new standards

IMAGINATION

Innovation leader
in industrial metrology

VISION

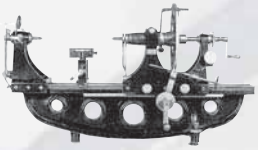
Seeing things from
a new perspective

We have the precise technology required for all conceivable requirements. Our range of products extends from calipers to customized high-end measuring systems. Our closeness to customers is one of the secrets of our innovative edge. The concepts we devise for the future of metrology are the direct result of dialog with production, research and development departments.

1870

Vernier calipers from Carl Mahr made of steel and brass, produced in 1868

1900



Length measuring machine from 1908. Reading on the vernier 1/10,000 mm

1930

Millimess precision probe, constructed in 1937. First indicating unit for reliably recording dimensional differences down to 1/1,000 mm

1960

Millitron from 1964, compact length measuring instrument that was given the nickname "the miner's lamp"

MORE ABOUT MAHR: HOW IT ALL STARTED

► | **The measure of all things since 1861.** The industrialization of the 19th century not only saw rapid growth in productivity, but also a call for precision in manufacturing machine parts. As early as 1861, Carl Mahr recognized the demand this would create for precision length measurement instruments. Founded in Esslingen on the Neckar River, his family business grew slowly but surely into a large-scale concern. Feinpruef was founded in 1936 in Göttingen,

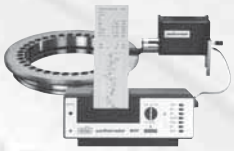
1980

MMQ 2, compact desktop formtester for evaluating roundness

1983

Maxμm,the world's first digital indicator, launched on the market by Federal Products Co. in 1983

1985



M4P, the first microprocessor-controlled roughness measuring instrument, with integrated printer for parameters and profiles

1997

MPC 502 from 1997, the first large multisensor measuring machine from WEGU-Messtechnik, which became Mahr Multisensor GmbH in 1999

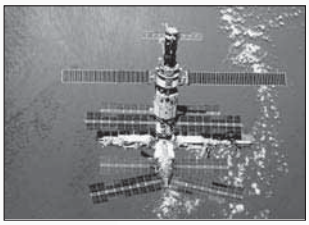
2006

HELIO-SCOPE, optical measuring unit for turned parts with matrix camera for direct use in the production area

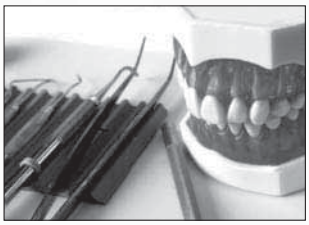
followed in 1973 by the acquisition of Dr. Ing. Perthen GmbH. WEGU-Messtechnik was added in 1999 along with Federal Products Co. in the USA. With OKM, Optische Koordinaten Messtechnik GmbH in Jena, the portfolio of precision length metrology was considerably expanded in 2004. In 2006, after the acquisition of Helios-Messtechnik, Mahr successfully integrated the shaft measuring instruments into its spectrum of products. Today Mahr is a global group of companies with a workforce well in excess of 1,500 employees.

AUTOMOTIVE

AEROSPACE



MEDICINE



ELECTRICAL ENGINEERING

MORE ABOUT MAHR: THE EXPERTISE

► | **Industrial metrology for all applications.** We are increasingly committed to developing solutions that provide our customers with a process-oriented spectrum of benefits for every conceivable application. Our ideas extend from initial research to final check. Many

MECHANICAL ENGINEERING

PLASTICS

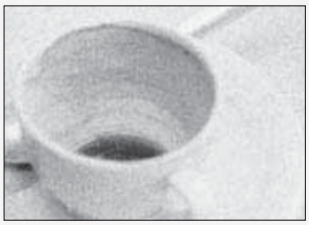
OPTICS

PRECISION ENGINEERING

of them are derived from direct dialog with our most loyal customers across a whole range of industries. A comprehensive global service network provides services for everything from procurement of spare parts to calibrations compliant with international calibration standards.

*Measuring **the future** is a tricky business*

***Accurate predictions** are something you shouldn't expect*



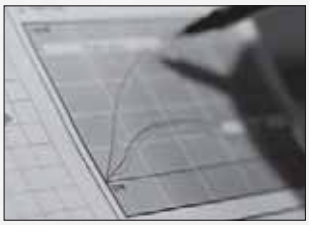
***People say** there are many ways to reach a goal*

*But **none** of them is entirely undisputed …*

MORE ABOUT MAHR: THE FUTURE

► | **Visions are becoming ever more quantifiable.** What challenges can we expect in the decades ahead? There's no shortage of speculation and theories. Nanotechnology requires workpieces that can be assembled precisely on a molecular level. The surfaces of artificial fibers must already be able to meet requirements that were considered impossible just a few years ago. The trend towards

*… **Prophecies** don't always come true*



***Forecasts** based on science also come with no guarantee*

*When it comes to the **future**, only one thing is certain:*

It's on its way

sustainability means that industry needs to constantly reinforce its commitment to accuracy in the production process. All of this combines to make dimensional metrology a key player in this process – and we are already busy contemplating new forms of measurement. What's important in this development is how you see your own future. So why not talk to us? And let us find the solution to your measurement needs.

GÖTTINGEN

Germany
Headquarters of the Mahr Group
Production site for Metrology Systems

Mahr GmbH Göttingen
Carl-Mahr-Str. 1
D-37073 Göttingen

ESSLINGEN

Germany
Precision Gages Division
Sales Europe and Asia

Mahr GmbH Esslingen
Reutlinger Straße 48
D-73728 Esslingen

WADGASSEN

Germany
The MarVision Product Group
Production and Sales

Mahr Multisensor GmbH
Wendelstraße 90
D-66787 Wadgassen

JENA

Germany
Production and Sales
Optical Coordinate Metrology

Mahr OKM GmbH
Carl-Zeiss-Promenade 10
D-07745 Jena

MORE ABOUT MAHR: A GLOBAL PLAYER

We're there wherever you need us. As globalization advances, our customers rightly expect that we at Mahr are also represented worldwide. We have therefore built a global network of production sites, branches and agencies with a view to ensuring

PROBOSTOV

Czech Republic
Production and Sales
Precision Gages

Mahr spol s.r.o.
Kpt. Jarose 552
CZ-41712 Probostov

PROVIDENCE

USA
Headquarters NAFTA
Production and Sales
Precision Gages and Metrology Systems

Mahr Federal Inc.
1144 Eddy Street,
Providence, RI 02905

SUZHOU

China
Production and Sales
Precision Gages

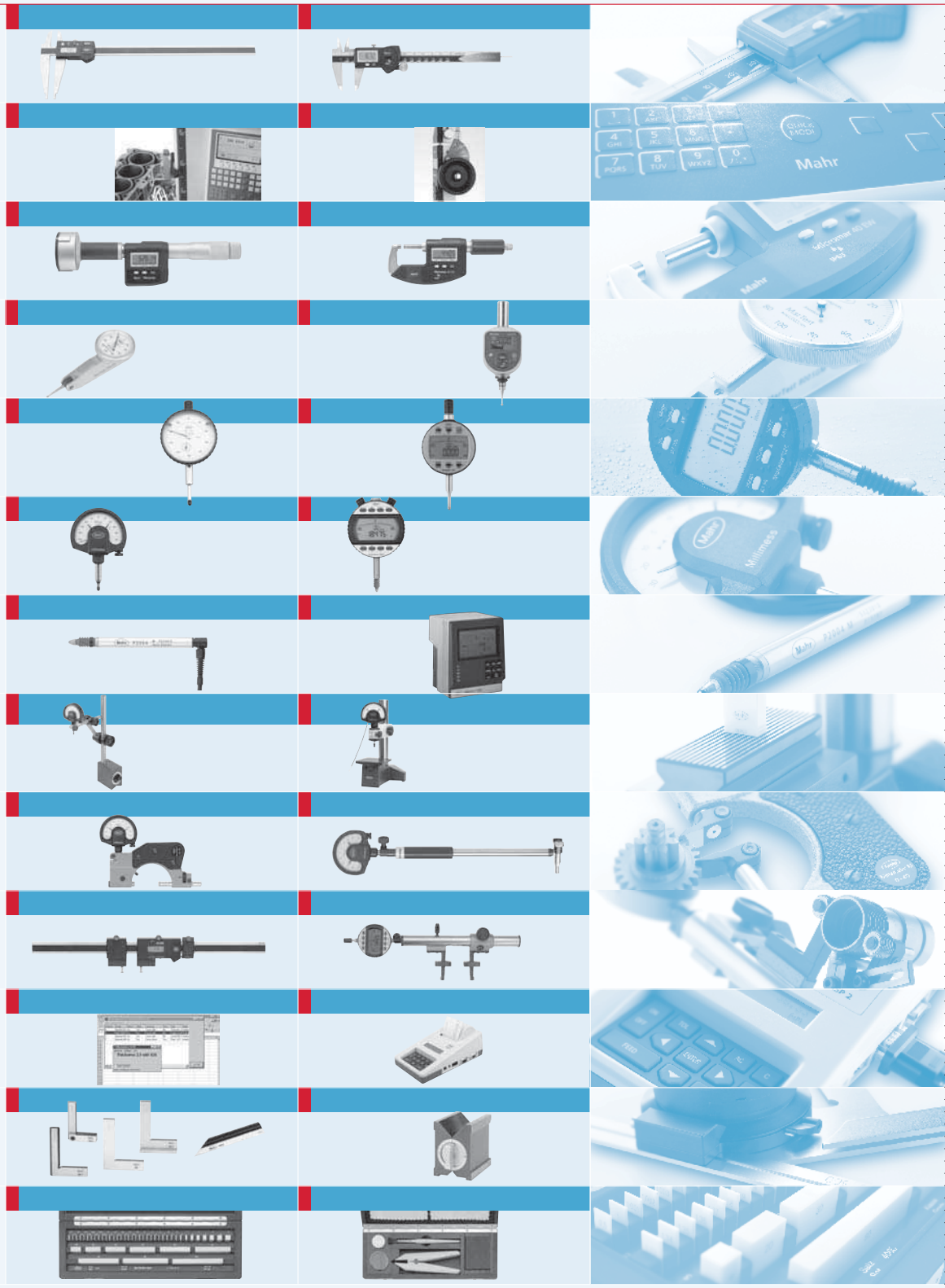
Mahr Precision Metrology
#399 Su Hong Road
Suzhou Industrial Park
Suzhou 21501, P.R.

MAHR IS REPRESENTED IN

Argentina, Australia, Austria, Belgium, Brazil, Bulgaria, Chile, China, CIS, Croatia, Czech Republic, Denmark, Egypt, Finland, France, Germany, Greece, Hong Kong, Hungary, India, Indonesia, Iran, Ireland, Israel, Italy, Japan, Korea, Malaysia, Mexico, Netherlands, Norway, Pakistan, Peru, Philippines, Poland, Portugal, Romania, Serbia, Singapore, Slovakia, Slovenia, South Africa, Spain, Sweden, Switzerland, Taiwan, Thailand, Tunisia, Turkey, UAE, United Kingdom, USA, Vietnam

the optimum level of quality service in every country throughout the world. You can find Mahr metrology contacts in Europe, North America, Latin America and Asia. We're there wherever and whenever you need us. Measure us by this pledge!

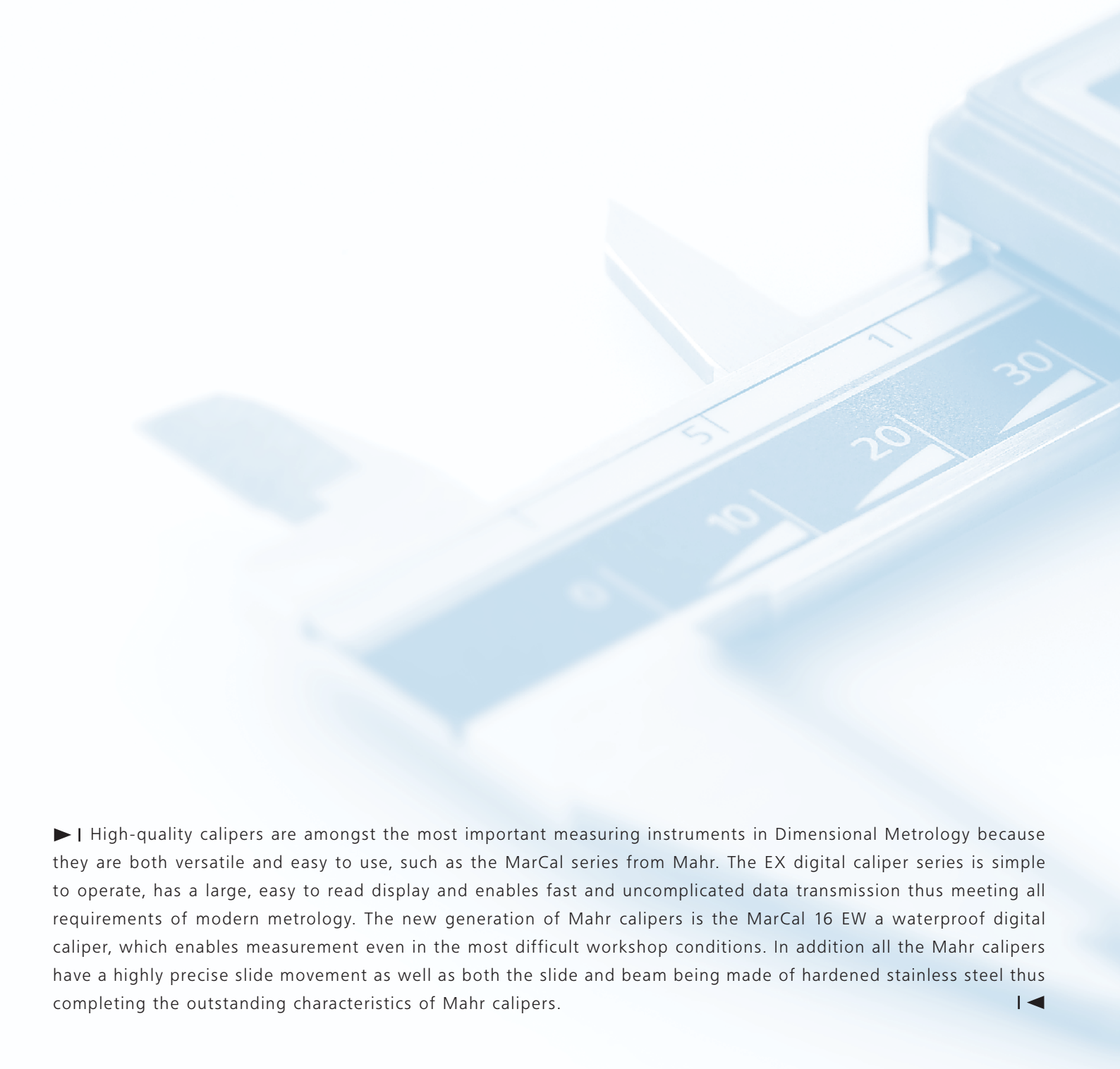
MAHR PRECISION GAGES



Contents

FOR SIMPLE MEASUREMENT THE RULE OF THUMB IS SUFFICIENT.
FOR THE REST THERE IS MARCAL.

The latest information on MARCAL products can be found on our website:
www.mahr.com, WebCode 203



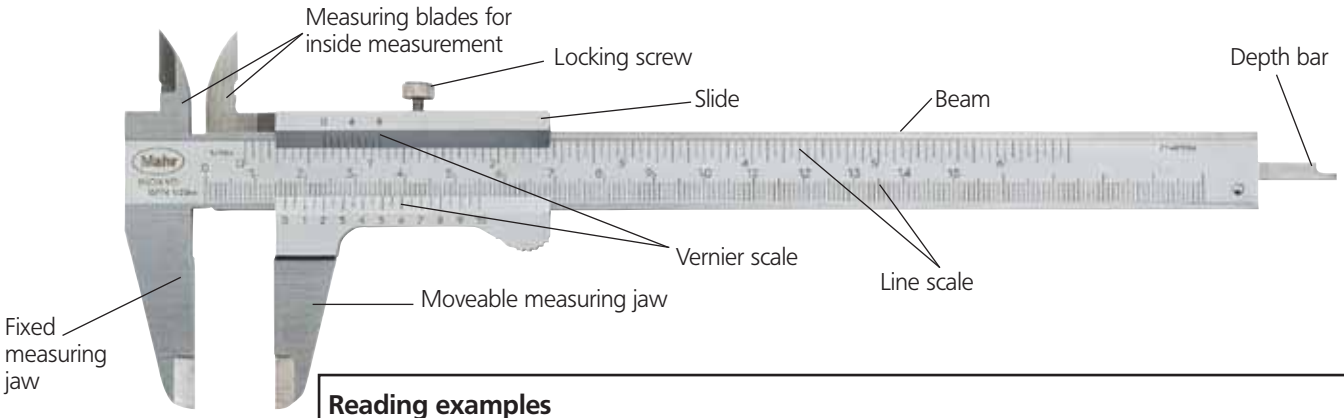
► | High-quality calipers are amongst the most important measuring instruments in Dimensional Metrology because they are both versatile and easy to use, such as the MarCal series from Mahr. The EX digital caliper series is simple to operate, has a large, easy to read display and enables fast and uncomplicated data transmission thus meeting all requirements of modern metrology. The new generation of Mahr calipers is the MarCal 16 EW a waterproof digital caliper, which enables measurement even in the most difficult workshop conditions. In addition all the Mahr calipers have a highly precise slide movement as well as both the slide and beam being made of hardened stainless steel thus completing the outstanding characteristics of Mahr calipers. | ◄

► | MarCal. Calipers

MarCal. Calipers

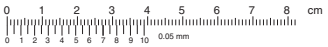
Overview

MarCal - Design Features

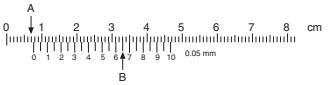


Reading examples

Metric (mm)



Readings: 0.05 mm



A:		7	mm
B:	(0.05 x 13)	0.65	mm
C:		7.65	mm

Metric (mm)

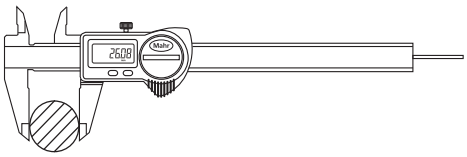
Readings: 0.02 mm

A:		8	mm
B:	(0.02 x 32)	0.64	mm
C:		8.64	mm

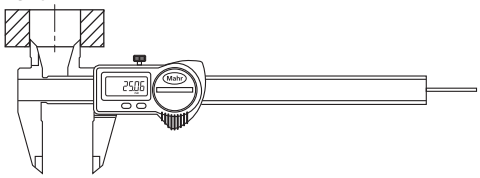
MarCal - Measuring Possibilities

With calipers from the 16 series (e.g. 16 EW, 16 U, 16 FN) the following 4 possible measurements can be conducted:

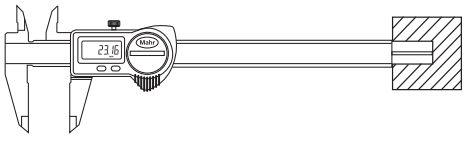
a) Outside measurement



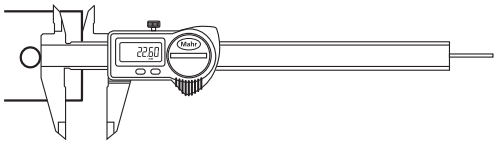
b) Inside measurement



c) Depth measurement



d) Step (Distance) measurement



Error limits *G* according to DIN 862

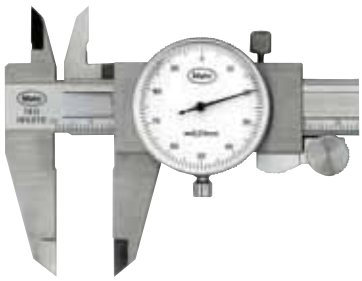
Measuring length	**Error limits** *G* in µm **Readings**		**Resolution**
l	0.1 and 0.05	0.02	0.01
50	50	20	20
100			
200		30	30
300			
400	60		
500	70		
600	80		
700	90	40	40
800	100		
900	110		
1000	120		
1200	140	50	–
1400	160	60	
1600	180		
1800	200		
2000	220		

MarCal - Types of Calipers

Mahr - Calipers are available with the following means of indication:

a) Digital display

b) Circular scale



c) Vernier scale (graduated)

Function keys of Digital Calipers

Functions		Type					
		16 EW 16 EX*	16 EX** 16 EXC	30 EW	16 EXV 18 EX 30 EX	30 EXN	18 ESA 30 ESD 31 ES 32 ES
ON/OFF	Switch On/Off	●	●	●	●	●	●
0	Set display to zero	●	●	●	●	●	●
mm/in	Switch between mm/inch	●	●	●	●	●	●
PR	Enter a numerical value			●	●	●	
+/-	Change measuring direction					●	
Reference Lock	Secure the zero position	●		●			
Hold	Displayed value will be stored						●
Data	Data transmission USB		●		●	●	
	Digimatic		●		●	●	
	RS232C		●		●	●	●***

* *without data output* ** *with data output* *** *only 18 ESA, 300 mm*

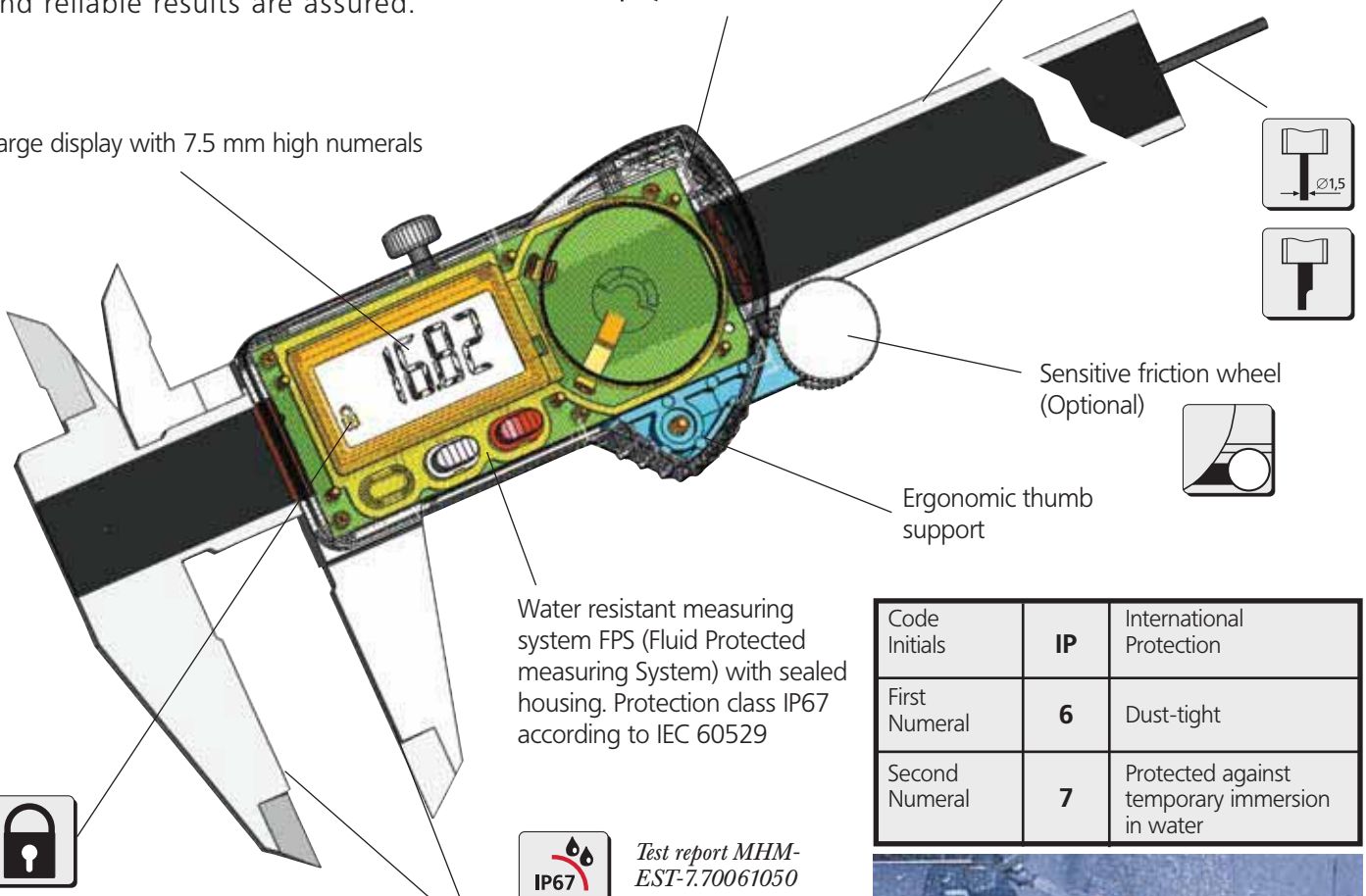
MarCal. Calipers

►| The water proof digital caliper **MarCal** 16 EW, is now available with the protection class IP67. Even in the most difficult workshop conditions, precise and reliable results are assured. |◄

Both the housing and operating buttons are made from Ultradur®, which has an excellent chemical resistance

Lapped guide ways allow smooth and even movement

Large display with 7.5 mm high numerals



Sensitive friction wheel (Optional)

Ergonomic thumb support

Water resistant measuring system FPS (Fluid Protected measuring System) with sealed housing. Protection class IP67 according to IEC 60529

Code Initials	IP	International Protection
First Numeral	6	Dust-tight
Second Numeral	7	Protected against temporary immersion in water

IP67 TÜV-geprüft

Test report MHM-EST-7.70061050

Reference Lock Function

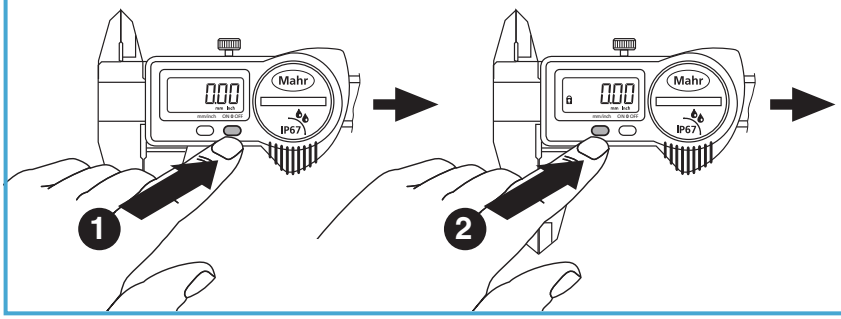
Lapped measuring faces for accurate measurement

LEADFREE RoHS conform components

Reference Lock Function

1. First set to zero

2. Lock-Function is activated



Advantages of the Reference Lock Function

- **Zero position is secured**
- **Operating error is prevented**
- **Caliper is always ready for measurement**

Digital Caliper 16 EW according to protection class IP67

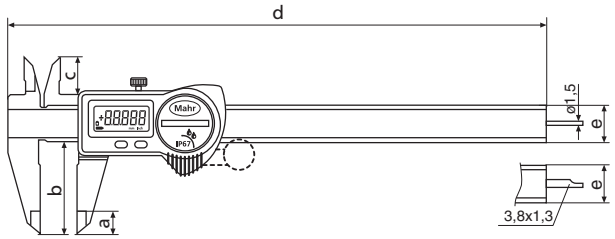
Features

Functions:
ON/OFF
0 (Zero setting)
mm/inch
Reference Lock
Unlock

- Inductive waterproof measuring system FPS (Fluid Protected measuring System) with Reference Lock Function
- Dirt wipers are integrated in the slide
- Life of the battery ca. 2 years
- Max measuring speed 1.5 m/sec (60"/sec)
- High contrast Liquid Crystal Display with 7.5 mm high digits
- Lapped guide way
- Slide and beam made of hardened stainless steel
- Measuring blades for inside measurement
- Step measuring function
- Locking screw
- Supplied with: Case, battery, operating instructions

Technical Data

Measuring range mm	*(inch)*	Resolution mm/*inch*	Error limit *G* mm/*inch*	DIN 862	Depth rod		Friction wheel	Order no.
150	***(6")***	0.01/ ***.0005"***	0.03/ ***.0015"***	●	●			**4102900**
150	***(6")***	0.01/ ***.0005"***	0.03/ ***.0015"***	●	●		●	**4102901**
150	***(6")***	0.01/ ***.0005"***	0.03/ ***.0015"***	●		●		**4102911**
150	***(6")***	0.01/ ***.0005"***	0.03/ ***.0015"***	●		●	●	**4102912**
200	***(8")***	0.01/ ***.0005"***	0.03/ ***.0015"***	●		●		**4102902**
200	***(8")***	0.01/ ***.0005"***	0.03/ ***.0015"***	●		●	●	**4102903**
300	***(12")***	0.01/ ***.0005"***	0.04/ ***.0016"***					**4102906**
300	***(12")***	0.01/ ***.0005"***	0.04/ ***.0016"***				●	**4102907**



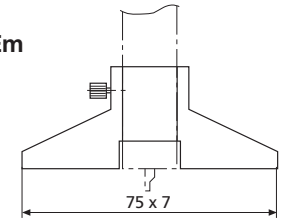
Dimensions

mm/ inch	a	b	c	d	e
150/ 6	10/ .4	40/ 1.6	16/ .6	233/ 9.2	16 x 3/ .6 x .12
200/ 8	10/ .4	40/ 1.6	16/ .6	285/ 11.2	16 x 3/ .6 x .12
300/12	14/ .5	64/ 2.5	18/ .7	388/ 15.2	16 x 4/ .6 x .15

Accessories

		Order no.
Depth Measuring Bridge	**16 Em**	**4102020**
Battery 3V, Type CR 2032		**4102520**

16 Em

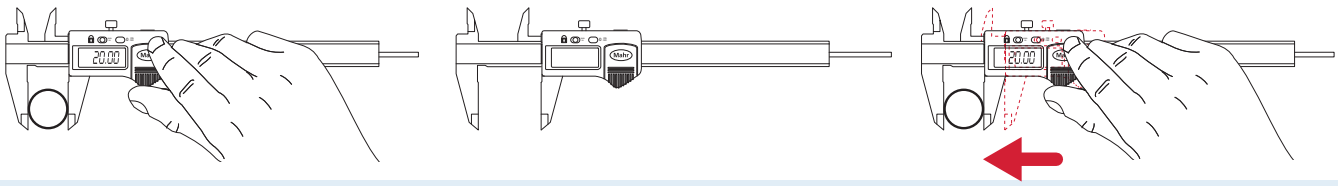


Digital Caliper 16 EX without data output

DIN 862

AUTO-ON Function

1. Measure
2. AUTO OFF (2 hours.)
3. AUTO ON



Advantages of the AUTO-ON function
- **Through movement of the slide the caliper is ready to measure**
- **The reference to the zero point is not lost**

Features

Functions:
ON/OFF
RESET (Zero setting)
mm/inch
Reference Lock/Unlock
- AUTO OFF/ON

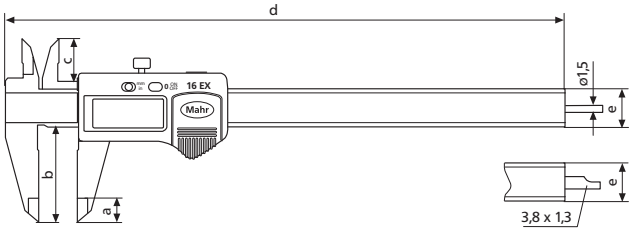
- Capacitive measuring system with an energy saving function, life of the battery ca. 2 years
- Dirt wipers are integrated in the slide
- Max measuring speed 1.5 m/sec (60"/sec)
- High contrast Liquid Crystal Display with 8 mm high digits
- Slide and beam made of hardened stainless steel
- Measuring blades for inside measurement
- Step measuring function
- Locking screw
- Supplied with: Case, battery, operating instructions

Technical Data

Measuring range mm	*(inch)*	Resolution mm/*inch*	Error limit *G* mm/*inch*	DIN 862	Depth rod ⌀1,5	Depth rod	Order no.
150	***(6")***	0.01/ ***.0005"***	0.03/ ***.0015"***	●	●		**4102201**
150	***(6")***	0.01/ ***.0005"***	0.03/ ***.0015"***	●		●	**4102204**

Dimensions

mm/ inch	a	b	c	d	e
150/ 6	10/ .4	40/ 1.6	16/ .6	233/ 9.2	16 x 3/ .6 x .12



Digital Calipers 16 EX / 16 EXC with data output

16 EXC
with ceramic measuring faces

Features

Functions:
ON/OFF
RESET (Zero setting)
mm/inch
DATA (Data transmission via connection cable)

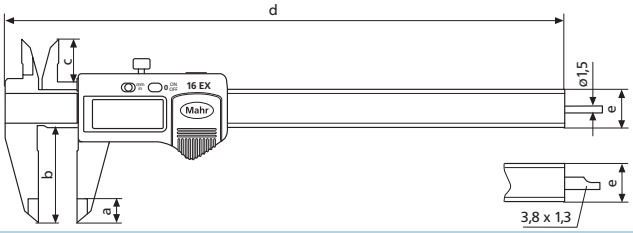
- Patented capacitive measuring system with an energy saving function, life of the battery approx. 2 years
- Dirt wipers are integrated in the slide
- Max measuring speed 1.5 m/sec (60"/sec)
- High contrast Liquid Crystal Display with 7.5 mm high digits
- Slide and beam made of hardened stainless steel
- Measuring blades for inside measurement
- Step measuring function
- Locking screw
- Supplied with: Case, battery, operating instructions

Technical Data

	Measuring range mm	*(inch)*	Resolution mm/*inch*	Error limit *G* mm/*inch*	DIN 862	Depth rod		Data output	Order no.
16 EX	150	***(6")***	0.01/ ***.0005"***	0.03/ ***.0015"***	●	●		●	**4102400**
16 EX	150	***(6")***	0.01/ ***.0005"***	0.03/ ***.0015"***	●		●	●	**4102403**
16 EX	200	***(8")***	0.01/ ***.0005"***	0.03/ ***.0015"***	●		●	●	**4102402**
16 EX	300	***(12")***	0.01/ ***.0005"***	0.04/ ***.0016"***				●	**4102360**
16 EXC	150	***(6")***	0.01/ ***.0005"***	0.03/ ***.0015"***	●	●		●	**4102824**

Dimensions

mm/ inch	a	b	c	d	e
150/ 6	10/ .4	40/ 1.6	16/ .6	233/ 9.2	16 x 3/ .6 x .12
200/ 8	10/ .4	40/ 1.6	16/ .6	285/ 11.2	16 x 3/ .6 x .12
300/ 12	14/ .5	64/ 2.5	18/ .7	388/ 15.2	16 x 4/ .6 x .15

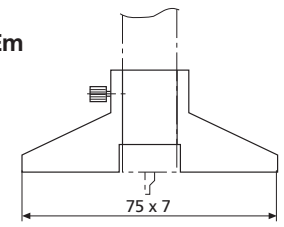


Accessories

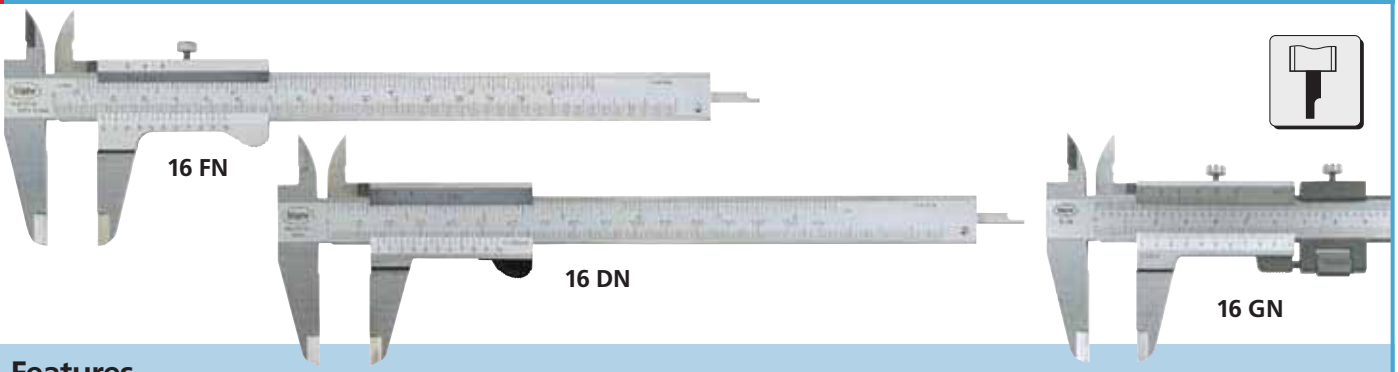
		Order no.
Depth Measuring Bridge	**16 Em**	**4102020**
Battery 3V, Type CR 2032		**4102520**
Data Connection Cable USB (2 m)	**16 EXu**	**4102357**
Data Connection Cable Opto RS232C (2 m), with SUB-D jack 9-pin	**16 EXr**	**4102410**
Data Connection Cable Digimatic (2 m), Flat plug 10-pin	**16 EXd**	**4102411**

Accessories for Data Processing see Chapter 11

16 Em



Vernier Calipers 16 N, 16 FN, 16 GN, 16 DN with scale reading



Features

- Vernier and main scale have a satin chrome finish for glare free reading
- Slide and beam made of hardened stainless steel
- Raised guide ways for the protection of the scale
- Measuring blades for inside measurement
- Step measuring function
- Depth bar
- Locking screw or thumb clamp
- Supplied with: Plastic case and thread table

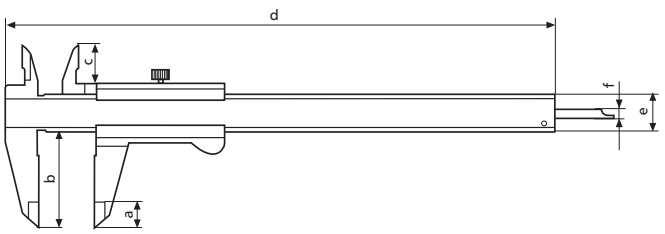
Technical Data

	Measuring range mm	*(inch)*	Readings upper *inch*	lower mm	Error limit *G* mm/*inch* DIN 862	Order no. without fine adjustment	Order no. with fine adjustment	Remarks
16 FN	150			0.05	0.05 ●	**4100420**		Locking screw above
16 FN	150	***(6")***	***1/128"***	0.05	0.05/ ***.002"*** ●	**4100400**		Locking screw above
16 DN	150	***(6")***	***1/128"***	0.05	0.05/ ***.002"*** ●	**4100600**		Thumb clamp
16 N	150	***(6")***	***1/128"***	0.05	0.05/ ***.002"*** ●	**4100500**		Locking screw below
16 GN	150			0.02	0.04	**4100650**	**4100660***	
16 GN	150	***(6")***	***.001"***	0.02	0.04/ ***.0016"***	**4100670**	**4100680***	
16 FN	200			0.05	0.05 ●	**4100421**		
16 FN	200	***(8")***	***1/128"***	0.05	0.05/ ***.002"*** ●	**4100401**		
16 GN	200			0.02	0.05	**4100651**	**4100661***	Locking screw above
16 GN	200	***(8")***	***.001"***	0.02	0.05/ ***.002"***	**4100671**	**4100681***	
16 FN	300			0.05	0.05 ●	**4100422**		
16 FN	300	***(12")***	***1/128"***	0.05	0.05/ ***.002"*** ●	**4100402**		
16 GN	300			0.02	0.05	**4100652**	**4100662***	
16 GN	300	***(12")***	***.001"***	0.02	0.05/ ***.002"***	**4100672**	**4100682***	

** Calipers with fine adjustment the measuring range is shortened by 20 mm / 1"*

Dimensions

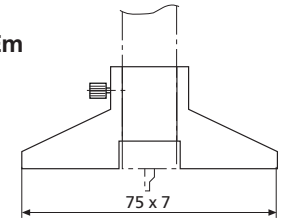
mm/inch	a	b	c	d	e	f
150/ 6	10/.4	40/1.5	16/.6	228/9	16 x 3/.6 x .12	3.8/.150
200/ 8	14/.5	50/2.0	19/.75	290/11	17 x 3.5/.6 x .14	3.8/.150
300/12	16/.6	64/2.5	23/.9	404/16	20 x 4/.8 x .15	4.8/.189



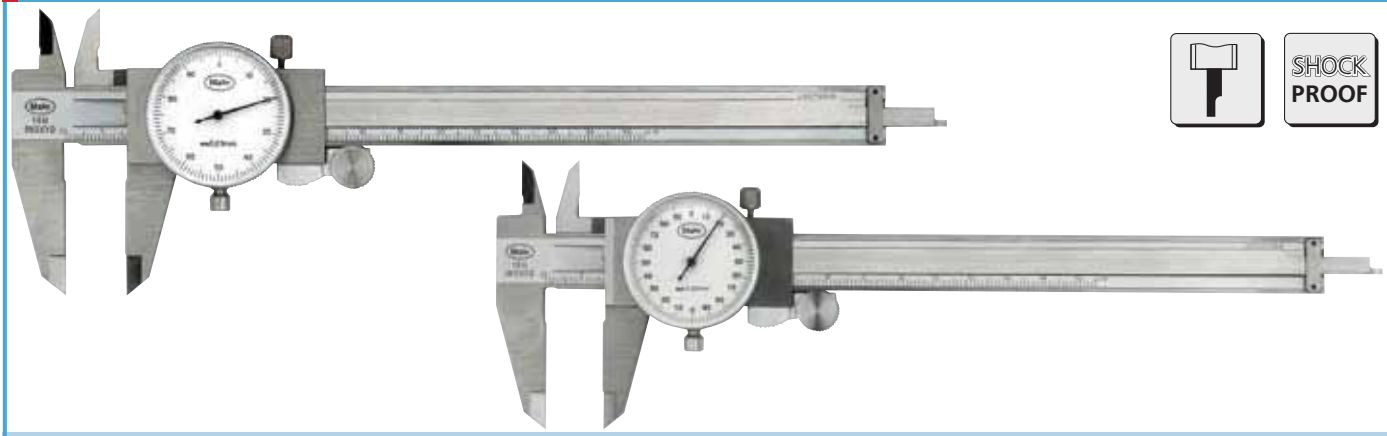
Accessories

		Order no.
Depth Measuring Bridge	**16 Em**	**4102020**
Leather case for meas. range 150 mm		**4100302**

16 Em



Vernier Caliper 16 U with circular scale



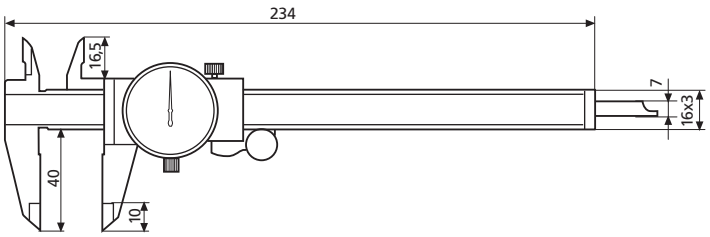
SHOCK PROOF

Features

- Large, high contrast dial face
- Satin chrome finished line scale
- Shockproof movement
- Zero setting through rotating the dial face and locking screw
- Covered rack
- Slide and beam made of hardened stainless steel
- Measuring blades for inside measurement
- Step measuring function
- Locking screw
- Depth bar
- Supplied with: Plastic case
- Inch model is supplied with a black dial face

Technical Data

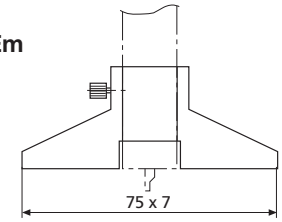
Measuring range	Readings	Diameter of circular scale	1 Pointer-revolution	Dial face color	Error limit *G*	DIN 862	Order no.
150 mm	0.01 mm	34 mm	1 mm	white	0.03 mm	●	**4107005**
150 mm	0.02 mm	34 mm	2 mm	white	0.03 mm	●	**4107107**
6"	***.001"***	***1.3"***	***.100"***	***black***	***.0012"***		**4107900**



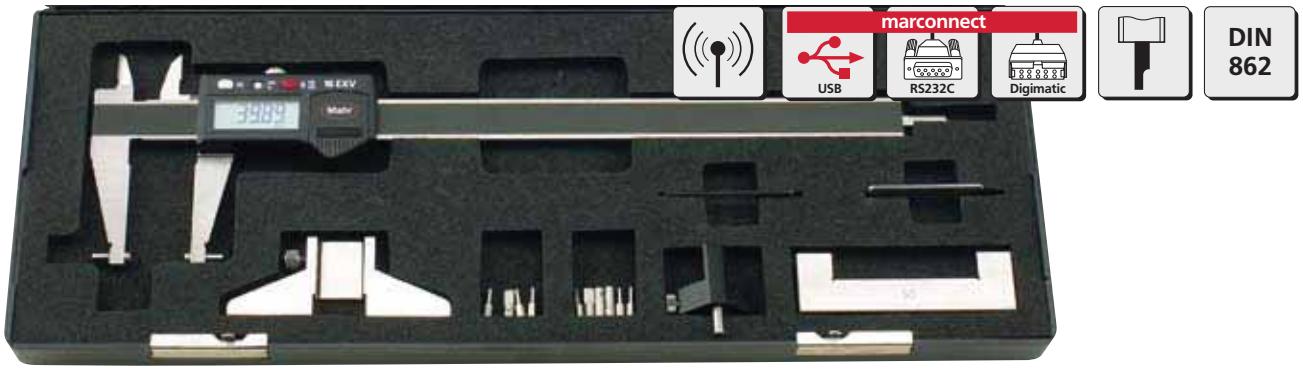
Accessories

		Order no.
Depth Measuring Bridge	**16 Em**	**4102020**
Leather case for meas. range 150 mm		**4100302**

16 Em



Universal Caliper 16 EXV in set



Features

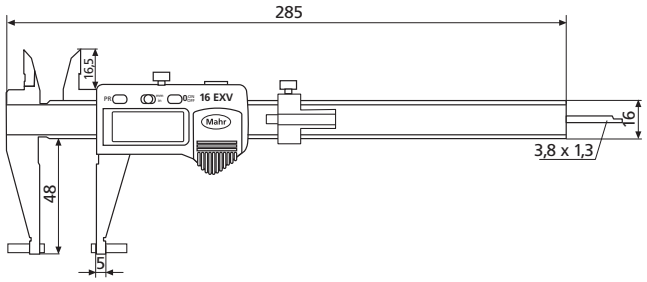
- Applicable as a standard caliper (fourfold measuring possibilities). When used in conjunction with the standard accessories it is also possible to measure recesses, grooves, etc. With additional accessories threads, bores, serrations etc. can be measured.

Functions:
- ON/OFF
  RESET (Zero setting)
  DATA (Data transmission via connection cable)
  PRESET (for entering a numerical value)
  mm/inch
- Patented capacitive measuring system with an energy saving function, life of the battery approx. 2 years
- Dirt wipers are integrated in the slide
- MarConnect data output, choose alternatively
  USB
  OPTO RS232C
  Digimatic
- High contrast Liquid Crystal Display with 7.5 mm high digits
- Slide and beam made of hardened stainless steel
- Supplied with:
  Plastic case, standard accessories, battery, operating instructions

Technical Data

Measuring range* mm	*(inch)*	Resolution mm/*inch*	Error limit *G* mm/*inch*	Order no.
200	***(8")***	0.01/ ***.0005"***	0.03/ ***.0015"***	**4118800****
200	***(8")***	0.01/ ***.0005"***	0.03/ ***.0015"***	**4118840*****

* *with accessories the measuring range may change*
** *with standard accessories*
*** *without accessories*

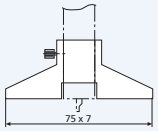
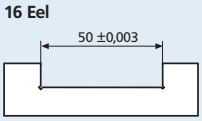
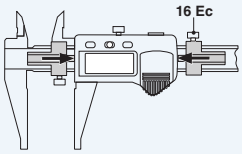
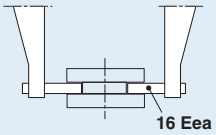
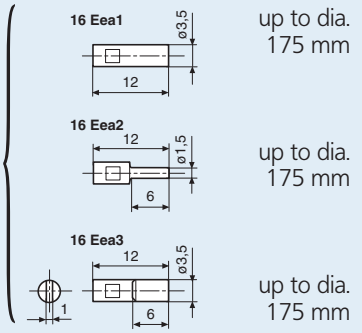
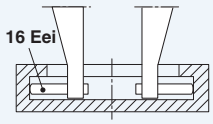
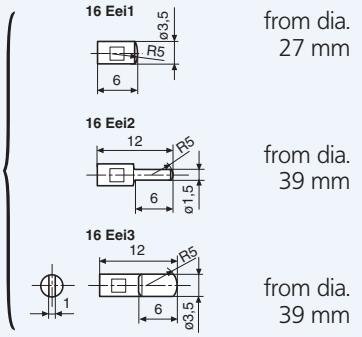


Additional Accessories

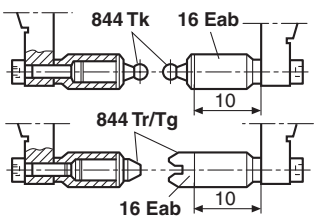
Catalog no.	Description	Remarks	Required quantity	Order no.
16 Eei 4	**Anvils** for inside measurement	from dia. 8.5 mm	2	**4118816**
16 Eab	**Mounting Attachment** for 844Tg/Tr and 844 Tk		2	**4118819**
844 Tk	**Ball Anvils**	**see page 10-10**	2	
844 Tg/Tr	**Thread Anvils**	**see page 10-14/10-12**	1 + 1	
16 EXu	**Data Connection Cable** USB			**4102357**
16 EXr	**Data Connection Cable** Opto RS232C			**4102410**
16 EXd	**Data Connection Cable** Digimatic			**4102411**
	Battery 3V, Type CR 2032			**4102520**

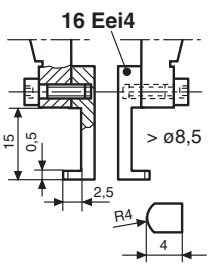
Universal Caliper 16 EXV in set

Standard Accessories are included in the set

Catalog no.	Description	Order no.	Required quantity	
16 Em	**Depth Measuring Bridge**	**4102020**	1	
16 Eel	**Setting Gage** for inside measurement	**4118817**	1	
16 Ec	**Measuring Force Device**	**4118818**	1	
16 Eea 1	**Anvils** for outside measurements	**4118810**	2	  up to dia. 175 mm
16 Eea 2	**Anvils** for outside measurements	**4118811**	2	up to dia. 175 mm
16 Eea 3	**Anvils** for outside measurements	**4118812**	2	up to dia. 175 mm
16 Eei 1	**Anvils** for inside measurement	**4118813**	2	  from dia. 27 mm
16 Eei 2	**Anvils** for inside measurement	**4118814**	2	from dia. 39 mm
16 Eei 3	**Anvils** for inside measurement	**4118815**	2	from dia. 39 mm
	Screws M2 x 8	**4879602**	2	

Additional Accessories





For further Universal-Measuring Instruments please refer to Chapter 10

Digital Caliper 18 EX

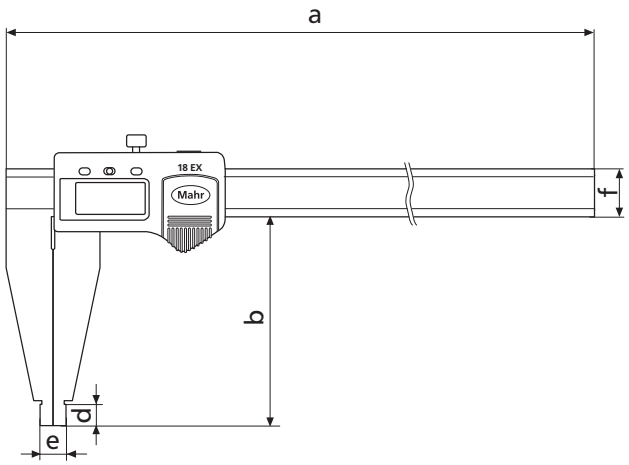
Features

Functions:
ON/OFF
RESET (Zero setting)
mm/inch
PRESET (for entering a numerical value)
DATA (Data transmission via connection cable)

- Patented capacitive measuring system with an energy saving function, life of the battery approx. 2 years
- Dirt wipers are integrated in the slide
- Max measuring speed 1.5 m/sec (60"/sec)
- MarConnect data output, choose alternatively
  USB
  OPTO RS232C
  Digimatic
- High contrast Liquid Crystal Display with 7.5 mm / 12 mm high digits
- Slide and beam made of hardened stainless steel
- Rounded measuring faces for inside measurement
- Locking screw
- Supplied with:
  Case, battery, operating instructions

Technical Data

Measuring range mm	*(inch)*	Resolution mm/*inch*	Error limit *G* mm/*inch*	Order no.
300	***(12")***	0.01/ ***.0005"***	0.04/ ***.0015"***	**4112701**
600	***(24")***	0.01/ ***.0005"***	0.05/ ***.0020"***	**4112711**
1000	***(40")***	0.01/ ***.0005"***	0.07/ ***.0025"***	**4112721**



Accessories

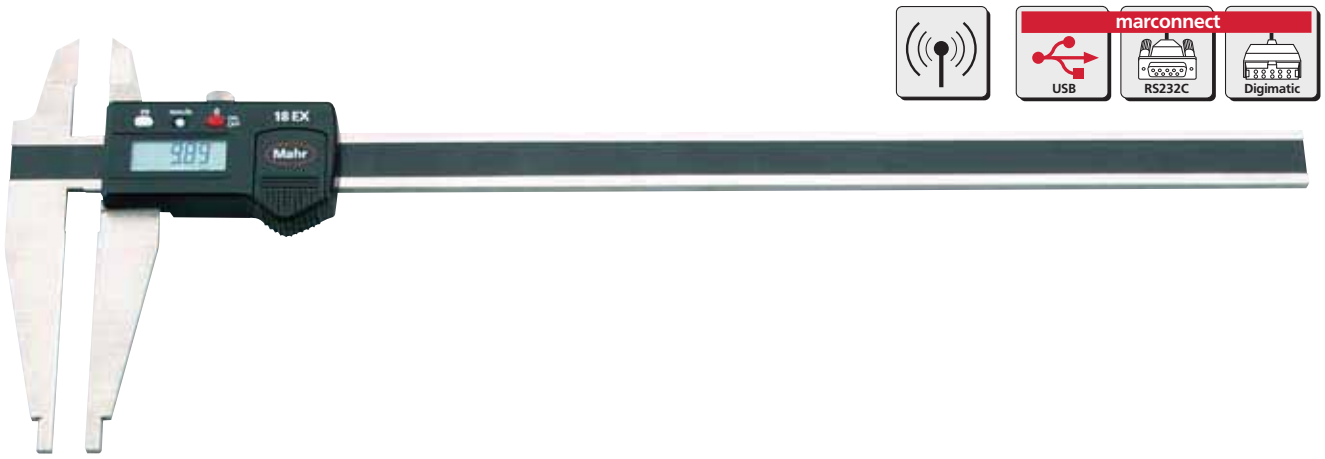
		Order no.
Battery 3V, Type CR 2032		**4102520**
Data Connection Cable USB (2 m)	**16 EXu**	**4102357**
Data Connection Cable Opto RS232C (2 m), with SUB-D jack 9-pin	**16 EXr**	**4102410**
Data Connection Cable Digimatic (2 m), Flat plug 10-pin	**16 EXd**	**4102411**

Accessories for Data Processing see Chapter 11

Dimensions

mm/inch	a	b	d	e	f
300/ 12	410/ 16.4	90/ 3.5	10/ .4	10/ .4	19.6 x 4.5/ .70 x .18
600/ 24	750/ 29	125/ 5.0	20/ .8	20/ .8	24.6 x 5.5/ .96 x .22
1000/ 40	1165/ 45	150/ 6.0	20/ .8	20/ .8	29.6 x 6.0/ 1.1 x .25

Digital Caliper 18 EX with measuring blades for outside measurement



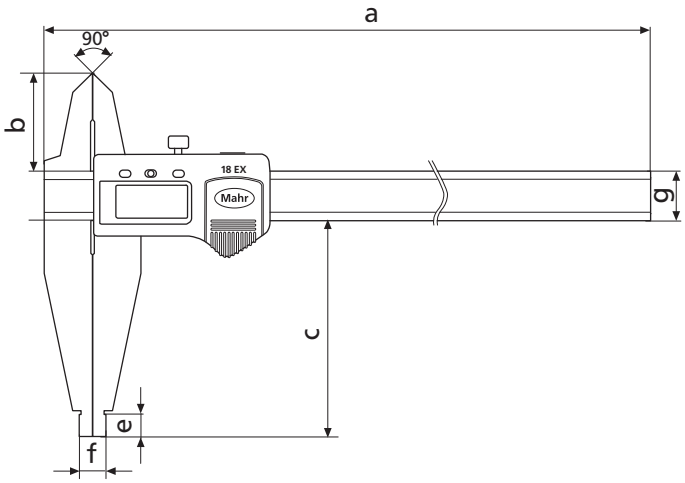
Features

Functions:
ON/OFF
RESET (Zero setting)
mm/inch
PRESET (for entering a numerical value)
DATA (Data transmission via connection cable)

- Patented capacitive measuring system with an energy saving function, life of the battery approx. 2 years
- Dirt wipers are integrated in the slide
- Max measuring speed 1.5 m/sec (60"/sec)
- MarConnect data output, choose alternatively
  USB
  OPTO RS232C
  Digimatic
- High contrast Liquid Crystal Display with 7.5 mm / 12 mm high digits
- Slide and beam made of hardened stainless steel
- Rounded measuring faces for inside measurement
- Locking screw
- Supplied with:
  Case, battery, operating instructions

Technical Data

Measuring range mm	*(inch)*	Resolution mm/*inch*	Error limit *G* mm/*inch*	Order no.
300	***(12")***	0.01/ ***.0005"***	0.04/ ***.0015"***	**4112700**
600	***(24")***	0.01/ ***.0005"***	0.05/ ***.0020"***	**4112710**
1000	***(40")***	0.01/ ***.0005"***	0.07/ ***.0025"***	**4112720**



Accessories

		Order no.
Battery 3V, Type CR 2032		**4102520**
Data Connection Cable USB (2 m)	**16 EXu**	**4102357**
Data Connection Cable Opto RS232C (2 m), with SUB-D jack 9-pin	**16 EXr**	**4102410**
Data Connection Cable Digimatic (2 m), Flat plug 10-pin	**16 EXd**	**4102411**

Accessories for Data Processing see Chapter 11

Dimensions

mm/inch	a	b	c	e	f	g
300/ 12	410/ 16.4	40/ 1.6	90/ 3.5	10/ .4	10/ .4	19.6 x 4.5/ .70 x .18
600/ 24	750/ 29	55/ 2.2	125/ 5.0	20/ .8	20/ .8	24.6 x 5.5/ .96 x .22
1000/ 40	1165/ 45	60/ 2.4	150/ 6.0	20/ .8	20/ .8	29.6 x 6.0/ 1.1 x .25

Digital Caliper 18 ESA lightweight construction

Features

Functions:
ON/OFF
RESET (Zero setting)
mm/inch
HOLD (storage of measured values)
DATA (Data transmission)

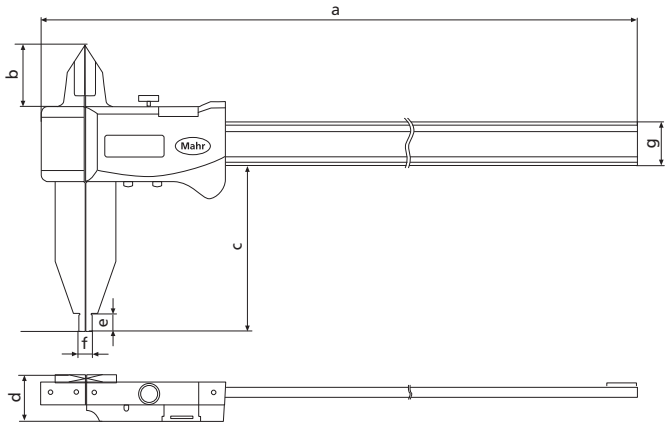
- Dirt wipers are integrated in the slide
- Max measuring speed 1.5 m/sec (60"/sec)
- Data output: Opto RS232C (only 300 mm version)
- High contrast Liquid Crystal Display with 6 mm or 10.5 mm high digits
- To reduce the overall weight the slide and beam are made from aluminum and are coated with a hard anodized surface coating (1100HV)
- Measuring faces are made of hardened stainless steel
- Prisma guide ways for a more smooth and even movement
- Measuring blades for outside measurement
- Rounded measuring faces for inside measurement
- Locking screw
- Supplied with: Case

Technical Data

Measuring range mm	*(inch)*	Resolution mm/*inch*	Error limit *G* mm/*inch*	RS232C	Weight kg	Order no.
300	***(12")***	0.01/ ***.0005"***	0.03/ ***.0015"***	•	0.5	**4112620**
500	***(20")***	0.01/ ***.0005"***	0.03/ ***.0015"***	-	1.4	**4112621**
800	***(32")***	0.01/ ***.0005"***	0.07/ ***.0025"***	-	1.6	**4112622**
1000	***(40")***	0.01/ ***.0005"***	0.08/ ***.0032"***	-	1.8	**4112623**

Dimensions

mm	a	b	c	d	e	f	g
300	450.5/17.7	33/1.3	90/3.5	24.5/0.9	10/ .4	10/.4	25/0.9
500	726/28.6	42/1.7	150/6.0	33.5/1.3	15/0.5	20/.8	31.9/1.3
800	1006/39.6	42/1.7	150/6.0	33.5/1.3	15/0.5	20/.8	31.9/1.3
1000	1026/40.3	42/1.7	150/6.0	33.5/1.3	15/0.5	20/.8	31.9/1.3



Accessories

		Order no.
Battery 3V, Type CR 2032		**4102520**
Data Connection Cable Opto RS232C (2 m), with SUB-D jack 9-pin	**16 ESv**	**4102510**

Accessories for Data Processing see Chapter 11

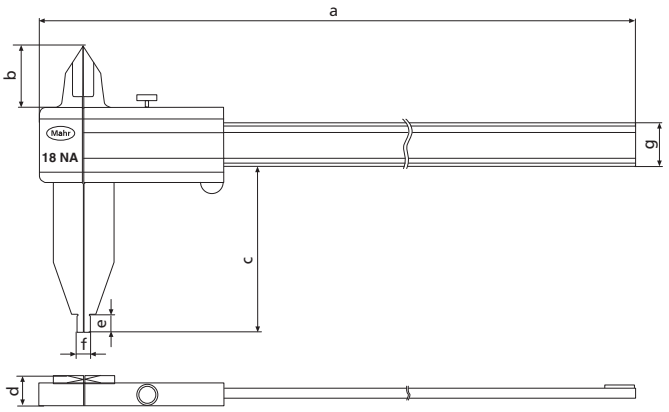
Caliper 18 NA lightweight construction

Features

- To reduce the overall weight the slide and beam are made from aluminum and are coated with a hard anodized surface coating (1100HV)
- Measuring faces are made of hardened stainless steel
- Prisma guide ways for a more smooth and even movement
- Measuring blades for outside measurement
- Rounded measuring faces for inside measurement
- Locking screw
- Supplied with:
  Case, over 1500 mm supplied in a cardboard box

Technical Data

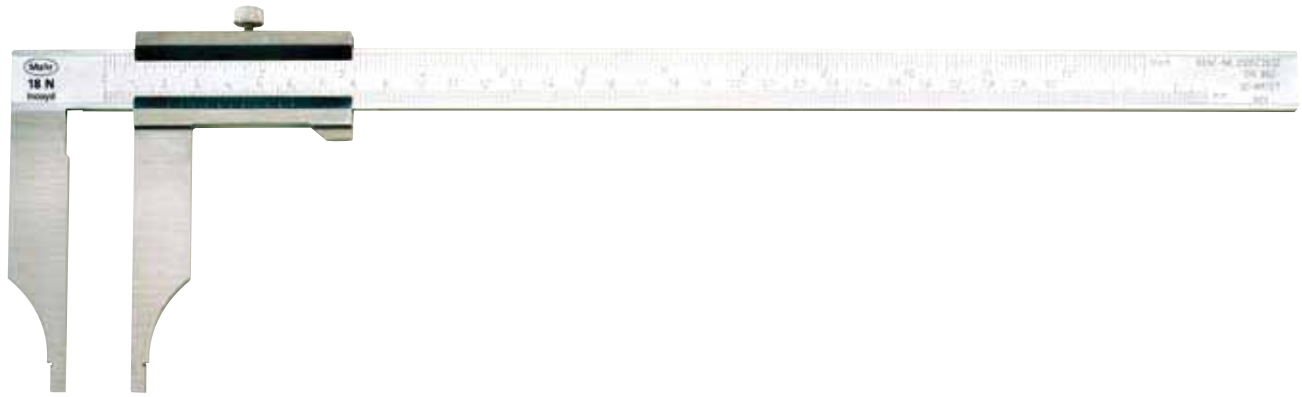
Measuring range mm	Readings upper mm	Readings lower mm	Error limit G mm	Weight kg	Order no.
300	0.05	0.02	0.03	0.5	**4112300**
500	0.05	0.02	0.03	1.4	**4112301**
800	0.05	0.02	0.07	1.6	**4112302**
1000	0.05	0.02	0.08	1.75	**4112303**
1500	0.05	0.02	0.16	2.1	**4112304**
2000	0.05	0.02	0.16	2.5	**4112305**



Dimensions

mm	a	b	c	d	e	f	g
300	450.5	33	90	17.5	10	10	25
500	726	42	150	20.7	15	20	31.9
800	1026	42	150	20.7	15	20	31.9
1000	1226	42	150	20.7	15	20	31.9
1500	1760	85	200	25	15	30	48
2000	2260	85	200	25	15	30	48

Vernier Caliper 18 N

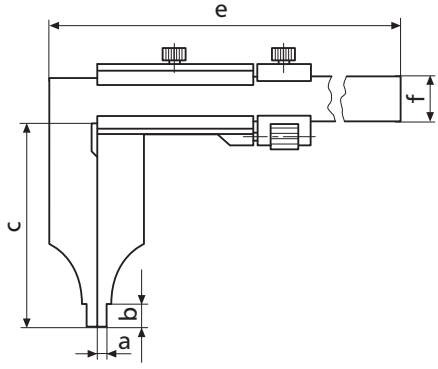


Features

- Vernier and main scale have a satin chrome finish for glare free reading
- Slide and beam made of hardened stainless steel
- Raised guide ways for the protection of the scale
- Rounded measuring faces for inside measurement
- Locking screw
- Supplied with: up to 1000 mm delivered with a case, over 1000 mm individually packed

Technical Data

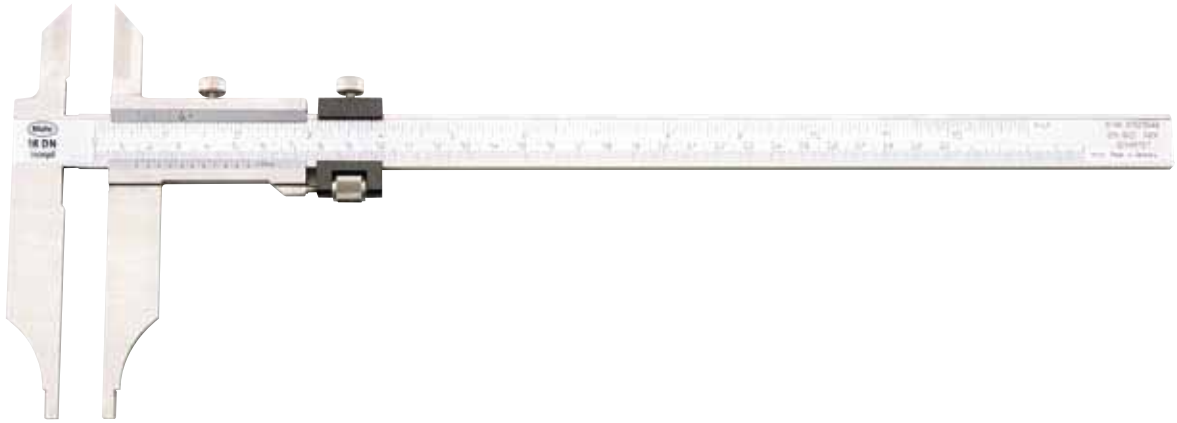
Measuring range mm	***(inch)***	**Resolution upper**	**lower**	**Error limit** *G* mm	**Order no.** without fine adjustment	**Order no.** with fine adjustment
200		0.02 mm	0.02 mm	0.05	**4112200**	
300		0.02 mm	0.02 mm	0.05	**4112201**	**4112220**
300	***(12")***	***.001"***	0.02 mm	0.05		**4112230**
500		0.02 mm	0.02 mm	0.06		**4112221**
500	***(20")***	***.001"***	0.02 mm	0.06		**4112231**
500		0.05 mm	0.05 mm	0.07	**4112210**	
800		0.02 mm	0.02 mm	0.08		**4112222**
800	***(32")***	***.001"***	0.02 mm	0.08		**4112232**
800		0.05 mm	0.05 mm	0.10	**4112211**	
1000		0.02 mm	0.02 mm	0.08		**4112223**
1000	***(40")***	***.001"***	0.02 mm	0.08		**4112233**
1000		0.05 mm	0.05 mm	0.12	**4112212**	
1500		0.02 mm	0.02 mm	0.10		**4112224**
1500	***(60")***	***.001"***	0.02 mm	0.10		**4112234**
1500		0.05 mm	0.05 mm	0.18	**4112213**	
2000		0.02 mm	0.02 mm	0.12		**4112225**
2000	***(80")***	***.001"***	0.02 mm	0.12		**4112235**
2000		0.05 mm	0.05 mm	0.22	**4112214**	



Dimensions

mm/inch	a	b	c	e	f
200/8	5/ .2	10/ .40	80/ 3.1	310/ 12	20 x 5/ .80 x .20
300/12	5/ .2	10/ .40	90/ 3.5	410/ 16	20 x 5/ .80 x .20
500/20	10/ .4	19/ .75	150/ 6.0	675/ 26	25 x 6/ 1.0 x .23
800/32	10/ .4	19/ .75	150/ 6.0	985/ 38	30 x 7/ 1.2 x .29
1000/40	10 /.4	19/ .75	150/ 6.0	1185/ 46	30 x 7/ 1.2 x .29
1500/60	15/ .6	19/ .75	200/ 8.0	1760/ 69	40 x 8/ 1.5 x .31
2000/80	15/ .6	19/ .75	200/ 8.0	2270/ 89	45 x 10/ 1.8 x .40

Vernier Caliper 18 DN with measuring blades for outside measurement

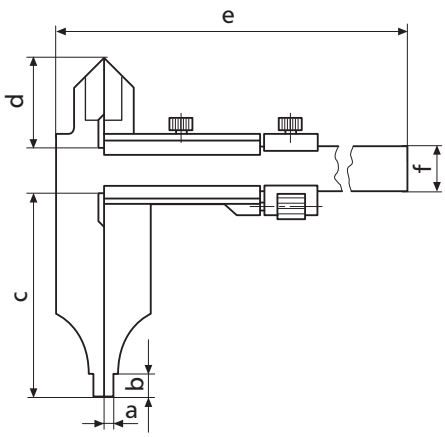


Features

- Vernier and main scale have a satin chrome finish for glare free reading
- Slide and beam made of hardened stainless steel
- Raised guide ways for the protection of the scale
- Rounded measuring faces for inside measurement
- Locking screw
- Supplied with: up to 1000 mm delivered with a case, over 1000 mm individually packed

Technical Data

Measuring range mm	Resolution upper mm	Resolution lower mm	Error limit *G* mm	Order no.	Remarks
200	0.05	0.05	0.05	**4113200**	without fine adjustment
300	0.05	0.05	0.05	**4113201**	
500	0.05	0.05	0.07	**4113202**	
800	0.05	0.05	0.10	**4113203**	
1000	0.05	0.05	0.12	**4113204**	
1500	0.05	0.05	0.18	**4113205**	
2000	0.05	0.05	0.22	**4113206**	
200	0.02	0.02	0.05	**4113300**	with fine adjustment
300	0.02	0.02	0.05	**4113301**	
500	0.02	0.02	0.06	**4113302**	
800	0.02	0.02	0.08	**4113303**	
1000	0.02	0.02	0.08	**4113304**	



Dimensions mm		a	b	c	d	e	f
18 DN	200 mm	5	10	80	40	310	20 x 5
	300 mm	5	10	90	40	410	20 x 5
	500 mm	10	19	150	60	675	25 x 6
	800 mm	10	19	150	65	985	30 x 7
	1000 mm	10	19	150	67	1185	30 x 7
	1500 mm	15	19	200	86	1760	40 x 8
	2000 mm	25	19	200	96	2270	45 x 10

Digital Depth Gage 30 EW according to protection class IP67

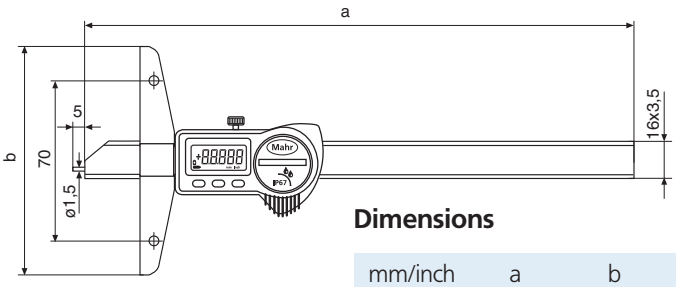
Features

Functions:
ON/OFF
0 (Zero setting)
mm/inch
PRESET (for entering a numerical value)
Reference Lock
Unlock

- Inductive waterproof measuring system FPS (Fluid Protected measuring System) with Reference Lock Function
- Dirt wipers are integrated in the slide
- Life of the battery ca. 2 years
- Max measuring speed 1.5 m/sec (60"/sec)
- High contrast LCD with 7.5 mm high digits
- Lapped guide way
- Beam and cross beam are made of hardened stainless steel
- Locking screw
- Supplied with: Case, battery, operating instructions

Technical Data

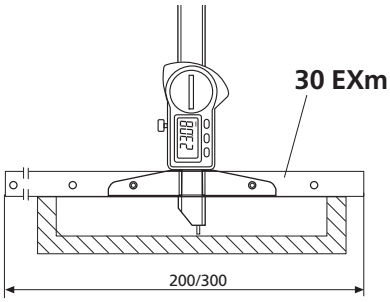
Measuring range mm	*(inch)*	Resolution mm/*inch*	Error limit *G* mm/*inch*	Order no.
150	***(6")***	0.01/ ***.0005"***	0.03/ ***.0015"***	**4126600**
300	***(12")***	0.01/ ***.0005"***	0.04/ ***.0020"***	**4126601**
500	***(20")***	0.01/ ***.0005"***	0.05/ ***.0020"***	**4126602**



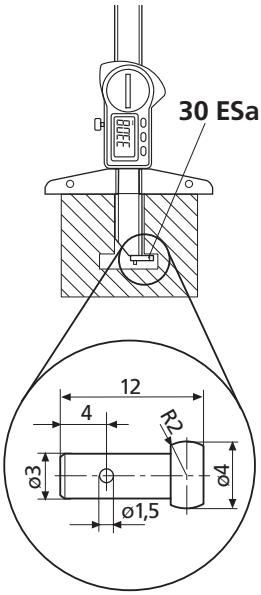
Dimensions

mm/inch	a	b
150/ 6	234/ 9.2	100/ 4
300/ 12	384/ 15.1	150/ 6
500/ 20	584/ 23	150/ 6

Depth measurement



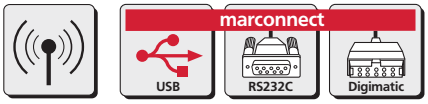
Distance measurement



Accessories

			Order no.
Battery 3V, Type CR 2032			**4102520**
Cross Beam Extension	200 mm	**30 EXm**	**4126511**
	300 mm	**30 EXm**	**4126510**
Anvil for distance measurement for fixing to measuring pin		**30 ESa**	**4125611**

Digital Depth Gage 30 EX



Features

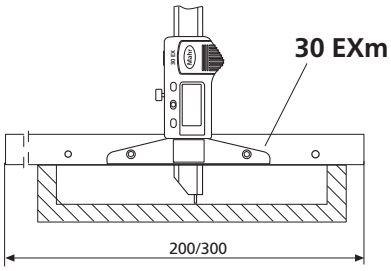
Functions:
ON/OFF
0 (Zero setting)
mm/inch
PRESET (entering numerical value)
DATA (Data transmission via connection cable)

- Patented capacitive measuring system with an energy saving function, life of the battery ca. 2 years
- MarConnect data output, choose alternatively
  USB
  OPTO RS232C
  Digimatic
- Max measuring speed 1.5 m/sec (60"/sec)
- High contrast LCD with 7.5 mm high digits
- Dirt wipers are integrated in the slide
- Supplied with: Case, battery, operating instructions

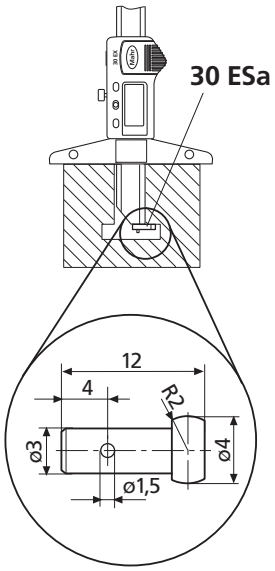
Technical Data

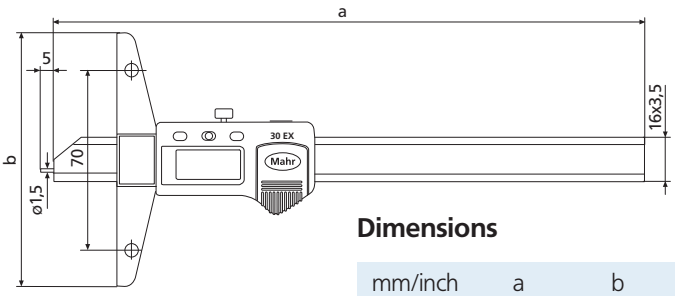
Measuring range mm	*(inch)*	Resolution mm/*inch*	Error limit *G* mm/*inch*	Order no.
150	***(6")***	0.01/ ***.0005"***	0.03/ ***.0015"***	**4126500**
300	***(12")***	0.01/ ***.0005"***	0.04/ ***.0020"***	**4126501**
500	***(20")***	0.01/ ***.0005"***	0.05/ ***.0020"***	**4126502**

Depth measurement



Distance measurement





Dimensions

mm/inch	a	b
150/ 6	234/ 9.2	100/ 4
300/ 12	384/ 15.1	150/ 6
500/ 20	584/ 23	150/ 6

Accessories

		Order no.
Battery 3V, Type CR 2032		**4102520**
Data Connection Cable USB (2 m)	**16 EXu**	**4102357**
Data Connection Cable Opto RS232C (2 m), with SUB-D jack 9-pin	**16 EXr**	**4102410**
Data Connection Cable Digimatic (2 m), Flat plug 10-pin	**16 EXd**	**4102411**
Cross Beam Extension 200 mm	**30 EXm**	**4126511**
300 mm	**30 EXm**	**4126510**
Anvil for distance measurement for fixing to measuring pin	**30 ESa**	**4125611**

Accessories for Data Processing see Chapter 11

Digital Depth Gage 30 EXN

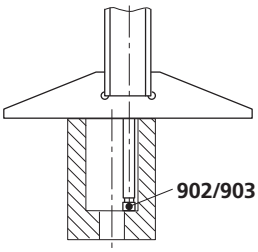
Features

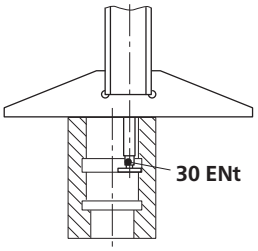
Functions:
ON/OFF
0 (Zero setting)
mm/inch
Reversal of counting direction
PRESET (for entering a numerical value)
DATA (Data transmission via connection cable)

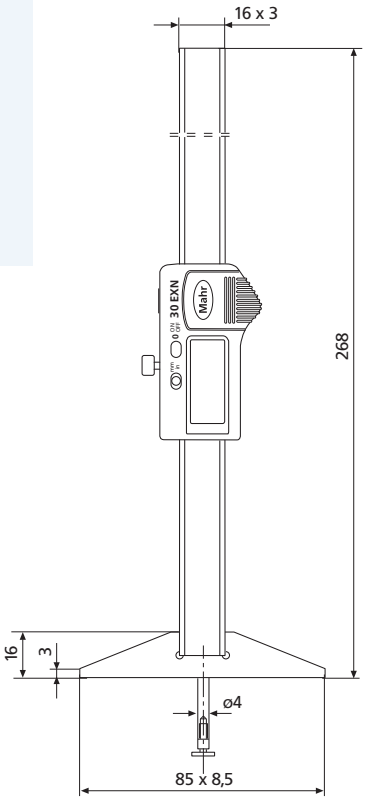
- MarConnect data output, choose alternatively
  USB
  OPTO RS232C
  Digimatic
- High contrast LCD with 7.5 mm high digits
- Dirt wipers are integrated in the slider
- Supplied with:
  Case, battery, anvils 30 ENt (1 mm), 902 and 903, operating instructions

Technical Data

Measuring range mm	*(inch)*	Resolution mm/*inch*	Error limit *G* mm/*inch*	Order no.
100	***(4")***	0.01/ ***.0005"***	0.03/ ***.0015"***	**4126400**





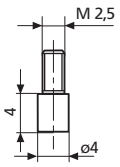


Accessories

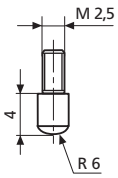
		Order no.
Battery 3V, Type CR 2032		**4102520**
Data Connection Cable USB (2 m)	**16 EXu**	**4102357**
Data Connection Cable Opto RS232C (2 m), with SUB-D jack 9-pin	**16 EXr**	**4102410**
Data Connection Cable Digimatic (2 m), Flat plug 10-pin	**16 EXd**	**4102411**
Disc Type Anvil 0.5 mm, hardened	**30 ENt**	**4126310**
Disc Type Anvil 1 mm, hardened	**30 ENt**	**4882022**

Accessories for Data Processing see Chapter 11

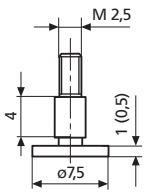
903



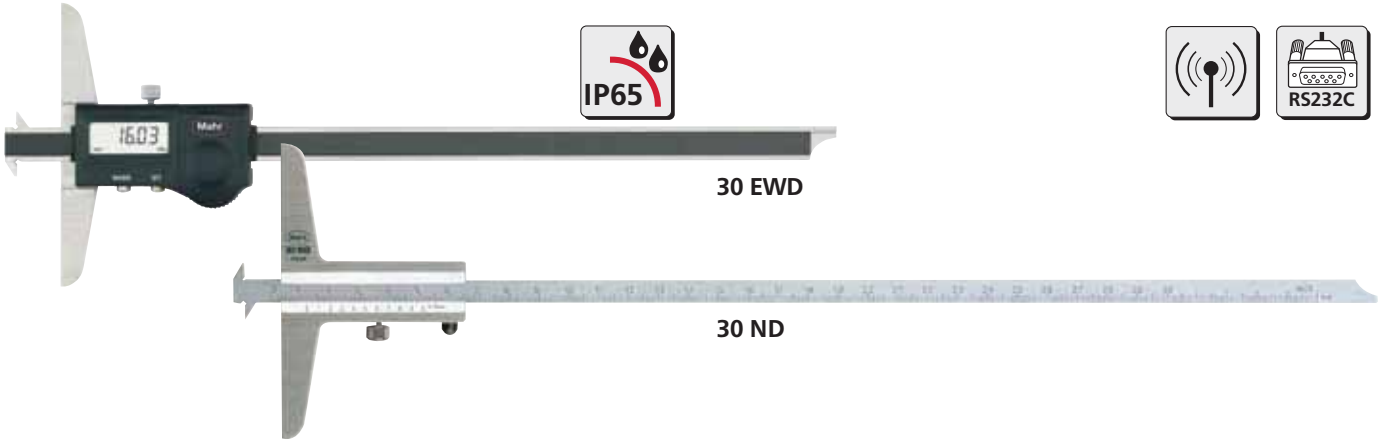
902



30 ENt



Double Hook Depth Gages 30 EWD / 30 ND



Features 30 EWD

Functions:
ON/OFF
RESET (Zero setting)
mm/inch
HOLD (storage of measured values)
DATA (Data transmission)

- Inductive measuring system with an energy saving function, battery life span ca. 2 years
- Max measuring speed 1.5 m/sec (60"/sec)
- Data output: Opto RS232C via data connection cable
- High contrast LCD with 6 mm high digits
- Slide, beam and cross beam are made of hardened stainless steel
- Locking screw
- Supplied with: Case, battery, operating instructions

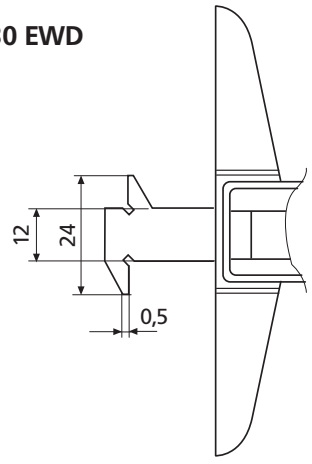
Features 30 ND

- Vernier and main scale have a satin chrome finish for glare free reading
- Reversible beam
- Locking screw
- Slide and beam made of hardened stainless steel
- Raised guide ways for the protection of the scale
- Supplied with: Case

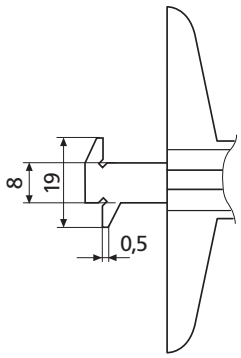
Technical Data

	Measuring range mm	*(inch)*	Length of cross beam mm/*inch*	Resolution mm/*inch*	Vernier scale mm	Error limit *G* mm/*inch*	Order no.
30 EWD	200	***(8")***	100/ ***3.9"***	0.01/ ***.0005"***		0.03/ ***.0015"***	**4126610**
	300	***(12")***	150/ ***5.9"***	0.01/ ***.0005"***		0.03/ ***.0015"***	**4126611**
30 ND	200		100		0.05		**4127410**
	300		100		0.05		**4127411**

30 EWD



30 ND

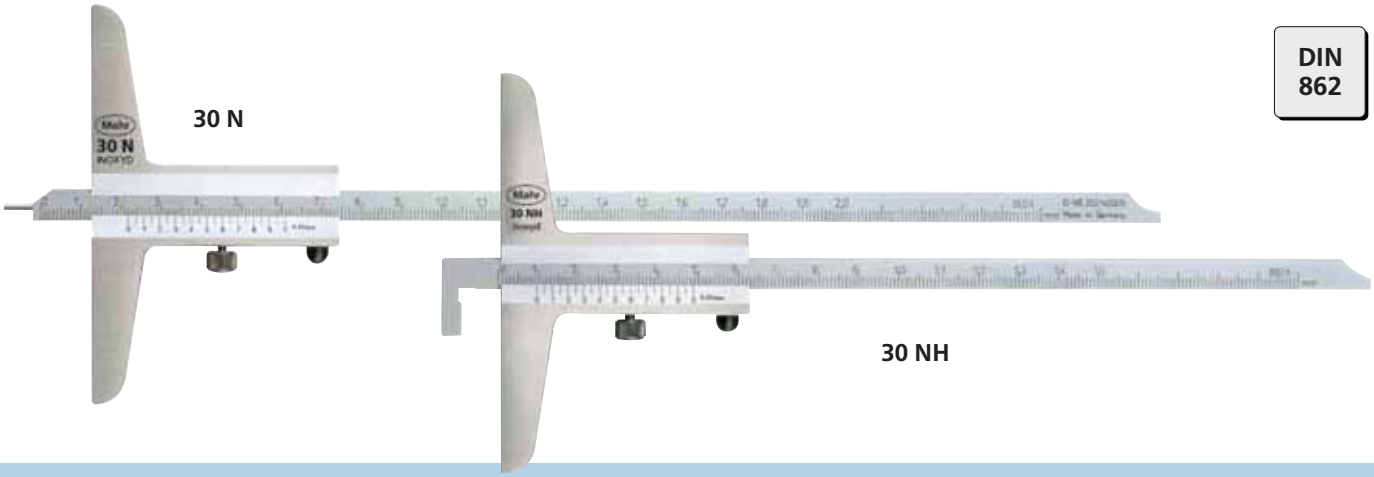


Accessories for 30 EWD

		Order no.
Battery 3V, Type CR 2032		**4102520**
Data Connection Cable Opto RS232C (2 m), with SUB-D jack 9 pin	**16 ESv**	**4102510**

Accessories for Data Processing see Chapter 11

Depth Gages 30 N / 30 NH



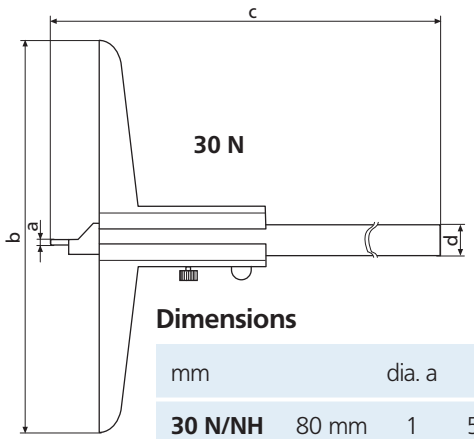
DIN 862

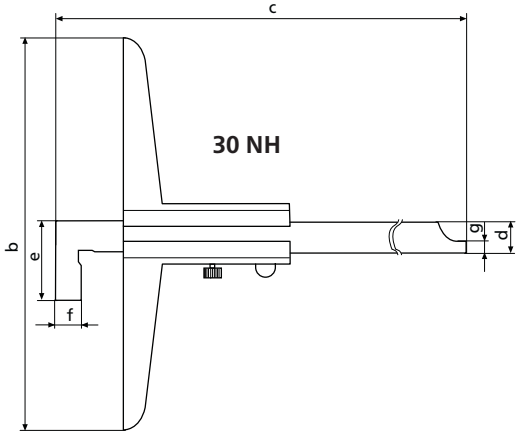
Features

- Vernier and main scale have a satin chrome finish for glare free reading
- Slide, beam and cross beam are made of hardened stainless steel
- Raised guide ways for the protection of the scale
- Locking screw
- Supplied with: Case

Technical Data

	Measuring range mm	Vernier scale mm	Error limit *G* mm	Order no.	Remarks
30 N	80	0.05	0.05	**4127200**	with hardened measuring pin, reversible beam
	150	0.05	0.05	**4127300**	
	200	0.05	0.05	**4127301**	
	300	0.05	0.05	**4127201**	
	500	0.05	0.07	**4127202**	
30 NH	150	0.05	0.05	**4127350**	with hook, reversible beam
	200	0.05	0.05	**4127351**	
	300	0.05	0.05	**4127352**	
	500	0.05	0.07	**4127353**	





Dimensions

mm		dia. a	b	c	d	e	f	g
30 N/NH	80 mm	1	50	140	8 x 3	-	-	-
	150 mm	1.5	100	235	8 x 3	20	5	3.5
	200 mm	1.5	100	285	8 x 3	20	5	3.5
	300 mm	2.0	150	390	12 x 4	28	10	4
	500 mm	2.0	150	590	12 x 4	28	10	4

Digital Linear Machine Scales 31 ES / 32 ES

31 ES

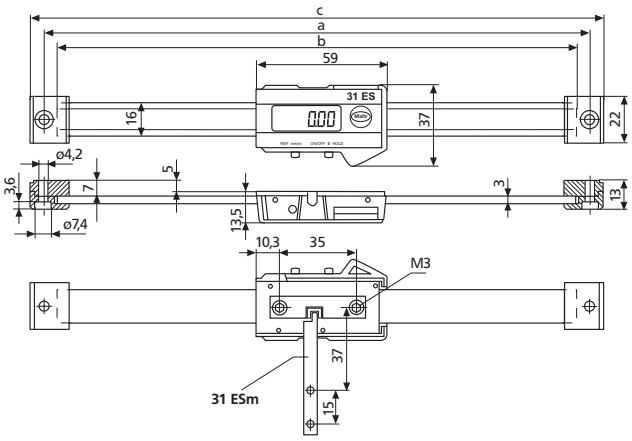
32 ES

Features

Functions:
ON/OFF
RESET (Zero setting)
mm/inch
HOLD (storage of measuring values)
DATA (Data transmission via connection cable)

- Patented capacitive measuring system, life of the battery approx. 2 years
- Max measuring speed 1.5 m/sec (60"/sec)
- Data output: Opto RS232C via data connection cable
- High contrast LCD with 6 mm high digits
- Slide and beam are made of hardened stainless steel

- Supplied with: Battery and operating instructions



Application

- For measuring travel on a machine (e.g. on an upright drilling machine, milling machine)

Dimensions

mm		a	b	c
31/32 ES	100 mm	197	185	209
	150 mm	247	235	259
	200 mm	298	286	310

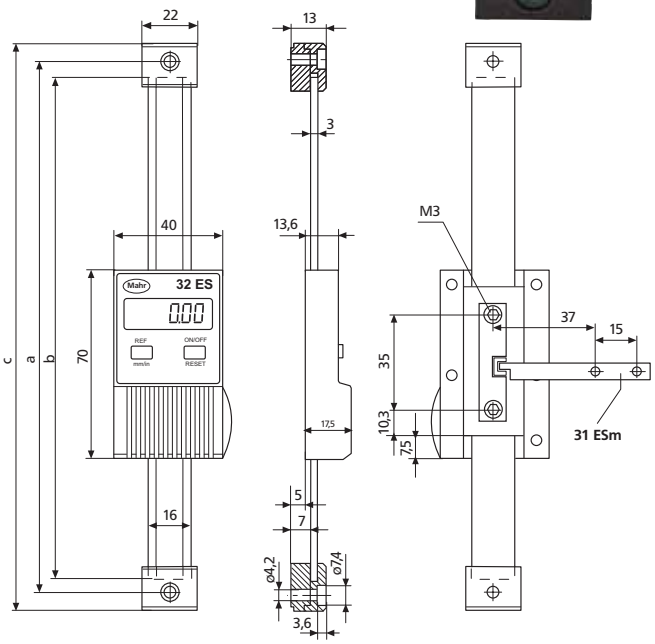
Technical Data

	Measuring range mm	*(inch)*	Resolution mm/*inch*	Error limit *G* mm/*inch*	Order no.
31 ES	100	***(4")***	0.01/ ***.0005"***	0.02/ ***.0010"***	**4102600**
Horizontal	150	***(6")***	0.01/ ***.0005"***	0.03/ ***.0015"***	**4102601**
display	200	***(8")***	0.01/ ***.0005"***	0.03/ ***.0015"***	**4102602**
32 ES	100	***(4")***	0.01/ ***.0005"***	0.02/ ***.0010"***	**4102620**
Vertical	150	***(6")***	0.01/ ***.0005"***	0.03/ ***.0015"***	**4102621**
display	200	***(8")***	0.01/ ***.0005"***	0.03/ ***.0015"***	**4102622**

Accessories

		Order no.
Drive-Type Device for instruments with a resolution of 0.01mm	**31 ESm**	**4102651**
Battery 3V, Type CR 2032		**4102520**
Data Connection Cable Opto RS232C (2 m), with SUB-D jack 9-pin	**16 ESv**	**4102510**

Accessories for Data Processing see Chapter 11



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FOR THIS THERE IS DIGIMAR.

The latest information on DIGIMAR products can be found on our website:
www.mahr.com, WebCode 204

► | Mahr offers you the complete product program in order for you to obtain the most reliable solution for all your measuring tasks. Whether it's simply scribing a work piece or complex measurements in two dimensions - Digimar Height Measuring Instruments guarantee a maximum of both flexibility and quality. Our motorized Height Measuring Instruments Digimar 817 CLM and CX2 exceed all customer requirements; they are simple to operate, all the basic functions can be executed with a single key as well as offering a maximum of ease and accuracy. | ◄

► | Digimar. Height Measuring Instruments

Digimar. Height Measuring Instruments

Overview

	Digimar 817 CLM "Quick Height"					
						
Catalog page	2-4	2-4	2-4	2-4	2-4	2-4
Measuring range mm/inch	0-350 / ***0-14"***		0-600 / ***0-24"***		0-1000 / **0-40"**	
Application range up to mm/inch	520 / ***20.47"***		770 / ***30.35"***		1170 / ***46.06"***	
Measuring error* in µm	1.8+L/600 (L in mm)		1.8+L/600 (L in mm)		1.8+L/600 (L in mm)	
Quick Mode	●		●		●	
1-D	●	●	●	●	●	●
2-D	–	●	–	●	–	●
Motorized measuring carriage	●		●		●	
Scribing/marking work pieces						
Bore diameter	●		●		●	
Max-Min	●		●		●	
Tolerance monitoring	●		●		●	
Perpendicularity measurement	●		●		●	
Straightness measurement	●		●		●	
Angle calculation		●		●		●
Statistics	–	●	–	●	–	●
Measuring programs	40		40		40	
Air bearings	●		●		●	
Integrated USB memory	●		●		●	
Interface	RS232		RS232		RS232	
USB printer interface	●		●		●	
Order no.	**4429000**	**4429010**	**4429001**	**4429011**	**4429002**	**4429012**

* *with standard accessories*

Digimar CX2			Digimar M 814 N		Digimar M 814 G		Digimar 814 S	
								
2-16	2-16	2-16	2-21	2-21	2-21	2-21	2-23	2-23
0-350 / ***0-14"***	0-600 / ***0-24"***	0-1000 / ***0-40"***	0-320 / ***0-12"***	0-620 / ***0-24"***	0-320 / **0-12"**	0-620 / ***0-24"***	0-350 / ***0-14"***	0-600 / 0-***24"***
685 / ***26.97"***	935 / ***36.81"***	1335 / ***52.25"***	320 / ***12.6***"	620 / ***24.4"***	320 / ***0-12.6***"	620 / ***24.4"***	300 / **12"**	600 / ***24"***
5+L/300 (L in mm)			20	30	20	30	30	30
●	●	●	●	●	●	●	●	●
●	●	●						
			●		●		●	●
●		●						
●	●	●	●		●		●	●
●	●	●	●		●		●	●
●	●	●	●		●		●	●
●	●	●						
1	1	1						
		●						
	RS232		Opto RS232		Opto RS232		RS232, Digimatic, USB	
5320104	**5320102**	**5320103**	**4426540**	**4426542**	**4426541**	**4426543**	**4123800**	**4123801**

Digimar 817 CLM Quick Height

► | The new Height Measuring Instrument **Digimar** 817 CLM with the innovative Quick Mode. Highly accurate rapid measurements, a wide range of measuring and evaluation possiblities and excellent operator comfort. | ◄

The best solution for all measuring tasks

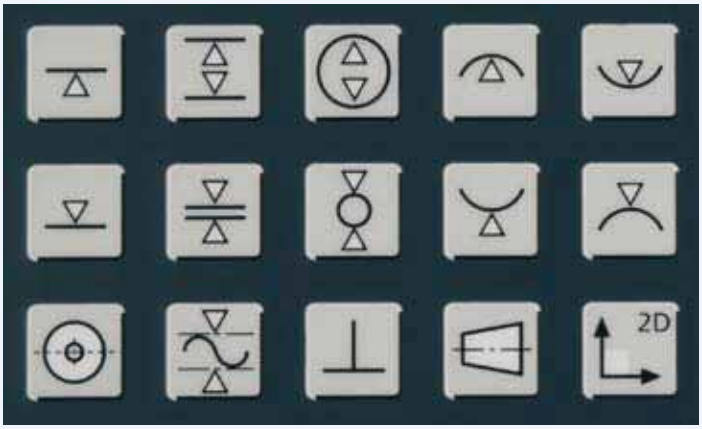
QUICK MODE

Fast measurement by Hand
Easy to operate due to the "Quick Mode", an innovative solution from Mahr (patent pending)

Ill. 1. Move the measuring carriage by hand in the direction of the object to be measured.

Ill. 2. The motor starts, the measurement procedure will automatically be performed.

Comfort to operate all measurement functions with the function keys due to the clearly defined symbols.



Highest accuracy and reliability

- Extremely accurate incremental measuring system with double reader head system, insensitive to the contamination of dirt
- Robust guide column, made from stainless steel
- Measuring head in precision ball bearings guide
- Temperature compensation with an integrated temperature sensor

20°C

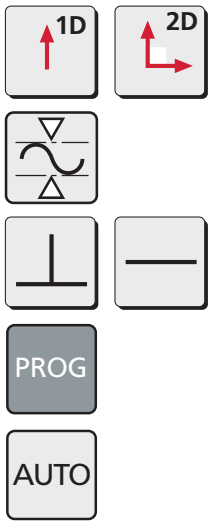
Ergonomic operating and display unit

- Large, back-lit display
- Self-explanatory guided operation with icons

- The display unit can be positioned freely with the swivel arm

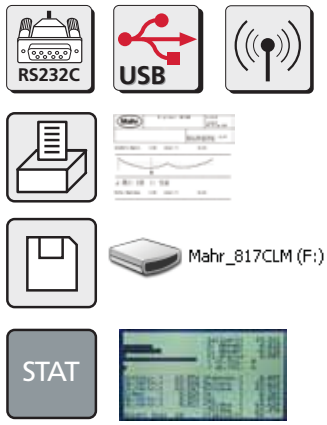
Universal measurement possibilities

- Wide range of measurement functions in 1D or 2D (optional)
- Dynamic measurement functions with the analog display
- Automatic perpendicularity and straightness measurements (in conjunction with accessories)
- Automated measuring procedures (measurement programs)
- Auto function for chain measurements and distance measurements



Extensive evaluation possibilities

- Transmit data to a PC via RS232 or USB (with an adapter) for example into MS Excel via the MarCom-Software
- Print measured values, statistics, etc. via a USB printer
- Save measued values in the integrated USB memory (will be recognized by a PC as an interchangeable disc drive)
- Broad range of statistical evaluations are available (optional)



Height Measuring Instrument Digimar 817 CLM

Features

Measuring system

- Excellent accuracy and reliabilty due to the optical incremental measurement system with the double reader head
- Dynamic probing system enabling high repeatability
- Air bearings system for light and smooth movement
- Precise measuring head on stainless steel guideways
- Motorized measuring carriage simplifies measurement runs
- Probe constant remains after the instrument is switched off
- Integrated rechargeable battery with a long operating time span for mains independent measurement
- Temperature compensation with an integrated temperature sensor

Operating and display unit

- Large and clearly defined function keys
- Easy to read background lit graphic LCD-Display
- Operator guidance with self-explanatory icons / pictograms
- Operator prompts and menus are available in several different languages
- Possible to set additional zero points on a work piece
- RS232 and / or USB data output for further data processing
- Save measured data on the integrated USB memory
- USB interface to connect a compatible USB printer
- Additional measuring instruments with OptoRS232-interface can be connected
- Secure the future due to software update potential
- Automatic Stand-by mode / background lit display can be switched off after defined length of time to save power

- Selectable Auto-off function, without loss of measured values

- Supplied with:
  Height Measuring Instrument incl. operating and display unit, carrier 817h1, probe K6/51, setting block 817eb, operating instructions, mains power adapter, USB cable

Technical Data

Measuring range	mm / ***inch***	350 / ***14"***	600 / ***24"***	1000 / ***40"***
Range of application	mm / ***inch***	520 / ***20.47"***	770 / ***30.31"***	1170 / ***46.06"***
Resolution	mm	0.01 / 0.005 / 0.001 / 0.0005 / 0.0001		
	inch	***0.001" / 0.0005" / 0.0001" / 0.00005" / 0.00001"***		
Measuring error*	µm	(1.8+L/600). L in mm		
Repeatability	µm	0.5 (plane) 1 (bore)		
Perpendicularity error (elect. adjusted)	µm	frontal ≤5	frontal ≤6	frontal ≤10
Operating time of rechargeable battery	h	up to 16		
Measuring force	N	1.0 ±0.2		
Permissible relative air humidity	%	65 (non condensed)		
Working temperature	°C / °F	20 ±1 / 68 ±33.8		
Operating temperature	°C / °F	10 . . . 40 / 50 . . . 104		
3-point air cushion, height	µm	ca. 9		
Measuring system		incremental scale with optical reading		
Total height	mm / ***inch***	741 /***29.17"***	985 / ***38.78"***	1392 / ***54.80"***
Base area (L x W)	mm / ***inch***	240 x 250 / ***9.45" x 9.84"***		
Weight	kg / lbs	25 / ***55.15***	30 / ***66.14***	35 / ***77.16***
Order no. 1D		**4429000**	**4429001**	**4429002**
Order no. 2D / Stat		**4429010**	**4429011**	**4429012**

** Surface base plate according to DIN 876/0 with standard accessories*

Height Measuring Instrument Digimar 817 CLM

Operating and display unit

2D Operating and display unit

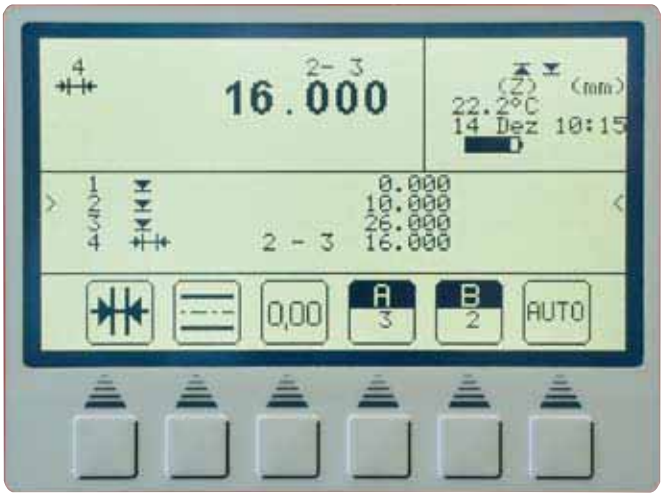
1D Operating and display unit

Operating and display unit		1D	2D / Stat
Measurement			
One dimensional (1D)		●	●
Two dimensional (2D)			●
Measuring programs (automatic run)		40	40
Perpendicularity / straightness measurement		●	●
Flatness / parallel deviation (Max, Min)		●	●
Roundness / run-out deviation (Max-Min)		●	●
Evaluation			
- Statistics			●
- Transmit measured values to a PC via RS232		●	●
- Print measured values and diagrams on a USB printer		●	●
- Print out statistical evaluation			●
- Save measured values on the integrated USB memory		●	●

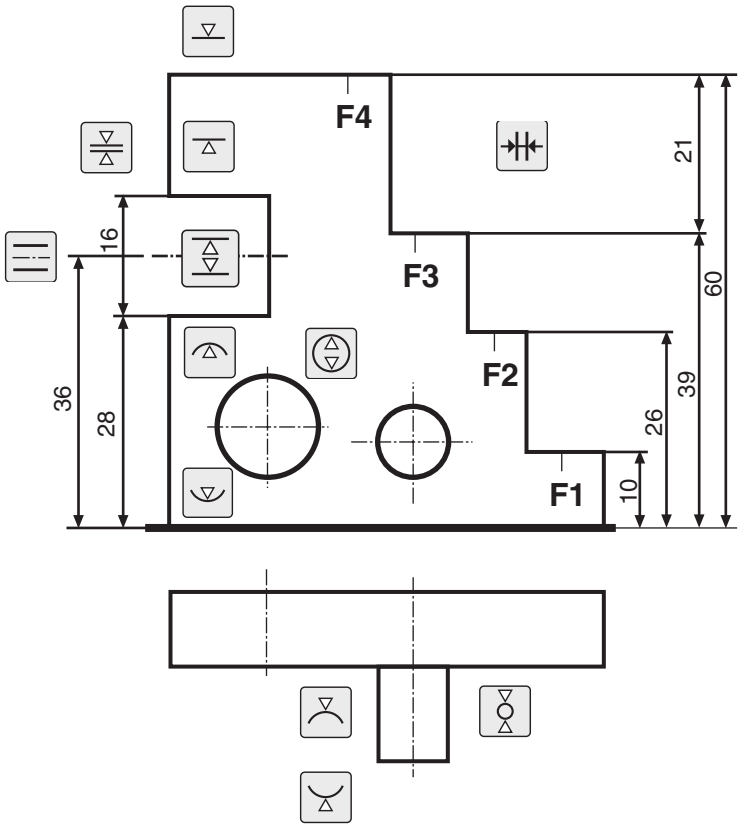
Height Measuring Instrument Digimar 817 CLM

Measuring with the function keys

Comfortable 1D standard measuring functions with a semi automatic run



- **Contacting a surface from above**
- **Contacting a surface from below**
- **Measuring a groove** (center and width)
- **Measuring a ledge** (center and width)
- **Measuring a bore** (center and diameter)
- **Contacting a bore from below**
- **Contacting a bore from above**
- **Measuring a shaft** (center and diameter)
- **Contacting a shaft from above**
- **Contacting a shaft from below**
- **Determining the center of a bore** (with a taper probe)
- **MAX-MIN Function**



Calculation functions

- **Calculate the distance between 2 measured values**
- **Calculate the symmetry between 2 measured values**
- **Chain measurements and distance measurements F1 to F4**
- **Automatically set the zero point**

Height Measuring Instrument Digimar 817 CLM

Measuring with Quick Mode

Ideal for fast and simple measurement

1. Move the measuring carriage by hand in the direction of the object to be measured.

2. The motor starts, the measurement procedure will automatically be performed.

Measurement using the keypad (speed keys) on the base

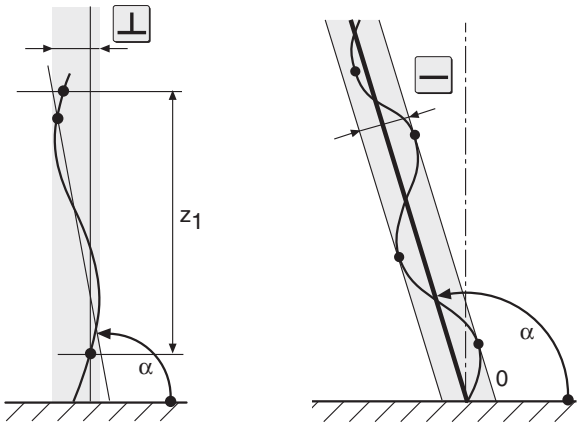
Ideal in conjunction with the air bearings for large work pieces.

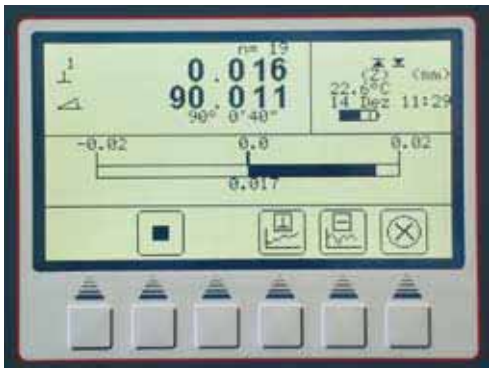
By using the keys that are integrated into the base; the operator can comfortably move the measuring carriage into the desired position and start a measurement. This eases measurement particularly when measuring large workpieces as these do not have to be moved into position. The operator can keep both hands on the measuring instrument (one hand on the key for the air bearing and other on the high-speed keys) and measure the workpiece in one run.

Height Measuring Instrument Digimar 817 CLM

⊥ — Perpendicularity and Straightness Measurements

Only one measurement required to determine perpendicularity and straightness deviation.

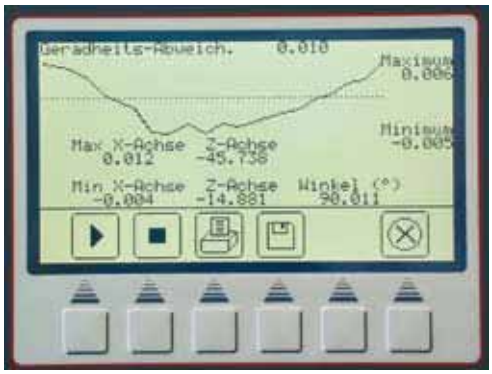




- Display shows the deviation of an angle (in degrees) and the deviation in mm (metric)
- The bar graph display shows the actual value, thus improving visualization

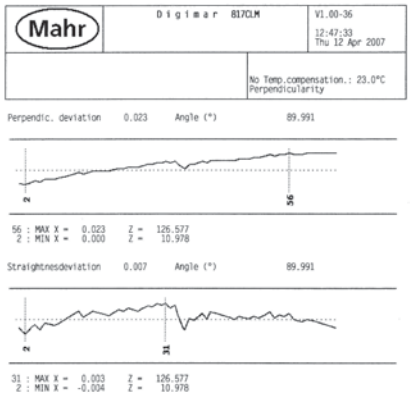
Comprehensive evaluation possibilities

- Display on the screen



- Save the data in the USB memory

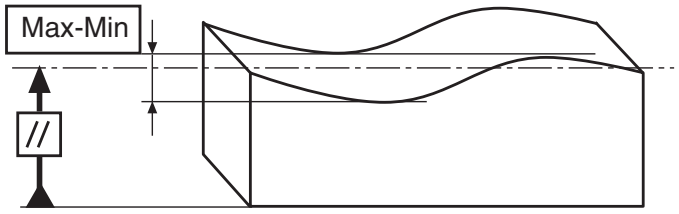
- Print data via a USB printer



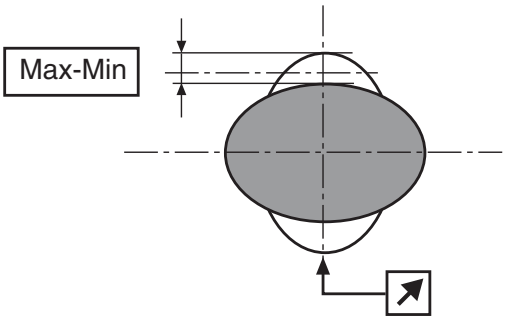
Height Measuring Instrument Digimar 817 CLM

Dynamic measuring functions

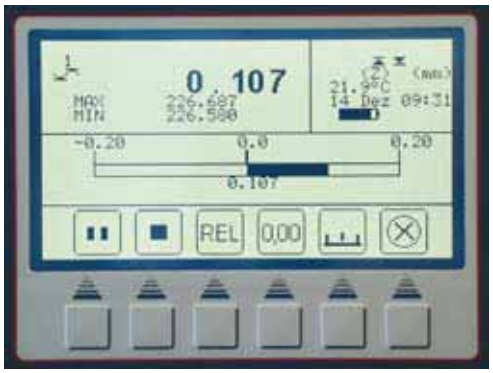
Only one measurement required to determine Maximum, Minimum and Maximum-Minimum.



- Parallel deviation



- Roundness deviation



- MAX, MIN and MAX-MIN are displayed simultaneously
- The bar graph display shows the actual value, thus improving visualization

Measuring program for repetitive measurements / serial components

Use the Teach-in mode to quickly devise a measuring program. Simply measure a work piece once; save this measurement and the measuring program is already created. The motorized carriage will travel automatically to the measuring position, the measuring function will start automatically. This greatly reduces the inspection time for a mini series consisting of only a few test pieces.

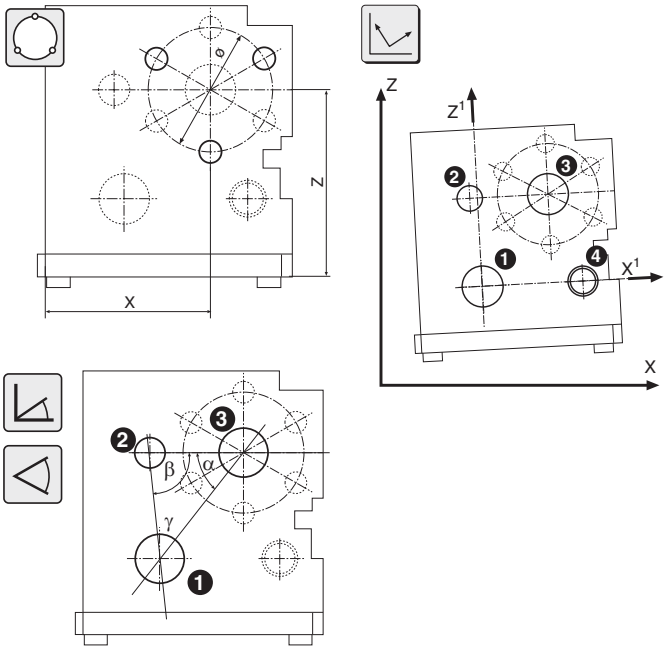
- Measuring programs in 1D and 2D
- Create measuring programs with the Teach-In-mode
- Simple programming and storage of up to 40 measuring programs, further measuring programs can be stored on a PC
- Tolerance monitoring during a measuring program
- Create production and inspection schedules
- Connection of additional hand measuring instruments with an Opto-RS232-interface is also available

Height Measuring Instrument Digimar 817 CLM

Measure in the 2D mode*

The most important 2D measurement functions can be conducted by pressing just one key.

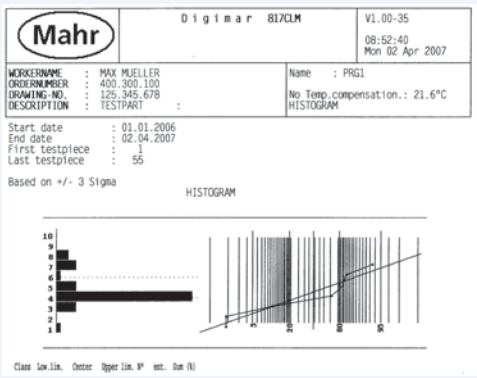
- **Determine an index circle**
- **Determine the distance and angle 2 elements**
- **Determine the distance and angle 3 elements**
- **Coordinate transformation**

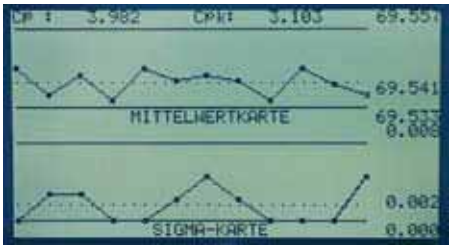


Statistical Evaluation*

The operating unit has extensive and selective possibilities for statistical evaluation.

- Statistical evaluation of individual features
- Histograms
- Process control charts
- Pareto diagrams
- Creation of production and inspection schedules
- Evaluation based on stored measurement data
- Histograms, process control charts and Pareto diagrams can be directly printed on a USB printer





** Only available with insturments that have a 2D / Stat. operating / display unit*

Height Measuring Instrument Digimar 817 CLM

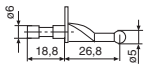
Accessories

Spherical probes

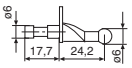
Catalog no.	Ball dia. D mm	Shaft length mm	Mount dia. mm	Order no.
K5/51	5	26.8	6	**4429158**
K6/51	6	24.2	6	**4429254***
K4/30	4	31	8	**7023813**
K6/40	6	41	8	**7023816**
K10/60	10	62	8	**7023810**
K10/100	10	103	8	**7023615**

* *supplied with standard accessories*

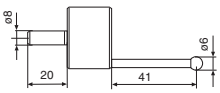
K 5/51



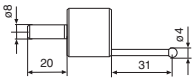
K 6/51



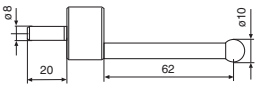
K 6/40



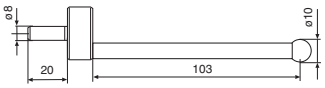
K 4/30



K 10/60



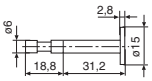
K 10/100



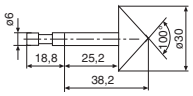
Special probes

Catalog no.	Description	Mount dia. mm	Order no.
S15/31,2	Disc probe	6	**4429226**
Z10/31,2	Cylindrical probe	6	**4429227**
Z10/60	Cylindrical probe	8	**7023819**
MKe 30	Taper probe	6	**4429228**
TMT 120	Spherical probe to measure recesses incl. carrier		**4429221**
KM 2	Probe M2 incl. styli 800 ts dia. 2 mm	6	**4429256**

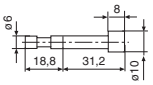
S 15/31,2



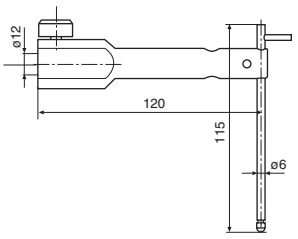
MKe 30



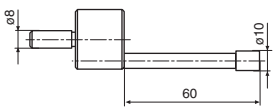
Z 10/31,2



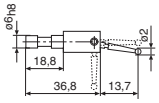
TMT 120



Z 10/60



KM 2

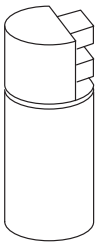


Setting blocks

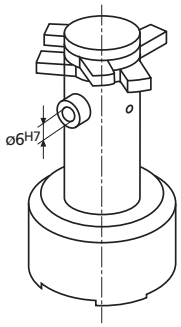
Catalog no.	Description	Order no.
817 eb	Setting block	**4429168***
EB I	Setting block for taper probe, with calibration certificate	**7023827**

* *supplied with standard accessories*

817 eb



EB I



Height Measuring Instrument Digimar 817 CLM

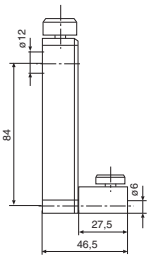
Accessories

Carrier for probes and transducers

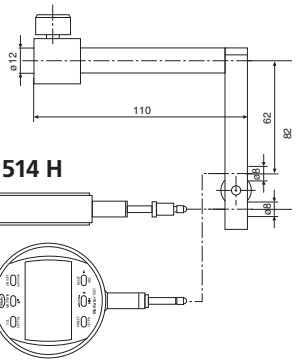
Catalog no.	Description	Shaft length mm	Mount dia. mm	Order no.
817 h1	Carrier for probes	27.5	6	**4429154***
817 h2	Carrier for probes	100	6	**4429219**
817 h3	Carrier for Digital indicator / Incremental probes		8	**4429206**
817 h4	Carrier for probes		8	**4429220**

* *supplied with standard accessories*

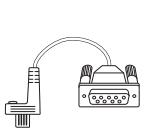
817 h1



817 h3

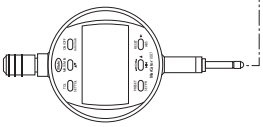


P1514 H



16 EXr

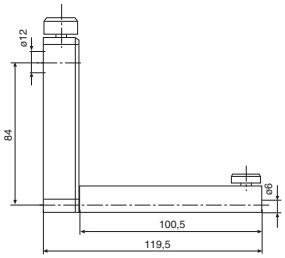
1086



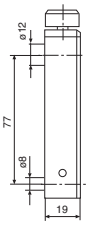
Transducers for measuring perpendicularity

Catalog no.		Order no.
P1514 H	Incremental probe, 12 mm incl. cable	**4426810**
1086	Digital indicator, 12.5 mm Resolution 0.001 / .00005"	**4337020**
16 EXr	Data cable for digital indicator 1086	**4102410**

817 h2



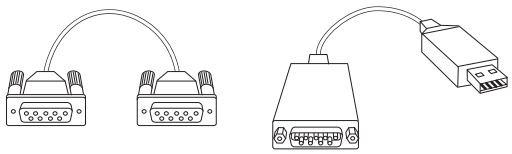
817 h4



Data connection cable

	Order no.
Data cable 817 CLM to MSP 2 / PC	**7024634**
Adapter cable RS232-USB for Digimar 817	**4102333**

Accessories for Data Processing see Chapter 11



Printer

HP-Deskjet 5940

- Standard connectivity: USB - compatible with USB 2.0 specifications, PictBridge
- Compatible operating systems: Microsoft® Windows® 98 SE, Me, 2000, XP (Home and Professional)
- Standard printer languages HP PCL 3 – GUI

	Order no.
HP 5940 Deskjet, Photo printer	**4429015**

Height Measuring Instrument Digimar 817 CLM

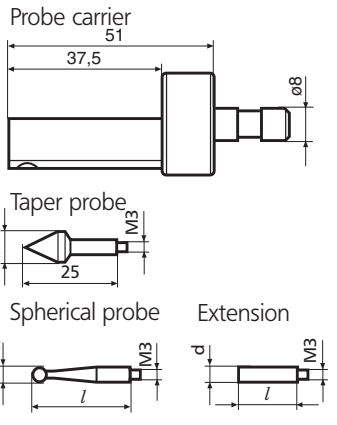
Probe accessory sets

Probe set 817 ts1 consists of:		**4429019**
	Carrying case	**4429020**
817 h2	Carrier for probes	**4429219**
S15/31,2	Disc probe	**4429226**
Z10/31,2	Cylindrical probe	**4429227**
MKe 30	Taper probe	**4429228**
TMT 120	Spherical probe to measure recesses incl. carrier	**4429221**
KM 2	Probe M2 incl. for MarTest styli M2	**4429256**
817 h4	Carrier for probes	**4429220**
K4/30	Spherical probe	**7023813**
K6/40	Spherical probe	**7023816**
K10/60	Spherical probe	**7023810**
K10/100	Spherical probe	**7023615**

817 ts1

Probe set 817 ts2 consists of:		**4429018**
	Carrying case	**4429020**
817 h2	Carrier for probes	**4429219**
S15/31,2	Disc probe	**4429226**
Z10/31,2	Cylindrical probe	**4429227**
MKe 30	Taper probe	**4429228**
TMT 120	Spherical probe to measure recesses incl. carrier	**4429221**
KM 2	Probe M2 for MarTest styli M2	**4429256**

Universal probe set CXt2 consists of:			**7034000**
Case			**3015925**
Probe carrier			**3015917**
	Dimension	**Shaft length**	
Measuring crook	d = 0.5 mm	l = 78 mm	**3015918**
Probe pin /tip:	dia. d = 1.2 mm	l = 75 mm ls = 15.5 mm	**3015919**
Taper probe	dia. d = 0–7.5 mm		**3015920**
Spherical probe	TC dia. dk = 3 mm	l = 24 mm	**3022000**
Spherical probe	TC dia. dk = 2 mm	l = 24 mm	**3022001**
Spherical probe	TC dia. dk = 1 mm	l = 24 mm	**3022002**
Extension M3 – M3	d = 4 mm	l = 20 mm	**3015921**
Extension M3 – M2.5	d = 4 mm	l = 20 mm	**3015888**



Height Measuring Instrument Digimar CX2

Digimar CX2. 350 / 600 / 1000 mm ***(14"/ 24"/ 40")***
The perfect partner, for use in workshop and inspection areas! Obtain your measurement results without complicated procedures; simple, fast and accurate! The Digital Height Measuring Instrument Digimar CX2 is your perfect partner for use in workshop and inspection areas.

Features

Measuring System

- Extremely accurate due to the capacitive incremental measuring system
- Dynamic probing system enables high repeatability
- Precise measuring head
- Motorized measuring carriage simplifies the measuring task and minimizes the influence caused by the operator
- Switch between Absolute and Relative modes
- Probe constant remains even after switching off
- Battery operated air pump for both easy and smooth movement (CX2, 1000 mm/ ***40"***)

Operating and Display Unit

- Large, easy to read operating buttons
- Easy to read Liquid Crystal Display
- RS232 data output for transmitting data for further data processing
- Interface for a Digital Indicator for conducting perpendicularity measurements
- Integrated rechargeable battery with a long operating time for mains independent measurements
- Auto-off function

Technical Data

Measuring range	mm/***inch***	350 / ***14"***	600 / ***24"***	1000 / ***40"***
Application range	mm/***inch***	685 / ***26.97"***	935 / ***36.81"***	1335 / ***52.25"***
Resolution	mm		0.01 / 0.001	
	inch		***0.0001" / 0.00005"***	
Measuring error* (U95)	µm		(5+L/300), L in mm	
Repeatability*	µm		2 (plane) 3 (bore)	
Perpendicularity error (electrically adjusted)	µm	≤9	≤15	≤25
Operating time between charges	h	up to 100	up to 100	up to 15
Measuring force	N		1.0 ±0.3	
Permissible relative air humidity	%		65 (non condensed)	
Working temperature	°C / °F		20 ±1 / 68 ±33.8	
Operating temperature	°C / °F		10 . . . 40 / 50 . . .104	
3-Point air cushion, height	µm	–	–	Yes (ca. 3)
Measuring system			Incremental capacitive	
Total height	mm/***inch***	741 / ***29.17"***	985 / ***38.78"***	1392 / ***54.80"***
Base area (L x W)	mm/***inch***		240 x 250 / ***9.45" x 9.84"***	
Weight	kg/lbs	14 / ***30.86***	16 / ***35.27***	26 / ***57.32***
Order no.		**5320104**	**5320102**	**5320103**

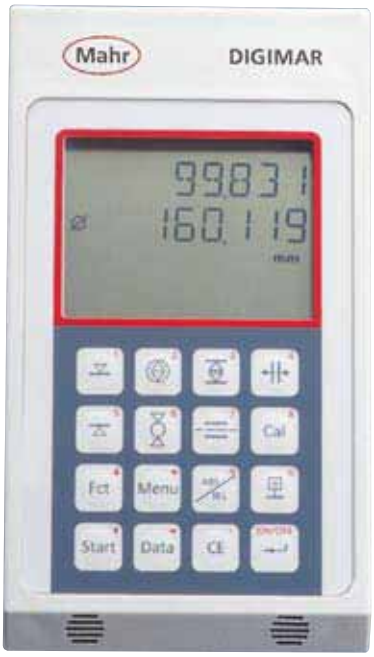
** Base plate GK 0 according to DIN 876 with Probe K10/50*

Height Measuring Instrument Digimar CX2

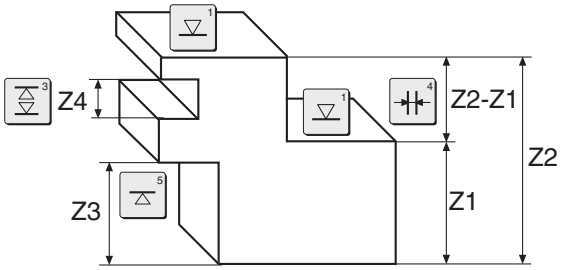
Measuring Functions

1D-Standard measurement functions in semi-automatic mode

Use the quick operating keys to rapidly obtain accurate results.

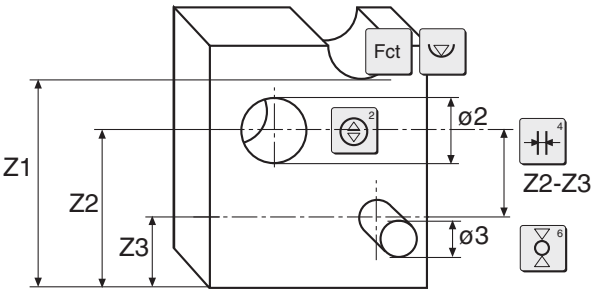


- **Contacting a surface from above**
- **Contacting a surface from below**
- **Measuring a groove** (center and width)
- **Measuring a bore** (center and diameter)
- **Contacting a bore from below**
- **Contacting a shaft from above**
- **Contacting a bore from above**
- **Contacting a shaft from below**
- **Determining the center of a bore** (with a taper probe)



Calculation functions

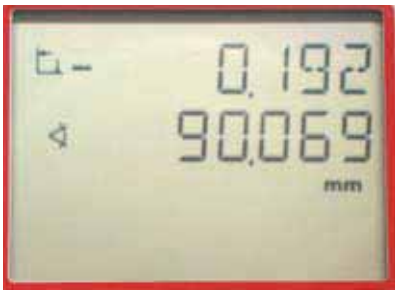
- **Calculate the distance between 2 measured values**
- **Calculate the symmetry between 2 measured values**

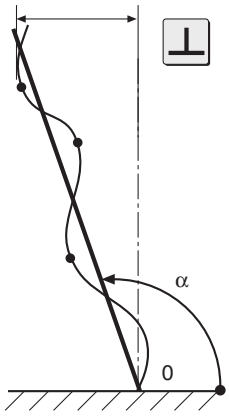


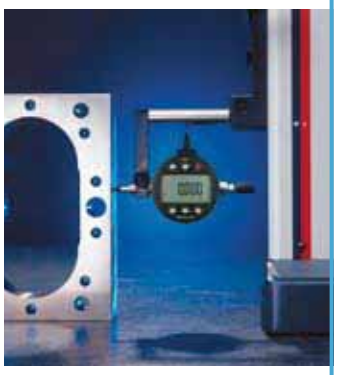
Height Measuring Instrument Digimar CX2

Perpendicularity Measurements

- **Automatic and semi-automatic**

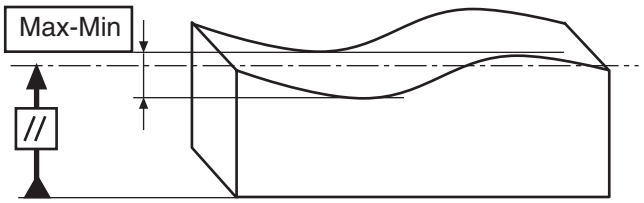




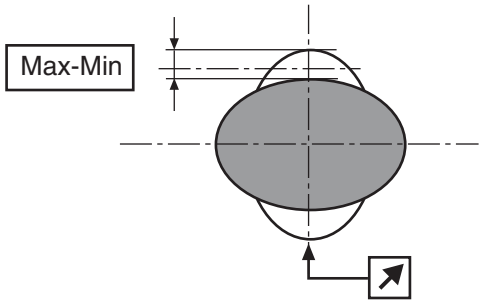


Dynamic measurements

• Parallel deviation



• Roundness deviation



Measuring program

With the Teach-in mode, measuring programs can be simply generated, for example a work piece can be measured; the results and operating steps can be immediately stored. The motorized measuring carriage travels to the measuring position and the measuring function will start automatically. This greatly reduces the inspection time for small component batches.

- Generate a Teach-In mode
- Simply program and store up to 20 features
- Monitoring tolerances via the measuring program
- The measuring program remains stored even when the CX2 is switched off.

Tolerance monitoring via the measuring program

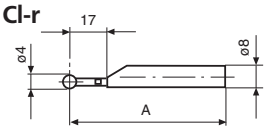
Accessories for Height Measuring Instrument Digimar CX2

Spherical Probes

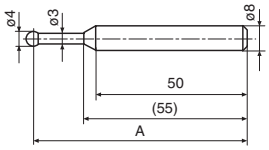
Catalog no.	dia. D mm	dia. D *(inch)*	A mm	A *(inch)*	Order no.
817 Cl-r	4	*(.157")*	90	*(3.54")*	**4426498**
K 4/72	4	*(.157")*	71	*(2.78")*	**7023609**
K 4/30	4	*(.157")*	30	*(1.18")*	**7023813**
K 6/40	6	*(.236")*	40	*(1.57")*	**7023816**
K 10/50	10	*(.394")*	50	*(1.97")*	**7022620***
K 10/60	10	*(.394")*	60	*(2.36")*	**7023810**
K 10/100	10	*(.394")*	100	*(3.94")*	**7023615**

** Standard accessories*

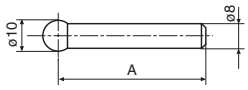
817 Cl-r



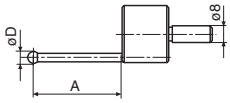
K 4/72



K 10/50



K 4/30 ... K 10/100

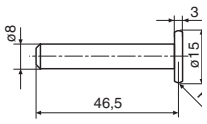


Special Probes

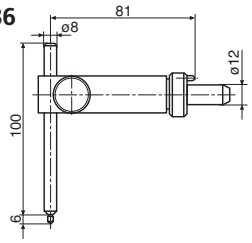
Catalog no.	Description	Order no.
S 15/47,5	Disc probe	**7023608**
Z 10/60	Cylindrical probe	**7023819**
MKe 20	Taper probe	**7023613**
TMT 86	Spherical probe for measuring recesses	**7023064**
817 Cl-sa	Probe with measuring pin	**4426433**
817 Cl-am	Holder for Dial Indicators and Test Indicators styluses	**4426434**
801 te	Styli carbide tipped dia. 2 mm*	**4309016**
801 tr	Styli ruby dia. 2.5 mm*	**4309088**

** for 817 CI-am*

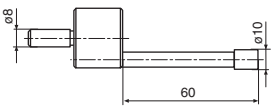
S 15/47,5



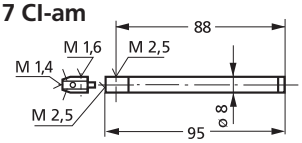
TMT 86



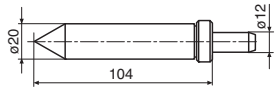
Z 10/60



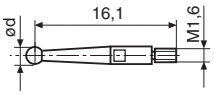
817 Cl-am



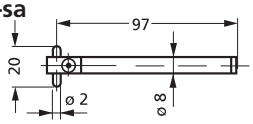
MKe 20



801t



817 Cl-sa

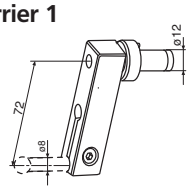


Carriers for Probes and Transducers

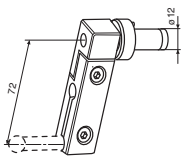
Catalog no.	Description	Order no.
Carrier 1	for probes	**7022630***
Carrier 2	with a joint for a probe	**7024010**
Carrier 3	for a Digital Indicator or an Incremental Probe	**7024086**

** Standard accessories*

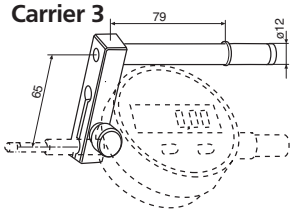
Carrier 1



Carrier 2



Carrier 3

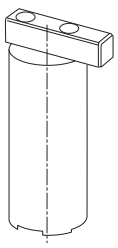


Setting Blocks

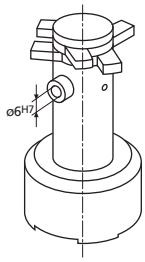
Catalog no.	Description	Order .
EB	Setting block	**7024083***
EB I	Setting block for taper probe, with calibration certificate	**7023827**

** Standard accessories*

EB



EB I



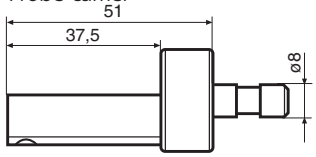
Accessories for Height Measuring Instrument Digimar CX2

Probe accessory sets

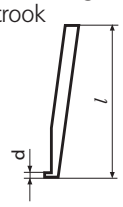
Probe set CXt1 consists of:		**7024087**
Carrying case		**7023837**
Carrier 2	with a joint for a probe	**7024010**
S 15/47,5	Disc probe	**7023608**
K 4/30	Spherical probe	**7023813**
K 4/72	Spherical probe	**7023609**
K 6/40	Spherical probe	**7023816**
K 10/60	Spherical probe	**7023810**
K 10/100	Spherical probe	**7023615**
MKe 20	Spherical probe	**7023613**
TMT 86	Spherical probe for recess measurement probe	**7023064**
Z 10/60	Cylindrical probe	**7023819**

Universal probe set CXt2 consists of:			**7034000**
Case			**3015925**
Probe carrier			**3015917**
	Dimension	**Shaft length**	
Measuring crook	d = 0.5 mm	l = 78 mm	**3015918**
Probe with pin /tip:	dia. d = 1.2 mm	l = 75 mm l_s = 15.5 mm	**3015919**
Taper probe	dia. d = 0–7.5 mm		**3015920**
Spherical probe	TC-dia. dk = 3 mm	l = 24 mm	**3022000**
Spherical probe	TC-dia. dk = 2 mm	l = 24 mm	**3022001**
Spherical probe	TC-dia. dk = 1 mm	l = 24 mm	**3022002**
Extension M3 – M3	d = 4 mm	l = 20 mm	**3015921**
Extension M3 – M2.5	d = 4 mm	l = 20 mm	**3015888**

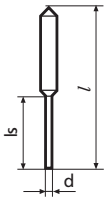
Probe carrier



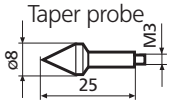
Measuring crook



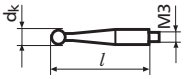
Pin probe



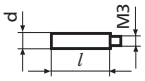
Taper probe



Spherical probe



Extension



Accessory sets for checking perpendicularity and straightness

Set CX2p2 consists of:		**4426682**
1086	Digital Indicator 12.5 mm	**4337020**
Carrier 3	for Digital Indicators	**7024086**
16 EXr	Connection cable 1086 to CX 2	**4102410**

Checking perpendicularity with a 1086 Digital Indicator

Height Measuring and Scribing Instrument Digimar 814 N / 814 G

Applications

Ideal for measuring:

- Heights
- Center distances between bores and surfaces, widths of ledges, plus marking and scribing of work pieces

Features

814 N With extra rugged, cast iron base with three-point support. To be used on base plates, machine beds and work piece surfaces.

814 G Table plate is made of fine grained black granite (green-stone) which is extremely hard and stable.

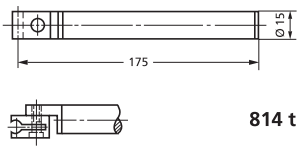
- High accuracy
- Incremental inductive measuring system
- Measuring head with an ball bush guide
- Resistance free measuring system
- Large, easy to read digital display
- Measuring system and display unit are incorporated in the measuring head
- Easy to operate due to the hand crank on the side of the measuring head, thus making height adjustment simple
- Constant measuring force; acting upwards or downwards as required
- Measuring head can be locked in position, ideal for scribing tasks
- With fine adjustment
- Data transmission via Opto RS232C interface
- Digital Preset
- Zero setting in any position
- MAX, MIN and MAX-MIN functions
- Enter tolerance limit for 1 characteristic
- Switch between mm/inch
- Mains independent due to being battery operated
- Universal application due to a broad range of accessories

Technical Data

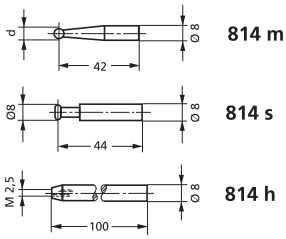
		814 N	814 G	814 N	814 G
Measuring range	mm/***inch***	320 / ***12.6“***		620 / ***24.4“***	
Resolution	mm ***(inch)***	0.01 / 0.001 (***0.0005“ / 0.00005“***)			
Measuring error	µm	20 / ***0.0008“***		30 / ***0.0012***“	
Repeatability	µm	5 / **0.0002“**			
Perpendicularity error	µm	frontal 20 (300 mm)		frontal 30 (600 mm)	
Operating time of the battery	h	2000			
Measuring force	N	ca. 3			
Working temperature	°C/°F	20 ± 1 / 68 ± 33.8			
Operating temperature	°C/°F	5 . .. 40 / 41 . . .104			
Measuring system		inductive			
Total height	mm/***inch***	513 / ***20.20“***	558 / ***21.97“***	813 / ***32.01“***	858 / ***33.78“***
Cast iron base(L x W)	mm/***inch***	205 x 175 / ***8.07“ x 6.89“***		205 x 175 / ***8.07“ x 6.89“***	
Granite plate (L x W)	mm/***inch***		200 x 300 / ***7.87“ x 11.81“***		200 x 300 / ***7.87“ x 11.81“***
Grade of accuracy			1 DIN 876		1 DIN 876
Weight	kg/lbs	6.2 / ***13.22***	14 / ***30.86***	10.5 / ***23.15***	18.3 / ***35.27***
Order-no.		**4426540**	**4426541**	**4426542**	**4426543**

Accessories for Height Measuring and Scribing Instrument Digimar 814 N / 814 G

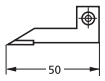
				Order no.
814 t	Probe arm with joint for mounting probes, dial indicators, dial comparators, and test indicators. Length of mounting shank Mounting bore	 150 mm 8 mm	 ***(5.91")*** ***(.315")***	**4426510***
814 m	Spherical probe To mount in probe arm 814 t	2 mm ball 3 mm ball 4 mm ball 5 mm ball 6 mm ball 7 mm ball 8 mm ball	***(.0787")*** ***(.118")*** ***(.157")*** ***(.197")*** ***(.236")*** ***(.276")*** ***(.315")***	**4426525** **4426526** **4426512** **4426527** **4426511** **4426528** **4426509***
814 s	Disc probe for measuring heights, distances, surfaces and edges. Especially recommended for narrow shoulders, e.g. on centering edges.			**4426513**
814 h	Probe holder for mounting styli of dial indicators and dial comparators for special applications.	M 2.5		**4426514**
814 a	Scriber for scribing and marking of work pieces. Carbide tipped. To be mounted on the Probe arm 814 t			**4426515**
814 kh	Holder			**4426516**
817 ks1 **817 ks2** **817 ks3** **817 ks4**	Measuring taper Measuring taper Measuring taper Measuring taper	0 – 15 14 – 20 18 – 24 23 – 30	***(0 - .591")*** ***(.551" - .787")*** ***(.709" - .945")*** ***(.906" -1.181")***	**4426071** **4426072** **4426073** **4426074**
814 u	Two direction probe for measuring outside and inside diameters, width of ledges, recesses and slots. Actual ball diameter does not influence the results.	4 mm ball	***(.157")***	**4426517**
814 ua	Interchangeable probe arm for use in conjunction with the two direction probe 814 u	2 mm ball	***(.0787")***	**4426518**
817 Cl-m	Spherical probe	4 mm ball	***(.157")***	**4426436**
817 Cl-am	Holder with connection thread	M 2.5, M 1.6, M 1.4		**4426434**
817 Cl-sa	Stylus with exchangeable measuring pin			**4426433**
817 Cl-p	Stylus with parallel measuring faces			**4426435**
	Battery 3 V, type CR 2032			**4102520***
	Dust cover	0–320 mm	***(0 - 12.60")***	**4426616***
	Dust cover	0–620 mm	***(0 - 24.41")***	**4426619***
814 Nf	Cast iron base			**4426506****
814 Gf	Table plate			**4426507****
814 X	Column with measuring head	320 mm	***(0 - 12.60")***	**4426544**
814 X	Column with measuring head	620 mm	***(0 - 24.41")***	**4426545**
16 ESv	Data connection cable Length 2 m / ***6.56 ft***	Opto RS232C		**4102510**



814 t

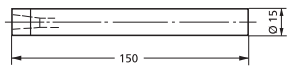


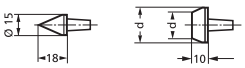
814 m
814 s
814 h



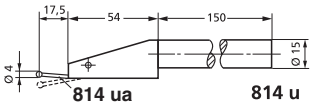
814 a

814 kh

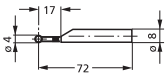




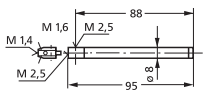
817 ks1
817 ks2
817 ks3
817 ks4



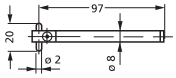
814 ua
814 u



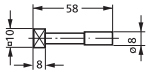
817 Cl-m



817 Cl-am



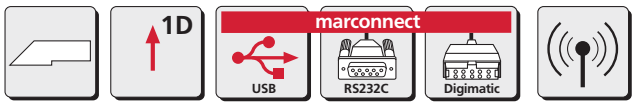
817 Cl-sa



817 Cl-p

* *Scope of supply*
** *for upgrade*

Height Measuring and Scribing Instrument Digimar 814 S



Application

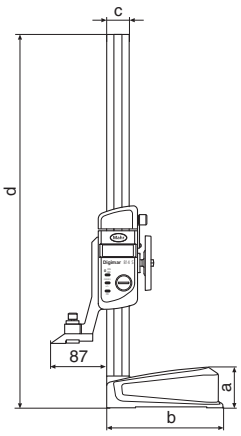
- Scribing and marking of work pieces
- Measuring heights and distances

Features

Functions:
ON/OFF
RESET (Zero setting)
mm/inch
Reversal of counting direction
DATA (data transmission)
PRESET (for entering a numerical value)

- Capacitive measuring system, life of battery approx. 2 years
- Max. measuring speed 1.5 m/s (60"/s)
- MarConnect Data output: choose either
  USB
  OPTO RS232C
  Digimatic
- High contrast Liquid Crystal Display with 12 mm high digits
- Sturdy heavy-duty base, easy to handle
- Hardened and lapped contact surface which produce both a smooth and even movement
- Slide and beam made of hardened stainless steel
- Hand crank for positioning and measuring
- Fine adjustment
- Locking screw
- Interchangable scriber point, carbide tipped

- Scope of supply:
  Scriber point, cardboard box, battery and operating instructions



Dimensions

mm	a	b	c	d
350	62	180 x 98	35 x 15	580
600	62	180 x 98	35 x 15	835

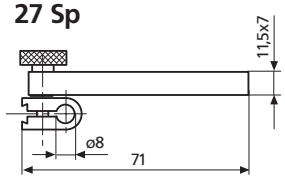
Technical Data

Measuring range mm	*(inch)*	Resolution mm/*inch*	Error limit mm/*inch*	Weight kg/lbs	Order no.
350	***(14")***	0.01 / ***.0005"***	0.04 / ***.0016"***	7 / ***15.43***	**4123800**
600	***(24")***	0.01 / ***.0005"***	0.05 / ***.0016"***	8 / ***17.64***	**4123801**

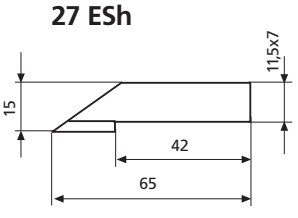
Accessories

		Order no.
Scriber Point, carbide tipped	**27 ESh**	**4123710**
Holder for test indicators	**27 Sp**	**4123041**
Battery 3V, type CR 2032		**4102520**
Data Connection Cable USB (2 m)	**16 EXu**	**4102357**
Data Connection Cable Opto RS232C (2 m), with SUB-D jack 9-pin	**16 EXr**	**4102410**
Data Connection Cable Digimatic (2 m), Flat plug 10-pin	**16 EXd**	**4102411**

27 Sp



27 ESh



DOES EVERYTHING ROTATE AROUND PRECISION?
NO PROBLEM WITH MICROMAR.

The latest information on MICROMAR products can be found on our website:
www.mahr.com, WebCode 205

► | Micrometers belong alongside calipers to the most frequently used hand measuring instruments. With their precision ground spindle, their carbide tipped measuring faces and their robust frame construction the modern micrometer from the Micromar series ensures maximum precision and a long working life. Our mechanical micrometers are extremely reliable and are easy to read due to the scales having a satin chrome finish, thus ensuring accuracy and user comfort. Our digital micrometers unite both the highly renowned mechanical precision from Mahr with most modern electronics. These digital micrometers offer simple operation with an error free reading as well as problem-free data of the determined parameters to an external evaluation instrument. Micromar 40 EW, the newest generation of waterproof digital micrometers ensures that even in the most difficult workshop conditions precise and reliable results are obtained. A speciality of Mahr is the micrometer with a dial comparator, with its built-in dial comparator, stationary anvil and constant measuring force they are particularly well suited for rapid measurements and highly precise serial measurements. | ◄

► | Micromar. Micrometers

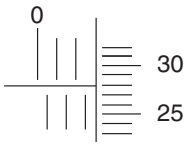
Micromar. Micrometer

Overview

Micromar - Design Features

Reading example:

Micrometer with 0.01 mm-divisions



Sleeve	2.5
Thimble	0.28
Measuring result	2.78 mm

Micromar - Types of Micrometers

Mahr - Micrometers are available with the following means of indication:

a) Digital Micrometer with digital display

b) Mechanical Micrometer with scale and dial

c) Mechanical Micrometer with scale

Error limits *G* according to DIN 862

Measuring range mm	**Error limit** *G* µm	**Measuring force** N
0 - 25	4	5 - 10
25 - 50	4	5 - 10
50 - 75	5	5 - 10
75 - 100	5	5 - 10
100 - 125	6	5 - 10
125 - 150	6	5 - 10
150 - 175	7	5 - 10
175 - 200	7	5 - 10
200 - 225	8	5 - 10
225 - 250	8	5 - 10
250 - 275	9	5 - 10
275 - 300	9	5 - 10
300 - 325	10	5 - 10
325 - 350	10	5 - 10
350 - 375	11	5 - 10
375 - 400	11	5 - 10
400 - 425	12	5 - 10
425 - 450	12	5 - 10
450 - 475	13	5 - 10
475 - 500	13	5 - 10

Micromar - Variations

a) Micrometer

b) Micrometer for inside dimensions

c) Micrometer for depth measurement

d) Micrometer Head

Function keys of Digital Micrometers

Functions			Type	
			40 EW 40 EXL	40 EX 44 EX 40 EWS 40 EWV 46 EX
PR	Enter a numerical value (Reference Setting)		●	●
mm/in	Switch between mm/inch		●	●
0/ABS	Set display to 0.000 mm / ***.0000"*** for relative measurement / Set to a reference or preset value (PR)	ABS	●	●
DATA	Data transmission	USB		●
		Digimatic		●
		RS232C		●

Micromar. Micrometer

►| The new digital water proof Micrometer **Micromar** 40 EW. Even in the most difficult conditions precise and reliable results are obtained. |◄

DIN 863-1

Highly precise measuring system, Patent pending

Ratchet is integrated in the thimble to enable one handed operation

IP65

Water proof measuring system according to Protection class IP65

Code Initial	**IP**	International Protection
First Numeral	**6**	Dust-tight
Second Numeral	**5**	Protected against powerful water jets

Rapid drive

Large display with 7.5 mm high digits

ABS

Absolute-Function: Micrometer can be set in any position to 0.000 mm / ***.0000"*** without the reference to the Preset value being lost

Stainless steel, hardened spindle

Ergonomically formed and heat insulated steel handle

Operating buttons are made from **Ultradur**®, which has an excellent chemical resistance

Sturdy satin chrome steel frame

Digital Micrometer 40 EW and 40 EXL

40 EW

ABS

DIN 863-1

IP65

40 EXL

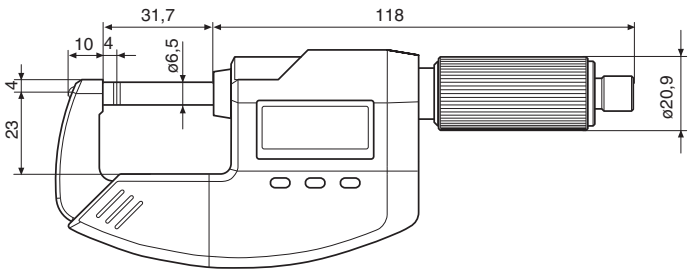
Features

Functions:
0 (Zero setting the display for Relative measurement)
ABS (Switching between Relative and Absolute measurement)
mm/inch
PR (Reference setting)

- Capacitive measuring system, life of battery approx. 2 years
- High contrast Liquid Crystal Display with 7.5 mm high digits
- Stain chrome steel frame, heat insulated
- Spindle and anvil are carbide tipped
- Spindle is made of stainless steel, hardened throughout and ground
- Ratchet is integrated in the thimble
- Rapid drive
- Supplied with: Case, battery, operating instructions

Technical Data

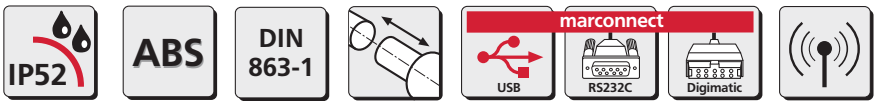
	Measuring range mm	Measuring range *(inch)*	Resolution mm/*inch*	Error limit *G* µm	Spindle thread pitch mm	Order no.	Protection class
40 EW	0 - 25	***(0 - 1")***	0.001/ ***.00005"***	4	0.635	**4151700**	**IP65**
40 EXL	0 - 25	***(0 - 1")***	0.001/ ***.00005"***	4	0.635	**4151600**	**IP40**



Accessories

	Order no.
Battery 3V, type CR 2032	**4102520**

Digital Micrometer 40 EWS with sliding spindle



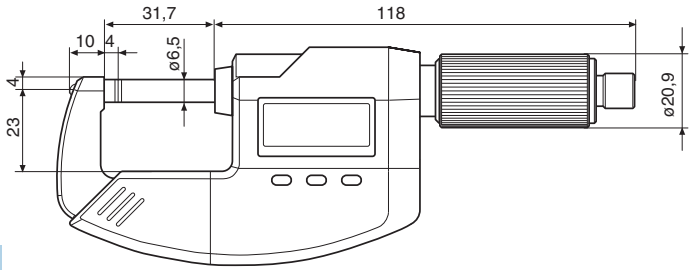
Features

Functions:
0 (Zero setting the display for Relative measurement)
ABS (Switching between Relative and Absolute measurement)
mm/inch
PR (Reference setting)

- Capacitive measuring system, life of battery approx. 2 years
- MarConnect data output, choose alternatively
  USB
  OPTO RS232C
  Digimatic
- High contrast Liquid Crystal Display with 7.5 mm high digits
- Stain chrome steel frame, heat insulated
- Spindle and anvil are carbide tipped
- Spindle is made of stainless steel, hardened throughout and ground
- Ratchet is integrated in the thimble
- Rapid drive
- Supplied with:
  Case, battery, operating instructions

Technical Data

Measuring range mm	Measuring range *(inch)*	Resolution mm/*inch*	Error limit *G* µm	Spindle thread pitch mm	Order no.
0 - 25	***(0 - 1")***	0.001/ ***.00005"***	4	0.635	**4151720**



Accessories

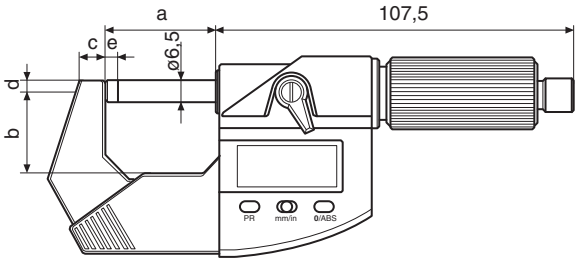
		Order no.
Battery 3V, type CR 2032		**4102520**
Data Connection Cable USB (2 m)	**16 EXu**	**4102357**
Data Connection Cable Opto RS232C (2 m), with SUB-D jack 9-pin	**16 EXr**	**4102410**
Data Connection Cable Digimatic (2 m), Flat plug10-pin	**16 EXd**	**4102411**

Digital Micrometer 40 EX with data Output

ABS | DIN 863-1 | marconnect: USB, RS232C, Digimatic

Technical Data

Measuring range mm	Measuring range *(inch)*	Resolution mm/*inch*	Error limit *G* µm	Spindle thread pitch mm	Order no.
0 - 25	***(0 - 1")***	0.001/ ***.00005"***	4	0.635	**4150570**
25 - 50	***(1 - 2")***	0.001/ ***.00005"***	4	0.635	**4150571**
50 - 75	***(2 - 3")***	0.001/ ***.00005"***	5	0.635	**4150572**
75 - 100	***(3 - 4")***	0.001/ ***.00005"***	5	0.635	**4150573**



Features

Functions:
0 (Zero setting)
ABS (Switching between Relative and Absolute measurement)
mm/inch
PRESET (enter a numerical value)
DATA (Data transmission via connection cable)

- Capacitive measuring system, life of battery ca. 2 years
- MarConnect data output, choose alternatively
  USB
  OPTO RS232C
  Digimatic
- High contrast LCD with 7.5 mm high digits
- Lacquered steel frame, heat insulated
- Spindle and anvil are carbide tipped
- Spindle is made of stainless steel, hardened throughout and ground
- Ratchet is integrated in the thimble
- Rapid drive

- Supplied with:
  Case, battery, operating instructions and setting standard (from measuring range 25-50 mm)

Accessories

		Order no.
Battery 3V, type CR 2032		**4102520**
Data Connection Cable USB (2 m)	**16 EXu**	**4102357**
Data Connection Cable Opto RS232C (2 m), with SUB-D jack 9-pin	**16 EXr**	**4102410**
Data Connection Cable Digimatic (2 m), Flat plug10-pin	**16 EXd**	**4102411**

Accessories for Data Processing see Chapter 11

Dimensions

Dimensions in mm	a	b	c	d	e
0 - 25 mm / 0-1"	31.5	24	6.5	4.5	3.5
25 - 50 mm / 1-2"	56.6	31.5	10	4.5	3.5
50 - 75 mm / 2-3"	82.5	44	10	4.5	3.5
75 -100 mm / 3-4"	107.5	56.5	10	4.5	3.5

Digital Micrometer Set 40 EXS

Application range	Order no	Remarks
0 - 100 mm ***(0 - 4")***	**4150590**	Includes: wooden case, setting standards 25 mm, 50 mm and 75 mm

Universal Digital Micrometer 40 EWV with sliding spindle

Features

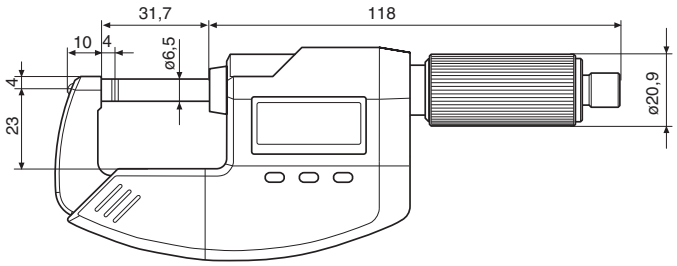
Functions:
0 (Zero setting the display for Relative measurement)
ABS (Switching from Relative to Absolute measurement)
mm/inch
PR (Reference Setting)

- Capacitive measuring system, life of battery ca. 2 years
- MarConnect data output, choose alternatively
  USB
  OPTO RS232C
  Digimatic
- High contrast Liquid Crystal Display with 7.5 mm high digits
- Satin chrome steel frame, heat insulated
- Mounting bore for inter-changeable anvils
- Measuring spindle is hardened throughout and ground
- Ratchet integrated in the thimble
- Rapid drive
- Supplied with:
  Case, battery and operating instructions

Technical Data

Measuring range* mm	*(inch)*	Resolution mm/*inch*	Error limit** *G* µm	Spindle thread pitch mm	Spindle dia. mm	Order no. without standard accessories	Order no. with standard accessories
0 - 25	***(0 - 1")***	0.001/ ***.00005"***	4	0.635	6.5	**4151711**	
0 - 25	***(0 - 1")***	0.001/ ***.00005"***	4	0.635	6.5		**4151710**

* *with thread anvils the measuring range is reduced*
** *with flat anvils over the full length of the anvils*



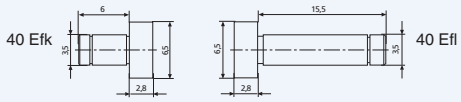
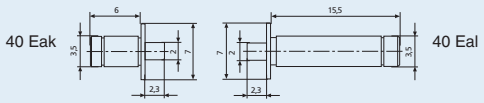
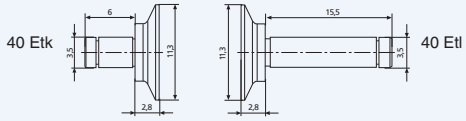
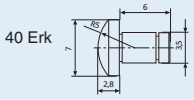
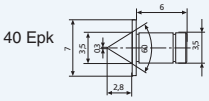
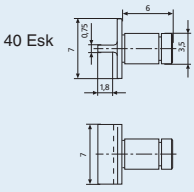
Special Accessories

		Order no.
Battery 3V, type CR 2032		**4102520**
Data Connection Cable USB (2 m)	**16 EXu**	**4102357**
Data Connection Cable Opto RS232C (2 m), with SUB-D jack 9-pin	**16 EXr**	**4102410**
Data Connection Cable Digimatic (2 m), Flat plug 10-pin	**16 EXd**	**4102411**

Accessories for Data Processing see Chapter 11

Universal Digital Micrometer 40 EWV with sliding spindle

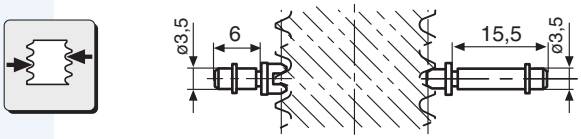
Standard Accessories are included in the set

Catalog no.	Description	Order no.	Quantity required	
40 Efk	Flat anvils (reference)	**4151771**	**1**	
40 Efl	Flat anvils (sensitive)	**4151761**	**1**	
40 Eak	Anvils with reduced measuring faces (reference)	**4151777**	**1**	
40 Eal	Anvils with reduced measuring faces (sensitive)	**4151767**	**1**	
40 Etk	Disc type anvils (reference) d = 11.3 mm	**4151772**	**1**	
40 Etl	Disc type anvils (sensitive) d = 11.3 mm	**4151762**	**1**	
40 Erk	Spherical anvil	**4151774**	**2**	
40 Epk	Concial shaped anvil	**4151773**	**2**	
40 Esk	Wedge shaped anvil (blade)	**4151775**	**2**	

Special Accessories

Thread anvils for pitch diameters

• Pair consists of a V-anvil and 1 blade



Metric thread (60°) Pitch mm	V-anvil Order no.	Blade Order no.	**Whitworth thread** (55°) Pitch range TPI	V-anvil Order no.	Blade Order no.	**American UST thread** (60°) Pitch range TPI	V-anvil Order no.	Blade Order no.
0.5 - 0.7	**4501000**	**4173700**	40 - 32	**4501007**	**4173743**	40 - 32	**4501018**	**4173815**
0.7 - 1	**4501001**	**4173701**	32 - 24	**4501008**	**4173744**	32 - 24	**4501019**	**4173816**
1.25 - 2	**4501002**	**4173702**	24 - 18	**4501009**	**4173745**	24 - 18	**4501020**	**4173817**
2 - 3.5	**4501003**	**4173703**	18 - 14	**4501010**	**4173746**	18 - 14	**4501021**	**4173818**
			14 - 10	**4501011**	**4173747**	14 - 10	**4501022**	**4173819**
			10 - 7	**4501012**	**4173748**	10 - 7	**4501023**	**4173820**

Micrometer 40 A

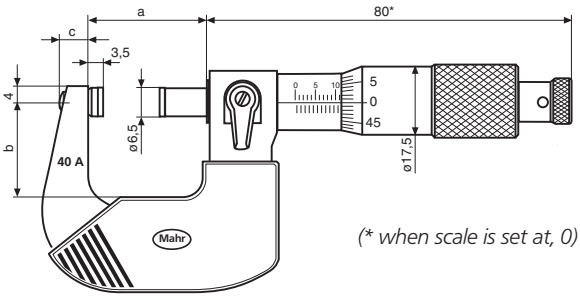
DIN 863-1

Features

- Chrome plated steel frame
- Spindle and anvil made of hardened steel, carbide tipped
- Scales with satin-chrome finish
- Heat insulators
- Rapid drive with integrated ratchet
- Locking device
- Supplied with: Case, setting standard (from measuring range 25-50 mm / 1-2"), operating instructions

Technical Data

Measuring range	Readings	Error limit *G*	Spindle thread pitch	Order no.
0 - 25 mm	0.01 mm	4 µm	0.5 mm	**4134000**
25 - 50 mm	0.01 mm	4 µm	0.5 mm	**4134001**
50 - 75 mm	0.01 mm	5 µm	0.5 mm	**4134002**
75 - 100 mm	0.01 mm	5 µm	0.5 mm	**4134003**
100 - 125 mm	0.01 mm	6 µm	0.5 mm	**4134004**
125 - 150 mm	0.01 mm	6 µm	0.5 mm	**4134005**
150 - 175 mm	0.01 mm	7 µm	0.5 mm	**4134006**
175 - 200 mm	0.01 mm	7 µm	0.5 mm	**4134007**
0 - 1"	***.0001"***	***.00016"***	***.025"***	**4134900**
1 - 2"	***.0001"***	***.00016"***	***.025"***	**4134901**
2 - 3"	***.0001"***	***.00020"***	***.025"***	**4134902**
3 - 4"	***.0001"***	***.00020"***	***.025"***	**4134903**
4 - 5"	***.0001"***	***.00024"***	***.025"***	**4134904**
5 - 6"	***.0001"***	***.00024"***	***.025"***	**4134905**
6 - 7"	***.0001"***	***.00028"***	***.025"***	**4134906**
7 - 8"	***.0001"***	***.00028"***	***.025"***	**4134907**



(when scale is set at, 0)*

Dimensions

Measuring range mm / inch	a mm	b mm	c mm
0 - 25 / 0-1"	31	25.5	7
25 - 50 / 1-2"	56	34.5	12
50 - 75 / 2-3"	81	47.5	12
75 - 100 / 3-4"	106	58.5	13
100 - 125 / 4-5"	131	71.5	13
125 - 150 / 5-6"	156	83.5	13
150 - 175 / 6-7"	182	95.5	13
175 - 200 / 7-8"	207	108.5	13

Accessories

Stand, setting standards, etc. please refer to page 3-22

Micrometer Sets 40 SA

Application range	Order no	Remarks
0-100 mm (4 Micrometers)	**4134050**	Incl. wooden case, setting standards 25 mm and 75 mm
100-200 mm (4 Micrometers)	**4134051**	Incl. wooden case, setting standards 125 mm and 175 mm
0-4" (4 Micrometers)	**4134960**	Incl. wooden case, setting standards 1" and 3"
4-8" (4 Micrometers)	**4134961**	Incl. wooden case, setting standards 5" and 7"

Micrometer 40 SH / 40 SD with extra large thimble

DIN 863-1

40 SH

40 SD

Features

- Chrome plated steel frame
- Maximum stability
- Spindle and anvil made of hardened steel, carbide tipped measuring faces
- Spindle is made of stainless steel, hardened throughout and ground
- Scales with satin-chrome finish
- Heat insulators
- Rapid drive with integrated ratchet
- Locking device
- Supplied with: Case (measuring range 0 - 100 mm)

Only 40 SD:

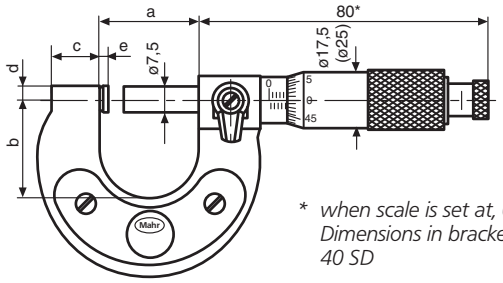
- Reading error is reduced due to the 1 mm measuring span per rotation of the thimble

Technical Data

	Measuring range mm	Readings mm	Error limit G µm	Spindle thread pitch mm	Order no
40 SH	0 - 25	0.01	4	0.5	**4131000**
	25 - 50	0.01	4	0.5	**4131001**
	50 - 75	0.01	5	0.5	**4131002**
	75 - 100	0.01	5	0.5	**4131003**
	100 - 125	0.01	6	0.5	**4131004**
	125 - 150	0.01	6	0.5	**4131005**
	150 - 175	0.01	7	0.5	**4131006**
	175 - 200	0.01	7	0.5	**4131007**
40 SD	0 - 25	0.01	4	1	**4135000**
	25 - 50	0.01	4	1	**4135001**
	50 - 75	0.01	5	1	**4135002**
	75 - 100	0.01	5	1	**4135003**

Accessories

Stand, setting standards, etc. please refer to page 3-22



* *when scale is set at, 0*
Dimensions in brackets are for the 40 SD

Dimensions

Measuring range Dimensions in mm	a	b	c	d	e
0 - 25	31	28	13	3.25	3
25 - 50	56	40	13	3.25	3
50 - 75	81	53	13	3.25	3
75 - 100	106	65	13	3.25	3
100 - 125	130	75.5	15	4	3.5
125 - 150	155	88	15	4	3.5
150 - 175	180	100.5	15	4	3.5
175 - 200	205	113	15	4	3.5

Micrometer Sets 40 SSH

Application range	Order no.	Remarks
0-100 mm (4 Micrometers)	**4133001**	Incl. wooden case, setting standards 25 mm and 75 mm
100-200 mm (4 Micrometers)	**4133005**	Incl. wooden case, setting standards 125 mm and 175 mm
0-4" (4 Micrometers)	**4133010**	Incl. wooden case, setting standards 1" and 3"

Micrometer 40 AG

DIN 863-1

Features

- Lacquered steel frame
- Spindle and anvil made of hardened steel, carbide tipped
- Scales with satin-chrome finish
- Heat insulators
- Ratchet is integrated in the thimble
- Locking device

- Supplied with:
  Case, setting standard

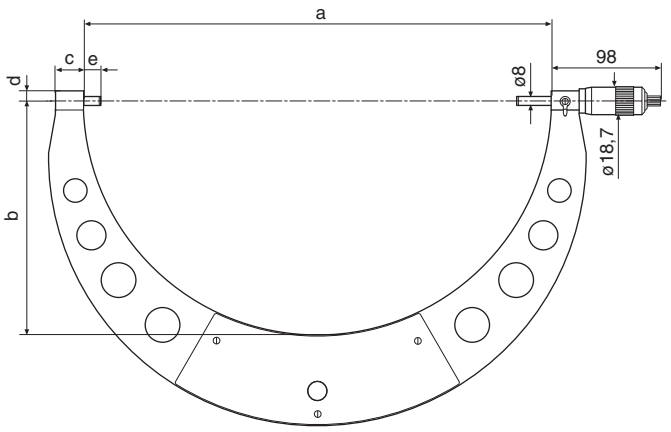
Note:
All Micrometers with measuring ranges between 400 mm to 500 mm, the frame is made from a steel tube

Technical Data

Measuring range mm	Readings mm	Error limit *G* µm	Spindle thread pitch mm	Order no.
200 - 225	0.01	8	0.5	**4134500**
225 - 250	0.01	8	0.5	**4134501**
250 - 275	0.01	9	0.5	**4134502**
275 - 300	0.01	9	0.5	**4134503**
300 - 325	0.01	10	0.5	**4134504**
325 - 350	0.01	10	0.5	**4134505**
350 - 375	0.01	11	0.5	**4134506**
375 - 400	0.01	11	0.5	**4134507**
400 - 425	0.01	12	0.5	**4134508**
425 - 450	0.01	12	0.5	**4134509**
450 - 475	0.01	13	0.5	**4134510**
475 - 500	0.01	13	0.5	**4134511**

Dimensions

Dimensions in mm	a	b	c	d	e
200 - 225	242.5	121.5	25	5	12
225 - 250	267.5	134	25	5	12
250 - 275	317.5	159	25	5	25
275 - 300	317.5	159	25	5	12
300 - 325	342.5	171.5	25	5	12
325 - 350	367.5	184	25	5	12
350 - 375	392.5	196.5	25	5	12
375 - 400	417.5	209	25	5	12
400 - 425	442	223	25	5	12
425 - 450	467	236	25	5	12
450 - 475	492	248	25	5	12
475 - 500	517	259	25	5	12



Micrometer 40 W

Features

- Lacquered steel frame
- Spindle and anvil made of hardened steel, carbide tipped
- Scales with satin-chrome finish
- Heat insulators
- Ratchet is integrated in the thimble
- Exchangeable anvils
- Locking device

- Supplied with:
  Case, setting standards

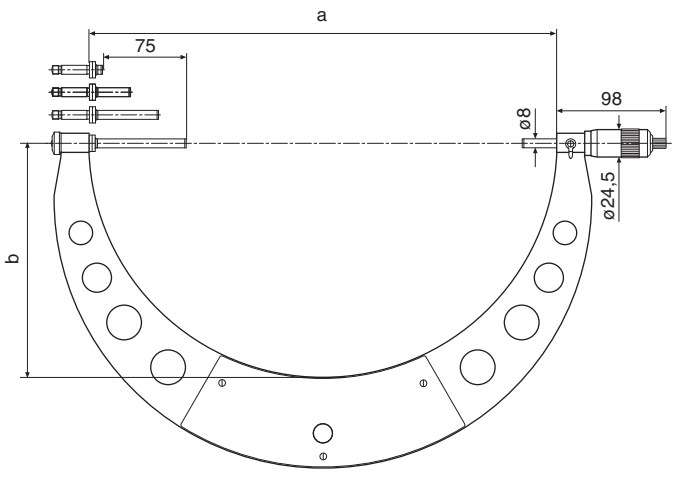
Note:
All Micrometers with measuring ranges from 400 mm up to 1000 mm, the frame is made from a steel tube

Technical Data

Measuring range mm	Readings mm	Error limit G µm	Spindle thread pitch mm	Order no.
0 - 100	0.01	5	1	**4137500**
100 - 200	0.01	7	1	**4137501**
200 - 300	0.01	9	1	**4137502**
300 - 400	0.01	11	1	**4137503**
400 - 500	0.01	13	1	**4137504**
500 - 600	0.01	21	1	**4137505**
600 - 700	0.01	23	1	**4137506**
700 - 800	0.01	26	1	**4137507**
800 - 900	0.01	28	1	**4137508**
900 - 1000	0.01	30	1	**4137509**

Dimensions

Dimensions in mm	a	b
0 - 100	117.5	59
100 - 200	217.5	109
200 - 300	317.5	159
300 - 400	417.5	209
400 - 500	517.5	259
500 - 600	617.5	309
600 - 700	717.5	360
700 - 800	817.5	410
800 - 900	917.5	460
900 - 1000	1017.5	510



Micrometer with integrated Dial Comparator 40 F / FC

DIN 863-3

Application

- For rapid measurements of diameters of cylindrical parts (shafts, bolts and shanks)
- Measurements of thickness and length
- Recommended for standard precision parts

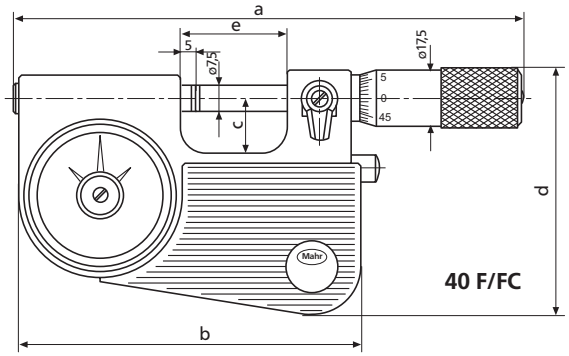
Features

- Chrome plated steel frame with heat insulators
- Maximum stability
- Retraction of the movable anvil and carbide-tipped measuring faces ensures maximum wear resistance
- Longer service life due to the ceramic measuring faces (40 FC)
- Measuring spindle made of stainless steel, hardened throughout and ground, lockable
- Scales with satin-chrome finish
- Constant measuring force
- Dial Comparator is integrated in frame
- Adjustable tolerance markers
- Supplied with: Case

Technical Data

	Measuring range	Retraction	Measuring faces Flatness	Measuring faces Parallelism	Measuring force	Order no.	Remarks
40 F	0 - 25 mm	1 mm	≤0.2 µm	≤1 µm	9 N	**4150000**	
	25 - 50 mm	1 mm	≤0.2 µm	≤1 µm	9 N	**4150001**	
	0 - 1"	***.04"***	***≤.00001"***	***≤.00005"***	9 N	**4150900**	
	1 - 2"	***.04"***	***≤.00001"***	***≤.00005"***	9 N	**4150901**	
40 FC	0 - 25 mm	1 mm	≤0.2 µm	≤1 µm	9 N	**4150200**	Ceramic measuring faces
	25 - 50 mm	1 mm	≤0.2 µm	≤1 µm	9 N	**4150201**	Ceramic measuring faces

Micrometer			Dial Comparator		
Readings	**Error limit G_{me}**	**Spindle thread pitch**	**Error limit G_e** (DIN 879)	**Meas. range**	**Spindle thread pitch**
0.01 mm	≤2 µm	0.5 mm	1 µm	±65 µm	1 µm
.0001"	***≤.00008"***	***.025"***	***.00005"***	***±.0025"***	***.00005"***



Dimensions

Dimensions in mm		a*	b	c	d	e
40 F/FC	0-25 mm (0-1")	149	100	16	71	32
	25-50 mm (1-2")	174	125	30	85	56

* *in zero position*

Accessories

Stand, setting standards, etc. please refer to page 3-22

Micrometer with Dial Comparator 40 T

DIN 863-3

Application

- For rapid measurements of diameters of cylindrical parts (shafts, bolts and shanks)
- Measurements of thickness and length
- Recommended for standard precision parts

Features

- Rugged steel frame, heat insulated and chrome plated (up to measuring range 100 - 150 mm)
- Maximum stability
- Retraction of the movable anvil and carbide-tipped measuring faces ensures maximum wear resistance
- Measuring spindle made of stainless steel, hardened throughout and ground, lockable
- Scales with satin-chrome finish
- Constant measuring force
- Heat insulators
- Supplied with: Dial Comparator 1003, wooden case

Technical Data

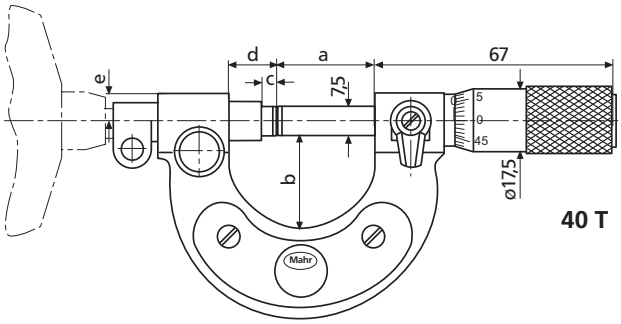
Measuring range	Retraction	Measuring faces Flatness	Measuring faces Parallelism	Measuring force	Order no.*
0 - 25 mm	1.2 mm	≤0.2 µm	≤2 µm	6.5 N	**4154000**
25 - 50 mm	1.2 mm	≤0.2 µm	≤2 µm	6.5 N	**4154001**
50 - 100 mm	1.2 mm	≤0.2 µm	≤2 µm	6.5 N	**4154002**
100 - 150 mm	1.2 mm	≤0.2 µm	≤2 µm	7.5 N	**4154003**
150 - 200 mm	1.2 mm	≤0.2 µm	≤2 µm	7.5 N	**4154004**

Micrometer			Dial Comparator+		
Readings	Error limit G_{me}	Spindle thread pitch	Error limit G_e (DIN 879)	Meas. range	Spindle thread pitch
0.01 mm	≤2 µm	0.5 mm	1 µm	±50 µm	1 µm

Dimensions

Dimensions in mm	a**	b	c	d**	e
0 - 25	27	28	4	11	8
25 - 50	52	40	4	11	8
50 - 100	76	65	5.5	30	8
100 - 150	127	87	5.5	30	8
150 - 200	177	112	5.5	30	8

* *Alternative indicating instruments are available on request*
** *in zero position*



40 T

Indicating Snap Gage 840 F
see page 9-8

Accessories

Stand, setting standards, etc. please refer to page 3-22

Precision Bench Micrometer 40 TS

DIN 863-3

Application

- For rapid measurements of diameters of cylindrical parts (shafts, bolts and shanks)
- Measurements of thickness and length
- Recommended for standard precision parts

Features

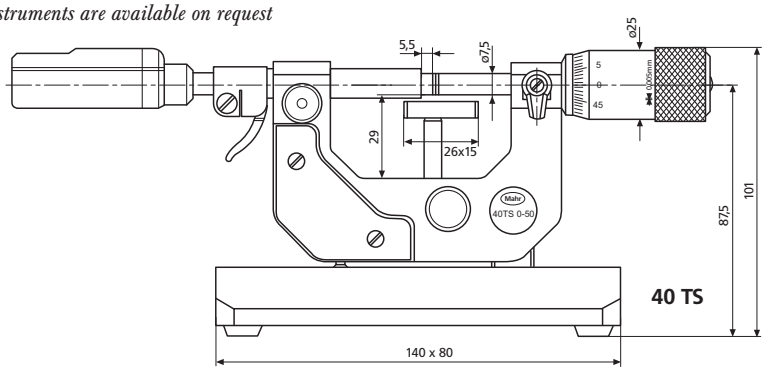
- Rugged steel frame, can be tilted up to 45° in relation to the sturdy base
- Retraction of the movable anvil and carbide-tipped measuring faces ensures maximum wear resistance
- Height-adjustable stop
- Constant measuring force
- Measuring spindle made of stainless steel, hardened throughout and ground, lockable
- Scales with satin-chrome finish

- Supplied with: Dial Comparator 1003

Technical Data

Measuring range	Retraction	Measuring faces Flatness	Measuring faces Parallelism	Measuring force	Order no.*	Order no wooden case
0 - 50 mm	1.2 mm	≤0.2 µm	≤2 µm	6.5 N	**4154030**	**4154035**
0 - 2"	***.045"***	***≤.00001"***	***≤.00008"***	6.5 N	**4154930**	**4154035**

* *Alternative indicating instruments are available on request*



Micrometer			Dial Comparator 1003/1003Z		
Readings	Error limit G_{me}	Spindle thread pitch	Error limit G_e (DIN 879)	Meas. range	Readings
0.01 mm	≤2 µm	0.5 mm	1 µm	±50 µm	1 µm
.00025"	***≤.00008"***	***.025"***	***.00005"***	***±.002"***	***.00005"***

Indicating Thread Snap Gage 852 TS see page 9-19

Accessories

Stand, setting standards, etc. please refer to page 3-22

Micrometer 40 AB with reduced measuring faces

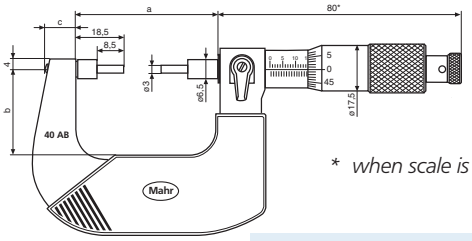
DIN 863-3

Features

- For measuring recesses, grooves, etc.
- Chrome plated steel frame
- Spindle and anvil made of hardened steel, carbide tipped
- Scales with satin-chrome finish
- Heat insulators
- Rapid drive with integrated ratchet
- Locking device
- Supplied with: Case, setting standard (from measuring range 25 - 50 mm / 1 - 2"), operating instructions

Technical Data

Measuring range	Readings	Error limit *G*	Spindle thread pitch	Order no.
0 - 25 mm	0.01 mm	4 µm	0.5 mm	**4134100**
25 - 50 mm	0.01 mm	4 µm	0.5 mm	**4134101**
50 - 75 mm	0.01 mm	5 µm	0.5 mm	**4134102**
75 - 100 mm	0.01 mm	5 µm	0.5 mm	**4134103**
0 - 1"	***.0001"***	***.00016"***	***.025"***	**4134920**
1 - 2"	***.0001"***	***.00016"***	***.025"***	**4134921**
2 - 3"	***.0001"***	***.00020"***	***.025"***	**4134922**
3 - 4"	***.0001"***	***.00020"***	***.025"***	**4134923**



* *when scale is set at, 0*

Dimensions in mm	a	b	c
0 - 25 mm / 0-1"	56	34.5	12
25 - 50 mm / 1-2"	81	47.5	12
50 - 75 mm / 2-3"	106	58.5	13
75 - 100 mm / 3-4"	131	71.5	13

Micrometer 40 AS with sliding spindle and measuring spades

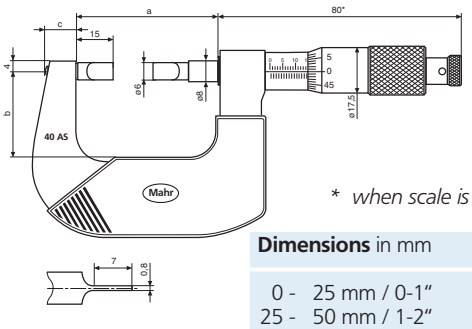
DIN 863-3

Features

- For measuring narrow recesses, grooves, etc.
- Chrome plated steel frame
- Spindle and anvil made of hardened steel
- Scales with satin-chrome finish
- Heat insulators
- Rapid drive with integrated ratchet
- Supplied with: Case, setting standard (from measuring range 25 - 50 mm / 1 - 2"), operating instructions

Technical Data

Measuring range	Readings	Error limit *G*	Spindle thread pitch	Order no.
0 - 25 mm	0.01 mm	4 µm	0.5 mm	**4134200**
25 - 50 mm	0.01 mm	4 µm	0.5 mm	**4134201**
50 - 75 mm	0.01 mm	5 µm	0.5 mm	**4134202**
75 - 100 mm	0.01 mm	5 µm	0.5 mm	**4134203**
0 - 1"	***.0001"***	***.00016"***	***.025"***	**4134930**
1 - 2"	***.0001"***	***.00016"***	***.025"***	**4134931**
2 - 3"	***.0001"***	***.00020"***	***.025"***	**4134932**
3 - 4"	***.0001"***	***.00020"***	***.025"***	**4134933**



* *when scale is set at, 0*

Dimensions in mm	a	b	c
0 - 25 mm / 0-1"	56	34.5	12
25 - 50 mm / 1-2"	81	47.5	12
50 - 75 mm / 2-3"	106	58.5	13
75 - 100 mm / 3-4"	131	71.5	13

Micrometer 40 AR with spherical anvils

DIN 863-3

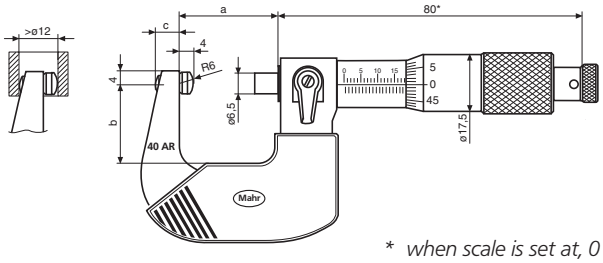
Features

- For measuring the wall thickness of a pipe, etc.
- Chrome plated steel frame
- Spindle and anvil made of hardened steel, carbide tipped
- Scales with satin-chrome finish
- Heat insulators
- Rapid drive with integrated ratchet
- Locking device
- Supplied with: Case, setting standard (from measuring range 25 - 50 mm / 1 - 2"), operating instructions

Technical Data

Measuring range	Readings	Error limit *G*	Spindle thread pitch	Order no.
0 - 25 mm	0.01 mm	4 µm	0.5 mm	**4134250**
25 - 50 mm	0.01 mm	4 µm	0.5 mm	**4134251**
0 - 1"	***.0001"***	***.00016"***	***.025"***	**4134940**
1 - 2"	***.0001"***	***.00016"***	***.025"***	**4134941**

Dimensions in mm	a	b	c
0 - 25 mm / 0-1"	31	25.5	7
25 - 50 mm / 1-2"	56	34.5	12



* *when scale is set at, 0*

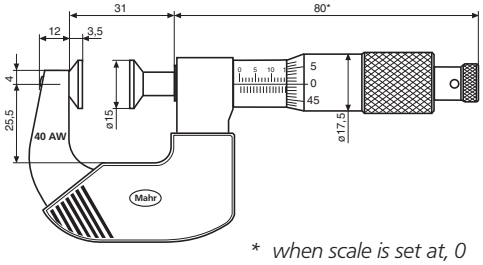
Micrometer 40 AW with sliding spindle and disc-type anvils

Features

- For measuring soft materials such as felt, rubber, cardboard, etc.
- Chrome plated steel frame
- Spindle and anvil made of hardened steel
- Scales with satin-chrome finish
- Heat insulators
- Rapid drive with integrated ratchet
- Supplied with: Case, setting standard (from measuring range 25 - 50 mm / 1 - 2"), operating instructions

Technical Data

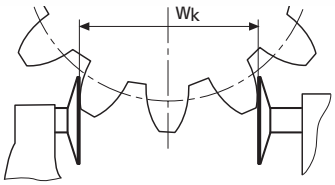
Measuring range	Readings	Error limit *G*	Parallelism	Flatness	Spindle thread pitch	Order no
0 - 25 mm	0.01 mm	8 µm	5 µm	2µm	0.5 mm	**4134300**
0 - 1"	***.0001"***	***.0003"***	***.0002"***	***.001"***	***.025"***	**4134950**



* *when scale is set at, 0*

Precision Micrometer 40 SM with disc-type anvils

DIN 863-3



Features

- Chrome plated steel frame
- Maximum stability
- Spindle is hardened throughout and ground
- Disc-type anvils are hardened and lapped
- Scale have a satin chrome finish
- Heat insulators
- Rapid drive with integrated ratchet
- Locking device
- Supplied with: Case (measuring range 0 - 95 mm)

Application

For measurements of

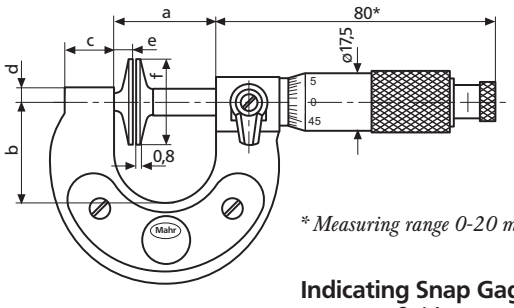
- Tooth spans W_k as of module 0.8 as indirect determination of tooth thickness on spur gears with straight and helical teeth
- Shoulders on shafts
- Undercut dimensions
- Registers
- Soft materials such as rubber, cardboard, felt, etc.

Technical Data

Measuring range mm	Readings mm	Error limit *G* µm	Spindle thread pitch mm	Measuring faces Flatness µm	Measuring faces Parallelism µm	Order no.
0 - 20	0.01	4	0.5	≤ 0.6	≤ 4	**4145000**
20 - 45	0.01	4	0.5	≤ 0.6	≤ 4	**4145001**
45 - 70	0.01	5	0.5	≤ 0.6	≤ 4	**4145002**
70 - 95	0.01	5	0.5	≤ 0.6	≤ 4	**4145003**
95 - 120	0.01	6	0.5	≤ 0.6	≤ 5	**4145004**
120 - 145	0.01	6	0.5	≤ 0.6	≤ 5	**4145005**
145 - 170	0.01	7	0.5	≤ 0.6	≤ 5	**4145006**
170 - 195	0.01	7	0.5	≤ 0.6	≤ 5	**4145007**

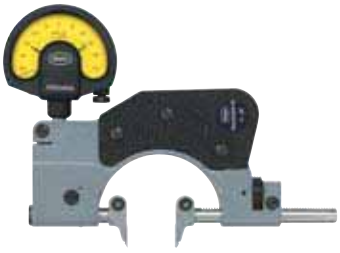
Dimensions

Dimensions in mm	a	b	c	d	e	f
0 - 20	31	28	13	3.25	4.5	25
20 - 45	56	40	13	3.25	4.5	25
45 - 70	81	53	13	3.25	4.5	25
70 - 95	106	65	13	3.25	4.5	25
95 - 120	130	75.5	15	4	4.5	30
120 - 145	155	88	15	4	4.5	30
145 - 170	180	100.5	15	4	4.5	30
170 - 195	205	113	15	4	4.5	30



** Measuring range 0-20 mm*

Indicating Snap Gage 840 FM
see page 9-14



Accessories

Stand, setting standards, etc. please refer to page 3-22

Thread Micrometer 40 Z

DIN 863-3

Features

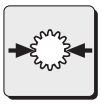
- For measuring pitch, root and outside diameters
- Rugged steel frame, heat insulated
- Spindle is hardened throughout, ground and is also provided which a locking device
- Adjustable anvil
- Both the spindle and anvil have a mounting bore for accommodating inter-changeable anvils
- Flat end surface of the anvil shank rests on a hardened steel ball which is at the bottom of the mounting bore
- Scales have a satin-chrome finish

Technical Data

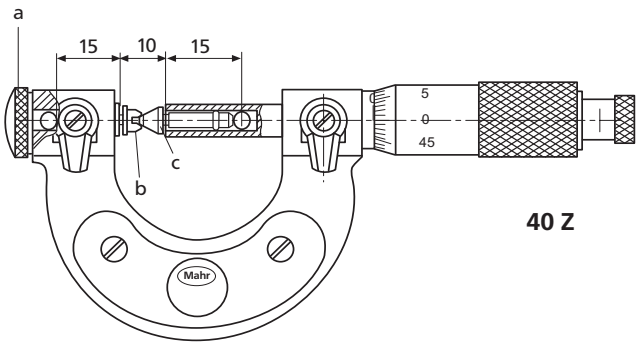
Readings	0.01 mm
Mounting bores for anvils	3.5 mm
Spindle thread pitch	0.5 mm
Thimble dia.	17.5 mm
Accuracy	DIN 863

Measuring range mm	Error limit G_{me}	Order no.	Order no. wooden case
0 - 25*	4 µm	**4170000**	**4170010**
25 - 50	4 µm	**4170001**	**4170011**
50 - 75	5 µm	**4170002**	**4170012**
75 - 100	5 µm	**4170003**	**4170013**
100 - 125	6 µm	**4170004**	**4170014**
125 - 150	6 µm	**4170005**	**4170015**
150 - 175	7 µm	**4170006**	**4170016**
175 - 200	7 µm	**4170007**	**4170017**

* *Setting only with Thread Setting Plug Gages 715 E, when the interchangeable anvils span over several leads*



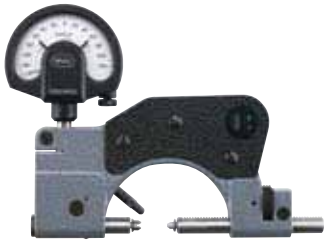
Ball anvils see Page 9-23



40 Z

a = Regulating range ±0.5 mm
b = V-anvil
c = Tapered anvil

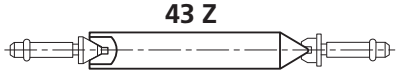
Indicating Thread Snap Gage 852 see page 9-18



Accessories

Setting Standards 43 Z
For setting Thread Micrometers 40 Z.
With point on one side and a V-groove on the other, both match the pitch angle of thread to be inspected.
One setting standard is sufficient for two adjacent frame sizes.

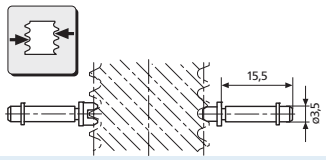
43 Z



Length mm	Accuracy ± µm	Thread angle 60° Order no.	Thread angle 55° Order no.
25	4	**4175000**	**4175100**
50	4.5	**4175001**	**4175101**
75	4.5	**4175002**	**4175102**
100	4.5	**4175003**	**4175103**
125	5	**4175004**	**4175104**
150	5	**4175005**	**4175105**
175	5	**4175006**	**4175106**
200	5.5	**4175630**	**4175636**

Interchangeable Anvils for Thread Micrometer 40 Z

For pitch, root and outside diameters. Hardened, wear-resistant special steel. With cylindrical mounting shank and retainer ring which ensures locking while permitting rotation in bore of spindle and anvil.



For pitch diameters

Set consists of V-anvil and tapered anvil. For pitch range 0.2 - 0.45 mm V-anvil covers 3 thread leads. Therefore setting with Thread Setting Plug Gages 715 E, as opposed to Setting Standards 43 Z for other applications.

Metric thread (60°)

Pitch mm	V-anvil Order no.	Tapered anvil Order no.
0.2	**4173007**	**4173407**
0.25	**4173008**	**4173408**
0.3	**4173009**	**4173409**
0.35	**4173010**	**4173410**
0.4	**4173011**	**4173411**
0.45	**4173012**	**4173412**
0.5 - 0.7	**4173000**	**4173400**
0.7 - 1	**4173001**	**4173401**
1.25 - 2	**4173002**	**4173402**
2 - 3.5	**4173003**	**4173403**
3.5 - 5	**4173004**	**4173404**
5 - 7	**4173005**	**4173405**
7 - 9	**4173006**	**4173406**

Whitworth thread (55°)

Pitch range TPI	V-anvil Order no.	Tapered anvil Order no.
40 - 32	**4173043**	**4173443**
32 - 24	**4173044**	**4173444**
24 - 18	**4173045**	**4173445**
18 - 14	**4173046**	**4173446**
14 - 10	**4173047**	**4173447**
10 - 7	**4173048**	**4173448**
7 - 4.5	**4173049**	**4173449**
4.5 - 3	**4173050**	**4173450**
3 - 2.5	**4179408**	**4179409**

American UST thread (60°)

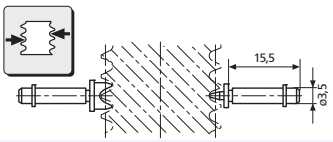
Pitch range TPI	V-anvil Order no.	Tapered anvil Order no.
60 - 48	**4173113**	**4173513**
48 - 40	**4173114**	**4173514**
40 - 32	**4173115**	**4173515**
32 - 24	**4173116**	**4173516**
24 - 18	**4173117**	**4173517**
18 - 14	**4173118**	**4173518**
14 - 10	**4173119**	**4173519**
10 - 7	**4173120**	**4173520**
7 - 4.5	**4173121**	**4173521**
4.5 - 3	**4173122**	**4173522**

For pitch diameters

Set consists of V-anvil and tapered anvil. Shank length 15.5 mm

For root diameters

Set consists of V-anvil and pointed anvil. Each pitch requires a separate V-anvil. Pointed anvil can be used for several pitches.



Trapezoid threads

Pitch mm	V-anvil Order no.	Tapered anvil Order no.
1	**4173250**	**4173650**
1.5	**4173251**	**4173651**
2	**4173252**	**4173652**
3	**4173253**	**4173653**
4	**4173254**	**4173654**
5	**4173255**	**4173655**
6	**4173256**	**4173656**
7	**4173257**	**4173657**
8	**4173258**	**4173658**
9	**4173259**	**4173659**
10	**4173260**	**4173660**

Metric thread (60°)

Pitch mm	V-anvil Order no.	Tapered anvil Order no.
0.5	**4173213**	
0.6	**4173214**	
0.7	**4173215**	
0.75	**4173216**	**4173220**
0.8	**4173217**	
0.9	**4173218**	
1	**4173219**	
1.25	**4173221**	
1.5	**4173222**	**4173224**
1.75	**4173223**	
2	**4173225**	
2.5	**4173226**	**4173228**
3	**4173227**	
3.5	**4173229**	
4	**4173230**	**4173232**
4.5	**4173231**	
5	**4173233**	
5.5	**4173234**	**4173236**
6	**4173235**	
7	**4173237**	
8	**4173238**	**4173240**
9	**4173239**	

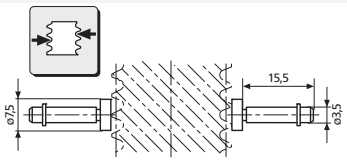
Whitworth thread (55°) American UST thread (60°)

Pitch range TPI	V-anvil Order no.	Tapered anvil Order no.
40	**4173331**	
36	**4173321**	**4173334**
32	**4173332**	
28	**4173333**	
26	**4173335**	
24	**4173336**	
22	**4173337**	**4173341**
20	**4173338**	
19	**4173339**	
18	**4173340**	
16	**4173342**	**4173344**
14	**4173343**	
12	**4173345**	**4173348**
11	**4173346**	
10	**4173347**	
9	**4173349**	**4173452**
8	**4173350**	
7	**4173451**	
6	**4173453**	
5	**4173454**	**4173456**
4.5	**4173455**	
4	**4173457**	
3.5	**4173458**	**4173461**
3.25	**4173459**	
3	**4173460**	

For outside diameter

Pair of Flat Anvils 40 Za
with flat measuring faces

Made of hardened steel
Order no. **4173210**
Carbide tipped
Order no. **4511190**



Accessories for Micrometers

41 H

Stand 41 H

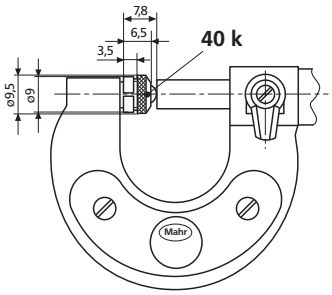
- For mounting a micrometer
- Enables the user to use both hands to operate the micrometer and / or to insert a work piece
- Sturdy, heavy-duty base, hammer-dimple enamel finish
- Clamping jaws are rubber lined to protect micrometer, the clamping jaws can be tilted
- Both the clamping jaws and hinge are fixed in place with one screw

Dimensions (D x W x H)	**Order no.**
130 x 100 x 90 mm	**4158000**

Ball shaped Anvil Attachment 40 k

- For measuring the thickness, for example: of pipe walls
- Slips over every anvil or the spindle with a dia. 7.5 mm
- Carbide ball, Ball dia. 5 ± 0.002 mm

Order no. **4130099**



Setting Standards 43 A

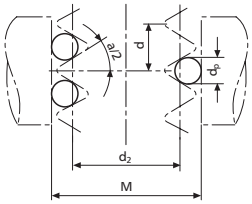
- For testing the basic setting of a micrometer
- Heat insulated handle
- Manufacturing tolerance js 2

Length mm	**Order no.**	**Length** inch	**Order no.**
25	**4159400**	***1"***	**4159940**
50	**4159401**	***2"***	**4159941**
75	**4159402**	***3"***	**4159942**
100	**4159403**	***4"***	**4159943**
125	**4159404**	***5"***	**4159944**
150	**4159405**	***6"***	**4159945**
175	**4159406**	***7"***	**4159946**

Thread Pin Gage 426 M in holder

- For determining the pitch diameter of external threads according to the three wire method
- Slips over every anvil or the spindle
- Pin gages are hardened and lapped

426 M



Pin gage dia.	**Manufacturing tol.**	**Mounting hole**
0.17 - 5.05 mm	± 0.5 µm	dia. 6.5 mm / 7.5 mm

Order no. and further details see page 13-18

Wooden Cases for Micrometer

For measuring ranges over 100 mm the following wooden cases are available:

	40 SH	**40 SM**	**Order no.**
Meas. range mm	100-125	95-120	**4130064**
	125-150	120-145	**4130065**
	150-175	145-170	**4130066**
	175-200	170-195	**4130067**

Inside Micrometer 44 Cms Set

Features

- Rigid, lightweight tubular construction
- Spindle is hardened throughout and ground
- Locking lever
- Scales with satin-chrome finish
- Carbide tipped spherical measuring faces
- Interchangeable extensions 44 Cv with cylindrical gage rods that are spring-mounted in protective sleeves; for the extension of the measuring range
- Protection sleeves have a satin chrome finish

Span of error

Basic unit in combination with any of the extensions

$4\ \mu m + 10 \times 10^{-6} \times l$

(l = length of the combination mm)

Technical Data

Catalog no.	Measuring range mm	Meas. head 44 Cm Readings mm	Meas. head 44 Cm Spindle thread pitch mm	Extensions 44 Cv length in mm	Order no.	Remarks
44 Cms1	100-150	0.01	0.5	25	**4168020**	incl. case
44 Cms2	100-300			25 / 50 / 100	**4168021**	incl. case
44 Cms3	100-500			25 / 50 / 100 / 200	**4168022**	incl. case
44 Cms4	100-900*			25 / 50 / 100 / 200 / 400	**4168023**	incl. case

** up to 2500 mm can be achieved with 2 extensions: 44 Cv 800 mm*

Accessories

Individual Extensions 44 Cv

Length a mm	dia. b mm	Order no.
25	15	**4167030**
50	15	**4167031**
100	15	**4167032**
200	15	**4167033**
400	15	**4167034**
800	22	**4167035**

Inside Micrometer 44 Cm

Measuring range mm	Reading mm	Spindle thread pitch mm	Order no.
100 - 125	0.01	0.5	**4168001**

	Order no.
Case for Inside Micrometer 44 Cm and extension sets Cvs1 or Cvs2	**4168015**
Wooden case for 2 extensions 44Cv 800 mm	**4168016**

Inside Micrometer 44 F

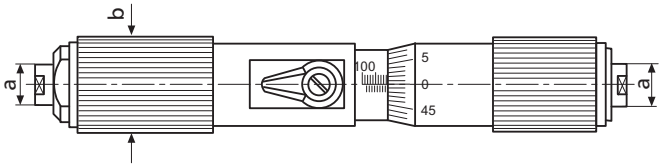
DIN 863-4

Features

- Rigid, lightweight tubular construction
- Spindle is hardened throughout and ground
- Measuring faces spherically lapped, one measuring face adjustable
- Scales with satin-chrome finish
- From measuring range 100-125 mm with heat insulators and a locking device
- Supplied with: Case

Technical Data

Measuring range mm	Readings mm	Error limit *G* µm	Spindle thread pitch mm	Order no.
30 - 40	0.01	4	0.5	**4163000**
40 - 50	0.01	4	0.5	**4163001**
50 - 70	0.01	5	0.5	**4163002**
70 - 100	0.01	5	0.5	**4163003**
100 - 125	0.01	6	0.5	**4163004**
125 - 150	0.01	6	0.5	**4163005**
150 - 175	0.01	7	0.5	**4163006**
175 - 200	0.01	7	0.5	**4163007**



Dimensions

Meas. range in mm	a	b
30 - 70	7	12.5
70 - 100	7	13.5
100 - 200	8	20

Accessories

	Page
Ring Gage 355 E for testing the basic setting	13-17

Special wear resistant steel,
hardened and lapped
Dimensions according to DIN 2250 C
Manufacturing tolerance in accordance to DIN 2250
Uncertainty of the engraved actual dimension 1/2 IT1

355 E

Self-Centering Inside Micrometer 44 A

DIN 863-4

Applications

For measuring:
- through holes
- blind holes
- centering shoulders

Features

- Scales with satin-chrome finish
- Spindle is hardened through-out and ground
- Rapid drive with integrated ratchet
- Self-centering measuring head consists of 3 laterally positioned anvils, each are offset at intervals of 120°
- Anvils from 12.5 mm are carbide tipped
- From 12.5 mm the anvils can be used to measure to the bottom of a bore
- From 40 mm all measuring heads are made from aluminum to reduce weight
- Supplied with:
  Case and operating instructions

Technical Data

Measuring range mm	Readings mm	Error limit *G* * µm	Order no.
6 - 8	0.005	4	**4190000**
8 - 10	0.005	4	**4190001**
10 - 12.5	0.005	4	**4190002**
12.5 - 16	0.005	4	**4190003**
16 - 20	0.005	4	**4190004**
20 - 25	0.005	4	**4190005**
25 - 30	0.005	4	**4190006**
30 - 35	0.005	4	**4190007**
35 - 40	0.005	4	**4190008**
40 - 50	0.005	4	**4190009**
50 - 60	0.005	5	**4190010**
60 - 70	0.005	5	**4190011**
70 - 85	0.005	5	**4190012**
85 - 100	0.005	5	**4190013**
100 - 125	0.005	6	**4190014**
125 - 150	0.005	6	**4190015**
150 - 175	0.005	7	**4190016**
175 - 200	0.005	7	**4190017**

* *Over the full length of the anvils*

Self-Centering Inside Micrometer Sets 44 AS

Measuring range mm	*(inch)*	Number of Micrometers 44 A	Ring gages dia. mm	Order no.
6 - 12.5	***(.25 - .5")***	3	8 / 10	**4190050**
12.5 - 25	***(.5 - 1")***	3	16 / 20	**4190051**
25 - 50	***(1 - 2")***	4	30 / 40	**4190052**
50 - 100	***(2 - 4")***	4	60 / 85	**4190053**

- Supplied with:
  Case and ring gage (includes a traceable calibration certificate for the ring gages)

Digital Self-Centering Inside Micrometer 44 EX

Application

For measuring:
- through holes
- blind holes
- centering shoulders

Technical Data

Measuring range mm	Measuring range *(inch)*	Readings mm/*inch*	Error limit *G** µm	Order no.
6 - 8	*(.25 - .3125")*	0.001/ *.00005"*	4	**4191000**
8 - 10	*(.3125 - .4")*	0.001/ *.00005"*	4	**4191001**
10 - 12.5	*(.4 - .5")*	0.001/ *.00005"*	4	**4191002**
12.5 - 16	*(.5 - .625")*	0.001/ *.00005"*	4	**4191003**
16 - 20	*(.625 - .775")*	0.001/ *.00005"*	4	**4191004**
20 - 25	*(.775 - 1.0")*	0.001/ *.00005"*	4	**4191005**
25 - 30	*(1.0 - 1.2")*	0.001/ *.00005"*	4	**4191006**
30 - 35	*(1.2 - 1.4")*	0.001/ *.00005"*	4	**4191007**
35 - 40	*(1.4 - 1.6")*	0.001/ *.00005"*	4	**4191008**
40 - 50	*(1.6 - 2.0")*	0.001/ *.00005"*	4	**4191009**
50 - 60	*(2.0 - 2.35")*	0.001/ *.00005"*	5	**4191010**
60 - 70	*(2.35 - 2.75")*	0.001/ *.00005"*	5	**4191011**
70 - 85	*(2.75 - 3.35")*	0.001/ *.00005"*	5	**4191012**
85 - 100	*(3.35 - 4.0")*	0.001/ *.00005"*	5	**4191013**
100 - 125	*(4.0 - 4.9")*	0.001/ *.00005"*	6	**4191014**
125 - 150	*(4.9 - 5.9")*	0.001/ *.00005"*	6	**4191015**
150 - 175	*(5.9 - 6.9")*	0.001/ *.00005"*	7	**4191016**
175 - 200	*(6.9 - 7.9")*	0.001/ *.00005"*	7	**4191017**

* *Over the full length of the anvils*

Features

Functions:
0 (Setting the display to zero for Relative measurement)
ABS (Switching between Relative and Absolute measurement)
mm/inch
PR (Reference setting)

- Basic Instrument consists of: Basic Unit 44 EXg and Measuring Head 44 Ak
- Threaded connection for changing the measuring heads
- Self-Centering measuring head consists of 3 laterally positioned anvils, each are offset at intervals of 120°
- Anvils from 12.5 mm are carbide tipped
- From 12.5 mm the anvils can be used to measure to the bottom of a bore
- From 40 mm all measuring heads are made from aluminum to reduce weight
- Supplied with: Case, battery and operating instructions

Digital Self-Centering Inside Micrometer Sets 44 EXS

Measuring range mm	Measuring range *(inch)*	Number of measuring heads 44 Ak	Ring gages dia. mm	Order no.
6 - 12.5	*(.25 - .5")*	3	8 / 10	**4191050**
12.5 - 25	*(.5 - 1")*	3	16 / 20	**4191051**
25 - 50	*(1 - 2")*	4	30 / 40	**4191052**
50 - 100	*(2 - 4")*	4	60 / 85	**4191053**

- Supplied with:
  1 Basic Unit 44 EXg, Measuring Heads 44 Ak, case and ring gages (includes a traceable calibration certifcate for the ring gages)

Self-Centering Measuring Pistol 844 A

Applications

For measuring:
- through holes
- blind holes
- centering shoulders

Technical Data

Measuring range mm	Measuring range *(inch)*	Error limit *G* * µm / *inch*	Order no.**
6 - 8	***(.25 - .3125")***	3 / ***0.00015***	**4487600**
8 - 10	***(.3125 - .4")***	3 / ***0.00015***	**4487601**
10 - 12.5	***(.4 - .5")***	3 / ***0.00015***	**4487602**
12.5 - 16	***(.5 - .625")***	3 / ***0.00015***	**4487603**
16 - 20	***(.625 - .775")***	3 / ***0.00015***	**4487604**
20 - 25	***(.775 - 1")***	3 / ***0.00015***	**4487605**
25 - 30	***(1.0" - 1.2")***	3 / ***0.00015***	**4487606**
30 - 35	***(1.2 - 1.4")***	3 / ***0.00015***	**4487607**
35 - 40	***(1.4 - 1.6")***	3 / ***0.00015***	**4487608**
40- 50	***(1.6 - 2.0")***	3 / ***0.00015***	**4487609**
50 - 60	***(2.0 - 2.35")***	4 / ***0.00016***	**4487610**
60 - 70	***(2.35 - 2.75")***	4 / ***0.00016***	**4487611**
70 - 85	***(2.75 - 3.35")***	4 / ***0.00016***	**4487612**
85 - 100	***(3.35 - 4.0")***	4 / ***0.00016***	**4487613**
100 - 125	***(4.0 - 4.9")***	5 / ***0.0002***	**4487614**
125 - 150	***(4.9 - 5.9")***	5 / ***0.0002***	**4487615**
150 - 175	***(5.9 - 6.9")***	6 / ***0.00025***	**4487616**
175 - 200	***(6.9 - 7.9")***	6 / ***0.00025***	**4487617**

Features

- Basic Instrument consists of: 844 Ag and Measuring Head 44 Ak
- Threaded connection for changing the measuring heads
- Self-Centering measuring head consists of 3 laterally positioned anvils, each are offset at intervals of 120°
- Anvils from 12.5 mm are carbide tipped
- From 12.5 mm the anvils can be used to measure to the bottom of a bore
- From 40 mm all measuring heads are made from aluminum to reduce weight
- Supplied with: Case and operating instructions

The following indicating instruments are recommended:

Indicating instr.	Order no.
MarCator 1086	**4337021**
MarCator 1087	**4337061**

Self-Centering Measuring Pistol Set 844 AS

Measuring range mm	Measuring range *(inch)*	Number of measuring heads	Ring Gages dia. mm	Order no. with Digital Indicator 1086	Order no.**
6 - 12.5	***(.25 - .5")***	3	8 / 10	**4487660**	**4487650**
12.5 - 25	***(.5 - 1")***	3	16 / 20	**4487661**	**4487651**
25 - 50	***(1 - 2")***	4	30 / 40	**4487662**	**4487652**
50 - 100	***(2 - 4")***	4	60 / 85	**4487663**	**4487653**

- Supplied with:
  1 Basic Instrument 844 Ag, Measuring Heads 44 Ak, case and ring gages (includes a traceable calibration certificate for the ring gages)

* *Indicator is not taken into consideration, over the full length of the anvils*
** *Excludes indicator*

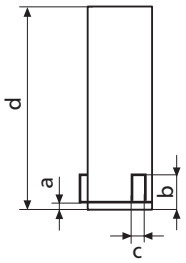
Accessories für 44 A, 44 EX, 844 A

Measuring Heads 44 Ak for 44 EX and 844 A

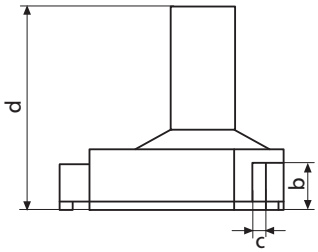
- Self-centering measuring head consists of 3 laterally positioned anvils, each are offset at intervals of 120°
- Anvils from 12.5 mm are carbide tipped
- From 12.5 mm, anvils can be used to measure to the base of a bore
- From 40 mm all measuring heads are made from aluminum to reduce weight

Measuring range mm	Measuring range *(inch)*	Order no.
6 - 8	*(.25 - .3125")*	**4190030**
8 - 10	*(.3125 - .4")*	**4190031**
10 - 12.5	*(.4 - .5")*	**4190032**
12.5 - 16	*(.5 - .625")*	**4190033**
16 - 20	*(.625 - .775")*	**4190034**
20 - 25	*(.775 - 1.0")*	**4190035**
25 - 30	*(1.0 - 1.2")*	**4190036**
30 - 35	*(1.2 - 1.4")*	**4190037**
35 - 40	*(1.4 - 1.6")*	**4190038**
40 - 50	*(1.6 - 2.0")*	**4190039**
50 - 60	*(2.0 - 2.35")*	**4190040**
60 - 70	*(2.35 - 2.75")*	**4190041**
70 - 85	*(2.75 - 3.35")*	**4190042**
85 - 100	*(3.35 - 4.0")*	**4190043**
100 - 125	*(4.0 - 4.9")*	**4190044**
125 - 150	*(4.9 - 5.9")*	**4190045**
150 - 175	*(5.9 - 6.9")*	**4190046**
175 - 200	*(6.9 - 7.9")*	**4190047**

Meas. range 6 - 12.5 mm



Meas. range 12.5 - 200 mm



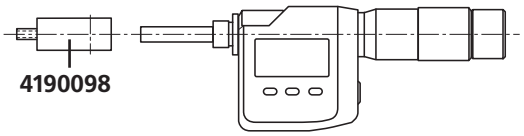
Measuring range mm	a	b	c	d
6 - 8	1.3	4.3	2	64
8 - 10	1.8	4.8	2	64
10 - 12.5	2	6	2.5	64
12.5 - 16	–	7	3	65
16 - 20	–	8.5	4	65
20 - 25	–	11	4	70
25 - 30	–	11	4	70
30 - 35	–	12	5	71
35 - 40	–	12	5	71
40 - 50	–	18	5	79
50 - 60	–	18	7	79
60 - 70	–	18	7	79
70 - 85	–	18	7	97
85 - 100	–	18	7	97
100 - 125	–	19	7	132
125 - 150	–	19	7	132
150 - 175	–	19	7	132
175 - 200	–	19	7	132

Ring Gages 44 Ae

- Can be used for 2 consecutive measuring ranges
- Manufacturing tolerance in accordance to DIN 2250C
- Includes a traceable calibration certificate

dia. mm	Order no.	dia. mm	Order no.
8	**4190300**	40	**4190305**
10	**4190301**	60	**4190306**
16	**4190302**	85	**4190307**
20	**4190303**	125	**4190308**
30	**4190304**	175	**4190309**

Basic Unit 44 EXg



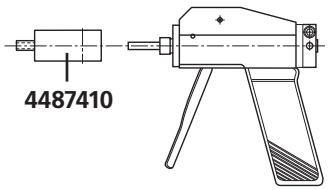
Threaded connection for changing the measuring heads.

Measuring range mm	Measuring range *(inch)*	Order no.
6 - 12.5	*(.25 - .5")*	**4190104**
12.5 - 100*	*(.5 - 4.0")*	**4190105**
20 - 100	*(.775 - 4.0")*	**4190101**
100 - 200	*(4.0 - 7.9")*	**4190102**

* *Includes adaptor 4190098*

Basic Unit Measuring Pistol 844 Ag

Threaded connection for changing the measuring heads. Any indicating instrument with an 8 mm mounting shank can be used.

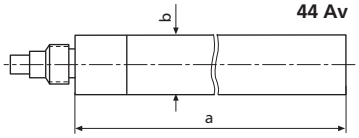


Measuring range mm	Measuring range *(inch)*	Order no.
6 - 100*	*(.25 - 4.0")*	**4487630**
20 - 100	*(.775 - 4.0")*	**4487631**
100 - 200	*(4.0 - 7.9")*	**4487632**

* *Includes adaptor 4487410*

Depth Extension Rod 44 Av

Measuring range mm	Measuring range *(inch)*	Length a mm	dia. b mm	Order no.
6 - 10	*(.25 - .4")*	75	5.8	**4190090**
10 - 20	*(.4 - .775")*	75	9.5	**4190091**
20 - 25	*(.775 - 1")*	150	19.0	**4190092**
25 - 200	*(1 - 7.9")*	150	22.0	**4190093**



Depth Micrometer 45 T

Applications

- Depth measurement
- Measuring the space between grooves and groove widths (in conjunction with a Disc anvil 45 Tm)

Features

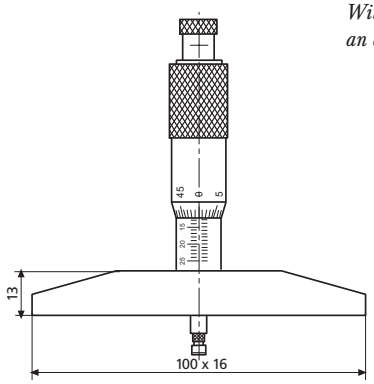
- Measuring spindle is hardened throughout and ground
- Hardened chrome plated cross beam, the contact surface is lapped
- Hardened anvil
- When using interchangeable extensions recalibrating the depth micrometer is not necessary
- Scales with satin-chrome finish
- Supplied with: Extensions 25 mm and 50 mm, case

Technical Data

Total measuring range mm	Range of micrometer mm	Readings mm	Spindle thread pitch mm	Error limit with standard anvil µm	Extensions mm	Length tolerance of extensions µm	Order no.
0 - 100	25	0.01	0.5	≤5 µm	25/50	± 1.5 µm	**4180000**

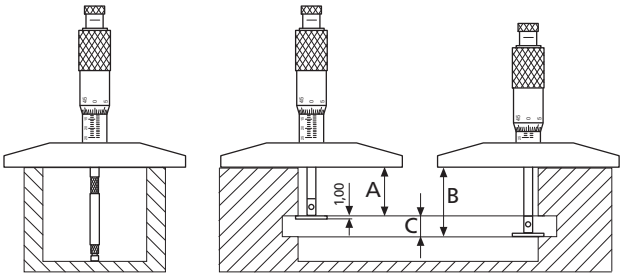
Standard depth measurements

With a standard anvil, if necessary with an extension



Measuring the space between grooves and the widths of a groove

With disc anvil 45 Tm, if necessary with an extension



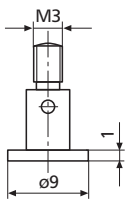
Dimension A: Can be direct read of the thimble

Dimension B: The reading plus 1.00 mm (thickness of the disc anvil)

Dimension C: Dimension B minus Dimension A

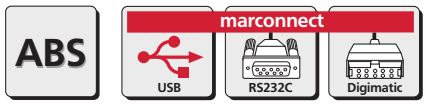
Accessories

	Order no.
Disc anvil 45 Tm for groove spacing and groove widths	**4180011**
Extension 45 Tv Length L / Length tolerance	
25 mm ± 1.5 µm	**4180001**
50 mm ± 1.5 µm	**4180002**
100 mm ± 1.5 µm	**4180003**



45 Tm

Digital Micrometer Head 46 EX



Features

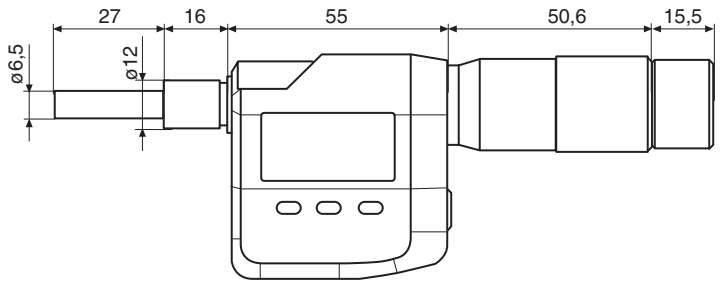
Functions:
0 (Zero setting)
ABS (Switching between Relative and Absolute measurement)
mm/inch
PRESET (enter a numerical value)
DATA (Data transmission via connection cable)

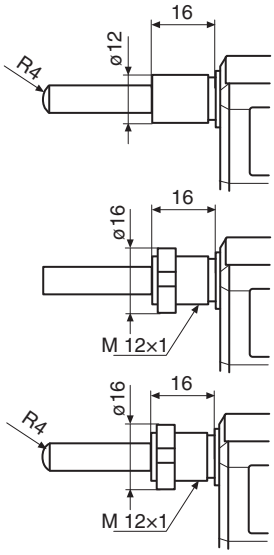
- Patented capacitive measuring system with an energy saving function, life of the battery approx. 2 years
- Ratchet with integrated coupler
- Supplied with:
  Case, adaptor dia. 12 mm to 16 mm, end cap (in case ratchet stop is not required) and operating instructions

Technical Data

Measuring range mm	*(inch)*	Readings mm/*inch*	Error limit G_{me} µm	Measuring face	Mounting shaft mm	Order no.
0-25	***(0-1")***	0.001/***.00005"***	4	flat	12	**4184301**
0-25	***(0-1")***	0.001/***.00005"***	4	flat	12*	**4184303**
0-25	***(0-1")***	0.001/***.00005"***	4	spherical	12	**4184302**
0-25	***(0-1")***	0.001/***.00005"***	4	spherical	12*	**4184304**

* *with locking nut*





Accessories

		Order no.
Battery 3V, type CR 2032		**4102520**
Data Connection Cable USB (2 m)	**16 EXu**	**4102357**
Data Connection Cable Opto RS232C (2 m), with SUB-D jack 9-pin	**16 EXr**	**4102410**
Data Connection Cable Digimatic (2 m), Flat plug10-pin	**16 EXd**	**4102411**

Accessories for Data Processing see Chapter 11

Micrometer Head 46

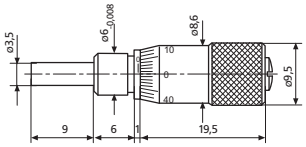
Features

- Spindle is made of stainless steel, hardened throughout and ground
- Scales with satin-chrome finish

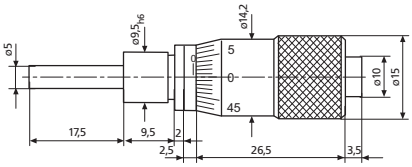
Technical Data

	Measuring range mm	Readings mm	Error limit G_{me} µm DIN 863	Spindle thread pitch mm	Spindle dia. mm	Order no.
46	0 - 6.5	0.01	3 ●	0.5	3.5	**4183021**
	0 - 13	0.01	3 ●	0.5	5	**4183025**
	0 - 25	0.01	3 ●	0.5	6.35	**4183030**
	0 - 25*	0.01	3 ●	0.5	6.35	**4183024**
	0 - 50	0.01	5	0.5	7.5	**4183023**
46 H	0 - 25**	0.01	3 ●	0.5	7.5	**4184000**

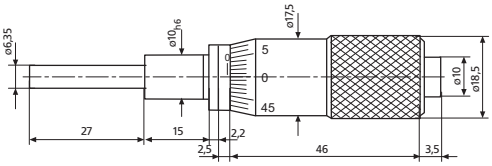
* *with locking nut*
** *with ratchet, carbide tipped*



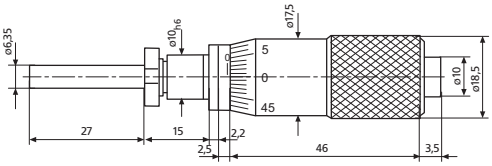
4183021
Measuring range 0-6.5 mm



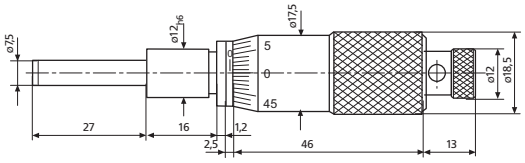
4183025
Measuring range 0-13 mm



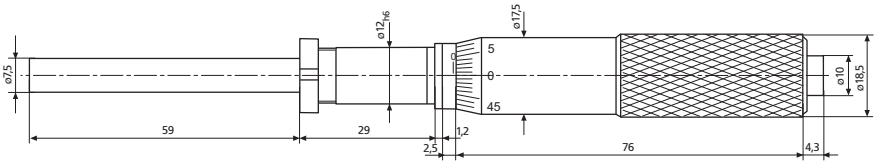
4183030
Measuring range 0-25 mm



4183024
Measuring range 0-25 mm
with locking nut



4184000
Measuring range 0-25 mm
carbide tipped



4183023
Measuring range 0-50 mm

YOUR MEASURING TASKS ARE SENSITIVE.
MARTEST IS HIGHLY SENSITIVE.

The latest information on MARTEST products can be found on our website:
www.mahr.com, WebCode 10407

► | Since 1936 Mahr is one of the leading global producers of test indicators, we have achieved this with the continuous advancement of our products and with unrelenting commitment to produce high quality products that not only meet customer requirements but also exceed them. We have also increased research and development in order to satisfy the demands and requirements of the market, however our core philosophy is to offer our customer a highly accurate and simple solution for various measuring tasks. With the MarTest series of test indicators there is not just a broad product range but also a wide variety of accessories at you disposal. The sensitive computer-optimized shockproof mechanism of the test indicator ensures maximum security and precision. MarTest is ideal for use in workshop conditions due the dial being sealed thus impervious to the penetration of liquids. | ◄

► | MarTest. Test Indicators and Touch Probes

MarTest. Test Indicators

Overview

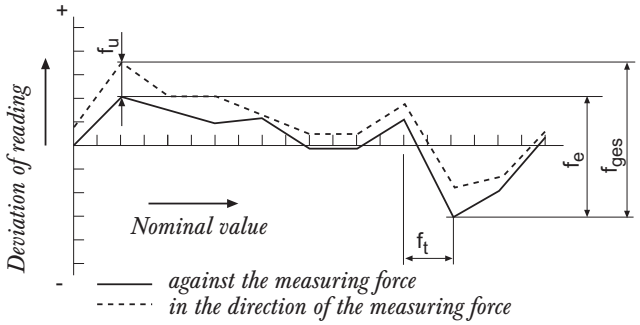
MarTest - Versions

		Measuring range	Dial style	Readings	DIN 2270	Accuracy f_{ges}	f_e	f_u	f_t	f_w
Standard 	**metric**									
	800 S	+/- 0.4 mm	0-40-0	0.01 mm	●	13 µm	10 µm	3 µm	5 µm	3 µm
	800 SG	+/- 0.4 mm	0-40-0	0.01 mm	●	13 µm	10 µm	3 µm	5 µm	3 µm
	800 SA	+/- 0.25 mm	0-25-0	0.01 mm		8 µm	5 µm	3 µm	5 µm	3 µm
	800 SGA	+/- 0.25 mm	0-25-0	0.01 mm		8 µm	5 µm	3 µm	5 µm	3 µm
	inch									
	801 S1	***+/- .015"***	***0-15-0***	***.001"***		***.0005"***	***.0004"***	***.00012"***	***.0002"***	***.0002"***
	801 S	***+/- .015"***	***0-15-0***	***.0005"***		***.0005"***	***.0004"***	***.00012"***	***.0002"***	***.0002"***
	801 SG	***+/- .015"***	***0-15-0***	***.0005"***		***.0005"***	***.0004"***	***.00012"***	***.0002"***	***.0002"***
	801 SGI	***+/- .015"***	***0-15-0***	***.001"***		***.0005"***	***.0004"***	***.00012"***	***.0002"***	***.0002"***
		(+/-0.30 mm)	(0-30-0)	(0.01 mm)						
Extra Long Styli 	**metric**									
	800 SL	+/- 0.25 mm	0-25-0	0.01 mm		13 µm	10 µm	5 µm	5 µm	3 µm
	800 SGL	+/- 0.25 mm	0-25-0	0.01 mm		13 µm	10 µm	5 µm	5 µm	3 µm
	800 SGB	+/- 0.5 mm	0-50-0	0.01 mm		13 µm	10 µm	4 µm	5 µm	3 µm
	inch									
	801 SL	***+/- .010"***	***0-10-0***	***.0005"***		***.0005"***	***.0004"***	***.0002"***	***.0002"***	***.00012"***
	801 SGL	***+/- .010"***	***0-10-0***	***.0005"***		***.0005"***	***.0004"***	***.0002"***	***.0002"***	***.00012"***
Higher Resolution 	**metric**									
	800 SM	+/- 0.1 mm	0-100-0	0.002 mm	●	4 µm	3 µm	2 µm	2 µm	1.5 µm
	800 SGM	+/- 0.1 mm	0-100-0	0.002 mm	●	4 µm	3 µm	2 µm	2 µm	1.5 µm
	800 SGE	+/- 0.07 mm	0-70-0	0.001 mm		4 µm	3 µm	2 µm	2 µm	1.5 µm
	inch									
	801 SM	***+/- .004"***	***0-4-0***	***.0001"***		***.00016".00012".00008".00008".00006"***				
	801 SGM	***+/- .004"***	***0-4-0***	***.0001"***		***.00016".00012".00008".00008".00006"***				
	801 SGE	***+/- .004"***	***0-4-0***	***.00005"***		***.00016".00012".00008".00008".00006"***				
Larger Measuring Range 	**metric**									
	800 SR	+/- 0.8 mm	0-40-0	0.01 mm		14 µm	10 µm	4 µm	5 µm	3 µm
	800 SRM	+/- 0.2 mm	0-100-0	0.002 mm		5 µm	3 µm	3 µm	2 µm	1.5 µm
	inch									
	801 SR	***+/- .030"***	***0-15-0***	***.0005"***		***.0005"***	***.0004"***	***.00016"***	***.0002"***	***.00012"***
	801 SRM	***+/- .008"***	***0-4-0***	***.0001"***		***.0002".00012".00012"".00008".00006"***				
Horizontal Models 	**metric**									
	800 H	+/- 0.4 mm	0-40-0	0.01mm	●	13 µm	10 µm	3 µm	5 µm	3 µm
	inch									
	801 H	***+/- .015"***	***0-15-0***	***.0005"***		***.0005"***	***.0004"***	***.00012"***	***.0002"***	***.00012"***
Vertical Models 	**metric**									
	800 V	+/- 0.4 mm	0-40-0	0.01 mm	●	13 µm	10 µm	3 µm	5 µm	3 µm
	800 VGM	+/- 0.1 mm	0-100-0	0.002 mm	●	4 µm	3 µm	2 µm	2 µm	1.5 µm
	inch									
	801 V	***+/- .015"***	***0-15-0***	***.0005"***		***.0005"***	***.0004"***	***.00012"***	***.0002"***	***.00012"***
	801 VGM	***+/- .004"***	***0-4-0***	***.0001"***		***.00016".00012".00008".00008".00006"***				

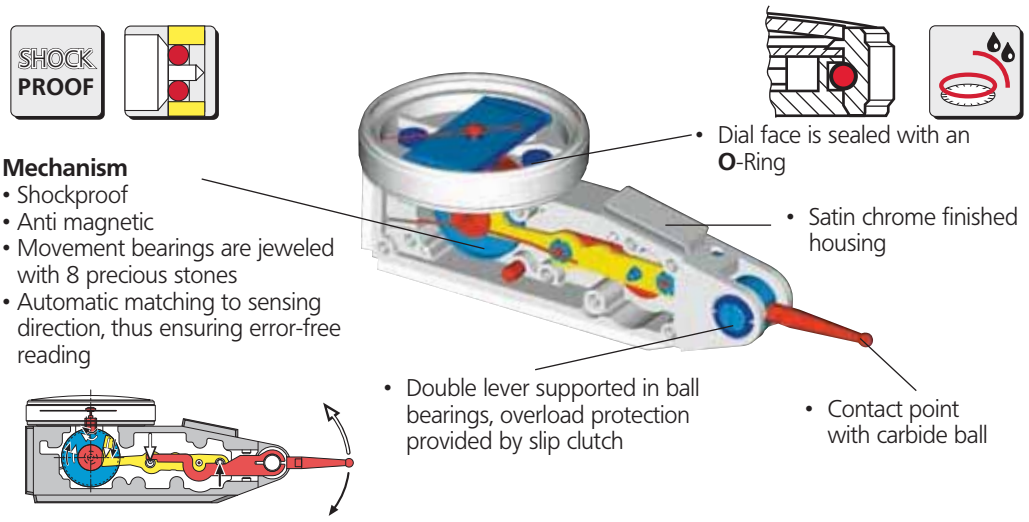
* *Only available in North America, Canada and Mexico; includes holding bar and clamp*

Length of Styli	Order no.	Order no. with kit*
14.5 mm	**4305200**	**2015309**
14.5 mm	**4307200**	**2015310**
14.5 mm	**4301200**	**2015343**
14.5 mm	**4301250**	**2015344**
14.5 mm	**4305960**	**2015317**
14.5 mm	**4305950**	**2015316**
14.5 mm	**4307950**	**2015318**
14.5 mm	**4307970**	**2015311**
41.24 mm	**4306200**	**2015312**
41.24 mm	**4306250**	**2015313**
32.325 mm	**4301300**	**2015346**
41.24 mm	**4306950**	**2015319**
41.24 mm	**4306960**	**2015320**
14.5 mm	**4308150**	**2015315**
14.5 mm	**4308200**	**2015314**
9.155 mm	**4308220**	**2015345**
14.5 mm	**4308960**	**2015321**
14.5 mm	**4308970**	**2015322**
14.5 mm	**4308985**	**2015323**
14.5 mm	**4307250**	**2015348**
14.5 mm	**4308250**	**2015349**
14.5 mm	**4307960**	**2015350**
14.5 mm	**4308980**	**2015351**
14.5 mm	**4303200**	**2015328**
14.5 mm	**4303950**	**2015324**
14.5 mm	**4302200**	**2015327**
14.5 mm	**4302250**	**2015347**
14.5 mm	**4302950**	**2015325**
14.5 mm	**4302960**	**2015326**

Metrological characteristics



Design features of MarTest Test Indicators



MarTest - Applications

Concentricity of a shaft

Concentricity of a sleeve

Centering of a bore

Aligning a surface

Testing parallelism

MarTest standard versions

DIN 2270

800 S

800 SA

800 SGA

SHOCK PROOF

800 SG

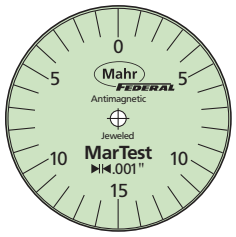
DIN 2270

Technical Data

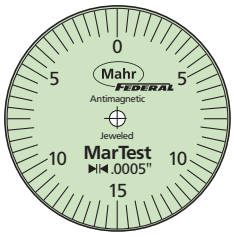
	Measuring range	Readings	Dial dia.	Measuring force	Length of styli	Order no.	Order no. with kit
800 S	± 0.4 mm	0.01 mm	27.5 mm	0.15 N	14.5 mm	**4305200**	**2015309**
800 SG	± 0.4 mm	0.01 mm	38 mm	0.15 N	14.5 mm	**4307200**	**2015310**
800 SA	± 0.25 mm	0.01 mm	27.5 mm	0.1 N	14.5 mm	**4301200**	**2015343**
800 SGA	± 0.25 mm	0.01 mm	38 mm	0.1 N	14.5 mm	**4301250**	**2015344**
801 S1	***± .015"***	***.001"***	***1.1"***	0.15 N	14.5 mm	**4305960**	**2015317**
801 S	***± .015"***	***.0005"***	***1.1"***	0.15 N	14.5 mm	**4305950**	**2015316**
801 SG	***± .015"***	***.0005"***	***1.5"***	0.15 N	14.5 mm	**4307950**	**2015318**
801 SGI	***± .015" (± 0.3 mm)***	***.0005" (0.01 mm)***	***1.5"***	0.15 N	14.5 mm	**4307970**	**2015311**

Supplied with:
Plastic storage case, spanner for changing the styli, styli dia. 2 mm, mounting shaft 800 a8 (for metric versions), mounting shaft 800 a6 (800 SA, 800 SGA), mounting shaft 800 a3/8 (for inch versions)

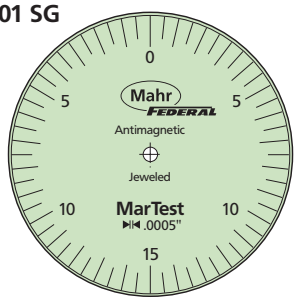
801 S1



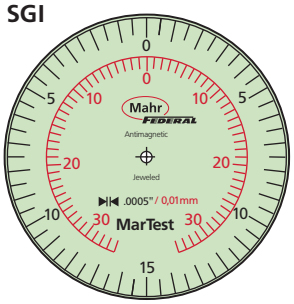
801 S

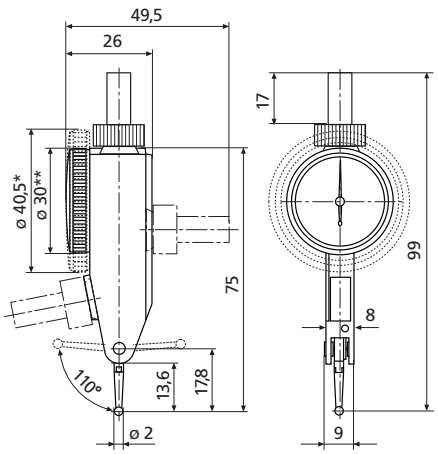


801 SG



801 SGI





* *800 SG, 800 SGA, 801 SG, 801 SGI*
** *800 S, 800 SA, 801 S1, 801 S*

MarTest with resolution 0.002 mm/0.001 mm for higher accuracy

DIN 2270

800 SM

DIN 2270

800 SGM

SHOCK PROOF

800 SGE

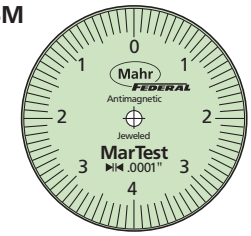
Inductive Probe Millimar 1318
see page 7-16

Technical Data

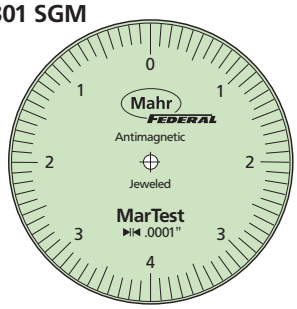
	Measuring range	Readings	Dial dia.	Measuring force	Length of styli	Order no.	Order no. with kit
800 SM	± 0.1 mm	0.002 mm	27.5 mm	0.15 N	14.5 mm	**4308150**	**2015315**
800 SGM	± 0.1 mm	0.002 mm	38 mm	0.15 N	14.5 mm	**4308200**	**2015314**
800 SGE	± 0.07 mm	0.001 mm	38 mm	0.2 N	14.5 mm	**4308220**	**2015345**
801 SM	***± .004"***	***.0001"***	***1.1"***	0.15 N	14.5 mm	**4308960**	**2015321**
801 SGM	***± .004"***	***.0001"***	***1.5"***	0.15 N	14.5 mm	**4308970**	**2015322**
801 SGE	***± .004"***	***.00005"***	***1.5"***	0.15 N	14.5 mm	**4308985**	**2015323**

Supplied with:
Plastic storage case, spanner for changing the styli, styli dia. 2 mm, mounting shaft 800 a8 (for metric versions), mounting shaft 800 a3/8 (for inch versions)

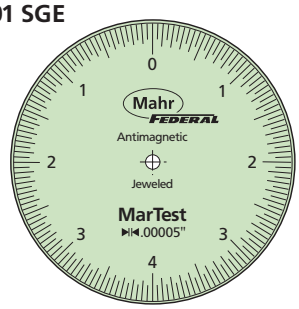
801 SM

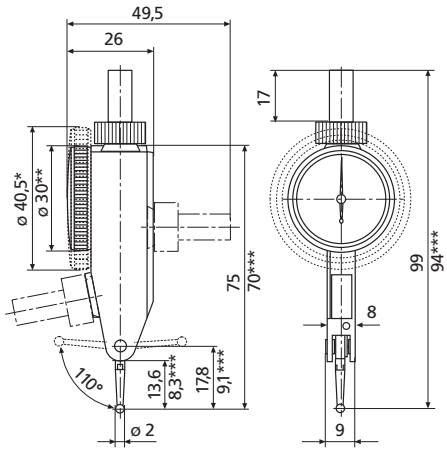


801 SGM



801 SGE





* *800 SGM, 800 SGE, 801 SGM, 801 SGE*
** *800 SM, 801 SM*
*** *800 SGE*

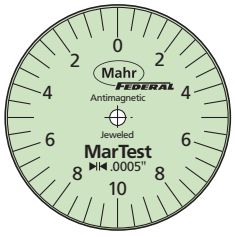
MarTest with extra long styli for measuring in even difficult to access positions

Technical Data

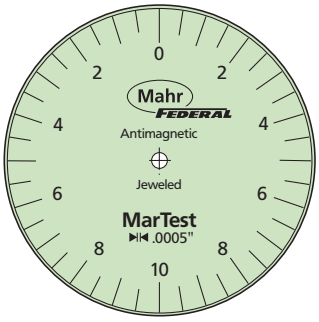
	Measuring range	Readings	Dial dia.	Measuring force	Length of styli	Order no.	Order no. with kit
800 SL	± 0.25 mm	0.01 mm	27.5 mm	0.07 N	41.24 mm	**4306200**	**2015312**
800 SGL	± 0.25 mm	0.01 mm	38 mm	0.07 N	41.24 mm	**4306250**	**2015313**
800 SGB	± 0.5 mm	0.01 mm	38 mm	0.07 N	32.3 mm	**4301300**	**2015346**
801 SL	***± .010"***	***.0005"***	***1.1"***	0.07 N	41.24 mm	**4306950**	**2015319**
801 SGL	***± .010"***	***.0005"***	***1.5"***	0.07 N	41.24 mm	**4306960**	**2015320**

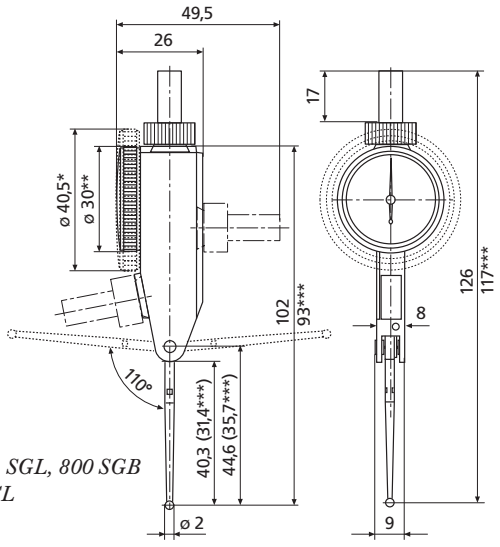
Supplied with:
Plastic storage case, spanner for changing the styli, styli dia. 2 mm, mounting shaft 800 a8 (for metric versions), mounting shaft 800 a6 (800 SGB), mounting shaft 800 a3/8 (for inch versions)

801 SL



801 SGL



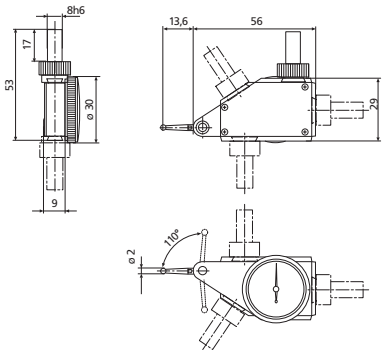


* *800 SGL, 801 SGL, 800 SGB*
** *800 SL, 801 SL*
*** *800 SGB*

MarTest styli can positioned horizontally to the dial face

DIN 2270

800 H



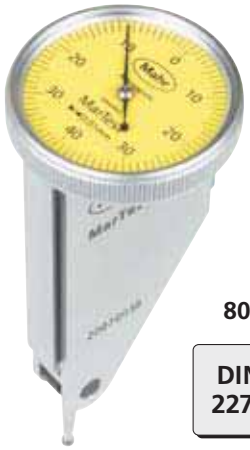
SHOCK PROOF

Technical Data

	Measuring range	Readings	Dial dia.	Measuring force	Length of styli	Order no.	Order no. with kit
800 H	± 0.4 mm	0.01 mm	27.5 mm	0.25 N	14.5 mm	**4303200**	**2015328**
801 H	***± .015"***	***.0005"***	***1.1"***	0.25 N	14.5 mm	**4303950**	**2015324**

Supplied with:
Plastic storage case, spanner for changing the styli, styli dia. 2 mm, mounting shaft 800 a8 (for metric versions), mounting shaft 800 a3/8 (for inch versions)

MarTest vertical model



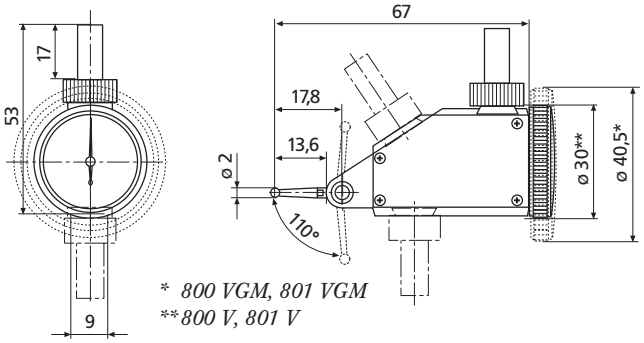
800 V

DIN 2270

800 VGM

DIN 2270

SHOCK PROOF



* 800 VGM, 801 VGM
** 800 V, 801 V

Technical Data

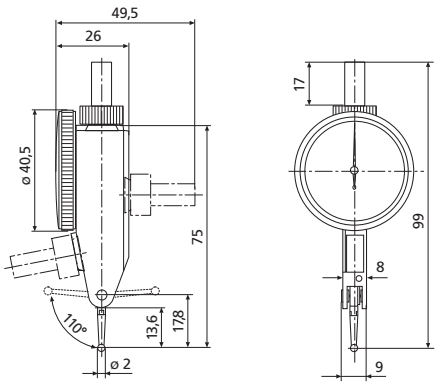
	Measuring range	Readings	Dial dia.	Measuring force	Length of styli	Order no.	Order no. with kit
800 V	± 0.4 mm	0.01 mm	27.5 mm	0.2 N	14.5 mm	**4302200**	**2015327**
800 VGM	± 0.1 mm	0.002 mm	38 mm	0.25 N	14.5 mm	**4302250**	**2015347**
801 V	***± .015"***	***.0005"***	***1.1"***	0.2 N	14.5 mm	**4302950**	**2015325**
801 VGM	***± .004"***	***.0001"***	***1.5"***	0.25 N	14.5 mm	**4302960**	**2015326**

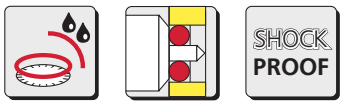
Supplied with:
Plastic storage case, spanner for changing the styli, styli dia. 2 mm, mounting shaft 800 a8 (for metric versions), mounting shaft 800 a3/8 (for inch versions)

MarTest with larger measuring range

800 SRM

800 SR/SRM





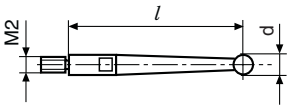
Technical Data

	Measuring range	Readings	Dial dia.	Measuring force	Length of styli	Order no.	Order no. with kit
800 SR	± 0.8 mm	0.01 mm	38 mm	0.15 N	14.5 mm	**4307250**	**2015348**
800 SRM	± 0.2 mm	0.002 mm	38 mm	0.15 N	14.5 mm	**4308250**	**2015349**
801 SR	***±.030"***	***.0005"***	***1.5"***	0.15 N	14.5 mm	**4307960**	**2015350**
801 SRM	***±.008"***	***.0001"***	***1.5"***	0.15 N	14.5 mm	**4308980**	**2015351**

Supplied with:
Plastic storage case, spanner for changing the styli, styli dia. 2 mm, mounting shaft 800 a8 (for metric versions), mounting shaft 800 a3/8 (for inch versions)

MarTest - Accessories

Styluses with ruby contact point



Styluses with carbide contact point

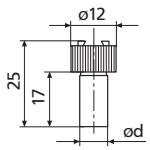
Spanner for changing the styluses **4305868**

Model	Stylus-length *l*	Styluses: Carbide contact point Cat.-no.	d dia. 1 mm	d dia. 2 mm	d dia. 3 mm	Ruby contact point Cat.-no.	d dia. 2 mm
800 S/801 S1/801 S **800 SG/801 SG** **800 SA** **800 SGA** **800 SM/801 SM** **800 SGM/801 SGM** **801 SGE** **800 SR/801 SR** **800 SRM/801 SRM** **800 H/801 H** **800 V/801 V** **800 VGM/801 VGM**	14.5 mm	**800 ts**	**4305870**	**4305850**	**4305871**	**800 tsr**	**4309051**
800 SGE	9.1 mm	**800 te**	**4308851**	**4308850**	**4308852**	**800 ter**	**4309050**
800 SL/801 SL **800 SGL/801 SGL**	41.24 mm	**800 tl**	**4306851**	**4306850**	**4306853**	**800 tlr**	**4309053**
800 SGB	32.3 mm	**800 tb**	**4301851**	**4301850**	**4301852**	**800 tbr**	**4309052**

Martest - Accessories

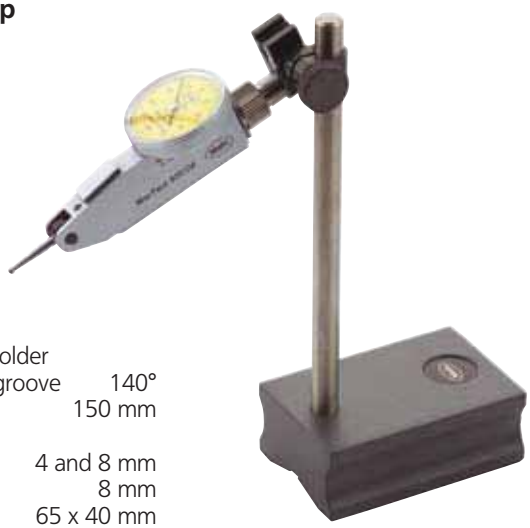
Mounting shaft for dovetail

800 a



Mounting shaft	dia. d mm	Order no.
800 a8	8	**4305865**
800 a6	6	**4301865**
800 a4	4	**4305885**
800 a1/4	***1/4"***	**4305895**
800 a3/8	**3/8"**	**4305875**

Stand 801 p



- With swivel holder
- Base with V-groove 140°

Total height 150 mm
Mounting bore dia. 4 and 8 mm
Column dia. 8 mm
Base surface 65 x 40 mm

Order no. 4309090

Indicator not included.

Centering support rods 801 v

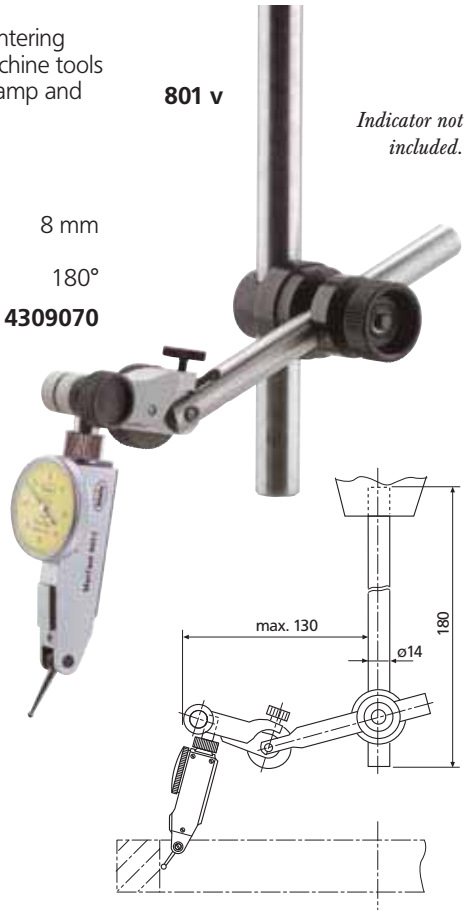
- For aligning and centering work pieces on machine tools
- Swivel mounting clamp and fine adjustment
- Stainless steel rods

801 v

Indicator not included.

Mounting bore dia. 8 mm
Swivel range of mounting clamp 180°

Order no. 4309070

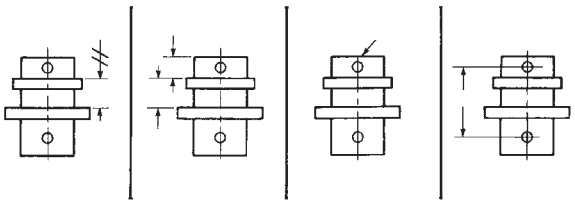


Leveling Table TE-20

Cuts set-up time 60% or more for many height gage measurements.

- The leveling table, TE-20, permits you to quickly bring the surface of a part into alignment with a surface plate in both planes. Completely eliminates shimming. Saves so much time that, used only occasionally, it will pay for itself in two weeks.
- The top plate is stress-relieved steel providing about 67 square inches of work area. It is drilled and tapped for fixtures. Fine pitch screws and large knobs assure precisely controlled adjustments. Works with any type of height gage.
- Operation is simple. Height gage readings are taken at edges of the surface to be aligned. Each plate, independently adjustable at right angles to the other, is angled as required for precise alignment.
  Flatness = .025 mm / ***.001"***

Typical checks which require careful positioning of work because rest surface is not sufficiently parallel to other work surfaces. Leveling Table compensates for error quickly, drastically reduces set-up time.

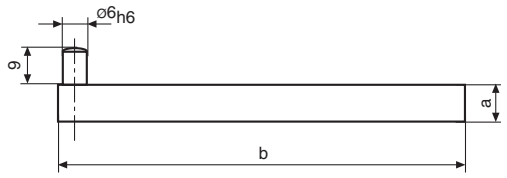


Parallelism | Step Height | Flatness | Center distance

Adjustment	Top Plate	Bottom Plate
Total	± 1° 30′	± 1° 30′

Martest - Accessories

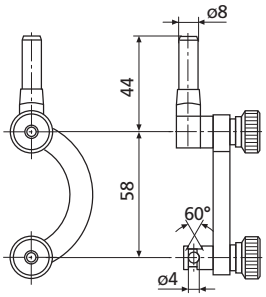
Holder 800 h



	Dimensions		Order no.
	a	b	
800 h1	9x9	100	**4305888**
800 h2	***1/4" x 1/2"***	***4"***	**4305889**

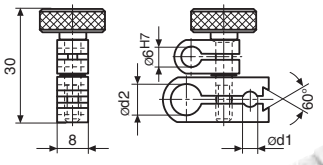
Universal centering support frame 800 b

Order no. 4305893



Indicator not included.

Universal clamp 800 k

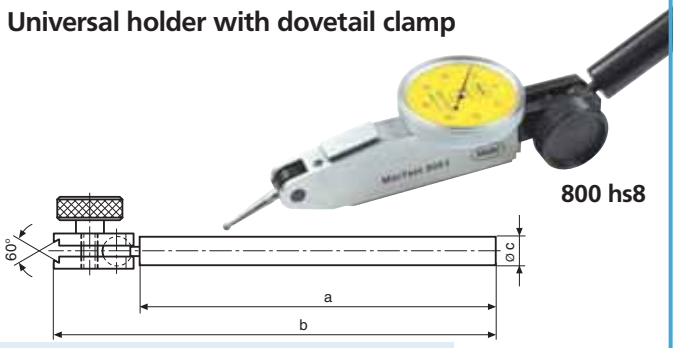


800 h1 with 800 k8

	Dimensions		Order no.
	dia. d1	dia. d2	
800 k8	4	8	**4305891**
800 k3/8	***5/32"***	***3/8"***	**4305892**

Indicator not included.

Universal holder with dovetail clamp



800 hs8

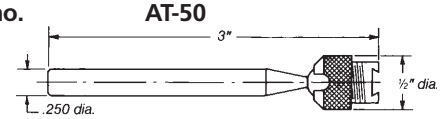
	Dimensions			Order no.
	a	b	dia. c	
800 hs8	100	124	8	**4305886**
800 hs3/8	***4"***	***5"***	***3/8"***	**4305887**

Indicator not included.

Ball Clamp

- Dovetail and ball for indicator mounting and omni-directional orientation

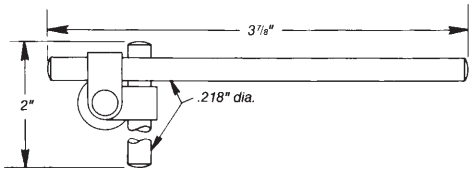
Order no. **AT-50**



Jig Borer Attachment

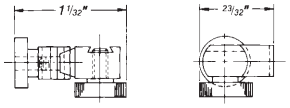
- Furnished with two rods and clamp for fast machine mounting

Order no. **RD-21**



Swivel Clamp

- Normally furnished with MarTest models. Allows indicator to be mounted on most indicator stands and fixtures

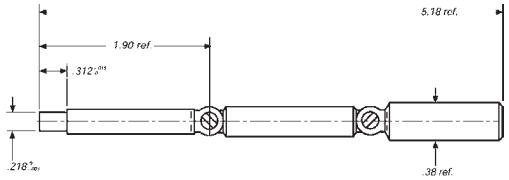


Order no. **CP-2199**

Double-jointed Clamp

- Reaches up to 127 mm / ***5"*** with easy positioning for many applications including milling machine and Jig Borers

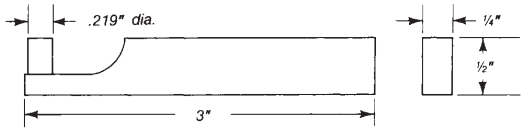
Order no. **AT-100**



Holding Bar

- Normally furnished with MarTest models. Three-inch length provides ample reach for most applications

Order no. **HB-2157**



Martest - Accessories

Test Stand 1492B

- Use with any MarTest Indicator - Support arms stepped at one end (.218in dia.) for Swivel Clamp (CP-2199).
- Accommodates Vertical and Horizontal lug back mounts for AGD type Indicators.
- Bases have powerful "ON/OFF" permanent magnets which hold from any of four faces - three sides or bottom.

Indicator not included.

Base Dimensions W x L x H mm	Base Dimensions W x L x H *(inch)*	Main Post Length mm/*inch*	Main Post Diameter mm/*inch*	Support Arm Length mm/*inch*	Support Arm Diameter mm/*inch*	Order no.
60 x 48 x 59	***(2.4" x 1.9" x 2.2")***	178/ ***7"***	10/ ***.47"***	165/ **6.5"**	9.9/ **.39"**	**1492B-5**
60 x 48 x 59	***(2.4" x 1.9" x 2.2")***	178/ ***7"***	10/ ***.47"***	149/ ***5.9"***	9.9/ ***.39"***	**1492B-10**
114 x 48 x 59	***(4.5" x 1.9" x 2.2")***	401/ ***15.8"***	20/ ***.79"***	200/ ***7.9"***	14/ ***.55"***	**1492B-15**

Measurements are mm/inch. All models furnished with post clamp and indicator mounting clamp.
Style 1492B-10 has fine adjustment on post clamp.

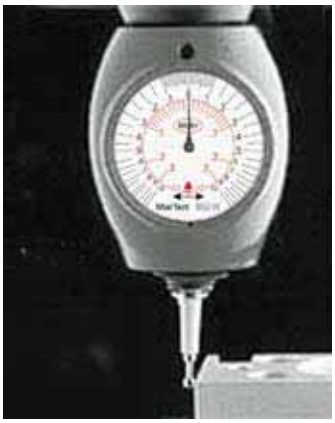
Transfer Stand 2300

- Fine adjustment conveniently located in base.
- Three-point base pads improve accuracy.
- Contoured shape facilitates movement.
- Use with any Testmaster Indicator - stud accommodates Swivel Clamp (CP-2199).
- EHE-2048 Gage head requires a CP-116 Clamp.

Indicator not included.

Base Dimensions W x L x H mm	Base Dimensions W x L x H *(inch)*	Column (dia. x H) mm/*inch*	Maximum vertical capacity mm/*inch*	Reach (base to contact point) mm/*inch*	Mounting stud dia. mm/*inch*	Order no.
76 x 110 x 45	***(3 x 4.375 x 1.75")***	25 x 430/ ***.995 x 17"***	457/ ***18"***	approx. 86/ ***3.375"***	5.55/ ***.218"***	**2300**

Mechanical 3D-Touch Probe 802 W



Applications

Can be used on milling and EDM machines to

- determine the zero position on a work piece
- determine the center of a bore
- determine and correct the position of a work piece

and for measurement of

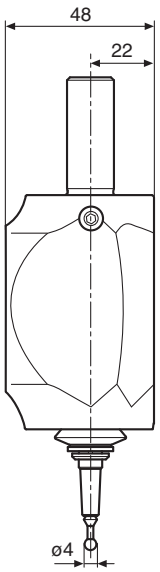
- lengths
- depths

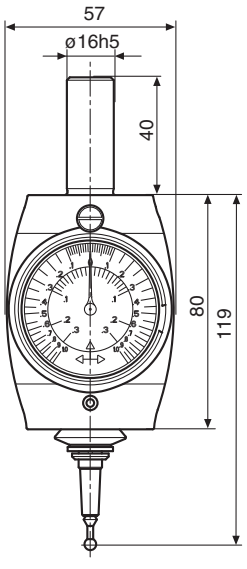
Features

- High accuracy and linearity
  - suitable for measuring work pieces
  - measurement over the entire working range is possible
- Can be controlled independently of a machine tool
- Easy to read display
- Large working range in all axis (X, Y, Z) prevents damage to the stylus by contacting errors
- Shock and Water proof, ideal for the use on a machine with a tool changer
- Compact metal housing and long probe arm

Technical Data

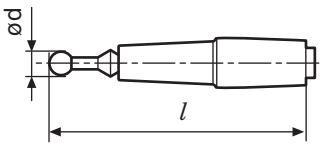
	Repeatability in zero position unidirectional	Readings	Dial dia.	Mounting shaft dia.	Order no.
802W	± 0.01 mm	0.01 mm	50 mm	16 mm	**4304310**
802 WZ	***± .0004"***	***.001"***	***2.0"***	***3/4"***	**4304315**



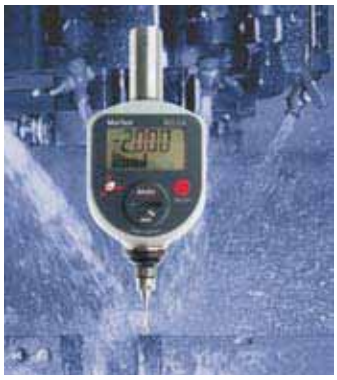


Accessories

Styli	dia. d mm	*l* mm	Working range x,y (mm)	z (mm)	Order no.
802Wts	4	44.8	10	7.5	**4304330**
802Wtk	3	32.6	13	7.5	**4304331**
802Wtl	6	71.1	19	7.5	**4304332**



Digital 3D-Touch Probe 802 EW



Applications

Can be used on milling and EDM machines to

- determine the zero position on a work piece
- determine the center of a bore
- determine and correct the position of a work piece

and for measurement of

- lengths
- depths

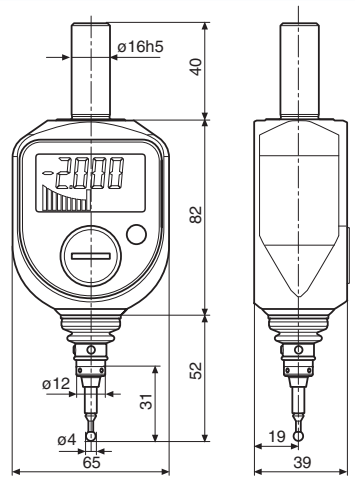
Features

- High accuracy and linearity
  - suitable for measuring work pieces
  - measurement over the entire working range is possible
- Can be controlled independently of a machine tool
- Easy to read display due to the combination of:
  - a progressive analog display (bar graph) for dynamic path information
  - a digital display for accurate reading
- Large working range (6 mm) in all axis (X, Y, Z) prevents damage to the stylus by contacting errors
- Shock and water proof; ideal for the use on a machine with a tool changer
- Compact metal housing and long probe arm

Technical Data

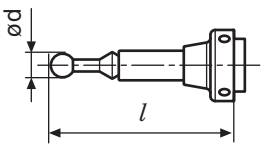
	Working range X, Y, Z-Axis unidirectional	Repeatability in zero position display	Resolution of digital	Display range	Mounting shaft dia.*	Order no.
802 EW	-2 to 4 mm	± 0.005 mm	0.005 mm	± 2 mm	16 mm	**4304300**
802 EWZ	***.0787" to .157"***	***± .0001"***	***.0001"***	***± .0787"***	***3/4"***	**4304305**

** Further mounting shafts are available on request*



Accessories

Styli	dia. d mm	*l* mm	Order no.
802 EWt	4	31	**4304320**



THEY POINT YOU IN THE RIGHT DIRECTION.
MARCATOR DIAL INDICATORS.

The latest information on MARCATOR products can be found on our website:
www.mahr.com, WebCode 206

► | Dial indicators due to their versatility rank as the most frequently applied transducer, just like our MarCator series. Our mechanical dial indicators have precision gears and pinions for a maximum accuracy. They are also available in shock and waterproof versions. Our digital indicator range contains highly precise electronic measuring systems, which make measuring functions possible yet without the loss of an analog display. With the simple operation, the large display that can be read error free and the possibility of a rapid and simple transmission of all your measurement results thus meeting all requirements of a modern measuring instrument. | ◄

► | MarCator. Dial and Digital Indicators

MarCator ANSI/AGD Dial Indicators

Overview

Dial Indicators Selection Guide

Grad	Range per Rev.	Total Range	Dial Style w/o Rev	Dial Style with Rev	Order number w/o Rev Counter	Order number with Rev Counter
			Group 0			
.0001"	***.004"***	***.010"***	0-2-0	–	**A1/2Q**	
.0001"	***.010"***	***.025"***	0-5-0	–	**A2I**	
.0005"	***.020"***	***.050"***	0-10-0	–	**A3Q**	
.001"	***.040"***	***.100"***	0-20-0	–	**A6Q**	
.002 mm	.100	.250	0-5-0	–	**N1/2O**	
.005 mm	.500	1.25	0-25-0	–	**N3I**	
.010 mm	1.00	2.50	0-50-0	–	**N6I**	
			Group 1			
.0001"	***.010"***	***.025"***	0-5-0	0-10	**12I**	**12I-RC**
.00025"	***.010"***	***.025"***	0-5-0	0-10	**12Q**	**12Q-RC**
.00025"	***.020"***	***.050"***	0-10-0	0-20	**B3K**	**B3K-RC**
.0005"	***.020"***	***.050"***	0-10-0	0-20	**B3Q**	**B3Q-RC**
.0005"	***.030"***	***.075"***	0-15-0	0-30	**B5M**	**B5M-RC**
.0005"	***.040"***	***.100"***	0-20-0	0-40	**B6K**	**B6K-RC**
.0005"	***.050"***	***.125"***	0-25-0	0-50	**B7I**	**B7I-RC**
.001"	***.020"***	***.050"***	0-10-0	0-20	**B3W**	**B3W-RC**
.001"	***.040"***	***.100"***	0-20-0	0-40	**B6Q**	**B6Q-RC**
.001"	***.050"***	***.125"***	0-25-0	0-50	**B7O**	**B7O-RC**
.001"	***.100"***	***.250"***	0-50-0	0-100	**B8I**	**B8I-RC**
.002 mm	.200	.500	0-10-0	0-20	**O1I**	**O1I-RC**
.005 mm	.500	1.25	0-25-0	0-50	**O3I**	**O3I-RC**
.010 mm	1.00	2.50	0-50-0	0-100	**O6I**	**O6I-RC**
.025 mm	2.50	6.25	0-125-0	0-250	**O8I**	**O8I-RC**
			Group 2			
.00005"	***.004"***	***.010"***	0-2-0	0-4	**C1/2K**	**C1/2K-RC**
.0001"	***.008"***	***.020"***	0-4-0	0-8	**C1K**	**C1K-RC**
.0001"	***.010"***	***.025"***	0-5-0	0-10	**2015781**	**2014761**
.00025"	***.010"***	***.025"***	0-5-0	0-10	**2015782**	**2014791**
.00025"	***.020"***	***.050"***	0-10-0	0-20	**2015783**	**2014808**
.0005"	***.020"***	***.050"***	0-10-0	0-20	**2015784**	**2014810**
.0005"	***.030"***	***.075"***	0-15-0	0-30	**2015786**	**2014811**
.0005"	***.040"***	***.100"***	0-20-0	0-40	**2015787**	**2014812**
.0005"	***.050"***	***.125"***	0-25-0	0-50	**2015790**	**2014814**
.001"	***.020"***	***.050"***	0-10-0	0-20	**2015785**	**2014809**
.001"	***.040"***	***.100"***	0-20-0	0-40	**2015789**	**2014813**
.001"	***.050"***	***.125"***	0-25-0	0-50	**2015791**	**2014815**
.001"	***.100"***	***.250"***	0-50-0	0-100	**2015792**	**2011049**
.001 mm	.100	.250	0-5-0	0-10	**P1/2I**	**P1/2I-RC**
.002 mm	.200	.500	0-10-0	0-20	**P1I**	**P1I-RC**
.005 mm	.500	1.25	0-25-0	0-50	**2015793**	**2014817**
.010 mm	1.00	2.50	0-50-0	0-100	**2015794**	**2014818**
.020 mm	2.00	5.00	0-100-0	0-200	**2015795**	**2014819**
			1 Rev			
.0005"	–	***.040"***	–	–	**2014793**	
.001"	–	***.080"***	–	–	**2014792**	
.010 mm	–	1.00	–	–	**2014795**	
.020 mm	–	2.00	–	–	**2014794**	
.010 mm	–	1.00	–	–	**2014797**	
.020 mm	–	2.00	–	–	**2014796**	

Grad	Range per Rev.	Total Range	Dial Style w/o Rev	Dial Style with Rev	Order number w/o Rev Counter	Order number with Rev Counter
			Group 3			
.0001"	***.008"***	***.020"***	0-4-0	0-8	**D1K**	**D1K-RC**
.0001"	***.010"***	***.025"***	0-5-0	0-10	**32I**	**32I-RC**
.00025"	***.010"***	***.025"***	0-5-0	0-10	**32Q**	**32Q-RC**
.00025"	***.020"***	***.050"***	0-10-0	0-20	**D3K**	**D3K-RC**
.00025"	***.030"***	***.075"***	0-15-0	0-30	**D5G**	**D5G-RC**
.0005"	***.020"***	***.050"***	0-10-0	0-20	**D3Q**	**D3Q-RC**
.0005"	***.030"***	***.075"***	0-15-0	0-30	**D5M**	**D5M-RC**
.0005"	***.040"***	***.100"***	0-20-0	0-40	**D6K**	**D6K-RC**
.0005"	***.050"***	***.125"***	0-25-0	0-50	**D7I**	**D7I-RC**
.001"	***.020"***	***.050"***	0-10-0	0-20	**D3W**	**D3W-RC**
.001"	***.040"***	***.100"***	0-20-0	0-40	**D6Q**	**D6Q-RC**
.001"	***.050"***	***.125"***	0-25-0	0-50	**D7O**	**D7O-RC**
.001"	***.100"***	***.250"***	0-50-0	0-100	**D8I**	**D8I-RC**
.002 mm	.200	.500	0-10-0	0-20	**Q1I**	**Q1I-RC**
.005 mm	.500	1.25	0-25-0	0-50	**Q3I**	**Q3I-RC**
.010 mm	1.00	2.50	0-50-0	0-100	**Q6I**	**Q6I-RC**
.020 mm	2.00	5.00	0-100-0	0-200	**Q8I**	**Q8I-RC**
			Group 4			
.0001"	***.008"***	***.020"***	0-4-0	0-8	**E1K**	**E1K-RC**
.0001"	***.010"***	***.025"***	0-5-0	0-10	**42I**	**42I-RC**
.00025"	***.020"***	***.050"***	0-10-0	0-20	**E3K**	**E3K-RC**
.00025"	***.030"***	***.075"***	0-15-0	0-30	**E5G**	**E5G-RC**
.0005"	***.020"***	***.050"***	0-10-0	0-20	**E3Q**	**E3Q-RC**
.0005"	***.030"***	***.075"***	0-15-0	0-30	**E5M**	**E5M-RC**
.0005"	***.050"***	***.125"***	0-25-0	0-50	**E7I**	**E7I-RC**
.001"	***.020"***	***.050"***	0-10-0	0-20	**E3W**	**E3W-RC**
.001"	***.050"***	***.125"***	0-25-0	0-50	**E7O**	**E7O-RC**
.001"	***.100"***	***.250"***	0-50-0	0-100	**E8I**	**E8I-RC**
.002 mm	.200	.500	0-10-0	0-20	**R1I**	**R1I-RC**
.005 mm	.500	1.25	0-25-0	0-50	**R3I**	**R3I-RC**
.010 mm	1.00	2.50	0-50-0	0-100	**R6I**	**R6I-RC**
.020 mm	2.00	5.00	0-100-0	0-200	**R8I**	**R8I-RC**
			Long Range			
.0001"	***.010"***	***.500"***	–	0-10		**42IQ**
.001"	***.100"***	***.500"***	–	0-100		**2014699**
.001"	***.100"***	***1.00"***	–	0-100		**2014698**
.001"	***.100"***	***1.00"***	–	0-100		**D8IS**
.001"	***.100"***	***2.00"***	–	0-100		**D8IT**
.001"	***.100"***	***3.00"***	–	0-100		**E8IU**
.010"	***1.00"***	***1.00"***	–	0-1000		**2014816**
.010 mm	1.00	25.00	–	0-100		**SP6IS**
.010 mm	1.00	25.00	–	0-100		**SQ6IS**
.025 mm	2.50	50.00	–	0-25		**Q8IT**
.025 mm	2.50	75.00	–	0-25		**R8IU**

Dial Indicators per ANSI/AGD

Features

You get more with Mahr Federal Dial Indicators

- Proven for the most demanding applications
- Superior design and serviceability
- Unmatched customer and technical support
- Catalog and customized styles
- Full range of accessories to suit virtually every need
- Unit construction, removable movement . . . saves repair/cleaning time and maintenance costs
- Hardened gears and stainless steel racks provide lasting protection against indicator failure due to shock or wear
- Jeweled bearings resist friction, add to longer indicator life
- Skeletonized, hobbed gears for more sensitive response, superior indicator accuracy with minimal hysteresis error
- Soft-tinted dials (green, inch, or yellow, metric) minimize eye strain
- Special steel alloy, balanced dial hand affords no-shift, precise reading
- Controlled rack and pinion mesh eliminates slope for precise response and reading
- Smooth-adjusting bezels for easy setup
- Positive pressure pull-back spring . . . less maintenance
- Compliance with ANSI/AGD dimensional and accuracy specifications
- Many models employ stainless steel stem for added durability

How to Order

How to Order Your Dial Indicator and Accessories

1. Select the type of Indicator you require. Check the specialize types as well as regular ANSI/AGD models.
2. Choose the Model best suited to the magnification, range and viewing needs of your job.
3. Accessories. These are important because they greatly increase the speed, efficiency and convenience of obtaining desired results. A wide selection of Mahr Federal dial indicator accessories are shown in this catalog.
4. Options. You are not restricted to the normally furnished equipment mentioned above. A wide choice of optionally available points, backs or dial arrangements can be specified at little or no extra cost. We maintain the most extensive stock of indicators and gages for dimensional measurement available anywhere. Items which are in stock are normally shipped within five working days. If you need them sooner, inquire when ordering. We can often make next-day deliveries. Understandably, some of the items in this catalog are not always in stock or are special order items, which take a little longer to ship.

If you need help in determining what Indicators right for your application, just ask us. Contact Mahr Federal:

1-800-333-4243

One of our experienced professionals will give you courteous, professional advice that can save you time and money.

Replacement indicators

Although Mahr Federal dial indicators are known for their lifetime service, it is not uncommon to change an indicator back, contact point, dial or to even add an accessory to suit your latest application.

When ordering a replacement dial indicator for a specific application, always verify the configuration of the indicator. Ordering a replacement using the standard model number shown on your indicator may not provide you with the configuration or accessories you desire.

Dial Indicators per ANSI/AGD

Selecting a Dial Indicator

Since modern manufacturing involves a wide range of tolerances, choosing a dial indicator might be difficult, especially since the number of indicators available is so vast. The following guidelines were prepared to assist you in selecting the right model for your application.

Consider four characteristics when selecting a dial indicator:

- **Minimum Graduation Value** – value of the smallest graduations marked on the dial. From several different values available from Mahr Federal, select the one which is closest to 10% of the tolerance spread of the work you are measuring. This assures that the tolerance will span about ten divisions of the dial

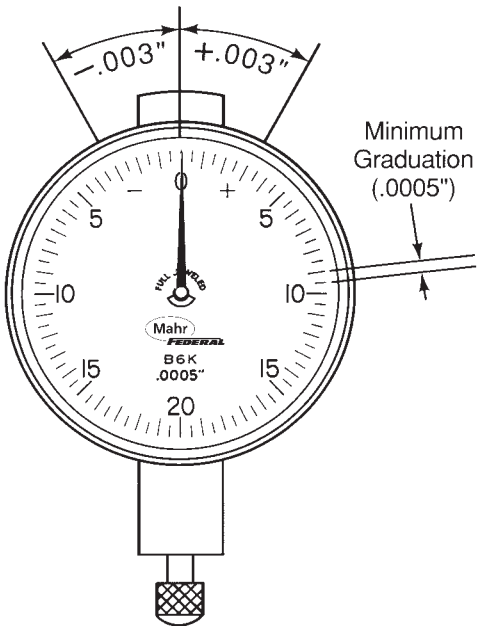
- **Size** – represents the bezel diameter. Make your selection on the basis of space available for the indicator and the distance from which it will be viewed. The Indicator photograph shown on the first page of each ANSI/AGD Group is full scale. Simply place the page which illustrates the Indicator at the expected viewing distance, and choose the size that offers you the best readability and is the proper size for your fixture. Mahr Federal's "C" size bezels (ANSI/AGD Group 2), which have a diameter of 2-1/4", are the most popular.

- **Range per Revolution** – represents the distance the spindle travels with one complete revolution of the dial hand. From the dials available in the size and minimum graduation value you chose, select the range per revolution which allows the tolerance spread to occupy 1/10 to 1/4 of the dial.

- **Total Range** – the maximum distance over which the indicator spindle can travel. Usually, this represents 2-1/2 revolutions of the hand, which is adequate for most needs. Sometimes, however, this may not be adequate for your application and a special total range may be necessary.

If your tolerance spread is .006"(±.003"), then, the most suitable minimum graduation value is .0005".

TOLERANCE IS .006"



Your tolerance spread is .006". You have chosen an ANSI/AGD Group 2 (Mahr Federal "C" Size) dial with a minimum graduation value of .0005". Mahr Federal offers four indicator types in this size and minimum graduation value. Of these, type C5M has a range per revolution of .030" which is about midway between your tolerance extremes.

You selected a C5M indicator. Your total range, however, needs to be at least .200" so the spindle can clear the lip of your part. But, the longest range available in the C5M indicator you need is only .075". Special ranges up to .400" are available for this indicator type. Select the closest range for your application (for Model C5M, you would select .250").

If the range you need is not listed under the "Special Ranges" category, contact Mahr Federal. Chances are we can supply the range you need.

Copies of the current ANSI Standard for Dial Indicators (ANSI B89.1.1 0-1987) are available from:

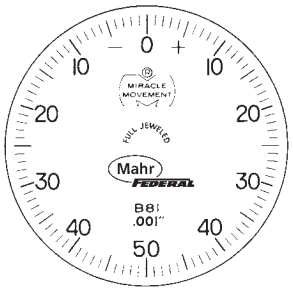
The American Society of Mechanical Engineers
ASME Order Desk
22 Law Drive
Fairfield, NJ 07007
(973)882-1167

Dial Indicators per ANSI/AGD

Dial Types

1. Balanced (+) on right.
Normally furnished on all Group 0, 1, 3 and 4 ANSI/AGD indicators only, unless otherwise specified. Indicates an increasing value when contact is depressed as in comparison type O.D. snap and bench thickness gages.

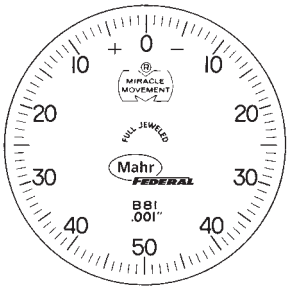
Note: If Revolution Counter models are ordered, counter dial numbered counterclockwise.



2. Balanced (+) on left.
Indicates decreasing values when contact is depressed as in comparison bore* and depth gages.

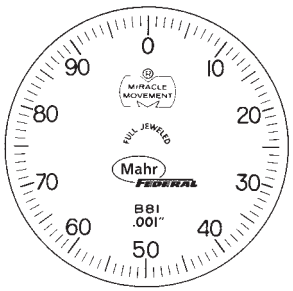
Note: With Revolution Counter models, counter dial numbered clockwise.

** Will vary as dictated by motion transfer design.*



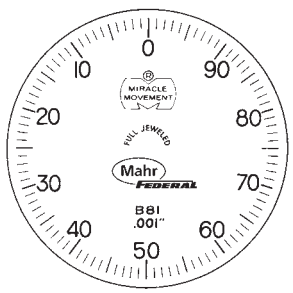
3. Continuous clockwise.
Normally furnished on Long and Extra Long Range Indicators, unless otherwise specified. Indicates an increasing value when contact is depressed as in direct-reading thickness gages.

Note: With Revolution Counter models, counter dial numbered counterclockwise.



4. Continuous counterclockwise.
Indicates a decreasing value when contact is depressed as in direct reading slot, recess or hole depth measurements.

Note: If Revolution Counter models are ordered, counter dial numbered clockwise



Dial Indicators per ANSI/AGD Group 0 - Mahr Federal Series A and N

Where available space prohibits the use of a larger dial indicator.

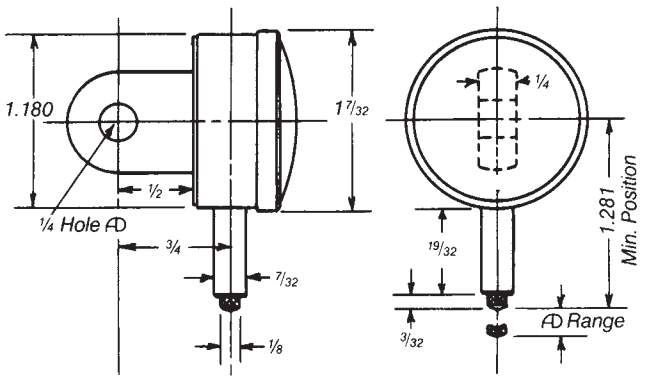
Technical Data

Mahr Federal Series A (inch)
Dial: approx. 1.250" dia. with soft-green tint

Measuring range	Graduation value	Dial style	Range per revolution	Accuracy	Order no.
.010"	***.0001"***	0-2-0	***.004"***	***±.0001"***	**A1/2Q**
.025"	***.0001"***	0-5-0	***.010"***	***±.0001"***	**A2I**
.050"	***.0005"***	0-10-0	***.020"***	***±.0005"***	**A3Q**
.100"	***.001"***	0-20-0	***.040"***	***±.001"***	**A6Q**

Mahr Federal Series N (Metric – mm)
Dial: approx. 32 mm dia. with soft-yellow tint

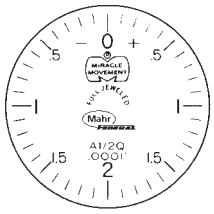
Measuring range	Graduation value	Dial style	Range per revolution	Accuracy	Order no.
0.250	0.002	0-5-0	0.100	±0.002 mm	**N1/2O**
1.250	0.005	0-25-0	0.500	±0.005 mm	**N3I**
2.500	0.010	0-50-0	1.00	±0.010 mm	**N6I**



Backs can be rotated 90° and 180°

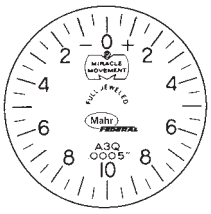
Dial Indicators per ANSI/AGD Group 0 - Mahr Federal Series A and N

Mahr Federal Series A

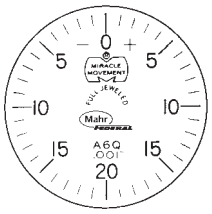


A1/2Q

A2I



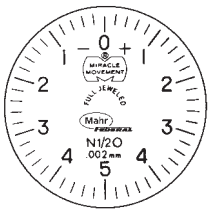
A3Q



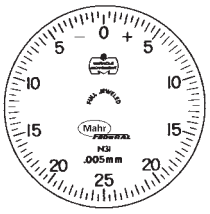
A6Q

- Normally furnished: balanced dial with + on right; centered vertical lug back; regular contact point, .09" radiused, .093" long.
- Optional dials: balanced with + on left; continuous clockwise; continuous counter-clockwise. Order by part number and specify dial style desired.
- For other dial styles or special requirements, call Mahr Federal.

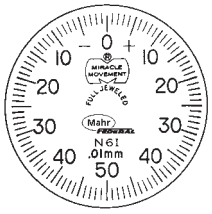
Mahr Federal Series N



N1/2O



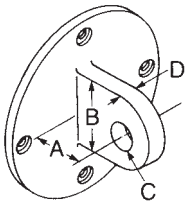
N3I



N6I

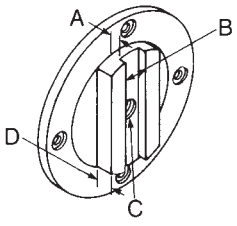
Backs for ANSI Group 0 - Series A and N

Vertical (Centered) Lug Back is normally furnished and included in price of Indicator. Back can be rotated 90° for horizontal lug mounting.



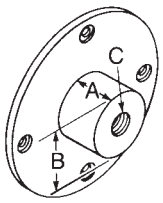
Vertical Lug (Centered)
BK-37

A	B	C	D
1/2	11/16	1/4	1/4



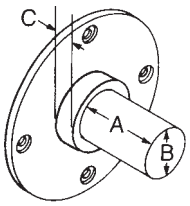
Adjustable
BK-45

A	B	C	D
1/8	3/8	8-32	1/4



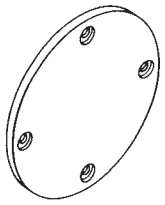
Screw Type
BK-88

A	B	C
1/2	11/16	1/4-28



Post
BK-38

A	B	C
5/16	7/32	1/16

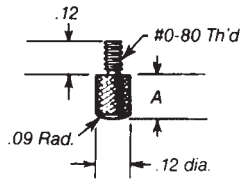


Flat
BK-32

Split Bushing, BU-112 Fits Stem (.218" I.D. x .375" O.D.), .500" long.

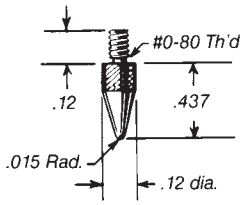
Points for ANSI Group 0 - Series A and N

Regular PT-43
normally furnished

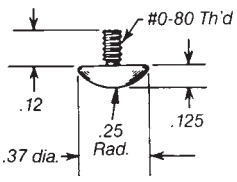


Dim. A	Style
3/32"	PT-43
1/4"	PT-204
3/8"	PT-205
1/2"	PT-207
5/8"	PT-208
3/4"	PT-209
7/8"	PT-210
1"	PT-211

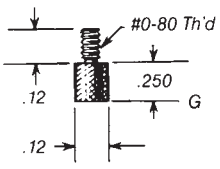
Taper
PT-119



Button
PT-118



Flat
AL-61



Dial Indicators per ANSI/AGD Group 1 - Mahr Federal Series B and O

Technical Data

Mahr Federal Series B (inch)
Dial: approx. 1.750" dia. with soft-green tint

Measuring range	Graduation value	Dial style w/o Rev Counter	Dial style with Rev Counter	Range per revolution	Accuracy	Order no. w/o Rev Counter	Order no. with Rev Counter
.025"	***.0001"***	0-5-0	0-10	***.010"***	***±.0001"***	**12I**	**12I-RC**
.025"	***.00025"***	0-5-0	0-10	***.010"***	***±.00025"***	**12Q**	**12Q-RC**
.050"	***.00025"***	0-10-0	0-20	***.020"***	***±.00025"***	**B3K**	**B3K-RC**
.050"	***.0005"***	0-10-0	0-20	***.020"***	***±.0005"***	**B3Q**	**B3Q-RC**
.075"	***.0005"***	0-15-0	0-30	***.030"***	***±.0005"***	**B5M**	**B5M-RC**
.100"	***.0005"***	0-20-0	0-40	***.040"***	***±.0005"***	**B6K**	**B6K-RC**
.125"	***.0005"***	0-25-0	0-50	***.050"***	***±.0005"***	**B7I**	**B7I-RC**
.050"	***.001"***	0-10-0	0-20	***.020"***	***±.001"***	**B3W**	**B3W-RC**
.100"	***.001"***	0-20-0	0-40	***.040"***	***±.001"***	**B6Q**	**B6Q-RC**
.125"	***.001"***	0-25-0	0-50	***.050"***	***±.001"***	**B7O**	**B7O-RC**
.250"	***.001"***	0-50-0	0-100	***.100"***	***±.001"***	**B8I**	**B8I-RC**

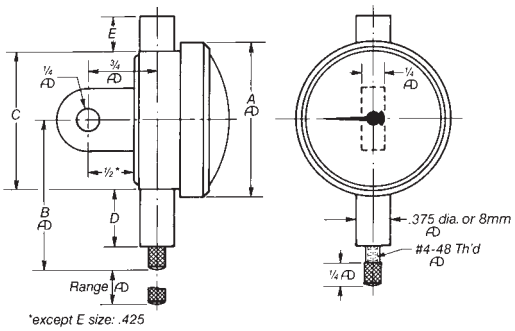
Mahr Federal Series O (Metric, mm)
Dial: approx. 45 mm dia. with yellow tint

Measuring range	Graduation value	Dial style w/o Rev Counter	Dial style with Rev Counter	Range per revolution	Accuracy	Order no. w/o Rev Counter	Order no. with Rev Counter
0.500	0.002	0-10-0	0-20	0.200	±0.004	**O1I**	**O1I-RC**
1.250	0.005	0-25-0	0-50	0.500	±0.005	**O3I**	**O3I-RC**
2.500	0.010	0-50-0	0-100	1.000	±0.010	**O6I**	**O6I-RC**
6.250	0.025	0-125-0	0-250	2.500	±0.025	**O8I**	**O8I-RC**

Dimensions

ANSI / AGD Group	Mahr Federal Styles	A mm/inch	B mm/inch	C mm/inch	D mm/inch	E mm/inch
1	B/O	42.86/ 1.688"	41.28/ 1.625"	38.10/ 1.5"	15.88/ .625"	8.73/ .344"
2	C/P	57.15/ 2.25"	50.80/ 2"	52.39/ 2.063"	18.26/ .719"	8.73/ .344"

These indicators are normally furnished with continuous dial (with R.C.) or + on right balance dial (w/o R.C.), lug back and .18" by .250" long contact.



Dial Indicators per ANSI/AGD Group 2 - Mahr Federal Series C and P

Ordering Information

In addition to the information provided below, see pages 5-4 & 5-5 for complete instructions on ordering your dial indicators and accessories.

www.mahr.com

Technical Data

Mahr Federal Series C (inch)
Dial: approx. .250" dia. with soft-green tint

Measuring range	Graduation value	Dial style w/o Rev Counter	Dial style with Rev Counter	Range per revolution	Accuracy	Order no. w/o Rev Counter	Order no. with Rev Counter	OLD Order no.
.020"	***.0001"***	0-4-0	0-8	***.008"***	***±.0001"***	**C1K**	**C1K-RC**	**C1K**
.025"	***.0001"***	0-5-0	0-10	***.010"***	***±.0001"***	**2015781**	**2014761**	**C2I/22I**
.025"	***.00025"***	0-5-0	0-10	***.010"***	***±.00025"***	**2015782**	**2014791**	**C2Q/22Q**
.050"	***.00025"***	0-10-0	0-20	***.020"***	***±.00025"***	**2015783**	**2014808**	**C3K/23K**
.050"	***.0005"***	0-10-0	0-20	***.020"***	***±.0005"***	**2015784**	**2014810**	**C3Q/23Q**
.075"	***.0005"***	0-15-0	0-30	***.030"***	***±.0005"***	**2015786**	**2014811**	**C5M/25M**
.100"	***.0005"***	0-20-0	0-40	***.040"***	***±.0005"***	**2015787**	**2014812**	**C6K/26K**
.125"	***.0005"***	0-25-0	0-50	***.050"***	***±.0005"***	**2015790**	**2014814**	**C7I/27I**
.050"	***.001"***	0-10-0	0-20	***.020"***	***±.001"***	**2015785**	**2014809**	**C3W/23W**
.100"	***.001"***	0-20-0	0-40	***.040"***	***±.001"***	**2015789**	**2014813**	**C6Q/26Q**
.125"	***.001"***	0-25-0	0-50	***.050"***	***±.001"***	**2015791**	**2014815**	**C7O/27O**
.250"	***.001"***	0-50-0	0-100	***.100"***	***±.001"***	**2015792**	**2011049**	**C8I/28IN**
Super Sensitive Type (Inch)								
.010"	***.00005"***	0-2-0	0-4	***.004"***	***±.0001"***	**C1/2K**	**C1/2K-RC**	**C1/2K**

Mahr Federal Series P (Metric, mm)
Dial: approx. 57 mm dia. with soft-yellow tint

Measuring range	Graduation value	Dial style w/o Rev Counter	Dial style with Rev Counter	Range per revolution	Accuracy	Order no. w/o Rev Counter	Order no. with Rev Counter	OLD Order no.
0.500	0.002	0-10-0	0-20	0.200	±0.002	**P1I**	**P1I-RC**	**P1I/21IN**
1.250	0.005	0-25-0	0-50	0.500	±0.005	**2015793**	**2014817**	**P3I/23I**
2.500	0.010	0-50-0	0-100	1.000	±0.010	**2015794**	**2014818**	**P6I/26I**
5.000	0.020	0-100-0	0-200	2.000	±0.020	**2015795**	**2014819**	**P8I/28IM**
Super Sensitive Type (Metric – mm)								
0.250	0.001	0-5-0	0-10	0.100	±0.002	**P1/2I**	**P1/2I-RC**	**P1/2I**

These indicators are normally furnished with continuous dial (with R.C.) or + on right balance dial (w/o R.C.), lug back, .18" by .250" long contact and tolerance hands.*

** tolerance hands not supplied on C1K, C1/2K , P1I & P1/2I.*

Accessories

- Contact Points - see page 5-27 and 5-22
- Backs and Mounting Brackets - see pages 5-21 and 5-22
- Accessories - see pages 5-23 and 5-24

Dial Indicators per ANSI/AGD Group 3 - Mahr Federal Series D and Q

Recommended for larger gages and greater visibility.

Ordering Information

In addition to the information provided below, see pages 5-4 & 5-5 for complete instructions on ordering your dial indicators and accessories.

www.mahr.com

Technical Data

Mahr Federal Series D (inch)
Dial: approx. 2.750" dia. with soft-green tint

Measuring range	Graduation value	Dial style w/o Rev Counter	Dial style with Rev Counter	Range per revolution	Accuracy	Order no. w/o Rev Counter	Order no. with Rev Counter
.020"	***.0001"***	0-4-0	0-8	***.008"***	***±.0001"***	**D1K**	**D1K-RC**
.025"	***.0001"***	0-5-0	0-10	***.010"***	***±.0001"***	**32I**	**32I-RC**
.025"	***.00025"***	0-5-0	0-10	***.010"***	***±.00025"***	**32Q**	**32Q-RC**
.050"	***.00025"***	0-10-0	0-20	***.020"***	***±.00025"***	**D3K**	**D3K-RC**
.075"	***.00025"***	0-15-0	0-30	***.030"***	***±.00025"***	**D5G**	**D5G-RC**
.050"	***.0005"***	0-10-0	0-20	***.020"***	***±.0005"***	**D3Q**	**D3Q-RC**
.075"	***.0005"***	0-15-0	0-30	***.030"***	***±.0005"***	**D5M**	**D5M-RC**
.100"	***.0005"***	0-20-0	0-40	***.040"***	***±.0005"***	**D6K**	**D6K-RC**
.125"	***.0005"***	0-25-0	0-50	***.050"***	***±.0005"***	**D7I**	**D7I-RC**
.050"	***.001"***	0-10-0	0-20	***.020"***	***±.001"***	**D3W**	**D3W-RC**
.100"	***.001"***	0-20-0	0-40	***.040"***	***±.001"***	**D6Q**	**D6Q-RC**
.125"	***.001"***	0-25-0	0-50	***.050"***	***±.001"***	**D7O**	**D7O-RC**
.250"	***.001"***	0-50-0	0-100	***.100"***	***±.001"***	**D8I**	**D8I-RC**

Mahr Federal Series Q (Metric – mm)
Dial: approx. 70 mm dia. with soft-yellow tint

Measuring range	Graduation value	Dial style w/o Rev Counter	Dial style with Rev Counter	Range per revolution	Accuracy	Order no. w/o Rev Counter	Order no. with Rev Counter
0.500	0.002	0-10-0	0-20	0.200	±.0.002	**Q1I**	**Q1I-RC**
1.250	0.005	0-25-0	0-50	0.500	±0.005	**Q3I**	**Q3I-RC**
2.500	0.010	0-50-0	0-100	1.000	±0.020	**Q6I**	**Q6I-RC**
5.000	0.020	0-100-0	0-200	2.000	±0.020	**Q8I**	**Q8I-RC**

These indicators are normally furnished with continuous dial (with R.C.) or + on right balance dial (w/o R.C.), lug back, and .18" by .250" long contact.

Accessories

- Contact Points - see pages 5-27 and 5-22
- Backs and Mounting Brackets - see pages 5-21 and 5-22
- Accessories - see pages 5-23 and 5-24

Dial Indicators per ANSI/AGD Group 4 - Mahr Federal Series E and R

Technical Data

Mahr Federal Series E (inch)
Dial: approx. 3.625" dia. with soft-green tint

Measuring range	Graduation value	Dial style w/o Rev Counter	Dial style with Rev Counter	Range per revolution	Accuracy	Order no. w/o Rev Counter	Order no. with Rev Counter
.020"	***.0001"***	0-4-0	0-8	***.008"***	***±.0001"***	**E1K**	**E1K-RC**
.025"	***.0001"***	0-5-0	0-10	***.010"***	***±.0001"***	**42I**	**42I-RC**
.050"	***.00025"***	0-10-0	0-20	***.020"***	***±.00025"***	**E3K**	**E3K-RC**
.075"	***.00025"***	0-15-0	0-30	**.030"**	**±.00025"**	**E5G**	**E5G-RC**
.050"	***.0005"***	0-10-0	0-20	***.020"***	***±.0005"***	**E3Q**	**E3Q-RC**
.075"	***.0005"***	0-15-0	0-30	***.030"***	***±.0005"***	**E5M**	**E5M-RC**
.125"	***.0005"***	0-25-0	0-50	***.050"***	***±.0005"***	**E7I**	**E7I-RC**
.050"	***.001"***	0-10-0	0-20	***.020"***	***±.001"***	**E3W**	**E3W-RC**
.125"	***.001"***	0-25-0	0-50	***.050"***	***±.001"***	**E7O**	**E7O-RC**
.250"	***.001"***	0-50-0	0-100	***.100"***	***±.001"***	**E8I**	**E8I-RC**

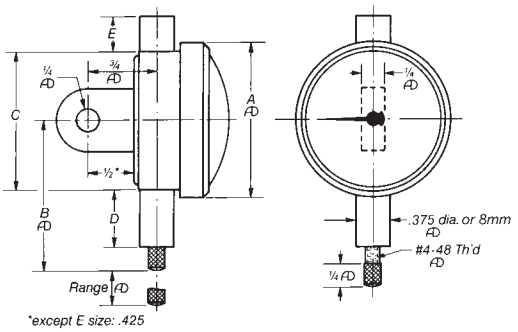
Mahr Federal Series R (Metric, mm)
Dial: approx. 92 mm dia. with yellow tint

Measuring range	Graduation value	Dial style w/o Rev Counter	Dial style with Rev Counter	Range per revolution	Accuracy	Order no. w/o Rev Counter	Order no. with Rev Counter
0.500	0.002	0-10-0	0-20	0.200	±0.002	**R1I**	**R1I-RC**
1.250	0.005	0-25-0	0-50	0.500	±0.005	**R3I**	**R3I-RC**
2.500	0.010	0-50-0	0-100	1.000	±0.010	**R6I**	**R6I-RC**
5.000	0.020	0-100-0	0-200	2.000	±0.020	**R8I**	**R8I-RC**

Dimensions

ANSI / AGD Group	Mahr Federal Styles	A mm/inch	B mm/inch	C mm/inch	D mm/inch	E mm/inch
3	D/Q	69.85/ 2.75"	53.98/ 2.125"	65.09/ 2.563"	15.88/ .625"	8.73/ .344"
4	E/R	92.08/ 3.625"	65.09/ 2.563"	87.31/ 3.438"	15.88/ .625"	8.73/ .344"

These indicators are normally furnished with continuous dial (with R.C.) or + on right balance dial (w/o R.C.), lug back and .18" by .250" long contact.



Easy Reading, Single Revolution Dial Indicator

Easy reading

A practical solution for inspectors and machine operators who need to eliminate the potential for indicator misreadings. No matter how far out of tolerance a part may be, the needle of a one revolution indicator will always stay in the red, non-read zone – no passing zero again – no reading errors.

- No limited contact travel
- Shockproof "Following Movement" always keeps the hand within a single revolution.
- Alternate contact points, backs and other accessories are optionally available.
- Metric dials are yellow
- One-piece case design
- Inserted precision bearings
- Available in ANSI/AGD Group 2 size

Technical Data

Measuring range	Graduation value	Stem diameter	Model no.	Order no.
2 mm	0.02 mm	***.375"***	**P1RN-200**	**2014794**
1 mm	0.01 mm	***.375"***	**P1RN-100**	**2014795**
2 mm	0.02 mm	8 mm	**M1RN-200**	**2014796**
1 mm	0.01 mm	8 mm	**M1RN-100**	**2014797**
.080"	***.001"***	***.375"***	**C1RN-80**	**2014792**
.040"	***.0005"***	***.375"***	**C1RN-40**	**2014793**

High Performance, Value Dial Indicators per ANSI/AGD Group 2

Features

- A well thought-out design, the use of high-quality components and materials as well as the precision engineered mechanism guarantee the outstanding quality of these indicators.
- The concentric "Speed Read" pointer (on 1.0" and .500" models) allows easy and safe reading of this Dial Indicator
- Spindle and stem are made of resistant stainless steel. Supplied with: Lug Back and Tolerance Hands

2016002

2016003

Technical Data

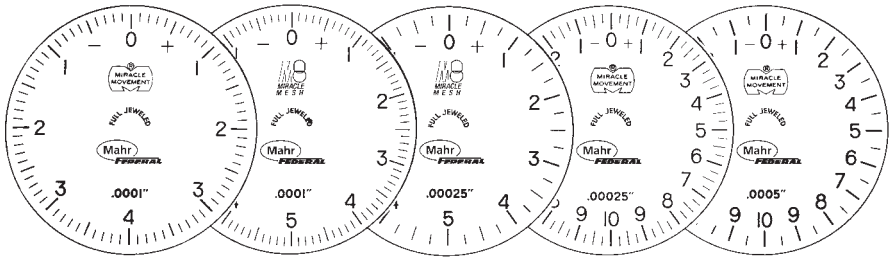
Measuring Range	Graduation value	Stem diameter	Dial style	Range per Rev.	Rev. Counter	Order no.
.025"	***.0001"***	***.375"***	0-10	***.010"***	Standard	**2016003**
.250"	***.001"***	***.375"***	0-100	***.100"***	Standard	**2016005**
.500"	***.001"***	***.375"***	0-100	***.100"***	Speed read	**2016004**
1.00"	***.001"***	***.375"***	0-100	***.100"***	Speed read	**2016002**

Accessories

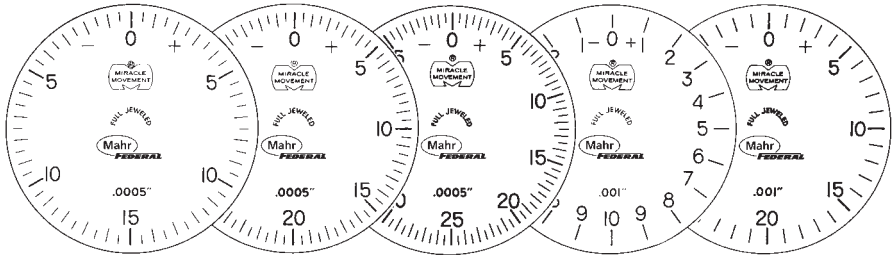
- Contact Points - see page 5-27

Dial Styles for ANSI/AGD Groups 1 thru 4 Balanced Dials

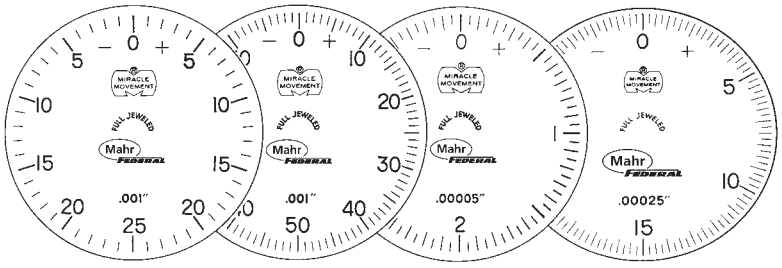
Mahr Federal Series B thru E



	12I	12Q	B3K	B3Q
C1K	2015781	2015782	2015783	2015784
D1K	32I	32Q	D3K	D3Q
E1K	42I		E3K	E3Q

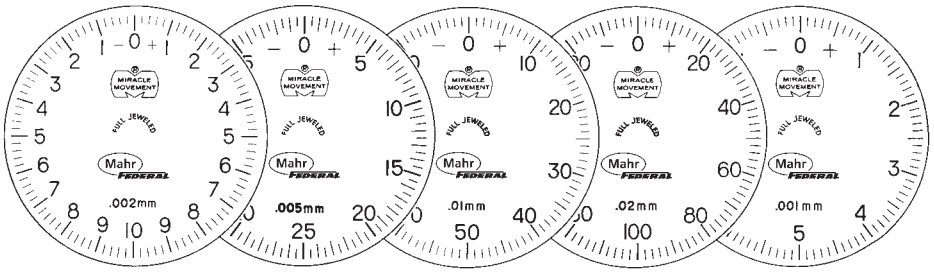


B5M	B6K	B7I	B3W	B6Q
2015786	2015787	2015790	2015785	2015789
D5M	D6K	D7I	D3W	D6Q
E5M		E7I	E3W	



B7O	B8I		
2015791	2015792	C1/2K	
D7O	D8I		D5G
E7O	E8I		E5G

Mahr Federal Series O thru R



O1I	O3I	O6I	Q8I	
21IN	2015793	2015794	2015795	P1/2I
Q1I	Q3I	Q6I	R8I	
R1I	R3I	R6I		

Indicator O8I is not illustrated: Dial style is 0-125-0, minimum graduation is .025 mm

Features

- Normally furnished: dial as illustrated; centered vertical lug back; regular contact point, .18" radiused, 1/4" long.
- Optional Dials: balanced dial with + on left; continuous clockwise; continuous counter-clockwise. (Order by part number and specify dial style desired.)
- Revolution Counters available, please specify when ordering. Includes continuous dial unless otherwise specified.
- For other dial styles or special requirements - call Mahr Federal.
- Indicator dimensions are located on pages containing individual ANSI/AGD descriptions.

Accessories

- Contact Points - see page 5-27 and 5-22
- Backs and Mounting Brackets - see pages 5-21 and 5-22
- Accessories - see pages 5-23 and 5-24

Ordering Information

In addition to the information provided above, see pages 5-4 & 5-5 for complete instructions on ordering your dial indicators and accessories.

www.mahr.com

Long Range and Extra Long Range Indicators

Technical Data

Long Range/Extra Long Range (Inch)
Dial: soft-green tint

Measuring range	Graduation value	Dial style	Range per revolution	Accuracy	ANSI/AGD	Model no.	Order no.
.500"	***.0001"***	0-10	***.010"***	***.0001"****	4	**42IQ**	**42IQ ****
.500"	***.001"***	0-100	***.100"***	***.001"***	2	**28IQN**	**2014699**
1.000"	***.001"***	0-100	***.100"***	***.001"***	2	**28ISN**	**2014698**
1.000"	***.001"***	0-100	***.100"***	***.001"***	3	**D3K**	**D8IS**
1.000"	***.010"***	0-1000	***1.000"***	***.010"***	2	**29I**	**2014816**
Extra Long Range							
2.000"	***.001"***	0-100	***.100"***	***.001"******	3	**D8IT**	
3.000"	***.001"***	0-100	***.100"***	***.001"******	4	**E8IU**	

* *for first 2-1/2 revolutions only.*
** *hysteresis = 0.0002" for full range*
*** *for first 1 inch of travel.*

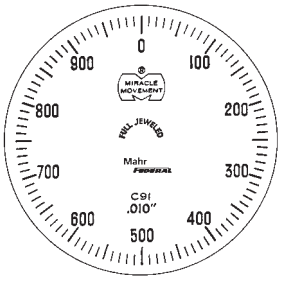
Long Range/Extra Long Range (Metric)
Dial: yellow tint

Measuring range	Graduation value	Dial style	Range per revolution	Accuracy	ANSI/AGD	Model no.	Order no.
25.000	0.010	0-100	1.000	.020	2	**SP6IS**	
25.000	0.010	0-100	1.000	.020	3	**SQ6IS**	
Extra Long Range							
50.000	0.025	0-25	2.500	.025****	3	**Q8IT**	
75.000	0.025	0-25	2.500	.025****	4	**R8IU**	

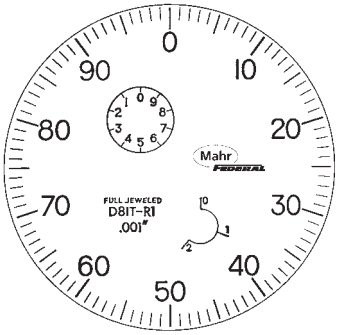
**** *for first 25 mm of travel.*

Dial Styles for Long Range and Extra Long Range Indicators

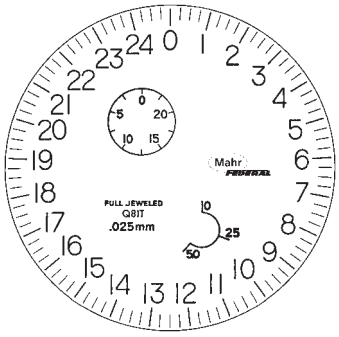
28IQN, 28ISN & D8IS



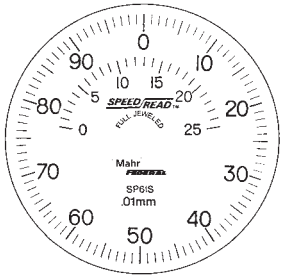
29I



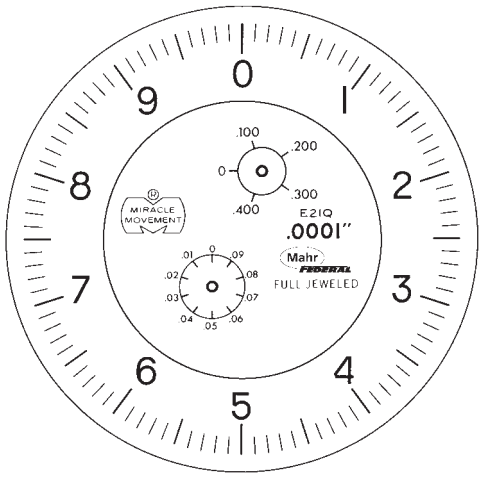
D8IT & E8IU



Q8IT & R8IU



SP6IS & SQ6IS



42IQ

Features

- Normally furnished: continuous clockwise dial; centered vertical lug back; regular contact point, .18" radiused, .250" long.
- Long Range Models: include (1) revolution counter (except C9I without revolution counter). Extra Long Range Models: include (2) revolution counters.
- For other dial styles or special requirements - call Mahr Federal.
- Indicator dimensions are located on pages containing individual ANSI/AGD descriptions.

Accessories

- Contact Points - see page 5-27 and 5-22
- Backs and Mounting Brackets - see pages 5-21 and 5-22
- Accessories - see pages 5-23 and 5-24

Dial Indicator Modifications & Specials

Available to meet specific requirements.

- Special Ranges
- Restricted Hand Travel
- Special Dials
- High Temperature
- Special Contact Points
- 8 mm Stem Diameters Special Lengths
- Specified Contact Load
- Counter-clockwise Movement
- Special Stem Lengths
- Push-Down Action
- Special Ratio Movement
- Threaded Stems

Ordering Information

In addition to the information provided above, see pages 5-4 & 5-5 for complete instructions on ordering your dial indicators and accessories.

www.mahr.com

Series WC and WP Wetproof Dial Indicators

Splashproof protection from coolant, oil, or other contaminant's.

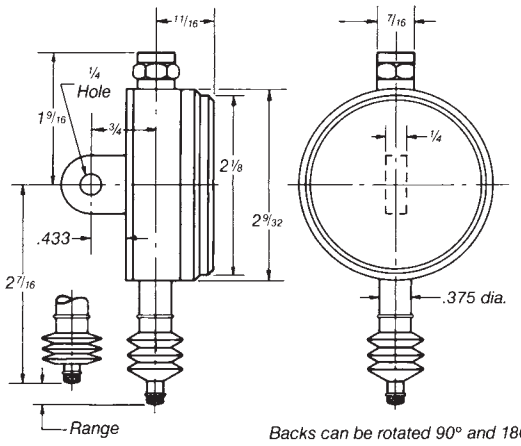
Technical Data

Series WC and WP Wetproof Dial Indicators (Inch)
Dial: approx. 2-1/4" dia. with soft-green tint

Measuring range	Graduation value	Dial style	Range per revolution	Accuracy	Order no.
.025"	***.0001"***	0-10	***.010"***	***.0001"***	**W22I**
.050"	***.00025"***	0-20	***.020"***	***.00025"***	**WC3K**
.050"	***.0005"***	0-20	***.020"***	***.0005"***	**WC3Q**
.075"	***.0005"***	0-30	***.030"***	***.0005"***	**WC5M**
.100"	***.0005"***	0-40	***.040"***	***.0005"***	**WC6K**
.125"	***.0005"***	0-50	***.050"***	***.0005"***	**WC7I**
.250"	***.001"***	0-100	***.100"***	***.001"***	**WC8I**
1.000"	***.001"***	0-100	***.100"***	***.001"***	**WC8IS**

Series WC and WP Wetproof Dial Indicators (Metric)
Dial: approx. 57 mm dia. with soft-yellow tint

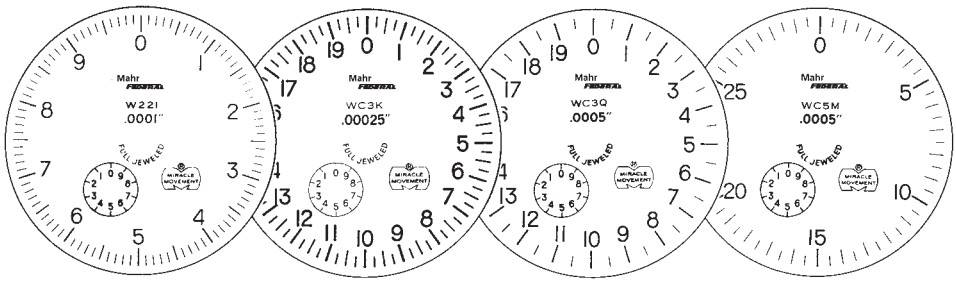
Measuring range	Graduation value	Dial style	Range per revolution	Accuracy	Order no.
0.500	0.002	0-20	0.200	0.002	**WP1I**
1.250	0.005	0-50	0.500	0.005	**WP3I**
2.500	0.010	0-100	1.000	0.010	**WP6I**



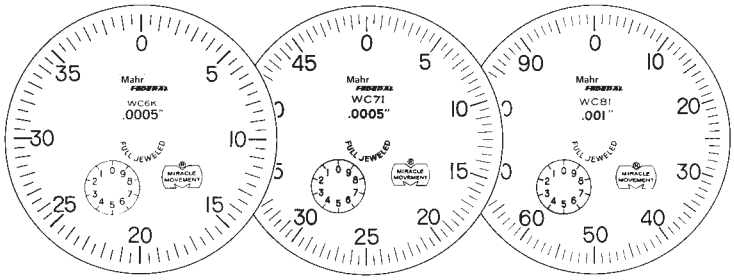
Backs can be rotated 90° and 180°

Dial Styles for WC and WP Wetproof Dial Indicators

Series WC indicators

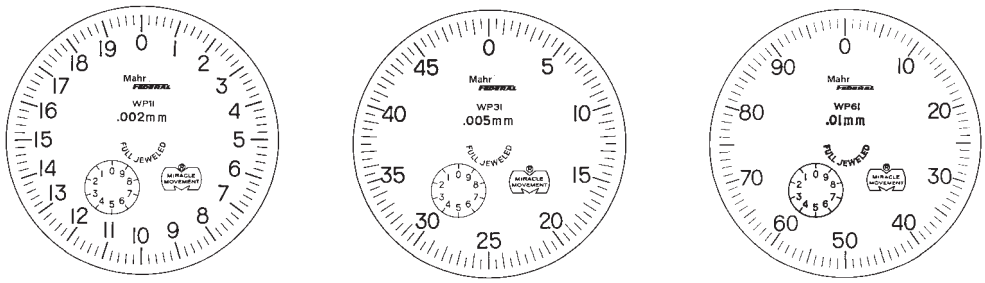


W22I WC3K WC3Q WC5M



WC6K WC7I WC8I/WC8IS

Series WP indicators



WP1I WP3I WP6I

Features

- Normally furnished: continuous clockwise dial with revolution counter; BK-63 centered vertical lug back; regular contact point, .18" radiused, .625" long
- Optional Dials: continuous counter-clockwise with revolution counter; balanced outer dial with + on right or left. Order by dial type and specify dial style desired.
- For other dial styles or special requirements - call Mahr Federal.

Accessories

- Contact Points - see page 5-27 and 5-22
- Accessories - see pages 5-23 and 5-24

Ordering Information

In addition to the information provided above, see pages 5-4 & 5-5 for complete instructions on ordering your dial indicators and accessories.

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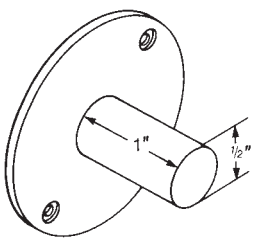
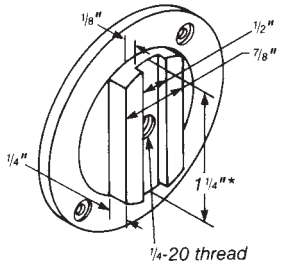
Backs for Wetproof Dial Indicators

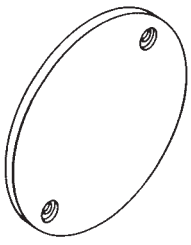
Vertical (centered) lug back is normally furnished and included in price of indicator. Back can be rotated 90° for horizontal lug mounting.



BK-90
Post Back



BK-68
Adjustable Back



BK-97
Flat Back

Perpendicular Dial Indicators

Provides improved readability where other style indicators cannot be used.

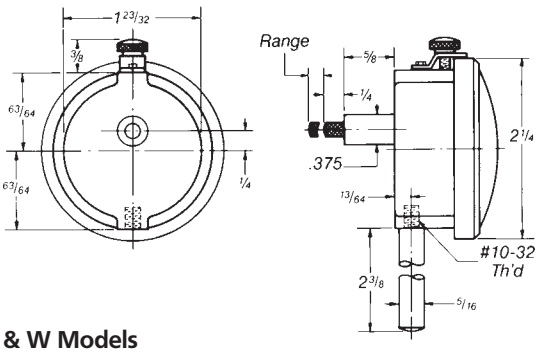
Technical Data

Series F, G, J, V (Inch)
Dial: soft-green tint

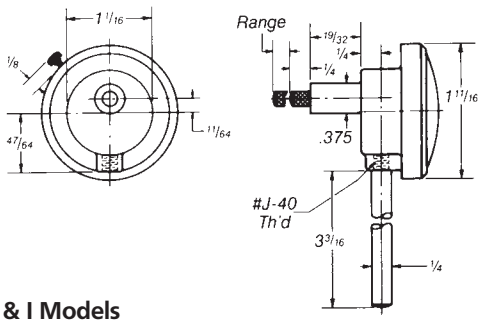
Measuring range	Graduation value	Dial style	Range per revolution	Accuracy	Gear type	Dial Dia. (approx.)	Order no.
.008"	***.0001"***	0-4-0	***.008"***	***.0001"***	crown	***2-1/4"***	**J1K**
.040"	***.0005"***	0-20-0	***.040"***	***.0005"***	crown	***2-1/4"***	**J6K**
.100"	***.0005"***	0-12-0	***.025"***	***.0005"***	spiral	***2-1/4"***	**G4O**
.100"	***.001"***	0-50-0	***.100"***	***.001"***	crown	***2-1/4"***	**J8I**
.100"	***.001"***	0-50-0	***.100"***	***.001"***	crown	***1-11/16"***	**V8I**
.200"	***.001"***	0-50-0	***.100"***	***.001"***	spiral	***1-23/32"***	**F8I**
.200"	***.001"***	0-50-0	***.100"***	***.001"***	spiral	***2-1/4"***	**G8I**

Series I, W (Metric)
Dial: yellow tint

Measuring range	Graduation value	Dial style	Range per revolution	Accuracy	Gear type	Dial Dia. (approx.)	Order no.
0.200	0.002	0-10-0	0.200	0.002	crown	57	**W1I**
1.000	0.010	0-50-0	1.000	0.010	crown	57	**W6I**
2.500	0.025	0-125-0	2.500	0.025	crown	57	**W8I**
2.500	0.025	0-125-0	2.500	0.025	crown	43	**I8I**



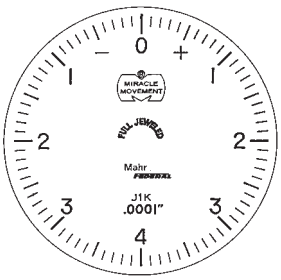
J & W Models



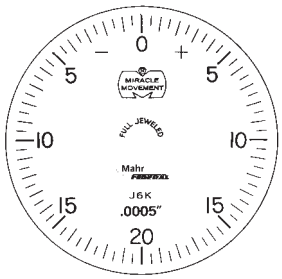
V & I Models

Dial Styles for Perpendicular Indicators

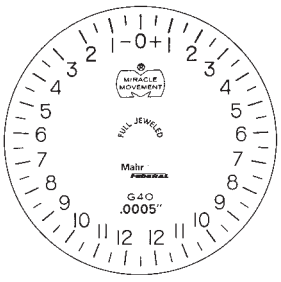
Series J, G, V, F



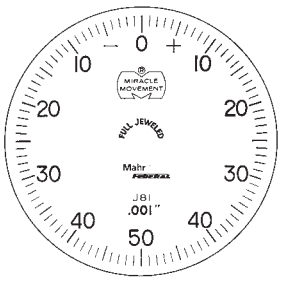
J1K



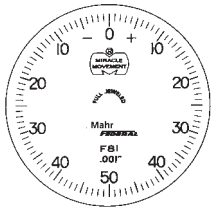
J6K



G40

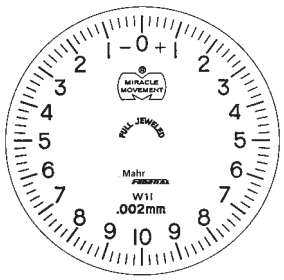


J8I & G8I

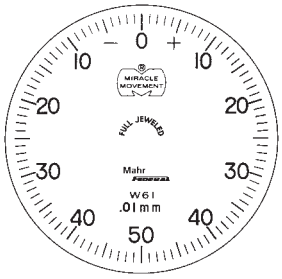


V8I & F8I

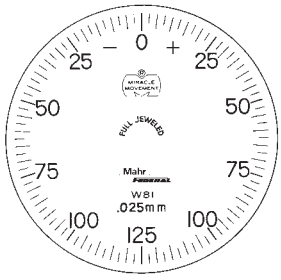
Series W, I



W1I



W6I



W8I & I8I

Features

- Normally furnished: balanced dial with + on right; mounting rod (see dimension drawings); regular contact point, .18" radiused, .250" long.
- Threaded stem versions available as an option; AD-59 (.5622 long x .500" O.D. for "J & W" styles), 3/8-32 internally threaded bushings and AD-60 (.687" long x .500" O.D. for "G & F" Models) purchased separately. Bushings also available separately.
- For other dial styles or special requirements - call Mahr Federal.

Accessories

- Contact Points - see page 5-27 and 5-22
- Accessories - see pages 5-23 and 5-24

Ordering Information

In addition to the information provided above, see pages 5-4 & 5-5 for complete instructions on ordering your dial indicators and accessories.

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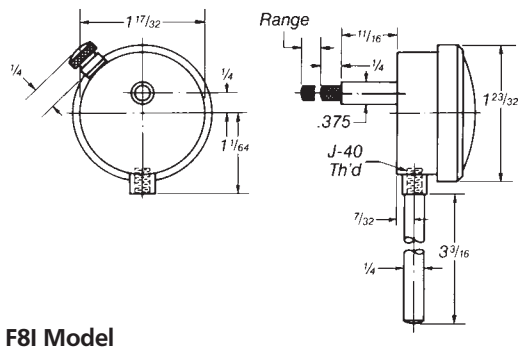
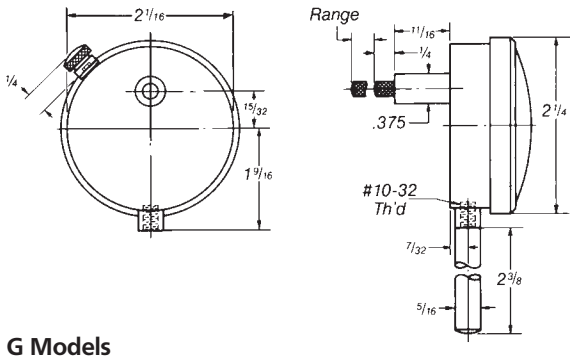


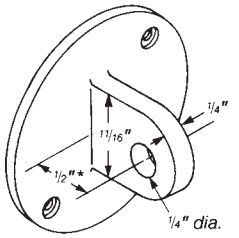
F8I Model



G Models

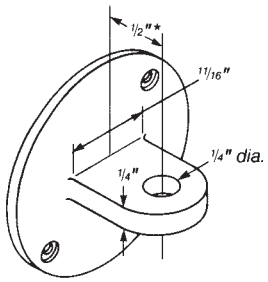
Backs for ANSI/AGD Group 1, 2, 3, and 4 Dial Indicators

Vertical Lug
(centered) normally furnished

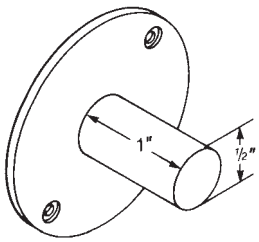


*27/64" for E/R size

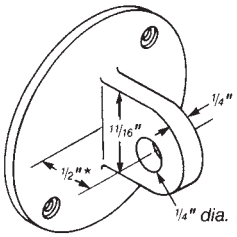
Horizontal Lug
(centered)



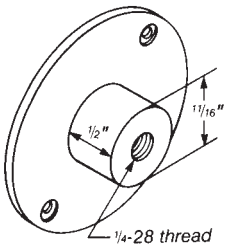
Post



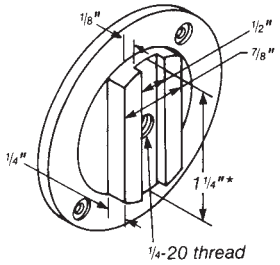
Vertical Lug
(offset) Left face of lug is on centerline of back



Screw Type

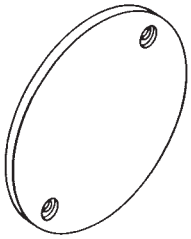


Adjustable



*7/8" for B/O size; no flats

Flat



Features

- Backs shown are for ANSI/AGD Groups 1,2,3,4, Long Range and Extra Long Range Indicators. Backs for ANSI/AGD Group 0 Indicators - see page 5-8. Backs for Wetproof Indicators - see page 5-18.
- To order - specify Back Order Number (from table below).
- Backs for ANSI/AGD Group 1 (Series B/O) Indicators can be repositioned 180°. Backs for ANSI/AGD Group 4 (Series E/R) Indicators can be repositioned 90° and 180°.
- For Special Backs - call Mahr Federal.

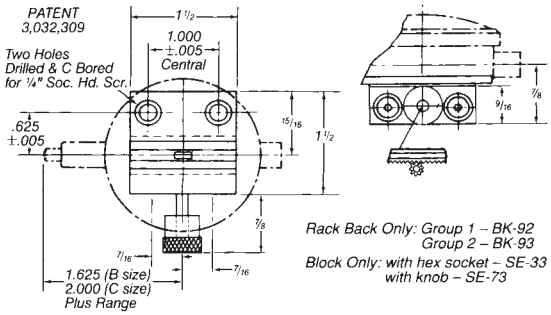
Ordering Numbers

	ANSI/AGD			
	Group 1 Series B/O	**Group 2 Series C/P**	**Group 3 Series D/Q**	**Group 4 Series E/R**
Vertical Lug, Centered	**BK-1600**	**BK-383**	**BK-431**	**BK-3**
Vertical Lug, Offset	**BK-1601**	**BK-2168**	**BK-545**	**BK-4**
Horizontal Lug, Centered	**BK-19**	**BK-400**	**BK-109**	**BK-3**
Flat	**BK-1660**	**BK-470**	**BK-473**	**BK-5**
Post	**BK-1634**	**BK-2093**	**BK-664**	**BK-17**
Screw	**BK-1661**	**BK-692**	**BK-177**	**BK-16**
Adjustable	**BK-1633**	**BK-531**	**BK-10**	**BK-18**

Adjustable Mounting Brackets

Features

- Allows fast, positive indicator adjustments
- Ideal for permanent indicator mounting to fixtures
- Rack Back included with all Brackets
- Sizes for ANSI/AGD Groups 1 and 2



Order Numbers

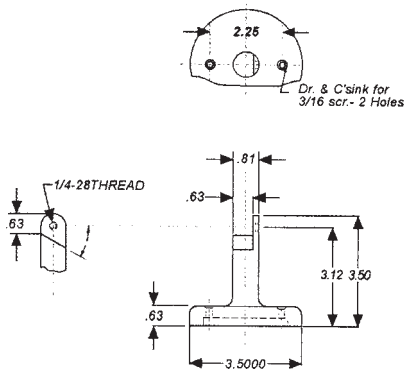
Mahr Federal Indicator	Used with	Order no.
Group 1	hex socket adjust	**AT-27**
Group 1	adjusting knob	**AT-115**
Group 2	hex socket adjust	**AT-28**
Group 2	adjusting knob	**AT-116**

Universal Mounting Base

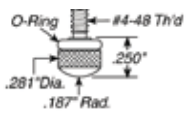
Features

- Allows mounting indicator to custom fixtures
- Uses lug back to mount indicator
- Accommodates all size indicators

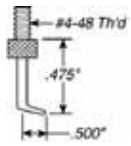
Order no. **BA-1051**



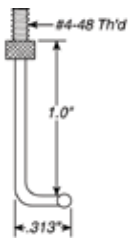
Added flexibility for your Mahr Federal Dial Indicators



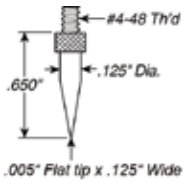
PT-2263



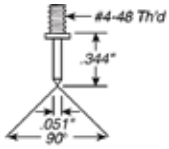
PT-2267



PT-2268



PT-2266



PT-2265

Features

Innovative Contact Points make your indicators more versatile.

- Minimize point damage with a shock absorbing contact, without the need for a cushion gear.
- Needle point perfect for checking small areas – etchings, pits and more.
- Chisel point easily adapts to small slots or screw heads.
- Small offset point for narrow recesses — grooves, holes and under ledges.
- Right angle point makes hard to reach grooves easily accessible.

Description	Order no.
Shock Absorbing Contact. "O" ring over threads provides a barrier between metal surface and stem, minimizing damage if point is pushed in with excessive force.	**PT-2263**
Chisel Point Contact for checking small slots. Furnished with a small lock nut for positioning on the indicator.	**PT-2266**
Small Offset Point Contact. Small tip, .010" radius, permits checking narrow recesses. Furnished with a lock nut for indicator positioning.	**PT-2267**
Needle Contact for checking into small areas. Correct length for use as a replacement on Mahr Federal 65P-40 depth gage.	**PT-2265**
Right Angle Contact with a .093" diameter ball for checking hard-to-reach grooves. Right angle allows checking to bottom or to top of a groove when used with a push down action Indicator. Its 1" length makes it long enough to be used with Mahr Federal 75P-50 Series Depth Gages.	**PT-2268**
Contact Thread Adapter, Adapts M2.5 thread to 4-48 thread (.375" length)	**AD-185**
4-48 to M2.5 Threaded Adapter	**2236519**

Indicator Accessories

Weights

Used with ANSI/AGD type and long range indicators. Applies constant pressure throughout indicator range.
To order specify requirement.

Protective Housing

For ANSI/AGD Group 2 indicators. Opens at rear so indicator can be mounted by its back. Mounts to indicator stem using a .687" O.D. bushing (not included). Order **HG-100** for Indicator models with ranges up to 6.35 mm /.250", **HG-101** for ranges of 6.35 mm /.250" to 25 mm /1".
Recommended bushings: **BU-111** split bushing, or **AD-87** split collet. See next page.

Magnetic Maximum Hand

For ANSI/AGD Groups 2 and 3 indicators having plain dials. Accurately indicates maximum reading. Easy to reset. Order **2014804** (Group 2, snap-on bezel), **2011341** (Group 3, screw-on bezel).

Styles for Groups 1 and 4 indicators available on special order; consult Mahr Federal Customer Resource Center.

Range Limiting Caps

Used with ANSI/AGD type indicators. Adjustable thru 9.52 mm /.375" to limit range to any desired amount. Order **CS-123**.

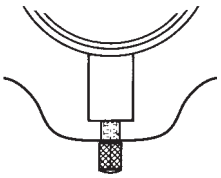
Lifting Levers - CAM Type.

Used with ANSI/AGD type and long range indicators.

Use with Indicator Type	Order no. Left Hand	Order no. Right Hand
ANSI/AGD Group 1*	**LR-46**	**LR-47**
ANSI/AGD Group 2*	**LR-48**	**LR-49**
ANSI/AGD Group 3*	**LR-50**	**LR-51**
ANSI/AGD Group 4*	**LR-68**	**LR-69**
Federal Models D8IT & Q8IT	**LR-115**	
Ox-Bow Lifting Lever	**LR-40**	

* *Up to 25 mm /1" range*

Ox-Bow Lifting Lever - Type LR-40



Tolerance Hands

Used with ANSI/AGD, long range and some Perpendicular indicators. Furnished integrally with split bezel. Easily replaces regular bezel.

Use with Indicator Type	Order no. Snap-on Bezel	Order no. Screw-type Bezel
ANSI/AGD Group 1	**HD-128**	**HD-59**
ANSI/AGD Group 2	**BZ-2503**	**HD-57**
ANSI/AGD Group 4		**HD-53**

Electronic Probe Adapter

Permits using electronic probes with many Mahr Federal dial indicators. Order **AD-138.**

Indicator Accessories

Hole Attachments

For ANSI/AGD type and perpendicular indicators with .375" diameter stems. For measuring internal surfaces. Order
AT-7293, 47.50 mm/ 1.87" long
AT-7294, 25 mm /1" long.

Split Collet

For .375" diameter stem indicators. Six-finger grip permits easy, secure indicator adjustment. Requires 1/2-32 threaded hole. O.D. is 17.45 mm/ .687". Can be used with protective housings, page 5-23. Order **AD-87**.
For 1/2-32 tap, order **V-892**.

Brake Attachment

For ANSI/AGD indicators with .001" graduations. Requires indicator modification for assembly. Range limited to 6.35 mm/ .250" for Group 1 indicators; and to 12 mm/ .500" for Group 2 indicators. Order
AT-A-7 stem mount,
AT-81 dust cap mount.

Threaded Bushing

For ANSI/AGD indicators with 5/16-32 threaded stems (an available option from Mahr Federal). Permits conventional stem mounting of indicator in gages and fixtures.
Order **AD-62**, .625" long, .500" O.D., 5/16-32 internal thread.
Threaded bushings for perpendicular indicators, see page 5-19.

Auxiliary Plungers

For extending reach of all ANSI/AGD type and perpendicular indicators with .375" diameter stems and ranges up to 6.35 mm/ .250" range. Attaches to indicator stem by integral split collet. Body is 12 mm/ .500" O.D.
Order **AT-25**, 57 mm/ 2.25" long, **AT-26**, 104 mm/ 4" long.
Special lengths available.
Replacement contact, **PT-184**, 8-32 thread.

Dust Guard

For ANSI/AGD perpendicular indicators with .375" diameter stems. Recommended for ranges of 7.62 mm/ .300" or less. Oil resistant to protect spindle and bushing from dust, mist and contaminant's.
Order **GU-2**.
For sealed indicators, see Wetproof models, page 5-17.

Split Bushings

Fits all ANSI/AGD type and perpendicular indicators. Permits safe, non-cramping stem mounting.
Order **BU-94** without counterbore, **BU-80** with counterbore, .375" stem hole x .500" O.D., **BU-111** for use with protective housings (.375" stem hole x .687" O.D.), **BU-112** (.218" stem hole x .375" O.D.), **BU-197** with shoulder, **4310103** without shoulder. (8 mm stem hole x .375" O.D.)

Right Angle Attachments

For ANSI/AGD type and perpendicular indicators (.375" diameter stems). For making measurements at right angle to spindle movement. Order **A-9**, regular type with flat spring hinge; for ranges up to 3.05 mm/ .120".
Replacement spring: **SP-56**.
Order **AT-24**, long range type with pivot-type bearing; for ranges up to 9.50 mm/. 375".

Indicator Calibrator with Digital Readout

Features

Model 400B-50

- A precision, benchtop instrument, providing a convenient means for calibrating a wide variety of precision measuring instruments, including dial indicators, test indicators, AirProbes®, electronic gage heads, or any other device that magnifies the linear displacement of a contact point or measuring spindle – user selectable for either inch or metric units.
- Two calibration stations provide high magnification and long range in a single unit. Incorporated within the micrometer-style control is a rotary encoder which senses the amount of movement and displays the actual displacement on a digital readout.
- Digital readout consists of six high visibility, LED digits and operator-accessible controls for inch/metric units, range selection, zero reset, and polarity/direction.

400B-50 Indicator Calibrator with Digital Readout

Technical Data

	Range	Minimum Graduation	Accuracy
Inch			
High mag. station	***.100"***	***.00001"***	***±20µ"***
Low mag. station	***.500"***	***.00005"***	***±50µ"***
Metric (mm)			
High mag. station	2.5	0.0001	±0.4 µm
Low mag. station	12.5	0.0005	±1.5 µm
Display	6-digit, 7-segment LED		
Output	RS-232		
Power	115Vac/60Hz/220Vac/50Hz-switchable		
Dimensions Calibrator (approx.)	330 x 200 x 285 mm h /13 x 8 x 11.25" h		
Readout Unit	170 x 125 x 80 mm h /6.625 x 5 x 3.25" h		
Weight Calibrator (approx.)	11.8 kg /26 lb.		
Readout Unit	0.8 kg /1.75 lb		

- Normally furnished:
  AM-178 Arm Assembly;
  AT-119 Mounting Clamp for .375" /9.5 mm dia. stems and probes;
  BU-112 Bushing (.218" I.D. to .375" O.D.).
  BU-197 Bushing (8 mm I.D. to .375" O.D.).
  AT-117 Adaptor for holding gage blocks.
- Also Available:
  AT-120 Adaptor for test indicators with long contacts.
  AT-122 Adaptor for test indicators with short contacts.
  AT-121 Adaptor for AGD type indicators with lug backs.

Upgrade Kit

EKT-1204

A kit is available to upgrade Models 400B-5 and 400B-25 Universal Calibrators to digital readout units with RS-232 output. The kit consists of a precision micrometer style controller with a digital encoder, which replaces the mechanical head, plus a digital readout unit.

Dial Indicator Calibrator

Features

400B-3 and 400B-4 Shop-floor Calibrators

- For checking dial indicators (both ANSI/AGD and perpendicular styles) and other transducers.
- Large micrometer wheel has widely spaced graduations for easy setting and reading.
- Adjustable crosshair provides on-the-mark setting.
- Tungsten carbide anvil for maximum wear resistance.
- Indicator clamped in-line with micrometer spindle.

400B-3
Dial Indicator Calibrator

Technical Data

	Range	Minimum Graduation	Accuracy	Order no.
Metric (mm)	0-25	0.002	within 0.001*	**400B-4**
Inch	***0-1.000"***	***.0001"***	***within .000050"****	**400B-3**

** Accuracy calibration as specified in Federal Specification GGG-105B.*

- Normally furnished:
  BU-112 Bushing (.218" I.D. to .375" O.D.)
  AD-58 Bushing (.275" I.D. to .375" O.D.)
  BU-197 Bushing (8 mm I.D. to .375" O.D.)

Universal Calibrator

Features

Model 400B-5 and 400B-25

- Highest accuracy calibrator for precise monitoring of any gaging transducer– mechanical Indicator, air probe, or electronic gage head.
- Two calibrating stations: one for high magnification transducers and one for long range (up to 12.5 mm/ .500").
- Easy to use: fine adjustment; large bi-directional reading micrometer head; carbide reference anvils; adjustable viewing angle.
- Furnished in a fitted wooden storage case.

400B-5
Universal Calibrator

Technical Data

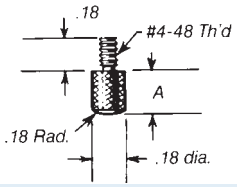
	Range	Minimum Graduation	Accuracy	Order no.
Metric (mm)	2.5 12.5	0.0002 0.001	±0.4 µm ±0.8 µm	**400B-25**
Inch	***.100"*** ***.500"***	***.000010"*** ***.000050"***	***±20µ"*** ***±30µ"***	**400B-5**

- Normally furnished:
  AM-178 Arm Assembly;
  AT-119 Mounting Clamp for 9.5 mm / .375" dia. stems and probes;
  BU-112 Bushing (.218" I.D. to .375" O.D.);
  BU-197 Bushing (8 mm I.D. to .375" O.D.);
  AT-117 Adaptor for holding gage blocks.
- Also Available:
  AT-120 Adaptor for test indicators with long contacts
  AT-122 Adaptor for test indicators with short contacts
  AT-121 Adaptor for AGD type Indicators with lug backs

Contact Points

Used with ANSI/AGD Groups 1,2,3,4 Long Range Wetproof Perpendicular and Maxμm® Indicators. Points for ANSI Group 0 Indicators - see page 5-8. For Special Points - call Mahr Federal. See pages 5-52 & 5-53 for additional Metric Contact Points.

Regular



Hardened Steel (inch)

Dimension A	Order no.	Dimension A	Order no.
1/8"	PT-225	***1-5/8"***	PT-235
1/4"	PT-223*	***1-3/4"***	PT-241
3/8"	PT-563	***1-7/8"***	PT-100
1/2"	PT-14	***2"***	PT-51
5/8"	PT-564**	***2-1/8"***	PT-243
3/4"	PT-31	***2-1/4"***	PT-696
7/8"	PT-201	***2-3/8"***	PT-101
1"	PT-232	***2-1/2"***	PT-245
1-1/8"	PT-305	***2-5/8"***	PT-102
1-1/4"	PT-565	***2-3/4"***	PT-566
1-3/8"	PT-239	***2-7/8"***	PT-247
1-1/2"	PT-50	***3"***	PT-155

Hardened Steel (Metric***)

Dimension A	Order no.	Dimension A	Order no.
6 mm	EPT-1037-W1	15 mm	EPT-1037-W3
10 mm	EPT-1037-W2	20 mm	EPT-1037-W4
12 mm	EPT-1037-W6	25 mm	EPT-1037-W5

Tungsten Carbide

1/4"	PT-35

Diamond

1/4"	PT-317

Set of 8 Steel

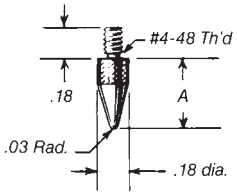
1/8" to ***1"***	PT-116

Set of 24 Steel

1/8" to ***3"***	PT-115

* *PT-223 normally furnished with all Indicators*
** *PT-564 normally furnished with all Wetproof Indicators*
*** *All Metric Points have M2.5 thread*

Tapered



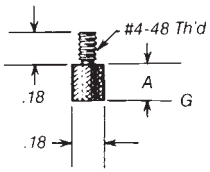
Hardened Steel (inch)

Dimension A	Order no.
3/16"	PT-233
7/16"	PT-229
1"	PT-253
1-7/16"	PT-230
2"	PT-231

Tungsten Carbide (inch)

Dimension A	Order no.
7/16"	PT-181
3/4"	PT-182
1"	PT-183

Flat End



Hardened Steel (inch)

Dimension A	Order no.
1/8"	AL-19
1/4"	AL-673
3/8"	AL-20
1/2"	AL-21
5/8"	AL-22
3/4"	AL-23
7/8"	AL-24
1"	AL-25

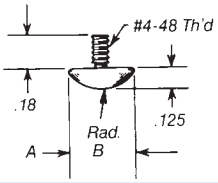
Hardened Steel (Metric***)

Dimension A	Order no.
6 mm	EAL-1016-W1
10 mm	EAL-1016-W2
15 mm	EAL-1016-W3
20 mm	EAL-1016-W4
25 mm	EAL-1016-W5

Tungsten Carbide

1/4"	AL-51
Set of 8 Steel	
1/8" to ***1"***	AL-55

Button



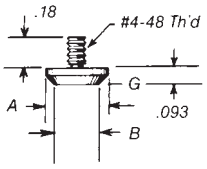
Hardened Steel (inch)

Dim. A	Dim. B	Order no.
.375"	***.250"***	PT-227
.500"	***.375"***	PT-619

Tungsten Carbide

Dim. A	Dim. B	Order no.
.375"	***.250"***	PT-120

Wide Face



Hardened Steel (inch)

Dim. A	Dim. B	Order no.
.356"	***.250"***	AL-502
.500"	***.375"***	AL-1510
.615"	***.500"***	AL-520
.731"	***.625"***	AL-44

Hardened Steel (Metric***)

Dim. A	Dim. B	Order no.
9.04	6.35	EAL-1020-W1
12.7	9.5	EAL-1020-W2
15.6	12.7	EAL-1020-W3
18.6	15.9	EAL-1020-W4

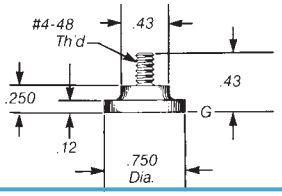
Tungsten Carbide (inch)

Dim. A	Dim. B	Order no.
.356"	***.250"***	AL-1730

Set of 8 Steel (Metric***)

Dim. A	Dim. B	Order no.
9.04	6.35	EAL-1021

Extra Wide Face



Hardened Steel

Order no.	AL-291

MarCator Dial Indicators (DIN style)

Overview

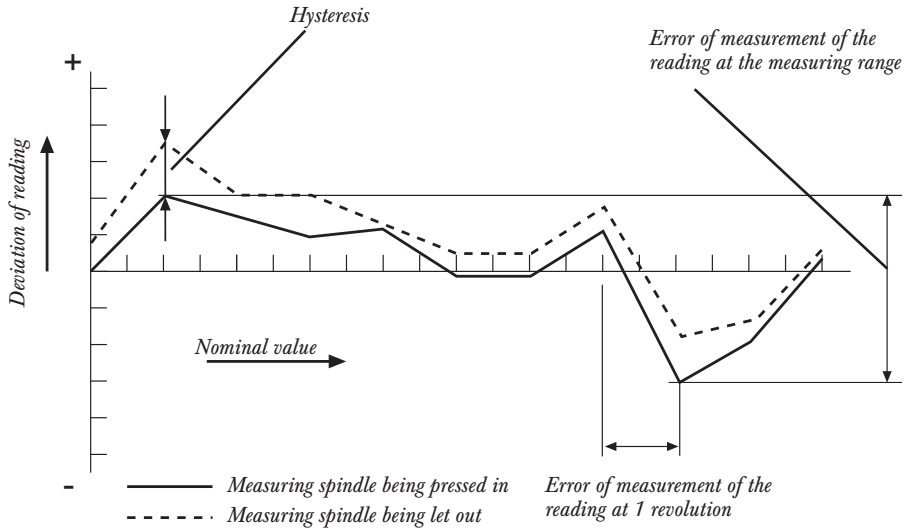
Precision Small Dial Indicators

Model			**803 A**	**805 A**	**803 S**	**803 SW**
						
Range			3 mm	5 mm	3 mm	3 mm
Readings			0.01 mm	0.01 mm	0.01 mm	0.01 mm
Dial style			0-50	0-100	0-50	0-50
Standard for metrological characteristics			DIN 878	DIN 878	DIN 878	DIN 878
(NEW) *DIN 878:2006*		***(OLD)*** *DIN 878:1983*				
Limit value for the error of measurement of the reading at	Measuring range	f_e	10 µm	12 µm	10 µm	10 µm
	1 revolution	-	9 µm	10 µm	9 µm	9 µm
	1/2 revolution	-	8 µm	9 µm	8 µm	8 µm
	1/10 revolution	f_t	5 µm	5 µm	5 µm	5 µm
Limit value for	Repeatability	f_w	3 µm	3 µm	3 µm	3 µm
Limit value for	Hysteresis	f_u	3 µm	3 µm	3 µm	3 µm
Shockproof SHOCK PROOF					●	●
Order no.			**4324050**	**4324060**	**4324000**	**4326000**

Precision Dial Indicators

Model			**810 A**	**810 AT**	**810 S**	**810 SW**
						
Range			10 mm	10 mm	10 mm	10 mm
Readings			0.01	0.01	0.01	0.01
Dial style			0-100	0-100	0-100	0-100
Standard for metrological characteristics			DIN 878	DIN 878	DIN 878	DIN 878
(NEW) *DIN 878:2006*		***(OLD)*** *DIN 878:1983*				
Limit value for the error of measurement of the reading at	revolution	f_e	15 µm	15 µm	15 µm	15 µm
	1 revolution	-	10 µm	10 µm	10 µm	10 µm
	1/2 revolution	-	9 µm	9 µm	9 µm	9 µm
	1/10 revolution	f_t	5 µm	5 µm	5 µm	5 µm
Limit value for	Repeatability	f_w	3 µm	3 µm	3 µm	3 µm
Limit value for	Hysteresis	f_u	3 µm	3 µm	3 µm	3 µm
Shockproof SHOCK PROOF					●	●
Order no.			**4311050**	**4311060**	**4311000**	**4315000**

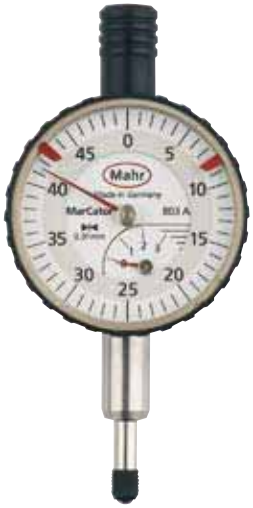
Metrological characteristics



803 SB	803 AZ
	
0.4 mm (±0.2)	***.120"***
0.01 mm	***.0005"***
0-20-0	0-20
DIN 878	Factory standard
7 µm	***.0004"***
5 µm	***.0002"***
3 µm	***.00012"***
3 µm	***.00012"***
●	
4324250	**4324900**

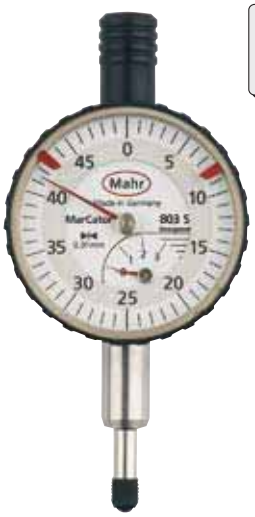
810 SB	810 SM	810 SRM	810 AZ	810 AU	810 AX	810 AG	810 V
							
0.8 mm (±0.4)	1 mm	10 mm	***.400"***	10 mm	10 mm	10 mm	40 mm
0.01	0.001	0.001	***.0005"***	0.01	0.1	0.01	0.01
0-40-0	0-100	0-100	0-45	100-0	0-10	0-100	0-100
DIN 878	Factory standard	Factory standard	Factory standard	Factory standard	Factory standard	Factory standard	Factory standard
7 µm	3 µm	10 µm	***.0005"***	14 µm 10 µm 9 µm	35 µm	14 µm	25 µm
5 µm	1 µm	3 µm	***.0002"***	5 µm	25 µm	5 µm	5 µm
3 µm	1 µm	3 µm	***.00012"***	3 µm	15 µm	3 µm	3 µm
3 µm	1.5 µm	3 µm	***.00012"***	3 µm	15 µm	5 µm	6 µm
●	●	●					●
4317000	**4311070**	**4311080**	**4311900**	**4329050**	**4331000**	**4322000**	**4321110**

Precision Small Dial Indicators 803 / 805 DIN style



803 A

805 A



SHOCK PROOF

803 S

Features

Small Dial Indicator 803 A
Standard version

- High precision gears and pinions
- Lifter protection cap on the upper end of the measuring spindle
- Adjustable tolerance markers
- Chrome-plated housing

Small Dial Indicator 805 A
Standard version

- High precision gears and pinions
- Lifter protection cap on the upper end of the measuring spindle
- Adjustable tolerance markers
- Chrome-plated housing

Small Dial Indicator 803 S
Shockproof version

- High precision gears and pinions
- Lifter protection cap on the upper end of the measuring spindle
- Adjustable tolerance markers
- Chrome-plated housing

All indicators delivered in plastic case

Technical Data

	Range mm	Readings mm	Dial face dia. mm	Overtravel mm	Mounting shank dia. mm	Measuring force N	Accuracy DIN 878	Order no.
803 A	3	0.01	34	0.1	8h6	0.7 - 1.1	●	**4324050**
805 A	5	0.01	34	0.1	8h6	0.7 - 1.1	●	**4324060**
803 S	3	0.01	34	0.1	8h6	0.7 - 1.1	●	**4324000**
803 SW	3	0.01	34	0.1	8h6	0.7 - 1.6	●	**4326000**
803 SB	0.4 (±0.2)	0.01	34	4.5	8h6	1	●	**4324250**
803 AZ	***.120"***	***.0005"***	***1.4"***	***.008"***	8h6	0.7 - 1.1		**4324900**

Precision Small Dial Indicators 803 / 805 DIN style

IP54

SHOCK PROOF

803 SW

SHOCK PROOF

803 SB

803 AZ

Features

Small Dial Indicator 803 SW
Waterproof and oil proof

Design features identical to 803 S, with the following exceptions:
- Hermetically sealed upper protective measuring spindle cap as well as bezel and transparent dial cover; sealed with O-rings
- Measuring spindle sealed with rubber sleeve, thus preventing contamination by liquids and impurities

Dial Indicator 803 SB
with limited measuring range

Design features identical to 803 S, with the following exceptions:
- Limited measuring range (0.4 mm) for error-free readings
- Large overtravel (approx. 4.5 mm), for easier insertion of test items in measuring devices
- Hermetically sealed upper protective measuring spindle cap

Small Dial Indicator 803 AZ
Inch version

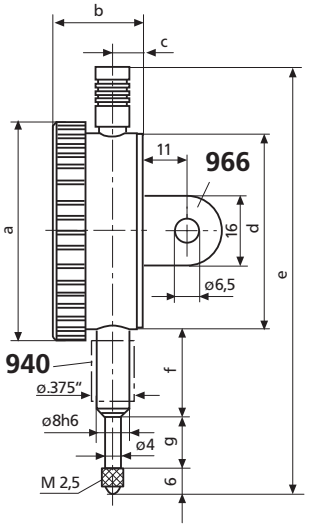
Design features identical to 803 A, with the following exception:
- The scope of supply includes an Adapter Bush 940 for adapting mounting shank 8h6 mm to inch bore .375"

Dimensions according to DIN EN ISO 463

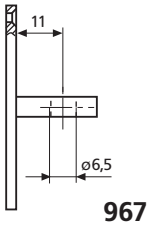
mm	a	b	c	d	e	f	g
803 A	ø 40	20.6	6.8	ø 37	83	15.5	8
805 A	ø 40	20.6	6.8	ø 37	83	15.5	8
803 S	ø 40	20.6	6.8	ø 37	80	15	5.5
803 SW	ø 44	21.6	7.1	ø 37	86	15	11
803 SB	ø 40	20.6	6.8	ø 37	83	15.5	8
803 AZ	ø 40	20.6	6.8	ø 37	83	15.5	8

Accessories

		Order no.
Adapter Bush for adapting mounting shank 8h6 mm to inch bore .375"	**940**	**4310103**
Splash Guard Cover for bezel dia. 40 mm	**956**	**4373021**
Mounting Lugs		
Bore perpendicular to mounting shank	**966**	**4375020**
Bore parallel to mounting shank	**967**	**4375021**



Shown with Mounting Lug



967

Precision Dial Indicators 810 DIN style

810 A

810 AT

810 S

810 SW

Features

Dial Indicator 810 A
Standard version

- High precision gears and pinions
- Lifter protection cap on the upper end of the measuring spindle
- Adjustable tolerance markers
- Chrome-plated housing

All indicators delivered in plastic case

Dial Indicator 810 AT
for depth measurement

Design features identical to 810 A, with the following exception:

- Scale of the dial face is counter-clockwise

Dial Indicator 810 S
Shockproof

- High precision gears and pinions
- Lifter protection cap on the upper end of the measuring spindle
- Adjustable tolerance markers
- Chrome-plated housing

Dial Indicator 810 SW
Waterproof and oil proof

Design features identical to 810 S, with the following exceptions:

- Measuring spindle sealed with rubber sleeve, thus preventing contamination by liquids and impurities
- Hermetically sealed protective measuring spindle cap

Technical Data

	Range mm	Readings mm	Dial face dia. mm	Overtravel mm	Mounting shank dia. mm	Measuring force N	Accuracy DIN 878	Order no.
810 A	10	0.01	50	0.1	8h6	0.7 - 1.3	●	**4311050**
810 AT	10	0.01	50	0.1	8h6	0.7 - 1.3	●	**4311060**
810 S	10	0.01	50	0.1	8h6	0.8 - 1.3	●	**4311000**
810 SW	10	0.01	50	0.1	8h6	0.9 - 1.5	●	**4315000**
810 SB	0.8 (±0.4)	0.01	50	9	8h6	0.9	●	**4317000**
810 SM	1	0.001	50	4	8h6	1.3 - 1.8		**4311070**
810 SRM	5	0.001	50	0.1	8h6	1.5 - 2		**4311080**
810 AZ	***.400"***	***.0005"***	***2"***	***.004"***	8h6	0.9 - 1.5		**4311900**

Accessories

		Order no.
Adapter Bush for adapting mounting shank 8h6 mm to inch bore .375"	**940**	**4310103**
Splash Guard Cover for bezel dia. 58 mm	**955**	**4373020**

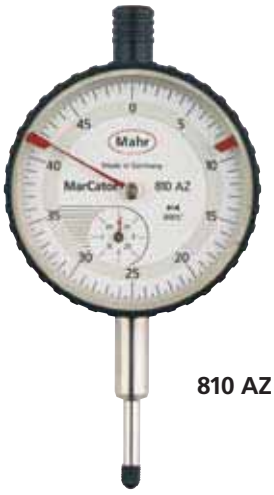
		Order no.
Mounting Lug		
Bore perpendicular to mounting shank	**961**	**4375010**
Bore parallel to mounting shank	**962**	**4375011**

Precision Dial Indicators 810 DIN style

810 SB

810 SM

810 SRM



810 AZ

Features

Dial Indicator 810 SB
with limited measuring range

Design features identical to 810 S, with the following exceptions:
- Limited measuring range (0.8 mm) for error-free readings
- Large overtravel (approx. 9 mm) for easier insertion of test items in measuring devices
- Hermetically sealed protective measuring spindle cap

Dial Indicator 810 SM
Shockproof
with reading 0.001 mm

- Precise mechanism with a combined gear lever transmission
- High accuracy with a minimum span of error
- Lifter protection cap on the upper end of the measuring spindle
- Adjustable tolerance markers
- Chrome-plated housing

Dial Indicator 810 SRM
Shockproof
with reading 0.001 mm

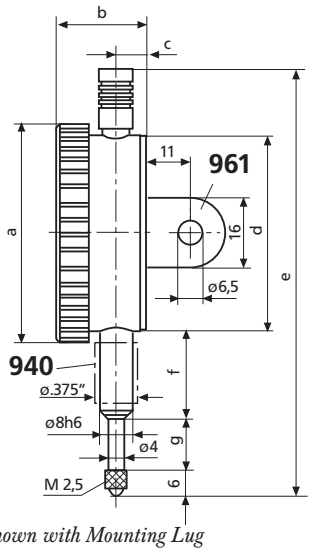
- High precision gears and pinions
- Lifter protection cap on the upper end of the measuring spindle
- Adjustable tolerance markers
- Chrome-plated housing

Dial Indicator 810 AZ
Inch version

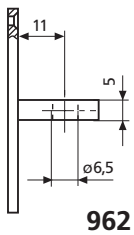
Design features are identical to 810 A, with the following exception:
- The scope of supply includes an Adapter Bush 940 for adapting mounting shank 8h6 mm to inch bore .375"

Dimensions according to DIN EN ISO 463

mm	a	b	c	d	e	f	g
810 A/AT	ø 58	23	7.5	52	112	21	16
810 S	ø 58	23	7.5	52	111.5	22	15
810 SW	ø 61	24.15	7.9	52	127.6	22	22.1
810 SB	ø 58	23	7.5	52	120	22	15
810 SM	ø 58	25	8.5	52	111.5	22	15
810 SRM	ø 58	23	7.5	52	111.5	22	15
810 AZ	ø 58	23	7.5	52	111.5	22	15



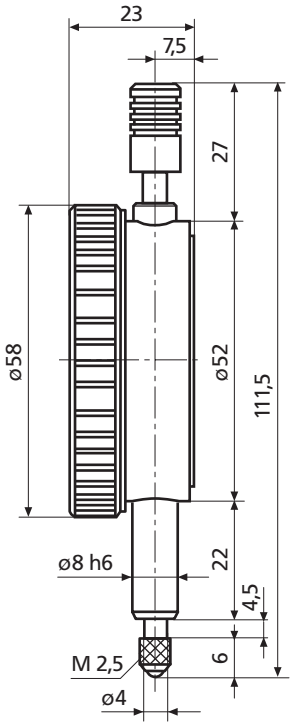
Shown with Mounting Lug

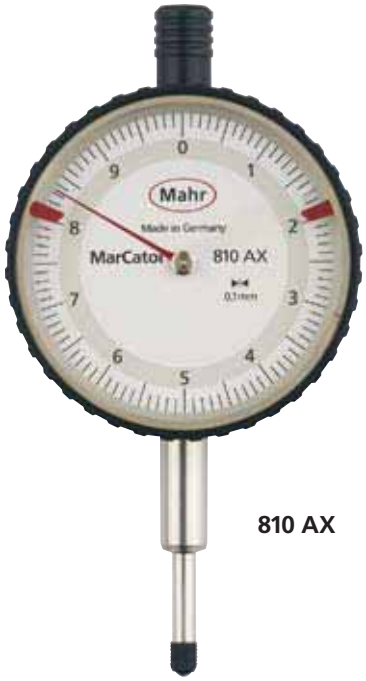


962

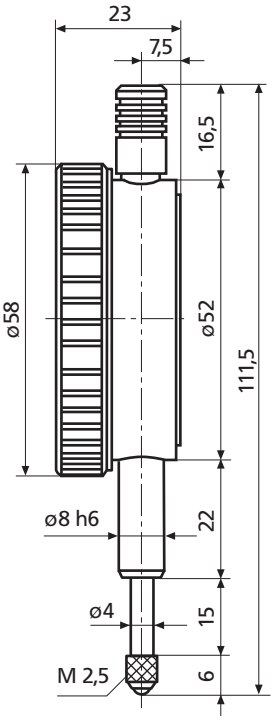
Precision Dial Indicators 810

810 AU





810 AX



Features

Dial Indicator 810 AU
with a reversed measuring force direction

- Chrome-plated housing
- Adjustable tolerance markers
- Scale on the dial increases counter clockwise (+ on left)
- Measuring force acting towards the top
- Delivered in plastic case

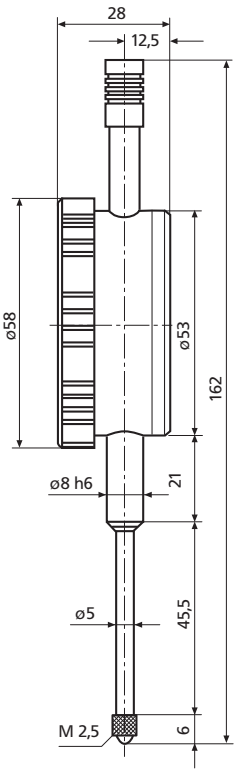
Dial Indicator 810 AX
with reading 0.1 mm

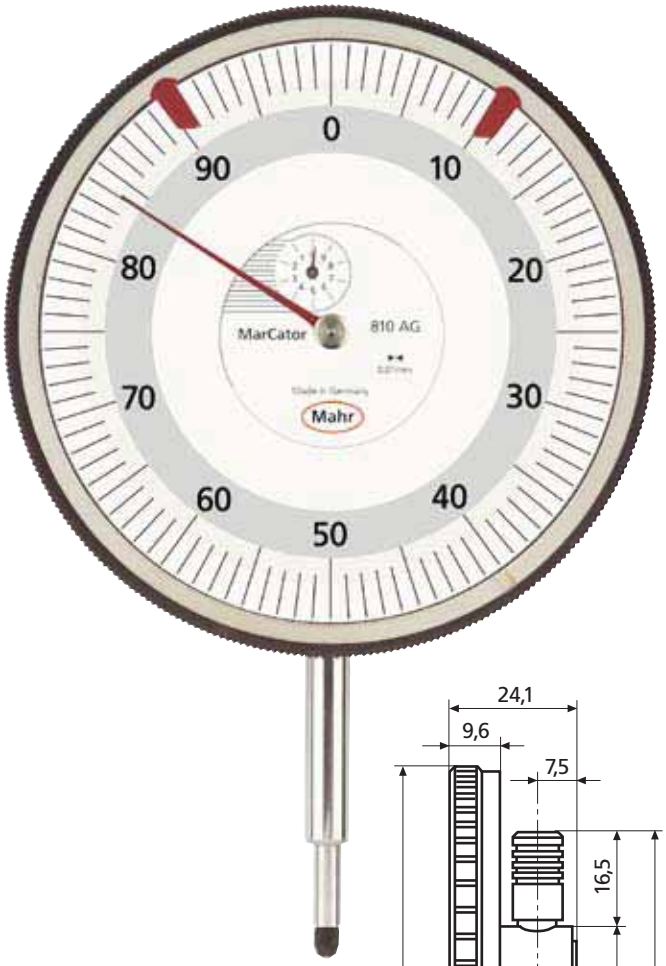
- Constant measuring force
- Chrome-plated housing
- Adjustable tolerance markers
- 1 pointer movement on 10 mm
- Delivered in plastic case

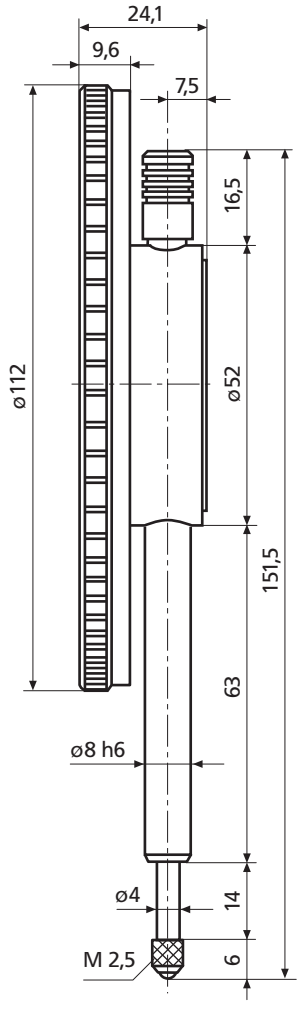
Technical Data

	Range mm	Readings mm	Dial face dia. mm	Overtravel mm	Mounting shank dia. mm	Measuring force N	Order no.
810 AU	10	0.01	50	0.1	8h6	1 - 1.8	**4329050**
810 AX	10	0.1	50	0.5	8h6	0.9 - 1.3	**4331000**
810 V	40	0.01	50	0.3	8h6	0.9 - 2.0	**4321110**
810 AG	10	0.01	108	0.1	8h6	1.3 - 2.2	**4322000**

Precision Dial Indicators 810







Features

Long Range Dial Indicator 810 V
with larger measuring range

- Range 40 mm
- Strengthened measuring spindle (5 mm)
- Raising of measuring spindle via lifting cap
- Adjustable tolerance markers
- Shockproof movement
- Delivered in folded box

Extra large Dial Indicator 810 AG
with dial face dia. 108 mm

- Ideal for long reading distance and in bad light conditions
- Plastic outer ring
- Delivered in folded box

Accessories

		Order no.
Adapter Bush for adapting mounting shank 8h6 mm to inch bore .375"	**940**	**4310103**
Splash Guard Cover for dia. 58 mm	**955**	**4373020**
Mounting Lug to mount on mounting shank of all versions	**963**	**4375002**

MarCator. Digital Indicators (Long range)

Overview

Functions of Digital Indicators

		1075	1080	1081	µMaxµmXLI
					
Catalog page		5 - 38	5 - 38	5 - 38	5 - 40
Measuring ranges	metric / ***inch***	12.5 mm / ***.5"***	12.5 mm / ***.5"***	12.5 mm /***.5"***	12.5 mm / ***.5"*** 25 mm / ***1"***
Resolution	metric ***inch*** metric ***inch*** metric ***inch*** metric ***inch*** metric ***inch*** metric ***inch*** metric ***inch***	0.01 mm ***.0005"***	0.005 mm ***.0001"***	0.001 mm ***.00005"***	0.0005 mm ***.00002"*** 0.001 mm ***.00005"*** 0.002 mm ***.0001"*** 0.005 mm ***.0002"*** 0.01 mm ***.0005"*** 0.02 mm ***.001"***
Mounting shank		8h6	8h6	8h6	8h6 / ***3/8"***
Protection class	IP class acc. to IEC 60529	IP51	IP51	IP51	IP42
Functions:					
ON/OFF		●	●	●	●
Set display to zero		●	●	●	●
Switch between mm/inch		●	●	●	●
Reversal of counting direction		●	●	●	●
Enter numerical value - PRESET		●	●	●	●
Data		●	●	●	●
ABS/REL-switchable					
Tolerance display					●
Dynamic measuring functions	MIN, MAX MAX-MIN (TIR)				
Search for reversal point	START/STOP				
Factor can be set / adjusted					
Analog display					
Switch the analog value					
Key lock function	LOC			●	●
Data output:	USB	●	●	●	
	Digimatic	●	●	●	●
	Opto RS232C	●	●	●	●
Control output:					

** only measuring ranges 12.5 and 25 mm*

µMaxµmXLT Standard	**µMaxµmXLT** High accuracy	**1086**	**1086 W**	**1087**	**1087 B**	**1088**	**1088 W**
							
5 - 40	5 - 40	5 - 42	5 - 45	5 - 46	5 - 50	5 - 48	5 - 49
50 mm / ***2"*** 100 mm / ***4"***	50 mm / ***2"*** 100 mm / ***4"***	12.5 mm / ***.5"*** 25 mm / ***1"*** 50 mm / ***2"*** 100 mm / ***4"***	12.5 mm / ***.5"*** 25 mm / ***1"***	12.5 mm / ***.5"*** 25 mm / ***1"***	12.5 mm / ***.5"***	50 mm / ***2"***	12.5 mm / ***.5"*** 25 mm / ***1"***
0.01 mm ***.0005"*** 0.02 mm ***.001"*** 0.05 mm ***.002"*** 0.1 mm ***.005"***	0.001 mm ***.00005"*** 0.002 mm ***.0001"*** 0.005 mm ***.0002"*** 0.01 mm ***.0005"*** 0.02 mm ***.001"*** 0.05 mm ***.002"*** 0.1 mm ***.005"***	0.001 mm ***.00005"*** 0.01 mm ***.0005"***	0.001 mm ***.00005"*** 0.01 mm ***.0005"***	0.001 mm ***.00005"***	0.001 mm ***.00005"***	0.001 mm ***.00005"***	0.001 mm ***.00005"***
8h6	8h6	8h6 / ***3/8"****	8h6	8h6 / ***3/8"***	8h6	8h6	8h6
IP42	IP42	IP42	IP54	IP42	IP42	IP42	IP54
●	●	●	●	●	●	●	●
●	●	●	●	●	●	●	●
●	●	●	●	●	●	●	●
●	●	●	●	●	●	●	●
●	●	●	●	●	●	●	●
●	●	●	●	●	●	●	●
		●	●	●	●	●	●
●	●	●	●	●	●	●	●
				●	●	●	●
				●		●	●
		●	●	●	●	●	●
●	●			●	●	●	●
●	●			●	●	●	●
●	●	●	●	●	●	●	●
		●	●	●	●	●	
●	●	●	●	●	●	●	●
		●	●	●	●	●	●
						●	●

Digital Indicators 1075 / 1080 / 1081

1075

1080

1081

Features

Functions:
ON/OFF
0 (Set display to zero)
mm/inch
Reversal of counting direction
PRESET (for entering a numerical value)
DATA (data transmission with a data connection cable)
LOCK-Function: keys can be blocked, only applies to 1081

- Capacitive measuring system, life of battery approx. 2 years
- Max measuring speed 1.5 m/sec (60"/sec)
- MarConnect Data output: choose either
  USB
  OPTO RS232C
  Digimatic
- High contrast Liquid Crystal Display with 8.5 / 10 mm high digits
- Operating temperature 10-40°C
- Class of protection IP51 according to IEC 60529

Scope of supply:
Battery,
Operating instructions

Technical Data

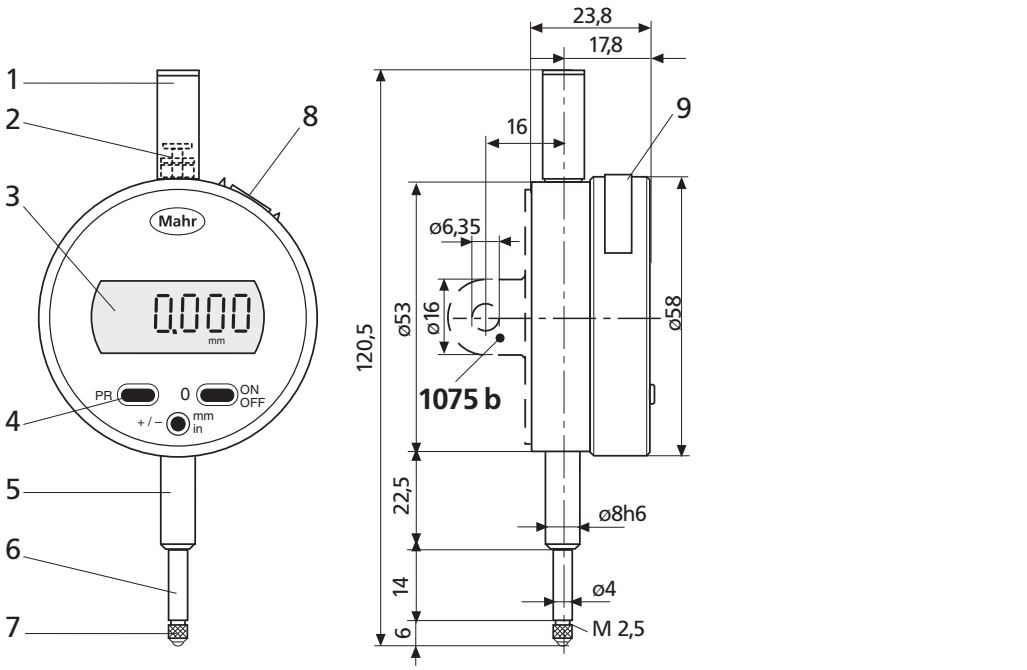
	Measuring range mm *(inch)*	Resolution mm/*inch*	Span of error *G* * mm	Measuring force N	Weight g	Order no.
1075	12.5 *(.5")*	0.01/ *.0005"*	0.025	0.6 - 1	120	**4336400**
1080	12.5 *(.5")*	0.005/ *.0001"*	0.015	0.6 - 1	120	**4336500**
1081	12.5 *(.5")*	0.001/ *.00005"*	0.005	0.5 - 1.1	120	**4336350**

* *in any zero point*

Digital Indicators 1075 / 1080 / 1081

Technical Data

1 Protection cap for lifter
2 Measuring spindle lifter
3 Display
4 Operating buttons
5 Mounting shank
6 Measuring spindle
7 Contact point 901
8 Data output
9 Battery compartment



Shown with Mounting Lug

Accessories

		Order no.
Battery 3V, Type CR 2032		**4102520**
Data Connection Cable USB (2 m)	**16 EXu**	**4102357**
Data Connection Cable Opto RS232C (2 m), with SUB-D jack 9-pin	**16 EXr**	**4102410**
Data Connection Cable Digimatic (2 m), Flat plug 10-pin	**16 EXd**	**4102411**
Adapter bush for adapting mounting shank 8h6 mm to inch bore .375"	**940**	**4310103**
Lug back	**1075 b**	**4336565**

Additional Accessories		Page
Contact Points	**901-913**	5-52
Special Holder	**941**	5-53
Sensor Lever	**943**	5-53

Accessories for Data Processing see Chapter 11

µMaxµm® XL Digital Indicators

XLT

XLI

XLI-57B-15

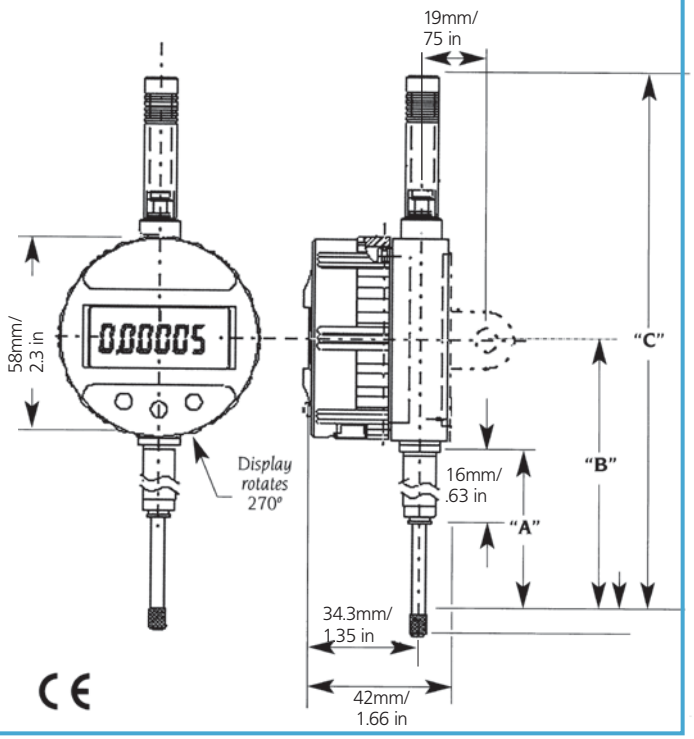
Features

The µMaxµm XL Series offers all the benefits of Federal's µMaxµm Indicators and is designed for convenience, ease of use, dependability and rugged shop floor handling . . . plus:

- Long measuring ranges of 12.5 mm / .5", 25 mm / 1", 50 mm / 2" and 100 mm / 4".
- XLT incorporates switchable resolution.
- The XL never loses zero, even when powered down.
- Features easy to use controls.
- Preset capabilities for direct dimension readout.
- Unilateral tolerances.
- Go/no-go display for foolproof operation.
- Large digital/analog dual display for fast, accurate readings.
- Two-format data output, serial or Digimatic, is compatible with most data collection devices.
- World version furnished with metric stem sizes and contact threads.
- Versions also available for deadweight applications with compressible materials.
- Special ratio and lockout versions also available.
- Ask about our optional XLS versions for special custom configurations and lock out of various user and set up functions

Accessories

	Order no.
Right hand Lifting Lever,	**ELR-1092**
Left hand Lifting Lever	**ELR-1093**



XLI Models & XLT Models

Range mm/***inch***	"A" mm/***inch***	"B" mm/***inch***	"C" mm/***inch***
12 / ***.5"***	35.1 / ***1.38"***	68.6 / ***2.7"***	128.27 / ***5.05"***
25 / ***1"***	47.5 / ***1.87"***	81.3/ ***3.2"***	153.7 / ***6.05"***
50 / ***2"***	72.64 / ***2.86"***	153 / ***6"***	275.6 / ***10.85"***
100 / ***4"***	123 / ***4.88"***	253 / ***9.97"***	427 / ***16.8"***

µMaxµm® XL Digital Indicators

Ordering Information

µMaxµm XL Indicators Model Number: **XLI- X X 0 0 X**

Model	Range	Stem Diameter / Length	Code
U.S. version	***0.5"***	***.375" / 0.63"***	1
U.S. version	***1.0"***	***.375" / 0.63"***	2
World version	12.5 mm	8 mm/ 16 mm	3
World version	25 mm	8 mm/ 16 mm	4
World version	25 mm	8 mm/ No spring	5*

* *Deadload Model (used with weights)*

Ratio	Code
1:1	0
4/5	1

Back	Code
Flat Back **(EBK-1020)**	0
Lug **(BK-183)** vert/horiz	1
Adjustable **(BK-531)**	2
Post **(BK-2930)**	3
Screw **(BK-692)**	4
Adaptor back for 75B Gage **(EPL-1914)** Rack Back **(BK-93)**	5

Examples: **XLI-10001** is a µMaxµm XL with 0.5" range, .375" stem diameter, 0.63" / 16 mm stem length, and a Lug Back.

µMaxµm XLT Indicators* Model Number: **XLT- X 0 0 0 X**

Version	Range	Stem Diameter / Length	Accuracy	Code
World	50 mm	8 mm / 15 mm	High: 8 µm/***.00032"***	1
World	50 mm	8 mm / 15 mm	Std: 20 µm/***.0008"***	2
World	100 mm	8 mm / 15 mm	High: 9 µm/***.00036"***	3
World	100 mm	8 mm / 15 mm	Std: 20 µm/***.0008"***	4

Back	Code
Flat Back **(EBK-1020)**	0
Lug **(BK-383)**	1
Adjustable **(BK-531)**	2
Post **(BK-2093)**	3
Screw **(BK-692)**	4

For additional contact points see pages 5-22, 5-27, 5-52 & 5-53

XLT Models include 3/8" bushing and M2.5 thread contact. Adaptor AD-185 provided when selecting a 4-48 threaded Contact Point

Technical Data

Model no.	Range mm/*inch*	Resolution mm/*inch*	Accuracy mm/*inch*	Gage Force	Weight
XLI Resolution Fixed	12.7/ ***.50"***	0.0005/ ***.00002"*** 0.001/ ***.00005"*** 0.002/ ***.0001"*** 0.005/ ***.0002"*** 0.01/ ***.0005"*** 0.02/ ***.001"***	0.005/ ***.0002"***	0.8 N / ***3-4 oz.***	200 g / ***7 oz.***
	25.4/ ***1.0"***				
XLT Standard Accuracy Resolution Selectable	50/ ***2.0"***	0.01/ ***.0005"*** 0.02/ ***.001"*** 0.05/ ***.002"*** 0.1/ ***.005"***	0.02/ ***.0008"***	0.8 - 1 N / ***7 - 11 oz.***	200 g / ***10 oz.***
	100/ ***4.0"***			2.3 - 4 N / ***8 - 14 oz.***	340 g / ***12 oz.***
XLT High Accuracy Resolution Selectable	50/ ***2.0"***	0.001/ ***.00005"*** 0.002/ ***.0001"*** 0.005/ ***.0002"*** 0.01/ ***.0005"*** 0.02/ ***.001"*** 0.05/ ***.002"*** 0.1/ ***.005"***	0.008/ ***.00032"***	0.8 - 1 N / ***7 - 11 oz.***	200 g / ***10 oz.***
	100/ ***4.0"***		0.009/ ***.00036"***	2.3 - 4 N / ***8 - 14 oz.***	340 g / ***12 oz.***

XL Common Specification Values

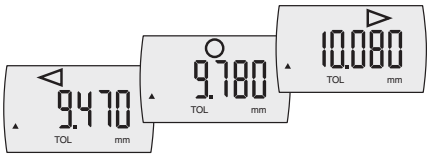
Output	Serial BCD, 13 digits, 52 bits; ASCII encoded 2400 baud asynchronous stream.
Spindle Velocity	60 in/sec (1.5m/sec) Maximum
Operating Temps	40° to 105° F / 5° to 40° C
Storage Temps	- 40° to 140° F / -20° to 60° C
Repeatability	± 1 least significant digit
Battery life	12 months normal use or 4000 hours. (May vary with "Auto Power Down Option")

MarCator 1086

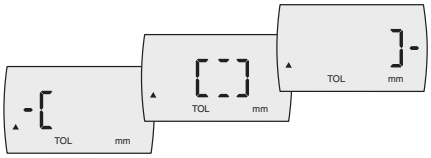
▶| The new Digital Indicator **Marcator** 1086. With the large display and the integrated tolerance function, your measurement results are clearly visual. |◀

Clear display

Tolerance indication with the diplayed value
Displayed is the actual measured value and the tolerance zone position



Tolerance indication without the value in the display. In and Out of tolerance will be indicated in the display as a symbol.



Universal Data-Interface

- **USB**
  No interface box is required! Simple and inexpensive way to set up a multiple measuring instruments via a USB hub

- **Digimatic**
  To connect a Digiamtic compatible evaluation instrument

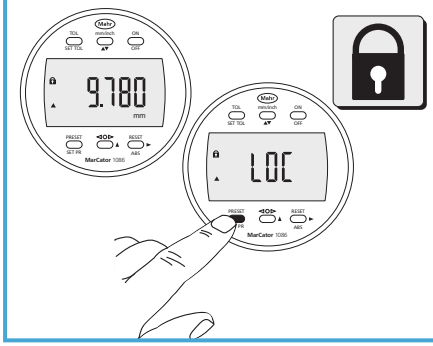
- **Mahr Opto RS232C**
  For direct connection to a COM port on a PC

Absolute function:
Digital Indicator can be set in any position to 0.000 without losing the reference to the preset value.

IP Protection class IP54 (optional)
- Protection cap is sealed
- Rubber bellows for the measuring spindle
- Sealed battery compartment

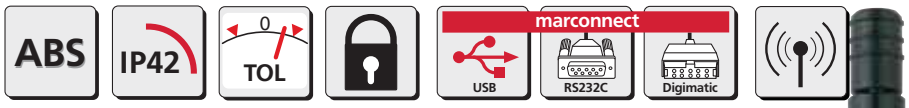
Code Initial	IP	International Protection
First Numeral	5	Dust protected
Second Numeral	4	Protection against splash water in all directions

Error free operation - Lock function



Lock function: This prevents unintentional activation of an operating button.
Either all the operating buttons or only certain individual buttons can be locked.
If a locked operating button is pressed the "LOC" symbol will appear in the display.

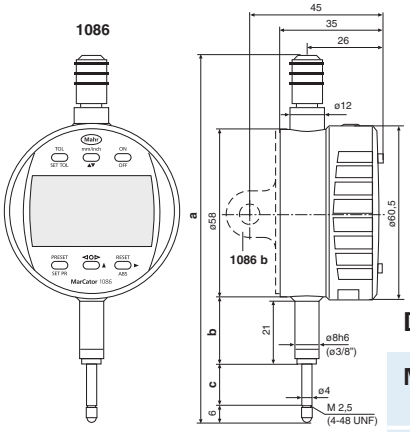
Digital Indicators MarCator 1086 / 1086 Z, Resolution 0.01 mm / .0005"



12.5 mm

25 mm

50 mm



Shown with Mounting Lug

Dimensions

Measuring range mm	(inch)	a mm	b mm	c mm
12.5	(.5")	126.3	23	13.5
25	(1")	153.4	26.8	26.5
50	(2")	267.3	40	52
100	(4")	420.3	91	103

Features

Functions:
ON/OFF
RESET (Set display to zero)
mm/inch
Reversal of the counting direction
PRESET (Allows the entry of any value using set buttons)
TOL (Enter tolerance limit values)
ABS (Display can be set to zero, without losing the reference to the Preset value)
<0> (Tolerance GO / NO GO display mode)
DATA (when connected with a data connection cable)
Factor (adjustable)

- Indvidual buttons can be locked
- Operating and diplay unit (bezel) can be rotated through 280°
- High contrast LCD with 11 mm high digits
- Inductive measuring system, battery life approx. 2000 hrs.
- Maximum measuring speed 1.5 m/s (60"/s)
- Lifter protection cap on the measuring spindle
- MarConnect data output: choose either
  USB
  OPTO RS232C
  Digimatic
- Operating temperature 10 - 40°C
- Class of protection IP42 in accordance to IEC 60529

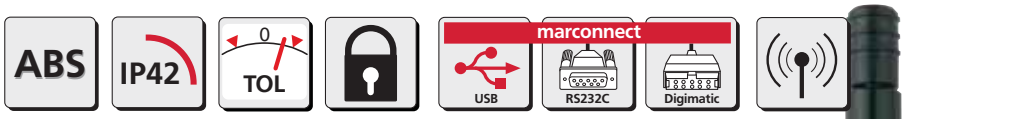
Supplied with:
Battery, operating instructions

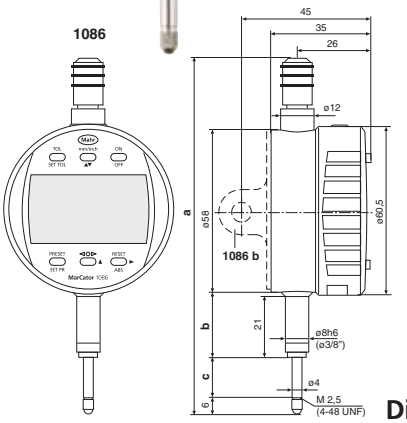
Technical Data

Measuring range mm	(inch)	Resolution mm/inch	Span of error* mm	Repeatability mm	Measuring force N	Weight g	Mounting shank dia.	Order no.
12.5	(.5")	0.01/.0005"	0.02	0.01	0.65 - 0.90	130	8h6	4337030
25	(1")	0.01/.0005"	0.02	0.01	0.65 - 1.15	140	8h6	4337031
50	(2")	0.01/.0005"	0.02	0.01	1.25 - 2.70	190	8h6	4337032
100	(4")	0.01/.0005"	0.02	0.01	1.60 - 3.50	235	8h6	4337033
12.5	(.5")	0.01/.0005"	0.02	0.01	0.65 - 0.90	150	3/8"	4337055
25	(1")	0.01/.0005"	0.02	0.01	0.65 - 1.15	160	3/8"	4337056

* *in any zero point*

Digital Indicators MarCator 1086 / 1086 Z, Resolution 0.001 mm / .00005"





Shown with Mounting Lug

Dimensions

Measuring range mm	(inch)	a mm	b mm	c mm
12.5	(.5")	126.3	23	13.5
25	(1")	153.4	26.8	26.5
50	(2")	267.3	40	52
100	(4")	420.3	91	103

Features

Functions:
ON/OFF
RESET (Set display to zero)
mm/inch
Reversal of the counting direction
PRESET (Allows the entry of any value using set buttons)
TOL (Enter tolerance limit values)
ABS (Display can be set to zero, without losing the reference to the Preset value)
<0> (Tolerance GO / NO GO display mode)
DATA (when connected with a data connection cable)
Factor (adjustable)

- Indvidual buttons can be locked
- Operating and diplay unit (bezel) can be rotated through 280°
- High contrast LCD with 11 mm high digits
- Inductive measuring system, battery life approx. 2000 hrs.
- Maximum measuring speed 1.5 m/s (60"/s)
- Lifter protection cap on the measuring spindle
- MarConnect data output: choose either
  USB
  OPTO RS232C
  Digimatic
- Operating temperature 10 - 40°C
- Class of protection IP42 in accordance to IEC 60529

Supplied with:
Battery, operating instructions

Technical Data

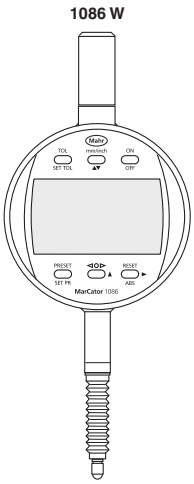
Measuring range mm	(inch)	Resolution mm/inch	Span of error* mm	Repeatability mm	Measuring force N	Weight g	Mounting shank dia.	Order no.
12.5	(.5")	0.001/ .00005"	0.005	0.002	0.65 - 0.90	130	8h6	4337020
25	(1")	0.001/ .00005"	0.005	0.002	0.65 - 1.15	140	8h6	4337021
50	(2")	0.001/.00005"	0.006	0.002	1.25 - 2.70	190	8h6	4337022
100	(4")	0.001/ .00005"	0.008	0.002	1.60 - 3.50	235	8h6	4337023
12.5	(.5")	0.001/ .00005"	0.005	0.002	0.65 - 0.90	150	3/8"	4337050
25	(1")	0.001/ .00005"	0.005	0.002	0.65 - 1.15	160	3/8"	4337051

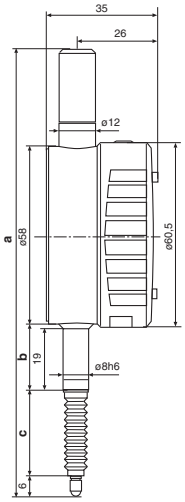
* *in any zero point*

Digital Indicators MarCator 1086 W, Water proof version

12.5 mm

25 mm





Dimensions

Measuring range mm	(inch)	a mm	b mm	c mm
12.5	(.5")	144.3	23	28.6
25	(1")	193.2	26.8	50

Features

Functions:
ON/OFF
RESET (Set display to zero)
mm/inch
Reversal of the counting direction
PRESET (Allows the entry of any value using set buttons)
TOL (Enter tolerance limit values)
ABS (Display can be set to zero, without losing the reference to the Preset value)
<0> (Tolerance GO / NO GO display mode)
DATA (when connected with a data connection cable)
Factor (adjustable)

- Indvidual buttons can be locked
- Operating and diplay unit (bezel) can be rotated through 280°
- High contrast LCD with 11 mm high digits
- Inductive measuring system, battery life approx. 2000 hrs.
- Maximum measuring speed 1.5 m/s (60"/s)
- Sealed protection cap
- Measuring spindle is sealed with a rubber bellows, thus preventing contamination by liquids and impurities
- MarConnect data output: choose either
  USB
  OPTO RS232C
  Digimatic
- Operating temperature 10 - 40°C
- Class of protection IP54 in accordance to IEC 60529

Supplied with:
Battery, operating instructions

Technical Data

Measuring range mm	*(inch)*	Resolution mm/*inch*	Span of error* mm	Repeatability mm	Measuring force N	Weight g	Mounting shank dia.	Order no.
12.5	***(.5")***	0.01/ ***.0005"***	0.005	0.002	0.65 - 1.40	135	8h6	**4337040**
25	***(1")***	0.001/ ***.00005"***	0.005	0.002	1.00 - 2.25	145	8h6	**4337041**
12.5	***(.5")***	0.01/ ***.0005"***	0.02	0.01	0.65 - 1.40	135	8h6	**4337045**
25	***(1")***	0.01/ ***.0005"***	0.02	0.01	1.00 - 2.25	145	8h6	**4337046**

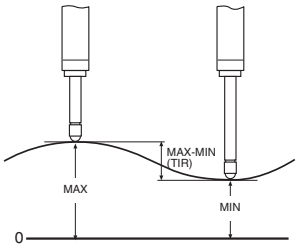
* *in any zero point*

MarCator 1087

▶| The new Digital Indicator **Marcator** 1087. The multi-functional Digital Indicator with a combined analog and digital display; plus tolerance and dynamic measuring functions.|◀

Dynamic measuring functions

- **MAX-MIN**-Function ideal for testing flatness and concentricity
- **MAX** and / or **MIN** for searching the reversal point



Universal Data-Interface

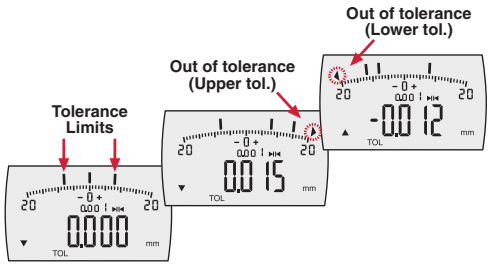
- **USB**
  No interface box is required! Simple and inexpensive way to set up a multiple measuring instruments via a USB hub

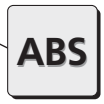
- **Digimatic**
  To connect a Digiamtic compatible evaluation instrument

- **Mahr Opto RS232C**
  For direct connection to a COM port on a PC

Clear display
Tolerance indication

The integrated bar graph visualizes the tolerance deviation. The out of tolerance; whether above the upper or below the lower tolerance limit is represented by arrows shown in the display.

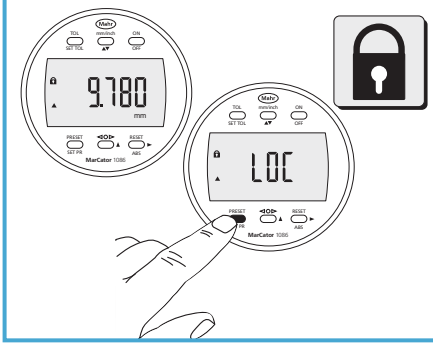




Absolute function:
Digital Indicator can be set in any position to 0.000 without losing the reference to the preset value.

LEADFREE
RoHS conform components

Error free operation - Lock function



Lock function: This prevents unintentional activation of an operating button.
Either all the operating buttons or only certain individual buttons can be locked.
If a locked operating button is pressed the "LOC" symbol will appear in the display.

Factor is adjustable
a symbol with appear in the display

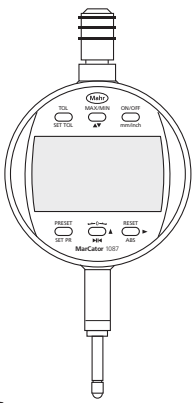
Example of application:
- Chamfer Gage

Digital Indicators MarCator 1087 / 1087 Z, with analog display

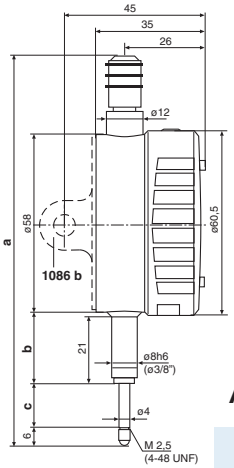
ABS | MAX MIN | IP42 | 0 TOL | marconnect USB | RS232C | Digimatic

12.5 mm

25 mm



Shown with Mounting Lug



Dimensions

Measuring range mm	(inch)	a mm	b mm	c mm
12.5	(.5")	126.3	23	13.5
25	(1")	153.4	26.8	26.5

Analog display

Readings mm / *inch*	Display range mm / *inch*
0.001 / ***.00005"***	± 0.02 / ***±.001"***
0.002 / ***.0001"***	± 0.04 / ***±.002"***
0.004 / ***.0005"***	± 0.08 / ***±.01"***
0.01 / ***.001"***	± 0.2 / ***±.02"***

Features

Functions:

ON/OFF
RESET (Set display to zero)
mm/inch
Reversal of the counting direction
PRESET (Allows the entry of any value using set buttons)
TOL (Enter tolerance limit values)
MAX/MIN memory, ideal for searching the reversal point
TIR (MAX-MIN) ideal for testing concentricity and flatness
ABS (Display can be set to zero, without losing the reference to the Preset value)
0 (Set the analog display to zero)
DATA (when connected with a data connection cable)
Factor (adjustable)

- Indvidual buttons can be locked
- Operating and diplay unit (bezel) can be rotated through 280°
- High contrast LCD with 8.5 mm high digits
- Inductive measuring system, battery life approx. 2000 hrs.
- Maximum measuring speed 1.5 m/s (60"/s)
- MarConnect data output: choose either
  - USB
  - OPTO RS232C
  - Digimatic
- Operating temperature 10 - 40°C
- Class of protection IP42 in accordance to IEC 60529

Supplied with:
Battery, operating instructions

Technical Data

Measuring range mm	*(inch)*	Resolution mm/*inch*	Span of error* mm	Repeatability mm	Measuring force N	Weight g	Mounting shank dia.	Order no.
12.5	***(.5")***	0.001/ ***.00005"***	0.005	0.002	0.65 - 0.90	140	8h6	**4337060**
25	***(1")***	0.001/ ***.00005"***	0.005	0.002	0.65 - 1.15	150	8h6	**4337061**
12.5	***(.5")***	0.001/ ***.00005"***	0.005	0.002	0.65 - 0.90	150	***3/8"***	**4337070**
25	***(1")***	0.001/ ***.00005"***	0.005	0.002	0.65 - 1.15	160	***3/8"***	**4337071**

* *in any zero point*

MarCator 1088

▶| The new Digital Indicator **MarCator** 1088. Tolerance monitoring is simplified with the changing of the color in the background lit display. |◀

Dynamic measuring functions

- MAX-MIN memory: ideal for testing flatness and concentricity
- MAX-MIN memory: for searching the reversal point

Tolerance function:

clearly visual tolerance excess due to the change of color in the background lit display.

Universal Data-Interface

- **USB**
  No interface box is required! Simple and inexpensive way to set up a multiple measuring instruments via a USB hub
- **Digimatic**
  To connect a Digiamtic compatible evaluation instrument
- **Mahr Opto RS232C**
  For direct connection to a COM port on a PC

Control output
can be connected to a SPS

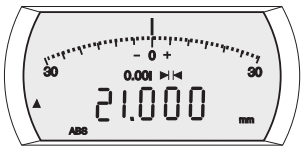
Absolute function:
Digital Indicator can be set in any position to 0.000 without losing the reference to the preset value.

Protection class IP54 according to IEC 60529. Especially suited for use in a manufacturing environment (except measuring range 50 mm)

Code Initial	IP	International Protection
First Numeral	5	Dust protected
Second Numeral	4	Protection against splash water in all directions

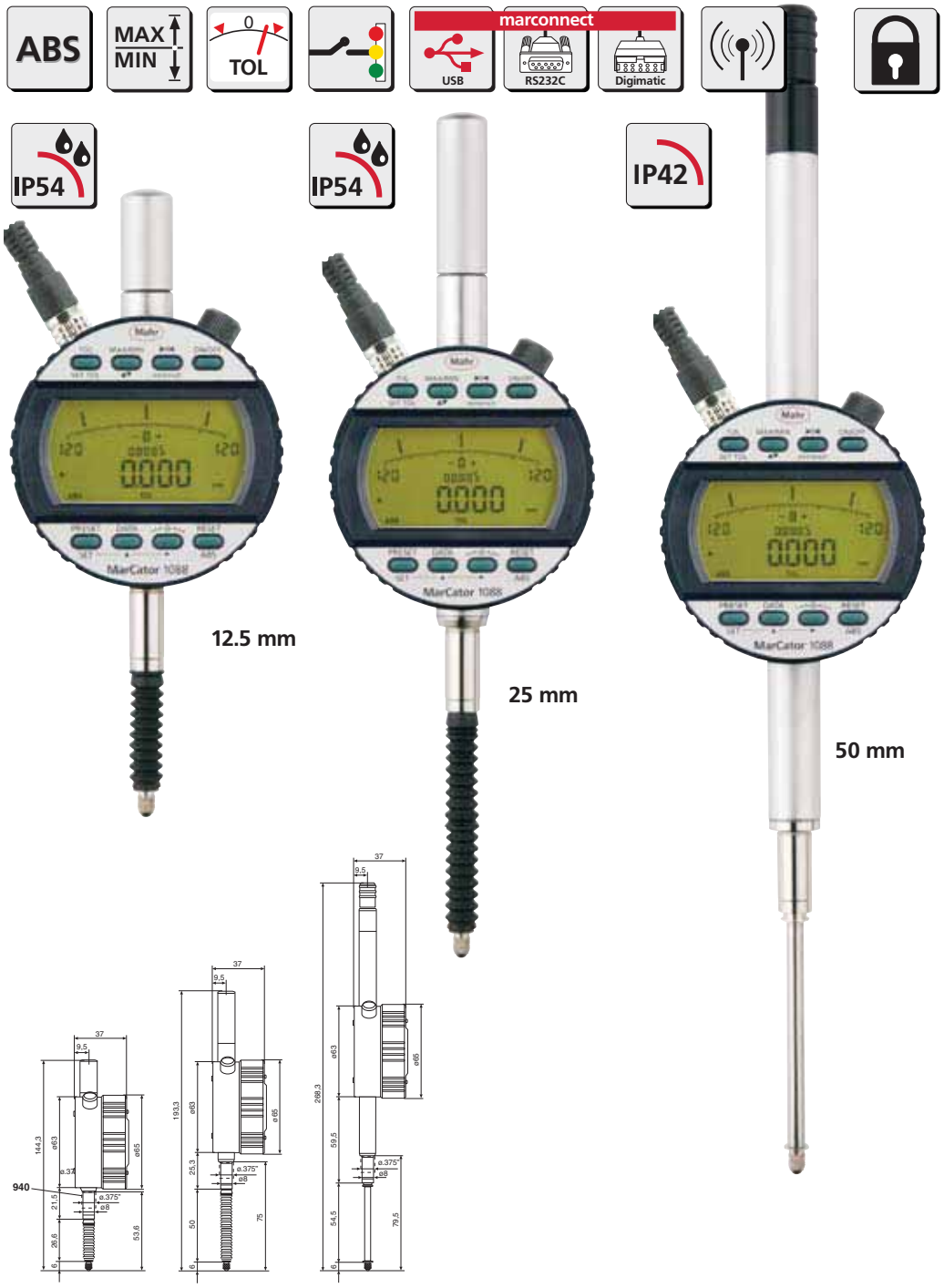
LEADFREE
RoHS conform components

Analog display



Readings (switchable) mm / ***inch***	Display range mm / ***inch***
0.001 / ***.00005"***	± 0.030 / ***±.0015"***
0.002 / ***.00001"***	± 0.060 / ***±.0030"***
0.005 / ***.0005"***	± 0.150 / ***±.0150"***
0.01 / ***.0001"***	± 0.30 / ***±.0150"***

Digital Indicators MarCator 1088 / 1088 W, with analog display



Features

Functions:
ON/OFF
RESET (set digital and analog displays to zero)
- 0 - (set the analog display to zero)
PRESET (enter any numerical values)
DATA (data transmission)
mm/inch-switchable
Reversal of counting direction (switch value in digital display)
MAX-MIN memory, ideal for searching the reversal point
MAX-MIN memory, ideal for testing flatness and concentricity
TOL (Enter tolerance limit values)
LOCK: operating functions can be blocked via PC-Software

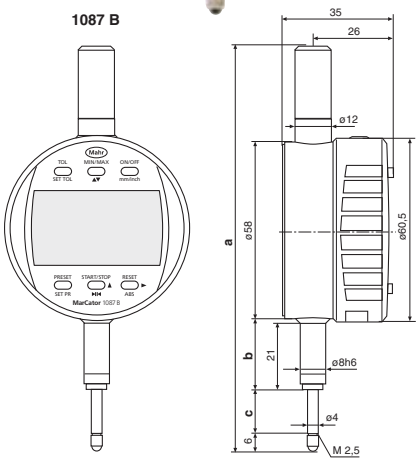
- Power supply via the main power adapter
- MarConnect data output USB, OPTO RS232C, or Digimatic
- Can be remotely operated via the interface (Opto RS232C)
- Control output compatible to Dial Comparators with limit contacts
- Operating and display unit (bezel) can be rotated 280°
- Class of protection IP54 in accordance to IEC 60529
- Operating temperature 5 - 40°C
- High contrast backlit LCD with 6.5 mm high digits
- Analog display with 4 mm pointer ensures better visual recognition, ideal when checking concentricity or flatness as well as searching for the reversal point when measuring bores
- Supplied with:
Mains adapter, rubber bellows, operating instructions

Technical Data

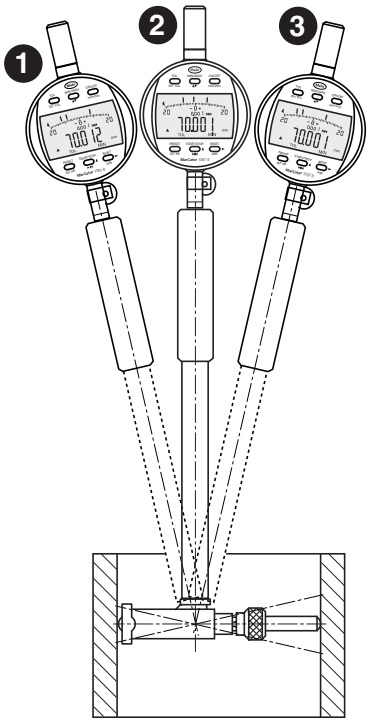
Measuring range mm	*(inch)*	Resolution mm/*inch*	Meas. force N	Span of error* mm	Protection class	Mounting shank dia.	Order no. 230 V	Order no. 115 V
12.5	***(.5")***	0.001/ ***.00005"***	0.65 - 0.9	0.005	IP54	8h6	**4337000**	**4337010**
25	***(1")***	0.001/ ***.00005"***	0.65 - 1.15	0.005	IP54	8h6	**4337001**	**4337011**
50	***(2")***	0.001/ ***.00005"***	1.25 - 2.7	0.008	IP42	8h6	**4337002**	**4337012**

* *in any zero point*

Digital Indicator MarCator 1087 B for 2 point inside measurement



Example of application



With a 2 point inside measuring instrument the point of reversal is automatically determined through rocking back and forth. The actual value is detected and stored by the MIN function and indicated in the display (3).

Features

Functions:
ON/OFF
RESET (Set the display to zero)
mm/inch
Reversal of the counting direction
PRESET (Allows the entry of any value using set buttons)
TOL (Enter tolerance limit values)
START/STOP for searching the reversal point
MAX/MIN memory, ideal for searching the reversal point
ABS (Display can be set to zero, without losing the reference to the Preset value)
0 (Set analog display to zero)
DATA (when connected with a data connection cable)
Factor (adjustable)

- Indvidual keys can be locked
- Operating and diplay unit (bezel) can be rotated 280°
- High contrast LCD with 8.5 mm high digits
- Inductive measuring system, battery life approx. 2000 hrs.
- Maximum measuring speed 1.5 m/s (60"/s)
- Sealed protection cap
- MarConnect data output: choose either USB, OPTO RS232C, Digimatic
- Operating temperature 10 - 40°C
- Class of protection IP42 in accordance to IEC 60529

Supplied with:
Battery, operating instructions

Dimensions

Measuring range mm	(inch)	a mm	b mm	c mm
12.5	(.5")	131	23	13.5

Analog display

Readings mm / ***inch***	Display range mm / ***inch***
0.001 / ***.00005"***	± 0.02 / ***±.001"***
0.002 / ***.0001"***	± 0.04 / ***±.002"***
0.004 / ***.0005"***	± 0.08 / ***±.01"***
0.01 / ***.001"***	± 0.2 / ***±.02"***

Technical Data

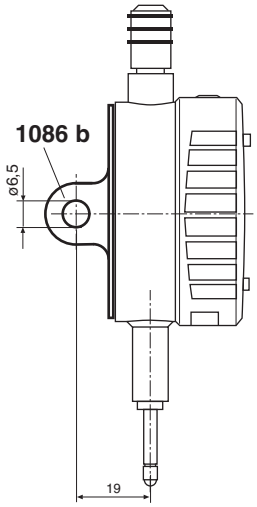
Measuring range mm	***(inch)***	Resolution mm/***inch***	Span of error* mm	Repeatability mm	Measuring force N	Weight g	Mounting **shank** dia.	Order no.
12.5	***(.5")***	0.001/ ***.00005"***	0.005	0.002	0.65 - 0.90	140	8h6	**4337062**

* *in any zero point*

Accessories for MarCator 1086, 1087 and 1088

Accessories for MarCator 1086 and 1087

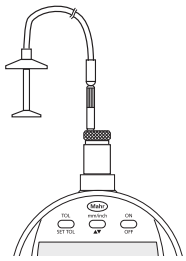
		Order no.
Battery 3V, Type CR 2450		**4884464**
Data Connection Cable USB (2 m)	**16 EXu**	**4102357**
Data Connection Cable Opto RS232C (2 m), with SUB-D jack 9-pin	**16 EXr**	**4102410**
Data Connection Cable Digimatic (2 m), Flat plug 10-pin	**16 EXd**	**4102411**
Mounting Lug	**1086 b**	**4337421**



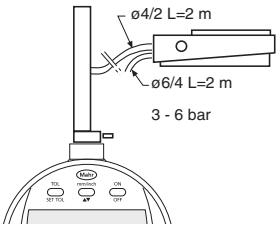
Accessories for MarCator 1088

		Order no.
Data Connection Cable USB (2 m)	**2000 usb**	**4346023**
Data Connection Cable Opto RS232C (2 m), with SUB-D jack 9-pin	**2000 r**	**4346020**
Data Connection Cable Digimatic (2 m), Flat plug 10-pin	**2000 d**	**4346021**
Cable to connect control output to an SPS	**2000 sps**	**4346031**
Mounting Lug	**1085 b**	**4336310**
Control Instrument for remote control button operation	**2000 sg**	**4346035**

1085 a



1082 p (12,5/25)

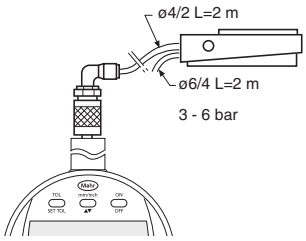


Accessories for MarCator 1086, 1087 and 1088

		Order no.
Cable Release for measuring ranges 12.5 and 25 mm	**1085 a**	**4336311**
Pneumatic Lifter for measuring ranges 12.5 and 25 mm	**1082 p**	**4336237**
Pneumatic Lifter for measuring ranges 50 and 100 mm	**1082 p**	**4336230**
Additional Accessories		**Page**
Contact Points	**901-913**	5-52
Special Holder	**941**	5-53
Sensor Lever	**943**	5-53

Accessories for Data Processing see Chapter 11

1082 p (50/100)



Contact Points and Accessories for Dial Indicators, Dial Comparators and Probes

Standard Contact Points 901
Ball dia. 3 mm

Catalog no.		Order no.
901	with steel ball	**4360001**
901 H	with carbide ball	**4360002**
901 R	with ruby ball	**4360003**

Spherical Contact Points 902 — Flat Contact Points 903

Length mm	**902** Steel **Order no.**	**902 H** Carbide contact face **Order no.**	**903** Steel **Order no.**	**903 H** Carbide tipped **Order no.**
4	**4360007**	**–**	**4360070**	**–**
6	**4360009**	**–**	**4360071**	**4360101**
8	**4360010**	**4360040**	**4360072**	**4360102**
10	**4360011**	**4360041**	**4360073**	**4360103**
12	**4360012**	**4360042**	**4360074**	**4360104**
15	**4360013**	**4360043**	**4360075**	**4360105**
20	**4360014**	**4360044**	**4360076**	**4360106**
25	**4360015**	**4360045**	**4360077**	**4360107**
30	**4360016**	**4360046**	**4360300**	**4360110**
35	**4360017**	**4360047**	**4360078**	**4360108**
40	**4360019**	**4360049**	**4360310**	**4360111**
45	**4360026**	**4360050**	**4360303**	**–**
50	**4360018**	**4360048**	**4360079**	**4360109**
55	**4360031**			
65	**4360035**			
75	**4360020**			
85	**4360036**			
95	**4360029**			

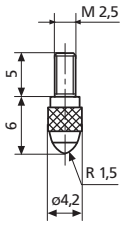
Ball Contact Point 906 H
with carbide ball. accuracy ball dia. 0/-6µm

Ball dia. d mm	*l* mm	Order no.	Ball dia. d mm	*l* mm	Order no.
1	8.5	**4360150**	5.5	9	**4360161**
1.25	8.5	**4360151**	6	9	**4360162**
1.5	8.5	**4360152**	6.35 ***(1/4")***	9	**4360163**
1.75	8.5	**4360153**	6.5	10	**4360164**
2	8.5	**4360154**	7	10	**4360165**
2.5	8.5	**4360155**	7.5	11	**4360166**
3	8.5	**4360156**	8	11	**4360167**
3.5	8.5	**4360157**	8.5	12	**4360168**
4	8.5	**4360158**	9	12	**4360169**
4.5	8.5	**4360159**	10	13	**4360170**
5	9	**4360160**			

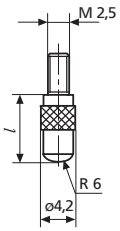
Contact Rollers 909
Concentricity error 3 µm

		Order no.
Cylindrical Roller	**909 A**	**4360220**
Radiused Roller, R = 5 mm	**909 B**	**4360221**

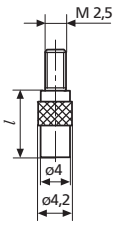
901



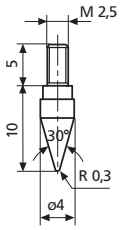
902



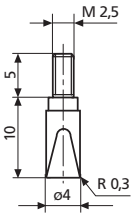
903



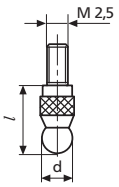
904



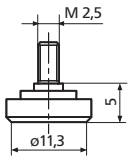
905



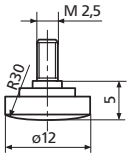
906 H



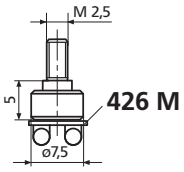
907



908 H



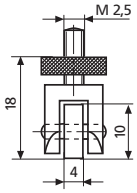
913



Special Contact Points

		Order no.
Conical Contact Points, Steel	**904**	**4360130**
Carbide tipped	**904 H**	**4360131**
Wedge Shaped Contact Points, Steel	**905**	**4360140**
Carbide tipped	**905 H**	**4360141**
Flat Contact Points, Steel, A = 1 cm²	**907**	**4360200**
Carbide tipped, dia. 7 mm	**907 H**	**4360201**
Spherical Contact Points, Steel	**908**	**4360210**
Carbide tipped	**908 H**	**4360211**
Flat Contact Point, for mounting Pin Gage Holder 426 M for measuring threads using three-wire method	**913**	**4360400**

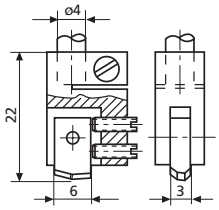
909 A

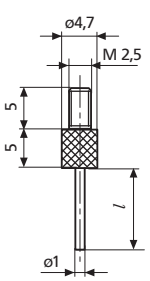


Contact Points and Accessories for Dial Indicators, Dial Comparators and Probes

Measuring Attachment 910 H

		Order no.
with parallel adjustable carbide blades	**910 H**	**4360230**

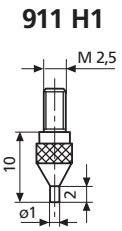


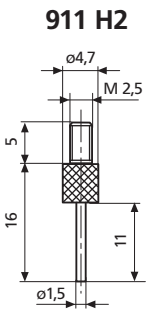


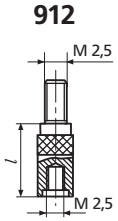
Pin Contact Point 911

dia. 1 mm, flat

Length l mm	Order no.	Length l mm	Order no.
15	**4360280**	35	**4360284**
20	**4360281**	40	**4360285**
25	**4360282**	50	**4360286**
30	**4360283**		







Pin Contact Point 911 H

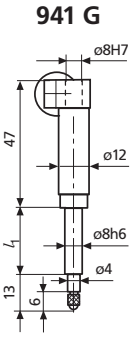
		Order no.
Carbide tipped, dia 1 mm, flat	**911 H1**	**4360240**
Carbide tipped, dia 1.5 mm, flat	**911 H2**	**4360241**

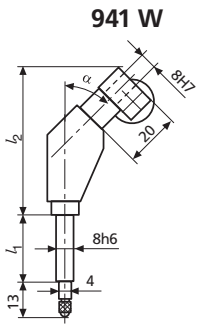
Measuring Spindle Extensions 912

Length l mm	Order no.	Length l mm	Order no.
10	**4360250**	35	**4360254**
15	**4360251**	50	**4360255**
20	**4360252**	75	**4360256**
25	**4360253**	100	**4360257**

Special Holder 941

For all types of measuring equipment
For placing a dial indicator at a certain distance or angle
Travel of the measuring spindle 3 mm
Contact Point 901 (interchangeable)



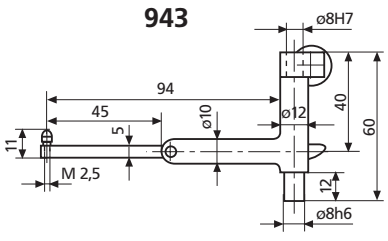


Transmission error with the 941 W max. 1%; for travel 3 mm = 0.03 mm

Straight Holder 941 G Mounting shank length l_1 mm	Order no.	Angular Holder 941 W Order no. Angle α=45°	l_2 mm	Order no. Angle α=60°	l_2 mm	Order no. Angle α=90°	l_2 mm
25	**4365000**	**4365010**	53.7	**4365020**	49.3	**4365030**	34.5
50	**4365001**	**4365011**		**4365021**		**4365031**	
75	**4365002**	**4365012**		**4365022**		**4365032**	

Sensor Level 943

	Order no.
For testing concentricity in bore holes as well as difficult to reach outside diameters To be inserted in a measuring stand with a lifting device Contact Point 901 interchangeable Travel ±1 mm	**4367000**



SIMPLE, ACCURATE AND INEXPENSIVE MEASUREMENT.
MILLIMESS DIAL COMPARATORS.

The latest information on MILLIMESS products can be found on our website:
www.mahr.com, WebCode 207

► | Millimess is the "classic" amongst all measuring instrument. For over 60 years the Millimess series of dial comparators has been synonymous with both high precision and extreme robustness. Both maximum accuracy and a minimal reversal span error are obtained through the levers, gears and pinions being supported with jeweled bearings and that the measuring spindle running in a ball bush guide. Millimess is therefore particularly suitable for measuring tasks where the accuracy and the reversal span of a conventional dial indicator are not sufficient. Further advantages of Millimess are the simple handling, the easy reading as well as the movement being absolute shockproof. With a digital comparator with an inductive measuring system combined with most modern state of the art digital technology readings as small as 0.2 µm/ 10 µinch are realized. The practical control functions (for example tolerance monitoring or the storage of measuring values for dynamic measurements), the combined analog and digital display as well as the easy to use data transmission rounds off the complete Millimess spectrum. | ◄

► | Millimess. Digital and Dial Comparators

Inductive Digital Comparators

Mechanical Dial Comparators

Millimess. Digital Comparators (Short range)

Overview

Inductive Digital Comparators

	2100	2000	2001	µMaxµm	Maxµm *III*
					
Catalog page	6 - 3	6 - 5	6 - 5	6 - 7	6 - 10
Measuring range	2.8 mm	1.8 mm	1.8 mm	2 mm	2 mm / 3.98 mm
Resolution	mm / ***inch*** 0.0005 / ***.00002"*** 0.001 / ***.00005"*** 0.005 / ***.0002"*** 0.01 / ***.0005"***	mm / ***inch*** 0.0002 / ***.00001"*** 0.0005 / ***.00002"*** 0.001 / ***.00005"***	mm / ***inch*** 0.0002 / ***.00001"*** 0.0005 / ***.00002"*** 0.001 / ***.00005"***	mm / ***inch*** 0.0005 / ***.00002"*** 0.001 / ***.00005"*** 0.002 / ***.0001"*** 0.005 / ***.0002"*** 0.010 / ***.0005"*** 0.020 / ***.001"***	mm / ***inch*** 0.0005 / ***.00002"*** 0.001 / ***.00005"*** 0.001 / ***.0001"*** 0.005 / ***.0005"***
Functions:					
ON/OFF	●	●	●	●	
Zero set the display	●	●	●	●	●
Zero set the analog display	●	●	●		
Switch between mm/inch	●	●	●	●	●
Reversal of counting direction	●	●	●	●	●
Entering a numerical value					
Preset	●	●	●	●	
Data key	●				
Data via control instrument 2000sg	●	●	●		
ABS/REL-switchable	●	●	●	●	
Tolearance display	●		●	●	●
Dynamic meas. functions — Min. Max.					
Dynamic meas. functions — Max-Min (Tir)	●		●		●
Resolution switchable	●	●	●	●	●
Analog display	●	●	●	●	●
Analog value switchable		●	●	●	●
Lock key function	●		●	Optional	Optional
Data output — USB	●	●	●		
Data output — Digimatic	●	●	●	●	●
Data output — Opto RS232C	●	●	●		●
Control output	●		●		
Protection class IP class acc. IEC 60529	IP54	IP54	IP54	IP54	IP54

Millimess. Digital Comparator

►| The new Inductive Digital Comparator **Millimess** 2100. Tolerance monitoring is simplified with the color change in the background lit display. |◄

LEADFREE
RoHS conform components

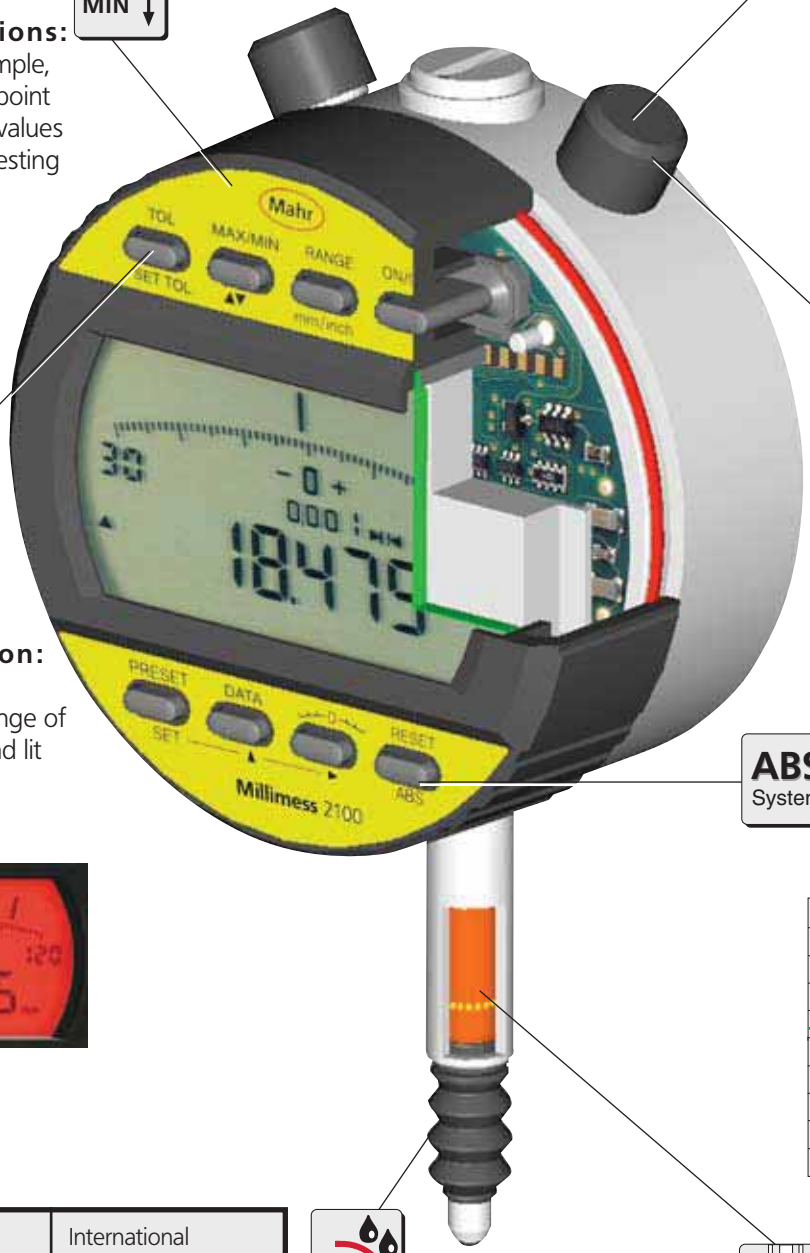
Universal SPS Interface
The choice is yours: **MarConnect** Data output, choose between USB, Digimatic or RS232C

marconnect
USB | RS232C | Digimatic

Dynamic measuring functions:
- MAX / MIN for example, finding the reversal point
- MAX - MIN storing values for example when testing concentricity and flatness

MAX / MIN

Control output can be connected to a SPS

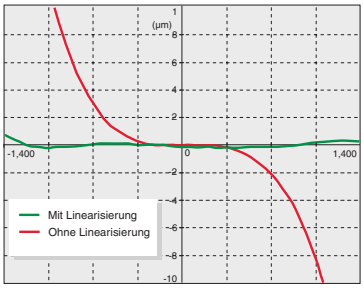


TOL

Tolerance function: clearly visual tolerance excess due to the change of color in the background lit display.

ABS System

Linearized, inductive **absolute measuring system.** Reference point is not lost when the instrument is switched off.



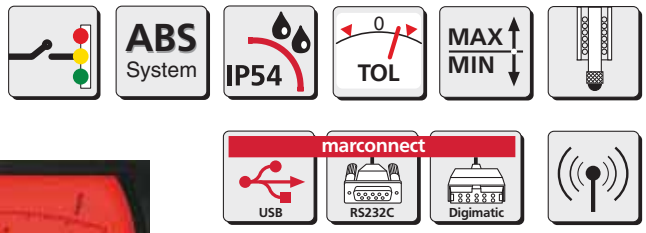
IP54

Especially suited for use in a manufacturing environment. Waterproof **protection class IP54** according to IEC 60529

High precision rotary stroke bearings for a longer service life and higher capacity

Code Initial	IP	International Protection
First Numeral	5	Dust protected
Second Numeral	4	Protection against splash water in all directions

Inductive Digital Comparator Millimess 2100 with background lit display



Features

Functions:
ON/OFF
RESET (zero setting the digital and analog displays)
- 0 - (set the analog display to zero)
PRESET (enter any numerical values)
DATA (data transmission) mm/inch-switchable
Reversal of counting direction
RANGE (switch the meas. range and resolution)
ABS (reference to elect. zero point)
MAX / MIN memory, e.g. ideal to search for the reversal point
MAX-MIN e.g. testing concentricity and flatness
TOL (entering tolerance)
LOCK: operating functions can be blocked via PC-Software

- Linearized inductive absolute measuring system
- Measurement electronic is compensated for temperature
- Power supply via the main power adapter
- MarConnect data output: choose either
  USB
  OPTO RS232C
  Digimatic
- Dial Comparator can be remotely operated via the interface (Opto RS232C)
- Control output compatible to Dial Comparators with limit contacts
- Operating and display unit (bezel) can be rotated through 280°
- Measuring force spring is interchangeable
- Lower stop is adjustable
- Protection class IP54 according to IEC 60529
- Operating temperature 5 - 40°C
- High contrast background lit LCD with 6.5 mm high digits
- Analog display has a 4 mm long pointer which ensures better visual perception, ideal when checking concentricity and flatness and also to search for the reversal point when measuring bores
- Supplied with:
  Mains adapter, rubber bellows and spanner for preliminary stroke setting

Technical Data

Measuring ranges switchable mm ***(inch)***	Resolution switchable mm/***inch***	Display range of the analog display mm ***(inch)***	Span of error* *G* within ±0.8 mm	Span of error* *G* within ±1.4 mm	Over-travel mm	Meas. force N	Order no. **230 V**	Order no. **115 V**
±1.0 ***(.04")***	0.0005 /***.00002"***	± 0.015 ***(.0006")***						
±1.4 ***(.55")***	0.001 /***.00005"*** 0.005 /***.0002"*** 0.01 /***.0005"***	± 0.030 ***(.0015")*** ± 0.150 ***(.0060")*** ± 0.300 ***(.0150")***	1 µm	2 µm	1.8	0.7 - 0.9	**4346200**	**4346201****

* *1 digit in any zero position*
** *Includes Adapter Bush 940*

Inductive Digital Comparators 2000 / 2001

Features

Extramess 2000

Functions:
ON/OFF
RESET (Set the digital and analog display to zero)
- 0 - (Set analog display to zero)
PRESET (enter any numerical values)
mm/inch switchable
Reversal of counting direction
RANGE (Switch the meas. range and resolution)
ABS (reference to elect.riccal zero point)

- Charge status of the battery is indicated
- Linearized inductive absolute measuring system
- Power supply via either the integrated rechargeable batteries (40 hrs.) or via the mains power adapter
- Rate measuring values are actualized 20 values/sec.
- MarConnect data output: choose either
  USB
  OPTO RS232C
  Digimatic
- Comparator can be remotely operated via the interface
- High contrast LCD with 6.5 mm high digits. Analog display has a 4 mm long pointer for better visual perception, ideal when checking concentricity and flatness as well as search for the reversal point when measuring bores
- Operating and display unit (bezel) can be rotated 280°
- Measuring force spring is interchangeable
- Lower stop is adjustable
- Protection class IP54
- Operating temperature 5 - 40°C
- Supplied with:
  Mains adapter, rubber bellows and spanner for preliminary stroke setting

Extramess 2001

Features are identical to Extramess 2000, in addition:
MAX / MIN memory, e.g. ideal to search for the reversal point
MAX-MIN e.g. testing concentricity and flatness
TOL (entering tolerance)

- Block individual operating functions via Software (see accessories)
- Factor can be set / adjusted
- Control output compatible to Dial Comparators with limit contacts
- Supplied with:
  Mains adapter, rubber bellows and spanner for preliminary stroke setting

Technical Data

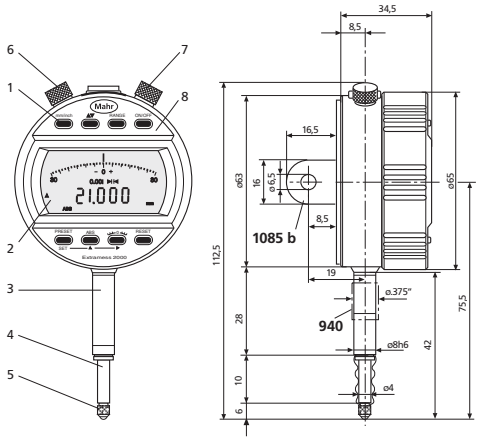
	Measuring ranges switchable mm *(inch)*	Resolution and readings mm/*inch*	Display range of analog display mm *(inch)*	Span of error* *G* µm	Over-travel mm	Meas. force N	Order no. 230 V	Order no. 115 V
2000	1.8 *(.07")*	0.001/ *.00005"*	± 0.030 *(.0015")*	0.6	2.4			
	1.8 *(.07")*	0.0005/ *.00002"*	± 0.015 *(.0006")*	0.6	2.4	0.7 - 0.9	**4346000**	**4346900 ****
	0.8 *(.031")*	0.0002/ *.00001"*	± 0.006 *(.0003")*	0.3	2.9			
2001	1.8 *(.07")*	0.001/ *.00005"*	± 0.030 *(.0015")*	0.6	2.4			
	1.8 *(.07")*	0.0005/ *.00002"*	± 0.015 *(.0006")*	0.6	2.4	0.7 - 0.9	**4346100**	**4346910 ****
	0.8 *(.031")*	0.0002/ *.00001"*	± 0.006 *(.0003")*	0.3	2.9			

** 1 digit in any zero position*

*** Includes Adapter Bush 940*

Inductive Digital Comparators 2100 / 2000 / 2001

1 Operating buttons
2 Display
3 Mounting shank
4 Measuring spindle
5 Contact point 901H
6 Connection or mains power supply
7 Data output
8 Rotatable operating and display unit (bezel)



Shown with Mounting Lug

Control Instrument 2000sg

Features

- Remote control buttons:
  RESET
  PRESET
  RANGE*
- DATA-button for data transmission, optionally via foot switch
- Power is supplied by the Extramess
- Connect to the Extramess with the built-in control cable
- Data can be transferred to a PC with an optional data cable
- Splash waterproof according to IP54

Order no. **4346035**

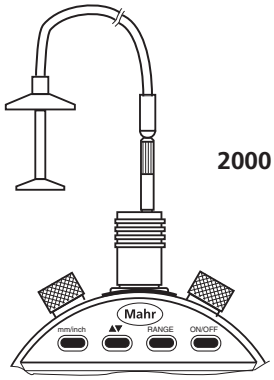
** Function is limited when used in conjunction with the 2100*

Accessories

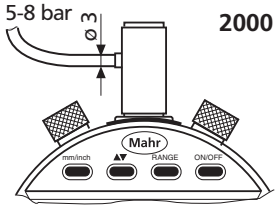
Data Connection Cable USB (2 m)	**2000 usb**	**4346023**
Data Connection Cable Opto RS232C (2 m), SUB-D jack 9-pin	**2000 r**	**4346020**
Data Connection Cable Digimatic (2 m), flat plug 10-pin	**2000 d**	**4346021**
Cable to connect control output to an SPS	**2000 sps**	**4346031**
Manual Lifter with cable release	**2000 h**	**4346010**
Pneumatic Lifter	**2000 p**	**4346011**
Measuring Force Adjuster	**2000 m**	**4346012**
Mounting Lug Horizontal/Vertical	**1085 b**	**4336310**
Adapter Bush for adapting mounting shank 8h6 mm to inch bore .375"	**940**	**4310103**

Measuring Force Springs

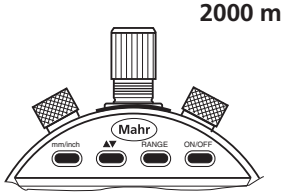
0.25 N	**4346050**
0.5 N	**4346051**
0.75 N	**4882284**
1.0 N	**4346052**
1.5 N	**4346053**
2 N	**4346054**
2.5 N	**4346055**



2000 h



2000 p



2000 m

Additional Accessories		**Page**
Contact Points	**901-913**	5-52
Special Holder	**941**	5-53

Accessories for Data Processing see Chapter 11

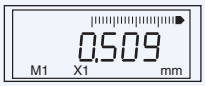
Inductive Digital Comparator µMaxµm®

The most valueable electronic indicator for high production measurements.

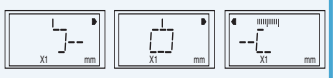
Features

- Inch/Metric – operator selectable with switchable Inch resolution.
- Normal/Reverse Sensing
- Preset capabilities
- Optional Calibration Lockout feature.
- "Absolute" Transducer – no overspeed errors or constant re-zeroing. Federal's unique transducer always remembers its location – even when power is off.
- High resolution digital readout and analog bar graph – digital display shows deviation from zero or a preset value.
- Lightweight, contamination resistant – ruggedly built to withstand hard use – gasketed case, crystal and stem assemblies resist fluid contamination.
- Calibratable – if ever needed – values remembered even after battery change.
- Data output – 2 popular formats – 7-pin recessed connector
- Auto power down – provides extremely low battery consumption, assuring long life from readily available commercial batteries.
- Unilateral Tolerances.
- Go/NoGo Display Feature.
- Increased resolution (0.0005 mm / 20 µinch) for today's demanding tolerances

Mode A:
Actual value + graphic display of tolerance



Mode B:
Go- No Go display

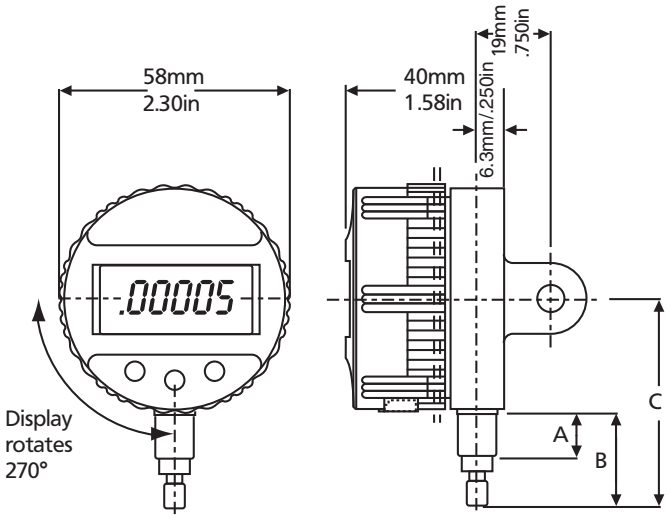


Technical Data

Dimensions

mm/inch	A	B	C
	11.7 / ***.46"***	24.1 / ***.95"***	53.6 / ***2.11"***
	38 / ***1.50"***	57.2 / ***2.25"***	86.6 / ***3.41"***

For Contact Points please refer to pages 5-22, 5-27, 5-52 & 5-53.



Inductive Digital Comparator µMaxµm®

Technical Data

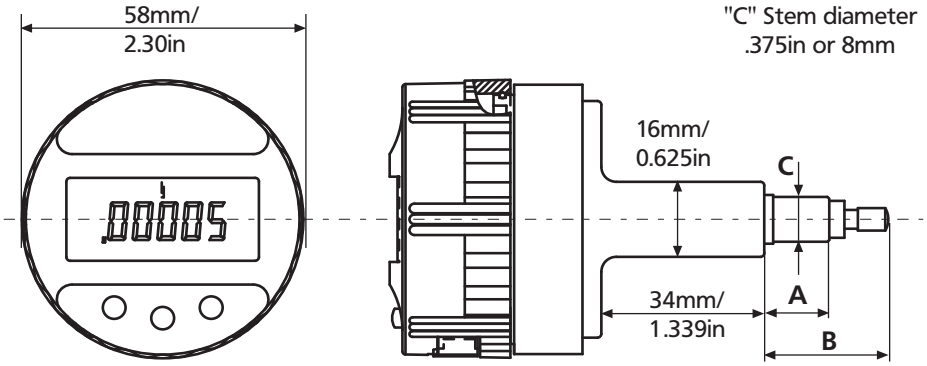
Range and Resolution

	Standard Units		High Resolution Units		
Display	**Range**	**Resolution**	**Accuracy % of Digital Range**	**Resolution**	**Accuracy % of Digital Range**
Inch	**± .040"**	**.00005" / .0001" / .0005" / .0002" / .001"**	**± .5% over ± .040" ± .25 % over ± .020"**	**.00002" plus same as standard**	**± .5 % over ± .040" ± .25 % over ± .020"**
Metric	± 1.0 mm	0.001 / 0.002 / 0.005 / 0.010 / 0.020 mm	± .5% over ± 1.00 mm ± .25 % over ± 0.50 mm	0.0005 mm plus same as standard	± .5 % over ± 1.00 mm ± .25 % over ± 0.50 mm

Specifications

Spindle Range	***- .050" to + .060"*** (-1.28 mm to + 1.5 mm)
Repeatability	± 1 digit
Contact Point	(Normally furnished – PT-223) for .375" dia. stem, .250" long, radiused tip, 4-48 thread; (EPT-1037-W1) for 8 mm dia. stem, 6 mm long, radiused tip, M2.5 mm thread
Gaging Force	85-112 g/3-4 oz. (at center of spindle travel) Other gaging forces available – call Technical Assistance
Power	3 volt lithium coin cell (2 per unit, consumer type, CR 2450) Mahr Federal Model Number: **EBY-1018**
Battery Life	nine months normal usage or 3000 hours
Weight	approx. 170 g / 6 oz.
Display	Rotates through 270°
Operating Temperature	4° . . . 50°C / 50° . . . 130° F

Perpendicular µMaxµm



Dimensions mm/inch	A	B
	11.7 / ***.46"***	24.1 / ***.95"***
	38 / ***1.50"***	57.2 / ***2.25"***

Inductive Digital Comparator µMaxµm®

Ordering Information

µMaxµm Model Number:

EDI- X X X 0 X

Style	Range	Resolution	Code
Standard	± 1 mm / ± .040"	.001 mm / 50 µinch	1
High Resolution	± 1 mm / ± .040"	.0005 mm / 20 µinch	2
Standard Perpendicular	± 1 mm / ± .040"	.001 mm / 50 µinch	3
High Resolution Perpendicular	± 1 mm / ± .040"	.0005 mm / 20 µinch	4

Ratio	Code
1:1	0
4/5	1
Calibration Lockout, 1:1	2*
Calibration Lockout, 4/5	3*

Stem dia./L**	Code
.375" / .46"	1
.375" / 1.5"	2
8 mm / .46"	3
8 mm / 1.5"	4

Back	Code
Perpendicular (no back)	0
Lug (EBK-1010)	1
Flat (EBK-1018)	2

* *Requires Calibration Access Key, EKY-1024 (sold seperately)*
** *Diameter / Length*

Note. Ask about our **EDS-X** models for special Setup Mode Lockout, MM/INCH Button Lockout, Calibration Lockout, Disable Sleep Mode and more

Accessories

	Order no.
Lug Back (Horizontal / Vertical)	**EBK-1010**
Flat Back	**EBK-1018**
Post Back	**EBK-1012**
Screw Back	**EBK-1013**
Back for Adjustable Mounting Brackets like AT-28 and AT-116 (slide sold separately)	**EBK-1014**
Adjustable Back (.5" slot x 1/4 - 20 thread)	**EBK-1016**
Mating Connector (7 pin)	**ECN-1720**
Output Cable to Digimatic	**2001025**
Serial output cable to DB-9 pin	**SCB-4**
Dust Cover	**ECV-1307-W2**
Calibration Access Key	**EKY-1024**
Spring – for lighter gaging force: 35 g / 1.2 oz.	**SP-351**

Maxμm® *III* Digital Comparator

Features

- Features both digital display for accuracy and readability and unique fan analog display for trend and change
- User configurable in inch / metric units, normal / reverse sensing, resolution, analog scale, and tolerance setup & display
- Dynamic Capabilities: Min, Max, TIR, Hold, Reset
- Absolute Transducers - no overspeed errors. . . . no missed counts. . . . no missed readings
- Auto power down - provides extremely low battery consumption, assuring long life from readily available commercial batteries
- Data output - 3 formats - Maxum, serial, or digimatic
- Both integral and remote readout versions available
- Easily used on Snap Gages, Bore Gages, Comparator Stands, and Fixture Gages
- Special options available: setup mode or calibration lockout, remote external power, 4:5 ratio, 12 o'clock mounted integral transducer, integral vertical or horizontal lug back, 1.5, 2.0 or 3.0 inch stem length, and more. . . .
- IP54 protection
- Easy to select, order and operate!

ABS System

TOL

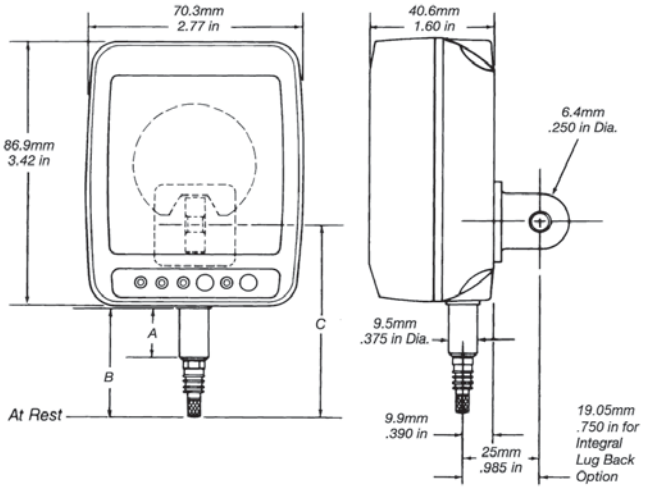
MAX MIN

RS232C

Digimatic

IP54

Technical Data



Easily designed into your applications . . . full-size Maxum® Indicator and accessories, tracing templates or CAD files available on request.

For short range indicators – Standard Stem Length (± 1.0 mm/ ± *.040"* range indicators)

A	B	C
17 mm/ ***.670"***	36 mm/ ***1.42"***	63.5 mm/ ***2.50"***

For long range indicators – Standard Stem Length (± 1.99 mm/ ± *.100"* range indicators)

22 mm/ ***.87"***	47 mm/ ***1.84"***	73 mm/ ***2.87"***

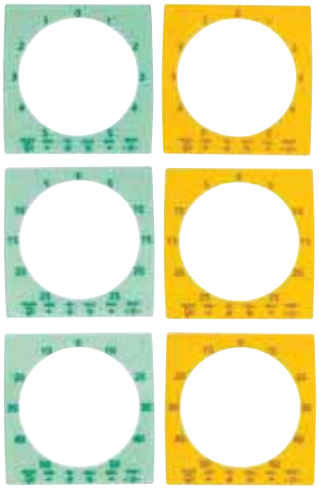
For both short and long range indicators – Long Stem Lengths

38 mm/ ***1.5"***	57 mm/ ***2.25"***	84.6 mm/ ***3.33"***
51 mm/ ***2"****	70 mm/ ***2.75"***	97.3 mm/ ***3.83"***
76 mm/ ***3"****	95 mm/ ***3.75"***	123 mm/ ***4.83"***

* *Special Order Lengths*

Maxμm® *III* Digital Comparator

Technical Data



Description	Short Range	Long Range
Digital range		
Standard	±1.00 mm/ ***±.040"***	±1.99 mm/ ***±.100"***
Reduced	±0.199 mm/ ***±.0199"***	None
Digital resolution	0.005 mm/ ***.0005"***	0.005 mm/ ***.0005"***
Switchable	0.001 mm/ ***.0001"***	0.001 mm/ ***.0001"***
	0.001 mm/ ***.00005"***	
	0.0005 mm/ ***.00002"***	
Analog range	5 or 25 or 50	25 or 50
Analog resolution	0.01 mm/ ***.001"***	0.01 mm/ ***.001"***
Switchable	0.005 mm/ ***.0005"***	0.005 mm/ ***.0005"***
	0.001 mm/ ***.0001"***	
Total spindle travel	3.04 mm/ ***.120"***	6.35 mm/ ***.250"***
Pre-Travel*	0.3 mm/ ***.010"***	1.06 mm/ ***.020"***
Over-Travel*	0.8 mm/ ***.030"***	1.31 mm/ ***.030"***
Accuracy		
Standard range	0.5% of Total Range	0.35% of Total Range
Reduced range	0.25% of Total Range	N/A
Repeatability	±One Least Digit	±One Least Digit
Gaging force	3 - 4 oz / 85 - 112 grams, preloaded	
Operation temperature	10° to 55°C / 50° to 130°F	
Storage temperature	-20° to 65°C / -4° to 149°F	
IP Rating	54	
Weight	approx. 385 g / 13.6 oz.	
Battery life	approx. 4000 hours	
Power	3.0 volt Lithium battery (type CR123A or equivalent) Mahr Federal Order Number: **2239138**	
Contact point	(Normally furnished – PT-223) for 0.375" dia. Stem, ***0.250"*** long, radiused tip, 4-48 thread; (EPT-1037-W1) for 8 mm dia. stem, 6 mm long, radiused tip, M2.5 thread.	

Stem length mm / ***inch***	**Stem diameter**	**Data output**	**Order no. Short range**	**Order no. long range**
17 mm/ ***0.670"***	***0.375"***	No Output	**2033101**	**2033102****
38 mm/ ***1.50"***	***0.375"***		**2033103**	**2033104**
17 mm/ ***0.670"***	8 mm		**2033105**	**2033106****
38 mm/ ***1.50"***	8 mm	Digital Output 6 pin (D, E1)	**2033107**	**2033108**
17 mm/ ***0.670"***	***0.375"***		**2033111**	**2033112****
38 mm/ ***1.50"***	***0.375"***		**2033113**	**2033114**
17 mm/ ***0.670"***	8 mm		**2033115**	**2033116****
38 mm/ ***1.50"***	8 mm		**2033117**	**2033118**
17 mm/ ***0.670"***	***0.375"***	Digital Output with Hold / Reset 10 pin (E2)	**2033121**	**2033122****
38 mm/ ***1.50"***	***0.375"***		**2033123**	**2033124**
17 mm/ ***0.670"***	8 mm		**2033125**	**2033126****
38 mm/ ***1.50"***	8 mm		**2033127**	**2033128**

* *dependent on standard or reduced range selected. Standard range shown.*

** *Long Range Indicator Stem Length is 0.870" / 22 mm*

Maxμm® *III* Digital Comparator

Technical Data

Maxμm® *III* Remote Indicating Unit*

	Order no.
No Digital Output Port	**2033001**
Digital Output -6 pin (D, E1)	**2033011**
Digital Output with Hold & Reset -10 pin (E2)	**2033021**

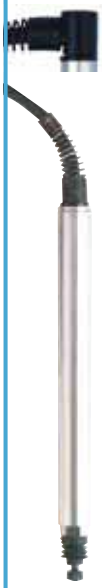
** Maxμm® III Remote Indicating Units are NOT compaitible with traditional Remote Transducer models EAS-XXXX.*

Maxμm® *III* Digital Transducer①

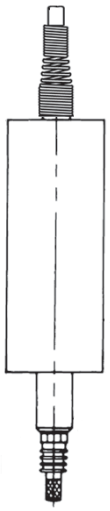
Digital Transducers	Short Range	Long Range
Range	±1.00 mm/ ***±.040"***	±1.99 mm/ ***±.100"***
Total Spindle Travel	3.04 mm/ ***.120"***	6.35 mm/ ***.250"***
Pre-Travel**	0.3 mm/ ***.010"***	0.5 mm/ ***.020"***
Over-Travel**	0.8 mm/ ***.030"***	
Gaging Force	3-4 oz / 85-112 grams, preloaded	
Operation Temperature	10° to 55°C/50° to 130°F	
Storage Temperature	-20° to 65°C/-4° to 149°F	
Contact Point	(Normally furnished — PT-223) for ***0.375"*** dia. Stem, ***0.250"*** long, radiused tip, 4-48 thread; (EPT-1037-W1) for 8mm dia. Stem, 6mm long, radiused tip, M2.5 thread.	

*** dependent on standard or reduced range selected. Standard range shown.*

Transducer Type	Stem Length	Stem Diameter	Order no. Short Range	Order no. Long Range
Canister	17 mm/ ***0.670"***	***0.375"***	**2033091**	**2033092②**
Canister	38 mm/ ***1.50"***	***0.375"***	**2033093**	**2033094**
Canister	17 mm/ ***0.670"***	8.0 mm	**2033095**	**2033096②**
Canister	38 mm/ ***1.50"***	8.0 mm	**2033097**	**2033098**
Pencil	Body Diameter = ***0.375"***		**2033099**	—



Pencil



Canister

① Digital Transducer models 203309X require an adaptor cable for use with traditional DEI-XXXXX Maxum and Maxum Plus Indicxating Units.

② Long Range Indicator Stem Length is 0.870" / 22 mm.
See Adaptor Cable selections as follows:

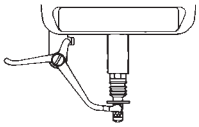
Adaptor Cables	Order no.
For DEI with 6 pin split connector	**2239080**
For DEI with 8 pin round connector	**2239081**

- Maxμm® and Maxμm Plus Transducers are available as Replacement Parts. Refer to Part Price List for Part Numbers and Pricing.
- Maxμm *III* Remote Indicating units sold separately from Digital Transducer.
- Any Digital Transducer may be used with a Maxμm *III* Remote Indicating unit.
- For English or Metric Contact Points visit pages 5-22, 5-27 and 5-52 thru 5-53.
- For alternate cable lengths or extension cables - call Mahr Federal's Technical Assistance Group.
- For special indicator options - call Mahr Federal's Technical Assistance Group.

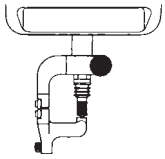
Maxμm® /// Digital Comparator

Accessories

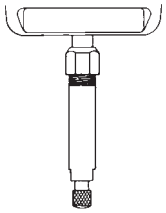
For Integral Maxμm® Indicators



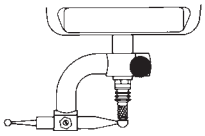
Lifting Levers[1)]
Furnished with washer and longer contact point. Left Hand (shown)
Order no. **EAS-1903***
Right Hand (not shown)
Order no. **EAS-1904**



Right Angle Attachments
Lever Type (not shown)
(± .187" maximum range)
Order Model **EAT-1034-W1**
Spring Type (shown)
(± .060" maximum range)
Order Model **EAT-1035-W1**



Auxiliary Plunger
3" long, .500" O.D.
Order no. **EAS-1912**



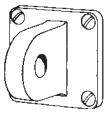
Hole Attachments
Short Lever (shown)
(1.0" pivot to contact)
Order Model **EAT-1032-W1**
Long Lever (not shown)
(1.87" pivot to contact)
Order Model **EAT-1033-W1**

[1)] *(For use on .670" stem length only, DEI-XX1X1)*
* *Not for (±.100" / 1.99 mm*

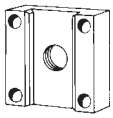
Ox-Bow Lifting Lever
Order no. **LR-40**

* *Other Accessories shown are for .375" stem models. Equivalent types are available for most Maxμm models having 8mm stems. Adaptor Bushing (BU-197) may also allow 8mm stem indicators to be used with the above accessories. Full size Maxμm Indicator and accessories tracing templates are available on request.*

Backs for Maxμm® Indicators and Remote Indicating Units (Supplied with mounting screws)



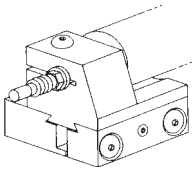
Lug Back (.250" hole)
Mounts horizontally or vertically.
Order no. **EBK-1006**



Adjustable Slide Back
(.500" slot, 1/4-20 thread)
Order no. **EBK-1007**

Rack Back
Fits SE-33 (shown) and SE-73. Adjustable Mounting Block (not shown).
Order no. **EBK-1005**

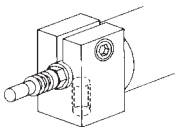
Replacement Screws
2-56 x .218"
Order no. **ESW-1252**



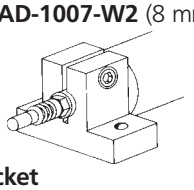
Rack Bracket (Shown mounted to SE-33 Adjustable Mounting Block.)

SE-33 and SE-73 Adjustable Mounting Blocks are available separately. SE-33 is supplied with hex-screw adjust. SE-73 is supplied with knob adjust.

Order Model EAD-1007-W1 (.375" I.D.)
Order Model EAD-1007-W2 (8 mm I.D.)



Square Bracket
(1/4-20 mounting thread)
Order Model **AAD-67**



T Bracket
Flange mounted.
Order Model **AAD-91**

* *Mounting Brackets shown are for .375" stem models. Equivalent types are available for most Maxμm models having 8 mm stems. Adaptor Bushing (BU-197) may also allow 8 mm stem indicators to be used with the above accessories. Full size Maxμm Indicator and accessories tracing templates are available on request.*

Other Maxμm Accesssories	**Order no.**
Data Output Cables for Maxμm ///	
Serial Cable (6 pin to db9 pinF PC)	**2239036**
Serial Cable (10 pin to db9 pinF PC)	**2239038**
Digimatic Cable (6 pin to std 10 pin)	**2239035**
Digimatic Cable (10 pin to std 10 pin)	**2239037**
Send Data Footswitch used with Serial Cables above.	**300-50**
Mating Connectors — Maxμm /// Models	
For 6 pin data output type (D, E1)	**ECN-1521**
For 10 pin data output type (E2)	**ECN-1689**
Remote Switch Assembly (for Hold/Reset)	
Handswitch	**EAS-2867**
Footswitch	**EAS-2868**
Splashcover for Maxμm ///	**ECV-1307-W1**
Battery for Maxμm ///	**2239138**
Overlay Kit for Maxμm ///	**2239040**
Access Key (6 pin)	**2240545**
Access Key (10 pin)	**2240547**

Millimess. Dial Comparators

Overview

Models

Metric	1000 A	1000 B	1002	1003	1003 XL	1004*
						
Measuring range	± 100 µm	± 50 µm	± 25 µm	± 50 µm	± 130 µm	± 0.13 mm
Readings	1 µm	1 µm	0.5 µm	1 µm	2 µm	5 µm
Dial style	100-0-100	50-0-50	25-0-25	50-0-50	130-0-130	130-0-130
Accuracy*	Factory standard	Factory standard	DIN 879-1	DIN 879-1	DIN 879-1	Factory standard
G_{ges}	2 µm	2 µm	0.6 µm	1.2 µm	2.4 µm	4 µm
G_e	1.5 µm	1.5 µm	0.5 µm	1 µm	2 µm	3.5 µm
f_u	1 µm	1 µm	0.3 µm	0.5 µm	1 µm	1 µm
G_t	0.7 µm	0.7 µm	0.4 µm	0.7 µm	1.4 µm	3 µm
r	0.5 µm	0.5 µm	0.3 µm	0.5 µm	1 µm	1 µm
Order no. Standard	**4338000**	**4339000**	**4335000**	**4334000**	**4334001**	**4333000**
Order no. Waterproof IP54			**4335005**	**4334005**	**4334006**	**4333005**

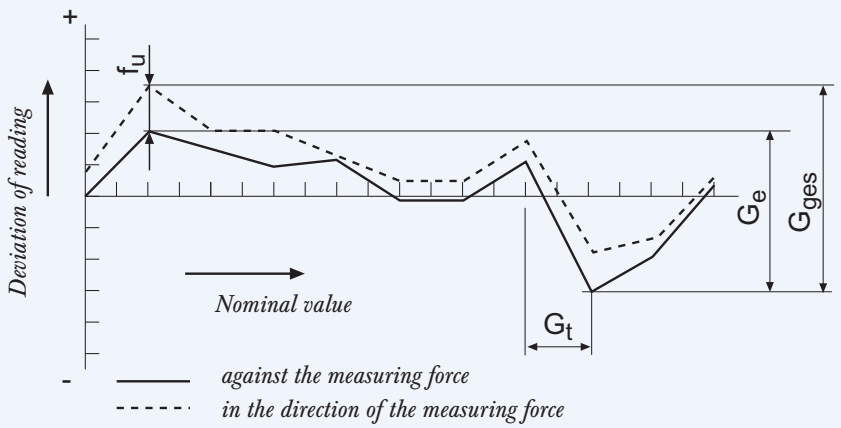
Inch	1000 Z	1002 Z	1003 Z		1004 Z
Measuring range	***±.0020"***	***±.0010"***	***±.0020"***		***±.0050"***
Readings	***.00005"***	***.00002"***	***.00005"***		***.0001"***
Dial style		***.001-0-.001***	***.002-0-.002***		***.005-0-.005***
Accuracy	Factory standard	Factory standard	Factory standard		Factory standard
G_{ges}	***.0001"***	***.000025"***	***.00006"***		***.00012"***
G_e	***.000075"***	***.00002"***	***.00005"***		***.0001"***
f_u	***.00005"***	***.00001"***	***.000025"***		***.00003"***
G_t		***.000014"***	***.000035"***		***.00005"***
r		***.00001"***	***.000025"***		***.00003"***
Order no. Standard	**4339900**	**4335900**	**4334900**		**4333900**
Order no. Waterproof IP54		**4335905**	**4334905**		**4333905**

* *Accuracy of 1004, 1010, 1010 Z, 1050 exceeds DIN 879-1*
** *Accuracy of 1104 N, 1110 N and 1150 N exceeds DIN 879-3*

1010*	1050*	1103 N	1104 N**	1110 N**	1150 N**
					
± 0.25 mm	± 1.5 mm	± 50 µm	± 0.13 mm	± 0.25 mm	± 1.5 mm
0.01 mm	0.05 mm	1 µm	5 µm	0.01 mm	0.05 mm
25-0-25	15-0-15				
Factory standard	Factory standard	DIN 879-3	Factory standard	Factory standard	Factory standard
8 µm	40 µm	1.8 µm	6 µm	12 µm	60 µm
7 µm	35 µm	1 µm	5 µm	6.5 µm	35 µm
2 µm	10 µm	1 µm	1.5 µm	3.5 µm	17 µm
4 µm	24 µm	1 µm	3.5 µm	5 µm	25 µm
2 µm	10 µm	1 µm	1.5 µm	0.5 µm	17 µm
4332000	**4330000**	**4345100**	**4344100**	**4343100**	**4342100**
4332005	**4330005**	**4345105**	**4344105**	**4343105**	**4342105**

1010 Z	
± .0100"	
.0005"	
.01-0-.01	
Factory standard	
.0004"	
.00035"	
.0001"	
.00025"	
.0001"	
4332900	
4332905	

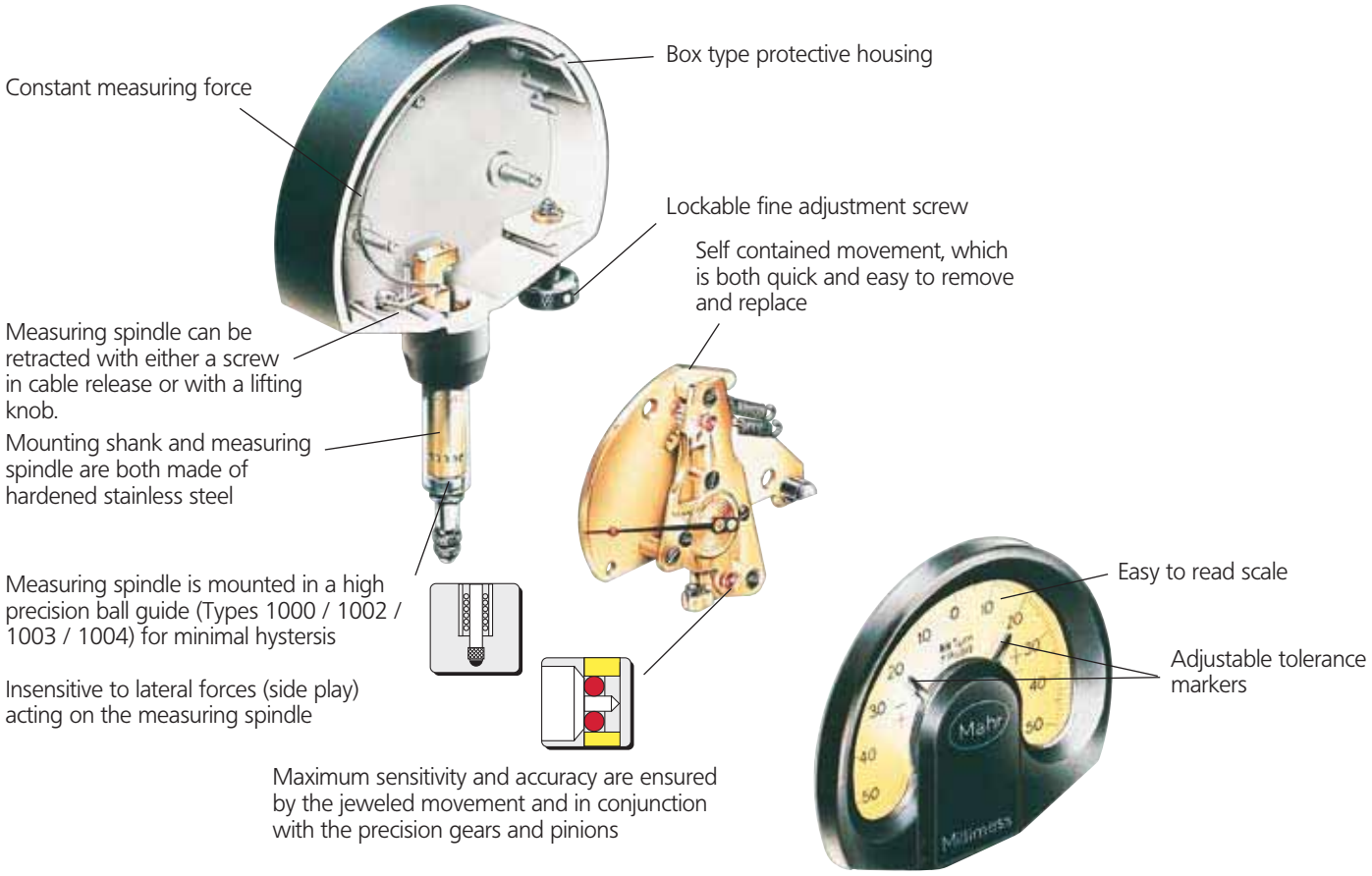
Metrological characteristics



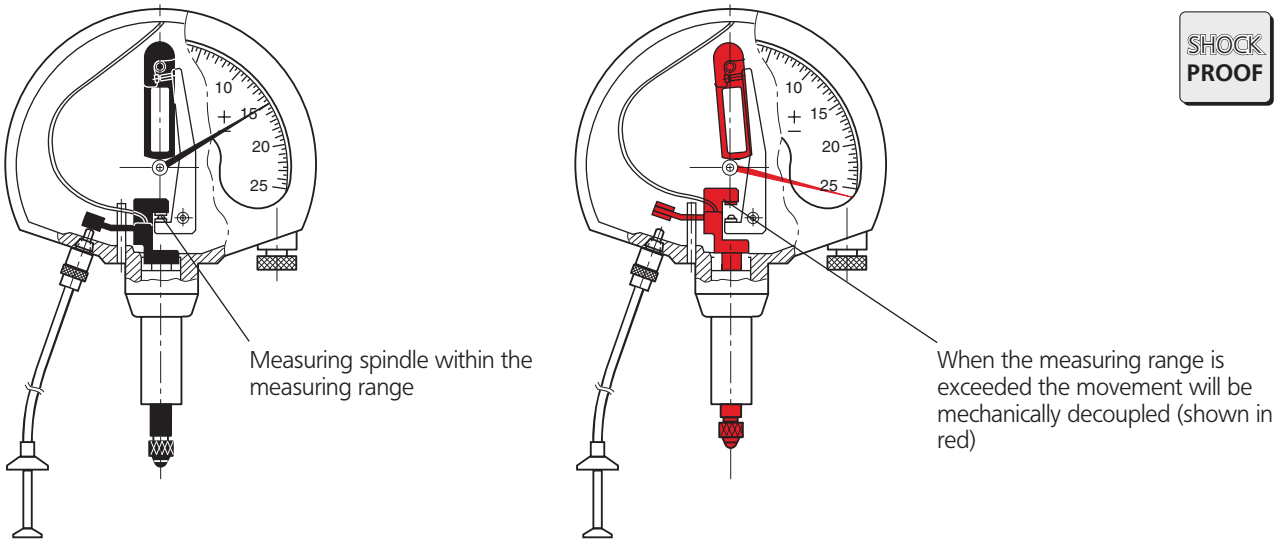
Millimess. Dial Comparators

Overview

Design Features



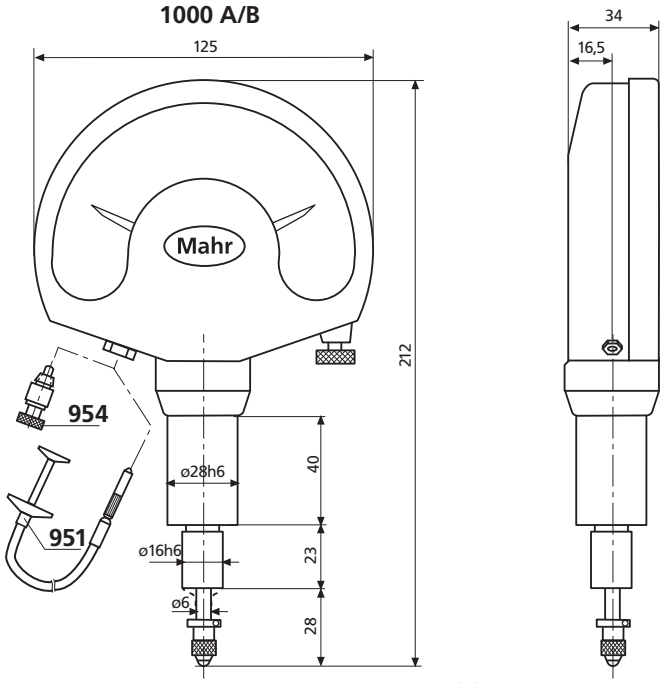
Shockproof Mechanism



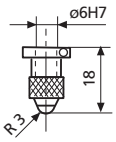
Mechanical Dial Comparator Large Type Millimess

1000 A

1000 A/B



921



Features

- Large design
- Easy to read dial
- Shockproof movement
- Jeweled movement bearings
- Measuring spindle is mounted in a high-precision ball guide which precludes play
- Supplied with: Cable Release 951, case

Accessories

		Order no.
Contact Points		
with Steel ball	**921**	**4362001**
with Ruby ball	**921 R**	**4362002**
Cable Release to raise the measuring spindle	**951**	**4372000**
Lifting Knob for lifting the measuring spindle	**954**	**4372030**
Rubber Bellows to seal the open end of the measuring spindle		**4338008**
Additional Accessories		**Page**
Precision Stand	**824 GT**	8-13

Technical Data

Metric	Measuring range	Reading	Scale division	Over-travel	Measuring force	Order no.
1000 A	± 100 µm	1 µm	1 mm	4 mm	3.5 N	**4338000**
1000 B	± 50 µm	1 µm	2 mm	4 mm	3.5 N	**4339000**
Inch						
1000 Z	***± .0020"***	***.00005"***	***.08"***	***.2"***	3.5N	**4339900**

Mechanical Dial Comparators

1003

DIN 879-1

1004

1002

DIN 879-1

1003XL

DIN 879-1

1003T**

DIN 879-1

IP54

Technical Data

Metric	Measuring range	Readings	Over-travel	Measuring force	Order no. Standard*	Order no. Water-proof**
1002 Supramess	± 25 µm	0.5 µm	2.8 mm	1 N	**4335000**	**4335005**
1003 Millimess	± 50 µm	1 µm	2.8 mm	1 N	**4334000**	**4334005**
1003 Millimess XL	± 130 µm	2 µm	2.5 mm	1 N	**4334001**	**4334006**
1004 Compramess	± 0.13 mm	5 µm	2.5 mm	1 N	**4333000**	**4333005**
1010 Zentimess	± 0.25 mm	0.01 mm	2.5 mm	1 N	**4332000**	**4332005**
1050 Dezimess	± 1.5 mm	0.05 mm	0.3 mm	1 N	**4330000**	**4330005**
Inch						
1002 Z Supramess	***±.0010"***	***.00002"***	***.11"***	1 N	**4335900**	**4335905**
1003 Z Millimess	***±.0020"***	***.00005"***	***.11"***	1 N	**4334900**	**4334905**
1004 Z Compramess	***±.0050"***	***.0001"***	***.10"***	1 N	**4333900**	**4333905**
1010 Z Zentimess	***±.0100"***	***.0005"***	***.10"***	1 N	**4332900**	**4332905**

* *Incl. Plastic Case; Adapter 940 (for inch instruments only)*

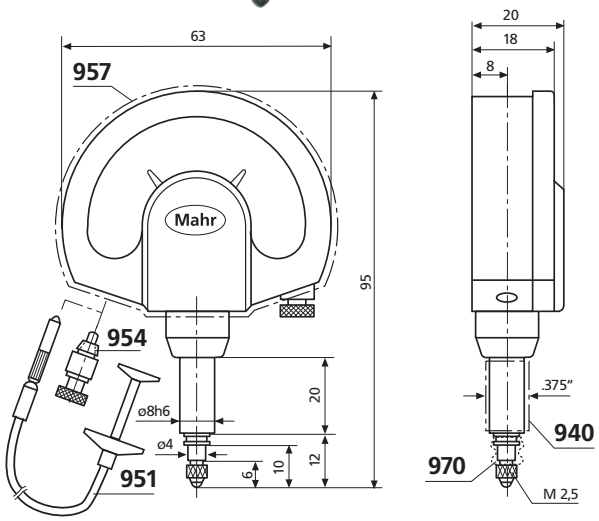
** *IP54, Incl. Plastic Case, Splash Guard Cover 957, Rubber Bellows (only for 1002/1003/1004); Adapter 940 (for inch instruments only)*

Mechanical Dial Comparators

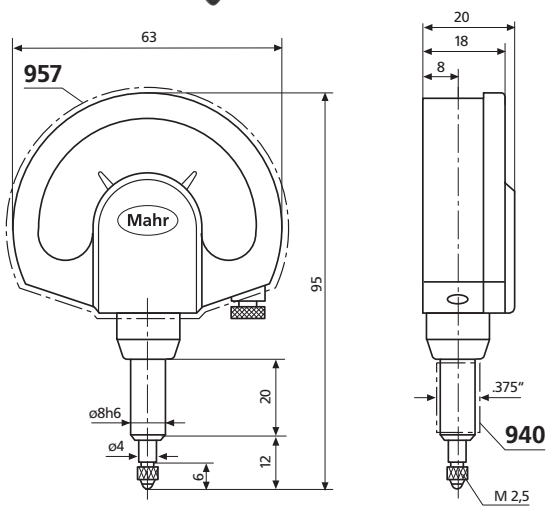
1010

1050

SHOCK PROOF



1002/1003/1004

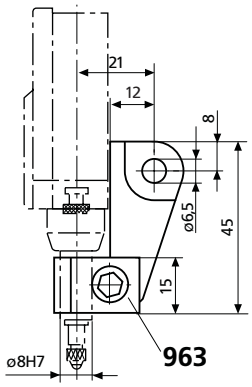


1010/1050

Accessories

		Order no.
Adapter Bush for adapting mounting shank 8h6 mm to inch bore .375"	**940**	**4310103**
Cable Release to raise the measuring spindle	**951**	**4372000**
Lifting Knob for lifting the measuring spindle	**954**	**4372030**
Splash Guard Cover	**957**	**4373030**
Rubber Bellows for 1002/1003/1004 to seal the open end of the measuring spindle	**970**	**4334786**
Mounting Lug to mount on mounting shank 8h6 mm	**963**	**4375002**

Additional Accessories		Page
Contact Points	**901-913**	5-52
Special Holder	**941**	5-52
Sensor Lever	**943**	5-53



Mechanical Dial Comparators and Electrical Comparator with limit contacts

1103 N

DIN 879-3

1103 NT**

DIN 879-3

IP54

1104 N

1110 N

1150 N

1100

Features

- Can be applied for example as tolerance control or as a precision contactor in automatic control systems
- Design features are identical with Mechanical Dial Comparators, but with the addition of adjustable limit contacts; made from high-grade precious metal
- Limit contacts are particularly well protected against vibration and mechanical overload

Technical Data

Metric		Measuring range	Readings	Over-travel	Measuring force	Order no. Standard*	Order no. Waterproof**
1103 N	Elmillimess	± 50 µm	1 µm	2.8 mm	2 N	**4345100**	**4345105**
1104 N	Elcompramess	± 0.13 mm	5 µm	2.5 mm	2 N	**4344100**	**4344105**
1110 N	Elzentimess	± 0.25 mm	0.01 mm	2.3 mm	2 N	**4343100**	**4343105**
1150 N	Eldezimess	± 1.5 mm	0.05 mm	0.3 mm	1.5 N	**4342100**	**4342105**
Inch							
1103 NZ	Elmillimess	***±.0020"***	***.00005"***	***.11"***	***2 N***	**4345910**	**4345915**
1104 NZ	Elcompramess	***±.0050"***	***.0001"***	***.10"***	***2 N***	**4344910**	**4344915**
1110 NZ	Elzentimess	***±.0100"***	***.0005"***	***.10"***	***2 N***	**4343910**	**4343915**

		Measuring range	Overtravel	Measuring force	Order no.
1100	Elmess	± 0.4 mm	2 mm	1.5 N	**4340000**

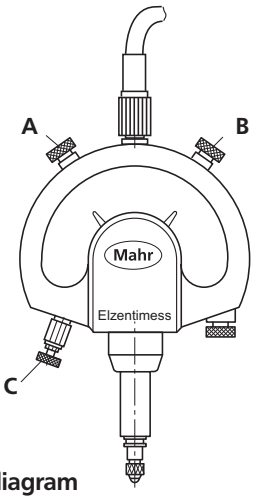
* *Incl. Plastic Case, Setting Knob 953, Cable (1.2m); Adapter 940 (for inch instruments only)*

** *IP54, Incl. Plastic Case, Splash Guard Cover 957, Rubber Bellows (only for 1103/1110); Adapter 940 (for inch instruments only)*

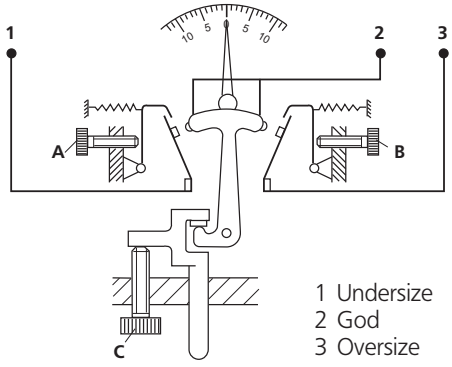
Mechanical Dial Comparators and Electrical Comparator with limit contacts

Electrical Specifications

	Contact uncertainty with non-inductive load of 10 mA/24V	max. contact rating	max. contact voltage	max. contact current
1103 N	+/- 0.3 µm			
1104 N	+/- 0.75 µm			
1110 N	+/- 1.5 µm	240 mW	24 V	100 mA
1150 N	+/- 7 µm			
1100	+/- 0.3 µm			

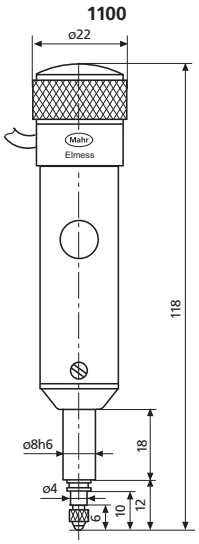


Wiring diagram

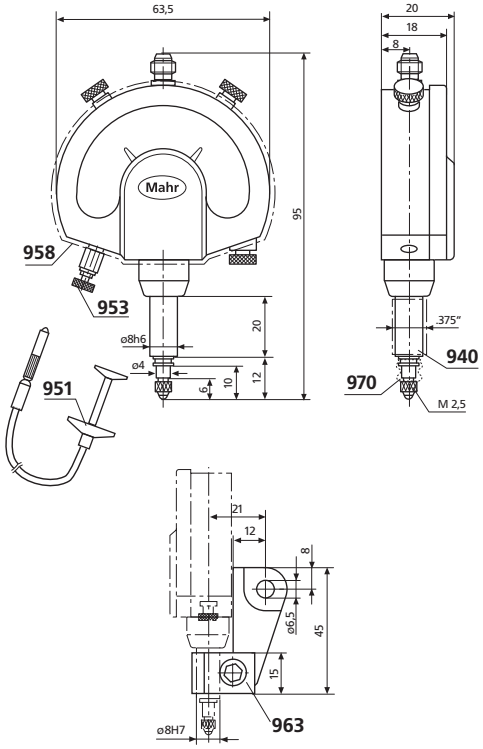


1 Undersize
2 God
3 Oversize

1100



1103/1104/1110/1150



Accessories

		Order no.
Connection Cable (1.2 m), axial		**4345695**
Connection Cable (5 m), axial		**4345694**
Adapter Bush for adapting mounting shank 8h6 mm to inch bore .375"	**940**	**4310103**
Cable Release to raise the measuring spindle	**951**	**4372000**
Setting Knob for setting the limit contacts without an additional setting standard	**953**	**4372020**
Lifting Knob for lifting the measuring spindle	**954**	**4372030**

		Order no.
Splash Guard Cover	**958**	**4373031**
Rubber Bellows to seal the open end of the measuring spindle	**970**	**4334786**
Mounting Lug to mount on mounting shank 8h6 mm	**963**	**4375002**

Additional Accessories		**Page**
Contact Points	**901-913**	5-52
Special Holder	**941**	5-53
Sensor Lever	**943**	5-53

COMPLEX MEASURING TASKS BROUGHT STRAIGHT TO THE POINT.
MILLIMAR

The latest information on MILLIMAR products can be found on our website:
www.mahr.com, WebCode 153

► | The requirements for electrical length measuring instruments are almost as broad as their scope of application. Reliability, precision as well as simple operation are the major demands, Millimar compact and column measuring instruments fulfill all these demands and requirements.

Millimar probes are the most influential components of a measurement chain. Their characteristics determine the quality of the entire measurement; depending upon the type of application we have the corresponding probe for your requirements. For example; a Millimar Inductive Probe: robust, versatile and has an attractive price, or a Millimar Incremental Probe which is ideal over a large measuring range and has a small linearity error over the entire measuring range. | ◄

► | Millimar. Electrical Length Measuring Instruments and Air Gaging

Millimar. Electrical Length Measuring Instruments

Overview

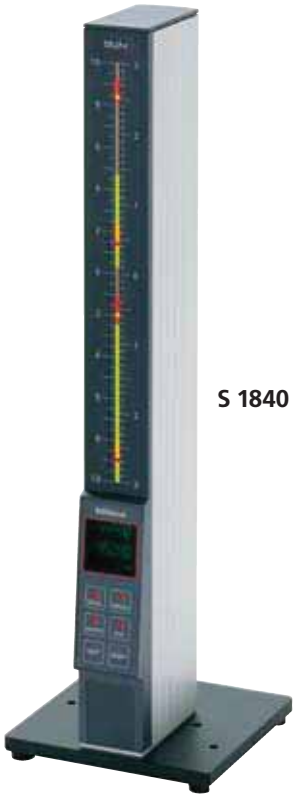
Evaluation Instruments

C 1216

- Compact, handy and simple to operate
- Extremely precise and easy to read due to the clearly defined analog of digital display
- Single, sum and differential measurement; plus limit switches and extreme value memories

C 1245

- Highly accurate, long term stability and insensitive to environmental influences
- Good zero stability even when changing the measuring range
- Short response time ideal for assessment of fast processes
- Analog or digital display



S 1840

- Digital output for the connection to a controller or a computer
- Analog output (optional)

Inductive Probes

- Large linearity range, strong output signal and insensitive to interference
- Precise measuring spindle and lever, frictionless ball or spring bearing for the highest resolution with the lowest hystersis
- Robust construction for use on the shop floor, further models for all applications

P1300M

Incremental Probes

- Highly accurate due to the precision glass scale
- Large measuring range with high resolution for absolute measurement
- Pneumatically cushioned measuring spindle lifter

P1526

Millimar. Electrical Length Measuring Instruments

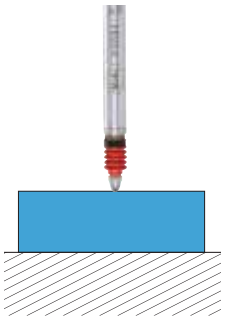
Applications with Inductive Probes

Single measurement with one probe

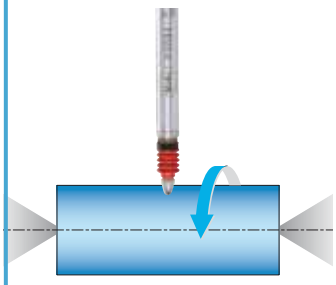
Indicating instrument instantly displays the measured value.

- Used for all kinds of direct measurements on cylindrical and flat work pieces
- Applied in the same way as with digital / dial indicators, digital / dial comparators or test indicators

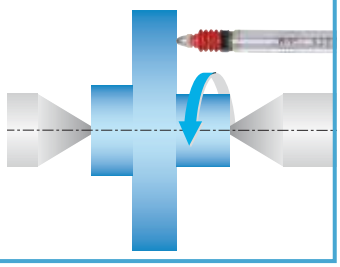
Thickness measurement



Radial run-out



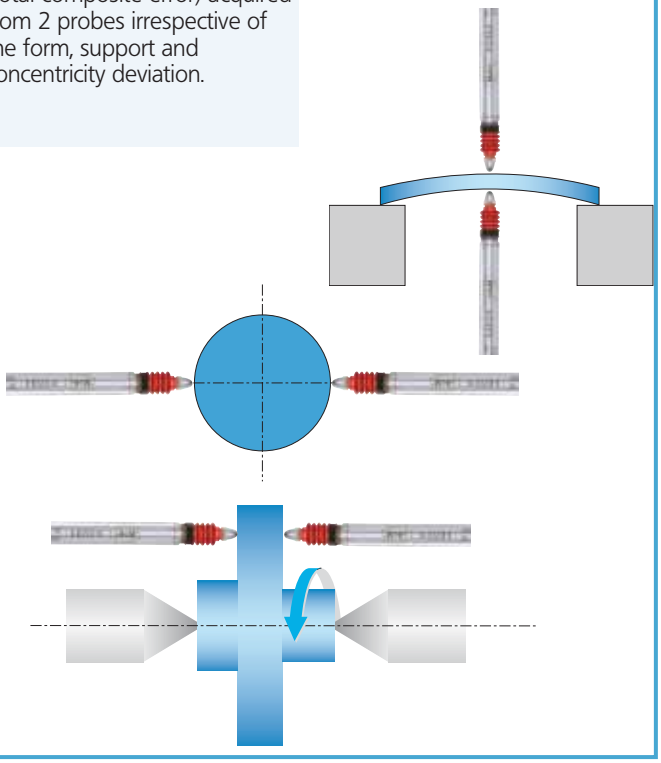
Axial run-out



Sum measurement with 2 probes

Indicates the sum of deviation (total composite error) acquired from 2 probes irrespective of the form, support and concentricity deviation.

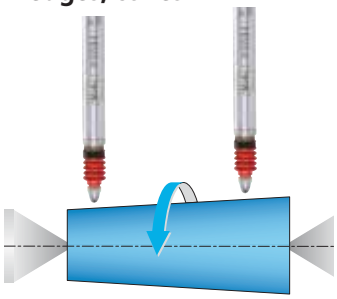
Thickness measurement



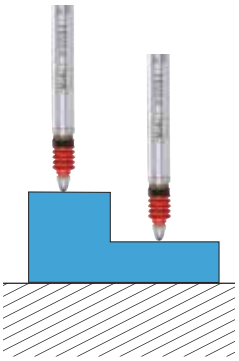
Difference measurement with 2 probes

Shows the difference between the measured values acquired by 2 probes irrespective of the absolute dimension of the test piece. This is particularly suitable for dimensional comparison of two test points.

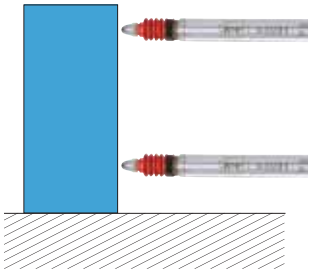
Form measurement of wedges, cones



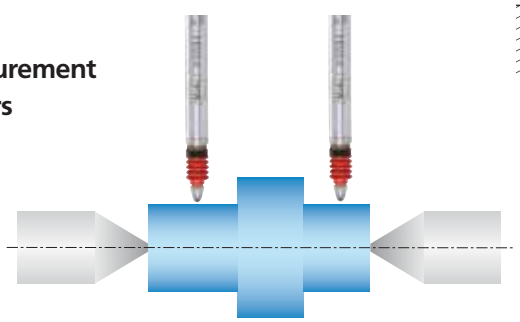
Height difference between 2 steps



Perpendicularity measurement



Concentricity measurement on 2 shaft diameters



Millimar. Electrical Length Measuring Instruments

Inductive Probe Program

P2000-Series

P2001 P2004 P2010 A P2104 A

- Available in all prominent compatibilities (Mahr, Mahr-Federal, Tesa, Marposs)
- Wide product spectrum; measuring ranges from 1 to 10 mm plus models with a compressed air (pneumatic) lifter or with vacuum retraction
- With rotary stroke bearings (except P2001)
- High linearity over the total measuring range
- Excellent electromagnetic shielding (EMC)
- All probes (except P2001) can be easily converted from axial to radial by mounting a slip on cap, included in the scope of supply

Page 7-10

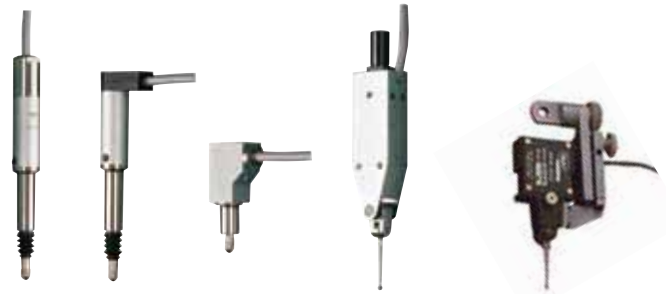
P1300-Series / 1300 / 1310 Series (Mahr-Half Bridge)

P1300MA P1300MB 1300 1310

- Well-proven and established Mahr-Half Bridge technology
- Easy to service. cable and Probe can be seperated via the plug-in connector (P1300)
- Simple to change to pneumatic lifting (P1300)
- Measuring spindle runs in rotary stroke bearings
- Compact design (1300)

Page 7-6, 7-14

1301 / 1303 / 1304 K / 1318 (Mahr-LVDT) / EHE-Series (Federal-LVDT)



1301 1303 1304 K 1318 EHE-2056

- Extremely robust in all operating conditions; measuring system is offset to guide and mounting shank
- Excellent clamping characteristics
- Measuring spindle runs in rotary stroke bearings (except 1318)
- Measuring spindle can be lifted with a cable release (1301/1303)
- Gaging pressure is less than 4g / .14 oz in either direction, with a change of less than 0.1 g per 25 µm / .0001" of contact travel and linearity of 0.1% over the full range ±0.250 mm ± .010", also clutch-mounted contact swivels through 280° arc for easy positioning (EHE-Series)

Page 7-16

1340 Mahr High Precision Probe

1340

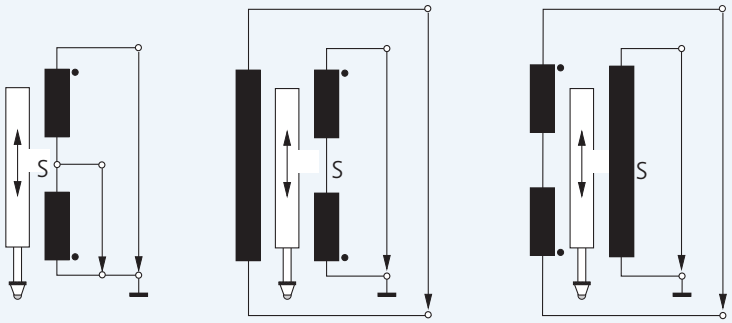
- To obtain the best results use in conjunction with Millitron 1240
- Unprecedented measuring accuracy and minimum linearity error < 0.01 %, i.e. 0.4 µm over the total measuring range

Page 7-22

General Technical Data of Inductive Probes

The measuring principle of inductive probes is based on the change of position of a magnets conductive core moving within a coil system, generally this is distinguished between a half bridge and LVDT's.

The Mahr P2000 series of probes applies a high linear, patented VLDT transducer which is similar to an LVDT transducer. This also operates according to a differential transformer principle.

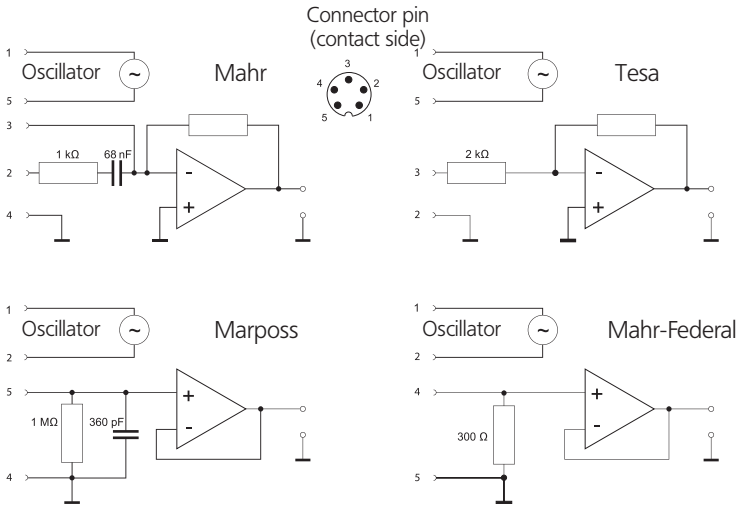


Half Bridge HB (Differential Choke Coil) | LVDT (Linear Variable Differential Transducer) | VLDT (Very Linear Differential Transducer)

Electrical specification of various compatibilities

		Type	Mahr	Tesa	Marposs	Mahr-Federal
Carrier frequence	KHz		19.4	13	7.5	5
Sensitivity	mV/V/mm	P2001 P2004 P2104	192	73.75	115	78.74
		P1300 1300 1301 1303 1304 K 1318	192	–	–	–
		P2010	19.2	29.5	11.5	7.874
		1310	19.2	–	–	–
Amplitude	Veff		5	3	3.5	2

Schematic drawings of Mahr input amplifers according to the various compatibilities

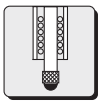


Millimar P1300 M

▶| The new Inductive Probe **Millimar** P1300 M.
The Plug and Play Probe: Cable and Probe can be separated with the plug-in connector. High linearity due to sensitivity compensation in the probe. |◀

High linearity due to the probe being able to compensate sensitivity.

Pneumatic Lifter can be fitted to any standard probe (standard accessories).
Simply fasten and unfasten an air hose.



Rotary stroke bearings
Insensitive to lateral forces acting upon the spindle

Sealing bellow is made from Viton which has a **excellent chemical resistance**.

Especially suited for use in critical manufacturing environments. Probe and cable connector are water proof **IP64** according to IEC 60529

Code Initial	IP	International Protection
First Numeral	6	Dust tight
Second Numeral	4	Protected against splash water from all directions

Extremely easy to service
Cable and Probe can be separated via the plug-in connector.

Advantages of a probe with a plug-in connector:

Service incident	P1300	Standard Probe
Cable break 	Only the cable has to be replaced. **Advantage:** a) Shorter downtime of manufacturing equipment as the probe does not need to be newly installed and adjusted. b) Inexpenisve, as only the cable has to be replaced and not the complete probe.	The complete probe must be removed from the fixture and replaced. **Disadvantage:** a) Longer downtime as the probe must be newly installed, set-up and adjusted. b) Expensive as the complete probe must be replaced.
Defective probe e.g. collision with workpiece 	Only the probe has to be replaced. **Advantage:** The cable does not need to be removed from the cable guide or the cable harness	The complete probe including the cable must be replaced. **Disadvantage:** The cable must be dismounted from the cable guide or the cable harness.

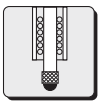
Inductive Probe Millimar P1300 M Half Bridge

Features

- Supplied with:
  Inductive Probe P1300
  Connection cable 2.5 m
  Screwed sealing plug
  Hose connector for compressed air
  Open-ended spanner
  Operating instructions

P1300 MA

P1300 MB



Cable and probe can be seperated with the plug-in connector.

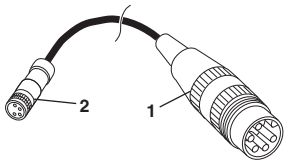
Technical Data

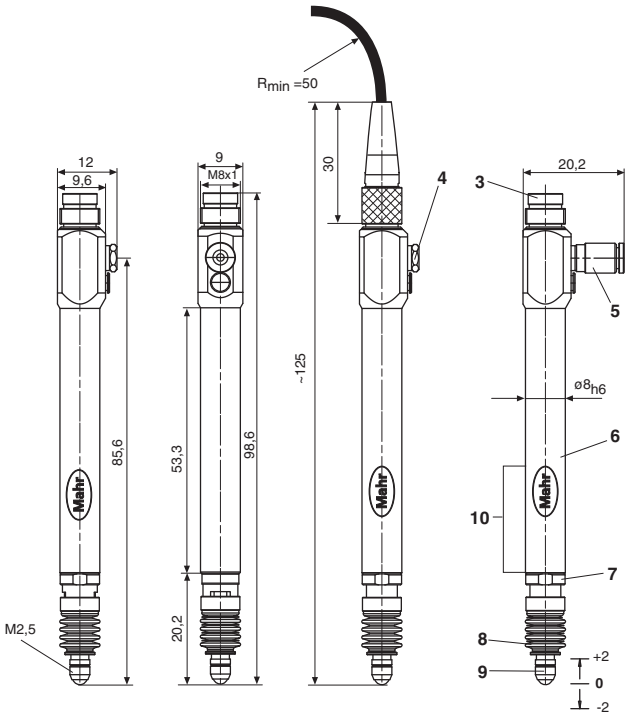
Probe type	**P1300 MA**	**P1300 MB**
Measuring range	± 2.0 mm / ***± 0.079"***	
Distance of lower stop[1)]	-- 2.2 . . . 0 mm / ***-0.09 . . . 0"***	
Distance of upper stop[1)]	2.2 . . . 4.4 mm / ***0.09 . . . 0.173"***	
Lifter/Retraction	Vacuum Lifter (Standard option)	Compressed Air Retraction (max. 1 bar)
Measuring force at electrical zero point	0.75 N / ± 0.15 N[2)]	depending upon air pressure
Increase in measuring force	0.3 N / mm	–
Sensitivity deviation	0.3 %	
Repeatability fw	0.1 µm / ***4 µin***	
Hysteresis fu	0.5 µm/ ***20 µin***	
Linearity deviation with revised sensitivity		
within range ± 0.5 mm	0.4 µm/ ***16 µin***	
within range ± 1.0 mm	1.5 µm/ ***60 µin***	
within range ± 2.0 mm	3.0 µm/ ***120 µin***	
Protection class according to IEC 60529	IP64	
Length of cable	2.5 m / 8 ft (detachable)	
Compatibility - Mahr	Half Bridge	
Order no.	**4400180**	**4400181**

1) Relative to the electrical zero point. Adjustable; lower and upper stops are simultaneously adjusted
2) Measuring force springs are interchangeable, following measuring force springs are available (0.25; 0.5; 1; 1.25; 1.5 N)

Inductive Probe Millimar P1300 M Half Bridge

1 Connection jack for an evaluation instrument
2 Connecting plug for the probe
3 Socket
4 Screw sealing plug SW 4.6
5 Hose connector for compressed air (external diameter 3 mm)
6 Mounting shank
7 Locking nut
8 Sealing bellows
9 Contact point 901 H
10 Preferred clamping area





All dimensions and values are metric

Individual Components and Accessories P1300M

P1300 MA

Connector for the air hose (90°)

Connection cable 2.5 m / 8 ft

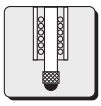
P1300 MB

	Order no.
P1300 MA without cable	**4400182**
P1300 MB without cable	**4400183**
Hose connector for compressed air 90°	**4400238**
Cable for P1300 M 2.5 m / 8 ft	**4885220**
Cable for P1300 M 5 m / 16 ft	**4885259**
Cable for P1300 M 10 m / 20 ft	**4885260**
Sealing bellows for	
P1300 MA	**7021546**
P1300 MB	**7028220**

	Order no.
Measuring force springs[1] for P1300 MA	
0.25 N	**7026827**
0.50 N	**7026827**
0.75 N	**7026828**
1.00 N	**7026849**
1.25 N	**7025579**
1.50 N	**7025505**

1) All measuring forces (except 0.25 N) including the sealing bellows have a measuring spring force of approx 0.25 N at zero point.

Inductive Probe Millimar P2000-Series



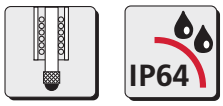

Technical Data

Probe type	**P2001**	**P2004**	**P2004 A**	**P2004 B**
Measuring range	± 0.5 mm / **± 0.020"**		± 2.0 mm / ***± 0.079"***	
Distance of lower stop[1)]	–		- 2.2 ... 0 mm / ***-0.09 ... 0"***	
Distance of upper stop[1)]	–		2.2 ... 4.4 mm / ***0.09 ... 0.173"***	
Lifter/Retraction	–	–	Vacuum lifter	Compressed air (max. 1 bar)
Measuring force at the electrical zero point	0.75 N ± 0.15 N	0.75 N [2)] ± 0.15 N	0.75 N [2)] ± 0.15 N	depending on air pressure
Increase in measuring force	0.1 N / mm	0.2 N / mm	0.2 N / mm	–
Sensitivity deviation	0.3 %		0.3 %	
Repeatability f_w	0.15 µm / ***6 µin***		0.1 µm / ***4 µin***	
Hysteresis f_u	0.2 µm / ***8 µin***		0.5 µm / ***20 µin***	
Linearity deviation with corrected sensitivity				
within range ± 0.1 mm	0.6 µm		–	
within range ± 0.5 mm	1.5 µm/ ***60 µin***		0.4 µm/ ***16 µin***	
within range ± 1.0 mm	–		1.5 µm/ ***60 µin***	
within range ± 2.0 mm	–		3.0 µm/ ***120 µin***	
Protection class according to DIN VDE 0470 Part 1 / EN 60529	IP40		IP64	
Cable length	2.5 m / 8 ft [3)]		2.5 m / 8 ft [3)]	

Order no.	**P2001**	**P2004**	**P2004 A**	**P2004 B**
Compatibility - Mahr	**5323040**	**5323010**	**5323020**	**5323030**
Compatibility - Tesa	**5323041**	**5323011**	**5323021**	**5323031**
Compatibility - Marposs	**5323043**	**5323013**	**5323023**	**5323033**
Compatibility - Federal	**5323044**	**5323014**	**5323024**	**5323034**

[1)] *Relative to the electrical zero point. Adjustable; lower and upper stops are simultaneously adjusted*
[2)] *Measuring force springs are interhangeable, additional measuring force springs are available (0.25; 0.5; 1; 1.25; 1.5 N)*
[3)] *Extension cables are available, see accessories*

Inductive Probe Millimar P2000-Series



Technical Data

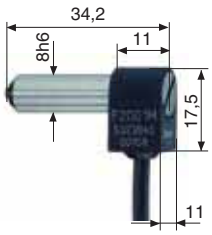
Probe type	**P2010 A**	**P2010 B**	**P2104 A**	**P2104 B**
Measuring range	± 5.0 mm / ***± 0.197"***		± 2.0 mm / ***± 0.079"***	
Distance of lower stop	- 5.3 mm / ***- .20"***	- 5.3 mm / ***- .20"***	-- 2.2 .. .0 mm / ***-0.09 . . . 0"*** [1]	
Distance of upper stop	+ 5.3 / ***+ .20"***	+ 5.3 / ***+ .20"***	8.4 . . . 10.4 mm / ***-0.33 . . . 0.41"*** [1]	
Lifter/Retraction	Vacuum lifter	Compressed air (max. 1 bar)	Vacuum lifter	Compressed air (max. 1 bar)
Measuring force at the electrical zero point	0.75 N ± 0.15 N [2]	depending on air pressure	0.75 N ± 0.15 N [2]	depending on air pressure
Increase in measuring force	0.1 N / mm	–	0.1 N / mm	–
Sensitivity deviation	0.3 %		0.3 %	
Repeatability f_w	0.2 µm / ***8 µin***		0.2 µm / ***8 µin***	
Hysteresis f_u	1 µm / ***40 µin***		0.5 µm / ***20 µin***	
Linearity deviation with corrected sensitivity				
within range ± 0.5 mm	–		0.5 µm / ***20 µin***	
within range ± 1.0 mm	–		2.0 µm / ***80 µin***	
within range ± 2.0 mm	4.0 µm / ***160 µin***		4.0 µm / ***160 µin***	
within range ± 5.0 mm	20.0 µm / ***800 µin***		–	
Protection class according to DIN VDE 0470 Part 1 / IEC 60529	IP64			
Cable length	2.5 m / 8 ft [3]		2.5 m / 8 ft [3]	

Order no.	**P2010 A**	**P2010 B**	**P2104 A**	**P2104 B**
Compatibility - Mahr	**5324020**	**5324030**	**5324070**	**5324080**
Compatibility - Tesa	**5324021**	**5324031**	**5324071**	**5324081**
Compatibility - Marposs	**5324023**	**5324033**	**5324073**	**5324083**
Compatibility - Federal	**5324024**	**5324034**	**5324074**	**5324084**

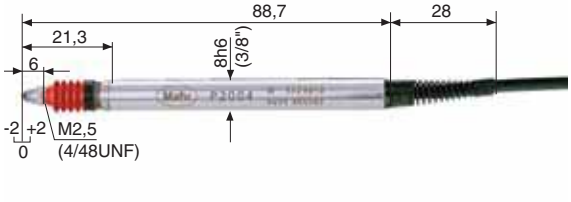
[1] *Relative to the electrical zero point. Adjustable; lower and upper stops are simultaneously adjusted*
[2] *Measuring force springs are interhangeable, additional measuring force springs are available (0.25; 0.5; 1; 1.25; 1.5 N)*
[3] *Extension cables are available, see accessories*

Inductive Probe Millimar P2000-Series

P2001

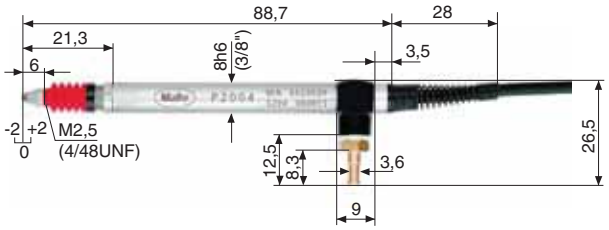


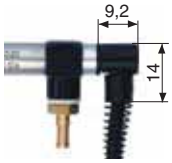
P2004



With the supplied slip-on cap, the cable can be flexed to 90° (vertical to horizontal)

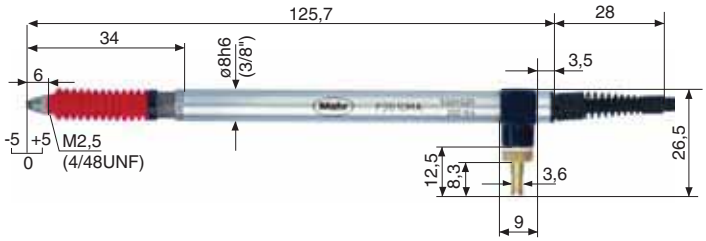
P2004 A / P2004 B

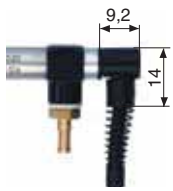




With the supplied slip-on cap, the cable can be flexed to 90° (vertical to horizontal)

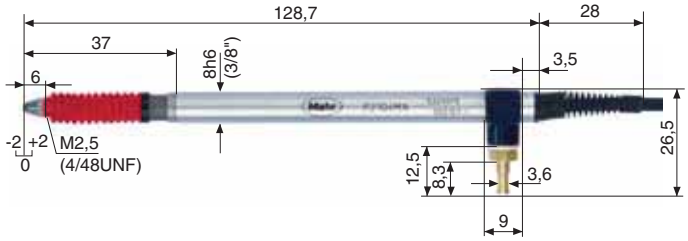
P2010 A / P2010 B

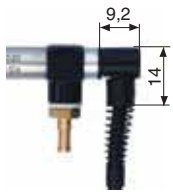




With the supplied slip-on cap, the cable can be flexed to 90° (vertical to horizontal)

P2104 A / P2104 B





With the supplied slip-on cap, the cable can be flexed to 90° (vertical to horizontal)

Values shown in brackets apply to Federal-compatibility
All dimensions and values are metric

Accessories

Extension cables Length	Description	Mahr M Order no.	Tesa T Order no.	Marposs U Order no.	Mahr Federal F Order no.
2.5 m	C 2025	**5323130**	**5323131**	**5323133**	**5323134**
5 m	C 2050	**5323140**	**5323141**	**5323143**	**5323144**
7.5 m	C 2075	**5323150**	**5323151**	**5323153**	**5323154**
10 m	C 2100	**5323160**	**5323161**	**5323163**	**5323164**

	Order no.
Measuring force springs[1] for P2004 and 2004 A	
0.25 N	**7026827**
0.50 N	**7026827**
0.75 N	**7026828**
1.00 N	**7026849**
1.25 N	**7025579**
1.50 N	**7025505**

1) All measuring forces (except 0.25 N) include the sealing bellows have a measuring spring force of approx. 0.25 N in zero position.

	Order no.
Measuring force springs[1] for P2010 A	
0.25 N	**7028212**
0.50 N	**7028212**
0.75 N	**7027764**
1.00 N	**7028213**
1.25 N	**7028214**
1.50 N	**7028215**

1) All measuring forces (except 0.25 N) include the sealing bellows have a measuring spring force of approx. 0.25 N in zero position.

	Order no.
Measuring force springs[1] for P2104 A	
0.25 N	**7028212**
0.50 N	**7027764**
0.75 N	**7028213**
1.00 N	**7028214**
1.25 N	**7028215**

1) All measuring forces include the sealing bellows

	Order no.
Sealing bellows for	
2004, 2004 A	**7021546**
2004 B	**7028220**
2010 A, 2104 A	**7027758**
2010 B, 2104 B	**7028221**

Pneumatic Lifter 1340/1	for connection with 1 Probe	**5313420**
Pneumatic Foot Switch 1340/1F	for connecting max. 4 Probes, types 1340, P2004xA, P2010xA, P2104xA, 1300 A, 1310 A	**5313419**

Temperature specifications

Temperature coefficient ftT	0.15 µm / °C
Working temperature range	+ 10 . . . + 55 ° C
Operating temperature range	- 10 . . . + 80° C
Information regarding chemical resistance	Resistant against oil, gasoline (petrol), water, alipate. Moderate against acids, alkaline solutions, solvents, ozone

Inductive Probe Millimar 1300 / 1310 Half Bridge

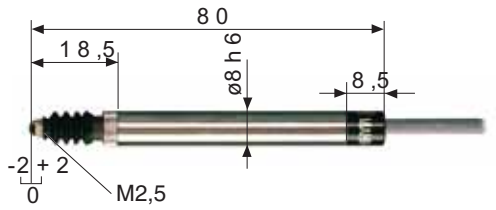
Technical Data

Probe type	**1300**	**1300 A**	**1310**	**1310 A**	**1310 B**
Measuring range	± 2.0 mm / ***± 0.079"***			± 5.0 mm / ***± 0.197"***	
Distance of lower stop	- 2.2 . . .0 mm / ***-0.09 . . . 0"*** [1]			- 5.2 mm / ***- 0.204"***	
Distance of upper stop	-2.2 . . . 4.4 mm / ***-0.09 . . . 0.173"*** [1]			5.8 mm / ***- 0.228"***	
Lifter/Retraction	–	Vacuum lifter	–	Vacuum lifter	Compressed air (max. 1 bar)
Measuring force at the electrical zero point	0.75 N [2] ± 0.15 N	0.75 N [2] ± 0.15 N		0.75 N [2] ± 0.15 N	depending on air pressure
Increase in measuring force	0.3 N / mm		0.08 N / mm . . . 0.15 N / mm		–
Sensitivity deviation	0.5 %		0.5 %		
Repeatability f_w	0.1 µm / ***4 µin***		0.5 µm / ***20 µin***		
Hysteresis f_u	0.5 µm / ***20 µin***		2 µm / ***80 µin***		
Linearity deviation with corrected sensitivity					
within range ± 0.5 mm	0.4 µm/ ***16 µin***		–		
within range ± 1.0 mm	1.5 µm / ***60 µin***		–		
within range ± 2.0 mm	3.0 µm/ ***120 µin***		10 µm / ***400 µin***		
within range ± 5.0 mm	–		30 µm / ***1200 µin***		
Protection class acc. to IEC 60529	IP64		IP52		
Cable length	1.5 m / 5 ft [3]				
Compatibility - Mahr	Half Bridge				
Order no.	**5313000**	**5313001**	**5313100**	**5313101**	**5313102**

[1] *Relative to the electrical zero point. Adjustable; lower and upper stops are simultaneously adjusted*
[2] *Measuring force springs are interchangeable. additional measuring force springs are available, see accessories*
[3] *Extension cables are available, see accessories*

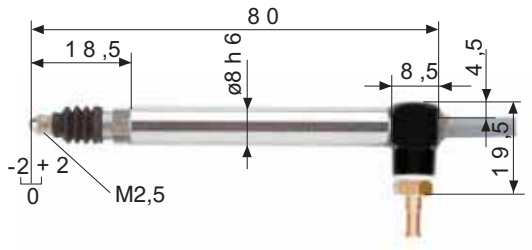
Inductive Probe Millimar 1300 / 1310 Half Bridge

1300

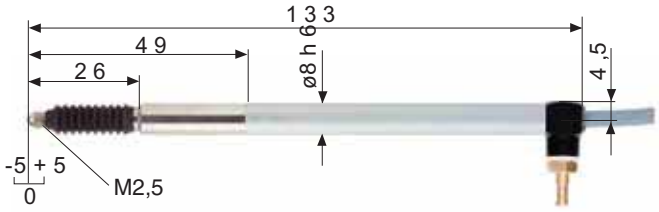


1310

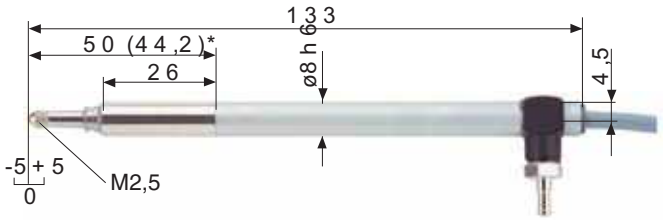
1300 A



1310 A



1310 B



All dimensions and values are metric

** in initial position*

Accessories

	Order no.
Extension cable for 1300 / 1310	
1 m	**9024001**
2 m	**9024002**
3 m	**9024003**
5 m	**7021787**
7 m	**9024007**
10 m	**7021788**
15 m	**9024015**
18 m	**7021789**
20 m	**9024020**
25 m	**9024025**
28 m	**9024028**
Pneumatic lifter 1340/1	**5313420**
Pneumatic lifter 1340/1F for 1300 A / 1310 A	**5313419**

	Order no.
Measuring force springs for 1300	
0.25 N	**7005555**
0.50 N	**7005556**
0.75 N	**7005557**
1.00 N	**7005558**
1.50 N	**7005559**
2.00 N	**7005560**
Measuring force springs for 1310	
0.5 N	**7003549**
0.75 N	**7003550**
1.00 N	**7003551**
2.00 N	**7003553**
Sealing bellows for	
1300	**3001869**
1310	**4321787**

Inductive Probe Millimar 1301 / 1303 / 1304 K / 1318

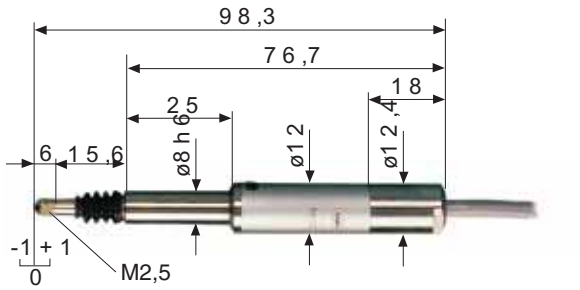
Technical Data

Probe type	**1301**	**1303**	**1304 K**	**1318**
Measuring range	± 1.0 mm / ***± 0.039"***		± 1.0 mm / ***± 0.039"***	-0.3..+1.0 mm/***-0.12..+.039"***
Distance of lower stop [1]	-1.1 . . . 0 mm / ***-0.043 . . . 0"***		1.1 mm / ***-0.043"***	- 0.37 mm / ***-0.0146"***
Distance of upper stop [1]	+2.7 mm / ***+0.106"***		+1.1 mm / ***+0.043"***	+ 1.6 mm / ***+0.063"***
Lifter/Retraction	Cable release		–	–
Measuring force at the electrical zero point	0.75 N ± 0.15 N		0.75 N ± 0.15 N	0.25 N ± 0.05 N
Increase in measuring force	0.4 N / mm		0.15 N / mm	0.04 N / mm
Sensitivity deviation	0.5 %		1.0 %	0.5 %
Repeatability f_w	0.1 µm / ***4 µin***		0.15 µm / ***6 µin***	0.03 µm / ***1.2 µin***
Hysteresis f_w	0.2 µm / ***8 µin***		0.2 µm / ***8 µin***	0.5 µm / ***20 µin***
Linearity deviation with corrected sensitivity				
within range ± 0.3 mm	–		–	0.9 µm / ***36 µin***
within range ± 0.5 mm	0.5 µm / ***20 µin***		1.0 µm / ***40 µin***	–
within range ± 1.0 mm	2.0 µm / ***80 µin***		4.0 µm / ***160 µin***	–
Protect. class acc. to IEC 60529	IP64		IP62	IP50
Cable length	1.5 m / 5 ft [2]			
Compatibility - Mahr	LVDT			
Order no.	**5313010**	**5313030**	**5313049**	**5313180**

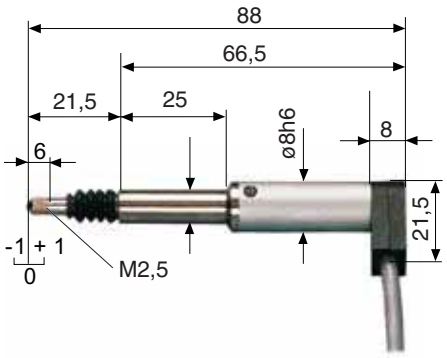
[1] *Relative to the electrical zero point*
[2] *Extension cables are available, see accessories*

Inductive Probe Millimar 1301 / 1303 / 1304 K / 1318

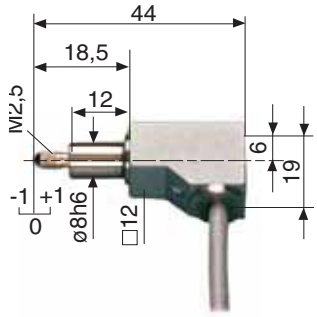
1301



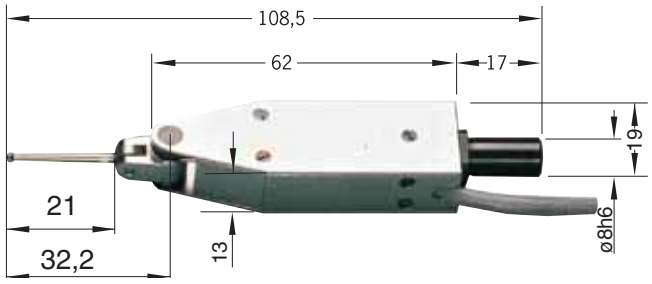
1303



1304 K



1318



All dimensions and values are metric

Accessories

	Description		Order no.
Extension Cables for 1301 / 1303 / 1304 K / 1318			
	1288/1	1 m / 3 ft	**5312881**
	1288/2,5	2.5 m / 8 ft	**5312882**
	1288/5	5 m / 16 ft	**5312885**
	1288/7,5	7.5 m / 24 ft	**5312887**
	1288/10	10 m / 30 ft	**5312889**
Cable Release for 1301 / 1303	**1399**		**5313990**
Styluses for 1318 with carbide ball		d = 2 mm; L = 21 mm (Standard)	**3005223**
		d = 1 mm; L = 21 mm	**7003902**
		d = 3 mm; L = 21 mm	**7003903**
Styluses for 1318 with ruby ball		d = 2 mm; L = 21 mm	**8004231**

Lever Type Gage Heads F

EHE-2056

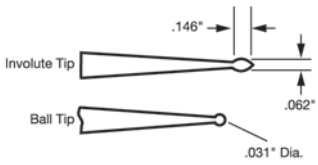
For use on test stands, surface plate work, or where light pressure is needed.

Features

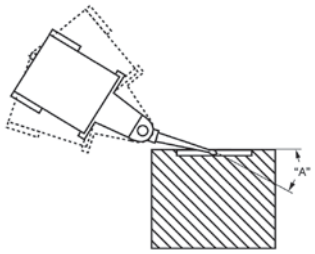
- Clutch-mounted contact swivels through 280° arc for easy positioning
- Linearity – 0.1% over full range of ±0.250 mm / ±.010"
- Gaging pressure less than 4 g / .14 oz. in either direction, with a change of less than 0.1 gram per 25 µm / .001" of contact travel. Special gaging pressures available. Contact Mahr Federal Technical Assistance
- Repeatability better than 0.1 µm / 4 µin
- Cable length – 1.2 m / 4 ft
- Miniature models include the same powerful features as standard sized Lever Type Gage Heads

Automatic Cosine Error Compensation

Angle "A"	Correction Factor
10	.985
20	.940
30	.866
40	.766
50	.643
60	.500



Involute tip (normally furnished) automatically corrects for cosine error when finger is at an angle up to 20°. Simplifies "reach over" jobs.



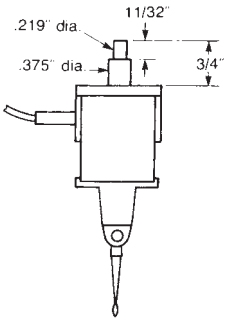
When exceeding 20°, use ball tip contact and table above. With multiplier function, 832F & 1840F Amplifiers can correct for cosine error.

Accessories

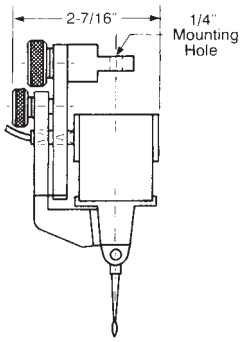
	Order no.
Adaptor to mount EHE-2048 on Model 2400 Stand	**EAM-1071**
Clamp for mounting EHE-2048 on model 2300 Stand	**CP-116**
Accessories kit for EHE-2048. Includes EAM-1071, CP-116, EPT-1013, two rectangular holding bars and a holding rod	**EAS-1333**
Replacement tip, 1.6 mm/ ***.062"*** dia. steel ball	**EPT-1004**
Replacement tip, 0.787 mm/ ***.031"*** dia. tungsten carbide ball	**EPT-1007**
Replacement tip, steel "volute (normally furnished)	**EPT-1008**
Replacement tip, 0.787 mm/ ***.031"*** steel ball	**EPT-1013**
Replacement tip, 1.6 mm/ ***.062"*** dia., sapphire ball, 1:1 ratio	**EPT-1059-W1**
Replacement tip, 1.6 mm/ ***.062"*** dia., sapphire ball, 2:1 ratio	**EPT-1059-W2**
Replacement tip, 1.6 mm/ ***.062"*** dia., sapphire ball, 3:1 ratio	**EPT-1059-W3**
Replacement tip, 1.6 mm/ ***.062"*** dia., sapphire ball, 4:1 ratio	**EPT-1059-W4**
Replacement tip, 1.6 mm/ ***.062"*** dia., sapphire ball, 5:1 ratio	**EPT-1059-W5**
Replacement adjustable nose mounting bracket	**EAT-1010**
Replacement fixed back plate mounting bracket	**EPL-1140**

Lever Type Gage Heads F

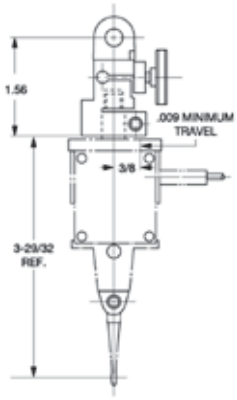
Models and Accessories



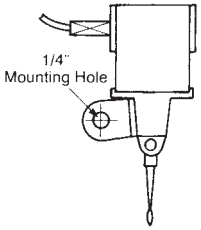
Model EHE-2048 – Post Bracket Back, (BK-108) tamper-proof mounted. Option: Conversion Bracket, EAM-1071, attaches quickly and securely in any rotational direction to suit a wide variety of mounting needs.



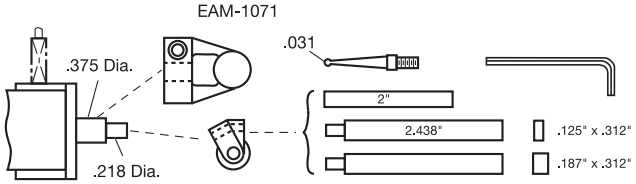
Model EHE-2056 – Adjustable Nose Mount (EAT-1010), tamper-proof mounted. Permits wide choice of positions and approximately 3.8mm/.150in fine adjustment for quick setup with support close to gaging contact.



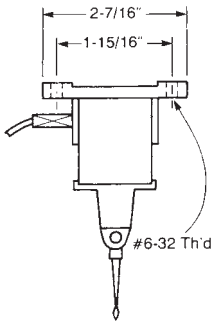
Model EAT-1026 – Fine Adjust Attachment for Lever Type Gage Heads with post mounting option, permits mounting on a wide variety of fixtures.



Model EHE-2050 – Fixed Nose Mount (EAM-1045), tamper-proof mounted. Provides support close to gaging contact for the most critical applications.



Model EAS-1333 – Mounting Kit for use with EHE-2048. Permits Gage Head to be mounted on a wide variety of stands and holding fixtures. Includes Conversion Bracket, EAM-1071 and 0.787mm/.031in diameter ball tip contact.



Model EHE-2052 – Fixed Back Plate, (EPL-1140) tamper-proof mounted. For mounting on adjustable plates or slides in fixtures for continuous duty application.

Spring (Pantograph) Type Gage Heads F

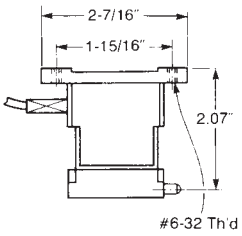
Rugged and reliable, ideal for fixtures or automatic gages

Features

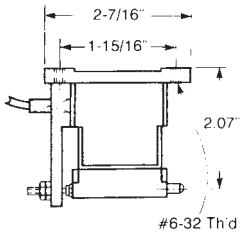
- Friction-free, straight line motion.
- Repeatability better than 0.01 µm /.5 µin
- Linearity – 0.05% over full range of ±0.250 mm / ±.010", with repeat accuracy within 0.01 µm / .5 µin.
- Adjustable pretravel.
- Gaging pressure provided by external spring, from 85 g / 3oz. to 400 g / 14 oz.
- Uses regular 4-48 threaded Contact Points (PT-223 normally furnished).
- Cable length – 2.4 m / 8 ft.

Technical Data

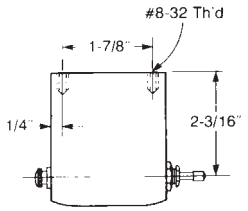
Model EHE-2053
Fixed Back Plate EPL-1140 (15.8 mm / 0.625" wide), tamper-proof mounted. Provides means of attachment for mounting on adjustable plates or slides in fixtures for continuous duty application.



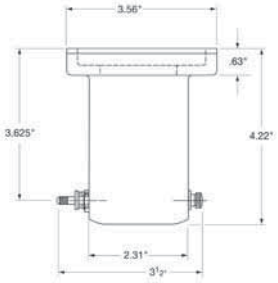
Model EHE-2049
Pressure Spring mount, tamper-proof mounted. Permits setting pre-travel and provides ample gaging pressure regardless of Gage Head position.



Model EGH-2011
Protective Housing encloses head in tamper-proof mounting. Permits adjustment of both gaging pressure (from 3 to 14 oz.) and pre-travel.



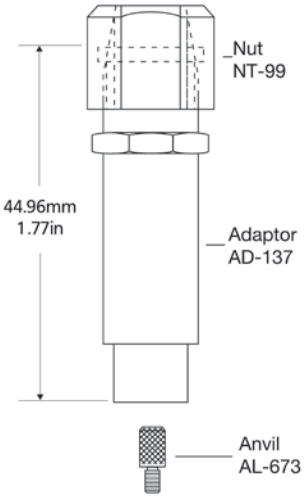
Model EGH-2006
Housing is extended and equipped with heavy duty back plate forming suitable support for use with Model 700 Comparator Stand.



Gage Head Adapter Cables

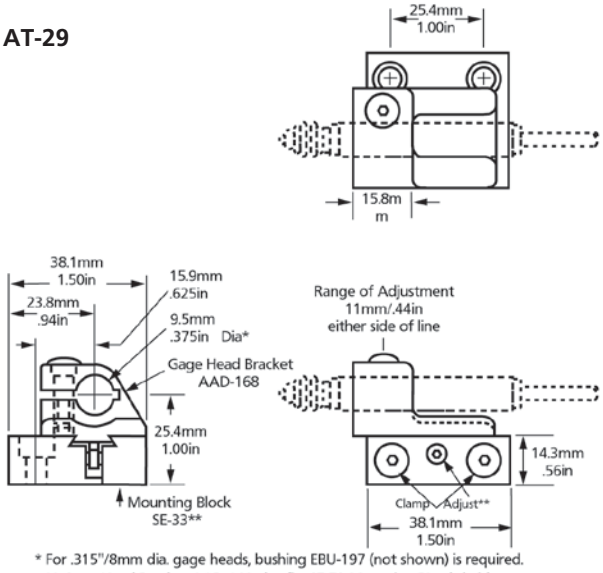
	Order no.
Gage Head Adapter Cables connects Mahr Federal EHE-2XXX and P2XXXF gage heads to Mahr Federal series 432 and 230 amplifiers; 152 mm / ***6"*** long	**ECB-1852**
Gage Head Adapter Cables connects Mahr Federal EHE 1XXX gage heads to Mahr Federal series 832 and 830 amplifiers; 152 mm / ***6"***	**ECB-1853**

Adapters for Cartridge Type Gage Heads

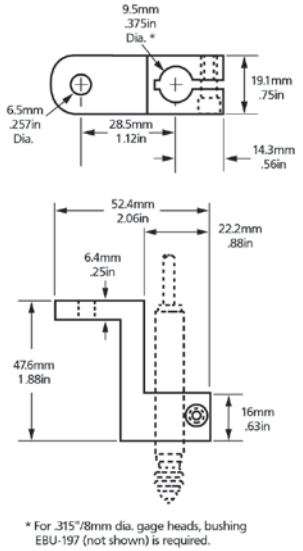


AD-138
Electronic probe adapter permits using cartridge type gage heads with any regular Mahr Federal indicator.

AT-29

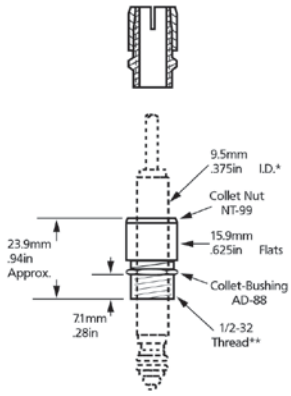


* For .315"/8mm dia. gage heads, bushing EBU-197 (not shown) is required.
** Gage Head Bracket AAD-168 also fits SE-73 Mounting BLock (with adjustment knob in place of socket head adjustment screw)



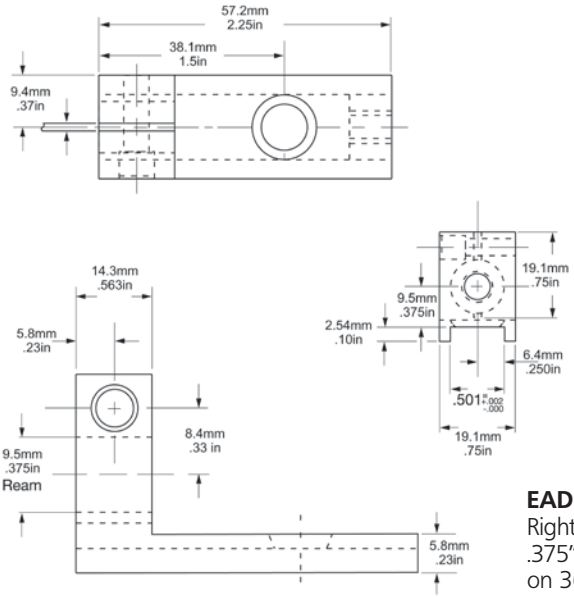
* For .315"/8mm dia. gage heads, bushing EBU-197 (not shown) is required.

AAD-66
"L" bracket used for mounting .375" diameter gage heads on comparator stands.

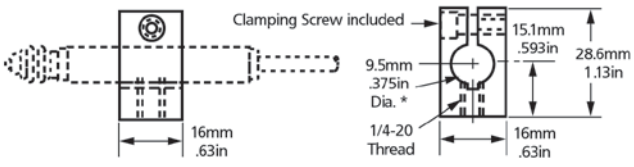


* For .315"/8mm dia. gage heads, bushing EBU-197 (not shown) is required.

AD-87
Split collar adapter for mounting .375" dia. gage heads.
For 1/2-32 taps use **V-892**

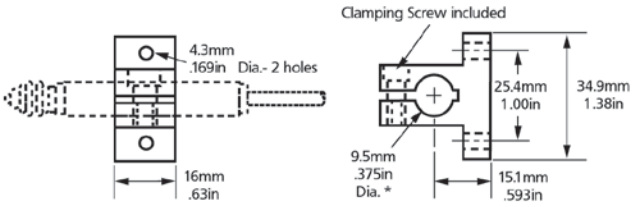


EAD-1029
Right angle adapter for mounting .375" diameter cartridge gage heads on 36B series comparators.



* For .315"/8mm dia. gage heads, bushing EBU-197 (not shown) is required.

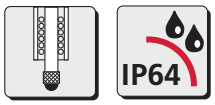
AAD-67
For .375" diameter stem, square bracket. 1/4-20 mounting thread.



* For .315"/8mm dia. gage heads, bushing EBU-197 (not shown) is required.

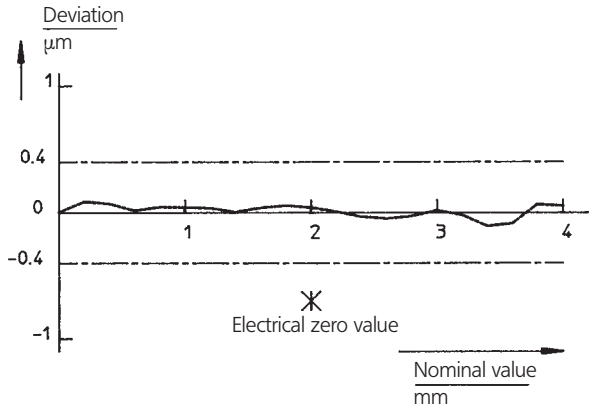
AAD-91
"T" bracket flange mounted, two 4.3 mm / .169" through holes. For .375" dia. gage heads.

Inductive Probe Millimar 1340



All dimensions and values are metric

Commercial deviation diagram



Features

- To obtain the best results use in conjunction with the Millitron 1240
- Unprecedented measuring accuracy and minimum linearity error < 0.01 %, i.e. 0.4 µm over the total measuring range
- Probe is protected against dirt and moisture, thus ideally suited for production related application
- Cable length 1.5 m / 5 ft

Technical Data

	1340
Measuring range	± 2 mm / ***± 0.079"***
Distance of lower stop [1]	- 2.2 mm / ***- 0.09"*** (adjustable)
Distance of upper stop [1]	+ 3.0 mm / ***+ 0.118"***
Spindle lift	pneumatic
Measuring force	0.75 N
Sensitivity deviation	0.3 %
Repeatability fw	≤ 0.08 µm
Hysteresis fu	0.08 µm
Linearity deviation	
within range ± 1 mm	0.15 µm
± 2 mm	0.4 µm
Contact points	carbide ball
Protection class acc. to IEC 60529	IP64
Cable output	lateral
Temperature coefficient	0.6 µm/K
Working temperature range	+ 10 . . .+ 40° C / + 50 . . .+ 104°F
Operating temperature range	- 10 . . .+ 80° C / - 14 . . .+ 176°F
Hysteris of measuring value	- 10 . . .+ 80° C / - 14 . . .+ 176°F
Order no.	**5313400**

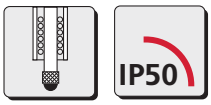
[1] *Relative to the electrical zero point*

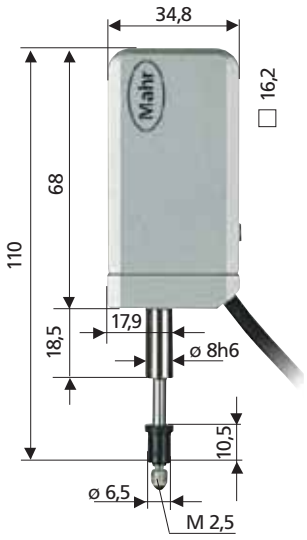
Accessories

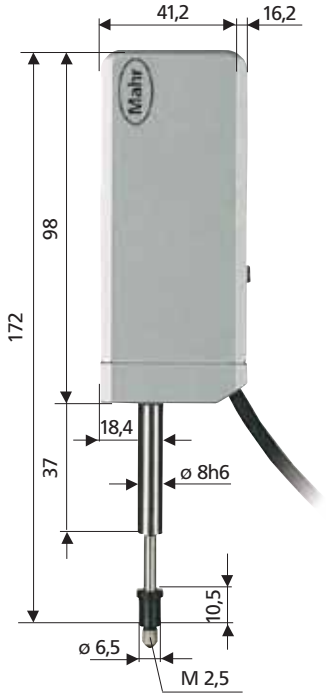
		Order no.
Extension Cable	5 m / 16 ft	**5313425**
Extension Cable	10 m / 32 ft	**5313421**
Extension Cable	20 m / 64 ft	**5313422**
Extension Cable	30 m / 98 ft	**5313423**

	Order no.
Pneumatic Lifter 1340/1	
Pneumatic hand pump with an plug-in hose approx. 1 m / 3 ft	**5313420**
Pneumatic Foot Switch 1340/1F for connecting max. 4 Probes 1340	**5313419**

Incremental Probe Millimar P1514 / P1526







Features

- To obtain the best results use in conjunction with C 1245 I
- Excellent accuracy over a large measuring range
- Supplied with:
  Finger lifter

Technical Data

Probe type	**P1514**	**P1526**
Output signal	1 Vss	
Measuring system	DIADUR-glass scale with incremental graduation	
Scale graduation	4 µm	
Signal period	2 µm	
Measuring range	12 mm / ***0.47"***	25 mm / ***0.98"***
System accuracy	± 0.2 µm	
Operating position	no limitation	
Measuring force		
Vertical. downwards	0.6 . . . 0.85 N	
Vertical. upwards	0.35 . . . 0.6 N	
Horizontal	0.48 . . . 0.73 N	
Admissible measuring speed	0.5 m/s	
Admissible lateral force	0.8 N	
Max. Acceleration[1)]		
Shock in m/s²	1000	
Vibration in m/s²	100	
Protection class acc. to DIN	IP50	
Reference temperature	20°C / 68°F	
Working temperature	+ 10 . . .+ 40° C / + 50 . . .+ 104°F	
Storage temperature	–20 . . . 70°C / - 4 . . .+ 158°F	
Weight excluding cable	100 g	180 g
Connection cable	1.5 m / 5 ft	
Order no.	**5315140**	**5315260**

1) The accuracy of this data is not guaranteed

Accessories

	Order-no.
Cable lifter with integral pneumatic damping	**3014019**
Extension cables	
3 m / 10 ft	**4407663**
5 m / 16 ft	**4407662**
7 m / 23 ft	**4407661**
10 m / 32 ft	**4407660**

Millimar. Evaluation Instruments

Overview

	C 1200 IC	830	832
			
Catalog page	7 - 26	7 - 27	7 - 28
Display	Needle analog scale with 2 tolerance markers	Needle analog scale	Analog display with 1 digital line display
Measuring channels	1 Inductive Probe (A)	According to type, up to: 2 Inductive Probes (A, B)	2 Inductive Probes (A, B) 1 Pneumatic Measuring Instrument (A, B)
Compatible Inductive Probe (carrier frequency)	Mahr	Mahr Federal	Mahr / TESA / Mahr Federal / Marposs
Max. Resolution	0.1 µm / ***.000002"***	0.1 µm / ***.000005"***	0.01 µm / ***.000001"***
Input Combinations	+A, - A	+A, - A, +B , -B , A + B , A - B , B - A , -A - B	+A, - A, +B , -B , A + B , A - B , B - A , -A - B
Features / Programs	1	2 / 2	2 / 2
Test steps	1	1	1
Dynamic measurements	–	–	MAX, MIN, MAX-MIN, (MAX+MIN)/2
Statistics functions	–	–	–
Classification	–	–	–
Control inuts and outputs/ SPC connectiong	– –	–	3 inputs, 5 TTL Opto-coupler outputs
Analog output	–	1	1
Data interface / ports	–	–	RS232, 9 pin, plug
Configuration	Turn switch	Turn switch	Keypad
Battery operated	yes	yes	yes
Dimensions in mm (H x W x D)	137 x 157 x 80	165 x 190 x 148	254 x 168 x 143

C 1208	C 1216	C 1245	1240	S 1840
				
7 - 30	7 - 31	7 - 32	7 - 33	7 - 34
Background lit LCD with 1 analog display and a 2 digital line digital display	Background lit LCD with 1 analog display and a 2 digital line digital display	Needle analog scale and 2 line display	Needle analog scale and 1 line display	1 illuminated bar graph and 2 line digital display
According to type, up to: 2 Inductive Probes (A, B) 1 Pneumatic Meas. Inst.	2 Inductive Probes (A, B)	According to type, up to: • 8 Inductive Probes • 4 Incremental Probes • 2 Pneumatic Meas. Inst. • 8 Analog Signals • or a combination of these inputs	2 Inductive Probes (A, B) 2 Incremental Probes (A, B) 1 Pneumatic Meas. Inst.	According to type, up to: 2 Inductive Probes (A, B) 1 Pneumatic Meas. Inst.
Mahr / TESA / Mahr Federal	Mahr / TESA / Mahr Federal	Mahr / TESA Mahr Federal	Mahr	Mahr / TESA Mahr Federal
0.1 µm / ***.000005"***	0.01 µm / ***.000001"***	0.1 µm / ***.000005"***	0.01 µm / ***.000001"***	0.1 µm / ***.000005"***
+A, - A, +B , -B , A + B , A - B , B - A , -A - B	+A, - A, +B , -B , A + B , A - B , B - A , -A - B	Formula editor for 80 characters Functions: + / - / * / ÷/ () / factor	+A, -A, +B, -B A+B, +A-B, -A+B, -A-B	A, -A, B, -B, A+B, A-B, -A+B, -A-B
2 / 2	2 / 2	16 / 6	2 / 2	2 / 2
1	1	6	1	1
MAX, MIN, MAX-MIN, (MAX+MIN)/2	MAX, MIN, MAX-MIN, (MAX+MIN)/2	MAX, MIN, MAX-MIN, (MAX+MIN)/2, mean	MAX, MIN, MAX-MIN, (MAX+MIN)/2, mean	MAX, MIN, MAX-MIN, (MAX+MIN)/2
–	–	N, x-quer, S, Xmax, Xmin, Range	n, xn, x, s, R	–
–	–	max. 998, max. 79 auf I/O	max. 30	–
3 Opto-coupler inputs, 3 Opto-coupler outputs	3 Opto-coupler inputs, 3 Opto-coupler outputs	3 Opto-coupler inputs, 6 Opto-coupler outputs	3 Opto-coupler inputs, 3 TTL outputs	3 Opto-coupler inputs, 3 Opto-coupler outputs
–	1	1	1	1
RS232, 9 pin, plug	RS232, 9 pin, plug	RS232, 9 pin, plug	RS232, 9 pin, plug	RS232, 9 pin, plug
PC, Keypad	PC, Keypad	PC, Keypad	Keypad	PC, Keypad
–	–	–	–	–
205 x 160 x 165	205 x 160 x 165	210 x 160 x 155	195 x 156 x 120	487 x 47 x 144

Millimar 1200 IC compact amplifer M

IP40

1200 IC/MZ

Features

- Compact housing
- Battery powered for portable usage in the workshop
- Large analog display with 2 tolerance markers
- Quick and reliable display of the measured value
- Switchable measuring direction
- One inductive probe can be connected
- Fine adjustment due to the large range zero setter
- Battery operation with the commerically available round R14 batteries
- Testing button for batteries
- Supplied with: Mains adapter

Technical Data

	1200 IC	1200 IC/MZ
Measuring range	± 3 µm / 0.1 µm	***± .0001" / .000002"***
Resolution	± 10 µm / 0.2 µm	***± .0003" / .00001"***
	± 30 µm / 1 µm	***± .001" / .00002"***
	± 100 µm / 2 µm	***± .003" / .0001"***
	± 300 µm / 10 µm	***± .01" / .0002"***
Scale length	120 mm / ***4.724"***	
Response time	350 ms	
Probe input	1	
Single meas. combinations	+A, -A	
Range of zero adjustment: 5 and 100 µm	1 Large range setter	
Deviation spread referring to measuring range	≤ 2.5%	
Protection class acc. to DIN	IP40	
Working temperature range	+ 10. . . + 40° C / + 50. . . + 104° F	
Power supply	mains adapter, 9V ⎓ ~5 VA	
Power consumption	approx. 0.1 W	
Dimensions	137 x 157 x 80 mm / ***5.394" x 6.181" x 3.149"***	
Weight	1 kg / 2.205 lbs	
Order no.	**5312000***	**5312009***

** When placing an order please specify which type of mains adapter is required*

Accessories

	Order-no.
Battery, R 14 battery 1.5 V, (6 are required)	**3004424**
Mains Adapter 100-240V~, 50-60Hz	**3017926***

For appropriate Inductive probes please refer to pages 7-6 to 7-17

* Included in scope of supply

Millitron 830 Gaging Amplifier F

Features

- Battery operates more than 8 hours under full load.
- Choice of Power Modules for 120 or 240 VAC operation.
- ±2 volt analog output.
- Conforms to CE Standards.
- The essential performer for today's slim budgets.
- Dual input - for single or differential modes.
- Normal/Reverse transducer setting.
- Selectable ranges in either Inch or Metric units.
- Calibration adjustments for each input.
- Convenient, front-mounted controls.
- Tilt base provides stable support and easy adjustment for best viewing angle.
- Used with "Federal' – F type Inductive Probes.

Technical Data

Repeatability	to within 0.00005 mm / ***.000002"*** or 1/10 of a graduation, whichever is greater
Linearity	less than 4/5 of a scale division
Calibration	less than 4/5 of a scale division
Response Speed-Display	less than .5 seconds for 10% to 90% step follow
Response Time - Output	< 15 ms
Dimensions	approx. 165 mm / 6.5" h x 190 mm / 7.5" w x 148 mm / 5.8" d
Temperature at specified accuracy	20°C / 68°F ±.2°C
Operating temperature	5° to 45°C / 40° to 110°F, with a temperature coefficient of .02% change/°C x full scale range
Storage temperature	0° to 60°C / 0° to 140°F

Order no.	830 F	120V	220V EU	240V UK	Ranges	Resolution
(Standard Unit)	**EAS-3031-**	**W11**	**W12**	**W13**	±100 µm / ***±.004"*** ±20 µm / ***±.001"*** ±10 µm / ***±.0002"***	5 µm / ***200*** µ" 1 µm / ***50*** µ" 0.5 µm / ***10*** µ"
(High Resolution – Inch)	**EAS-3031-**	**W41**	**W42**	**W43**	±200 µm / ***±.004"*** ±50 µm / ***±.001"*** ±10 µm / ***±.0001"***	5 µm / ***200*** µ" 1 µm / ***50*** µ" 0.5 µm / ***10*** µ"
(High Resolution – Metric)	**EAS-3031-**	**W41** **V6117**	**W42** **V6207**	**W43** **V6245**	±200 µm / ***±.004"*** ±50 µm / ***±.001"*** ±2 µm / ***±.0001"***	10 µm / ***200*** µ" 2.5 µm / ***50*** µ" 0.1 µm / ***5*** µ"

Accessories

	Order-no.
Analog Output Connector	**PRT-2380**
120V Battery Charger	**EBY-1016**
220V Battery Charger (EU)	**EBY-1019**
240V Battery Charger (UK)	**EBY-1020**
Battery	**EBY-1021**
Battery Eliminator Kit for 110V Models	**EKT-1237-W1**
Battery Eliminator Kit for 220 Models	**EKT-1237-W2**

Millitron 832 Digital Electronic Amplifier

Features

- Dynamics – simultaneously computes the minimum, maximum, T.I.R., nominal and actual gage head signal for dynamic measurement capability.
- Multi-Range – three selectable ranges in inch or metric units.
- Message Center – display provides a simple "menu-driven" setup procedure in English, French or Spanish.
- RS-232 Output – for communicating with Data Collection Devices.
- Two Gage Head Input – Independent reading or for providing the capability of "summing" for diameter reading, matching clearances, runout and parallelism.
- Angular units – selectable arc seconds or millirads for angular measurement applications (see Electronic Levels).
- User selectable password for full lockout capability or individual key lockout in both setup and gaging modes.
- Specific models available for use with Mahr, Mahr Federal, Tesa or Marposs inductive probes.

Technical Data

	Measuring Range	Digital Resolution	Analog Minimum Grad.
Linear	±2 mm / ***±0.100"*** ±.200 mm/ ***±.010"*** ±.020 mm / ***±.001"***	.001 mm / ***.0001"*** .0001 mm / ***.00001"*** .00002 mm / ***.000001"***	0.1 mm / ***.005"*** 0.1 mm / ***.0005"*** .001 mm / ***.00005"***
Angular	5 mrad / ±1000 arc sec. 1 mrad / ±200 arc sec.	.005 mrad / 1 arc sec. .0005 mrad / 0.1 arc sec.	.25 mrad / 50 arc sec. .05 mrad /10 arc sec.

Auto Range	automatically selects the smallest range for the best resolution, in both linear and angular units
Repeatability	±1 digit
Calibration Accuracy	±1 digit
Linear Error	less than .025% of full scale
Response Time	42 msec.
Thermal Stability	.01% /C x full scale
Temperature Range:	
At Specified Accuracy	20°C / 68°F ±.2°C
Operating	5° to 45°C / 40° to 110°F, with a temperature coefficient of .02% change/°C x full scale range.
Storage	0° to 60°C / 0° to 140°F
Digital I/O	five TTL opto-isolated outputs
Data Output	RS-232, transmits Channels A, B, or both, units, and tolerances
Analog Output	±5 VDC full scale for displayed value signal
Measuring Modes	Actual, Minimum, Maximum, T.I.R., Nominal
Tolerance Indicators	five LEDs
Weight	3.5 lbs. / 1.58 kg
Dimensions	168 mm w x 254 mm d x 143 mm h / ***6.63"*** w x ***10"*** d x ***5.63"*** h
Gage Head Display	A, B or both at any time
Auto Power Off	User selectable, up to 99 minutes of non-use
Power Requirements	rechargeable battery, 10 hour operation under full load: or 120 VAC/240 VAC 50-60Hz with power module (furnished with Amplifier)
Replacement Battery	**EBY-1015** Ni-Cad rechargeable, 4.8v, 2.5 amp hours

Millitron 832 Digital Electronic Amplifier

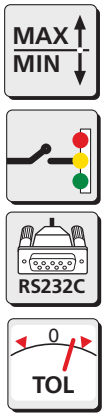
Technical Data

Power	832 F Mahr Federal probe type Order no.	832 M Mahr probe type Order no.	832 T Tesa probe type Order no.	832 U Marposs probe type Order no.
120VAC adapter	2004005	2004000	2004015	2004020
US battery/120VAC charger	2004007	2004002	2004017	2004022
EU/UK 220/240VAC adapter	2004006	2004001	2004016	2004021
EU battery/220VAC charger	2004008	2004003	2004018	2004023
UK battery/240VAC charger	2004009	2004004	2004019	2004024

Accessories

	Order no.
RS-232 cable, amplifier to MSP2 printer or computer, 2 m / 6 ft	**7024634**
Storage Cover (opaque)– protection for the 832 Amplifier when used in harsh environments	**ECV-1276**
Oil/Splash Cover (clear)–protection for the 832 Amplifier when used in harsh environments	**ECV-1285**
Footswitch for HOLD/RESUME, 3 m / 10 ft cable (15 pin)	**ECB-1857**
Footswitch for DYNAMIC RESET, or remote zeroing 3 m /1 0 ft cable (15 pin)	**ECB-1858**
Footswitch for SEND DATA, 3 m / 10 ft cable (15 pin)	**ECB-1859**
Footswitch for DYNAMIC RESET, or Remote Zeroing, 1.5m/5 ft cable (Phone Plug)	**300-50**
Remote pushbutton for DYNAMIC RESET, or remote zeroing 1.5 m / 5 ft cable (Phone Plug)	**ECB-1855**
Remote pushbutton for SEND DATA, 1.5 m / 5 ft cable (15 pin)	**ECB-1860**
Remote pushbutton for HOLD/RESUME, 1.5 m / 5 ft cable (15 pin)	**ECB-1861**
Remote pushbutton for HOLD/RESUME and SEND DATA, 3 m / 10 ft cable (15 pin)	**ECB-1868**
Relay Box – five relays each with Normally Open/Normally Closed contacts; Contact Rating – 30 Vdc/120 Vac, 3 amps Power Supply – 120 Vac Dimensions – 39 mm x 129 mm x 134.6 mm d/1.53" x 5.082 x 5.3" with ECB-1886W-2, 6.1 mm/24" interconnect cable for amplifier to relay box	**EKT-1236-W3**
Mating connector, Digital I/O connector (15 pin MALE)	**ECN-1695-W2**
Mating connector, Reset Data connector (3/32 microphone plug)	**ECN-1693**
Mating connector, RS-232 Digital Output connector (9 pin FEMALE)	**ECN-1695-W1**
Mating connector, Gage Head to amplifier connector (5 pin MALE)	**ECN-1690**
Battery Charger Modules (For 832 Units using 3 pin connector)	
Plug-in 120 VAC, 50-60Hz charger for use with 120 Vac battery operated units	**EBY-1028**
220 VAC, 50-60Hz charger for use with 220 Vac battery operated units	**EBY-1029**
240 VAC, 50-60Hz (UK) charger for use with 240 Vac battery operated units	**EBY-1030**
Power Supply Module (Bypass battery operated units to direct AC source operation)	
For 120 Vac models (For 832 Units using 3 pin connector)	**2010000**
For 220/240 Vac models (For 832 Units using 3 pin connector)	**2010001**
Printers	
MSP-2 line printer: includes power module for 120 V US	**4102045**
MSP-2 line printer: includes power module for 230 V Euro	**4102040**
RS-232 Cable: Amplifier to Printer, 2.0 m / 6 ft	**7024634**
Paper rolls for MSP-2 Line Printer	**4102041**

Millimar C 1208 Compact amplifier with background lit display



Features

Functions
- Favorites, frequently required functions can be assigned to the SELECT key
- Static measurements ± A, ± B and all combinations
- Dynamic measurements: Max, Min, Max-Min, Max+Min, mean
- Auto-Detect-Mode, two measuring instruments can be connected (Probe, Plug Gage . . .)
- Programmable via the integrated key pad or by RS232 interface in conjunction with the MS-Windows configuration Software

Display
- Background lit LCD-Display with an analog and a two line digital display
- 5 three color status lamps for warning and tolerances limits
- Up to 2 features can be simultaneously displayed

Connections
- 2 inputs for inductive probes (also compatible with probes from Mahr, Tesa, Mahr-Federal)
- RS232 interface
- 3 digital inputs for measurement start, master measurement, send measured values, . . .
- 3 digital outputs for GO, NO GO, rework, measuring time, . . .

Technical Data

Display	Background LCD, 115 mm x 70 mm
Analog scale	Pointer, 61 graduations
Range and text display	7 digit LCD, 5 x 7 dot matrix, alpha-numeric
Measured value display	7 digit LCD, 7 segments
Tolerance display	5 LEDs, 3 colors
Displayed ranges	± 3, 10, 30, 100, 300, 1000, 3000, 10000 µm ***± 0.0001; 0.0003; 0.001; 0.003; 0.01; 0.03; 0.1; 0.3 inch*** or tolerance related
Resolution	0.1 µm / ***.000005"***

Response time

- Meas. value memory	0.010s
- Digital display	0.100s
- Analog display	0.100s
- Outputs	0.020s

Error limits

- 10 x analog display	2.5%
- Digital display	0.3% (min. 0.2 µm)
Temperature coefficient	0.005%/°C
Operating temperature	0°C to 45°C / 32°F to 113°F

Interfaces

Computer, printer	RS232, 9 pin. male (PC-compatible assignment)
- Control outputs	3 Opto-coupler-outputs, 2 24V, 100mA
- Control inputs	3 Opto-coupler-inputs, 24V, 10mA
Power supply via	
Mains power pack	100V to 240V, 47Hz to 63Hz
Power consumption	10 VA
Protection class	IP54, with conductive dust IP43
Housing dimensions (H x W x D)	ca. 205 mm x 160 mm x 165 mm ***ca. 8.07" x 6.29" x 6.49"***
Weight	ca. 2.1 kg / 4.6 lbs

Order no.

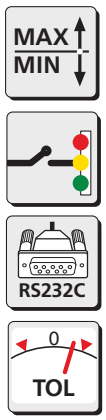
		Order no.
C 1208 M	Mahr compatible	**5312080**
C 1208 T	Tesa compatible	**5312081**
C 1208 F	Mahr-Federal compatible	**5312082**

For appropriate Inductive probes please refer to pages 7-6 to 7-17

Accessories

		Order no.
Extension cable (9 pin D-Sub-jack to a D-Sub-socket), length 3 m / 10 ft		**7024634**
Control Unit with 3 push buttons		**5330950**
Foot switch for	for Input 1	**5330955**
	for Input 2	**5330956**
	for Input 3	**5330957**

Millimar C 1216 Compact amplifier with background lit display



Features

Functions
- Favorites, frequently required functions can be assigned to the SELECT key
- Static measurements ± A, ± B and all combinations
- Dynamic measurements: Max, Min, Max-Min, Max+Min, mean
- Auto-Detect-Mode, two measuring instruments can be connected (Probe, Plug Gage . . .)
- Programmable via the integrated key pad or by RS232 interface in conjunction with the MS-Windows configuration Software

Display
- Background lit LCD-Display with an analog and a two line digital display
- 5 three color status lamps for warning and tolerances limits
- Up to 2 features can be simultaneously displayed
- **Additional resolution, 0.01 µm / 1µin**

Connections
- 2 inputs for inductive probes (also compatible with probes from Mahr, Tesa, Mahr-Federal)
- RS232 interface
- 3 digital inputs for measurement start, master measurement, send measured values, . . .
- 3 digital outputs for GO, NO GO, rework, measuring time, . . .
- **Analog ouput**
- **Programable analog output voltage (max. ±5V)**

Technical Data

Display	Background LCD, 115 mm x 70 mm
Analog scale	Pointer, 61 graduations
Range and text display	7 digit LCD, 5 x 7 dot matrix, alpha-numeric
Measured value display	7 digit LCD, 7 segments
Tolerance display	5 LEDs, 3 colors
Displayed ranges	± 3, 10, 30, 100, 300, 1000, 3000, 10000 µm ***± 0.0001; 0.0003; 0.001; 0.003; 0.01; 0.03; 0.1; 0.3 inch*** or tolerance related
Resolution	0.01 µm / ***.000001"***

Response time

- Meas. value memory	0.010s
- Digital display	0.100s
- Analog display	0.100s
- Outputs	0.020s

Error limits

- 10 x analog display	2.5%
- Digital display	0.3% (min. 0.2 µm)
Temperature coefficient	0.005%/°C
Operating temperature	0°C to 45°C / 32°F to 113°F

Interfaces

Computer, printer	RS232, 9 pin. male (PC-compatible assignment)
- Control outputs	3 Opto-coupler-outputs, 2 24V, 100mA
- Control inputs	3 Opto-coupler-inputs, 24V, 10mA
Power supply via	
Mains power pack	100V to 240V, 47Hz to 63Hz
Power consumption	10 VA
Protection class	IP54, with conductive dust IP43
Housing dimensions (H x W x D)	ca. 205 mm x 160 mm x 165 mm ***ca. 8.07" x 6.29" x 6.49"***
Weight	ca. 2.1 kg / 4.6 lbs

Order no.

		Order no.
C 1216 M	Mahr compatible	**5312160**
C 1216 T	Tesa compatible	**5312161**
C 1216 F	Mahr-Federal compatible	**5312162**

For appropriate Inductive probes please refer to pages 7-6 to 7-17

Accessories

		Order no.
Extension cable (9 pin D-Sub-jack to a D-Sub-socket), length 3 m / 10 ft		**7024634**
Control Unit with 3 push buttons		**5330950**
Foot switch for	for Input 1	**5330955**
	for Input 2	**5330956**
	for Input 3	**5330957**

Millimar C 1245 compact amplifier

Features

Display
- Analog indicator instrument for display of measurement values
- Two-line LCD for measuring values and help texts
- 5 three color status lamps for warning and tolerance limits
- Up to 3 features can be simultaneously displayed

Functions
- 16 characteristics can be defined
- With the formula editor (80 characters) the input channels C1 to C8 are mathematically linked with 4 basic arithmetical functions with factors and brackets
- Static measurements: current value, square root, arc tangent
- Dynamic measurements: Max, Min, Max-Min, Max+Min, mean,
- Statistical functions: n, x-bar, S, Xmax, Xmin, R
- Programmable via the integrated keypad or with MS-Windows configuration software via the RS232 interface
- Memory can store up to 500 measurements
- Measurement Start / Stop

Connections
- 2 input modules can be inserted into base unit
- Following modules are available:
- 4 inputs for Inductive Probes (compatible with Mahr, Mahr-Federal, Tesa)
- 2 inputs for Incremental Probes
- RS232 interface
- 1 Analog output
- 3 digital inputs for measurement start, master measurement / zeroize, send data
- 6 digital outputs for GO, NO GO, rework, ALL GO, measuring time, 4 classes

Technical Data

Display	analog indicator instrument. LCD 53 mm x 40 mm ***(2.087" x 1.585")***
Analog scale	145 mm x 80 mm ***(5.709" x 3.149")***
Range and Text display	7-point LCD, 5 x 7 dot matrix. alphanumeric
Measured value display	7-point LCD. 7 Segment
Tolerance display	5 LEDs, 3-colors
Display ranges	± 10; 30; 100;. 300; 1000; 3000, 10000 µm ***± 0.0003; 0.001; 0.003; 0.01; 0.03; 0.1; 0.3 inch***
Measuring range of inductive probe	4000 (+/.2000) µm, resolution 0.1 µm (measured value display)
Resolution	0.1 µm / ***.000005"***

Response time

- Meas. value memory	0.005s
- Digital display	0.300s
- Analog display	0.050s - 0.300s
- Outputs	0.020s

Error limits

- 10 x Analog display	2 %
- Digital display	0.3 % (min. 0.2 µm)
Temperature coefficient	± 0.005%/°C
Oper. temperature range	0°C to 50°C

Interfaces

Computer. printer	RS232, 9 pin. male (PC-compatible layout)
- Control outputs	6 Optocoupler-outputs, 24V, 10mA
- Control inputs	3 Optocoupler-inputs, 24V, 100mA
Analog output. voltage	programmable
Power supply	90 V . . . 264 V. 47Hz . . . 63Hz
Power consumption	11 VA
Protection class	IP53 with conductive dust IP43
Housing dimensions (H x B x T)	ca. 210 mm x 160 mm x 155 mm ***ca. (8.268" x 6.299" x 6.1032")***
Weight	ca. 2 kg / 4.40 lbs

Order no.

		Order no.
C 1245 M	Mahr compatible	**5331250**
C 1245 T	Tesa compatible	**5331251**
C 1245 F	Mahr-Federal compatible	**5331253**

For appropriate Inductive probes please refer to pages 7-6 to 7-17

C 1245 I	for probes P1514, P1526	**5331254**

Accessories

		Order no.
Extension cable (9 pin D-Sub-jack to a D-Sub-socket), length 3 m / 10 ft		**7024634**
Control Unit with 3 push buttons		**5330950**
Foot switch for	for Input 1	**5330955**
	for Input 2	**5330956**
	for Input 3	**5330957**

Millimar 1240 compact amplifier

Features

- Highly accurate processing of measured values
- Zero setting is possible at any point within the measuring range
- Actual value of a standard can be acquired at the touch of a button
- Statistical functions x-bar, s, r and n for 1 parameter
- 2 inputs for Inductive Probes for single, sum or difference measurements
- Tolerance monitoring (with adjustable hysteresis)
- Tolerance field can be set along the total width
- Universal classification possibilities
- Extreme value memories of long stability
- RS232C interface for connection to a printer / computer / data logger
- Analog output for connecting a recorder
- All functions can be remote controlled using the RS232C interface

Technical Data

Display	analog/digital

Analog display: Measuring range/resolution

± 1 µm/0.02 µm ***(± .003 µin/.0001 µin)***
± 3 µm/0.1 µm ***(± .01 µin/.0002 µin)***
± 10 µm/0.2 µm ***(± .03 µin/.01 µin)***
± 30 µm/1 µm ***(± .1 µin/.002 µin)***
± 100 µm/2 µm ***(± .3 µin/.01 µin)***
± 300 µm/10 µm ***(± .00003 µin/.000001 µin)***
± 1000 µm/20 µm ***(± .0001 µin/.000002 µin)***
± 3000 µm/100 µm ***(± .0003 µin/.00001 µin)***
± 10000 µm/200 µm ***(± .001 µin/.00002 µin)***

Digital display: Measuring range/resolution

± 200 µm/0.01 µm***(± .08 µin/.00001 µin)***
± 2000 µm/0.1 µm***(± .008 µin/.000001 µin)***

Probe inputs	2
Suitable probes	P2000-Series, 1300, 1301, 1303, 1304 K, 1310[1)], 1318, 1340,
Single measurement/ combinations	+A, -A, +B, -B A+B, +A-B, -A+B, -A-B
Dynamic Functions	Max, Min, Max-Min, (Max+Min)/2, mean
Static Functions	n, xn, x, s, R
Zero adjuster	Zero setting at any point

Deviation spread referring to measuring range

Analog display	≤ 1.5 %
Digital display	≤ 0.01%
Analog output	≤ 1 %
Output voltage	± 5 V
Data output	RS 232 C
Limit switches	2
Signal lamps	3
Response time	15 ms
Control outputs	3
Type of output	TTL
Control inputs	3
Protection class acc. to DIN	IP40
Working temperature range	+10 . . . +40°C / + 50. . . + 104° F
Power supply	230 V~/115 V~ ± 10%, 50–60 Hz (switchable)
Power consumption	ca. 30 VA
Dimensions (W x H x D)	156 x 195 x 120 mm ***(6.142" x 7.677" x 4.7242)***
Weight	2.3 kg / 5.07 lbs

1) the probe signal has to be multiplied by factor 10

Order no.

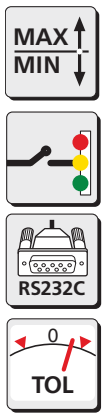
Version		Order no.
1240	Front Panel German	**5312400**
1240	Front Panel English	**5312401**
1240	Front Panel French	**5312402**

Accessories

	Order no.
Push buttons 1240/3D for activating 3 different functions e.g., Start, zero setting etc., connection cable 1.5 m/ 5ft	**5312430**
Foot Switch 1240/1F, connection cable length 2 m/ 5ft	**5312431**
Data Cable to any. PC (9 pin D-jack)/MSP2	**7024634**
Statistics Printer MSP2, 230V / 110V	**4102040**

For appropriate inductive probes please refer to pages 7-6 to 7-17
Recommended **Probe 1340** see page 7-22

Millimar S 1840 compact column amplifier



Features

- Easy to read 3 color analog display
- Measurement in conjunction with inductive probes (e. g. Mahr P2004) or electronic plug gages etc
- Two inputs for inductive probes (compatible with probes from Mahr, Mahr-Federal, Tesa)
- Extensive calculation of input signals: ±A, ±B and all combinations
- Dynamic measurements: Max, Min, Max-Min, Max+Min, Mean
- Programmable either via the integrated keypad or the RS232 interface by means of MS-Windows configuration software
- Programmable warning and tolerance limits, exceeding the limit causes the color to change from green to yellow to red
- Background lit 2 lined LCD to display measured values, help text and measuring units
- Analog output:
  3 digital inputs (e.g. start of measurement, master measurement)
  3 digital outputs for GO – NO GO – rework, measuring time

Technical Data

Analog display	101 LED elements, 3 colors
Range and Text display	7 point LCD, 14 Segment, alphanumeric
Measured value display	7 point LCD, 7 Segments
Tolerance display	via color changes in the analog display
Display ranges	± 10; 30; 100; 300; 1000; 3000; 10000 µm ***± .0003; .001; .003; .01; .03; .1; .3 inch*** or tolerance related
Measuring range of inductive probe	4000 (+/– 2000) µm, resolution 0.1 µm (Digital display)
Resolution	0.1 µm / ***.000005"***
Response time	
- Meas. value memory	0.008 s
- Analog display	0.020 s
- Outputs	0.020 s
Error limits	
- 10 x Analog display	1% (101 LEDs)
- Digital display	0.3% (min. 0.2 µm)
Temperature coefficient	± 0.005% / °C
Operating temp. range	0 . . . 45 °C / 32°F . . . 113°F
Interfaces	
Computer, printer	RS232, 9 pin. male (PC-compatible layout)
- Control outputs	3 Optocoupler Outputs, 24 V, 10 mA
- Control inputs	3 Optocoupler Inputs, 24 V, 100 mA
Analog output	Voltage 1V/mm
Power supply	90 . . . 264 V, 47 . . . 63 Hz
Power consumption	20 VA
Protection class	IP53 IP43 with conductive dust
Dimensions (H x W x D)	approx. 487 x 47 x 144 mm ***(19.173" x 1.850" x 5.669")***
Weight	ca. 1.6 kg / 3.53 lbs

Order no.

		Order no.
S 1840 M	Mahr compatible	**5330001**
S 1840 T	Tesa compatible	**5330002**
S 1840 F	Mahr-Federal compatible	**5330107**

For appropriate Inductive probes please refer to pages 7-6 to 7-17

Accessories

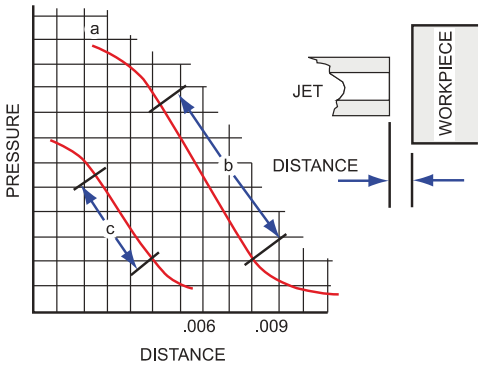
		Order no.
Base Plate, for up to 3 columns		**5330901**
Connection Cable (9 pin D-Sub-jack to D-Sub-jack), length 3 m / 10 ft		**7024634**
Control Unit with 3 push buttons		**5330950**
Foot Switch for Millimar	Input 1	**5330955**
	Input 2	**5330956**
	Input 3	**5330957**

Air Gages

General Technical Data of Air Gages

Air gaging is a measuring system that uses airflow and / or air pressure to determine the size of measured part. The relationship between air pressure and distance of a restriction (workpiece) to the air escape (jets) can be plotted on a graph (line a).

As the distance between jets and work surface increases, the pressure decreases and the ratio becomes linear as represented by the straight section "B". This straight portion of the curve can be accurately calibrated, and represents the scale of the Dimensionair. Compare its length with "C" on the other curve, which is the usable portion of other air gage scales. This longer linear scale gives the Dimensionair its longer usable measuring range.



Description

- Air plug gages are used for testing cylindrical through bores or blind bores. The plug gage bodies are equipped with two opposing measuring jets which record the measured value without contact. This arrangement allows the diameter, the diametric roundness and the cylindricity of bores to be calculated using a single jet air plug gage.
- The diameter is measured immediately after the air plug gage is introduced, while the diametric roundness deviation can be tested by rotation around 180° and the cylindricity by movement in a longitudinal direction.
- The maximum measuring range of the air plug gages is 76 µm / .003".
- Air plug gages are furnished in high chrome stainless steel or chrome plated versions and, if required, with a shut-off valve to conserve air consumption.
- The air tooling long service life is due in part to hardened measuring jets which are recessed relative to the generated surface of the measuring body and are, therefore, protected against damage.
- The standard Mahr Federal air tooling is compatible with the complete line of evaluation units. These include Dimensionair, µDimensionair, 830 PE, 1840 PE, and 1841 PE signal sharing column. Air/Electric convertors for interfacing to gaging computer systems are also available.
- Special air gage designs for measuring taper, straightness and other applications are available. Contact Mahr Federal.

Dimensionair® Air Gages (single master system)

Features

- Uses regular shop air (40 - 150 psig).
- Internal pressure regulator keeps measuring pressures within calibrated range.
- Adjust meter to zero using a single setting master and the zero setting screw.
- High visibility meter has fine line graduations and a needle-thin hand for clear, precise readings. An air filter is included to remove dust and dirt contaminants from air line.
- Tooling mounts to the front of the unit. Connections are tight with finger pressure.
- No recalibration necessary when changing tooling. Just set zero and measure!
- Models available in 5 magnifications, 2 dial styles, and either Metric or Inch.

Technical Data

Magnification	Tooling ID no.	Range	Minimum Graduation	Dial Style	Surface Finish (recommended) *uin* / um Ra	Part Tolerance (recommended)	Order no.
1250:1	100	***.006"***	***.0001"***	Regular	***100*** / 2.54	***±.002"***	**2095183**
2500:1	50	***.003"***	***.00005"***	82.6 mm / ***3.25"***	***50*** / 1.27	***±.001"***	**2095184***
5000:1	20	***.0015"***	***.00002"***	diameter	***20*** / 0.50	***±.0005"***	**2095185***
10000:1	10	***.0006"***	***.00001"***		***10*** / 0.25	***±.0002"***	**2095186**
20000:1	5	***.0003"***	***.000005"***		***5*** / 0.12	***±.0001"***	**2095189**
1250:1M	100	152 µm	2 µm		***100*** / 2.54	± 50 µm	**2095190**
2500:1M	50	76 µm	1 µm		***50*** / 1.27	± 25 µm	**2095191***
5000:1M	20	38 µm	0.5 µm		***20*** / 0.50	± 13.5 µm	**2095192***
10000:1M	10	15.2 µm	0.2 µm		***10*** / 0.25	± 5 µm	**2095193**
20000:1M	5	7.6 µm	0.1 µm		***5*** / 0.12	± 2.5 µm	**2095194**
4000:1	50	***.003"***	***.000025"***	Large	***50*** / 1.27	***±.001"***	**2095195***
8000:1	20	***.0015"***	***.000010"***	152.4 mm / ***6"***	***20*** / 0.50	***±.0005"***	**2095196***
16000:1	10	***.0006"***	***.000010"***	diameter	***10*** / 0.25	***±.0002"***	**2095197**
32000:1	5	***.0003"***	***.000005"***		***5*** / 0.12	***±.0001"***	**2095198**
4000:1M	50	76 µm	0.5 µm		***50*** / 1.27	± 25 µm	**2095199***
8000:1M	20	38 µm	0.2 µm		***20*** / 0.50	± 13.5 µm	**2095200***
16000:1M	10	15.2 µm	0.2 µm		***10*** / 0.25	± 5 µm	**2095201**
32000:1M	5	7.6 µm	0.1 µm		***5*** / 0.12	± 2.5 µm	**2095202**

* *Contingent upon Plug having equivalent range, see chart on pages 7-43 & 7-44.*

Dimensionair® Air Gages (single or dual master system)

Interchangeable Dials

Each Universal Dimensionair is furnished with an adaptor (for connecting standard Mahr Federal air tooling) Optional adaptors are available for virtually any air tooling application.

Features

- Uses regular shop air (40 -150 psig).
- Internal pressure regulators and differential meter assure ultimate stability over full operating range.
- Adjust span and zero setting to tune the gaging range to the interchangeable dial ranges.
- Interchangeable dials provide an easy, inexpensive means to accommodate various ranges
- High visibility meter has fine line graduations and a needle thin hand for clear, precise readings.
- An air filter is included to remove dust and dirt contaminants from airline.
- Tooling mounts to the front of the unit. Adaptors are available for virtually any tooling configuration.

Technical Data

Dial Size diameter mm / ***inch***	82.6 / ***3.25"***
Housing Dimensions	mm 127 x 187 x 197 (high) ***inch 5" x 7.125" x 7.75"***
Weight (including filter) approx.	6.7 kg / 14.25 lbs.
Operating Pressure	414-1034 kPa / 60-150 psig

A plastic protective cover for Universal Dimensionair is available **Order No. ACV-1**

Ordering Information

Universal Dimensionair, complete with air filter and tooling adaptor for standard Mahr Federal single master air tooling. Supplied with one **2242662** Dial. **Order No.2098125**

Optional Dials

	Total Range	Range	Dial Graduations	Magnification	Order No.
(inch)	***.006"***	***±.003"***	***.0001"***	1260:1	**2242760**
	.004"	***±.002"***	***.0001"***	1875:1	**2242761**
	.003"	***±.0015"***	***.00005"***	2500:1	**2242762**
	.002"	***±.001"***	***.00005"***	3750:1	**2242763**
	.0015"	***±.00076"***	***.00002"***	5000:1	**2242764**
	.001"	***±.0005"***	***.00002"***	7500:1	**2242765**
	.0006"	***±.0003***	***.00001"***	10000:1	**2242766**
(metric)	152 µm	± 76 µm	2 µm	1260:1	**2242770**
	100 µm	± 50 µm	2 µm	1875:1	**2242771**
	76 µm	± 38 µm	1 µm	2500:1	**2242772**
	50 µm	± 25 µm	1 µm	3750:1	**2242773**
	38 µm	± 19 µm	0.5 µm	5000:1	**2242774**
	15.2 µm	± 7.6 µm	0.2 µm	10000:1	**2242776**

Tooling Adaptors

Adaptors are available for many standard-tooling configurations:

Thread/Adaptor style	Plug Type / Measured size	Order No.
1/4-28	2.7686 mm / ***.109"*** to 12.547 mm /***.494"***	**AAD-193* AAD-312**
10-32	12.547 mm / ***.494"*** to 23.876 mm / ***.940"***	**AAD-194* AAD-313**
1/2-20	23.876 mm / ***.940"*** to 139.7 mm / ***5.500"***	**AAD-195* AAD-314**
1/8 Barb	3/8-32 Female	**2242767**
Setlock	Moore	**2242777**
8mm	Mahr Row	**2240621**
12mm	Mahr Row	**2240623**
9/32-40	Mahr Federal High Mag	

** Includes bleed to simulate MFI jetting.*

µDimensionair® (single master system)

The µDimensionair is the ultimate of portability and versatility – in your hand or at the workbench or machine tool.

Features

- **Affordable**
- **Versatile**
- **Innovative**
- **Rugged**
- No other air gaging system offers so much – in the palm of your hand – mounted to the workbench or even right to the machine tool. µDimensionair is rated IP54, so, it can be used on the shop floor – and, the air tooling cleans dirt from the part for high performance measurements – fast and easy!
- Air gage readout is right in front of you – simple and clear.
- Fixed resolution and balanced air system makes the gage stable and reliable for your manufacturing environment.
- Single mastering for fast setup.

All other features of the µMaxµm Digital Indicator:

- Inch/metric units
- Digital and analog display
- Bi- and uni-lateral tolerances with presets
- Absolute transducer for eliminating travel errors
- Calibratable – battery retains settings
- Multiple data output formats
- Auto-zeroing
- Normal-reverse settings for ID/OD measurements

Technical Data

Measuring Range mm/inch	**Digital Resolution** mm/inch	**Tooling I.D. Number**
± 0.080/ ***± 0.003"***	0.001/ ***0.00005"***	60
± 0.040/ **± 0.0016"**	0.0005/ ***0.00002"***	50
± 0.020/ ***± 0.00076"***	0.0005/ ***0.00002"***	20

Operating Temperature	5 - 35° C/ 41 - 95° F
Storage Temperature	0 - 60° C / 32 - 140° F
Repeatability	± 1 digit
Calibration Accuracy	± 1 digit
Linear Error	± 1 digit
Response Time	Approximately 1 second
Thermal Stability	0.1% of full scale/F
Data Output	ASCII/Digimatic
Tolerance Indicators	Two – over/under
Weight	25 kg / 5lbs.
Dimensions - Main body	approx. 100 x 60 x 70 mm ***approx. (4" x 2.5" x 3")***
Auto Power Off	15 minutes of non-use
Power Requirements	3 volt lithium battery coin cell, 2 per unit – CR-2450
Battery Life	9 months normal usage – 3000 hours
Air Supply	2.10 ± .01 bar / 30.4 ± .15 psi
Display	Rotates through 270 degrees

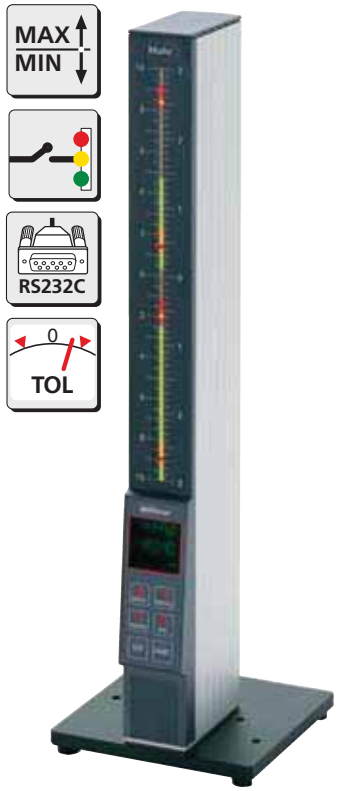
Order no.

	Order no.
µDimensionair, complete with handle, adaptor and hose	**2095389**

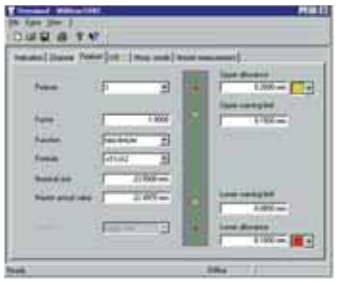
Accessories

	Order no.
Pressure Regulator with filter	**2238020**
Pressure Meter	**2095924**
Bench Kit with adaptor	**2239307**
Output cable – Digimatic	**2001025**
Serial output cable to DB-9 pin	**SCB-4**
Battery 3V type CR-2450	**EBY-1018**
Insulated Handle	**2237666**
Shut off valve	**2240993**
Rest Stand	**2241109**
Swivel Adaptor	**2240594**
Supply Hose to Regulator/Filter	**AHO-2**
Oil and water Trap	**AFL-24**

Millimar S 1840 PE (single or dual master system)



The Millimar S 1840 column amplifier can be programmed either menu-guided via the integrated membrane keypad or with the provided MS Windows® configuration software.



Features

Assess and judge measuring results at a glance – nothing is easier than that with the Millimar S 1840 column amplifier.

The Millimar S 1840 column amplifier offers a broad range of functions for combining the signals from both static and dynamic measurements.

Measuring results are indicated by way of 101 three-color LEDs. When the programmable warning and tolerance limits are exceeded, the LEDs change their color from green to yellow or red, accordingly – high visibility from any distance.

Display
- Three-color illuminated bar graph with analog warning and tolerance limit display
- Two-line backlit LCD for indicating measured values, help texts, and measuring units
- Up to two characteristics can be displayed simultaneously.

Connections
- Single input.
- RS 232 interface.
- Analog output.
- Three digital inputs for measuring start, master measurement, etc.
- Three digital outputs for Accept – Reject – Rework classification, measuring time, etc.

Functions
- Static measurements: ± A, ± B, and all combinations.
- Dynamic measurements: Max, Min, Max-Min, Max+Min, mean.
- Windows® software for configuring the LED display The Millimar S 1840 column amplifier can be programmed either menu-guided via the integrated membrane keypad or with the provided MS Windows® configuration software.
- Single Master or Dual Master setup.
- Password lockout in Setup Mode.

Technical Data

Air/electronic converter for Millimar S 1840 PE

Measuring principle	differential pressure		
Measuring value acquisition	piezo		
Magnification	2500:1	5000:1	10000:1
Pneumatic measuring range in µm (inch)	± 50 ***(±.00196")***	± 25 ***±.00098"***	± 12.5 ***±.00049")***
Resolution	0.1 µm / ***.000005"***		
Measuring error in µm (inch)	< 1 % of measuring range, better 0.5 %		
Signal noise in µm (µinch)	<= 0.4 (15.748)	<= 0.2 (7.874)	<= 0.1 (3.937)
Setting time in sec. (1 m / 3.3 ft hose)	<= 0.3	<= 0.3	<= 0.5
Setting time in sec. (2 m / 6.6 ft hose)	<= 0.5	<= 0.5	<= 0.7
Operating temperature	0 ... 40 °C (32 ... 104 °F)		
Supply pressure (> 4 bar before pressure reducer)	2 bar ± 5 %		
Air supply connection	PU hose, dia 8 x 1 ***(.315 x .0394")***		
Measuring air connection	PU hose, dia. 6 x 1 ***(.236 x .0394")***		
Zero setter (OFFSET)	electrical		
Amplification (GAIN)	electrical		
Air consumption	approx. 1-2 m^3 approx. ***(1.308-2.616 cu.yd.)***		

Order no.

	Order no.
Millimar S 1840 PE/F	
for 1 Air Gage 2500:1 / 5000:1 without Regulator	**5330104***
for 1 Air Gage 10000:1 without Regulator	**5330106***

* *Base with Regulator required and sold separately. Air Supply Kit recommended.*

Accessories

	Order no.
Basefoot	
With 1 Regulator for 1 1840 PE Column Unit	**5330910**
With 2 Regulators for 2 1840 PE Column Units	**5330911**
With 3 Regulators for 3 1840 PE Column Units	**5330912**
Air Supply Adaptor Kit	
Includes AFL-24 Filter and AHO-2 Hose	**2121236**

832 Dimensionair® Air Gaging System (single master system)

Features

- Digital and analog displays in a single unit. Large, high contrast digital readout shows exact deviation from zero; analog display shows measurement conditions at a glance.
- Fixed resolution and balanced air system makes the Digital Dimensionair a stable and reliable system for manufacturing environments.
- Only a single master required to set zero; system is precalibrated for correct magnification.
- Ranges and resolutions for virtually any air gage application, including 2-, 3-, 4- and 6-jet tooling plus AirProbes and JetProbes.
- Dynamics measurement capability.
- RS-232 Output – for communicating with a data collector, computer or printer, permitting statistical process control.
- Master Deviation – enhances measurement by making Auto Zero even more accurate.

Technical Data

Model	Measuring Range	Digital Resolution	Analog Resolution	Tooling I.D. Number
Low Magnification Single or Dual Input	±0.080 mm/ ***±.003"*** ±0.04 0mm/ ***±.0015"*** ±0.020 mm/ ***±.00075"***	0.0002 mm/ ***10µ"***	0.004 mm/ ***150µ"*** 0.002 mm/ ***75µ"*** 0.001 mm/ ***38µ"***	60 50 20
High Magnification Single or Dual Input	±0.008mm/ ***±.0003"*** ±0.004mm/ ***±.00015"***	0.0001 mm/ ***5µ"***	0.0004 mm/ ***15µ"*** 0.0002 mm/ ***8µ"***	10 5

Number of Jets	Voltage/Adaptor	Low Magnification Single Input Order no.	High Magnification Single Input Order no.	Low Magnification Dual Input Order no.	High Magnification Dual Input Order no.
1, 2, 3	110 / U.S.	**2004100**	**2004103**	**2004106**	**2004109**
4	110 / U.S.	**2004101**	**2004104**	**2004107**	**2004110**
6	110 / U.S.	**2004102**	**2004105**	**2004108**	**2004111**
1, 2, 3	240 / International	**2004112**	**2004115**	**2004118**	**2004121**
4	240 /International	**2004113**	**2004116**	**2004119**	**2004122**
6	240 / International	**2004114**	**2004117**	**2004120**	**2004123**

Millimar C 1208 PE / C 1245 PE (single or dual master system)

1208 PE

C 1245 PE

Features

C1208 PE Display
- Background lit LCD-Display with an analog and a two line digital display
- 5 three-color status lamps for warning and tolerance limits
- Up to 2 characteristics can be displayed at the same time.

C1208 PE Functions
- Favorites, frequently required functions can be assigned to the SELECT key
- Static measurements ± A, ± B and all combinations
- Dynamic measurements: Max, Min, Max-Min, Max+Min, mean

C1245 PE Display
- Analog indicator instrument for display of measurement value.
- Two-line LCD display for values and menu text
- 5 three-color status lamps for warning and tolerance limits.
- Up to 3 characteristics can be displayed at the same time.

C1245 PE Functions
- 16 characteristics can be defined using an equation editor (80 characters), input channels C1 to C8 are mathematically linked with factors and brackets using the 4 basic mathematical functions.
- Static measurements: Current value, square root, arc tangent.
- Dynamic measurements: Max, Min, Max-Min, Max+Min, Mean value.
- Statistical functions: n, x-bar, S, Xmax, Xmin, R.
- Measured value memory for 5000 measured values.
- Measurement start / stop via keyboard, digital input, RS232.

Technical Data

		Order no.
Millimar C 1208 PE/F	For 1 Air Gage 2,500:1 / 5000:1 with Regulator	**5312095**
Millimar C 1208 PE/F	For 1 Air Gage 10,000:1 with Regulator	**5312093**
Millimar C 1245 PE/F	For 1 air gage 2,500:1 / 5000:1 with Regulator	**5331271**
Millimar C 1245 PE/F	For 1 air gage 10,000:1 with Regulator	**5331273**
Millimar C 1245 PE/F2	For 2 air gages 2,500:1 / 5000:1 without Regulator	**5331275***
Millimar C 1245 PE/F2	For 2 air gages 10,000:1 without Regulator	**5331277***
Air Supply Adaptor Kit	includes AFL-24 Filter and AHO-2 Hose	**2121236**
*** Baseplate with 2 Regulators**	(required for 2 Air Gage Units)	**5330909**

Air Plugs

Features

- **Calibrated I.D. tooling for the Dimensionair® Air Gaging Systems**
- Tooling is interchangeable without adjusting system magnification.
- Federal Air Plugs have large clearance (see table below), allowing easy entrance into the hole being measured and greater measuring range.
- Long life - wide clearance and high chrome stainless steel body extends useful life of the Air Plug. Chromed steel or other materials for extreme use are available.
- Deep, recessed jets - Air jets are recessed into the plug body which protects them from damage.
- Large jet size eliminates clogging from dirts and oils.

Plug identification

Air Plugs are marked with an identification number which identifies its size, number of jets, plug style, and the Dimensionair® Model the plug should be used with.

For example: **DP50-T2-1.000** is the identification number of an Air Plug for a **2095184** or a standard magnification 832 Dimensionair (DP50), through-hole style with two jets (-T2), and 25 mm/1.000" nominal size (-1.000).

The number (50) which identifies the Dimensionair intended is marked on the plug and also appears on the dial of the Dimensionair to help in matching the tooling to its corresponding Dimensionair Model.

Total Clearance from Nominal Size

Plug Identification	Nominal Size mm/*inch*	To & include above mm/*inch*	Clearance from Nominal Size mm/*inch*
DP100, DP60	6.3/ ***.248"***	76.4/ ***3.004"***	0.081/ ***.0032"***
DP50	3/ ***.123"***	3.5/ ***.140"***	0.015/ ***.0006"***
	3.5/ ***.140"***	4.7/ ***.185"***	0.027/ ***.0011"***
	4.7/ ***.185"***	6.3/ ***.248"***	0.030/ ***.0012"***
	6.3/ ***.248"***	76.5/ ***3.004"***	0.045/ ***.0018"***
	76.5/ ***3.004"***	127/ ***5"***	0.071/ ***.0028"***
	Above 127/ ***5"***		0.081/ ***.0032"***
DP20	3/ ***.123"***	3.5/ ***.140"***	0.009/ ***.00035"***
	3.5/ ***.140"***	4.7/ ***.185"***	0.013/ ***.0005"***
	4.7/ ***.185"***	6.3/ ***.248"***	0.015/ ***.0006"***
	6.3/ ***.248"***	76.5/ ***3.004"***	0.023/ ***.0009"***
	76.5/ ***3.004"***	127/ 5"	0.071/ ***.0028"***
	Above 127/ ***5"***		0.081/ ***.0032"***
DP10	All sizes to 1.75	44.45/ ***1.750"*** up	0.009/ ***.00035"*** 0.014/ ***.00055"***
DP5	All sizes to 1.0	25.4/ ***1.0"***	0.004/ ***.000175"***
	1.75	1.75	0.005/ ***.0002"***
		up	0.0076/ ***.0003"***

Ordering Information

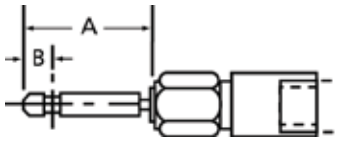
When ordering Air Plugs please specify:
1. Nominal I.D. Size and Tolerance.
2. Dimensionair Model to be used.
3. Air Plug style (Through Hole, Blind Hole, or Counterbore).
4. Air Plug finish (Normally furnished High Chrome stainless steel, or specify chromed steel).
5. Order Master Setting Ring at same time.

Unless otherwise specified, Mahr Federal will furnish a 2-jet, Through Hole, High Chrome Air Plug for a 2500:1 Dimensionair.

Through Hole and Blind Hole Air Plugs

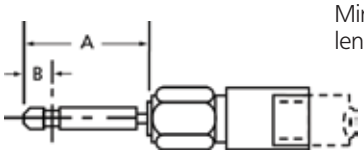
Through Hole Plugs (DP50 - DP20 & 60)

3-3.5 mm / .123-.140"



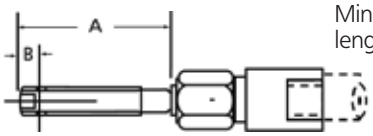
Minimum recommended hole length: .187"

3.5-4.7 mm / .140-.185"



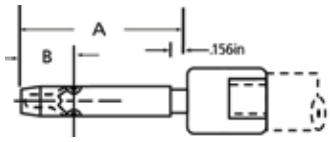
Minimum recommended hole length: .187"

4.7-6.3 mm / .185-.248"



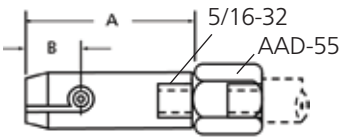
Minimum recommended hole length: .187"

6.3-9.5 mm / .248-.3735"



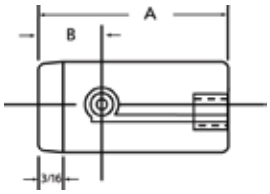
Minimum recommended hole length: .250"
With guide sleeve or stop collar: .070"

9.5-14.93 mm / .3735-.588"



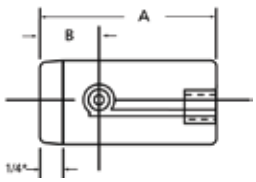
Minimum recommended hole length: .250". With guide sleeve or stop collar: .070".
May be used with AEX-1 or -2 Extensions for deep holes.

14.93-37.7 mm / .588-1.484"



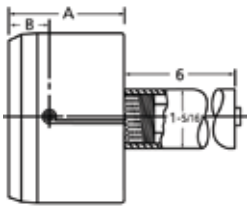
Minimum gageable hole length: .250". With guide sleeve or stop collar: .070". May be used with AHA-4 or -5 Extensions for deep holes.

37.7-76.3 mm / 1.484-3.004"



Minimum recommended hole length: .250". With guide sleeve or stop collar: .070".
May be used with AHA-4 or -5 Extensions for deep holes.

76.3-114.3 mm / 3.004-4.50"



Minimum recommended hole length: .250".
With guide sleeve or stop collar: .070".

Technical Data

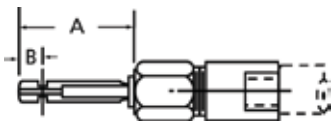
Through Hole Plugs

Above mm/***inch***	To & include mm/***inch***	"A" mm/***inch***	"B" mm/***inch***	Minimum Hole Length* mm/***inch***	Measuring Range DP50 mm/***inch***	DP20 mm/***inch***
3 / ***.123"***	3.5 / ***.140"***	23.8 / ***.9375"***	4.8/ ***.1875"***	4.7/ ***.187"***	0.025/ ***.001"***	0.013/ ***.0005"***
3.5 / ***.140"***	4.7 / ***.185"***	23.8 / ***.9375"***	4.8/ ***.1875"***	4.7/ ***.187"***	0.038/ ***.0015"***	0.020/ ***.00075"***
4.7 / ***.185"***	6.3 / ***.248"***	38 / ***1.5"***	12.7/ ***.500"***	4.7/ ***.187"***	0.051/ ***.002"***	0.025/ ***.001"***
6.3 / ***.248"***	9.5 / ***.3735"***	38 / ***1.5"***	12.7/ ***.500"***	6.4/ ***.250"***	0.076/ ***.003"***	0.038/ ***.0015"***
9.5 / ***.3735"***	14.93 / ***.588"***	38 / ***1.5"***	12.7/ ***.500"***	6.4/ ***.250"***	0.076/ ***.003"***	0.038/ ***.0015"***
14.93 / ***.588"***	37.7 / ***1.484"***	41.3 / ***1.625"***	15.9/ ***.625"***	6.4/ ***.250"***	0.076/ ***.003"***	0.038/ ***.0015"***
37.7 / ***1.484"***	76.3 / ***3.004"***	50 / ***2"***	19/ ***.750"***	6.4/ ***.250"***	0.076/ ***.003"***	0.038/ ***.0015"***
76.3 / ***3.004"***	114.3 / ***4.5"***	50 / ***2"****	19/ ***.750"***	6.4/ ***.250"***	0.076/ ***.003"***	0.038/ ***.0015"***

* *If a guide sleeve or stop collar is used, minimum hole length can be as small as 1.8 mm/.070" for holes larger than 6.3 mm/.248".*
** *A handle 152 mm/6" long and 33.3 mm/1.31" diameter is supplied with plugs over 76.3 mm/3.004".*

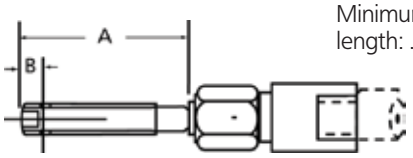
Blind Hole/Counterbore Plugs (DP50 - DP20 & 60)

3.9-4.7 mm / .155-.185“



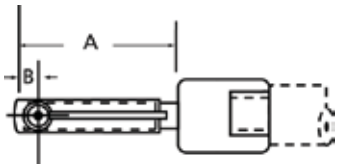
Minimum recommended hole length: .250”.
Note: Masters must simulate workpiece for holes of this size.

4.7-6.3 mm / .185-.248“



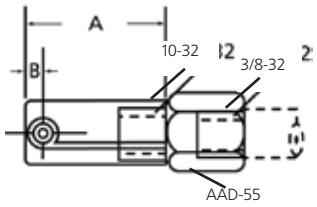
Minimum recommended hole length: .250”.

6.3-9.48 mm / .248-.3735“



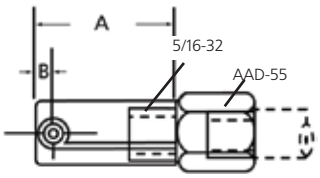
Minimum recommended hole length: .250”.
Shorter bores can be checked. Consult Mahr Federal Customer Resource Center.

9.48-11.8 mm / .3735-.467“



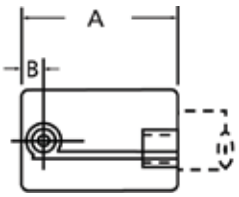
Minimum recommended hole length: .250”.
Shorter bores can be checked. Consult Mahr Federal Customer Resource Center. May be used with Extension AHA-28 for deep holes.

11.8-14.93 mm / .467-.588“



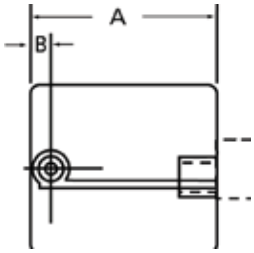
Minimum recommended hole length: .250”.
Shorter bores can be checked. Consult Mahr Federal Customer Resource Center. May be used with Extensions AEX-1 or -2 for deep holes.

14.93-37.7 mm / .588-1.484“



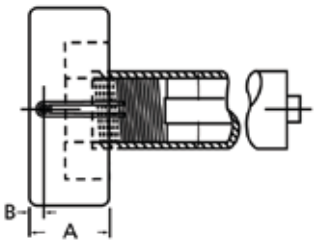
Minimum recommended hole length: .250”.
Shorter bores can be checked. Consult Mahr Federal Customer Resource Center. May be used with AHA-4 or -5 Extensions for deep holes.

37.7-76.30 mm / 1.484-3.004“



Minimum recommended hole length: .250”.
Shorter bores can be checked. Consult Mahr Federal Customer Resource Center. May be used with AHA-4 or -5 Extensions for deep holes.

76.3-108.114.3 mm/3.004-4.50“



Minimum gageable hole length: .250”.

Technical Data

Blind Hole/Counterbore Plugs

Above	To & include	“A”	“B”	Minimum Hole Length*	Measuring Range DP50	DP20
mm/inch	mm/inch	mm/inch	mm/inch	mm/inch	mm/inch	mm/inch
3.9/ ***.155”***	4.7/ ***.185”***	19/ ***.750”***	4/ ***.156”***	6.4/ ***.250”***	0.038/ ***.0015”***	0.01905/ ***.00075”***
4.7/ ***.185”***	6.3/ ***248”***	29.4/ ***1.156”***	4/ ***.156”***	6.4/ ***.250”***	0.051/ ***.002”***	0.025/ ***.001”***
6.3/ ***.248”***	11.8/ ***.467”***	29.4/ ***1.156”***	4/ ***.156”***	6.4/ ***.250”***	0.076/ ***.003”***	0.038/ ***.0015”***
11.8/ ***.467”***	14.93/ ***.588”***	29.4/ ***1.156”***	4/ ***.156”***	6.4/ ***.250”***	0.076/ ***.003”***	0.038/ ***.0015”***
14.93/***.588”***	37.7/ ***1.484”***	29.4/ ***1.156”***	4/ ***.156”***	6.4/ ***.250”***	0.076/ ***.003”***	0.038/ ***.0015”***
37.7/ ***1.484”***	76.3/ ***3.004”***	35.7/ ***1.406”***	4/ ***.156”***	6.4/ ***.250”***	0.076/ ***.003”***	0.038/ ***..0015”***
76.3/ ***3.004”***	114.3/ ***4.5”***	38/ ***1.5”****	4/ ***.156”***	6.4/ ***.250”***	0.076/ ***.003”***	0.038/ ***.0015”***

** A handle 152 mm/ 6“ long and 33.3 mm / 1.31” diameter is supplied with plugs over 76.3 mm / 3.004”*

Contact Mahr Federal Customer Resource Center with your requirements

Super Blind Plugs

Blind Hole Air Plugs can be furnished to check shorter holes than listed, and can be furnished to check closer to the bottom of a hole. Holes must be at least 2.8 mm/ .110” long, and the distance from the end of the plug to the center-line of the jets can be as short as 2.2 mm/ .085” for plugs below 6.3 mm/ .248” or 1.9 mm/ .075” for plugs above 6.3 mm/ .248”.

Air Gaging Instruments

Accessories

Handles and Extensions

When an Air Plug is used with a hose, it should be equipped with a Handle to avoid excessive strain on the air connection and corrosion on the polished plug body. Handles may be combined for gaging deep holes.

Selection of a handle or extension is determined by the bore itself and whether or not it is preceded by a larger C-bored diameter. Corresponding thread sizes of the handle or extension must also be considered.

If no portion of the handle or extension enters the part, only thread sizes must be considered. If the plug does enter the part, then both O.D. and thread size must be considered.

AHA-4 and **AHA-5 Extensions** – accept AHO-1 Hose on one end and the following plug sizes on the opposite end: all 1250:1 thru 8000:1 plugs up to 76.3 mm / 3.004".

AHA-6 Handle – accepts AHO-1 Hose on one end and the following plug sizes on the opposite end: all 1250:1 thru 8000:1 plugs up to 76.3 mm / 3.004".
Has Bakelite insulating cover. Recommended for 37.7 mm / 1.484" up to 76.3 mm / 3.004" diameters.

2237666 – High impact and coolant resistant, light weight composite handle – normally furnished with uDimensionair and air snaps.

AHA-66 and **2236070** – light weight aluminum handles without or with air shutoff valve.

AHA-15 Handle – Used and furnished with 1250:1 thru 8000:1 through or blind hole plugs over 76.3 mm / 3.004".

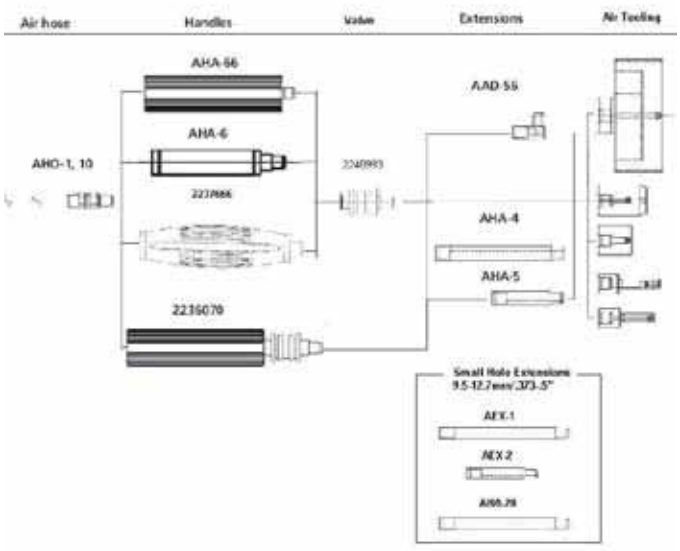
AHA-23 and **AHA-24 Handles** – Used with 10000:1 thru 32000:1 plugs.

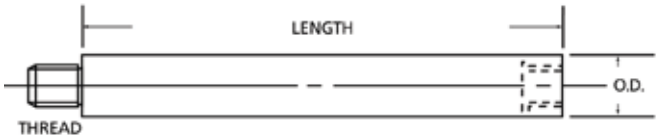
AHA-28 Handle – Used with 2500:1 thru 8000:1 blind hole plugs in the 9.48 mm / .3735" to 11.8 mm / .467" range, using an AAD-315 Adaptor.

AEX-1 and **AEX-2 Extensions** – Used with 2500:1 thru 8000:1 through hole air plugs in the 9.5 mm / .3735" to 14.93 mm / .588" range and with 11.8 mm / .467" to 14.93 mm / .588" range blind hole plugs, using an AAD-55 Adaptor.

2201975 – extension used with BA-100 adjustable base. Provides easily configured base for bench-mounted air tooling fixturing. See Dimentron Plugs (Chapter 9. MaraMeter).

Accessory Configuration for DP60/DP50/DP20 Systems – Low Magnification





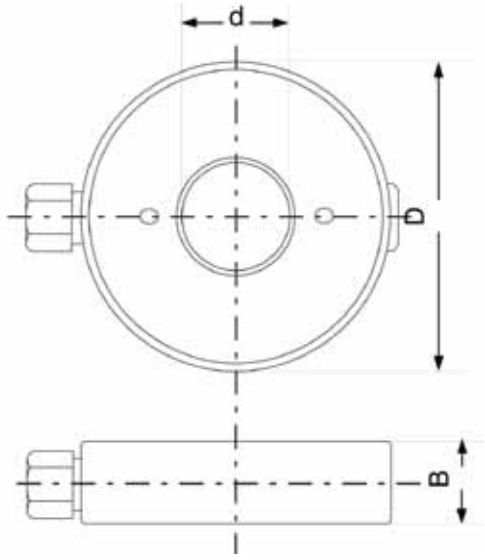
Order no.	Thread	O.D. mm/*inch*	Length mm/*inch*
AHA-4	3/8-32	12.07/ ***.475"***	102/ ***4"***
AHA-5	3/8-32	12.07/ ***.475"***	51/ ***2"***
AHA-6	3/8-32	19/ ***.750"***	102/ ***4"***
AHA-15	1-1/8-18	33.4/ ***1.315"***	152/ ***6"***
AHA-20	3/8-32	12.7/ ***.500"***	144.8/ ***5.7"***
AHA-23	9/32-40	9.14/ ***.360"***	51/ ***2"***
AHA-24	9/32-40	9.14/ ***.360"***	102/ ***4"***
AHA-28	10-32	9.14/ **.360"**	102/ ***4"***
AEX-1	5/16-32	9.02/ ***.355"***	51/ ***2"***
AEX-2	5/16-32	9.02/ ***.355"***	102/ ***4"***
2201975*	3/8-32	9.5/ ***.374"***	61.7/ ***2.43"***

** Use on BA-100*

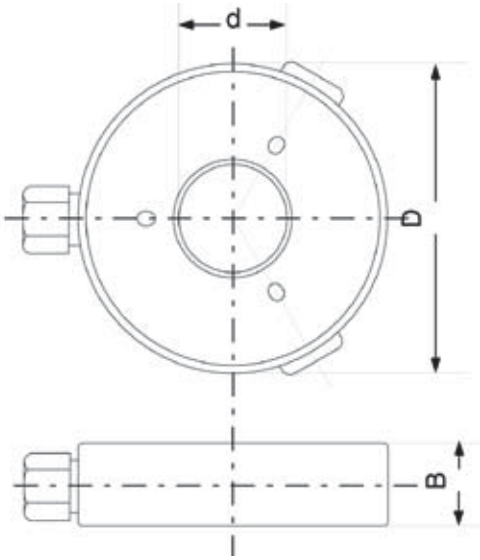
Accessories for High Magnification Systems – DP10/DP5

Dimensionair® Air Rings

Air rings are supplied in several styles for external measuring. Two and three jet rings are most common, used for checking outside diameters for sizes out of round conditions from 6.3 mm/ .248" to 63.5 mm/ 2.500". Four and six jet rings are also available for special applications. All Air Rings have chrome-plated wear surfaces unless otherwise specified.

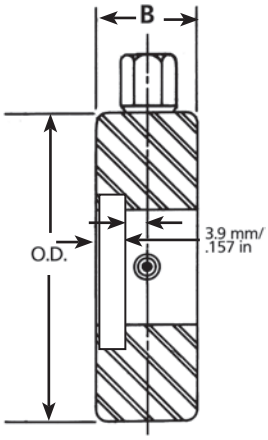


Jet air ring gage with 2 measuring jets

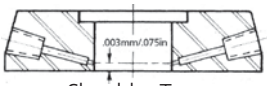


Jet air ring gage with 3 measuring jets

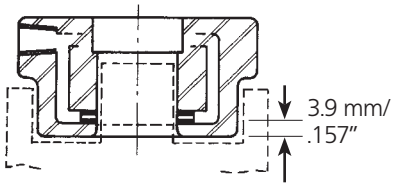
For applications where O.D.'s need to be checked near a shoulder, or where part length is restricted, contact Mahr Federal for technical assistance about shoulder and SnoutType Air Rings.



Counterbore Type



Shoulder Type
(for 2500:1 & 4000:1
5000:1 & 8000:1 only)



Snout Types

Technical Data

Diameter d mm/*inch*	Diameter D mm/*inch*	Width B mm/*inch*
6.3-7.6/ ***.248-.299"***	76.2/ ***3.00"***	25.4/ ***1.00"***
7.6-9.3/ ***.299-.366"***	76.2/ ***3.00"***	25.4/ ***1.00"***
9.3-13.0/ ***.366-.512"***	76.2/ ***3.00"***	25.4/ ***1.00"***
13.0-21.0/ ***.512-.827"***	76.2/ ***3.00"***	25.4/ ***1.00"***
21.0-25.4/ ***.827-1.00"***	76.2/ ***3.00"***	25.4/ ***1.00"***
25.4-38.4/ ***1.00-1.51"***	101.6/ ***4.00"***	25.4/ ***1.00"***
38.4-44.5/ ***1.41-1.75"***	101.6/ ***4.00"***	25.4/ ***1.00"***
44.5-50.8/ ***1.75-2.00"***	127.0/ ***5.00"***	25.4/ ***1.00"***
50.8-63.5/ ***2.00-2.50"***	127.0/ ***5.00"***	25.4/ ***1.00"***
63.5-76.2/ ***2.50-3.00"***	139.7/ ***5.00"***	25.4/ ***1.00"***

When ordering ring gages, please specify the following:

- Nominal workpiece dimensions
- Tolerance
- Desired magnification
- Instrument used
- Setting plug to be supplied?

Air Rings may be attached directly to a Dimensionair or used on a base and connected to the gage with a plastic hose. Vee type Guide Chutes can be furnished on one or both sides if Air Rings from 6.3 mm / .248" through 44.5 mm / 1.750". Tube type guide can be furnished on sizes from 6.3 mm / .248" through 63.5 mm / 2.500".

Air Gaging Accessories

Magnification Kits

Magnification Kits provide a means for checking Amplifier accuracy, traceable to the National Institute of Standards and Technology (NIST). Each Kit contains restrictors that provide pressure characteristics at zero and at both ends of the scale, a calibrated dial diagram and a Certification of Calibration.

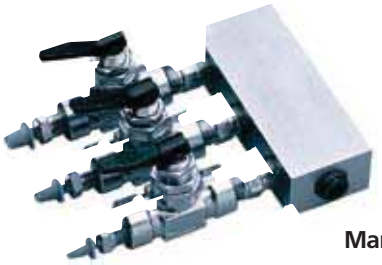
Order No.	For use with:	Tooling
AMR-SPEC-136	1250:1	DP/DR100
2094182	1260:1	DP/DR60
AMR-12	2500:1/4000:1	DP/DR50
AMR-13	5000:1/8000:1	DP/DR20
AMR-14	10000:1/16000:1	DP/DR10
AMR-15	20000:1/32000:1	DP/DR5

AMR-12

Manifolds

Manifolds allow connecting multiple pieces of air tooling to one Dimensionair. Toggle valves allow activation of the selected tool. Manifolds are compatible with Dimensionairs 1250:1 through 8000:1M Manifolds for use with other Dimensionairs, contact Mahr Federal Customer Resource Center – **1-800-333-4243.**

Order No.	Description
AAD-82	2-way Manifold
AAD-83	3-way Manifold
AAD-84	4-way Manifold
AAD-85	5-way Manifold



Manifold AAD-83

Hoses

Supply hoses and hoses between Dimensionair and air tooling.

Order No.	Description	Thread
AHO-2	1.5 m / 5 ft Air Supply Hose. Fits all Dimensionair models. (rubber)	7/16-20
AHO-1	0.9 m / 3 ft Air hose for tooling for Models 1250:1 – 8000:1. (Tygon)	3/8-32
AHO-8	1.5 m / 5 ft Air hose for tooling on Models 1250:1 – 8000:1. (Tygon)	3/8-32
AHO-10	1.8 m / 6 ft Air hose for Models 1250:1 – 8000:1. (Tygon)	3/8-32
AHO-20	0.9 m / 3 ft Air hose for tooling on Models 10000:1 – 32000:1. (Tygon)	9/32-40
ARG-1	Replacement O-ring for AHO-1, -8, -10 Hoses and AHA-4, -5, -6, -20 Handles.	
ARG-6	Replacement O-ring for AHO-20 Hose, AHA-23 and -24 Handles.	
ARG-10	For AEX-1, AEX-2 and AHA-28	

Traps and Filters

Good gaging practice requires clean, dry air for gage performance. Dimensionair Models are furnished with a particle filter. Shop air contains water and oil, which should be removed, using Model **AFL-24** Oil and Water Separator Trap.

Order No.	Description
AFL-10	Particle Filter (normally furnished on all Dimensionair Models). Filter size: 5 microns; Maximum pressure: 250 p.s.i.; maximum working temperature: 175°F.
AFL-24	Oil and Water Separator Trap, includes mounting hardware. Filtering capacity: 99.7% removal of oil and water; filter size: 3-6 microns; maximum pressure: 150 p.s.i.; flow rate: 20 cubic feet of air/minute @ 80 p.s.i.
AFL-23	Replacement cartridge for AFL-24.
AFL-21	Replacement cartridge for AFL-10.
AAD-263	Retrofit Kit for AFL-9

AFL-24 Trap

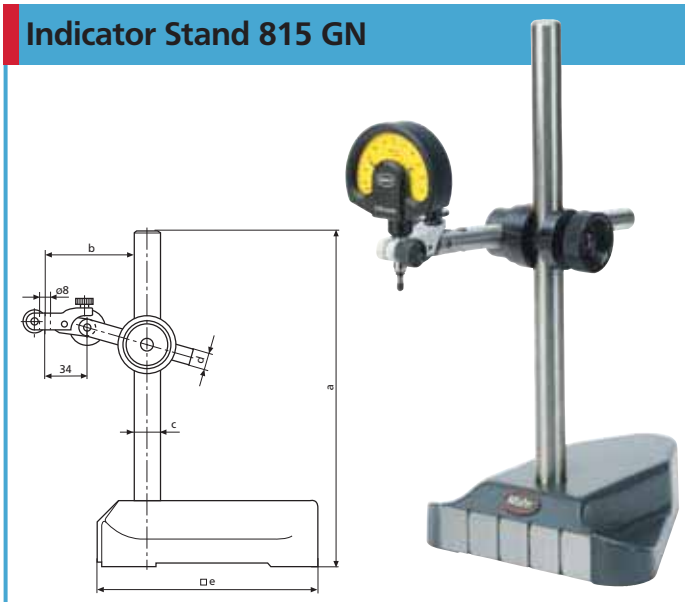
YOUR STABLE PARTNER FOR MANUFACTURING.
MARSTAND.

The latest information on MARSTAND products can be found on our website:
www.mahr.com, WebCode 210

► | MarStand Indicator Stands, Comparator Stands and Run out Testing Instruments offer high stablity which ensures precise measurements. Whether you are using a dial indicator, a dial comparator, a test indicator or a measuring probe you will always have the best possible support. | ◄

► | MarStand. Indicator Stands, Comparator Stands, Run out Testing Instruments

Indicator Stand 815 GN



Features

- Rugged base ensures both maximum stability and sturdiness
- The upper side of the base has a convenient hand grip
- Moves easily over surfaces without vibration
- Front of the base is ground to allow movement of the stand along edges and rules
- Stable due to the three point support
- Support arm can be fine adjusted
- Post and support arm are made from stainless steel
- Indicator can be rotated through ± 90°

Technical Data

Total height with base a mm / *inch*	Max. projection of support arm b mm	Post dia. c mm	Post dia. d mm	Base surface e mm	Fine adjustment range mm	Weight kg	Order no.* Mount dia. 8H7	Order no.* Mount dia. 3/8 inch
300 / ***12"***	185	18	14	150 x 150	2	4.2	**4413000**	**4413050**
500 / ***20"***	200	25	18	190 x 180	2	9	**4413001**	**4413051**
750 / ***30"***	230	35	25	190 x 180	2	10	**4413005**	**4413052**

* *excludes indicating instrument*

Indicator Stand 2400

Features

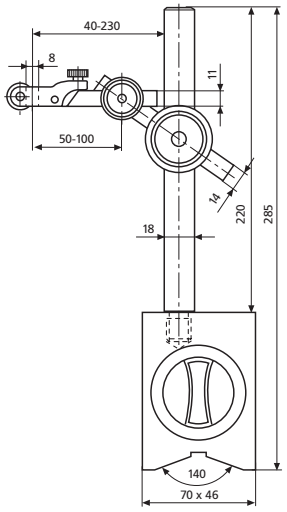
- A stable Height Stand for electronic measurement,
- Fine adjustment in the base allows easy operator set-up, even at high magnification. Up to 3.8 mm / .150" adjustment when arms fully extended.
- Collar has Teflon bearings and metal-to-metal clamping.
- Post is thermally isolated from heat transfer from the base.
- Arm lock is independent of the pivot lock.
- Uses vertical lug mounting
- EHE-2056 Lever gage head mounts directly to arm (as shown) EHE-2048 Lever gage head requires an EAM-1071 adaptor
  CP-83 Extra arm and swivel clamp assembly (allows mounting two lever gage heads on one stand)

Technical Data

Total height with base mm / *inch*	Arm reach mm / *inch*	Post dia. force mm / *inch*	Base surface mm / *inch*	Fine adjustment range mm / *inch*	Order no.*
530 / ***20.8"***	254 / ***10"***	38.1 / ***1.25"***	161.7 x 94 / ***6.2 x 3.7"***	3.8 / ***1.5"***	**2400**

* *excludes indicating instrument*

Indicator Stand 815 MA with magnetic base



Features

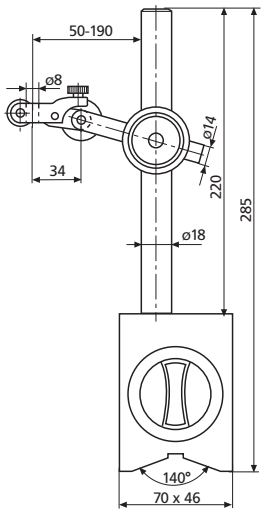
- Support arm with two joints
- Base has a powerful ON/OFF permanent magnet
- Magnetic force is active across the surfaces and the V-shaped bottom plus the front of the base
- Post and support arm are made from stainless steel
- Support arm can be fine adjusted

Technical Data

Total height with base mm / ***inch***	**V-way for shaft dia.** mm	**Magnetic force** N	**Fine adjust-ment range** mm	**Weight** kg	**Order no.*** Mount dia. 8H7	**Order no.*** Mount dia. 3/8 inch	**Order no. wooden case**
285 / ***11.2"***	20 - 100	450	2	2.5	**4416000**	**4416050**	**4416001**

* *excludes indicating instrument*

Indicator Stand 815 MB with magnetic base



Features

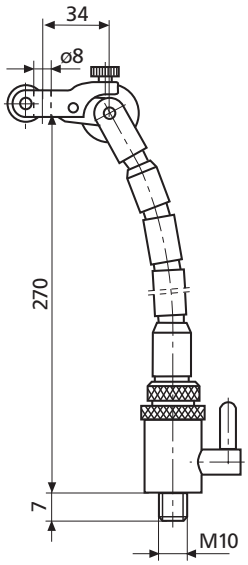
- Support arm with one joint
- Base has a powerful ON/OFF permanent magnet
- Magnetic force is active across the surfaces and the V-shaped bottom plus the front of the base
- Post and support arm are made from stainless steel
- Support arm can be fine adjusted
- Indicating instrument can be rotated through ± 90°

Technical Data

Total height with base mm / ***inch***	**V-way for shaft dia.** mm	**Magnetic force** N	**Fine adjust-ment range** mm	**Weight** kg	**Order no.*** Mount dia. 8H7	**Order no.*** Mount dia. 3/8 inch	**Order no. wooden case**
285 / ***11.2"***	20 - 100	450	2	2.2	**4417000**	**4417050**	**4416001**

* *excludes indicating instrument*

Indicator Stand 815 MG with flexible stem



Features

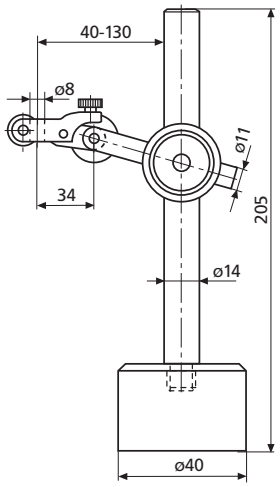
- Flexible in any direction, arm can be locked in position
- The sleeves and grounded steel balls of the stem are compressed with a strong steel cable
- Clamping force is adjustable
- Base has a powerful ON/OFF permanent magnet
- Magnetic force is active across the surfaces and the V-shaped bottom plus the front of the base
- Support arm can be fine adjusted
- Indicating instrument can be rotated through ± 90°

Technical Data

Total height with base mm / ***inch***	**V-way for shaft dia.** mm	**Magnetic force** N	**Fine adjust-ment range** mm	**Weight** kg	**Order no.*** Mount dia. 8H7	**Order no.*** Mount dia. 3/8 inch	**Order no. wooden case**
350 / ***14"***	20 - 100	450	1.5	1.9	**4420000**	**4420001**	**4416001**

* *excludes indicating instrument*

Indicator Stand 815 P with magnetic base



Features

- Support arm has one joint
- Sturdy circular base with permanent magnet
- Post and support arm are made from stainless steel
- Support arm can be fine adjusted
- Indicating instrument can be rotated through ± 90°

Technical Data

Total height with base mm / ***inch***	**Magnetic force** N	**Fine adjust-ment range** mm	**Weight** kg	**Order no.*** Mount dia. 8H7	**Order no.*** Mount dia. 3/8 inch
205 / ***8"***	250	1.5	0.7	**4422000**	**4422050**

* *excludes indicating instrument*

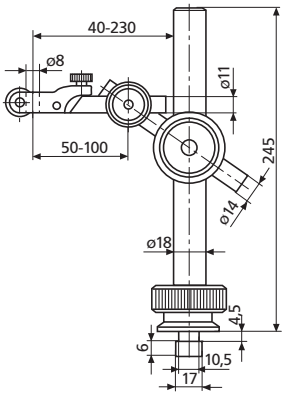
Post and Support Arm Assemblies 815 X

For application in inspection equipment for conducting length and concentricity (run-out) tests

815 XN
for mounting in a T-slot

- Two joints
- Knurled nut for clamping to the post
- Post and support arm are made from stainless steel
- With fine adjustment

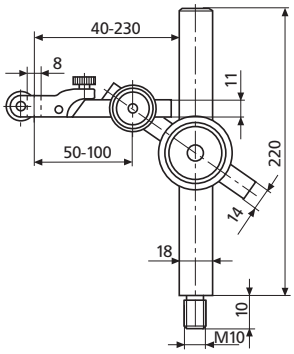
Order no. **4424000**



815 XMA
with mounting thread

- Two joints
- Post and support arm are made from stainless steel
- With fine adjustment

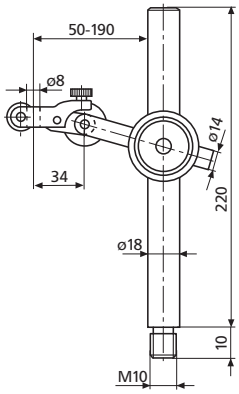
Order no. **4424005**



815 XMB
with mounting thread

- One joint
- Post and support arm are made from stainless steel
- With fine adjustment

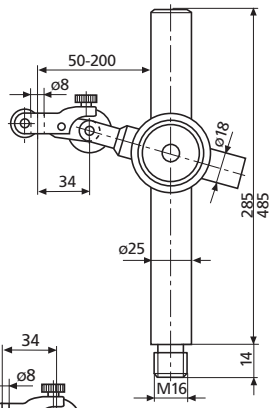
Order no. **4424006**



815 XMS
especially stable version with mounting thread

- One joint
- Post and support arm are made from stainless steel
- With fine adjustment

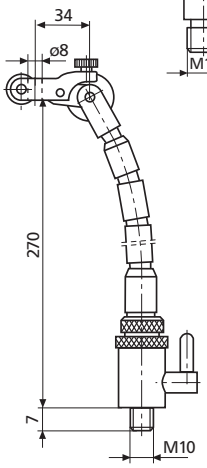
Post height	**Order no.**
285 mm	**4435011**
485 mm	**4435015**



815 XMG
with mounting thread

- Flexible in any direction, arm can be locked in position
- With fine adjustment

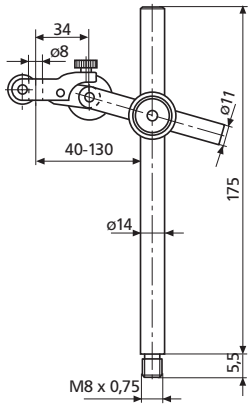
Order no. **4424010**



815 XP
with mounting thread

- One joint
- Post and support arm are made from stainless steel
- With fine adjustment

Order no. **4424015**



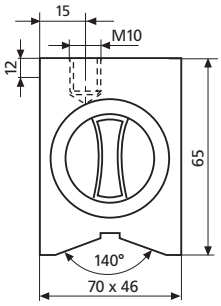
Magnetic Bases 815 Y

For the setting up of inspection equipment or as a base for adjusting devices on machine tools.

815 YM Standard Version

- Base has a powerful ON/OFF permanent magnet
- With threaded mounting hole
- V-groove in base
- Front is flat
- Magnetic force 450 N

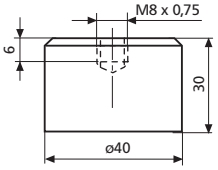
Order no. **4425000**



815 YP Round Version

- Permanent magnet plus threaded mounting hole
- Underside of the base is flat
- Magnetic force 250 N

Order no. **4425002**



Center Bench 818

Features

- Ideal for quick and accurate concentricity / run-out checks

Bench:
- Flatness of the surface is in accordance to DIN 876/1
- Two T-slots for Tailstock and / or Support Arm

Tailstock:
- Both Tailstocks can be relocated (slide into position)
- The Tailstock on the right side has a retractable (spring actuated) precision aligned center
- The Tailstocks have a peak height of 75 mm with a 90° prism for workpieces without a center, to a diameter of 20 mm (0.79")

Support Arm 815 XNB:
- Support arm with one joint
- with fine adjustment

Technical Data

Height of centers mm	*(inch)*	Distance between centers mm	*(inch)*	Base size (L x W) mm	Lateral and/or height difference of Tailstocks mm	T-slot width mm	Weight kg	Order no.*
50	***(2")***	0 - 200	***(0-8")***	350 x 110	0.01	10H7	8	**4622200**
75	***(3")***	0 - 350	***(0-14")***	500 x 110	0.01	10H7	12	**4622201**
100	***(4")***	0 - 450	***(0-18")***	700 x 180	0.01	12H7	35	**4622202**
150	***(6")***	0 - 450	***(0-18")***	700 x 180	0.01	12H7	38	**4622203**

* *excludes indicating instrument*

Center Bench 818 with V-support

V-support height mm	Base size (L x W) mm	T-slot width mm	Weight kg	Order no.
70	350 x 110	10H7	6.5	**4622260**
70	500 x 110	10H7	9,5	**4622261**
120	700 x 180	12H7	30	**4622262**

Center Bench 818 with Roller support

Roller support height mm	Base size (L x W) mm	T-slot width mm	Weight kg	Order no.
70	350 x 110	10H7	6.5	**4622250**
70	500 x 110	10H7	9,5	**4622251**
120	700 x 180	12H7	30	**4622252**

Modular Units 818 for individual center benches

Accessories

818 pe V-support anvils in pairs

Center height mm	Dia. range mm	Order no.
50 / 75	3 - 15	**4622210**
100	8 - 45	**4622211**

818 pb V-support in pairs

Height mm	Dia. range mm	T-slot width mm	Order no.
70	5 - 20	10	**4622215**
120	5 - 45	12	**4622216**

818 ab Roller support in pairs

Height mm	Dia. range mm	T-slot width mm	Order no.
70	3 - 20	10	**4622220**
120	3 - 45	12	**4622221**

Supporting table

Center height mm	Base size (L x W) mm	Order no.
50	350 x 110	**4622265**
75	500 x 110	**4622266**
100 / 150	700 x 180	**4622267**

Pointed support in pairs

Center height mm	Order no.
50	**4622270**
75	**4622271**
100	**4622272**
150	**4622273**

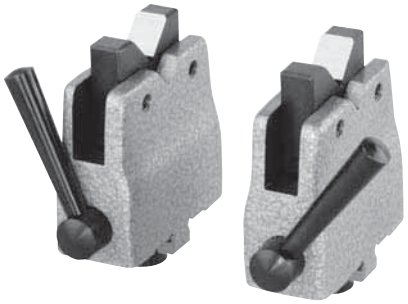
Support arm 818 XNB

Center height mm	Support Arm Dia. mm	Length mm	Order no.
50 / 75	18	210	**4622275**
100	18	260	**4622276**
150	18	360	**4622277**

818 pe

818 ab

818 pb

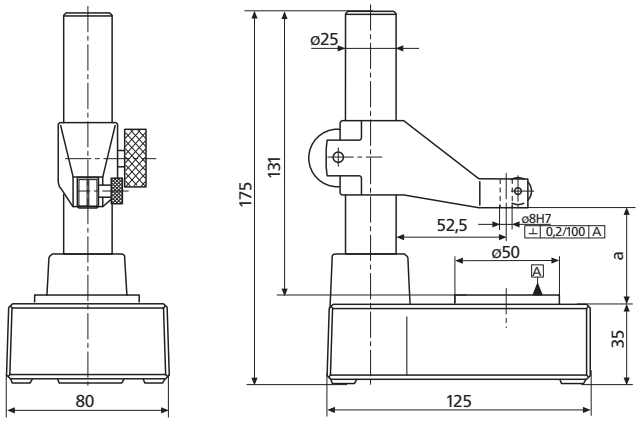


Small Comparator Stands 820

820 N

Features

- Sturdy design
- Plate is made from either hardened steel or black granite or ceramic
- Rugged ground post made of stainless steel
- Fine adjustment, consisting of a strong, rigid parallel spring assembly (Small Comparator Stands 820 FG and 820 FC)
- Adjustable support arm of a indicating instrument



820 N

Technical Data

	Working range a mm	*(inch)*	Grade	Flatness tolerance (DIN 876) mm	Fine adjustment range	Weight kg	Order no.* Mount dia. 8H7	Order no.* Mount dia. 3/8 inch	Remarks
820 N	0 - 110	***(0 - 4.3")***	steel	00		2.6	**4430000**	**4430018**	
820 NG	0 - 130	***(0 - 5.1")***	granite	0		3.2	**4430100**	**4430110**	
820 FG	0 - 130	***(0 - 5.1")***	granite	0	± 0.2	3.2	**4431100**	**4431110**	fine adjustment
820 NC	0 - 110	***(0 - 4.3")***	ceramic	00		4.0	**4432100**	**4432120**	
820 FC	0 - 110	***(0 - 4.3")***	ceramic	00	± 0.2	4.0	**4433100**	**4433110**	fine adjustment

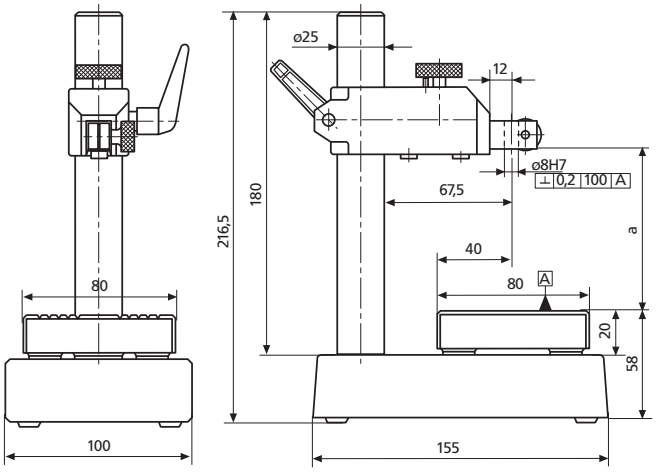
* *excludes indicating instrument*

Small Comparator Stands 820

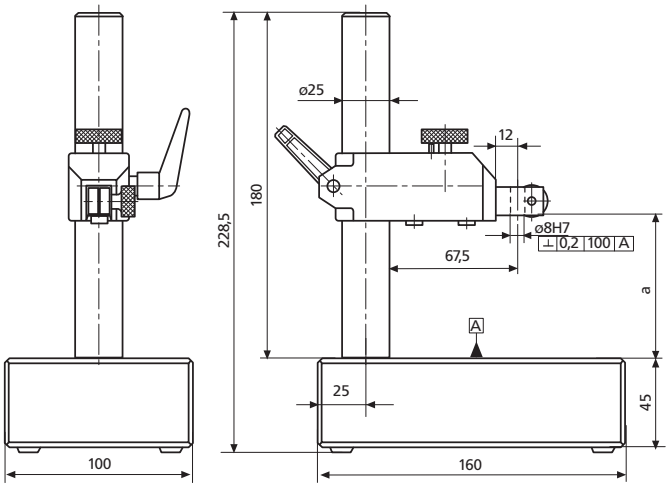
820 FC

820 FG

820 FC



820 FG



Accessories

V-Block 108° for checking small, cylindrical work pieces for out of roundness and polygon errors (for further details please refer to Page 12-8)

		Order no.
107 V	(Single)	**4229000**
	(Pair)	**4229001**

Comparator Stands 35 B

Excludes indicating instrument. Only indicating instruments that have a horizontal lug back can be used.

Features

- Model 35B has a precision ground base. Indicator arms with and without fine adjustment are available. Models are also available with lapped anvils for the highest precision work.
- Alternate post lengths, Indicators, Anvils and special fixturing available upon request. Contact Mahr Federal Technical Assistance

Technical Data

Capacity	Post Diameter	Throat Depth	Reference Surface	Gaging Arm	Anvil	Order no. (w/o indicator)
0 - 8.75" 0 - 222 mm	***1.25"*** 31.75 mm	***2.5"*** 62.5 mm	***1 x 3"*** 25 x 75 mm	adjustable AM-146	plain	**OMI-35B-21**
				plain AM-3	none	**OMI-35B-30**
				adjustable AM-146	none	**OMI-35B-32**
				adjustable AM-146	serrated	**OMI-35B-41**

Accessories

Replacement Anvils

- Anvils for Comparator Stands 35B-21 and 35B-41 are available: Surface is lapped flat to within .00001"

Type	Dimensions	Order no.
plain surface	25 x 25 x 75 mm ***(1 x 1 x 3")***	**AL-96**
serrated surface	25 x 25 x 75 mm ***(1 x 1 x 3")***	**AL-97**

Fine Adjustment Arm

- The Fine Adjust Arm is available separately to convert 35B Comparator Stands with plain arms

Range	Order no.
1.5 mm / **0.060"**	**AM-146**

Readout Specification: Because of the versatility of the Series 35B and NB-60 Stands, almost any type of readout can be used.

- With Dial or Digital Indicators having a horizontal lug back

Comparator Stand NB-60

Excludes indicating instrument. Only indicating instruments that have a horizontal lug back can be used.

Features

- Model NB-60 and NB-61 have the largest base and greatest throat depth. Indicator arms with and without fine adjust are available. Base has a pattern of 1/4-20 tapped holes for mounting platens or special tooling

Technical Data

Capacity	Post Diameter	Throat Depth	Reference Surface	Gaging Arm	Anvil	Order no. (w/o indicator)
0 - 8"	***1.25"***	***4.88"***	***9.38 x 6.5"***	plain AM-10011	none	**OMI-NB-60**
0 - 203 mm	31.75 mm	124 mm	238 x 165 mm	adjustable AM-147	none	**OMI-NB-61**

Accessories

Platens

Type	Dimensions	Order no.
serrated	114 x 152 mm ***(4.5 x 6")***	**PL-99**
serrated	152 x 203 mm ***(6 x 8")***	**PL-147**

Note: (4) screws SW-1338 are required

Fine Adjustment Arm

- The Fine Adjust Arm is available separately to convert NB-60 Comparator Stands with plain arms

Range	Order no.
1.5 mm / ***0.060"***	**AM-147**

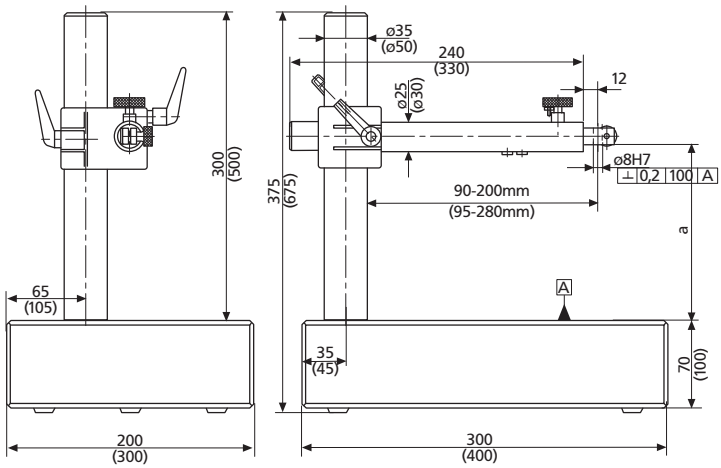
Readout Specification: Because of the versatility of the Series 35B and NB-60 Stands, almost any type of readout can be used.

- With Air Probes or Electronic Probes having a 3/8 in dia., order Mounting Adapter **AAD-66**

Large Comparator Stands 821

Features

- Extremely sturdy design
- Plate is made from lapped black granite
- Heavy duty post and adjustable support arm for maximum stability
- Post made from stainless steel and precision ground
- Support arm has a fall brake
- Fine adjustment, consisting of a strong, rigid parallel spring assembly (Large Comparator Stand 821FG)



821 FG

Technical Data

	Working range a mm	*(inch)*	Flatness tolerance (DIN 876) Grade	Fine adjustment range mm	Weight kg	Order no.* Mount dia. 8H7	Order no.* Mount dia. 3/8 inch	Remarks
821 NG	0 - 250	***(0 -10")***	0	-	15.8	**4435100**	**4435150**	
	0 - 430	***(0 -17")***	0	-	48	**4435110**	**4435160**	
821 FG	0 - 250	***(0 -10")***	0	± 0.2	15.8	**4435101**	**4435151**	Fine adjustment
	0 - 430	***(0 -17")***	0	± 0.2	48	**4435111**	**4435161**	Fine adjustment

* *excludes indicating instrument*

Accessories

V-Block 108° for checking small, cylindrical work pieces for out of roundness and polygon errors (for further details please refer to Page 12-8)

		Order no.
107 V	(Single)	**4229000**
	(Pair)	**4229001**

Heavy Comparator Stands 824

Precision Stand 824 NT

Without fine adjustment

Precision Stand 824 FT

With fine adjustment, consisting of a strong, rigid parallel spring assembly

Precision Stand 824 GT

For Large Type Millimess. With fine adjustment by way of vertical movement of the mounting socket

Features

Basic Units

- Sturdy, T-shaped base which is made from a special cast iron
- Extremely stable
- Fine adjustment, consisting of a strong, rigid parallel spring assembly
- Support arm has a rotation lock, height of the arm via the toothed rack is adjustable

Plates

- Measuring faces are hardened and lapped
- Longitudinal grooves
- Plates for sum measurements have a 8H7 mm mounting hole for Inductive Probes

Technical Data

Basic Unit

	Working range mm	*(inch)*	Fine adjustment range mm	Weight kg	Order no.* Mount dia. 8H7	Order no.* Mount dia. 28H7	Order no.* Mount dia. 3/8 inch
824 NT	0 - 210	***(0 - 8.2")***	-	17	**4442100**		**4442105**
824 FT	0 - 210	***(0 - 8.2")***	± 0.2	19	**4443100**		**4443105**
824 GT	0 - 200	***(0 - 8.0")***	± 1.5	18		**4444200**	

* *excludes indicating instrument, excludes plate*

Plates

	Plate size mm	Flatness tolerance µm	Mounting hole mm	Weight kg	Order no.	Remarks
827 b 31	100 x 40	1		1.2	**4082731**	for single measurement
827 b 32	100 x 40	1	8H7	1.0	**4082732**	for sum measurement
827 b 33	130 x 130	1		2.5	**4082733**	for single measurement
827 b 34	130 x 130	1	8H7	2.5	**4082734**	for sum measurement

Accessories

V-Block 108° for checking small, cylindrical work pieces for out of roundness and polygon errors (for further details please refer to Page 12-8)

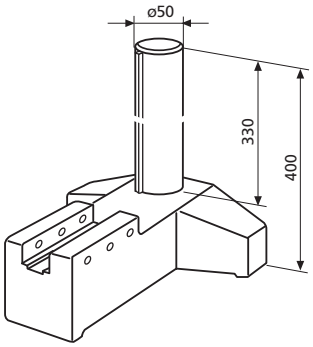
		Order no.
107 V	(Single)	**4229000**
	(Pair)	**4229001**

Modular Units 827 for individual comparator stands

For the combination of comparator stands for special tasks, to adapt existing stands as well as the incorporation into inspection equipment for all types of length measurements.

Base with Post

827 b 5

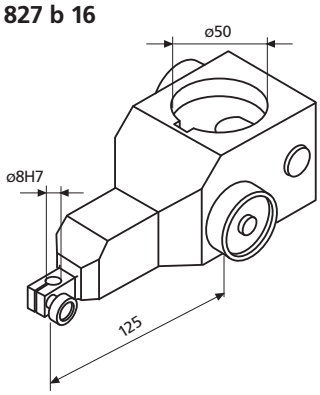


- T-shaped base which is made from a special cast iron
- Post has a chrome finish

Order no. **4082705**

Support Arms

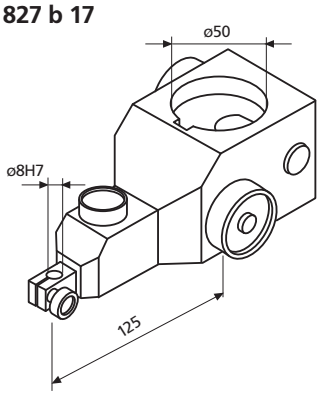
827 b 16



- Mounting hole 8 mm
- Without fine adjustment

Order no. **4082716**

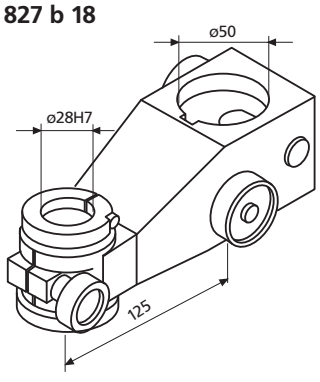
827 b 17



- Mounting hole 8 mm
- Fine adjustment, consisting of a strong, rigid parallel spring assembly

Order no. **4082717**

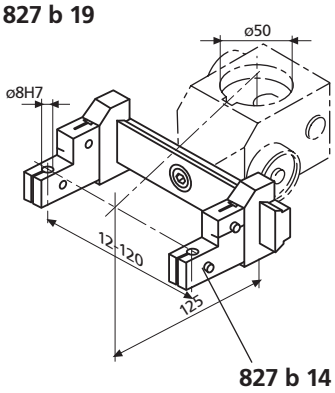
827 b 18



- Mounting hole 28 mm
- With fine adjustment

Order no. **4082718**

827 b 19



827 b 14

827 b 19
- Support arm with dovetail guide

Order no. **4082719**

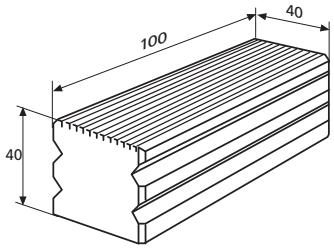
827 b 14
- With probe holder, mounting hole 8 mm

Order no. **4082714**

Modular Units 827 for individual comparator stands

Plates

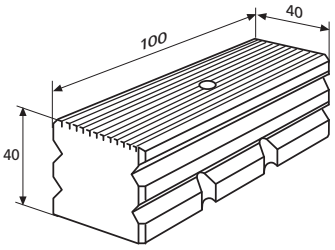
827 b 31



- For single measurement
- Hardened and lapped
- Reversible
- Measuring surface has longitudinal grooves
- Flatness deviation 1 µm

Order no. 4082731

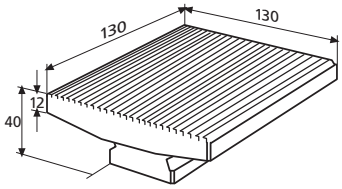
827 b 32



- For sum measurement
- Measuring surface has longitudinal grooves, hardened and lapped
- With mounting hole 8H7 mm/ .375" and a clamp for inductive probes
- Flatness deviation 1 µm

Order no. 8 mm 4082732
Order no. .375" 9100238

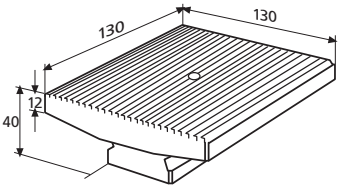
827 b 33



- For single measurement
- Large measuring surfaces which has longitudinal grooves, hardened and lapped
- Flatness deviation 1 µm

Order no. 4082733

827 b 34

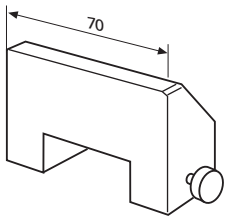


- For sum measurement
- Large measuring surfaces which have longitudinal grooves, hardened and lapped
- With mounting hole 8H7 mm/ .375" and a clamp for inductive probes
- Flatness deviation 1 µm

Order no. 8 mm 4082734
Order no. .375" 9100239

Adjustable Stop

827 b 35

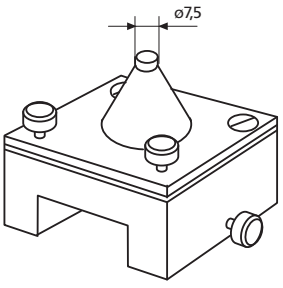


- Ensures that a work piece is correctly positioned
- To be attached to plates 827 b 31 and 827 b 32

Order no. 4082735

Attachment Stand

827 b 36

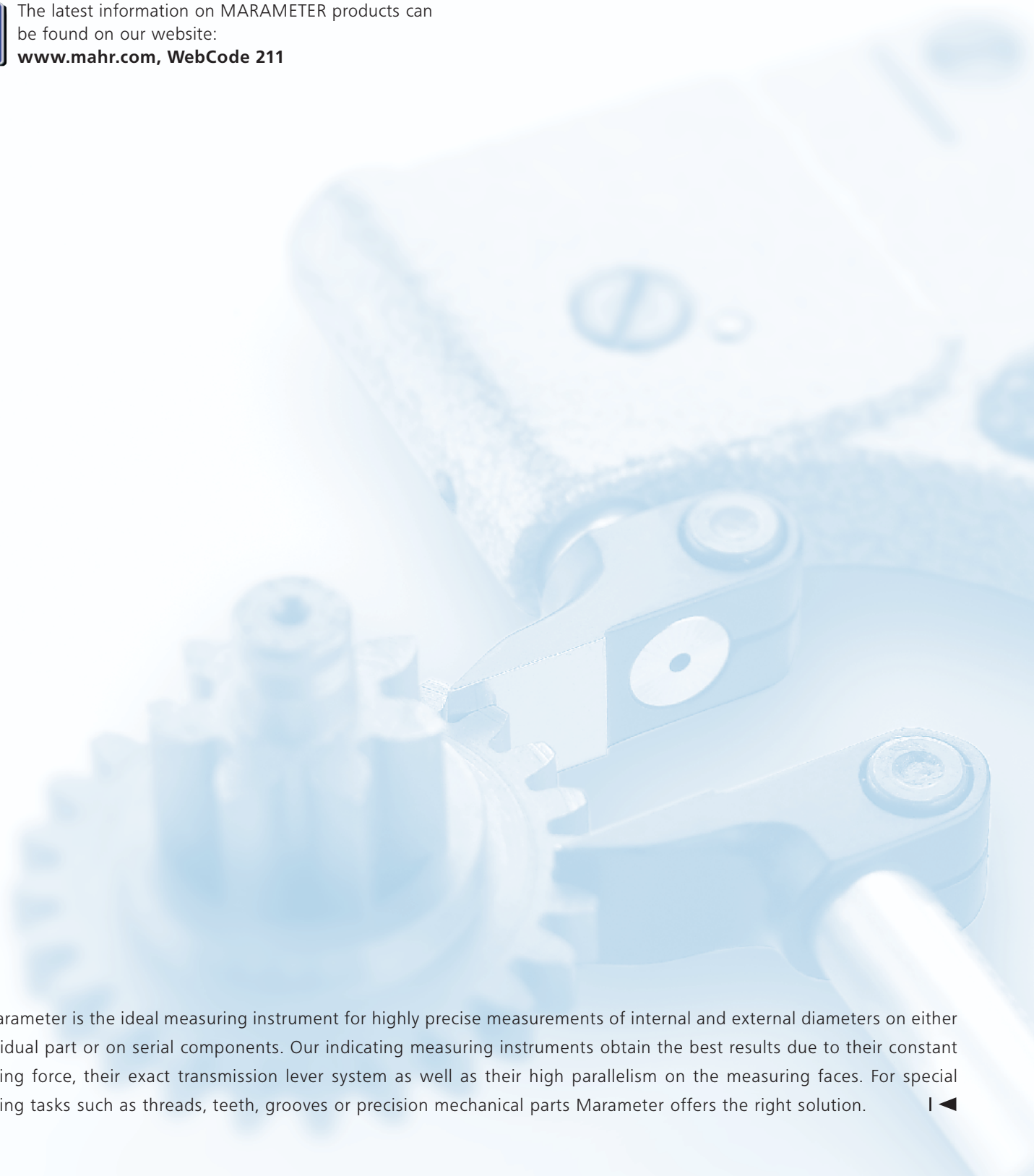


- With adjustment screws for parallel alignment of 2 plan surfaces
- Particularly suitable for mounting Pin Gages 426 M
- To be attached to plates 827 b 31 and 827 b 32

Order no. 4082736

THE BENCHMARK OF INDICATING MEASURING INSTRUMENTS. **MARAMETER.**

The latest information on MARAMETER products can be found on our website:
www.mahr.com, WebCode 211



► | Marameter is the ideal measuring instrument for highly precise measurements of internal and external diameters on either an indvidual part or on serial components. Our indicating measuring instruments obtain the best results due to their constant measuring force, their exact transmission lever system as well as their high parallelism on the measuring faces. For special measuring tasks such as threads, teeth, grooves or precision mechanical parts Marameter offers the right solution. | ◄

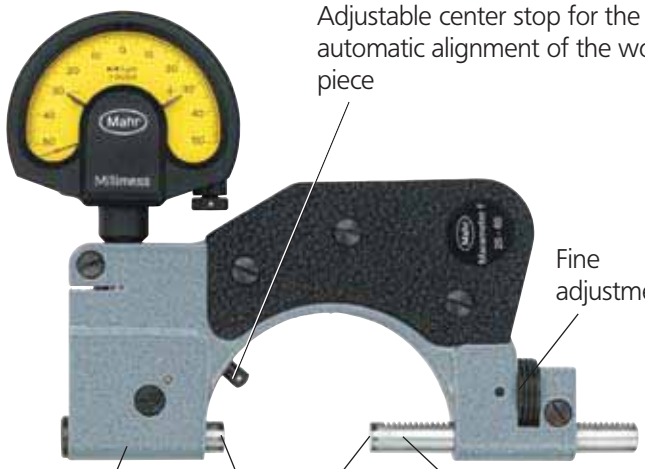
MaraMeter. Indicating Measuring Instruments

MaraMeter. Indicating Snap Gages

Overview

► | **MaraMeter.** The Indicating Snap Gage is ideal for highly accurate and reliable results on cylindrical work pieces with a narrow tolerance. | ◄

MaraMeter 840 F

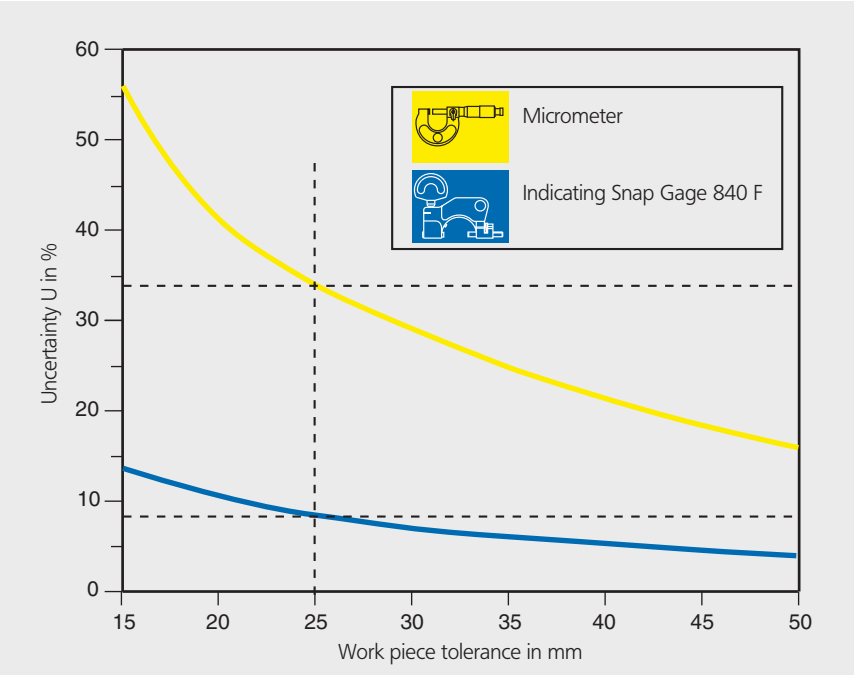


MaraMeter 300 P-1

Advantages of the Snap Gage compared to a Micrometer

- **Reduced Measuring Uncertainty**

The MaraMeter Indicating Snap Gages have a notably reduced measuring uncertainty in comparison to to a Micrometer.



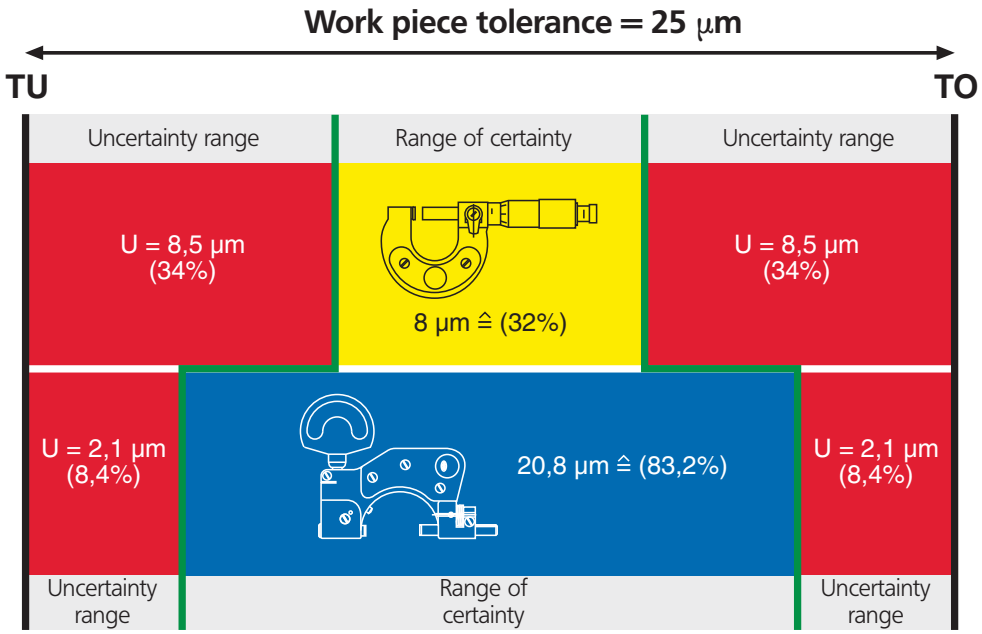
Measuring Uncertainty U is dependent upon the tolerance of the work piece

- **Better utilization of the tolerance zone**

Example:
Work piece tolerance 25 µm

The measured value in the uncertainty range can lie outside of the tolerance range, therefore the utilized tolerance of the micrometer is reduced to only 32% (8 µm).

With a MaraMeter Indicating Snap Gage 83% (20.8 µm) of the work piece tolerance can be utilized.



Advantage:
With the Indicating Snap Gage the tolerance zone can be used to far greater extent, thus reducing the production costs.

Snap Gages for Outside Diameters 1000P

The economical way to check outside diameters on the shop floor.

Features

- Flat lower anvil (reference) adjustable over a broad range.
- Radiused upper anvil (sensitive) spring-loaded to counter balance the weight of the gage.
- 0.01 mm grads. on Metric Models. .0005" grads. on Inch Models.
- 0.50 mm / .020" Range of Sensitive Contact.
- Indicator can be rotated to read from front or rear of the gage.
- Anvils are tungsten carbide for long life.

1000P-3
0.01 mm or .0005" Dial Indicator normally furnished

Technical Data

Capacity mm	Capacity *(inch)*	Reference Anvil Diameter mm / *inch*	Order no. Metric	Order no. Inch
0 - 25	***(0 - 1")***	13 / ***.50"***	**1000P-1M***	**1000P-1***
19 - 50	***(.75 - 2"***	13 / ***.50"***	**1000P-2M***	**1000P-2***
44 - 82	***(1.75 - 3.25")***	13 / ***.50"***	**1000P-3M**	**1000P-3**
76 - 114	***(3 - 4.5")***	16 / ***.625"***	**1000P-4M**	**1000P-4**
102 - 152	***(4 - 6")***	16 / ***.625"***	**1000P-5M**	**1000P-5**
152 - 203	***(6 - 8")***	19 / ***.75"***	**1000P-6M**	**1000P-6**
203 - 254	***(8- 10")***	19 / ***.75"***	**1000P-7M**	**1000P-7**

Series 1000P gages with greater capacity, alternate Indicators, alternate contact configurations, or other modification to suit specific applications are available – contact Mahr Federal.

* *Insulated grip not available.*

Snap Gages for Outside Diameters 300P

Superior precision for O.D. checks

EDI-301P-1
BA-26 Bench Stand (not included)

Features

- Patented "Channel Lock" design assures precisely parallel anvil surfaces throughout the full 25 mm / 1" range of adjustment.
- All Series 300P Snap Gages are fully adjustable with positive position locking at any point within the range.
- 0.50 mm / .020" Range of Sensitive Contact.
- Snap Gages available over a wide range of sizes, styles, and readout configurations.
- Large 15.5 mm / .61" square tungsten carbide anvils provide flat, parallel, long lasting working surfaces ensuring precision that lasts.
- Indicator can be rotated to read from front or rear of the gage.
- Optional lift-lever model (301P) available for retracting the upper anvil.
- All adjustments accomplished using a single hex wrench (furnished).

Technical Data

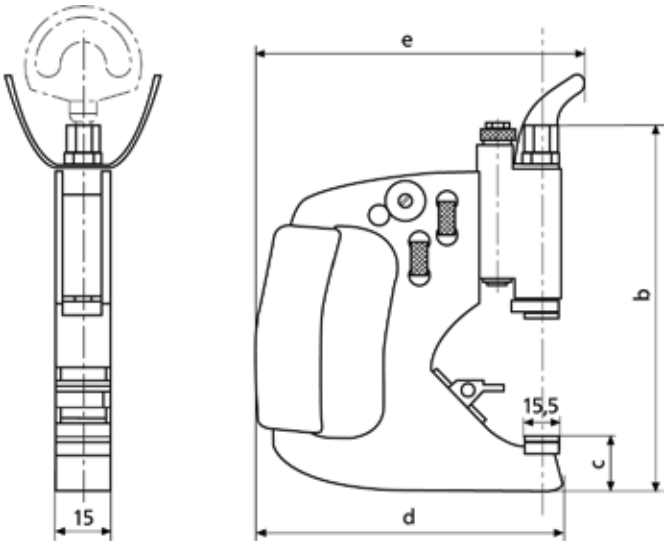
Style	Normally Furnished Indicating Instruments Readings	Snap Style	Separately, Order no.
12I/22I	.0001"	Flat Anvil	**IDT-102/IDT-106**
O1I/P1I	0.002 mm	Flat Anvil	**IDS-206/IDS-208**
Maxμm®/// (1)	selectable (3)	Flat Anvil	**2033109**
Maxμm®/// (2)	selectable (3)	Flat Anvil	**2033119**
EDI-10102	0.001 mm / .00005"	Flat Anvil	**EDI-10102**
B5M/C5M	.0005"	Groove Anvil	**IDS-101/IDS-105**
O6I/P6I	0.010 mm	Groove Anvil	**IDS-207/IDS-209**
Maxμm®/// (1)	selectable (3)	Groove Anvil	**2033109**
Maxμm®/// (2)	selectable (3)	Groove Anvil	**2033119**
with Air Probe for 2500:1		All	*
with Electronic Gage Heads		All	*

A300P-2

* *Call Mahr Federal.*
(1) With no Data Output
(2) With Data Output (6 pin)
(3) Selectable Readings – 0.001 mm / 0.005 mm / 0.0005 mm /.0001" / .0005" / .00002"

Snap Gages for Outside Diameters 300P

Technical Data



Dimensions

Meas. range mm / *inch*	b	c	d	e
0-25 / ***0-1"***	150/ **6"**	29/ ***1.16"***	145/ ***5.8"***	158/ ***6.3"***
25-50 / ***1-2"***	175/ **7"**	29/ ***1.16"***	141/ ***5.6"***	154/ ***6.16"***
50-76 / ***2-3"***	200/ **8"**	29/ ***1.16"***	155/ ***6.2"***	167/ ***6.7"***
76-100 / ***3-4"***	226/ ***9"***	29/ ***1.16"***	167/ ***6.7"***	180/ ***7.2"***
100-127 / ***4-5"***	251/ ***10"***	29/ ***1.16"***	180/ ***7.2"***	193/ ***7.7"***
127-152 / ***5-6"***	278/ ***11"***	30/ ***1.2"***	203/ ***8"***	215/ ***8.6"***
152-178 / ***6-7"***	303/ ***12"***	30/ ***1.2"***	213/ ***8.5"***	226/ ***9"***
178-203 / ***7-8"***	329/ ***13"***	30/ ***1.2"***	231/ ***9.2"***	244/ ***9.7"***
203-229 / ***8-9"***	335/ ***13.5"***	30/ ***1.2"***	248/ ***9.9"***	261/ ***10.4"***

Ordering Information

Plain Anvils (Anvils included in price – choose from list below)

Capacity mm/*inch*	No Indicator	No Indicator with 8 mm adaptor	With Maxμm®*III* indicator	With Maxμm indicator	With AirProbe®	No Indicator with 8 mm adaptor & lift lever	With Dial Indicator No lift lever	With Dial Indicator With lift lever
0 - 25/ ***0-1"***	**OMI-300P-1**	**2003100**	**EMD-300P-1**	**EDI-300P-1**	**A300P-1**	**2003110**	**300P-1**	**301P-1**
25 - 50/ ***1-2"***	**OMI-300P-2**	**2003101**	**EMD-300P-2**	**EDI-300P-2**	**A300P-2**	**2003111**	**300P-2**	**301P-2**
50 - 76/ ***2-3"***	**OMI-300P-3**	**2003102**	**EMD-300P-3**	**EDI-300P-3**	**A300P-3**	**2003112**	**300P-3**	**301P-3**
76 - 100/ ***3-4"***	**OMI-300P-4**	**2003103**	**EMD-300P-4**	**EDI-300P-4**	**A300P-4**	**2003113**	**300P-4**	**301P-4**
100 - 127/ ***4-5"***	**OMI-300P-5**	**2003104**	**EMD-300P-5**	**EDI-300P-5**	**A300P-5**	**2003114**	**300P-5**	**301P-5**
127 - 152/ ***5-6"***	**OMI-300P-6**	**2003105**	**EMD-300P-6**	**EDI-300P-6**	**A300P-6**	**2003115**	**300P-6**	**301P-6**
152 - 178/ ***6-7"***	**OMI-300P-7**	**2003106**	**EMD-300P-7**	**EDI-300P-7**	**A300P-7**	**2003116**	**300P-7**	**301P-7**
178 - 203/ ***7-8"***	**OMI-300P-8**	**2003107**	**EMD-300P-8**	**EDI-300P-8**	**A300P-8**	**2003117**	**300P-8**	**301P-8**
203 - 229/ ***8-9"***	**OMI-300P-9**	**2003108**	**EMD-300P-9**	**EDI-300P-9**	**A300P-9**	**2003118**	**300P-9**	**301P-9**

Blade Anvils (Anvils included in price – choose from list below)

0 - 25/ ***0-1"***	**OMI-300P-31**	**EMD-300P-31**	**EDI-300P-31**	**A300P-31**		**300P-31**	**301P-31**
25 - 50/ ***1-2"***	**OMI-300P-32**	**EMD-300P-32**	**EDI-300P-32**	**A300P-32**		**300P-32**	**301P-32**
50 - 76/ ***2-3"***	**OMI-300P-33**	**EMD-300P-33**	**EDI-300P-33**	**A300P-33**		**300P-33**	**301P-33**
76 - 100/ ***3-4"***	**OMI-300P-34**	**EMD-300P-34**	**EDI-300P-34**	**A300P-34**		**300P-34**	**301P-34**
100 - 127/ ***4-5"***	**OMI-300P-35**	**EMD-300P-35**	**EDI-300P-35**	**A300P-35**		**300P-35**	**301P-35**

Larger capacities available on request.
To specify Metric models, add suffix "M" to the Model number. To specify Digital Output, add suffix "D" to Model numbers of EMD-300P and EMD-301P Series Gages. To specify both, add suffix "MD" to Model numbers of EMD-300P and EMD-301P Series Gages.

Examples: 300P-2 specifies a Snap Gage with a 12I (.0001" grad.) Dial Indicator, 25-50 mm / 1-2" capacity.
EMD-301P-33D specifies a Groove Diameter Snap Gage with lift lever, 50-76 mm / 2-3" capacity, AL-110 Blade Anvils, 2033119 (selectable units and resolution) Maxμm*III* Indicator with Digital Output

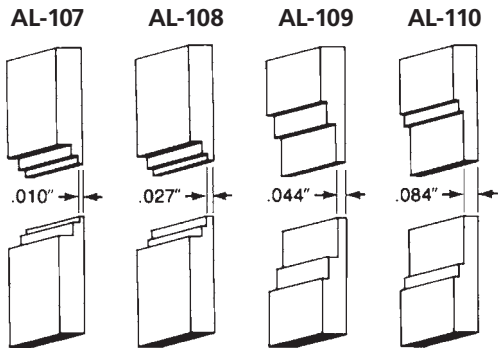
Snap Gages for Outside Diameters 300P

Accessories

BA-71
Bench Stand for Disc Masters

Groove Diameter Snap Gages – One pair of anvil inserts must be specified with each gage. Stocked anvils (shown below) are hardened steel. If no other anvils are specified, AL-110 will be provided.

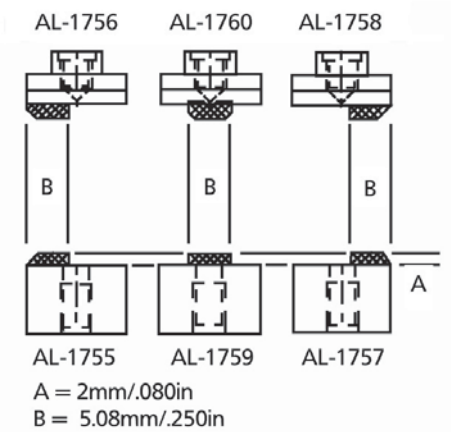
Anvil Inserts – For all Series 300P-30 and 301P-30 groove gages (2 required per gage).



Anvil Inserts

		Order no.
Bench Stand for Gages Clamps 300P and 1000P Series Gages firmly. A 6.4 mm / 0.25" mounting hole allows permanent fastening to bench surface.		**BA-26**
Bench Stand for Disc Masters Holds any AGD type Disc up to 127 mm / 5" diameter and 27 mm / 1.12" wide. Two 6.4 mm / 0.25" mounting holes allow permanent fastening to bench surface		**BA-71**
Gaging pressure options		
For EMD, OMI and Dial Indicator models	Lighter	**SP-192**
	Heavier	**SP-118**
For EDI models only	Lighter	**2243295**
	Heavier	**2243297**

Plain Anvil Options
Front View

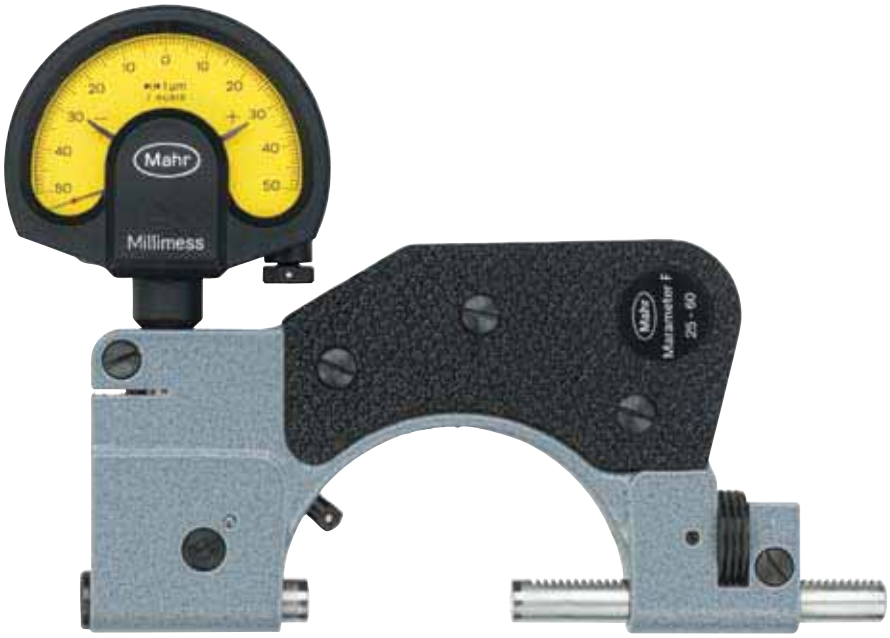


Blade Anvils

Width mm / *inch*	Depth mm / *inch*	Order no. Steel	T.C.
0.25 / ***.010"***	0.76 / ***.030"***	**AL-107**	**AL-1741**
0.69 / ***.027"***	1.02 / ***.040"***	**AL-108**	**AL-1742**
1.12 / ***.044"***	4.83 / ***.19"***	**AL-109**	**AL-1743**
2.13 / ***.084"***	6.35 / ***.25"***	**AL-110***	**AL-1744**

* *normally provided*

Indicating Snap Gages 840 F / 840 FC MaraMeter F



Features

- For cylindrical parts such as shafts, bolts and spindles, for thickness and length measurements
- Rugged, forged steel frame with heat insulators
- Measuring spindle is mounted in long guide way with lever-controlled retraction
- Anvil spindle can easily be fine adjusted
- Measuring spindle and anvil spindle are both made of hardened stainless steel, carbide-tipped or ceramic (840 FC) measuring faces
- Adjustable center stop for automatic alignment
- Maximum wear resistance due to non-contact positioning in conjunction with carbide-tipped measuring faces
- Constant measuring force as a result of built-in spring, thus eliminating user influence
- Universally applicable and extremely versatile. Each instrument spans a broad measuring range, within this range any dimension and fit can be very quickly and easily adjusted

Technical Data

Catalog no.	Measuring range mm	Measuring range *(inch)*	Measuring** force N	Distance of moveable anvil mm	Measuring face Flatness µm	Measuring face Parallelism µm	Order no.*	Order no. Wooden case
840 F	0 - 25	***(0 - 1")***	7.5	2	≤ 0.2	≤ 1	**4450000**	**4450010**
	25 - 60	***(1 - 2.36")***	7.5	2	≤ 0.2	≤ 2	**4450001**	**4450011**
	50 - 100	***(2 - 4")***	7.5	2.5	≤ 0.2	≤ 2	**4450002**	**4450012**
	100 - 150	***(4 - 6")***	7.5	2.5	≤ 0.2	≤ 2	**4450003**	**4450013**
	150 - 200	***(6 - 8")***	7.5	2.5	≤ 0.2	≤ 2	**4450004**	**4450014**
840 FC	0 - 25	***(0 - 1")***	7.5	2	≤ 0.2	≤ 1	**4450100**	**4450010**
	25 - 60	***(1 - 2.36")***	7.5	2	≤ 0.2	≤ 2	**4450101**	**4450011**

** Excludes indicating instrument ** Further measuring forces are available on request*

Indicating Instruments

All indicating instruments that has a 8 mm mounting shank may be used. Recommended are:

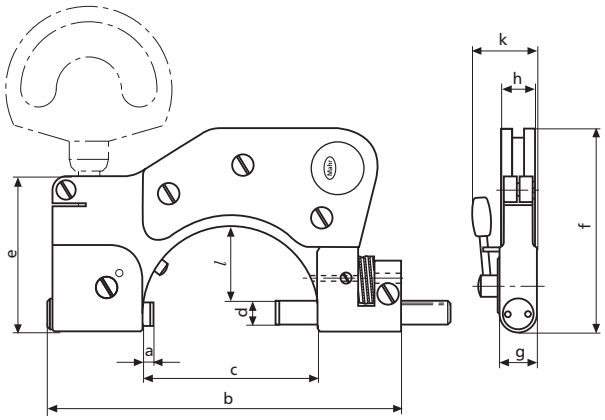
Dial Comparator		Readings mm / *inch*	Order no. mm / *inch*
Compramess	**1004 / *1004 Z***	5 µm / ***.0001"***	**4333000 / *4333900***
Millimess	**1003 / *1003 Z***	1 µm / ***.00005"***	**4334000 / *4334900***
Millimess	**1003 XL**	2 µm	**4334001**
Supramess	**1002 / *1002 Z***	0.5 µm / ***.00002"***	**4335000 / *4335900***
Extramess	**2000**	0.2 µm / ***.00001"***	
		0.5 µm / ***.00002"***	**4346000***
		1 µm / ***.00005"***	
Extramess	**2001**	0.2 µm / ***.00001"***	
		0.5 µm / ***.00002"***	**4346100***
		1 µm / ***.00005"***	
µMaxµm		.001 mm / ***.00005"***	**EDI-10302****

2000

1003

Digital Indicators see Chapter 5
Electrical Indicating Instruments see Chapter 7

* *230 V, for 115 V please refer to page 6-5*
** *requires contact 4360107*



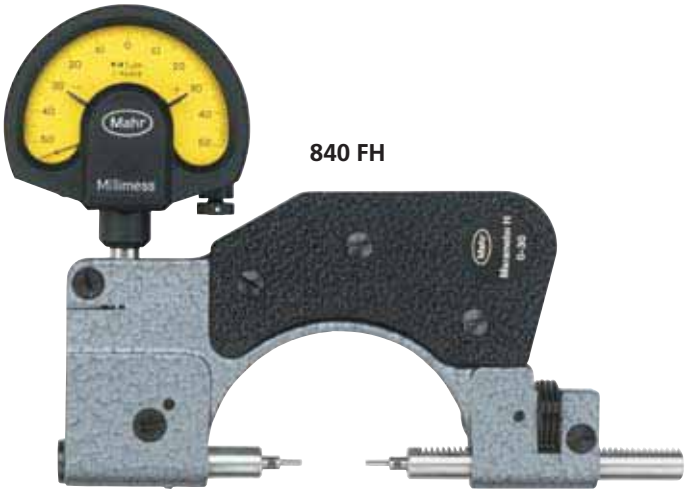
Meas. range mm	0 - 25	25 - 60	50 - 100	100 - 150	150 - 200
a*	5	5	6.5	6.5	6.5
b	97	140	193	258	316
c	34	68	110	162	212
d	8	9	10	12	12
e	54	60	60	70	75
f	65	77	103	141	171
g	12	13	14	16	16
h	13	13	13	12	12
k	23	25	28	31	31
l	14	30	54	81	106

* *In initial position*

Accessories

Reference Discs 390 see Chapter 13
Gage Blocks see Chapter 13
Holder 840 Fk and **Stand 840 Ff** see Page 9-15

Indicating Snap Gage 840 FH with interchangeable anvils



840 FH

Features

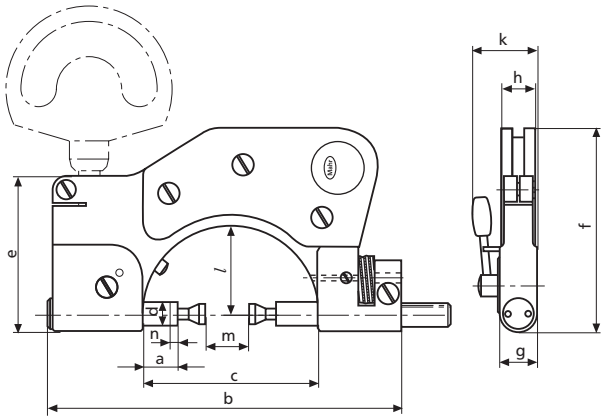
- Measuring spindle and anvil spindle have precision tapered bores for mounting interchangeable anvils 40 He
- For cylindrical parts such as shafts, bolts and spindles
- Rugged, forged steel frame with heat insulators
- Measuring spindle is mounted in long guide way with lever-controlled retraction
- Anvil spindle can easily be fine adjusted
- Measuring spindle and anvil spindle and both made from hardened stainless steel
- Maximum wear resistance due to non-contact positioning
- Constant measuring force as a result of built-in spring, thus eliminating user influence
- Universally applicable
- All kinds of measurement problems can be solved with the broad range of interchangeable anvils

Technical Data

Catalog no.	Measuring range* mm	*(inch)*	Distance of moveable anvil mm	Meas. force N	Order no.**	Order no. Wooden case
840 FH	0 - 30	***(0 - 1.18")***	2	7.5	**4451000**	**4510010**
	30 - 80	***(1.18 - 3")***	2.5	7.5	**4451005**	**4510011**

* *Measuring is dependent upon the length of the anvils being used*

** *Excludes indicating instrument*



Meas. range **m** (mm)	840 FH 0 - 30	30 - 80
a*	12.5	7.5
b	140	193
c	68	110
d	9	10
e	60	60
f	77	103
g	13	13
h	13	13
k	25	28
l	34	59
n**	2	2.5

* *In initial position*

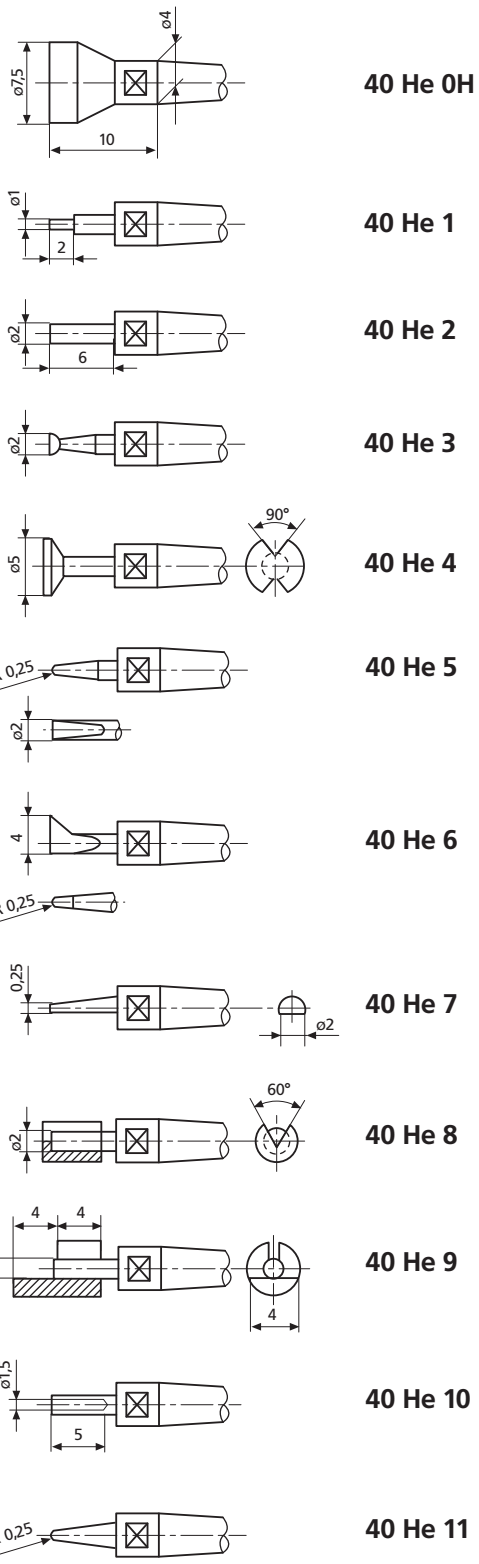
** *Distance of moveable anvil*

Interchangeable Anvils 40 He for Indicating Snap Gage 840 FH

with tapered shank

Catalog no.	Features	Order no.
40 He 0H*	Flat faces	**4152036**
40 He 1	Stepped flat faces	**4152011**
40 He 1H*	Stepped flat faces	**4152033**
40 He 2	Stepped flat faces	**4152012**
40 He 2H*	Stepped flat faces	**4152032**
40 He 3	Discs	**4152013**
40 He 4	Discs with V-groove	**4152014**
40 He 5	Blades	**4152015**
40 He 6	Offset blades	**4152016**
40 He 7	Recessed blades	**4152017**
40 He 8	Recessed flat faces with V-grooves on sleeve	**4152018**
40 He 9	Recessed flat faces with slip on support	**4152019**
40 He 10	With clearance bores	**4152020**
40 He 11	Point	**4152021**

* *Carbide version*



Indicating Instruments

All indicating instruments that has a 8 mm mounting shank may be used. Recommended are:

Dial Comparator		Readings mm / *inch*		Order no. mm / *inch*
Compramess	**1004 / *1004 Z***	5 µm/	***.0001"***	**4333000/*4333900***
Millimess	**1003 / *1003 Z***	1 µm/	***.00005"***	**4334000/*4334900***
Millimess	**1003 XL**	2 µm		**4334001**
Supramess	**1002 / *1002 Z***	0.5 µm/	***.00002"***	**4335000/*4335900***
Extramess	**2000**	0.2 µm/	***.00001"***	
		0.5 µm/	***.00002"***	**4346000***
		1 µm/	***.00005"***	
Extramess	**2001**	0.2 µm/	***.00001"***	
		0.5 µm/	***.00002"***	**4346100***
		1 µm/	***.00005"***	
µMaxµm		.001mm/	***.00005"***	**EDI-10302****

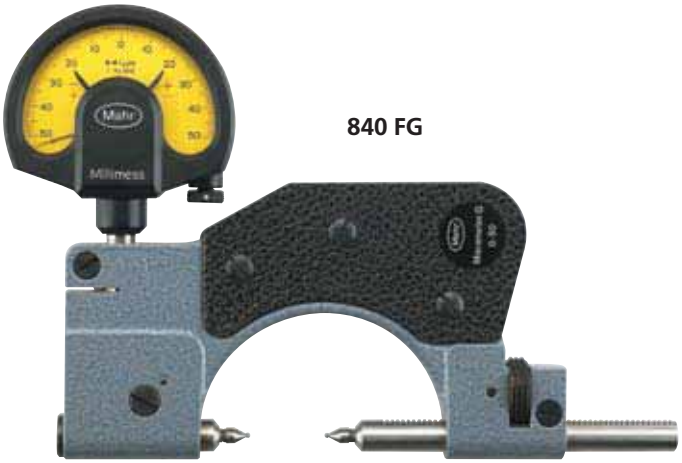
Digital Indicators see Chapter 5
Electrical Indicating Instruments see Chapter 7
** 230 V, for 115 V please refer to page 6-5 ** requires contact 4360107*

Accessories

Spanner (Included in scope of supply)
for **840 FH**, to loosen anvils
Order no. **4880210**

Reference Discs 390 see Chapter 13
Gage Blocks see Chapter 13
Holder 840 Fk and **Stand 840 Ff** see Page 9-15

Indicating Snap Gages 840 FG with interchangeable anvils



840 FG

Features

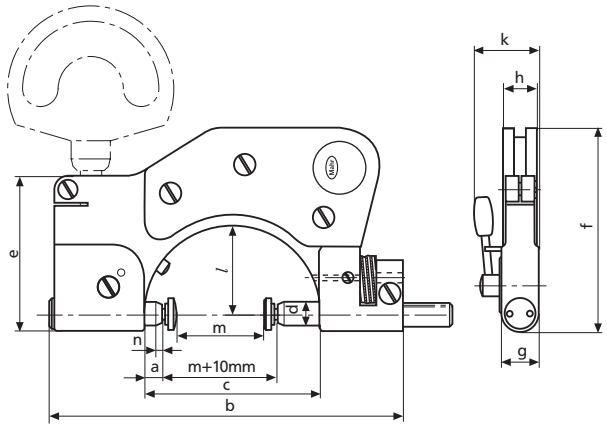
- Measuring spindle and anvil spindle have a M 2.5 connection thread, thus enabling the use of interchangeable anvils that are also used in dial indicators and dial comparators
- For cylindrical parts such as shafts, bolts and spindles
- Rugged, forged steel frame with heat insulators
- Measuring spindle is mounted in long guide way with lever-controlled retraction
- Anvil spindle can easily be fine adjusted
- Measuring spindle and anvil spindle and both made from hardened stainless steel
- Maximum wear resistance due to non-contact positioning
- Constant measuring force as a result of built-in spring, thus eliminating user influence
- Universally applicable
- All kinds of measurement problems can be solved with the broad range of interchangeable anvils

Technical Data

Catalog no.	Measuring range* mm	*(inch)*	Distance of moveable anvil mm	Meas. force N	Order no.**	Order no. Wooden case
840 FG	0 - 50	***(0 - 2")***	2	7.5	**4454000**	**4450011**
	30 - 90	***(1.57 - 3.57")***	2.5	7.5	**4454001**	**4450012**

* *Measuring is dependent upon the length of the anvils being used*

** *Excludes indicating instrument*



Meas. range **m** (mm)	840 FG 0 - 50	40 - 90
a*	5	6.5
b	140	193
c	68	110
d	9	10
e	60	60
f	77	103
g	13	14
h	13	13
k	25	28
l	34	59
n**	2	2.5

* *In initial position*

** *Distance of moveable anvil*

Interchangeable Anvils for Indicating Snap Gage 840 FG

Catalog no.	Features	Order no.
901 H	Standard contact point with carbide ball, ball dia. 3 mm	**4360002**
902 H	Spherical contact point, with carbide face, R = 6 mm	
	Length *l* in mm	
	10	**4360041**
	15	**4360043**
	20	**4360044**
903 H*	Flat contact point, carbide tipped	
	Length *l* in mm	
	6	**4360101**
	10	**4360103**
	15	**4360105**
	20	**4360106**
904 H	Conical contact point, carbide tipped	**4360131**

906 H **Ball Contact Points**

with carbide ball,
manufacuring tolerance ball dia. 0/-6 µm

Ball dia. d mm	*l* mm	Order no.	Ball dia. d mm	*l* mm	Order no.
1	8.5	**4360150**	5.5	9	**4360161**
1.25	8.5	**4360151**	6	9	**4360162**
1.5	8.5	**4360152**	6.35 (1/4")	9	**4360163**
1.75	8.5	**4360153**	6.5	10	**4360164**
2	8.5	**4360154**	7	10	**4360165**
2.5	8.5	**4360155**	7.5	11	**4360166**
3	8.5	**4360156**	8	11	**4360167**
3.5	8.5	**4360157**	8.5	12	**4360168**
4	8.5	**4360158**	9	12	**4360169**
4.5	8.5	**4360159**	10	13	**4360170**
5	9	**4360160**			

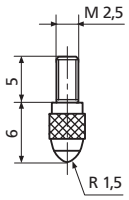
Indicating Instruments

All indicating instruments that has a 8 mm mounting shank may be used. Recommended are:

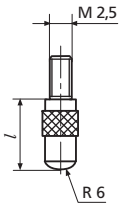
Dial Comparator		Readings mm / *inch*	Order no. mm / *inch*
Compramess	**1004 / *1004 Z***	5 µm/ ***.0001"***	**4333000/*4333900***
Millimess	**1003 / *1003 Z***	1 µm/ ***.00005"***	**4334000/*4334900***
Millimess	**1003 XL**	2 µm	**4334001**
Supramess	**1002 / *1002 Z***	0.5 µm/ ***.00002"***	**4335000/*4335900***
Extramess	**2000**	0.2 µm/ ***.00001"***	
		0.5 µm/ ***.00002"***	**4346000***
		1 µm/ ***.00005"***	
Extramess	**2001**	0.2 µm/ ***.00001"***	
		0.5 µm/ ***.00002"***	**4346100***
		1 µm/ ***.00005"***	
µMaxµm		.001mm/***.00005"***	**EDI-10302****

Digital Indicators see Chapter 5
Electrical Indicating Instruments see Chapter 7
** 230 V, for 115 V please refer to page 6-5 ** requires contact 4360107*

901 H



902 H



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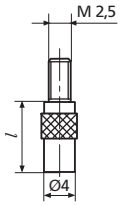
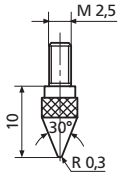
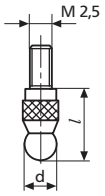


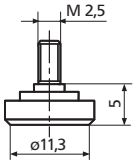
904 H



906 H



907



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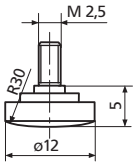

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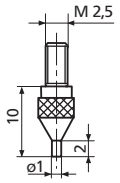


Catalog no.	Features	Order no.
907	Flat contact plates* steel, dia. 11.3 mm, A = 1 cm²	**4360200**
907 H	Flat contact plates*, carbide tipped, dia. 7 mm	**4360201**
908	Spherical contact plates, steel	**4360210**
908 H	Spherical contact plates, carbide tipped	**4360211**
911 H	Pin contact point, carbide tipped, dia. 1 mm, plan	**4360240**

** When using a flat contact plate the opposite facing anvil must be a spherical contact plate.*

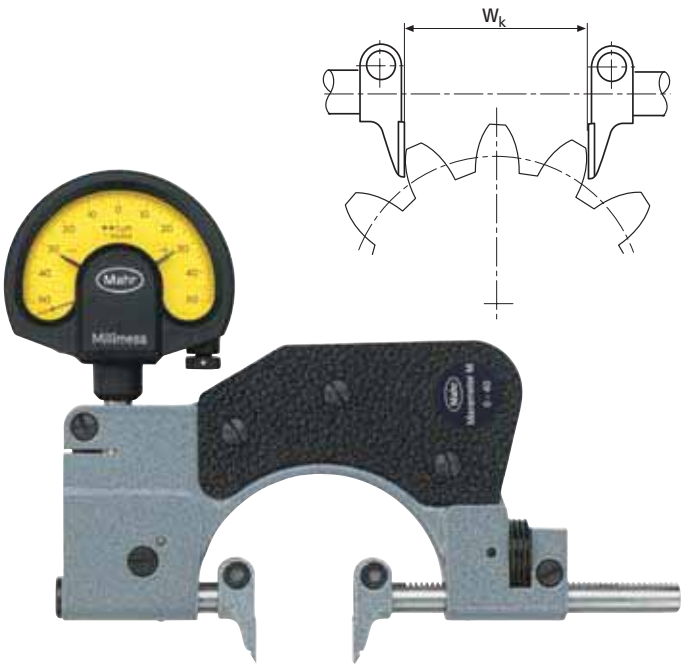
Accessories

Reference Discs 390 see Chapter 13

Gage Blocks see Chapter 13

Holder 840 Fk and **Stand 840 Ff** see Page 9-15

Indicating Snap Gages 840 FM MaraMeter M with measuring jaws



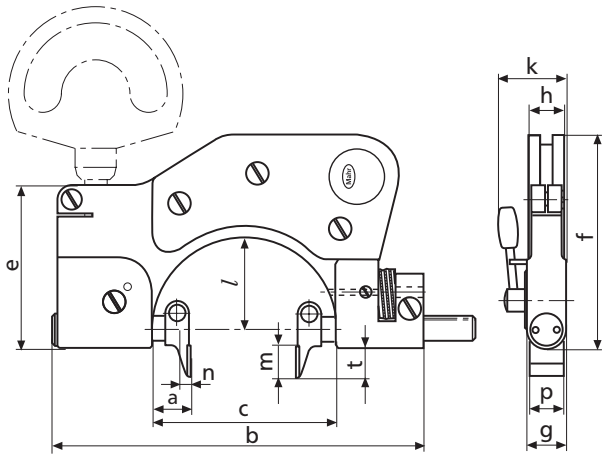
Features

- For diameters of small hubs, registers, shoulders on shafts and groove widths as well as for tooth span Wk as indirect, reference-free determination of tooth thickness on spur gears with straight and helical teeth
- Rugged, forged steel frame with heat insulators
- Measuring spindle is mounted in long guide way with lever-controlled retraction
- Anvil spindle can easily be fine adjusted
- Maximum wear resistance due to non-contact positioning in conjunction with carbide-tipped measuring faces
- Measuring spindle and anvil spindle made of hardened stainless steel; with extending carbide-tipped measuring jaws
- Constant measuring force as a result of built-in spring, thus eliminating user influence
- Universally applicable and extremely versatile, each instrument spans a broad measuring range, within this range any dimension and fit can be very quickly and easily adjusted

Technical Data

Measuring range mm	*(inch)*	Measuring force N	Measuring face area mm	flatness µm	parallelism µm	Tooth span measurements as per module m	Order no.*	Order no. Wooden case
0 - 40	*(0 - 1.57")*	7.5	12 x 12	≤ 0.5	≤ 2	0.5	**4452000**	**4450011**
40 - 80	*(1.57 - 3")*	7.5	12 x 12	≤ 0.5	≤ 3	0.5	**4452001**	**4450012**
80 - 130	*(3 - 5")*	9	15 x 17	≤ 0.5	≤ 3	1.0	**4452002**	**4450013**
130 - 180	*(5 - 7")*	9	15 x 17	≤ 0.5	≤ 3	1.0	**4452003**	**4450014**

** Excludes indicating instrument*



Dimensions

Meas. range (mm)	0 - 40	40 - 80	80 - 130	130 - 180
Dist mov. anvil (mm)	2	2.5	2.5	2.5
a*	14	14	19	15
b	140	193	258	316
c	68	110	162	212
e	60	60	70	75
f	77	103	141	171
g	13	14	16	16
h	13	13	12	12
k	25	28	31	31
l	34	59	87	112
m	12	12	17	17
p	12	12	15	15
t	11	11	17	17

** In initial position*

Accessories

Indicating instruments, see Page 9-9
Reference Discs 390 see Chapter 13
Gage Blocks see Chapter 13
Holder 840 Fk and **Stand 840 Ff** see Page 9-15

Accessories for Dial Indicators and Dial Comparators

Holder 840 Fk for Dial Indicators and Dial Comparators

- For attaching to the following measuring instruments **840 F/FC, 840 FH, 840 FG, 840 FM** and **852**
- Straight transfer of the spindle movement to the indicator
- Following the Abbe principle allows an even higher degree of accuracy than the already excellent level obtained with the standard set-up employing 90° transmission
- When the indicating instrument is in the shown position it is often easier to read
- For stationary application when in conjunction with the **Stand 840 Ff**

Catalog no.	Suitable for instruments with measuring ranges (mm)					Order no.
	840 F/FC	**840 FH**	**840 FG**	**840 FM**	**852**	
840 Fk/1	0 - 25					**4450050**
840 Fk/2	25 - 60	0 - 30	0 - 50	0 - 40	0 - 45	**4450051**
840 Fk/3	50 - 100	30 - 80	40 - 90	40 - 80	45 - 85	**4450052**
840 Fk/4	100 - 150 150 - 200			80 - 130 130 - 180	85 - 140 140 - 190	**4450053**

Stand 840 Ff

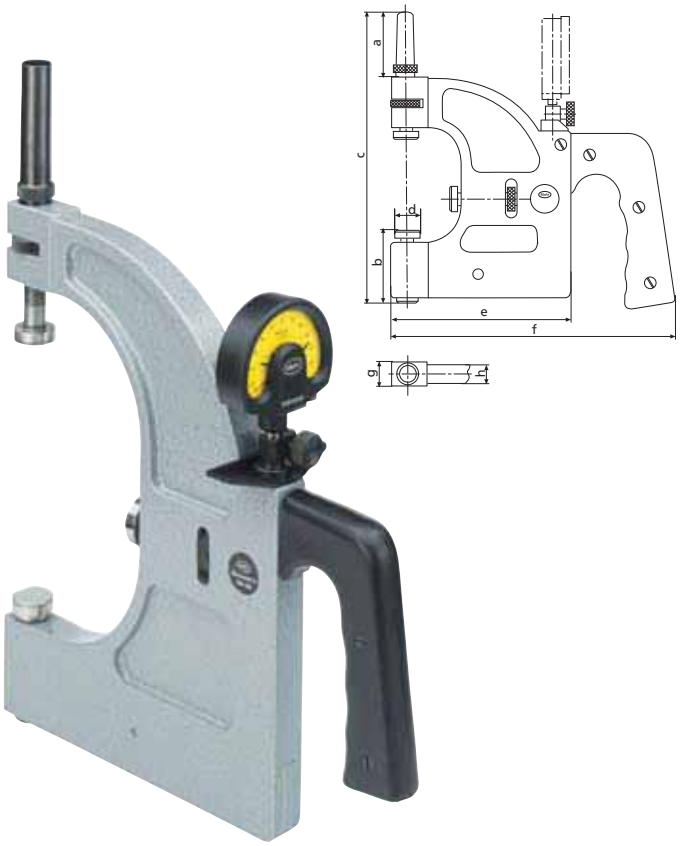
- For stationary application in conjunction with the following measuring instruments **840 F/FC, 840 FH, 840 FG, 840 FM, 840 E** and **852**
- User has both hands free for insertion of work piece and retraction of moving spindle
- Indicating instrument is always in operator's field of vision
- Rugged, rigid cast-iron stand with clamp for locking the indicating snap gage
- Indicating snap gage is locked in mounting hole for dial comparator
- Only in conjunction with **Holder 840 Fk**

Catalog no.	Suitable for instruments with measuring ranges (mm)						Order no.
	840 F/FC	**840 FH**	**840 FG**	**840 FM**	**840 E**	**852**	
840 Ff	0 - 25 25 - 60	0 - 30	0 - 50	0 - 40	0 - 25	0 - 45	**4450020**

Indicating Snap Gages 840 FS MaraMeter S

Features

- For all kinds of cylindrical work pieces, whether directly on a machine tool or in the production control
- Rigid frame; convenient handle with heat insulators open on one end to eliminate heat transfer from operators hand
- Both spindles are made of hardened stainless steel and mounted in long guide ways
- Carbide-tipped measuring faces slightly chamfered at the front to facilitate positioning
- Projects over width of frame for measurement of narrow registers or when measuring directly at shoulders
- Maximum accuracy. Straight transfer of spindle movement to indicator. During the measurement, the weight of the gage rests on the anvil spindle
- Adjustable center stop for automatic alignment
- Indicating instrument is protected against possible impact during handling by a laterally projecting guard
- Direct indication and evaluation of measurement results
- Universally applicable and extremely versatile, each instrument spans a broad measuring range, within this range any dimension and fit can be very quickly and easily adjusted
- Constant measuring force as a result of built-in spring, thus eliminating operator influence



Dimensions

Meas. range mm	dia. d	a	b	c	e	f	g	h
10 - 30	18	37	46	154	87	161	17	15
30 - 60	18	45	51	199	122	196	17	15
60 - 100	22	56	62	260	154	228	20	18
100 - 150	22	71	62	335	189	263	20	18
150 - 200	22	71	62	385	214	288	20	18
200 - 250	22	71	62	436	248	322	20	18
250 - 300	22	71	62	487	280	354	20	18
300 - 350	22	71	62	537	310	384	20	18
350 - 400	22	71	62	587	350	424	20	18
400 - 450	22	71	62	637	380	454	20	18
450 - 500	22	71	62	687	410	484	20	18

Technical Data

Measuring range mm	*(inch)*	Measuring force N	Distance of moveable anvil mm	Meas. faces flatness µm	Meas. faces Parallelism µm	Weight kg	Order no.*	Order no. Wooden case
10 - 30	*(.39 - 1.18")*	13.5	0.7	≤ 0.5	≤ 3	0.6	**4455000**	**4455020**
30 - 60	*(1.18 - 2.36")*	13.5	0.7	≤ 0.5	≤ 3	0.9	**4455001**	**4455021**
60 - 100	*(2.36 - 4")*	13.5	0.7	≤ 0.5	≤ 3	1.3	**4455002**	**4455022**
100 - 150	*(4 - 6")*	15	0.7	≤ 0.5	≤ 3	1.7	**4455003**	**4455023**
150 - 200	*(6 - 8")*	15	0.7	≤ 0.5	≤ 3	2.0	**4455004**	**4455024**
200 - 250	*(8 - 10")*	15	0.7	≤ 0.5	≤ 3	2.2	**4455005**	**4455025**
250 - 300	*(10 - 12")*	15	0.7	≤ 0.5	≤ 3	2.5	**4455006**	**4455026**
300 - 350	*(12 - 14")*	15	0.7	≤ 0.5	≤ 4	3.3	**4455007**	**4455027**
350 - 400	*(14 - 16")*	15	0.7	≤ 0.5	≤ 4	3.3	**4455008**	**4455028**
400 - 450	*(16 - 18")*	15	0.7	≤ 0.5	≤ 4	4.3	**4455009**	**4455029**
450 - 500	*(18 - 20")*	15	0.7	≤ 0.5	≤ 4	4.7	**4455010**	**4455030**

* *Excludes indicating instrument*

Accessories for Indicating Snap Gages 840 FS MaraMeter S

Indicating Instruments

All indicating instruments that has a 8 mm mounting shank may be used. Recommended are:

Dial Comparator		Readings mm / *inch*		Order no. mm / *inch*
Compramess	**1004 / *1004 Z***	5 µm/	***.0001"***	**4333000/*4333900***
Millimess	**1003 / *1003 Z***	1 µm/	***.00005"***	**4334000/*4334900***
Millimess	**1003 XL**	2 µm		**4334001**
Supramess	**1002 / *1002 Z***	0.5 µm/	***.00002"***	**4335000/*4335900***
Extramess	**2000**	0.2 µm/	***.00001"***	
		0.5 µm/	***.00002"***	**4346000***
		1 µm/	***.00005"***	
Extramess	**2001**	0.2 µm/	***.00001"***	
		0.5 µm/	***.00002"***	**4346100***
		1 µm/	***.00005"***	
µMaxµm		.001mm/	***.00005"***	**EDI-10302****

Digital Indicators see Chapter 5
Electrical Indicating Instruments see Chapter 7
** 230 V, for 115 V please refer to page 6-5 ** requires contact 4360045*

2000

1003

Electronic Snap Gage 840 E MaraMeter E for extremely high accuracy

Features

- Inductive measuring system incorporated directly into frame
- Readings selectable down to 0.01 µm
- Rugged, forged steel frame with heat insulators
- Measuring spindle mounted in extra long guideway with lever-controlled retraction
- Anvil spindle can easily be fine adjusted
- Measuring spindle and anvil spindle made of hardened stainless steel; measuring faces carbide-tipped
- Adjustable center stop for automatic alignment
- Extremely accurate due to the straight transfer of spindle movement to the inductive measuring system according to the Abbe principle
- Universally applicable and extremely versatile, each instrument spans a broad measuring range, within this range any dimension and fit can be very quickly and easily adjusted
- Maximum wear resistance due to non-contact positioning in conjunction with carbide-tipped measuring faces
- Constant measuring force as a result of built-in spring, thus eliminating user influence

Accessories

Reference Discs 390 see Chapter 13
Gage Blocks see Chapter 13
Stand 840 Ff see Page 9-15

Recommended indicating instruments:
Electrical indicating instruments; recommended are C 1208 M and 1240, please refer to Chapter 7

Technical Data

Measuring range	0-25 mm
Readings /	
Resolution adjustable to*	0.01 µm
Measuring force	4.5 N
Measuring face dia.	7.5 mm
Repeatability	≤ 0.1 µm
Parallelism of measuring surfaces	≤ 0.3 µm
Order no. (without indicating instrument)	**4453000**
Order no. Wooden case	**4453010**

** Depending upon which indicating instrument is being used*

Indicating Thread Snap Gage 852

Features

- For measuring pitch, root and outside diameters of all kinds of external threads as well as serrations
- Rugged, forged steel frame with heat insulators
- Measuring spindle is mounted in long guide way with lever-controlled retraction
- Anvil spindle can easily be fine adjusted
- Measuring spindle and anvil spindle are both made of hardened stainless steel, with mounting bore for insertion of interchangeable anvils
- Adjustable center stop for automatic alignment
- Maximum wear resistance due to non-contact positioning
- Constant measuring force as a result of built-in spring, thus eliminating user influence
- Universally applicable and extremely versatile, each instrument spans a broad measuring range

Technical Data

Measuring range* mm	*(inch)*	Meas.force N	Order no.**	Order no. wooden case
0 - 45	***(0 - 1.77")***	7.5	**4510000**	**4510010**
45 - 85	***(1.77 - 3.34")***	7.5	**4510001**	**4510011**
85 - 140	***(3.34 - 5.51")***	9	**4510002**	**4510012**
140 - 190	**(5.51 - 7.48")**	9	**4510003**	**4510013**

* *Depending upon which anvils are being used, purchase seperately*
** *Excludes indicating instrument and anvils*

Indicating Instruments

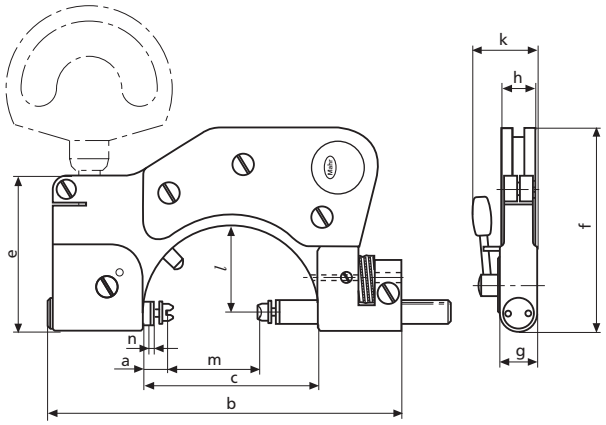
All indicating instruments that has a 8 mm mounting shank may be used. Recommended are:

Dial Comparator		Readings mm / *inch*		Order no. mm / *inch*
Compramess	**1004 / *1004 Z***	5 µm/	***.0001"***	**4333000/*4333900***
Millimess	**1003 / *1003 Z***	1 µm/	***.00005"***	**4334000/*4334900***
Millimess	**1003 XL**	2 µm		**4334001**
Supramess	**1002 / *1002 Z***	0.5 µm/	***.00002"***	**4335000/*4335900***
Extramess	**2000**	0.2 µm/	***.00001"***	
		0.5 µm/	***.00002"***	**4346000***
		1 µm/	***.00005"***	
Extramess	**2001**	0.2 µm/	***.00001"***	
		0.5 µm/	***.00002"***	**4346100***
		1 µm/	***.00005"***	
µMaxµm		.001mm/	***.00005"***	**EDI-10302****

Digital Indicators see Chapter 5
Electrical Indicating Instruments see Chapter 7
** 230 V, for 115 V please refer to page 6-5 ** requires contact 4360107*

Accessories

Interchangeable Anvils please refer to Pages 9-21 to 9-23
Thread Setting Plug Gages see Page 13-14
Holder 840 Fk and **Stand 840 Ff** (for 0-45 mm) see Page 9-15



Meas. range m (mm)	0-45	45-85	85-140	140-190
Dist mov. anvil n (mm)	2	2.5	2.5	2.5
a*	13	8	10	6
b	140	193	258	316
c	68	110	162	212
e	60	60	70	75
f	77	103	141	171
g	13	14	16	16
h	13	13	12	12
k	25	28	31	31
l	34	59	87	112

a = in initial position*

Indicating Bench Snap Gage 852 TS

Applications

- For rapid measurements of diameters of cylindrical parts (shafts, bolts and shanks)
- For measuring pitch, root and outside diameters of all kinds of external threads as well as serrations
- For thickness and length measurement
- Particularly suited for batch produced parts

Features

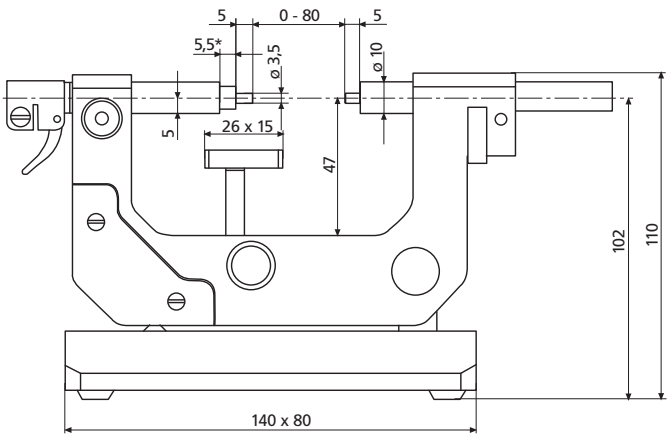
- Rugged steel frame, can be inclined up to 45° from the sturdy base
- Measuring spindle and anvil spindle are both made of hardened stainless steel, with mounting bore for insertion of interchangeable anvils
- Anvil spindle can easily be fine adjusted
- Height adjustable stop
- Constant measuring force as a result of built-in spring, thus eliminating user influence
- Universally applicable and extremely versatile, each instrument spans a broad measuring range

- Scope of supply: TC tipped-anvils, dia. D= 3.5 mm, Dial Comparator 1003

Technical Data

Measuring range [1] mm	*(inch)*	Retraction mm	Measuring force N	Measuring face Parallelism µm	Mounting dia.	Order no.
0 - 80	***(0 - 4")***	1.2	6.5	≤ 2	8 mm 8 mm ***.375"***	**4510030** **4510031** [2] **4510035** [2]

[1] *Depending upon which anvils are being used*
[2] *Excludes indicating instrument, order indicating instrument seperately. Delivery with a different indicating instrument order seperately*



* *In initial position*

Accessories

	Order no.
Standard TC tipped-anvils, pair dia. D= 3,5 mm	**4510840**

Interchangeable Anvils please refer to Pages 9-21 to 9-23
Thread Setting Plug Gages see Page 13-14

Indicating Thread Snap Gage 853 for taps

Features

- For pitch, root and outside diameters on taps in conjunction with inter-changeable anvils
- Measuring spindle mounted in long guideway, lever-controlled retraction with mounting bore for inter- changeable anvils
- Anvil spindle adjustable with thumbscrew via worm and rack, for mounting inter-changeable support yokes
- Measuring spindle and anvil spindle are made of hardened stainless steel
- Further features are similar to the model 852; for details please refer to Page 9-18

Technical Data

Meas. range mm	*(inch)*	Meas. force N	Order no.*	Order no. Wooden case
1.2 - 35	***(.04 - 1.37")***	7.5	**4511000**	**4511020**
35 - 75	***(1.37 - 3")***	7.5	**4511001**	**4511021**

** Excludes indicating instrument, yoke and anvils*

Interchangeable Support Yokes 853 q

Depending upon the number of flutes, allowance has to be made for a compensation factor when reading the result. See the following table:

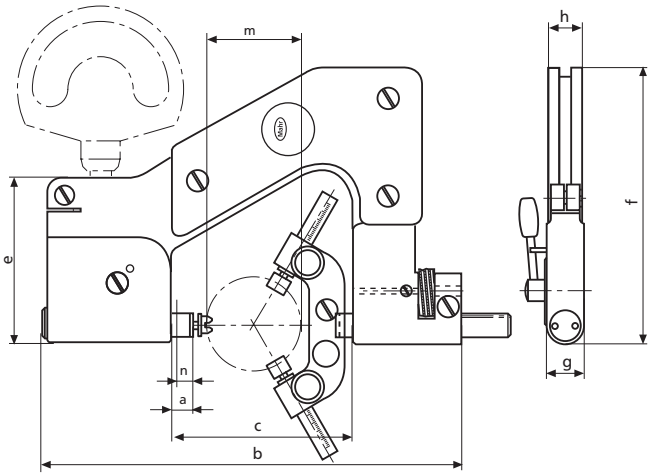
Cat. no.	No. of flutes of taps	For meas. range mm	Compens. factor**	Order no.
853 qk 3	3	1.2 - 35	x 1	**4511024**
853 qk 5	5	1.2 - 35	x 1.34	**4511026**
853 qk 7	7	1.2 - 35	x 1.42	**4511028**
853 qg 3	3	35 - 75	x 1	**4511025**
853 qg 5	5	35 - 75	x 1.34	**4511027**
853 qg 7	7	35 - 75	x 1.42	**4511029**

*** Allowance is to be made for other compensation methods when using the Holder 840 Fk*

Indicating Instruments

All indicating instruments that has a 8 mm mounting shank may be used. Recommended are:

		Readings	Order no.
MarCator	**810S**	0.001 mm	**4311000**
Compramess	**1004/*1004 Z***	5 µm/ ***.0001"***	**4333000/*4333900***
Zentimess	**1010/*1010 Z***	0.01 mm/***.0005"***	**4332000/*4332900***
MarCator	**1087/*1087 Z***	1 µm / ***.00005"***	**4337060/*4337070***



Meas. range m (mm)	1.2-35	35-75
Dist mov. anvil n (mm)	8	8
a*	12	11.5
b	152	192
c	66	110
e	60	65
f	98	125
g	14	14
h	11.5	14

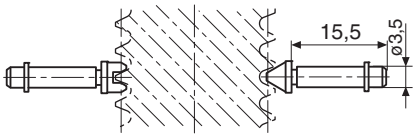
a = in initial position*

Accessories

Dial Comparators see Page 9-18
Recommendations: 810 S (see Page 5-32), 1010, 1004
Interchangeable Anvils see from Pages 9-21 to 9-23
Thread Setting Plug Gages see Page 13-20

Interchangeable Anvils for 852, 852 TS and 853

For pitch, root and outside diameters. Special wear-resistant hardened steel. With cylindrical mounting shank and retainer ring which ensures locking while permitting rotation in bore of indicating snap gages.



Sets consist of:

For pitch diameters
852 - 1 V-anvil and 1 blade
853 - 1 V-anvil and 2 radiused blades

For root diameters
852 - 1 V-anvil and 1 blade
853 - 1 V-anvil and 2 blades

For outside diameters
852 - 2 flat-face anvils
853 - 3 flat-face anvils

Anvils for pitch diameters for 852 and 852 TS

Metric thread (60°)			Whitworth thread (55°)			American UST thread (60°)		
Pitch	V-anvil	Blade	Pitch range	V-anvil	Blade	Pitch range	V-anvil	Blade
mm	**Order no.**	**Order no.**	tpi	**Order no.**	**Order no.**	tpi	**Order no.**	**Order no.**
0.2*	**4173007**	**4173707**	40 - 32	**4173043**	**4173743**	60 - 48	**4173113**	**4173813**
0.25*	**4173008**	**4173708**	32 - 24	**4173044**	**4173744**	48 - 40	**4173114**	**4173814**
0.3*	**4173009**	**4173709**	24 - 18	**4173045**	**4173745**	40 - 32	**4173115**	**4173815**
0.35*	**4173010**	**4173710**	18 - 14	**4173046**	**4173746**	32 - 24	**4173116**	**4173816**
0.4*	**4173011**	**4173711**	14 - 10	**4173047**	**4173747**	24 - 18	**4173117**	**4173817**
0.45*	**4173012**	**4173712**	10 - 7	**4173048**	**4173748**	18 - 14	**4173118**	**4173818**
0.5 - 0.7	**4173000**	**4173700**	7 - 4.5	**4173049**	**4173749**	14 - 10	**4173119**	**4173819**
0.7 - 1	**4173001**	**4173701**	4.5 - 3	**4173050**	**4173750**	10 - 7	**4173120**	**4173820**
1.25 - 2	**4173002**	**4173702**	3 - 2.5	**4179408**	**4179410**	7 - 4.5	**4173121**	**4173821**
2 - 3.5	**4173003**	**4173703**				4.5 - 3	**4173122**	**4173822**
3.5 - 5	**4173004**	**4173704**						
5 - 7	**4173005**	**4173705**						
7 - 9	**4173006**	**4173706**						

Anvils for pitch diameters for Indicating Thread Snap Gage 853

Metric thread (60°)			Whitworth thread (55°)			American UST thread (60°)		
Pitch	V-anvil	Blade	Pitch range	V-anvil	Blade	Pitch range	V-anvil	Blade
mm	**Order no.**	**Order no.**	tpi	**Order no.**	**Order no.**	tpi	**Order no.**	**Order no.**
0.2	**4173051**	**4174007**	40 - 32	**4173043**	**4176043**	60 - 48	**4173124**	**4176113**
0.25	**4173052**	**4174008**	32 - 24	**4173044**	**4176044**	48 - 40	**4173125**	**4176114**
0.3	**4173053**	**4174009**	24 - 18	**4173045**	**4176045**	40 - 32	**4173115**	**4176115**
0.35	**4173054**	**4174010**	18 - 14	**4173046**	**4176046**	32 - 24	**4173116**	**4176116**
0.4	**4173055**	**4174011**	14 - 10	**4173047**	**4176047**	24 - 18	**4173117**	**4176117**
0.45	**4173056**	**4174012**	10 - 7	**4173048**	**4176048**	18 - 14	**4173118**	**4176118**
0.5 - 0.7	**4173000**	**4174000**	7 - 4.5	**4173049**	**4176049**	14 - 10	**4173119**	**4176119**
0.7 - 1	**4173001**	**4174001**	4.5 - 3	**4173050**	**4176050**	10 - 7	**4173120**	**4176120**
1.25 - 2	**4173002**	**4174002**	3 - 2.5	**4179408**	**4179411**	7 - 4.5	**4173121**	**4176121**
2 - 3.5	**4173003**	**4174003**				4.5 - 3	**4173122**	**4176122**
3.5 - 5	**4173004**	**4174004**						
5 - 7	**4173005**	**4174005**						
7 - 9	**4173006**	**4174006**						

Carbide anvils for 852, 852TS and 853

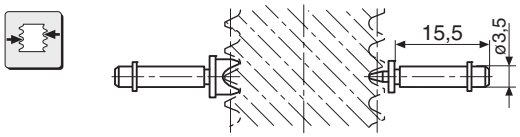
1.25 - 2	**4511105**	**4511104**
2 - 3.5	**4511108**	**4511107**
3.5 - 5	**4511140**	**4511139**
5 - 7	**4511142**	**4511141**

** V-anvil covers 3 pitches*

Interchangeable Anvils for 852, 852 TS and 853

For root diameters

Each pitch requires a separate V-anvil.
Blade can be used for several pitches.



Anvils for root diameters

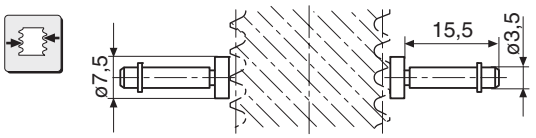
Metric thread (60°)			Whitworth thread (55°)			American UST-thread (60°)
Pitch	V-anvil	Blade	Pitch range	V-anvil	Blade	The same anvils are to be used as with the Whitworth-thread (55°).
mm	**Order no.**	**Order no.**	tpi	**Order no.**	**Order no.**	
0.5	**4173213**		40	**4173331**		
0.6	**4173214**		36	**4173321**	**4173833**	
0.7	**4173215**		32	**4173332**		
0.75	**4173216**	**4173719**	28	**4173333**		
0.8	**4173217**		26	**4173335**		
0.9	**4173218**		24	**4173336**		
1	**4173219**		22	**4173337**	**4173840**	
1.25	**4173221**		20	**4173338**		
1.5	**4173222**	**4173723**	19	**4173339**		
1.75	**4173223**		18	**4173340**		
2	**4173225**		16	**4173342**	**4173843**	
2.5	**4173226**	**4173727**	14	**4173343**		
3	**4173227**		12	**4173345**	**4173847**	
3.5	**4173229**		11	**4173346**		
4	**4173230**	**4173731**	10	**4173347**		
4.5	**4173231**		9	**4173349**	**4173851**	
5	**4173233**		8	**4173350**		
5.5	**4173234**	**4173735**	7	**4173451**		
6	**4173235**		6	**4173453**		
7	**4173237**		5	**4173454**	**4173855**	
8	**4173238**	**4173739**	4.5	**4173455**		
9	**4173239**		4	**4173457**		
			3.5	**4173458**	**4173860**	
			3.25	**4173459**		
			3	**4173460**		

For outside diameters

Anvil 40 Za, flat

Measuring face dia. 7.5 mm
with 853 smallest
measurable O.D. dia. 5 mm

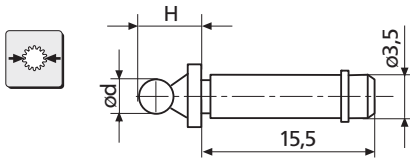
Hardened steel **Order no.** **4173210**
Carbide tipped **Order no.** **4511190**



Interchangeable Anvils for 852 and 852 TS

Ball Anvils

For measuring gears and for special applications. Carbide ball. With cylindrical mounting shank and retainer ring.
For mounting into mounting bores of thread micrometers 40 Z and 852.



Shank dia. 3.5 mm
Shank length 15.5 mm
Manufacturing tolerance
Ball dia. ± 2 µm

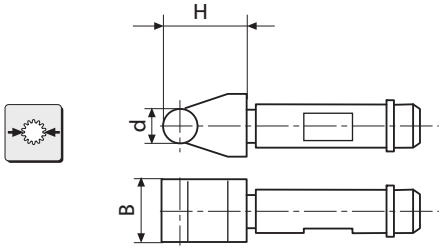
dia. **d** mm	**H** mm	**Order no.**	dia. **d** mm	**H** mm	**Order no.**	dia. **d** mm	**H** mm	**Order no.**
0.5	5.0	**4179150**	1.65	6.2	**4179168**	3.048	7.5	**4179182**
0.551	5.1	**4179151**	1.7	6.2	**4179169**	3.2	7.7	**4170570**
0.62	5.1	**4179152**	1.75	6.3	**4170553**	3.25	7.8	**4170566**
0.623	5.1	**4179153**	1.782	6.3	**4179170**	3.4	7.9	**4179183**
0.63	5.1	**4179154**	1.8	6.3	**4179171**	3.5	8.0	**4170558**
0.722	5.2	**4179155**	1.829	6.3	**4179172**	3.658	8.2	**4179184**
0.862	5.4	**4179156**	1.9	6.4	**4179173**	3.7	8.2	**4170571**
0.895	5.4	**4179157**	2	6.5	**4170554**	4	8.5	**4170559**
0.965	5.5	**4179158**	2.032	6.5	**4170568**	4.5	9.0	**4170560**
1	5.5	**4170550**	2.2	6.7	**4170569**	4.835	9.3	**4179185**
1.1	5.6	**4179159**	2.25	6.8	**4170564**	5	9.5	**4170561**
1.118	5.6	**4179160**	2.284	6.8	**4179174**	5.25	9.8	**4179186**
1.125	5.6	**4179161**	2.386	6.9	**4179175**	5.486	10.0	**4179187**
1.25	5.8	**4170551**	2.438	6.9	**4179176**	5.5	10.0	**4170562**
1.35	5.9	**4179162**	2.5	7.0	**4170556**	6	10.5	**4170563**
1.372	5.9	**4179163**	2.667	7.2	**4179177**	6.096	10.6	**4179188**
1.385	5.9	**4179164**	2.704	7.2	**4179178**	6.35	10.9	**4179189**
1.5	6.0	**4170552**	2.713	7.2	**4179179**	6.5	11.0	**4170567**
1.524	6.0	**4179165**	2.721	7.2	**4179180**	7	11.5	**4170572**
1.54	6.0	**4179166**	2.743	7.2	**4179181**	8	12.5	**4170573**
1.6	6.1	**4179167**	2.75	7.3	**4170565**	9	13.5	**4170574**
			3	7.5	**4170557**	10	14.5	**4170575**

Further sizes are available upon request (material: steel)

Roller Blades

For measuring gears and for special applications. The measuring roller is made of carbide.
To be mounted in the mounting bores of the 40 Z and 852.

Shank dia. 3.5 mm
Shank length 15.5 mm
Manufacturing tolerance
Ball dia. ± 2 µm



dia. **d** mm	**Dimension H** mm	**Dimension B** ø mm	**Order no.**
1	5.5	5	**4510200**
1.25	5.8	5	**4510201**
1.5	6.0	5	**4510202**
1.75	6.3	5	**4510203**
2	6.5	5.5	**4510204**
2.5	7.0	5.5	**4510206**
3	7.5	5.5	**4510207**
3.5	8.0	5.5	**4510208**
4	8.5	5.5	**4510209**
4.5	9.0	5.5	**4510210**
5	9.5	6	**4510211**
5.5	10.0	6	**4510212**
6	10.5	6	**4510213**

Further sizes are available upon request (material: steel)

Portable Thickness Gages 22 P

Portable measurement of sheet materials and small parts

22P-15

XLI-22P-20 with **XLI-20000** µMaxµm XL Digital Indicator (front mounted) and BA-26 Stand (Stand not included)

XLI-22P-20 with **XLI-20000** µMaxµm XL Digital Indicator

Features

- Indicator built into gage frame for maximum ruggedness.
- Lift-lever for one-hand operation.
- Continuous reading dials with revolution counter for absolute measurement of thin materials, plastic films, a small parts.
- 6.3 mm/ .25" diameter, flat steel contacts.
- XLI Models (with µMaxµm® XL Digital Indicator) can be Left/Right hand operated or front mounted and used with BA-26 Stand for bench applications.

Technical Data

Metric	Inch	Capacity mm / *inch*	Throat Depth mm / *inch*	Graduation
22P-10M	**22P-11**	0 - 2.54 / ***0-.10"***	28.6 / ***1.13"***	.002 / ***.0001"***
22P-15M	**22P-15**	0 - 12.70/ ***0-.50"***	50 / ***2"***	.01 / ***.001"***
22P-20M	**22P-20**	0 - 25 / ***0-1"***	50 / ***2"***	.01 / ***.001"***
	XLI-22P-20	25 / ***0-1"***	50 / ***2"***	.001 / ***.00005"*** (Resolution)

Portable Thickness Gages 26 P

26P-7

Features

- Push-down movement.
- Molded body fits shape of hand; built-in indicator.
- Gage is normally open for easy part entry. Push-down button to close the contacts.
- Rugged and compact for roving inspection.
- 6.3 mm / .25" diameter, flat steel contacts.

Technical Data

Metric	Inch	Capacity mm / *inch*	Throat Depth mm / *inch*	Graduation mm / *inch*
26P-7M	**26P-7**	0-7.6 / ***0-.30"***	16 / ***.63"***	.01 / ***.001"***

Portable Thickness Gages 838

838 A

838 B

Features

- Rugged sturdy frame made from hard aluminum
- Built-in Digital or Dial Indicator
- With a lifting lever for the moveable upper measuring spindle
- Convenient heat insulated handle, open at one end
- Versions with a throat depth of 200 mm have a removable stand

Thickness Gage 838 A

- With flat measuring faces
- For measuring soft materials for example; foil, felt, rubber, paper and cardboard

Thickness Gage 838 B

- With flat measuring faces
- For measuring soft materials for example; foil, felt, rubber, paper and cardboard

Technical Data

Catalog-no.	Throat depth mm *(inch)*	Measuring range mm *(inch)*	Measuring face dia. mm	Measuring face radius mm	Order no. with Indicator **810** 0.01 mm Res	Order no. with Indicator **1080** 0.005/ .0001" Res	Order no. Wooden case
838 A	50 *(2")*	0 - 20 *(0 - .750")*	11.3 = 1 cm²	-	**4495000**	**4495120**	**4495050**
	100 *(4")*	0 - 20 *(0 - .750")*	11.3 = 1 cm²	-	**4495001**	**4495121**	**4495051**
	200 *(8")*	0 - 20 *(0 - .750")*	11.3 = 1 cm²	-	**4495002**	**4495122**	**4495052**
	50 *(2")*	0 - 20 *(0 - .750")*	20 = 3.14 cm²	-	**4495103**	**4495125**	**4495050**
	100 *(4")*	0 - 20 *(0 - .750")*	20 = 3.14 cm²	-	**4495104**	**4495126**	**4495051**
	200 *(8")*	0 - 20 *(0 - .750")*	20 = 3.14 cm²	-	**4495105**	**4495127**	**4495052**
	50 *(2")*	0 - 20 *(0 - .750")*	30 = 7.06 cm²	-	**4495109**	**4495130**	**4495050**
	100 *(4")*	0 - 20 *(0 - .750")*	30 = 7.06 cm²	-	**4495110**	**4495131**	**4495051**
	200 *(8")*	0 - 20 *(0 - .750")*	30 = 7.06 cm²	-	**4495111**	**4495132**	**4495052**
838 B	50 *(2")*	0 - 20 *(0 - .750")*	12	30	**4495010**	**4495135**	**4495050**
	100 *(4")*	0 - 20 *(0 - .750")*	12	30	**4495011**	**4495136**	**4495051**
	200 *(8")*	0 - 20 *(0 - .750")*	12	30	**4495012**	**4495137**	**4495052**

838 AB

Features

- Rugged sturdy frame made from hard aluminum
- Built-in Digital or Dial Indicator or Dial Comparator
- With a lifting lever for the moveable upper measuring spindle
- Convenient heat insulated handle, open at one end

Thickness Gage 838 AB

- Lower measuring face is flat
- Upper measuring face is spherical
- For measuring hard materials for example; sheet metal, hardboard

Technical Data

Catalog no.	Throat depth mm *(inch)*	Measuring range mm *(inch)*	Measuring face dia. mm lower	Measuring face radius mm upper	Order no. with Indicator **810** 0.01 mm Res	Order no. with Indicator **1080** 0.005/ .0001" Res	Order no. Wooden case
838 AB flat/ spherical	50 ***(2")***	0 -20 ***(0 - .750")***	11.3 = 1 cm²	30	**4495504**	**4495140**	**4495050**
	100 ***(4")***	0 -20 ***(0 - .750")***	11.3 = 1 cm²	30		**4495141**	**4495051**

Catalog no.	Throat depth mm *(inch)*	Measuring range mm *(inch)*	Measuring faces dia. mm lower	Measuring faces radius mm upper	Order no. with Indicator **1082** 0.001 mm/ .0005" Res	Order no. with Comparator **1003** 1 µm Res	Order no. Wooden case
838 AB flat/ spherical	50 ***(2")***	0 - 20 ***(0 - .750")***	11.3 = 1 cm²	30	**4495145**	**4495519**	**4495050**
	100 ***(4")***	0 - 20 ***(0 - .750")***	11.3 = 1 cm²	30	**4495146**	**4495517**	**4495051**

Dead Load Thickness Gages 57B

XLI-57B-15

Features

- Solid casting with ribbed frame provides strength and rigidity for accurate measurements.
- 0.003 mm / .0001" parallelism with tables up to 19 mm / .75" diameter.
- 283 g / 10 oz. dead load weight for constant gaging pressure.
- 10 mm / .407" diameter flat upper 54.0 mm/ 2.125" lower contacts.
- Indicator mounts with adjustable back for quick positioning for each gaging requirement.
- Available with Dial Indicator or Digital Electronic Indicator.
- Gage is supplied with a lift lever so work can be easily placed between the table and contact.
- Four-inch throat depth for part clearance.

Technical Data

Order no. Metric	Inch	Capacity mm / *inch*	Description
57B-14M	**57B-14**	0-2.5 / ***0-.10"***	Dial Indicator readout with 2.5mm / .10" sensitive range and .002 mm / .0001" grads.
57B-15M	**57B-15**	0-25 / ***0-1"***	Dial Indicator readout with 25mm / 1" sensitive range and .01 mm / .001"grads.
XLI-57B-15			µMaxµm® XL Digital Indicator with 25mm / 1" range and .001 mm / .00005" resolution (Model XLI-50002).

Alternate Indicators and contact points available upon request.
Contact Mahr Federal.

Wire Insulation Thickness Gages 57B

For checking wall thickness of wire insulation and other small-diameter tubular parts

57B-13

Features

- Using the basic design of the Model 57B-13 (Model 57B-13M — Metric) Gage, the lower contact is PT-103, 1.10 mm / .043" diameter rod, mounted horizontally. The upper radiused contact is a chisel contact, in line with the rod. By slipping tubular parts onto the lower contact, the gage can measure the thickness of the wall of the tube. A 10 gram auxiliary weight (WT-3) on the Indicator provides a total dead-load weight of 25 grams. (Replacement lower rod: PS-43)

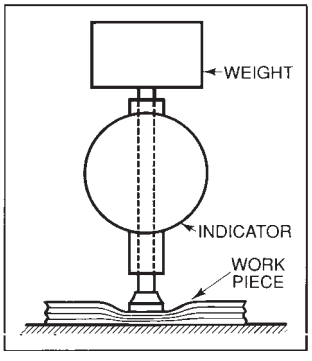
Technical Data

Order no. Metric	Inch	Capacity mm / *inch*	Description
57B-13M	**57B-13**	0-2.5 / ***0-.10"***	Dial Indicator readout with 7.6 mm / .30" sensitive range and 0.01 mm / .0005" grads.
XLI-57B-13			µMaxµm® XL Digital Indicator with 25 mm / 1" range and 0.001 mm / .00005" resolution (Model XLI-50002).
Options			
PT-2245			0.050 mm / .02" diameter Pin, Lower Contact Assembly

Measuring Compressible Materials

Compressible materials such as paper, plastics, rubber or fabrics must be measured under controlled conditions. Many materials have measurement standards specified by A.S.T.M., U.L., or other industry standards organizations. Measurement standards specify dead load weight, upper and lower contact configurations, and Indicator resolution.

Series 57B Gages are easily modified to meet most of these industry standards. Mahr Federal has on file designs for the measurement of paper, latex foam rubber, sponge rubber, vulcanized rubber, asbestos tape and cloth, sheet and roll felt, and many other materials. When inquiring, specify A.S.T.M. Specification Number, if possible.



Thickness Gages 57B Bench Style

57B-12

Features

- Solid casting with ribbed frame provides strength and rigidity for accurate measurements.
- Gage is furnished with a lift lever so work can be easily placed between the contacts.
- Large 54 mm/ 2.125" diameter lower anvil provides convenient stage for small parts or flat materials.
- 4.75 mm/ .187" diameter radiused upper contact normally provided.
- 102 mm/ 4" throat depth for part clearance.
- Indicator mounts with adjustable back for quick positioning for each gaging requirement.
- Available with Dial Indicator or Digital Electronic Indicator.

Technical Data

Order no. Metric	Inch	Capacity mm / *inch*	Description
57B-11M	**57B-11**	0-25 / ***0-1"***	Dial Indicator readout with 25 mm / 1" sensitive range and .01 mm /.001"grads.
XLI-57B-11			µMaxµm® XL Digital Indicator with 25 mm/ 1" range and .001 mm / .00005" resolution (Model XLI-50002).
EMD-57B-11		0-21.5 / ***0-.85"***	Maxµm/// Digital Indicator with selectable range and resolution, 2033101.
EDI-57B-11			µMaxµm Digital Indicator with 2 mm / .08" sensitive range, .001 mm / .00005" resolution (Model EDI-10101).
57B-12M	**57B-12**	0-12.5 ***/ 0-.5"***	Dial Indicator readout with 12.50 mm/ .50" sensitive range and .01 mm / .0005" grads.
XLI-57B-12			µMaxµm® XL Digital Indicator with 12.50 mm / .50" range and .001 mm / .00005" resolution (Model XLI-10002).

Alternate Indicators and contact points available upon request.
Contact Mahr Federal.

Caliper Gages 49P

The most widely used gages for checking medium tolerance dimensions on patterns, castings, forgings, dies, sheet metal.

49P

Features

- The most widely used gages for checking medium tolerance dimensions on patterns, castings, forgings, dies, sheet metal.
- Generous clearance on jaws reaches over non-measured part protrusions for easy access to areas where thickness must meet critical dimensional specs.
- Retraction lever is conveniently located for one-hand operation.
- .02 mm or .1 mm / .01", .001", or 1/64" grads. available.
- Continuous reading dials with revolution counters normally provided.
- Cylindrical radius steel contact tips normally furnished.

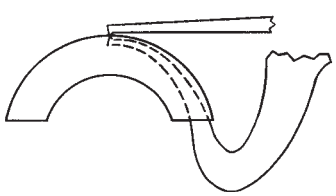
Technical Data

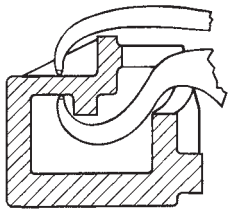
Order no. Metric	Inch	Capacity* mm / *inch*	Gaging Depth mm / *inch*	Minimum Graduation mm / *inch*	A	B
49P-17M	**49P-17**	0 - 50 / ***0 - 2"***	100 / ***4"***	0.02 / ***.001"*** grads.	1-1/4	1-1/4
49P-19M	**49P-19**	0 - 50 / ***0 - 2"***	200 / ***8"***	0.02 / ***.001"*** grads.	2-9/16	2
49P-1M	**49P-1**	0 - 75 / ***0 - 3"***	100 / ***4"***	0.1 / ***.01"*** grads.	1-1/4	1-1/4
49P-2M	**49P-2**	0 -75 / ***0 - 3"***	200 / ***8"***	0.1 / ***.01"*** grads.	2-9/16	2

* *Ordinarily this gage is used as a comparator. The actual measuring range of the instrument is 38 mm / 1.50".*
If the gage is used for direct linear measurement, chordal errors may need to be corrected.
Contact Mahr Federal Technical Assistance for details.

Special Applications

Series 49P and 149P Caliper Gages have many design possibilities. Specially shaped arms of various lengths can be designed to reach inaccessible spots or get around obstructions to make measurements possible which might otherwise go unchecked. For alternate contact shapes or materials, alternate capacities and gaging depths, and special designs to meet your application contact Mahr Federal Technical Assistance.



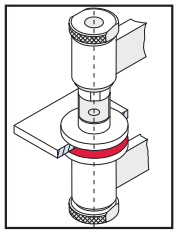


Gages for External Measurement 838 TA

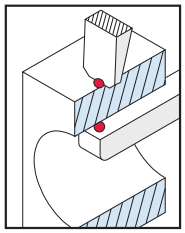
Features

- For measuring thicknesses and wall thicknesses
- Precision rack and pinion mechanism ensures reliable reproducibility
- Easy to operate, very habile and portable
- Resolution from 0.005 mm
- Tolerance markers are easy to read
- Dust and splash waterproof
- Contact points are made from carbide
- Absolute measuring instrument

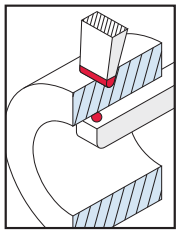
Applications

① 

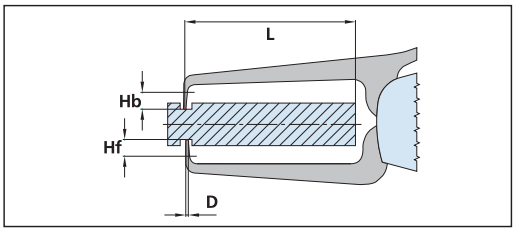
T dia. 10 mm

② 

TC-ball dia. 1.5 mm

③ 

TC-ball dia. 1.5 mm SR 0.4



Technical Data and Dimensions

Application range	Awb	mm / ***inch***	0 - 5 / ***0 - .2"***	0 - 10 / ***0 - .4"***	0 - 10 / ***0 - .4"***
Measuring range	Meb	mm / ***inch***	5 / ***.2"***	10 / ***.4"***	10 / ***.4"***
Readings	Skw	mm / ***inch***	0.005 / ***.0002"***	0.01 / ***.0005"***	0.01 / ***.0005"***
Deviation within the meas. range	f_M	mm / ***inch***	± 0.02 / ***± .001"***	± 0.02 / ***± .001"***	± 0.02 / ***± .001"***
Repeatability	f_w	mm / ***inch***	0.005 / ***.0002"***	0.005 / ***.0002"***	0.005 / ***.0002"***
Measuring depth	L	mm / ***inch***	28 / ***1.1"***	59 / ***2.3"***	59 / ***2.3"***
Contact point - type	D	mm	T dia. 10 ①	K dia. 1.5 ②	K dia. 1.5/SR 0.4 ③
		inch	T dia. ***.4"***	K dia. ***.06"***	K dia. ***.06"/SR .015"***
Contact point - length (moveable)	Hb	mm / ***inch***	16.5 / ***.65"***	8 / ***.314"***	8 / ***.314"***
Contact point - length (fixed)	Hf	mm / ***inch***	8.5 / ***.332"***	0.9 / ***.035"***	0.9 / ***.035"***
Minimum meas. force	Fmin.	N	1.20	0.80	0.80
Maximum meas. force	Fmax.	N	1.70	1.30	1.30
Order no. Metric graduation			**4495070**	**4495071**	**4495072**
Order no. Inch graduation			**4495970**	**4495971**	**4495972**

Electronic Gage for External Measurement 838 EA for measuring thicknesses and wall thickness

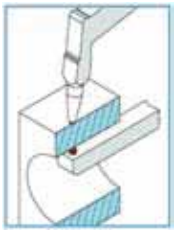
Features

- High contrast analog and digital LCD
- Specified measuring programs according to applications /measuring tasks
- Absolute/Relative measuring program
- Tolerance is displayed with 2 LEDs
- mm/inch switchable
- Protection class IP63 according to EN 60529

- Supplied with: Test certificate, Battery

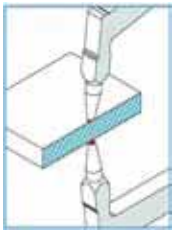
Applications

①

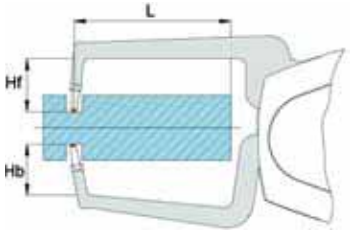


Ball dia.1.5 mm

②



Ball dia.1.5 mm
Ball dia.3 mm



Technical Data and Dimensions

Measuring range	mm / ***inch***	0 - 20 / **0 - 8"**	0 - 20/ **0 - 8"**	0 - 40/ **0 - 16"**
Resolution	mm / ***inch***	0.01 / ***.0005"***	0.01 / ***.0005"***	0.01 / ***.0005"***
Measuring depth "L"	mm / ***inch***	50 / **1.97"**	50 / **1.97"**	115 / **4.53"**
Contact point-length "Hb"	mm / ***inch***	15 / **.59"**	15 / **.59"**	22 / **.87"**
Contact point-length "Hf"	mm / ***inch***	15 / **.59"**	0,9	22
Contact point-type	mm / ***inch***	K dia. 1.5 / ***.059"*** ②	K dia. 1.5 / ***.059"*** ①	K dia. 3 / ***.118"*** ②
Measuring force	N	0.7 - 1.3	0.7 - 1.3	1.0 - 1.5
Error limit "G"	mm / ***inch***	0.02 / ***.001"***	0.02 / ***.001"***	0.04 / ***.0015"***
Repeatability "r"	mm / ***inch***	0.01 / ***.0005"***	0.01 / ***.0005"***	0.02 / ***.001"***
Order no.		**4495057**	**4495058**	**4495059**

Accessories

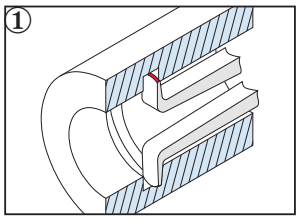
		Order no.
838 di	Digimatic Interface incl. Data Conncion Cable	**4495084**
	Battery Alkaline AA 1.5 V	**4243072**

Gages for Internal Measurement 838 TI

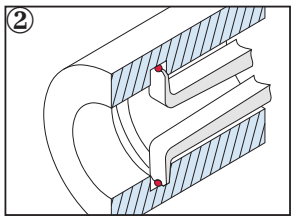
Features

- For measuring bores and internal grooves
- Precision rack and pinion mechanism ensures reliable reproducibility
- Easy to operate, very habile and portable
- Resolution from 0.005 mm
- Tolerance markers are easy to read
- Dust and splash waterproof
- Contact points are made from carbide
- Absolute measuring instrument

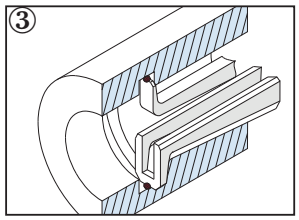
Applications



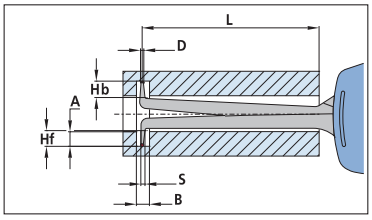
Blade R 0.1 mm



TC-ball dia. 1 mm
TC-ball dia. 0.6 mm



TC-ball dia. 1 mm



Technical Data and Dimensions

Application range	Awb	mm	2.5 - 7.5	5 - 10	5 - 15	10 - 20	20 - 30	30 - 40	40 - 50
		inch	***.1 - .3"***	***.2 - .4"***	***.2 - .6"***	***.4 - .8"***	***.8 - 1.2"***	***1.2 - 1.6"***	***1.6 - 2.0"***
Measuring range	Meb	mm/***inch***	5 / ***.2"***	5 / ***.2"***	10 / ***.4"***	10 / ***.4"***	10 / ***.4"***	10 / ***.4"***	10 / ***.4"***
Readings	Skw	mm	0.005	0.005	0.01	0.01	0.01	0.01	0.01
		inch	***.0002"***	***.0002"***	***.0005"***	***.0005"***	***.0005"***	***.0005"***	***.0005"***
Deviation within the meas. range	f_M	mm	±0.01	±0.01	±0.02	±0.02	±0.02	±0.02	±0.02
		inch	***±.0005"***	***±.0005"***	***±.001"***	***±.001"***	***±.001"***	***±.001"***	***±.001"***
Repeatability	f_w	mm	0.0025	0.0025	0.005	0.005	0.005	0.005	0.005
		inch	***.0001"***	***.0001"***	***.0002"***	***.0002"***	***.0002"***	***.0002"***	***.0002"***
Measuring depth	L	mm/***inch***	10/***.4"***	22/***.86"***	30/***1.2"***	50/***2.0"***	52/***2.05"***	57/***2.25"***	57/***2.25"***
Groove depth	A	mm/***inch***	0.7/***.03"***	2.2/***.08"***	1.7/***.06"***	4/***.16"***	4/***.16"***	4.5/***.17"***	4.5/***.17"***
Groove width	B	mm/***inch***	0.6/***.024"***	1.4/***.05"***	1.1/***.04"***	2/***.08"***	2/***.08"***	2/***.08"***	2/***.08"***
Contact point - type	D	mm	SR 0.1 ①	K dia. 0.6 ②	K dia. 0.6 ②	K dia. 1 ③	K dia. 1 ③	K dia. 1 ②	K dia. 1 ②
		inch	***.004"***	***.02"***	***.02"***	***.04"***	***.04"***	***.04"***	***.04"***
Contact point - length (mov.)	Hb	mm/***inch***	0.7/***.03"***	2.3/***.09"***	2.3/***.09"***	5/***.2"***	5/***.2"***	5/***.2"***	5/***.2"***
Contact point - length (fixed)	Hf	mm/***inch***	0.7/***.03"***	2.3/***.09"***	2.3/***.09"***	5/***.2"***	5/***.2"***	5/***.2"***	5/***.2"***
Contact point - thickness	S	mm/***inch***	0.5/***.02"***	1.2/***.05"***	1.2/***.05"***	1.7/***.06"***	1.7/***.06"***	1.7/***.06"***	1.7/***.06"***
Minimum meas. force	Fmin.	N	1.20	1.20	0.80	0.80	0.80	0.80	0.80
Maximum meas. force	Fmax.	N	1.70	1.70	1.30	1.30	1.30	1.30	1.30
Order no.	**Metric**		**4495060**	**4495061**	**4495062**	**4495063**	**4495064**	**4495065**	**4495066**
Order no.	**Inch**		**4495960**	**4495961**	**4495962**	**4495963**	**4495964**	**4495965**	**4495966**

Electronic Gage for Internal Measurement 838 EI for measuring bores and internal grooves

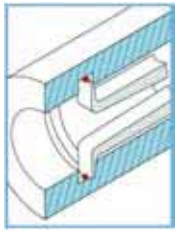
Features

- High contrast analog and digital LCD
- Specified measuring programs according to applications / measuring tasks
- Absolute/Relative measuring program
- Tolerance is displayed with 2 LEDs
- mm/inch switchable
- Protection class IP63 according to EN 60529

- Supplied with: Test certificate, Battery

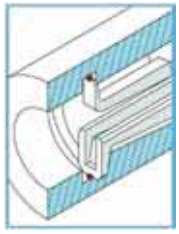
Applications

①

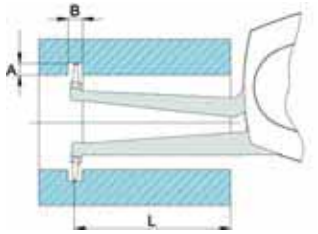


Ball dia. 0.6 mm
Ball dia. 1 mm

②



Ball dia. 1 mm



Technical Data and Dimensions

Measuring range	mm / ***inch***	5 - 25 / ***.197 - .984"***	10 - 30 / ***.394 - 1.18"***	20 - 40 / ***.787 - 1.574"***
Resolution	mm / ***inch***	0.01 / ***.0005"***	0.01 / ***.0005"***	0.01 / ***.0005"***
Measuring depth "L"	mm / ***inch***	29 / ***1.14"***	49 / ***1.93"***	53 / ***2.09"***
Groove depth "A"	mm / ***inch***	2.2 / ***.087"***	4 / ***.157"***	4 / ***.157"***
Groove width "B"	mm / ***inch***	1.8 / ***.071"***	2 / ***.079"***	2 / ***.079"***
Contact point-type	mm / ***inch***	K dia. 0.6 / ***.024"*** ①	K dia. 1 / ***.039"*** ②	K dia. 1 / ***.039"*** ①
Measuring force	N	0.9 - 1.4 / ***.035" - .055"***	0.9 - 1.4 / ***.035" - .055"***	1.1 - 1.4 / ***.043" - .055"***
Error limit "G"	mm / ***inch***	0.02 / ***.001"***	0.02 / ***.001"***	0.02 / ***.001"***
Repeatability "r"	mm / ***inch***	0.02 / ***.001"***	0.01 / ***.0005"***	0.01 / ***.0005"***
Order no.		**4495053**	**4495054**	**4495055**

Accessories

		Order no.
838 di	Digimatic Interface incl. Data Conncion Cable	**4495084**
	Battery Alkaline AA 1,5 V	**4243072**

Definition of Terms Specifications for inspection and test acceptance procedure of mechanical and electronic caliper gages

1. Basics

The inspection only follows approximately the testing methods and procedures of the German standard DIN 878 for dial gages and the testing statements for caliper gages according to VDI/VDE/DGQ 2618 page 13. The gages are referred to without special reference as gages for 'absolute' measurements and adjustable zero point.

2. Definitions

Definitions of length checking techniques see DIN 2257 part 1 and part 2 (see also Illustration).

2.1 Application range Awb

Application range Awb of a gage corresponds to the sum of adjusting and measuring range.

2.2 Measuring range Meb

The measuring range of an indicating gage represents the range of measuring values in which agreed error limits must not be exceeded.

2.3 Reading Zw

The reading Zw of a numerical interval of a numerical scale is the modification of the value of a measured variable that causes the modification of the indication by one interval. The numerical interval corresponds to the scale interval of a line scale and is indicated in the unity of the measured variable.

2.4 Scale interval Skw

The scale interval Skw is indicated on the scale, i.e. 0.01 mm. It corresponds to the measuring value between two scale graduation marks.

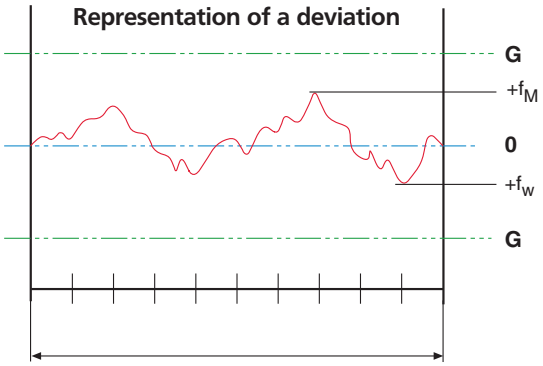
2.5 Deviation within the measuring range f_M

The deviation within the measuring range (range of deviation) f_M represents the distance of ordinates between the highest and the lowest position in the deviation diagram when the movable caliper arm closes. The error limits G for f_M is symmetrically positioned to the zero line and is indicated as $\pm f_{Mzul}$.

The deviation in the partial measuring range f_t can only be determined by using electronic testing methods during the preparation of certificates of quality.

2.6 Repeatability f_w

Repeatability f_w is a characteristic value for deviations of the measured variable within the measuring range in the same motion direction of the movable caliper arm (usually n is 5).



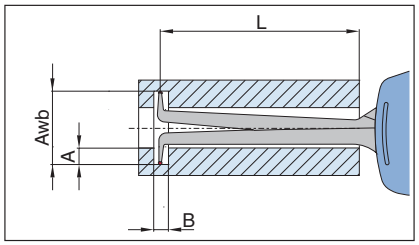
Measuring Capacity of Inside Measuring Instruments

The data that is shown in the table refer to groove depth A, groove width B and measuring depth L, these are only meant to be rough guidelines.

For each type of instrument there is dependence of these three values from each other and on the application range Awb. This is shown in the adjacent table of examples. For each inside measuring instrument this table is available upon request in connection with a detailed data sheet.

Groove depth A (mm)	Application range Awb (mm)										
	10	11	12	13	14	15	16	17	18	19	20
0	0/55	0/55	0/56	0/56	0/57	0/57	0/57	0/57	0/57	0/57	0/58
0.5		1.4/55	1.4/56	1.4/56	1.4/56	1.4/56	1.4/56	1.4/56	1.4/57	1.4/57	1.4/57
1			1.4/56	1.4/56	1.4/56	1.4/56	1.4/56	1.4/56	1.4/56	1.4/56	1.4/57
1.5				1.4/55	1.4/55	1.4/55	1.4/55	1.4/56	1.4/56	1.4/56	1.4/56
2					1.4/55	1.4/55	1.4/55	1.5/55	1.5/55	1.5/56	1.5/56
2.5						1.4/55	1.5/55	1.5/55	1.6/55	1.6/55	1.6/55
3							1.5/54	1.6/54	1.6/55	1.6/55	1.6/55
3.5								1.6/54	1.6/54	1.6/54	1.6/55
4									1.7/54	1.7/54	1.7/54
4.5										1.7/53	1.8/54

Relationship B/L



B = Min. groove depth (mm)
L = Max. usable caliper arm length (mm)

Example: Awb = 12 A = 0.5 B = 1.4 L = 56

Indicating Depth Gage 65P-40, 75P-30 and 837

75P-30 and 75P-35

65P-40

837*

Features

- **65P-40** has a "V" shaped base and a needle contact. Movement is "Push-Down" style. Ideal for measuring etch depth, pits, or small, shallow recesses.
- **75P-30** Depth Gages have rectangular, flat base and a radiused contact point. 75P-30 is supplied with contact point, for measuring depths from the base as a reference. Contact points for other depths are available upon request.
- **75P-35** Depth Gages have three interchangeable contact points, allowing inspection of depths to 76 mm / 3". Check depths against a setting master.
- **837** has a large cross beam with hardened and ground contact surface as well as mounting clamp for dial indicator.

Technical Data

Order no. Metric	Order no. Inch	Capacity	Range of Sensitive	Graduation Contact	Base Dimensions	Contact Style/ Length
65P-40M	**65P-40**	0-2 mm / ***0-.075"***	0-2 mm / ***0-.075"***	0.01 mm / ***.0005"***	64 mm / ***2.50"***	Needle
75P-30M	**75P-30**	0-4 mm / ***0-.15"***	0-4 mm / ***0-.15"***	0.01 mm / ***.0005"***	64x14 mm / ***2.5x.56"***	radiused: 3 mm / ***.13"***
75P-35M	**75P-35**	0-75 mm / ***0-3"***	0-75 mm / ***0-3"***	0.01 mm / ***.001"***	64x14 mm / ***2.5x.56"***	(3) radiused: 3 mm / ***.13"*** 28 mm / ***1.13"*** 54 mm / ***2.13"***

Model	Range	Range with Anvils (837v)	Beam length	Beam width	Mounting hole dia.	Order no.
837	0-10 mm	0-100 mm	60 mm	12 mm	8 mm	**4494000***

* *Indicator not included.*

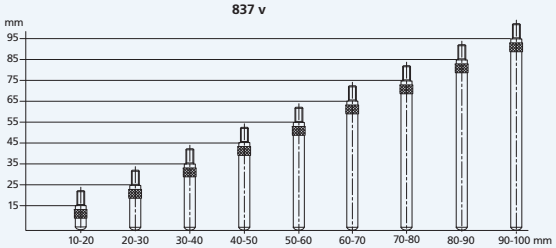
Indicating Instruments

All indicating instruments that has a 8 mm mounting shank may be used. However the Dial Indicator 810 AT is recommended due to its large measuring range.

Readings	0.01 mm
Measuring range	10 mm
Order no.	**4311060**

Other alternatives are Digital Indicators 1075 or 1086, please refer to Chapter 5 for more information.

Accessories



Anvil Set 837 v
Set of 9 anvils in increments of 10 mm. Spherical measuring faces, M 2.5 connection thread

Order no. **4494009**

Wooden case
Accommodates the Depth Gage, a Dial Indicator and Anvils

Order no. **4494001**

Depth Gages 75P-50

75P-52 with Setting Master

Features

- Modular depth gages for all applictions.
- Single and multi-purpose bases with choice of Dial Indicator for comparative or direct measurement.
- Indicator collet mounting allows easy interchangeability of Indicators and bases – use one Indicator with several bases or change Indicators to meet range requirements.
- Family of contact points available to cover wide range of depth measurement applications.
- Setting masters available with anvil ground to specified depth (± 0.0025 mm / ± .0001" in accuracy).

Technical Data

- **For Comparative Measurement:** Unless otherwise specified, a comparative measurement Indicator will be furnished. Correct contact point will be furnished for the gaging depth specified.

  Metric: Furnished with .01 mm grads. / 2.50 mm range, balance dial.

  Inch: Furnished with .0005" grads. / .075" range, balanced dial.

- **For Direct Measurement:** (Special Order) Contact point for 0-25 mm / 0-1" depth will be furnished unless otherwise specified.

  Metric: Model SP6IS (0.01 mm grads. / 25 mm range, continuous dial with revolution counter).

  Inch: Model 28ISN (.001" grads. / 1" range, continuous dial with revolution counter).

  Digital: Model XLI-20000 (.001 mm/.00005" resolution, 25 mm / 1" range)

- For long range models contact Mahr Federal.

Base Dimensions (all bases are 15 mm/ ***.59"*** high x 19 mm/ ***.75"*** wide)

Order no. Metric	Order no. Inch	Length mm / *inch*	Width mm / *inch*	Diameter mm / *inch*	Measuring Positions	Base only Model*
75P-50M	**75P-50**	50 / ***2"***	19 / ***.75"***	–	One	BA-42
75P-51M	**75P-51**	76 / ***3"***	19 / ***.75"***	–	One	BA-43
75P-52M	**75P-52**	102 / ***4"***	19 / ***.75"***	–	Two	BA-44
75P-53M	**75P-53**	152 / ***6"***	19 / ***.75"***	–	Three	BA-45
75P-54M	**75P-54**	203 / ***8"***	19 / ***.75"***	–	Three	BA-46
75P-55M	**75P-55**	–	–	19 / ***.75"***	One	BA-47
75P-56 M	**75P-56**	–	–	32 / ***1.25"***	One	BA-76

Ordering Information

When ordering please specify:

1. Model Number.
2. Comparative or Direct Measurement.
3. Depth to be gaged.
4. Master Setting Block, if required.
5. Any special or optional features such as special contact points, Indicator Housing, or alternate Indicators.

* If base only is specified, it is supplied without the indicator holding collet, model AD-87.

Order collet seperately if required.

Contact Points

To increase the versatility of any **75P-50** Series Depth Gage, additional contacts may be used to extend the capacity of the gage. Specify additional contact points required from the table at right.

To order the entire set of points, order by Model **PT-750** Contact Point Set.

Gaging Depth mm / *inch*	Contact Point model*	Maxμm *III*
0.00 - 1.60 / ***0 - .063"***	PT-201	PT-564
1.60 - 4.80 / ***.063 - .188"***	PT-232	PT-31
4.80 - 8 / ***.188 - .313"***	PT-305	PT-201
8 - 11 / ***.313 - .438"***	PT-565	PT-232
11 - 14 / ***.438 - .563"***	PT-239	PT-305
14 - 17.50 / ***.563 - .688"***	PT-50	PT-565
17.50 - 21 / ***.688 - .813"***	PT-235	PT-239
21 - 24 / ***.813 - .938"***	PT-241	PT-50
24 - 27 / ***.938 - 1.063"***	PT-100	PT-235
27 - 30 / ***1.063 - 1.188"***	PT-51	PT-241
30 - 33.40 / ***1.188 - 1.313"***	PT-243	PT-100
33.4 - 37 / ***1.313 - 1.438"***	PT-696	PT-51
37 - 40 / ***1.438 - 1.563"***	PT-101	PT-243
40 - 43 / ***1.563 - 1.688"***	PT-245	PT-696
43 - 46 / ***1.688 - 1.813"***	PT-102	PT-101
46 - 49 / ***1.813 - 1.938"***	PT-566	PT-245
49 - 52.4 / ***1.938 - 2.063"***	PT-247	PT-102

** For "C" size dial indicators, "EDI-" and "XLI-" μMaxμm Digital Indicators.*

Semi-finished Model

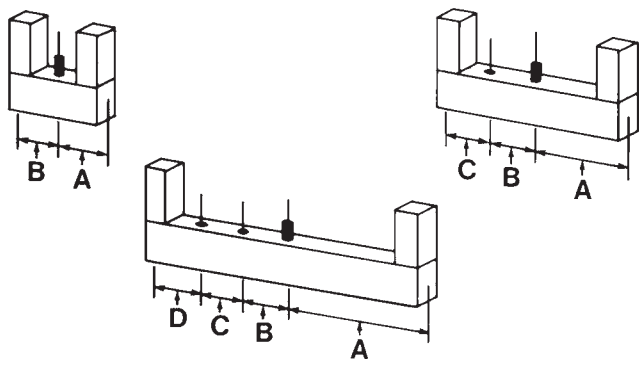
0-25 mm/ **0-1"**	25-50 mm/ **1-2"**	**Gaging Positions**	**Used with Model**	**"A"**	**"B"**	**"C"**	**"D"**
MR-501	**MR-502**	One	75P-50, 75P-30/35	25 mm/ ***1"***	25 mm/ ***1"***	–	–
MR-511	**MR-512**	One	75P-51	38 mm/ ***1.5"***	38 mm/ ***1.5"***	–	–
MR-521	**MR-522**	Two	75P-52	50 mm/ ***2"***	25 mm/ ***1"***	25 mm/ ***1"***	–
MR-531	**MR-532**	Three	75P-53	75 mm/ ***3"***	25 mm/ ***1"***	25 mm/ ***1"***	25 mm/ ***1"***
MR-541	**MR-542**	Three	75P-54	102 mm/ ***4"***	25 mm/ ***1"***	25 mm/ ***1"***	25 mm/ ***1"***
MR-551	**MR-552**	One	75P-55, 75P-56	17 mm/ ***.68"***	17 mm/ ***.68"***	–	–

Six different setting masters are available for Series 75P Models. Setting masters are available in two styles: Finished (ground to final size) and Semi-finished (assembled but not ground to final size). Finished depths available from 0 - 50 mm / 0 - 2". Unground Anvil can be purchased separately. Specify **Model AL-89**.

For multi-position masters, please specify the anvil location.
Protective Housings for the Dial Indicator are available, see page 5-23.

For Series 75P-50 style depth gages with alternate Indicators, greater gaging depth, alternate contact configurations or other modifications, contact Mahr Federal Technical Assistance.

For master finished to size, specify size and add suffix "F". Example: MR-502F, size 1.265" (Master for 75P-50 set to 1.265").



Bench Depth Gages 75B-1

For inspecting small parts

75B-1

Features

- Available with Dial Indicator (75B-1 Models) or Maxμm® /// and μMaxμm Digital Electronic Indicators (EMD-75B and XLI-75B Models).
- 89 x 102 mm / 3.50 x 4" hardened, ground work surface provides excellent reference surface.
- Four #10-32 tapped holes provided for mounting part location fixturing.
- Indicator adjustable vertically over 32 mm / 1.25".
- Two contact points provided, 6 mm / .25" and 32 mm / 1.25" to check features up to 50 mm / 2" deep.

Technical Data

Order no. Metric	Inch	Indicator Range / Graduation or Resolution
75B-1M	**75B-1**	25 mm / .01 mm (***1" / .001"***) graduation Dial Indicator.
EMD-75B-1		Maxμm/// Digital Indicator with selectable range and resolution, 2033201.
XLI-75B-1		μMaxμm XL Digital Indicator, 25 mm / ***1"*** range, .001 mm / ***.00005"*** resolution
XLI-75B-2		μMaxμm XL Digital Indicator, 12 mm / ***.50"*** range, .001 mm / ***.00005"*** resolution

To specify Digital Output on EMD-75B Models, add suffix "D". Example = EMD-75B-1D.
Output is standard with XLI and EDI models.

Dimentron® Plug Inside Diameter Gages

Thru-hole and Blind Hole Dimentron Plugs

Features

- Designed for high production I.D. gaging.
- High chrome content; hardened stainless steel bodies ground precisely for specified size measurement.
- Plug tooling interchangeable for quick changeover.
- Measuring is easy – just insert plug into diameter and read. No rocking needed.
- Set to nominal dimension with a single master ring.
- Long life: Tungsten carbide contacts and vee rod ensure durable motion transfer.
- Three styles of plugs available – Thru-hole, Blind Hole and Super-blind.
- Open design rinses clean easily.
- Explore bores for taper, barrel shape, bell-mouth and 2-point out-of-round.
- Stop Collars available for all standard sizes.
- Captive vee rod design.

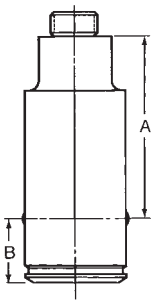
Technical Data

Blind Hole Plugs***
Use Dimension "A" below. Dimension "B" is 4 mm / .157".

Super-blind Plugs
Use Dimension "A" below. Dimension "B" is 2 mm / .08",
for 5.5 mm / .217" & up .108" for 3.2 mm /. 125" to 5.5 mm /.217"

Super-Super blind Plugs
Use Dimension "A" below. Dimension "B" is 0.79 mm / .031".
(4.500" to 9.00" are not available with this model.)

Dimentron Plug Dimensions



Blind Hole Plugs

Thru-hole Plugs

Sizes above mm / *inch*	To and include mm / *inch*	A mm / *inch*	B mm / *inch*	Group*
3.2 / ***.125"***	5.5 / ***.217"***	30.4 / ***1.2"***	6.4 / ***.25"***	no group**
5.5 / ***.217"***	8.2 / ***.322"***	34.8 / ***1.37"***	6.5 / ***.256"***	5
8.2 / ***.322"***	9.5 / ***.375"***	34.8 / ***1.37"***	6.5 / ***.256"***	6
9.5 / ***.375"***	12.7 / ***.50"***	35.4 / ***1.39"***	13 / ***.512"***	8
12.7 / ***.50"***	19.05 / ***.75"***	35.4 / ***1.39"***	13 / ***.512"***	8
19.05 / ***.75"***	25 / ***1"***	48.3 / ***1.90"***	16 / ***.63"***	12
25 / ***1"***	38 / ***1.50"***	48.3 / ***1.90"***	16 / ***.63"***	12
38 / ***1.50"***	63 / ***2.50"***	46.7 / ***1.84"***	19 / ***.748"***	12
63 / ***2.50"***	114.3 / ***4.5"***	46.7 / ***1.84"***	19 / ***.748"***	12
114.3 / ***4.50"***	228.6 / ***9.0"***	46.7 / ***1.84"***	9.5 / ***.375"***	12

* *Group Number specifies thread size on gaging plugs. Threaded bushings are provided with each plug to allow mounting to Maxμm® Adaptor or Electronic Handle Assembly.*

** *Only available as Thru- and Blind Hole Small Bore Probe. For larger or smaller plugs, alternate contact materials, extended gaging depths, more clearance, or other plug modifications - contact Mahr Federal Technical Assistance.*

*** *A blind-hole, Dimentron Plug Gage with μMaxμm® Digital Electronic Indicator makes a compact, lightweight portable hand tool.*

Dimentron® Plug Inside Diameter Gages

Dimentron Plug Assembly
shown with Maxμm®/// Indicator, Housing and Handle

Ordering Information

When ordering specify:

1. Diameter
2. Tolerance
3. Gaging depth
4. Plug style
5. Contact type — polished chrome steel or tungsten carbide
6. Stop collar

Gaging Range:
Dimentron Plugs are ground to one of four measuring ranges, based on part tolerance.

Technical Data

Sizes above mm / *inch*	To and include mm / *inch*	Metric M01 Inch 050 mm / *inch*	Maximum Part Tolerance M02 100 mm / *inch*	M05 200 mm / *inch*	M08 400 mm / *inch*
3.18 / ***.1250"***	3.62 / ***.1426"***	±0.025 / ***±0010"***	±0.038 / ***±0015"***		
3.62 / ***.1426"***	5.52 / ***.2171"***	±0.025 / ***±0010"***	±0.046 / ***±0018"***	±0.076 / ***±0030"***	
5.50 / ***.2171"***	7.94 / ***.3125"***	±.0.025 / ***±0010"***	±0.046 / ***±0018"***	±0.069 / ***±0027"***	±0.102 / ***±0040"***
7.94 / ***.3125"***	9.50 / ***.375"***	±.0.030 / ***±0012"***	±0.051 / ***±0020"***	±0.069 / ***±0027"***	±0.127 / ***±0050"***
9.50 / ***.3750"***	12.7 / ***.500"***	±0.038 / ***±0015"***	±0.058 / ***±0023"***	±0.086 / ***±0034"***	±0.137 / ***±0054"***
12.7 / ***.5000"***	19.05 / ***.750"***	±0.038 / ***±0015"***	±0.069 / ***±0027"***	±0.102 / ***±0040"***	±0.165 / ***±0065"***
19.05 / ***.750"***	25.4 / ***1.000"***	±0.038 / ***±0015"***	±0.076 / ***±0030"***	±0.127 / ***±0050"***	±0.180 / ***±0071"***
25.4 / ***1.000"***	38 / ***1.500"***	±0.038 / ***±0015"***	±0.076 / ***±0030"***	±0.152 / ***±0060"***	±0.221 / ***±0087"***
38 / ***1.500"***	114.3 / ***4.50"***		±0.076 / ***±0030"***	±0.152 / ***±0060"***	±0.254 / ***±0100"***
114.3 / ***4.5"***	229 / ***9.00"***			±0.152 / ***±0060"***	±0.254 / ***±0100"***

Order Maxμm Indicator and Accessories separately.

Maxμm/// Indicator
Inch: Specify **2033101 (2033111** if Digital Output is required) for .00005" resolution, .0001" grad., and "0" on the Indicator in the 12 o'clock position.
For "0" at 6 o'clock position, specify **2033201**.

Metric: Specify **2033101 (2033111** if Digital Output is required) for 0.001 mm resolution, 0.001 mm grad., and "0" at 12 o'clock. Specify DEI-24121 for "0" at 6 o'clock.

EKT-1120-W1 is required to mount the Maxμm/// Indicator to Dimentron Plugs. (Specify **EKT-1120-W2** for Maxμm/// Indicators with 8 mm stems). This adaptor kit includes mounting adaptor, hex wrench, and flat-end, carbide faced contact point for the Indicator.

Other models include:
EKT-1120-W3 — EDI/Dial .375" stem — 4-48 thread
EKT-1120-W4 — EDI/Dial 8 mm stem — 2.5 thread
EKT-1120-W6 — 1002 - 1010 8 mm stem — 2.5 thread

Protective Housings for Plugs over 50 mm/ 2"
EHG-1172 For Maxμm/// Indicators without Output. Requires in-line or pistol style grip Handle (**HA-88** Handle and **AT-124** Adaptor).
EHG-1198 For Maxμm/// Indicators with Output. Requires pistol style grip Handle (**HA-88** and **AT-124** Adaptor).

B-12668 For Maxμm/// Indicators with Output. Complete with in-line style handle. **AT-125** Bench Stand Adaptor permits the Maxμm Indicator in a Protective Housing to be clamped in **BA-26** Bench Stand. (See pages 9-5 and 9-7)

Dimentron® Plug Inside Diameter Gages

With Electronic Gage Heads

Gage heads are mounted to Dimentron Plugs using HA-88 and AD-140 Adaptor. Electronic Gage Heads can be ordered separately. The following Handle Assemblies include Adaptor, Wrenches and Gage Head:

Handle Assemblies

Order no.	Description
EHA-1146	Flat Contact 3 m / 11 ft. coiled cable
EHA-1145	Flat Contact 3 m / 11 ft. straight cable

Accessories

Base, BA-100

Heavy cast base has tooling plate allowing plug to be mounted vertically or horizontally. Can be used with Electronic Gage Heads or Maxμm Remote Transducers or Maxμm/// Digital Transducers.

Stop Collars

Stop collars are available for all Dimentron Plugs.

Right Angle Adaptor AT-155

Extensions

Extensions for Dimentron Plugs are available for Plugs over 9.5 mm / .375". See table below:

Group 8 Plugs 9.3 mm/.366" O.D.	Group 12 Plugs 16 mm/.63" O.D.	Extension Length
EX-204	**EX-210**	50 mm/ ***1.97"***
EX-205	**EX-211**	100 mm/ ***3.94"***
EX-206	**EX-212**	200 mm/ **7.87"**

Consists of 1280P Indicator and Handle Assembly with stocked adaptor:

	Order no.		Minimum graduation
Inch	**550P-10**	Dial Indicator	***.0001"***
Metric	**550P-20**	Dial Indicator	.002 mm
	EDI-550P-10	(with EDI-10102)	***.00005"***/.001 mm
	EDI-550P-20	(with EDI-20102)	***.00002"***/.0005 mm

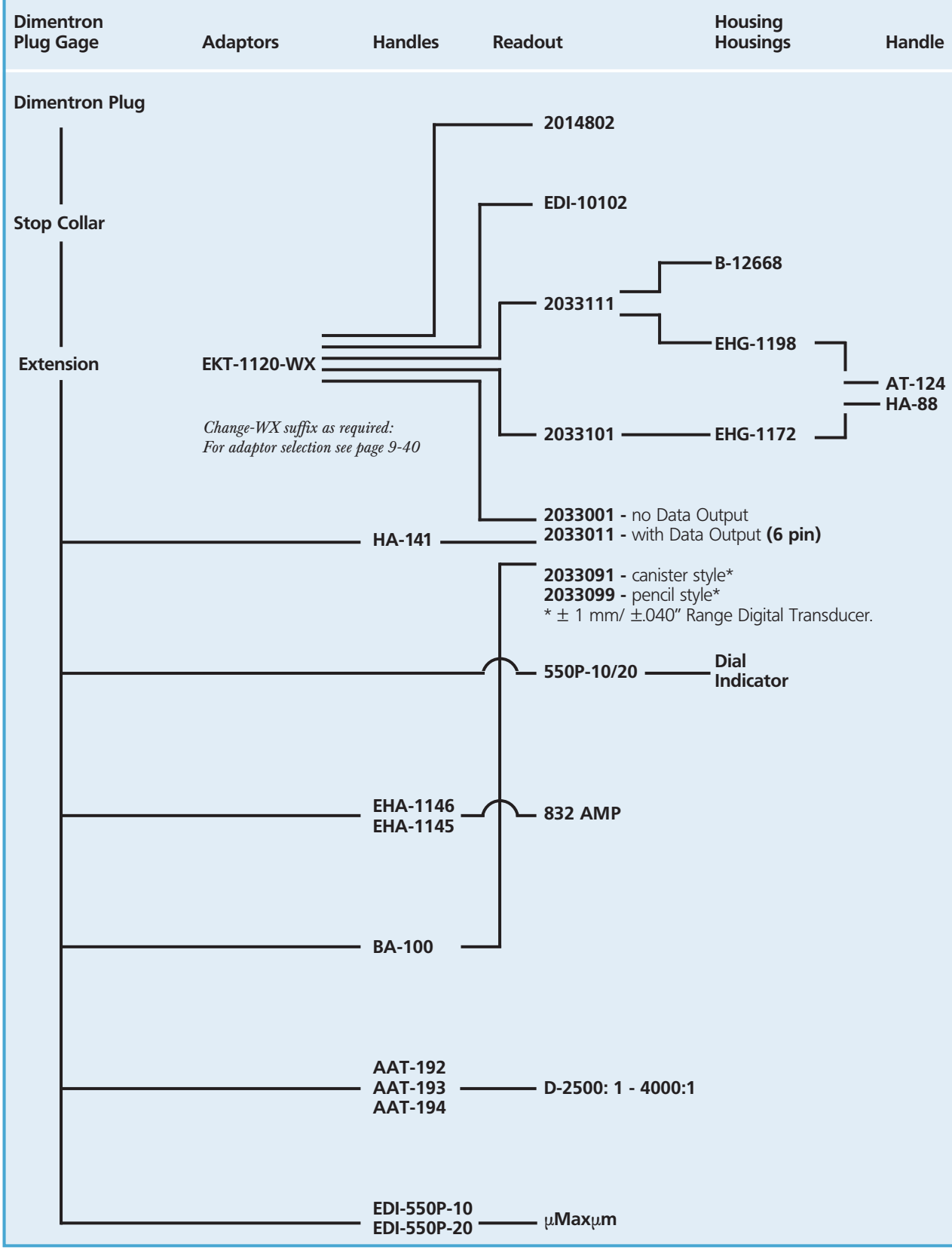
EDI-550P-10

Remote MaxμmTransducer or Maxμm/// Digital Transducer Dimentron Plug Handle/ Adaptor: **HA-141**

BA-100 (Dimentron Plug not included)

Dimentron® Plug Inside Diameter Gages

This table depicts available readouts for Dimentron Plug Inside Diameter Gages. After making a Plug selection, follow the chart for all the components needed to make up a gaging system suited to your application.



Indicating Plug Gages 844 D

Features

- For the rapid testing of diameter, roundness and conicity of bores
- Especially suitable for testing batches with tight tolerances
- No rocking in the bore is required to determine the reversal point
- Therefore ideal for use in conjunction with a digital indicating instrument and for subsequent processing of measured values
- Measuring head has a hardened, hard chromium plated guide cylinder and carbide-tipped anvils
- The carbide expanding pin transfers radial movement to indicating instrument
- Constant measuring force as a result of built-in spring, thus eliminating user influence
- Measuring head, holder, depth extension, right angle attachments and depth stops are part of an extensive modular system

Technical Data of the Measuring Heads

Nominal diameter of the bore	Measuring range starting from the minimum bore dimension to be measured **844 Dk/844Dkr**	**844 Dks** (from 4 mm)
2.98 - 8 mm	= - 0.02 + 0.1 mm	= - 0.02 + 0.1 mm
over 8 - 16 mm	= - 0.02 + 0.15 mm	= - 0.02 + 0.15 mm
over 16 - 32 mm	= - 0.02 + 0.2 mm	= - 0.02 + 0.15 mm
over 32 - 70 mm	= - 0.03 + 0.2 mm	= - 0.03 + 0.15 mm
over 70 - 200 mm	= - 0.04 + 0.2 mm	= - 0.04 + 0.15 mm

When placing an order please quote the nominal diameter and tolerances, for example:

Bore diameter	Tolerance	
35 D7	+ 80	+105 µm
35 H7	+ 0	+25 µm
35 R7	- 50	-25 µm

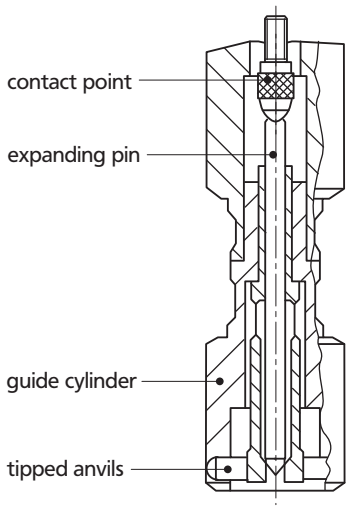
The diameter of the guide cylinder is produced between 0.02 and 0.07 mm smaller than the minimum dimension of the bore to be checked.

Example:

Plug Gage 844 Dk for bore	35 D7
Nominal diameter:	35 mm
Minimum dimension:	35.080 mm
Maximum dimension:	35.105 mm
Meas. range:	35.050 - 35.280 mm

Accuracy

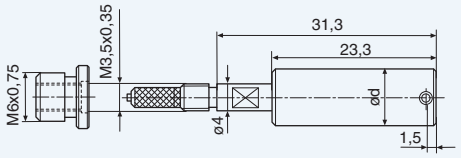
Hystersis	≤ 0.4 µm
Repeatability	≤ 1 µm
Linearity	≤ 1 %
Linearity 844 Dks >16 mm	≤ 2 %

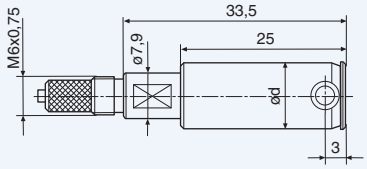


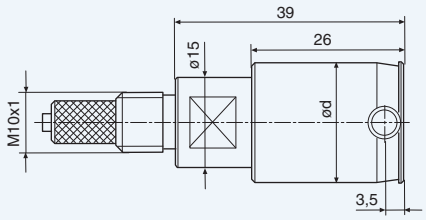
Plug Gages

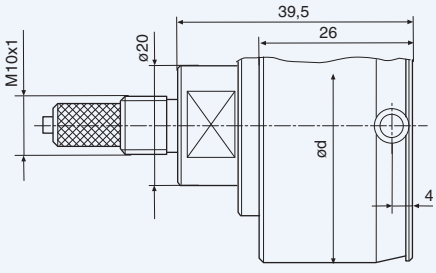
Measuring Head 844 Dk, Standard version

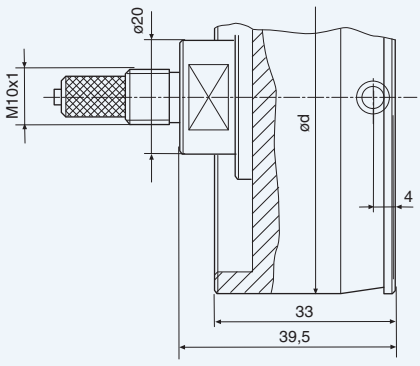
	Nominal① diameter mm	Manufacturing② tolerance mm	Meas. range③ dia. **d** mm	Order no.
	2.98 - 3.99	-0.02/-0.04	0.1	**4480184***
over	3.99 - 8	-0.02/-0.04	0.1	**4478200***
over	8 - 16	-0.02/-0.04	0.15	**4478201**
over	16 - 25	-0.02/-0.05	0.2	**4478202**
over	25 - 32	-0.02/-0.05	0.2	**4478204**
over	32 - 44	-0.02/-0.06	0.2	**4478205**
over	44 - 50	-0.03/-0.06	0.2	**4478206**
over	50 - 60	-0.03/-0.06	0.2	**4478207**
over	60 - 70	-0.03/-0.06	0.2	**4478208**
over	70 - 80	-0.04/-0.07	0.2	**4478209**
over	80 - 90	-0.04/-0.07	0.2	**4478210**
over	90 -100	-0.04/-0.07	0.2	**4478211**
over	100 -110	-0.04/-0.07	0.2	**4478212**
over	110 -120	-0.04/-0.07	0.2	**4478213**
over	120 -130	-0.04/-0.07	0.2	**4478214**
over	130 -140	-0.04/-0.07	0.2	**4478215**
over	140 -150	-0.04/-0.07	0.2	**4478216**
over	150 -160	-0.04/-0.07	0.2	**4478217**
over	160 -170	-0.04/-0.07	0.2	**4478218**
over	170 -180	-0.04/-0.07	0.2	**4478219**
over	180 -190	-0.04/-0.07	0.2	**4478220**
over	190 -200	-0.04/-0.07	0.2	**4478221**







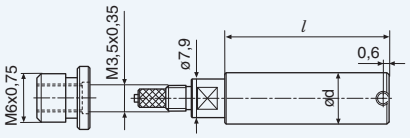
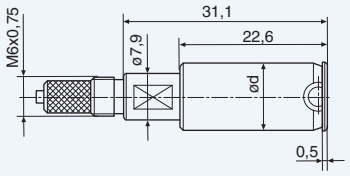
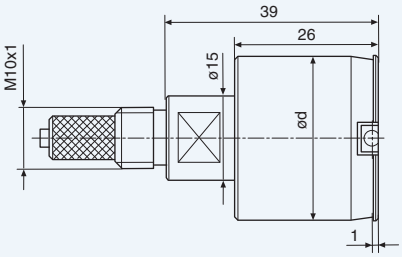
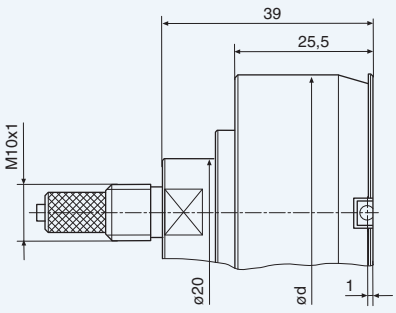
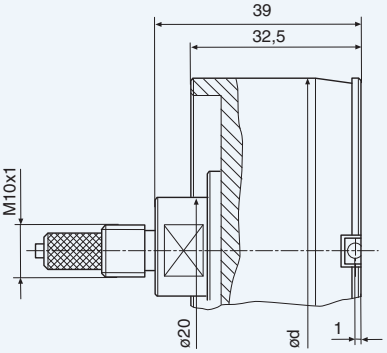




① *Nominal diameter =smallest bore diameter*
② *dia. d in reference to the smallest bore diameter*
③ *Measuring range refers to the nominal diameter*
* *With Adaptor for connection to the holder*

Plug Gages

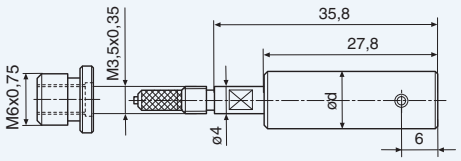
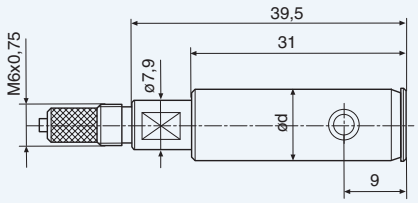
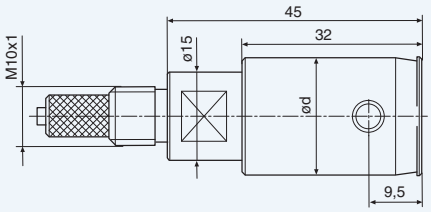
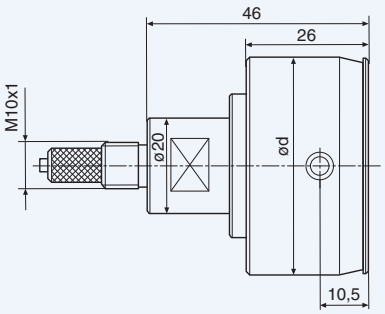
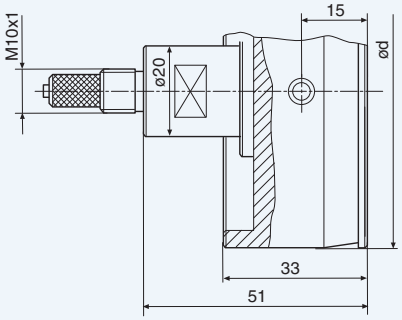
Measuring Head 844 Dks, for blind holes, to measure to almost the base of the bore

	Nominal① diameter mm	Manufacturing② tolerance mm	Meas. range③ dia. **d** mm	Order no.	
	4 - 8	-0.02/-0.04	0.10	**4478285***	
over	8 - 16	-0.02/-0.04	0.15	**4478245**	
over over over	16 - 25 25 - 32 32 - 44	-0.02/-0.05 -0.02/-0.05 -0.02/-0.06	0.15 0.15 0.15	**4478230** **4478232** **4478233**	
over over over	44 - 50 50 - 60 60 - 70	-0.03/-0.06 -0.03/-0.06 -0.03/-0.06	0.15 0.15 0.15	**4478234** **4478235** **4478236**	
over over over over over over over over	70 - 80 80 - 90 90 -100 100 -110 110 -120 120 -130 130 -140 140 -150	-0.04/-0.07 -0.04/-0.07 -0.04/-0.07 -0.04/-0.07 -0.04/-0.07 -0.04/-0.07 -0.04/-0.07 -0.04/-0.07	0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15	**4478237** **4478238** **4478239** **4478240** **4478241** **4478242** **4478243** **4478244**	

① *Nominal diameter =smallest bore diameter*
② *dia. d in reference to the smallest bore diameter*
③ *Measuring range refers to the nominal diameter*
* *With Adaptor for connection to the holder*

Plug Gages

Measuring Head 844 Dkr, with an extended guide cylinder to measure through holes for the edge of a bore, ideal for narrow parts

	Nominal① diameter mm	Manufacturing② tolerance mm	Meas. range③ dia. **d** mm	Order no.	
	2.98 - 3.99	-0.02/-0.04	0.1	**4478272***	
over	3.99 - 8	-0.02/-0.04	0.1	**4478250***	
over	8 - 16	-0.02/-0.04	0.15	**4478251**	
over	16 - 25	-0.02/-0.05	0.2	**4478252**	
over	25 - 32	-0.02/-0.05	0.2	**4478254**	
over	32 - 44	-0.02/-0.06	0.2	**4478255**	
over	44 - 50	-0.03/-0.06	0.2	**4478256**	
over	50 - 60	-0.03/-0.06	0.2	**4478257**	
over	60 - 70	-0.03/-0.06	0.2	**4478258**	
over	70 - 80	-0.04/-0.07	0.2	**4478259**	
over	80 - 90	-0.04/-0.07	0.2	**4478260**	
over	90 -100	-0.04/-0.07	0.2	**4478261**	
over	100 -110	-0.04/-0.07	0.2	**4478262**	
over	110 -120	-0.04/-0.07	0.2	**4478263**	
over	120 -130	-0.04/-0.07	0.2	**4478264**	
over	130 -140	-0.04/-0.07	0.2	**4478265**	
over	140 -150	-0.04/-0.07	0.2	**4478266**	
over	150 -160	-0.04/-0.07	0.2	**4478267**	
over	160 -170	-0.04/-0.07	0.2	**4478268**	
over	170 -180	-0.04/-0.07	0.2	**4478269**	
over	180 -190	-0.04/-0.07	0.2	**4478270**	
over	190 -200	-0.04/-0.07	0.2	**4478271**	

① Nominal diameter =smallest bore diameter
② dia. d in reference to the smallest bore diameter
③ Measuring range refers to the nominal diameter
** With Adaptor for connection to the holder*

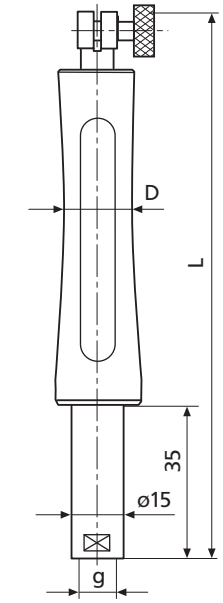
Modular Unit System 844 D

Standard Holder 844 Kg/844 Dg - Standard version

With locking clamp for an indicating instrument and a connecting thread for a measuring head. Heat insulated handle. The model 844 Dg is made from **Invar steel**.

Cat. no.	Connecting thread g	Length L mm/*inch*	Handle dia. D mm/*inch*	Order no.
844 Kg	M6 x 0.75	50/ ***1.98"***	14/ ***.55"***	**4470851**
844 Dg	M10 x 1	150/ ***6"***	26/ ***1"***	**4478851**

844 Kg / 844 Dg

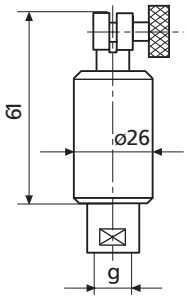


Short Holder 844 Dgk - Short version

With locking clamp for an indicating instrument and a connecting thread for a measuring head. Heat insulated handle.

Cat. no.	Connecting thread g	Length L mm/*inch*	Handle dia. D mm/*inch*	Order no.
844 Dgk	M10 x 1	61/ ***2.4"***	26/ ***1"***	**4478050**

844 Dgk

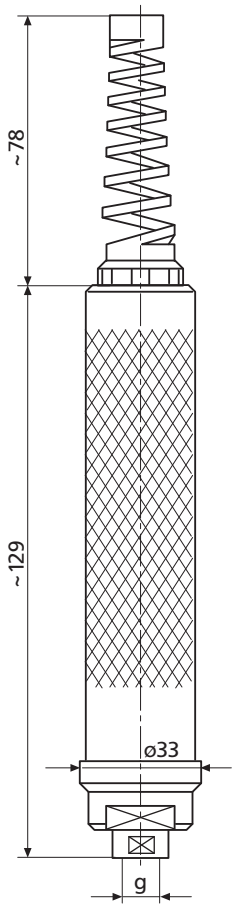


Holder 844 Dge for Inductive Measuring Probes

With long sleeve for shock and waterproof mounting of inductive measuring probes. Strain relief clamp for probe cable. Threaded connection for measuring heads. Heat insulated handle.

Cat. no.	Connecting thread g	Length L mm/*inch*	Handle dia. D mm/*inch*	Order no.
844 Dge	M6 x 0.75 M10 x 1	195/ ***7.7"*** 195/ ***7.7"***	33/ ***1.3"*** 33/ ***1.3"***	**4478020** **4478021**

844 Dge

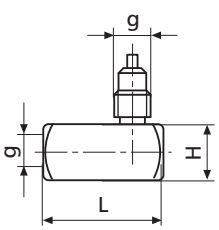


Right Angle (Elbow) Attachment

For measuring difficult to reach bores, e.g. in tight spaces, on a machine tool or when the bores on a work piece are inconveniently located. For screwing in between holder and measuring head.

Cat. no.	Connecting thread g mm	Elbow Length L mm/*inch*	Elbow Height H mm/*inch*	Order no.
844 Kw	M6 x 0.75	26.5/ ***1.04"***	22.5/ ***.89"***	**4470110**
844 Dw	M10 x 1	36.7/ ***1.44"***	17/ ***.67"***	**4478110**

844 Kw / 844 Dw



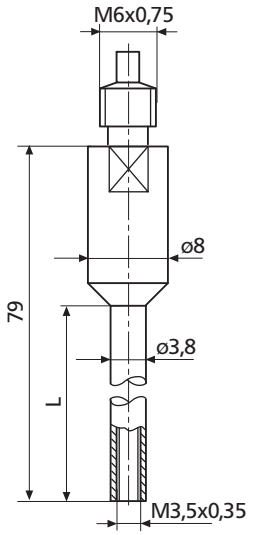
Modular Unit System 844 D

Extensions

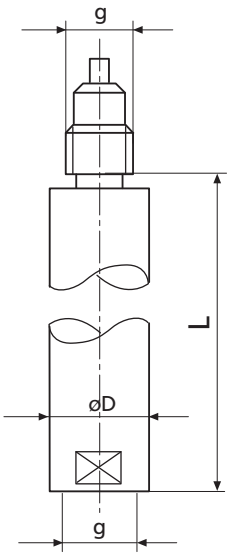
For extra-deep bores. Screws in between holder and measuring heads. Several extensions can be screwed together as of 8 mm. Models 844 Dv and 844 Dvk made of **Invar steel**.

Cat. no.	Connecting thread g	Length L mm/*inch*	dia. D mm/*inch*	Order no.
844 Dvk	M6x0.75/M3.5x0.35	64/ ***2.5"***	3.8 /***.15"***	**4478080**
844 Kv	M6 x 0.75	64/ ***2.5"***	8 / ***.32"***	**4470070**
844 Dv	M10 x 1	64/ ***2.5"***	15 / ***.6"***	**4478070**
844 Dv	M10 x 1	80/ ***3"***	15 / ***.6"***	**4478071**
844 Dv	M10 x 1	100/ ***4"***	15 / ***.6"***	**4478072**
844 Dv	M10 x 1	125/ ***5"***	15 / ***.6"***	**4478073**
844 Dv	M10 x 1	250/***10"***	15 / ***.6"***	**4478074**
844 Dv	M10 x 1	500/***20"***	15 / ***.6"***	**4478075**
844 Dv	M10 x 1	750/***30"***	15 / ***.6"***	**4478076**

844 Dvk



844 Kv / 844 Dv

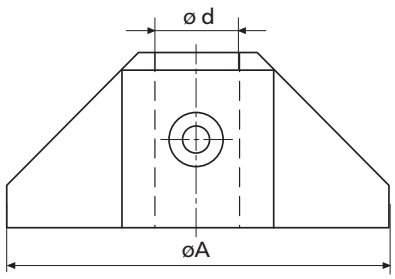


Depth Stops

For limiting depth of insertion of measuring head in bore. Can be attached to Extensions 844 Kv or 844 Dv. With clamping screw.

Cat. no.	Mounting hole dia. d mm/*inch*	Stop surface dia. A mm/*inch*	Order no.
844 Kt	8 / ***.32"***	25 / ***1"***	**4470115**
844 Dt	15 / ***.6"***	45 / ***1.8"***	**4478115**
844 Dt	15 / ***.6"***	75 / ***3"***	**4478116**
844 Dt	15 / ***.6"***	110 / ***4.3"***	**4478117**
844 Dt	15 / ***.6"***	160 / ***6.3"***	**4478118**
844 Dt	15 / ***.6"***	220 / ***8.6"***	**4478119**

844 Kt / 844 Dt

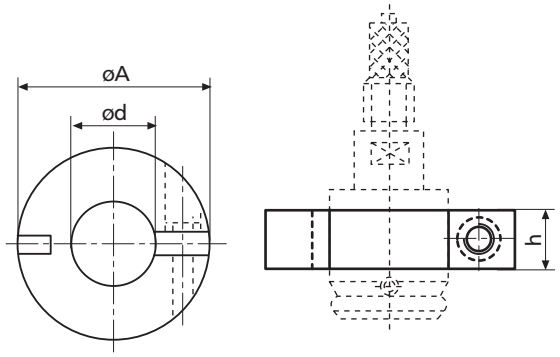


Depth Stop Rings

For limiting depth of insertion of measuring head in bore. Clamped onto the measuring head.

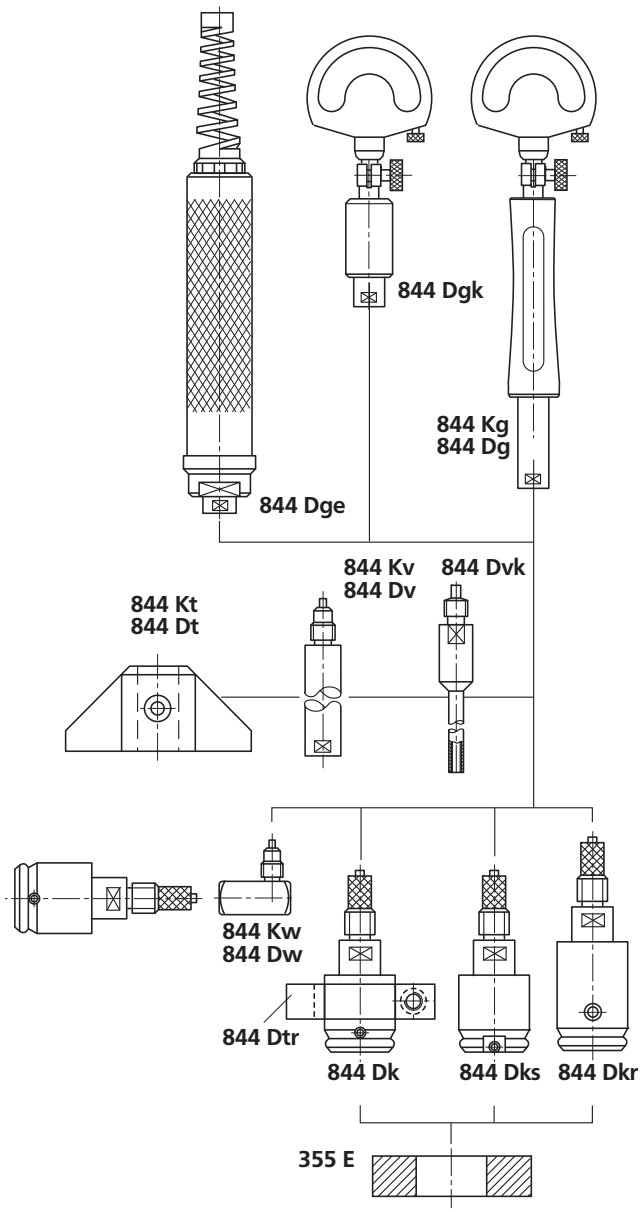
Cat. no.	Mounting hole dia. d mm	Stop surface dia. A mm/*inch*	Height h mm/*inch*	Order no.
844 Dtr	3 - 5	27 / ***1.1"***	10 / ***.4"***	**4478130**
	5 - 8	30 / ***1.2"***	10 / ***.4"***	**4478130**
	8 - 11	33 / ***1.3"***	10 / ***.4"***	**4478130**
	11 - 15	37 / ***1.5"***	10 / ***.4"***	**4478130**
	15 - 20	42 / ***1.7"***	10 / ***.4"***	**4478130**
	20 - 25	51 / ***2.0"***	12 / ***.5"***	**4478131**
	25 - 30	56 / ***2.2"***	12 / ***.5"***	**4478131**
	30 - 35	61 / ***2.4"***	12 / ***.5"***	**4478131**
	35 - 40	66 / ***2.6"***	12 / ***.5"***	**4478131**
	40 - 44	71 / ***2.8"***	12 / ***.5"***	**4478131**
	44 - 50	76 / ***2.9"***	12 / ***.5"***	**4478132**
	50 - 60	86 / ***3.4"***	12 / ***.5"***	**4478132**
	60 - 70	96 / ***3.8"***	12 / ***.5"***	**4478132**
	70 - 80	106 / ***4.1"***	12 / ***.5"***	**4478132**
	80 - 90	116 / ***4.6"***	12 / ***.5"***	**4478133**
	90 - 100	126 / ***4.9"***	12 / ***.5"***	**4478133**

844 Dtr



Modular Units	Diameter of Measuring Heads 2.98 - 8 mm *(.16 - .3")*	8 - 16 mm *(.3" - .6")*	over 16 mm *(over .6")*
844 Kg	**4470851**		
844 Dg			**4478851**
844 Dgk			**4478050**
844 Dge	**4478020**		**4478021**
844 Dvk **844 Kv** **844 Dv**	**4478080**	**4470070**	**4478070** to **4478076**
844 Kt **844 Dt**		**4470115**	**4478115** to **4478119**
844 Kw **844 Dw**	**4470110**		**4478110**
844 Dk **844 Dks** **844 Dkr**			
355 E	see page 9-62		

Modular Unit	Diameter of Measuring Heads 2,98 - 20 *(.16-.787")*	20 - 44 *(.787-1.72")*	44 - 80 *(1.72-3.15")*	80 - 100 *(3.15-3.94")*
844 Dtr	**4478130**	**4478131**	**4478132**	**4478133**



Indicating Instruments

All indicating instruments that has a 8 mm mounting shank may be used. Recommended are:

Indicator		Readings	Order no.
Compramess	**1004**	5 µm	**4333000**
Millimess	**1003**	1 µm	**4334000**
Supramess	**1002**	0,5 µm	**4335000**
Extramess	**2000**	0,2 µm, 0,5 µm, 1 µm	**4346000**
Extramess	**2001**	0,2 µm, 0,5 µm, 1 µm	**4346100**
Millimar	**C 1208**	±3, 10, 30, 100, 300, 1000 µm 3000 µm, 10000 µm	**5312080**
Millimar	**S 1840**	±10, 30, 100, 300, 1000 µm 3000 µm, 10000 µm	**5330001**

Digital Indicators see Chapter 5
Electrical Indicating Instruments see Chapter 7

Adjustment of Plug Gages 844 D

Ring Gage 355 E:

Special wear-resistant gage steel. Hardened and lapped. With actual deviation engraved.

Dimensions: DIN 2250, type C
Manufacturing tolerance: DIN 2250
Available diameters: 0.5-200 mm

Self-Centering Dial Bore Gages 844 K Intramess

Features

- Measuring the diameter, roundness and conicity of bores
- Spring-loaded halves of measuring probe are split via expanding pin with precision-lapped taper. This movement is transferred to indicating instrument
- Maximum wear-resistance due to hard chrome plating. From 4 mm alternatively with carbide tipped available on request
- Constant measuring force as a result of built-in spring thus eliminating user influence
- Highly versatile, each gage covers a large range. Within the respective limits, quickly and easily adjustable to any size and any type of measuring application
- Measuring probe, holder, depth extensions, right-angle attachments and depth stops are part of an extensive modular system

Technical Data

Complete Instrument

844 K Measuring heads hard chrome plated, expanding pin made of stainless steel

844 KH Measuring heads carbide tipped on both sides, carbide expanding pin

844 KS Blind hole measuring heads hard chrome plated, expanding pin made of stainless steel

Catalog no.	Measuring range mm	Number of meas. probes	Order no.*
844 K	0.47 - 0.97	6	**4470000**
	0.95 - 1.55	5	**4470001**
	1.5 - 4.2	10	**4470002**
	3.7 - 7.3	7	**4470003****
	6.7 - 10.3	7	**4470004****
	9.4 - 18.6	9	**4470005****
844 KH	1.5 - 4.2	10	**4471002**
	3.7 - 7.3	7	**4471003****
	6.7 - 10.3	7	**4471004****
	9.4 - 18.6	9	**4471005****
844 KS	1.5 - 4.2	10	**4482163**
	3.7 - 7.3	7	**4482164****
	6.7 - 10.3	7	**4482165****
	9.4 - 18.6	9	**4482166****

** Includes holder, measuring probe, expanding pin and wooden case, but not indicating instrument*

***Additionally includes measuring force spring 4470828 and disk 4470821*

Accuracy

Deviation of linearity
≤ 2 % measuring ranges 0.47-1.55 mm
≤ 1 % measuring ranges 1.5-18.6 mm

Repeatability
1 µm manual measurement
≤ 0.5 µm measurement with Stand 844 Kst and Floating Holder 844 Ksts

Indicating Instruments

All indicating instruments that has a 8 mm mounting shank may be used. Recommended are:

Dial Comparator		Readings mm / *inch*		Order no. mm / *inch*
Compramess	**1004 / *1004 Z***	5 µm/	***.0001"***	**4333000/*4333900***
Millimess	**1003 / *1003 Z***	1 µm/	***.00005"***	**4334000/*4334900***
Millimess	**1003 XL**	2 µm		**4334001**
Supramess	**1002 / *1002 Z***	0.5 µm/	***.00002"***	**4335000/*4335900***
Extramess	**2000**	0.2 µm/	***.00001"***	
		0.5 µm/	***.00002"***	**4346000***
		1 µm/	***.00005"***	
Extramess	**2001**	0.2 µm/	***.00001"***	
		0.5 µm/	***.00002"***	**4346100***
		1 µm/	***.00005"***	
µMaxµm		.001mm/	***.00005"***	**EDI-10302****
Marcator	**1087 B**	0,1 µm/	***.001"***	
		0.2 µm/	***.00001"***	**4337062**
		0,4 µm,/	***.005"***	
		1 µm/	***.00005"***	

Digital Indicators see Chapter 5
Electrical Indicating Instruments see Chapter 7

** 230 V, for 115 V please refer to page 6-5 ** requires contact 4360045*

Modular Unit System for 844 K Standard Measuring Probes

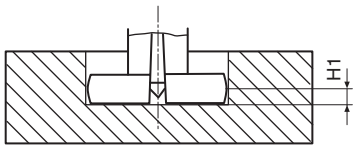
In addition complete Dial Bore Gages 844 K, modular units area available for assembly as required to suit an individual measuring task and or application.

Measuring Probe 844 Kk, Expander Pin, individual Ring Gage for 844 Ke

Nominal dimension mm	Measuring range mm	Measuring depth mm	Measuring probe hard chrome plated	Expanding pin steel	Measuring probe carbide tipped	Expander pin carbide	Ring gage
0.50	0.47 - 0.53	1.25	4470586	4470801			4482300
0.55	0.52 - 0.58	1.5	4470587				4482301
0.60	0.57 - 0.67	1.7	4470588				4482302
0.70	0.65 - 0.77	2.2	4470589	4470802			4482303
0.80	0.75 - 0.87	2.55	4470590				4482304
0.90	0.85 - 0.97	2.65	4470591				4482305
1.00	0.95 - 1.15	10.5	4470592				4482306
1.10	1.07 - 1.25	10.5	4470593				4482307
1.20	1.17 - 1.35	10.5	4470594	4470803			4482308
1.30	1.27 - 1.45	10.5	4470595				4482309
1.40	1.37 - 1.55	10.5	4470596				4482310
1.75	1.50 - 1.90	16	4470597		4471234		4482311
2.00	1.80 - 2.20	16	4470598	4470804	4471206	4471207	4482312
2.25	2.05 - 2.45	16	4470599		4471812		4482313
2.50	2.30 - 2.70	21	4470600		4471813		4482314
2.75	2.55 - 2.95	21	4470601		4471814		4482315
3.00	2.80 - 3.20	21	4470602		4471208		4482316
3.25	3.05 - 3.45	21	4470603	4470805	4471815	4471819	4482317
3.50	3.30 - 3.70	21	4470604		4471816		4482318
3.75	3.55 - 3.95	21	4470605		4471817		4482319
4.00	3.80 - 4.20	21	4470606		4471204		4482320
4.00	3.70 - 4.30	38	4470607		4471607		4482320
4.50	4.20 - 4.80	38	4470608		4471608		4482321
5.00	4.70 - 5.30	38	4470609		4471609		4482322
5.50	5.20 - 5.80	38	4470610		4471610		4482323
6.00	5.70 - 6.30	38	4470611		4471611		4482324
6.50	6.20 - 6.80	38	4470612		4471612		4482325
7.50	7.20 - 7.80	38	4470615		4471615		4482327
8.00	7.70 - 8.30	38	4470616		4471616		4482328
8.50	8.20 - 8.80	45	4470617		4471617		4482329
9.00	8.70 - 9.30	45	4470618		4471618		4482330
9.50	9.20 - 9.80	45	4470619		4471619		4482331
10.00	9.70 - 10.30	45	4470620		4471620		4482332
10.00	9.40 - 10.60	45	4470621		4471621		4482332
11.00	10.40 - 11.60	45	4470622		4471622		4482333
12.00	11.40 - 12.60	45	4470623		4471623		4482334
13.00	12.40 - 13.60	45	4470624		4471624		4482335
14.00	13.40 - 14.60	45	4470625	4470808	4471625	4471202	4482336
15.00	14.40 - 15.60	45	4470626		4471626		4482337
16.00	15.40 - 16.60	80	4470627		4471627		4482338
17.00	16.40 - 17.60	80	4470628		4471628		4482339
18.00	17.40 - 18.60	80	4470629		4471629		4482340

Nominal dimension mm			L mm	H 1 mm
0.50			19.50	0.25
0.55			19.50	0.27
0.60			19.50	0.29
0.70			19.50	0.31
0.80			19.50	0.33
0.90			19.50	0.35
1.00	–	1.40	19.50	0.60
1.75	–	2.25	25.30	0.90
2.50	–	4.00	30.60	1.20
4.00	–	10.00	47.30	2.00
10.00	–	18.00	48.50	3.30

Minimum measurement height

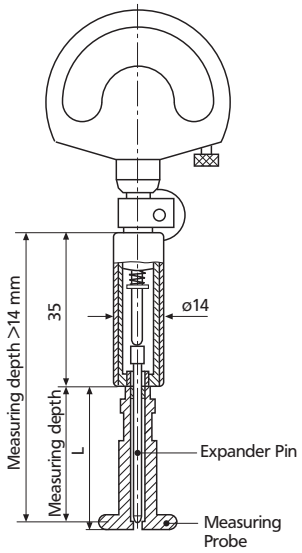


Modular Unit System for 844 KS Blind Hole Measuring Probes

In addition to complete Dial Bore Gages 844 KS, modular units are available for assembly as required to suit a individual measuring task and or application.

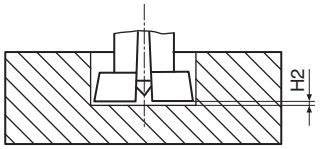
Blind Hole Measuring Probe 844 Kk, Blind Hole Expander Pin

Nominal dimension mm	Measuring range mm	Measuring depth mm	Blind hole measuring probe hard chrome plated	Blind hole expander pin steel
1.75	1.50 - 1.90	16	**4482228**	
2.00	1.80 - 2.20	16	**4482229**	**4482176**
2.25	2.05 - 2.45	16	**4482230**	
2.50	2.30 - 2.70	21	**4470301**	
2.75	2.55 - 2.95	21	**4482227**	
3.00	2.80 - 3.20	21	**4482178**	
3.25	3.05 - 3.45	21	**4482179**	**4482177**
3.50	3.30 - 3.70	21	**4470300**	
3.75	3.55 - 3.95	21	**4482188**	
4.00	3.80 - 4.20	21	**4482180**	
4.00	3.70 - 4.30	38	**4482057**	
4.50	4.20 - 4.80	38	**4482162**	
5.00	4.70 - 5.30	38	**4482056**	
5.50	5.20 - 5.80	38	**4470953**	
6.00	5.70 - 6.30	38	**4482140**	
6.50	6.20 - 6.80	38	**4482055**	
7.00	6.70 - 7.30	38	**4482108**	**4482028**
7.50	7.20 - 7.80	38	**4482204**	
8.00	7.70 - 8.30	38	**4482054**	
8.50	8.20 - 8.80	45	**4482206**	
9.00	8.70 - 9.30	45	**4482170**	
9.50	9.20 - 9.80	45	**4482182**	
10.00	9.70 - 10.30	45	**4470375**	
10.00	9.40 - 10.60	45	**4482205**	
11.00	10.40 - 11.60	45	**4482042**	
12.00	11.40 - 12.60	45	**4482112**	
13.00	12.40 - 13.60	45	**4482102**	
14.00	13.40 - 14.60	45	**4482181**	
15.00	14.40 - 15.60	45	**4482202**	**4482192**
16.00	15.40 - 16.60	80	**4482021**	
17.00	16.40 - 17.60	80	**4482203**	
18.00	17.40 - 18.60	80	**4482113**	



844 Kk

Minimum measurement height



Nominal dimension mm			L mm	H 2 mm
0.50			19.50	
0.55			19.50	
0.60			19.50	
0.70			19.50	
0.80			19.50	
0.90			19.50	
1.00	–	1.40	19.50	
1.75	–	2.25	25.30	0.30
2.50	–	4.00	30.60	0.30
4.00	–	10.00	47.30	0.50
10.00	–	18.00	48.50	1.00

Ring Gage Sets 844 Ke

For setting Dial Bore Gages 844 K, 844 KH and 844 KS. Supplied in sets to match the measuring ranges of these instruments. Can be stored in the wooden case of the bore gages.

Diameter tolerance ± 1 µm

Ring Gages 844 Ke are only available with the diameters shown in the table.
For all other dimensions, Ring Gages 355 E with dimensions as per DIN 2250 and with actual deviation engraved are available.

For Meas. range mm	Diameter mm	Order no.
0.47 - 0.97	0.5/0.55/0.6/0.7/0.8/0.9	**4470160**
0.95 - 1.55	1/1.1/1.2/1.3/1.4	**4470161**
1.5 - 4.2	1.75/2/2.25/2.5/2.75/ 3/3.25/3.5/3.75/4	**4470162**
3.7 - 7.3	4/4.5/5/5.5/6/6.5/7	**4470163**
6.7 - 10.3	7/7.5/8/8.5/9/9.5/10	**4470164**
9.4 - 18.6	10/11/12/13/14/15/ 16/17/18	**4470165**

Modular Unit System for 844 K

Holder 844 Kg
With locking clamp for an indicating instrument and a connecting thread for a **Measuring Head 844 Kk**. Heat insulated handle.

Order no. **4470851**

Extensions 844 Kv
For extra-deep bores. Screws in between Holder 844 Kg and Measuring Head 844 Kk for measuring range 10-18 mm. Length 64 mm, dia. 8 mm.

Order no. **4470070**

Right Angle Attachment 844 Kw
For measuring bores which are difficult to reach, e.g. in tight spaces, on machine tools or when work piece bores are inconveniently located. For screwing in between Holder 844 Kg and Measuring Head 844 Kk.

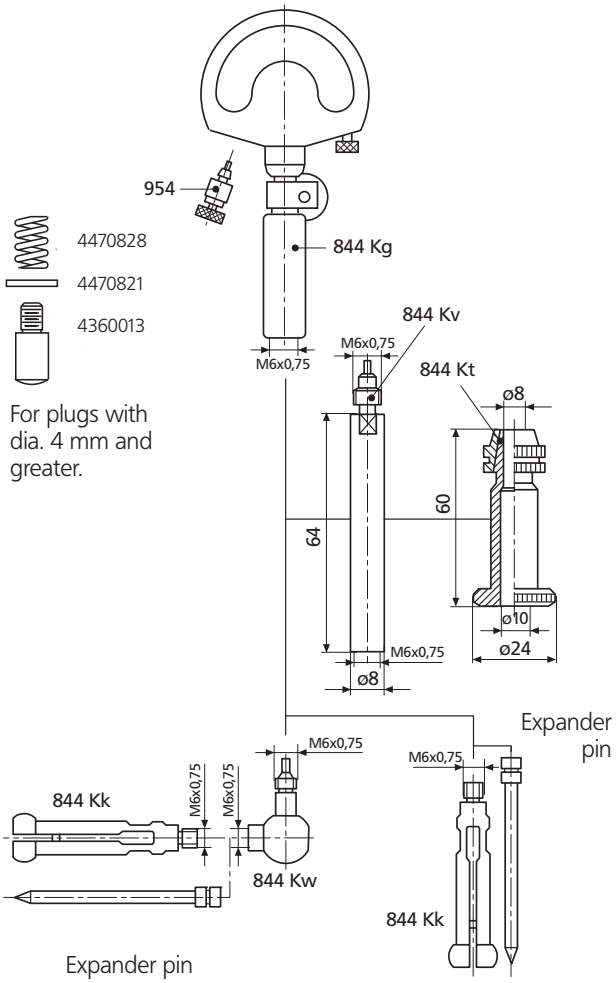
Order no. **4470110**

Lifter 954
Facilitates insertion of measuring probe in bore by lifting measuring spindle of Dial Comparator.

Order no. **4372030**

Depth Stop 844 Kt
For checking diameter of bores at prescribed depth. Only to be used with Extension 844 Kv.

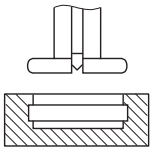
Order no. **4470115**



Measuring Probes for Special Applications

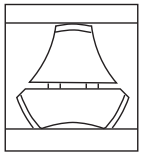
For measurement of diameters of recesses, distances between plane-parallel surfaces, etc. special models of measuring probes are available on request.

1. Measurement of the diameter of recesses*

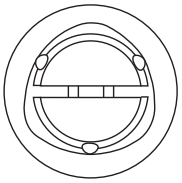


* *Requires holder 4471196*

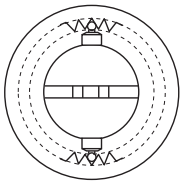
2. Measurement of plane-parallel surfaces



3. Measurement of polygon bores



4. Measurement of inside serrations, see 844 Z Page 9-64



Accessories

Stand 844 Kst

Features

For quick checks of bores in small work pieces. Hardened table plate can be raised with lever, thus moving test piece into positon. Plate can be clamped at any height for checking eccentricity. Particularly suited to use with digital indicators, where appropriate in conjunction with data printers or computer equipment, in cases where determination of reversal point is inappropriate.

Table dia.	58 mm / ***2.28"***
Throat depth of arm	45 mm / ***1.77"***
Table stroke	30 mm / ***1.18"***
Max. work piece height	ca. 100 mm / ***4"***

Order no. **4470100**

Floating Holder 844 Ksts

Features

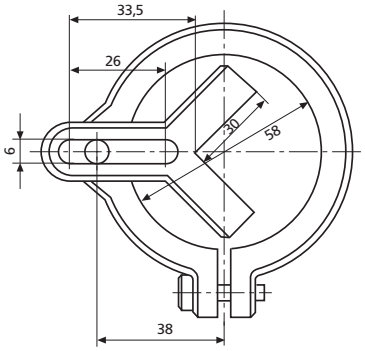
For use in conjunction with Stand 844 Kst. Enables measuring probe to find common axis of bore and measuring instrument quickly and easily on insertion into hole, thus providing optimum measuring speed and high accuracy. Particularly suitable for small diameters, as measuring confidence is considerably enhanced.

Order no. **4470105**

Angle Stop 844 Ka

Facilitates positioning of cylindrical work pieces under measuring instrument. For clamping to Stand 844 Kst.

Order no. **4470120**



Adjustable Bore Gages 1280 P

Superior Accuracy for Production and Inspection.

1282P-3W2 and 1280P-1W1

Features

- Rugged construction for long life and low maintenance: Stainless steel gaging head, one piece centralizing yoke with replaceable tungsten carbide balls.
- Heavy duty housing protects Indicator.
- Flow-through design makes Series 1280P Bore Gages swish clean, no disassembly required.
- Outstanding stability: Holds mastered value.
- Furnished with either Dial Indicator or Maxμm®/// Digital Electronic Indicator.
- Digital bore gages with output are provided with Maxμm/// Indicators. The Dynamic memory of the Maxμm/// greatly simplifies operation and assures repeatable readings with a single sweep of the diameter being measured.
- Output available for Statistical Quality Control requirements.

Technical Data

With Dial Indicator
Range of Sensitive Contact: 0.63 mm / ***.025"***,
0.002 mm / ***.0001"*** grad.

With Maxμm®/// Indicators
Range of Sensitive Contact: 0.39 mm /***.020"***.
Resolution: 0.001 mm / ***.00005"*** resolution,
0.001 mm / ***.001"*** grad.

If gage capacity is 25 mm / 1" or greater, the Maxμm/// Indicator is covered with a cast aluminum protective housing.
If under 25 mm / 1" capacity, the protective housing is not normally furnished.

With Dial Indicator	With Digital Output	Capacity mm/*inch*	Gaging Depth mm/*inch*	End of Head to Contact mm/*inch*
1280P-1W1	**1282P-1W1**	12 - 25 /***.50 - 1"***	76 / ***3"***	2.77 / ***.11"***
1280P-2W2	**1282P-2W2**	25 - 50 / ***1- 2"***	152 / ***6"***	4.37 / ***.17"***
1280P-3W2	**1282P-3W2**	50 - 203 / ***2 - 8"***	152 / ***6"***	7.92 / ***.31"***
1280P-1W2	**1282P-1W2**	12 - 25 / ***.50 - 1"***	152 / ***6"***	2.77 / ***.11"***
1280P-2W3	**1282P-2W3**	25 - 50 / **1 - 2"**	305 / ***12"***	4.37 / ***.17"***
1280P-3W3	**1282P-3W3**	50 - 203 / ***2 - 8"***	305 / ***12"***	7.92 / ***.31"***

See matrix on next page.
Note: Model numbers do not include extensions.

Series 1280P Adjustable Bore Gages are normally furnished with adjusting wrenches. Reference contacts for particular measurement sizes must be specified separately (see table on following page). If not specified, T.C. contacts will be furnished.
For alternate gaging depths, contact materials, and other modifications are available.

Example: **1282P-3MW3** with **PT-156 and EX-224** specifies an Adjustable Bore Gage with tungsten carbide reference contact and an extension to cover the range from 75 mm / 3" to 89 mm / 3.5".
The Gage is furnished with a Metric Maxμm/// Indicator, **2033119** (which has selectable resolution, units and includes Digital Output).

Adjustable Bore Gages 1280 P

Ordering Information

To order the correct bore gage to suit your measurement application, start with the base Model Number: **128XP-XXXX** and substitute the X with the appropriate number or letter from the boxes below:

128 X P - X X X X

Indicator

0 – Dial Indicator
2 – Maxμm®/// with Output

Capacity

1 – 12.50 - 25 mm / ***.50 - 1"*** gaging depth to 305 mm / ***12"***
2 – 25 - 50 mm / ***1 - 2"*** gaging depth to 610 mm / ***24"***
3 – 50 - 200 mm / ***2 - 8"*** gaging depth to 1220 mm / ***48"***

Units

– Omit for Inch
M – Metric

Configuration

W – Gage only
S – Complete kit with steel contacts*
T – Complete kit with T.C. contacts*

* *Each kit is complete with components needed for capacity ranging from 12.70 - 203 mm / .50 - 8". A fitted case is furnished for all models with a gaging depth 150 mm / 6" or under. It contains a Dial or MaxμmIII Indicator with each tube assembly and all contacts, extensions, extenders, locknuts and necessary wrenches.*

Gaging Depth

1 – 76 mm / ***3"***
2 – 150 mm / ***6"***
3 – 300 mm / ***12"***
4 – 450 mm / ***18"***
5 – 600 mm / ***24"***
6 – 760 mm / ***30"***
7 – 910 mm / ***36"***
8 – 1220 mm / ***48"***

Example: If you chose **1282P-3S5** as your model number, you would have chosen an Inside Diameter gage with Maxμm/// Indicator, 50 - 200 mm / 2 - 8" capacity, inch units, having a complete kit with steel contacts and a gaging depth of 600 mm / 24". Metric equivalent Model would be: **1282P-3MS5**.

Handles / Housing

All 1280P gages have a removable handle as a part of the Indicator Housing.

All 1282P gages can be equipped with a handle which projects at 90° to the gage housing.

1282P gages with capacity 12-25 mm / .50-1" are not normally furnished with a protective housing. Handles and Housings may be ordered separately.

For Handles order **HA-88** with **AT-124** Adaptor. For Housings order **EHG-1198**.

Gaging Extensions

Specify the Reference Contact Gaging Extensions required from the table below. For all diameters below 50 mm /2" the Reference Contact is integral with each Extension. For diameters over 50 mm/ 2" the Reference Contact is separate and interchangeable among Extension Sets.

1282P-1W1
(Output Cable not included)

Technical Data

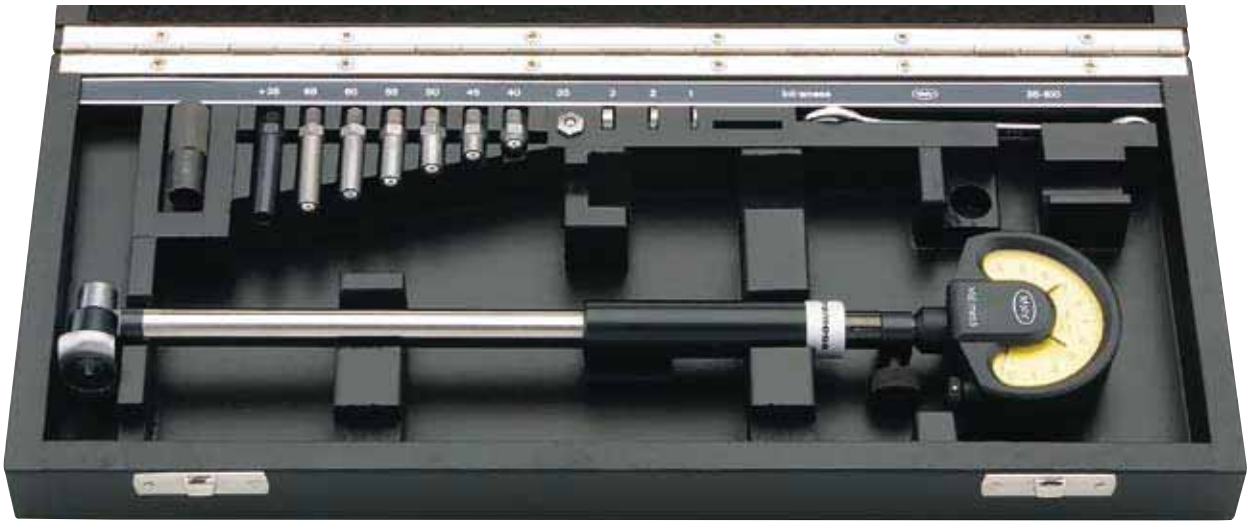
Diameter to be measured mm/*inch*	Extension Required Carbide	Steel	Used on Gage Model Numbers
12 - 16 / ***.50 - .625"***	**PT-562**	**PT-558**	1280P-1xxx
16 - 19 / ***.625 - .75"***	**PT-567**	**PT-559**	
19 - 22 / ***.75 - .875"***	**PT-568**	**PT-560**	1282P-1xxx
22 - 25 / ***.875 - 1"***	**PT-557**	**PT-561**	
25 - 32 / ***1 - 1.25"***	**PT-554**	**PT-555**	1280P-2xxx
32 - 38 / ***1.25 - 1.50"***	**PT-553**	**PT-556**	
38 - 45 / ***1.50 - 1.75"***	**PT-552**	**PT-569**	1282P-2xxx
45 - 50 / ***1.75 - 2"***	**PT-550**	**PT-551**	

For the gaging diameters listed below, select one Contact Point and at least one Extension Set.

Contact Point:	**Extension Required**	**Used on Gage Models**
Carbide	PT-156	1280P-3XXX
Steel	PT-2224	1282P-3XXX

Extension Sets: Diameter to be Measured mm/*inch*	Extension Sets	Used on Gage Models
50 - 64 / ***2 - 2.5"***	**EX-222**	
64 - 76 / ***2.5 - 3"***	**EX-223**	
76 - 89 / ***3 - 3.5"***	**EX-224**	1280P-3XXX
89 - 100 / ***3.5 - 4"***	**EX-225**	
100 - 127 / ***4 - 5"***	**EX-223 with EX-226**	1282P-3XXX
127 - 152 / ***5 - 6"***	**EX-225 with EX-226**	
152 - 178 / ***6 - 7"***	**EX-223 with EX-228**	
178 - 200 / ***7 - 8"***	**EX-225 with EX-228**	

Self-Centering Dial Bore Gages 844 N Intramess



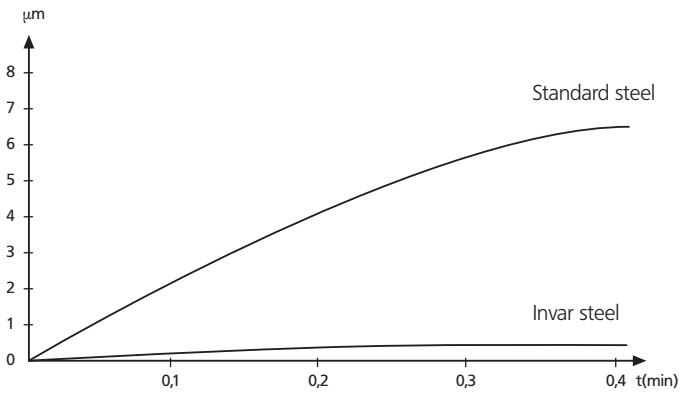
Features

- Measuring the diameter, roundness and conical form of a bore as well as the distances of plane-parallel surfaces
- Measuring head consists of a carbide-tipped moving anvil and an interchangeable stationary anvil which has a hardened steel ball; alternatively a carbide ball is available
- Transmission lever system transfers movement of the movable anvil to indicating instrument
- The broad centering bridge ensures automatic centering in the bore
- Insensitive to temperature due to both the shank and transfer rod being made from heat resistant **Invar steel**
- Highly resistant to wear and tear due to the carbide-tipped moving anvil
- Constant measuring force due to built-in spring thus eliminating user influence
- Universally applicable and extremely versatile as every instrument spans a broad measuring range, within this range it is quick and easy to adjust to any size
- Measuring head, holder, extensions, right-angle attachments and depth stops are all part of this extensive modular system

Invar steel has a particularly low expansion coefficient and thus makes the instrument totally insensitive to any kind of heat. Body heat from the user, increases in ambient temperature have no influence on the measuring results.

The graph on the right compares the Invar steel version to a standard type. Both gages were hand-held and thus influenced by body heat. The deviation when using Invar steel is negligible.

Change in length due to heat



Technical Data

Complete Instrument

844 N Carbide-tipped moving anvil; stationary anvil with steel ball

844 NH Moving anvil **and** stationary anvil are carbide-tipped

Accuracy

Accuracy of transmission	≤ 2 µm
Repeatability	≤ 0.5 µm

844 N

Measuring range mm	Measuring range *(inch)*	for meas. depth** to mm/*inch*	Order no.*
18 - 50	*(.7 - 2")*	200/ *8"*	**4474000**
35 - 100	*(1.4 - 4")*	250/ *10"*	**4474001**
100 - 250	*(4 - 10")*	350/ *14"*	**4474002**
250 - 400	*(10 - 16")*	500/ *20"*	**4474003**
400 - 800	*(16 - 32")*	500/ *20"*	**4474004**
250 - 800	*(10 - 32")*	500/ *20"*	**4474005**

844 NH

Measuring range mm	Measuring range *(inch)*	for meas. depth** to mm/*inch*	Order no.*
18 - 50	*(.7 - 2")*	200/ *8"*	**4475000**
35 - 100	*(1.4 - 4")*	250/ *10"*	**4475001**
100 - 250	*(4 - 10")*	350/ *14"*	**4475002**
250 - 400	*(10 - 16")*	500/ *20"*	**4475003**
400 - 800	*(16 - 32")*	500/ *20"*	**4475004**
250 - 800	*(10 - 32")*	500/ *20"*	**4475005**

* *Includes holder, measuring head, stationary anvil, wooden case (excludes indicating instrument)*

** *Excludes extension*

Indicating Instruments

All indicating instruments that has a 8 mm mounting shank may be used. Recommended are:

Dial Comparator		Readings mm / *inch*	Order no. mm / *inch*
Compramess	**1004 / *1004 Z***	5 µm/ ***.0001"***	**4333000/*4333900***
Millimess	**1003 / *1003 Z***	1 µm/ ***.00005"***	**4334000/*4334900***
Millimess	**1003 XL**	2 µm	**4334001**
Supramess	**1002 / *1002 Z***	0.5 µm/ ***.00002"***	**4335000/*4335900***
Extramess	**2001**	0.2 µm/ ***.00001"***	
		0.5 µm/ ***.00002"***	**4346100***
		1 µm/ ***.00005"***	
µMaxµm		.001 mm/***.00005"***	**EDI-10302****
		0,1 µm/ ***.001"***	
Marcator	**1087 B**	0.2 µm/ ***.00001"***	**4337062**
		0,4 µm,/ ***.005"***	
		1 µm/ ***.00005"***	

2001

1003

Digital Indicators see Chapter 5
Electrical Indicating Instruments see Chapter 7

** 230 V, for 115 V please refer to page 6-5* *** requires contact 4360045*

Accessories to set and adjust Dial Bore Gages

1. Ring Gage 355 E

Special wear-resistant gage steel. Hardened and lapped.
With actual deviation engraved

Dimensions:	DIN 2250, type C
Manufacturing tolerance:	DIN 2250
Available diameters:	0.5 - 200 mm

355 E

2. Setting Device

Uses standard gage blocks for setting any bore diameter and any tolerance. Replaces ring gages and is universally applicable

Components

Measuring Jaw 844 em

Measuring range mm *(inch)*	Dimensions mm/*inch*	Order no.
18 - 800 ***(.7 - 32")***	60 x 9.5 x 9 /***2.36 x .37 x .35"***	**4470095**

Setting Bridge 844 Neb

Measuring range mm *(inch)*	Width mm/*inch*	Height mm/*inch*	Order no.
18 - 250 ***(.7 - 10")***	70/ ***2.75"***	12/***.47"***	**4474080**
18 - 400 ***(.7 - 16")***	165/ ***6.49"***	17/***.67"***	**4474081**
18 - 800 ***(.7 - 32")***	320/***12.59"***	20/***.78"***	**4474082**

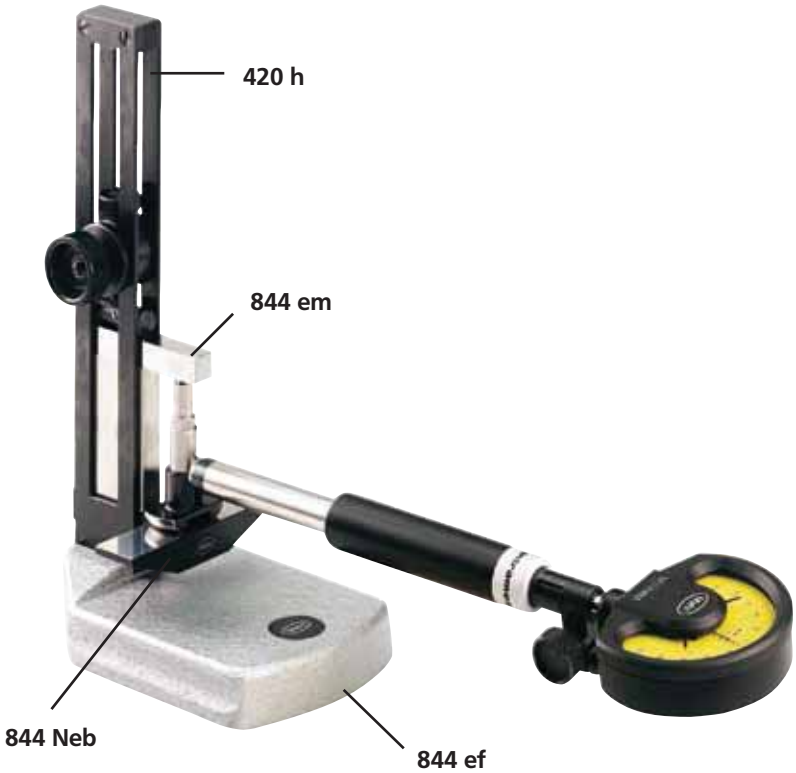
Gage Block Holder 420 h

Clamping range mm	*(inch)*	Order no.
0 - 70	***(0 - 2.75")***	**4800120**
0 - 120	***(0 - 4.72")***	**4800121**
100 - 220	***(4 - 8.66")***	**4800122**
100 - 420	***(4 - 16.53")***	**4800123**
400 - 820	***(16 - 32.28")***	**4800124**

Stand 844 ef

For mounting setting device up to 420 mm

Order no. **4470098**



Modular Unit System 844 N

In addition to complete Dial Bore Gages 844 N, modular units can also be compiled as required to suit a individual measuring task and or application.

Measuring Head 844 Nk, steel

Measuring Head 844 NHk, carbide

With built-in lever transmission system, carbide-tipped anvil and extra-wide centering bridge. With interchangeable stationary anvil. Threaded connection for Holders 844 Ng and 844 Ngk.

Measuring range mm	*(inch)*	Order no. 844 Nk	Order no. 844 NHk
18 - 50	***(.7 - 2")***	**4474151**	**4474156**
35 - 100	***(1.37 - 4")***	**4474152**	**4474157**
100 - 250	***(4 - 10")***	**4474153**	**4474158**
250 - 400	***(10 - 16")***	**4474154**	**4474159**
400 - 800	***(16 - 32")***	**4474155**	**4474160**

Extension Set 844 Nes

For extending range of Measuring Head 844 Nk/NHk from 250-400 mm to 800 mm. Consists of additional centering bridge and two extensions.

Order no.: **4474010**

Holder 844 Ng

Shank and transfer rod made of heat-resistant Invar steel. With a locking clamp for indicator.

For meas. range mm (*inch*)	L mm/*inch*	d1 mm/*inch*	d2 mm/*inch*	Order no.
18 - 50 ***(.7 - 2")***	200/ ***8"***	14/ ***.6"***	8/ ***.3"***	**4474040**
35 - 100 ***(1.37 - 4")***	250/ ***10"***	18/ ***.7"***	12/ ***.5"***	**4474041**
100 - 250 ***(4 - 10")***	350/ ***14"***	26/ ***1.0"***	18/ ***.7"***	**4474042**
250 - 800 ***(10 - 32")***	500/ ***20"***	30/ ***1.2"***	24/ ***.9"***	**4474043**

Short Holder 844 Ngk

Shank and transfer rod made of heat-resistant Invar steel. With a locking clamp for an indicator.

For meas. range mm (*inch*)	L mm/*inch*	d1 mm/*inch*	d2 mm/*inch*	Order no.
18 - 50 ***(.7 - 2")***	120/ ***5"***	14/ ***.6"***	8/ ***.3"***	**4474050**
35 - 100 ***(1.37 - 4")***	120/ ***5"***	18/ ***.7"***	12/ ***.5"***	**4474051**
100 - 250 ***(4 - 10")***	150/ ***6"***	26/***1.0"***	18/ ***.7"***	**4474052**
250 - 800 ***(10 - 32")***	250/ ***10"***	30/***1.2"***	24/ ***.9"***	**4474053**

Right Angle Attachment 844 Nw

For measuring difficult to reach bores, e.g. in tight spaces, inconveniently located or on machine tools. For screwing in between 844 Ng or 844 Ngk and 844 Nk/NHK.

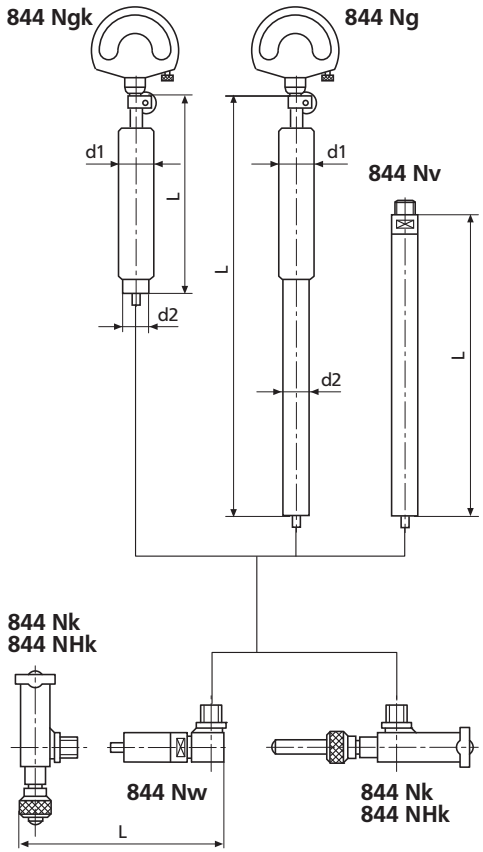
For meas. ranges mm	*(inch)*	Length* L mm/*inch*	Bore depth mm/*inch*	Order no.
18 -50	***(.7 - 2")***	66/***2.6"***	45/***1.8"***	**4474070**
35 -100	***(1.37 - 4")***	80/***3.1"***	55/***2.2"***	**4474071**
100 -250	***(4 - 10")***	105/***4.1"***	70/***2.8"***	**4474072**

** With measuring heads 844 Nk/NHk*

Extension 844 Nv

For extra deep bores. For screwing in between 844 Ng and 844 Nk/NHk. Shank and transfer rod made of Invar steel.

For instruments mm	*(inch)*	Length L (mm/*inch*)	Order no.
18 - 50	***(.7 - 2")***	250 / ***9.8"***	**4474066**
35 -100	***(1.37 - 4")***	250 / ***9.8"***	**4474060**
100 -250	***(4 - 10")***	250 / ***9.8"***	**4474061**
		500 / ***19.7"***	**4474062**
250 -800	***(10 - 32")***	250 / ***9.8"***	**4474063**
		500 / ***19.7"***	**4474064**



Dial Bore Gage for Internal Serrations 844 Z

Dial Bore Gage 844 Z
Diametrical two ball measurement "M_{dk}" from **3.5 - 333 mm**

Modular Unit Parts 844 Kk
"M_{dk}" from **3.5 - 26.1 mm**
(see table below)

Modular Unit Parts 844 Z
"M_{dK}" **26 - 333 mm** (see table on opposite page)

Features

- For diametrical two ball measurement M_{dK}, to obtain the pitch diameter and conical form of internal gears in any position and at any depth
- For ball dimensions from 3.5 to 26.1 mm use the 844 Kk with carbide ball anvil s and in conjunction with an expander pin
- For ball dimensions >26 mm the measuring heads 844 z1 or 844 z2 with the appropriate modular units are to be employed
- Maximum wear resistance due to carbide ball anvils
- Constant measuring force due to built-in spring thus eliminating user influence
- Anvils, measuring heads, holder, spacer (intermediate piece) and depth extensions form a very comprehensive modular system which can rapidly be converted to measure further gear sizes

Modular Unit Parts 844 Kk

Diametrical two ball measurement „M_{dk}" from **3.5 - 26.1 mm**

Ball dimen. M_{dk} (mm)	**Order no.** ball dia. 1-5 graduation 0.5	**Ball dia.** according to table	**Order no.** ball dia. 7.5-10 graduation 0.5	**Expander pin** Steel
3.5 - 4.1	**4482450**	**4482550**		
4.0 - 4.6	**4482451**	**4482551**		
4.5 - 5.1	**4482452**	**4482552**		
5.0 - 5.6	**4482453**	**4482553**		
5.5 - 6.1	**4482454**	**4482554**		
6.0 - 6.6	**4482455**	**4482555**		
6.5 - 7.1	**4482456**	**4482556**		**4470806**
7.0 - 7.6	**4482457**	**4482557**		
7.5 - 8.1	**4482458**	**4482558**		
8.0 - 8.6	**4482459**	**4482559**		
8.5 - 9.1	**4482460**	**4482560**		
9.0 - 9.6	**4482461**	**4482561**		
9.3 - 10.6	**4482462**	**4482562**	**4482662**	
10.3 - 11.6	**4482463**	**4482563**	**4482663**	
11.3 - 12.6	**4482464**	**4482564**	**4482664**	
12.3 - 13.6	**4482465**	**4482565**	**4482665**	
13.3 - 14.6	**4482466**	**4482566**	**4482666**	
14.5 - 16.1	**4482467**	**4482567**	**4482667**	
15.5 - 17.1	**4482468**	**4482568**	**4482668**	
16.5 - 18.1	**4482469**	**4482569**	**4482669**	
17.5 - 19.1	**4482470**	**4482570**	**4482670**	**4470808**
18.5 - 20.1	**4482471**	**4482571**	**4482671**	
19.5 - 21.1	**4482472**	**4482572**	**4482672**	
20.5 - 22.1	**4482473**	**4482573**	**4482673**	
21.5 - 23.1	**4482474**	**4482574**	**4482674**	
22.5 - 24.1	**4482475**	**4482575**	**4482675**	
23.5 - 25.1	**4482476**	**4482576**	**4482676**	
24.5 - 26.1	**4482477**	**4482577**	**4482677**	

Lifting Knob 954
enables the dial bore gage to gently guided into the serration. The measuring spindle of the indicating instrument can also be lifted.
Order no. **4372030**

Holder 844 Kg
with a clamping device for the indicating instrument. The mounting bore diameter 8 mm
Order no. **4470851**

Extension 844 Kv
for measuring in depth bores; length 64 mm
Order no. **4470070**

844 Kk Anvil
for internal serrations; ball dimension „M_{dk}" from

3.5 - 26.1 mm

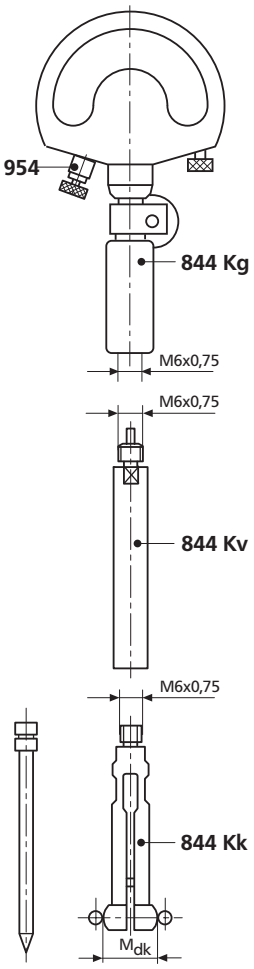


Table (Sizes in mm)

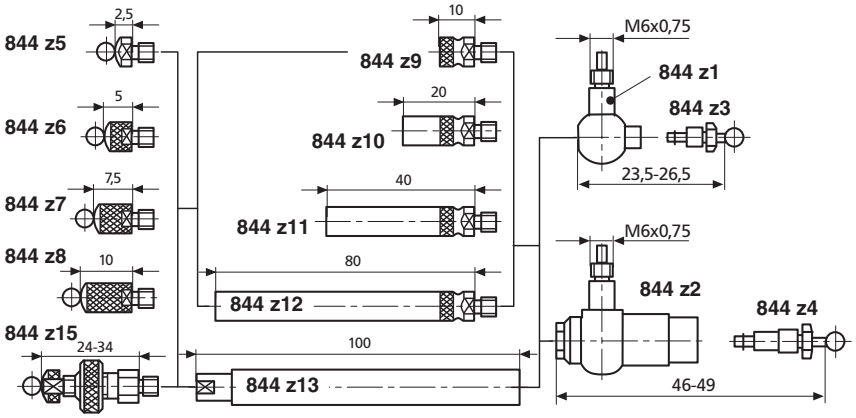
0.500 - 0.551 - 0.620 - 0.623 - 0.630 - 0.722 - 0.862 - 0.895 - 0.965 - 1.100 - 1.118 - 1.125 - 1.250
1.350 - 1.372 - 1.385 - 1.524 - 1.540 - 1.600 - 1.650 - 1.700 - 1.750 - 1.782 - 1.800 - 1.829 - 1.900
2.032 - 2.250 - 2.284 - 2.386 - 2.438 - 2.667 - 2.704 - 2.713 - 2.721 - 2.743 - 2.750 - 3.048 - 3.250
3.400 - 3.658 - 4.835 - 5.250 - 5.486 - 5.500 - 6.000 - 6.096 - 6.350 - 6.500 - 7.000

Modular Unit Parts 844 Z

Diametrical two ball measurement from M_{dK} **26-333 mm**

Measuring Heads			**Order no.**
844 z1 for M_{dK} 26 - 130.5 mm			**4485000**
844 z2 for M_{dK} 48.5 - 333 mm			**4485001**
Floating Ball Anvils with carbide ball			
	Grad. (mm)	**Ball** dia. mm	
844 z3 Meas. range 3 mm. for Meas. Head 844 z1	0.5	1.0 - 5.0	**4488300**
		acc. to table	**4488301**
	0.5	7.5 - 10	**4488302**
844 z4 Meas. range 3 mm. for Meas. Head 844 z2	0.5	1.0 - 5.0	**4488310**
		acc. to table	**4488311**
	0.5	7.5 - 10	**4488312**
Ball Anvils with carbide ball			
844 z5 Length 2.5 mm	0.5	1.0 - 5.0	**4488320**
		acc. to table	**4488321**
	0.5	7.5 - 10	**4488322**
844 z6 Length 5.0 mm	0.5	1.0 - 5.0	**4488330**
		acc. to table	**4488331**
	0.5	7.5 - 10	**4488332**
844 z7 Length 7.5 mm	0.5	1.0 - 5.0	**4488340**
		acc. to table	**4488341**
	0.5	7.5 - 10	**4488342**
844 z8 Length 10.0 mm	0.5	1.0 - 5.0	**4488350**
		acc. to table	**4488351**
	0.5	7.5 - 10	**4488352**
844 z15 Length adjustable from 24-34 mm	0.5	1.0 - 5.0	**4488360**
		acc. to table	**4488361**
	0.5	7.5 - 10	**4488362**
Spacer (intermediate piece)			
	Length (mm)		
844 z9	10		**4486501**
844 z10	20		**4486502**
844 z11	40		**4486503**
844 z12	80		**4486504**
844 z13	100*		**4486505**
Wooden case			**4485013**

** Only for 844 z2*



Dial Bore Gage for Internal Serrations 844 Z

Selecting Modular Unit Parts **Measuring Head 844 z1** and **Floating Ball Anvil 844 z3**

M_{dK} in mm	844 z5	844 z6	844 z7	844 z8	844 z15	844 z9	844 z10	844 z11	844 z12	844 z13
26.0 - 29.0	x									
28.5 - 31.5		x								
31.0 - 34.0			x							
33.5 - 36.5				x						
36.0 - 39.0	x					x				
38.5 - 41.5		x				x				
41.0 - 44.0			x			x				
43.5 - 46.5				x		x				
46.0 - 49.0	x						x			
47.5 - 60.5					x					
48.5 - 51.5		x					x			
51.0 - 54.0			x				x			
53.5 - 56.5				x			x			
56.0 - 59.0	x					x	x			
57.5 - 70.5					x	x				
58.5 - 61.5		x				x	x			
61.0 - 64.0			x			x	x			
63.5 - 66.5				x		x	x			
66.0 - 69.0	x							x		
67.5 - 80.5					x		x			
68.5 - 71.5		x						x		
71.0 - 74.0			x					x		
73.5 - 76.5				x				x		
76.0 - 79.0	x					x		x		
77.5 - 90.5					x	x	x			
78.5 - 81.5		x				x		x		
81.0 - 84.0			x			x		x		
83.5 - 86.5				x		x		x		
86.0 - 89.0	x						x	x		
87.5 - 100.5					x			x		
88.5 - 91.5		x					x	x		
91.0 - 94.0			x				x	x		
93.5 - 96.5				x			x	x		
96.0 - 99.0	x					x	x	x		
97.5 - 110.5					x	x		x		
98.5 - 101.5		x				x	x	x		
101.0 - 104.0			x			x	x	x		
103.5 - 106.5				x		x	x	x		
107.5 - 120.5					x		x	x		
117.5 - 130.5					x	x	x	x		

Example:

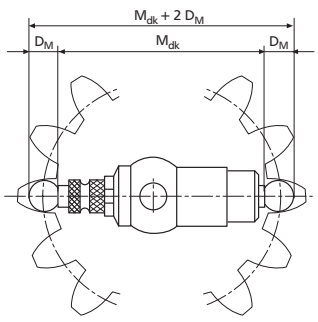
Diametrical two ball meas. M_{dK}	73.0	mm
Ball dia.	5.486	mm

When placing an order please quote the ball diameter of the modular unit system for 844 z3 - 844 z8, as well as 844 z15. On the basis of the above specified example above result several combinations that are possible to choice from is dependent upon the work piece. For further details please refer to the illustration on Page 9-65.

The measuring application can be solved with either one of the following 4 versions:

Type	Description	Ball dia. mm	Length mm	Order no.
Version 1				
844 z1	Meas. Head		23.5-26.5	**4485000**
844 z3	Floating Ball Anvil	5.486		**4488301**
844 z7	Ball Anvil	5.486	7.5	**4488341**
844 z11	Spacer		40.0	**4486503**
Meas. range			71.0-74.0	
Version 2				
844 z1	Meas. Head		23.5-26.5	**4485000**
844 z3	Floating Ball Anvil	5.486		**4488301**
844 z15	Ball Anvil	5.486	24.0-34.0	**4488361**
844 z10	Spacer		20.0	**4486502**
Meas. range			67.5-80.5	
Version 3				
844 z2	Meas. Head		46.0-49.0	**4485001**
844 z4	Floating Ball Anvil	5.486		**4488311**
844 z6	Ball Anvil	5.486	5.0	**4488331**
844 z10	Spacer		20.0	**4486502**
Meas. range			71.0-74.0	
Version 4				
844 z2	Meas. Head		46.0-49.0	**4485001**
844 z4	Floating Ball Anvil	5.486		**4488311**
844 z15	Ball Anvil	5.486	24.0-34.0	**4488361**
Meas. range			70.0-83.0	

Determination of setting values



D_M = Ball diameter of the ball anvil

M_{dk} = Diametrical two ball measurement

M_{dk} + 2 D_M = Setting value (length of the gage block required for setting)

Indicating Instruments

All indicating instruments that has a 8 mm mounting shank may be used. Recommended are:

Dial Comparator	Readings mm / ***inch***	Order no. mm / ***inch***
Compramess 1004/*1004 Z*	5 µm/ ***.0001"***	**4333000/*4333900***
Millimess 1003/*1003 Z*	1 µm/ ***.00005"***	**4334000/*4334900***

Digital Indicators see Chapter 5
Electrical Indicating Instruments see Chapter 7

Selecting Modular Unit Parts 844 Z **Measuring Head f 844 z2** and **Floating Ball Anvil 844 z4**

M_{dK} in mm	844 z5	844 z6	844 z7	844 z8	844 z15	844 z9	844 z10	844 z11	844 z12	844 z13
48.5 - 51.5	x									
51.0 - 54.0		x								
53.5 - 56.5			x							
56.0 - 59.0				x						
58.5 - 61.5	x					x				
61.0 - 64.0		x				x				
63.5 - 66.5			x			x				
66.0 - 69.0				x		x				
68.5 - 71.5	x						x			
70.0 - 83.0					x					
71.0 - 74.0		x					x			
73.5 - 76.5			x				x			
76.0 - 79.0				x			x			
78.5 - 81.5	x					x	x			
80.0 - 93.0					x	x				
81.0 - 84.0		x				x	x			
83.5 - 86.5			x			x	x			
86.0 - 89.0				x		x	x			
88.5 - 91.5	x							x		
90.0 - 103.0					x		x			
91.0 - 94.0		x						x		
93.5 - 96.5			x					x		
96.0 - 99.0				x				x		
98.5 - 101.5	x					x		x		
100.0 - 113.0					x	x	x			
101.0 - 104.0		x				x		x		
103.5 - 106.5			x			x		x		
106.0 - 109.0				x		x		x		
108.5 - 111.5	x						x	x		
110.0 - 123.0					x			x		
111.0 - 114.0		x					x	x		
113.5 - 116.5			x				x	x		
116.0 - 119.0				x			x	x		
118.5 - 121.5	x					x	x	x		
120.0 - 133.0					x	x		x		
121.0 - 124.0		x				x	x	x		
123.5 - 126.5			x			x	x	x		
126.0 - 129.0				x		x	x	x		
128.5 - 131.5	x								x	
130.0 - 143.0					x		x	x		
131.0 - 134.0		x							x	
133.5 - 136.5			x						x	
136.0 - 139.0				x					x	
138.5 - 141.5	x					x			x	
140.0 - 153.0					x	x	x	x		
141.0 - 144.0		x				x			x	
143.5 - 146.5			x			x			x	
146.0 - 149.0				x		x			x	
148.5 - 151.5	x									x
150.0 - 163.0					x				x	
151.0 - 154.0		x								x
153.5 - 156.5			x							x
156.0 - 159.0				x						x
158.5 - 161.5	x					x				x
160.0 - 173.0					x	x			x	
161.0 - 164.0		x				x				x
163.5 - 166.5			x			x				x
166.0 - 169.0				x		x				x
168.5 - 171.5	x						x			x
170.0 - 183.0					x					x
171.0 - 174.0		x					x			x
173.5 - 176.5			x				x			x
176.0 - 179.0				x			x			x
178.5 - 181.5	x					x	x			x
180.0 - 193.0					x	x				x
181.0 - 184.0		x				x	x			x
183.5 - 186.5			x			x	x			x
186.0 - 189.0				x		x	x			x

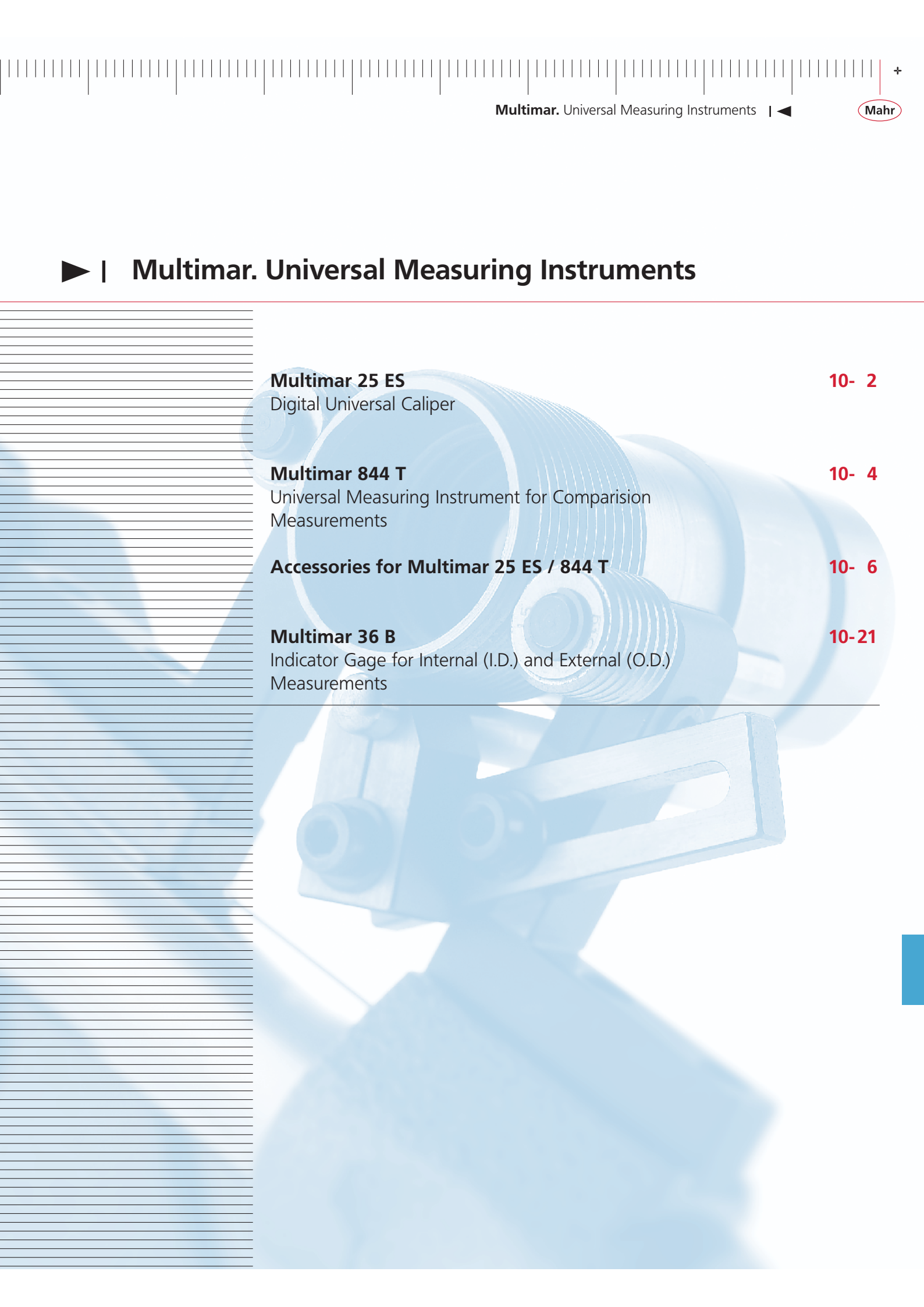
M_{dK} in mm	844 z5	844 z6	844 z7	844 z8	844 z15	844 z9	844 z10	844 z11	844 z12	844 z13
188.5 - 191.5	x							x		x
190.0 - 193.0					x		x			x
191.0 - 194.0		x						x		x
193.5 - 196.5			x					x		x
196.0 - 199.0				x				x		x
198.5 - 201.5	x					x		x		x
200.0 - 213.0					x	x	x			x
201.0 - 204.0		x				x		x		x
203.5 - 206.5			x			x		x		x
206.0 - 209.0				x		x		x		x
208.5 - 211.5	x						x	x		x
210.0 - 223.0					x			x		x
211.0 - 214.0		x					x	x		x
213.5 - 216.5			x				x	x		x
216.0 - 219.0				x			x	x		x
218.5 - 221.5	x					x	x	x		x
220.0 - 233.0					x	x		x		x
221.0 - 224.0		x				x	x	x		x
223.5 - 226.5			x			x	x	x		x
226.0 - 229.0				x		x	x	x		x
228.5 - 231.5	x								x	x
230.0 - 243.0					x		x	x		x
231.0 - 234.0		x							x	x
233.5 - 236.5			x						x	x
236.0 - 239.0				x					x	x
238.5 - 241.5	x					x			x	x
240.0 - 253.0					x	x	x	x		x
241.0 - 244.0		x				x			x	x
243.5 - 246.5			x			x			x	x
246.0 - 249.0				x		x			x	x
248.5 - 251.5	x						x		x	x
250.0 - 263.0					x				x	x
251.0 - 254.0		x					x		x	x
253.5 - 256.5			x				x		x	x
256.0 - 259.0				x			x		x	x
258.5 - 261.5	x					x	x		x	x
260.0 - 273.0					x	x			x	x
261.0 - 264.0		x				x	x		x	x
263.5 - 266.5			x			x	x		x	x
266.0 - 269.0				x		x	x		x	x
268.5 - 271.5	x							x	x	x
270.0 - 283.0					x		x		x	x
271.0 - 274.0		x						x	x	x
273.5 - 276.5			x					x	x	x
276.0 - 279.0				x				x	x	x
278.5 - 281.5	x					x		x	x	x
280.0 - 293.0					x	x	x		x	x
281.0 - 284.0		x				x		x	x	x
283.5 - 286.5			x			x		x	x	x
286.0 - 289.0				x		x		x	x	x
288.5 - 291.5	x						x	x	x	x
290.0 - 303.0					x			x	x	x
291.0 - 294.0		x					x	x	x	x
293.5 - 296.5			x				x	x	x	x
296.0 - 299.0				x			x	x	x	x
298.5 - 301.5	x					x	x	x	x	x
300.0 - 313.0					x	x		x	x	x
301.0 - 304.0		x				x	x	x	x	x
303.5 - 306.5			x			x	x	x	x	x
306.0 - 309.0				x		x	x	x	x	x
310.0 - 323.0					x		x	x	x	x
320.0 - 333.0					x	x	x	x	x	x

DO YOU HAVE DIVERSE MEASURING TASKS?
MULTIMAR MASTERS THEM WITH FLYING COLORS.

The latest information on MULTIMAR products can be found on our website:
www.mahr.com, WebCode 10281

► | Regardless of whether gears, threads, cones or grooves are to be measured; the versatility of Multimar Universal Measuring Instruments combined with a broad range of accessories ensures a perfect solution for nearly all your internal and external measuring requirements. | ◄

► | Multimar. Universal Measuring Instruments



Digital Universal Caliper 25 ES Varimeter

Illustration is shown with accessories, these are sold seperately

Applications

For measuring:
- Outside and inside dimensions
- Centering shoulders
- Narrow collars
- External and internal tapers
- Dovetails
- Grooves
- Distances between hole centers
- For scribing of work pieces

Features

Functions:
ON/OFF
RESET (zero setting)
mm/inch
HOLD (Storage of measuring values)
DATA (Data transmission)
PRESET (for entering a numerical value)
TOL (Tolerance display)

- Capacitive measuring system, life of the battery ca. 2 years
- Max measuring speed: 1.5 m/s (60"/s)
- Data output: Opto RS232C via data connection cable
- High contrast 6 mm Liquid Crystal Display
- Interchangeable measuring arms
- Due to the patented mounting fixture of the measuring arms and or measuring attachments provided on both the upper and lower longitudinal face of the arm holders, the digital display is always in the operator's line of vision
- The application range can be easily extended by reversing the measuring arms
- Both measuring arms can be moved along the beam thus having a well balanced weight distribution even with small dimensions
- Slide and beam are made of hardened stainless steel
- Supplied with: Battery

Technical Data

Measuring range* outside mm	outside *(inch)*	inside mm	inside *(inch)*	Resolution mm/*inch*	Error limit (DIN 862) mm/*inch*	Weight g/lbs	Order no.	Order no. wooden case
0 - 300	***(0 - 12")***	25 - 325	***(1 - 13")***	0.01/ ***.0005"***	0.03/ ***.0015"***	770/ 1.7	**4118700**	**4118750**
0 - 300	***(0 - 12")***	25 - 325	***(1 - 13")***	0.01/ ***.0005"***	0.03/ ***.0015"***	750/ 1.6	**4118701****	**4118750**
0 - 600	***(0 - 24")***	25 - 625	***(1 - 25")***	0.01/ ***.0005"***	0.03/ ***.0015"***	1050/ 2.3	**4118702**	**4118751**
0 - 1000	***(0 - 40")***	25 - 1025	***(1 - 41")***	0.01/ ***.0005"***	0.04/ **.0020"**	1470/ 3.2	**4118703**	**4118752**

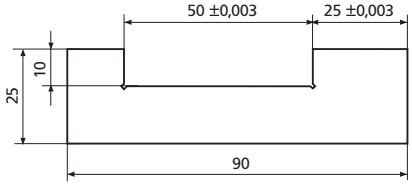
* *Dependent upon which accessories are being used the measuring range can be extended by a further 75 mm (2.95") by reversing the measuring arms 844 Te/Tx*
** *Without fine adjustment*

Accessories

		Order no.
Setting Gage, hardened steel, screwed in to wooden case	**25 EeI**	**4118520**
Battery 3V, Type CR 2032		**4102520**
Data Connection Cable RS232C (2 m), SUB-D-jack 9-pin	**16 ESv**	**4102510**

Accessories for Data Processing see Chapter 11

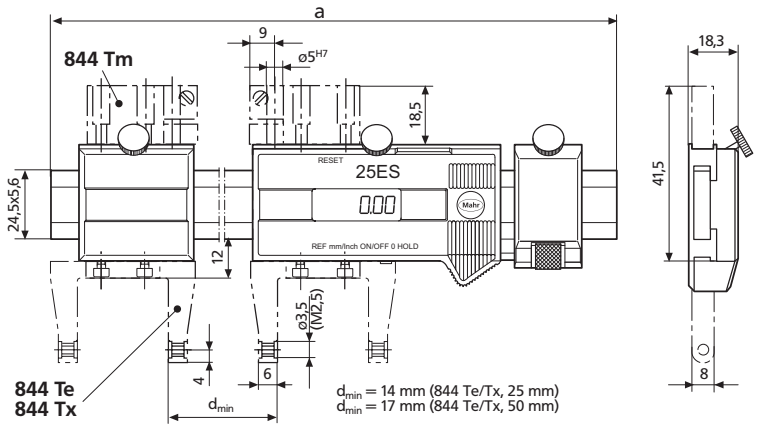
25 EeI

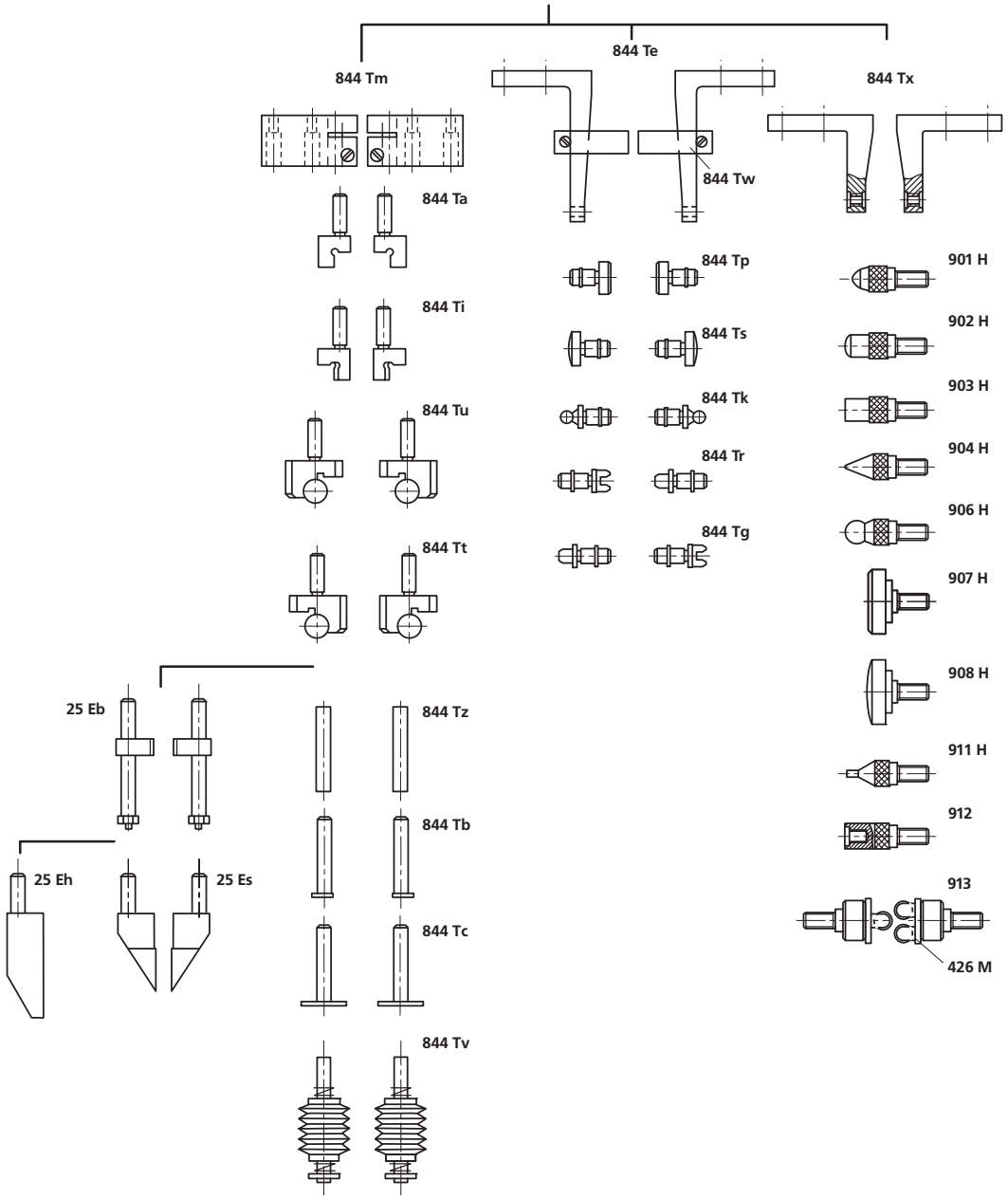


Digital Universal Caliper 25 ES Measuring Arms, Mounting Attachments and Anvils

Dimensions

Range of application	a
mm/*inch*	mm/*inch*
0 - 300 / ***0 - 12"***	475/***18.5"***
0 - 600 / ***0 - 24"***	775/***30.5"***
0 - 1000/ ***0 - 40"***	1175/***46.2"***





Multimar. Universal Gage 844 T for external and internal dimensions

► | The Universal Gage **Multimar** 844 T. Easy to use and versatile; ideal for all your measuring requirements in dimensional metrology. | ◄

Applications

- External and internal dimensions
- External and internal threads
- Centering shoulders
- Narrow collars, recesses and grooves
- External and internal tapers
- External and internal tooth profiles / gears
- and lots more

All indicating instruments with an 8 mm mounting shank can be used

Constant measuring force due to the built-in measuring force spring

The moveable measuring arm holder is mounted in a highly precision ball guide to eliminate both play and friction; it also has an extreme measuring sensitivity and accuracy due to the optimal stability and ease of movement

Technical Data

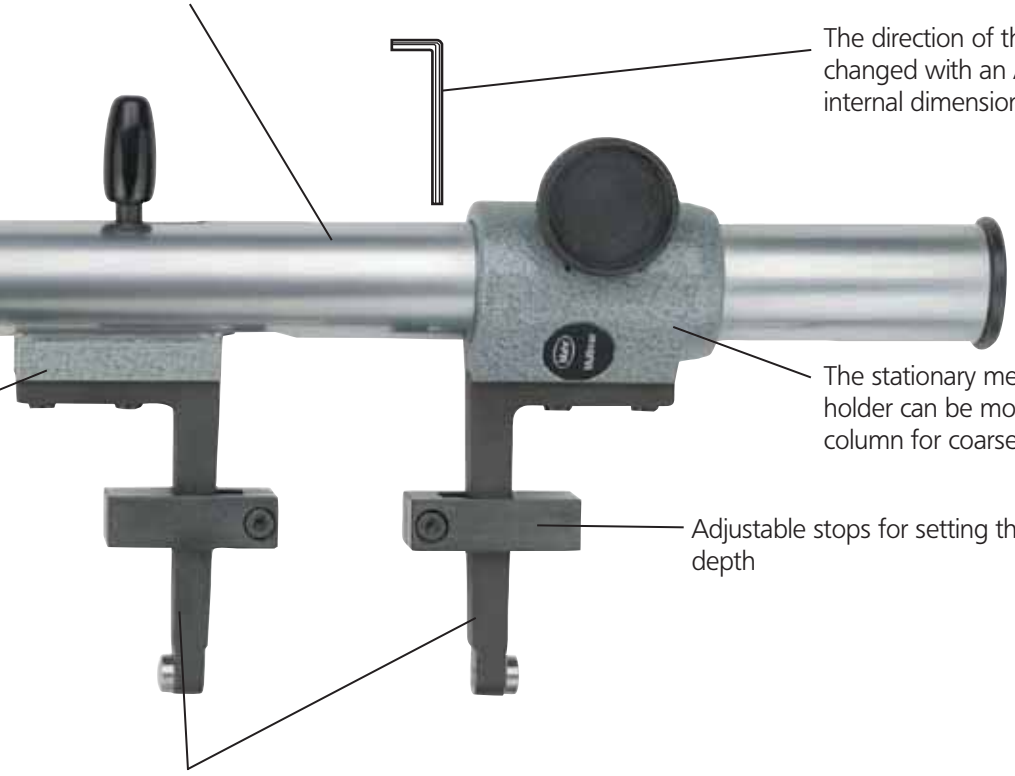
Application range* mm	Application range* *(inch)*	Extended range of application mm/*inch*	Distance of movable anvil mm/*inch*	Weight g/lbs	Order no.**	Order no. Wooden case
25 - 110	***(1 - 4.33")***	25 - 185 / ***1 - 7.28"***	10/ ***.4"***	775 / 1.71	**4500001**	**4500010**
100 - 260	***(4 - 10.24")***	100 - 335 / ***4 - 13.18"***	10/ ***.4"***	1010 / 2.23	**4500002**	**4500011**
250 - 610	***(10 - 24.02")***	250 - 685 / ***10 - 26.96"***	10/ ***.4"***	1580 / 3.48	**4500003**	**4500012**
600 - 1010	***(24 - 39.75")***	600 -1085 / ***24 - 42.71"***	10/ ***.4"***	2225 / 4.91	**4500004**	**4500013**
1000 - 1500	***(39.37 - 59.06")***	1000 -1575 / ***39.37 - 62.01"***	10/ ***.4"***	2460 / 5.42	**4500005*** **	-
1500 - 2000	***(59.06 - 78.74")***	1500 -2075 / ***59.06 - 81.69"***	10/ ***.4"***	2620 / 5.78	**4500006*** **	-
2000 - 2500	***(78.74 - 98.43")***	2000 -2575 / ***78.74 -101.38"***	10/ ***.4"***	2800 / 6.17	**4500007*** **	-

* *These application ranges only apply to internal measurements. For external measurements the range of application is reduced by 25 mm (1").*
The extension of the application range takes place when the measuring elements are rotated through 180°.
All application ranges depend upon which anvil is being used.
From 1000 mm (range of application) a lightweight CRP tube is used.

** *Excludes indicating instrument*

*** *Includes a transport and storage case*

The basic Multimar 844 T gage is made from a rugged, ground and hard chrome plated column



The direction of the measuring force can be changed with an Allen key for either external or internal dimensions

The stationary measuring arm holder can be moved along the column for coarse adjustment

Adjustable stops for setting the measuring depth

The measuring arms for measurement of external and internal dimensions. By simply reversing the measuring arms the application range can be extended

Innovative lightweight construction of the basic body, made from carbon fiber reinforced plastic (CRP) tube, for measuring range 1000-1500 mm.

Indicating Instruments

All indicating instruments with a 8 mm mounting shank can be used.
Recommended are:

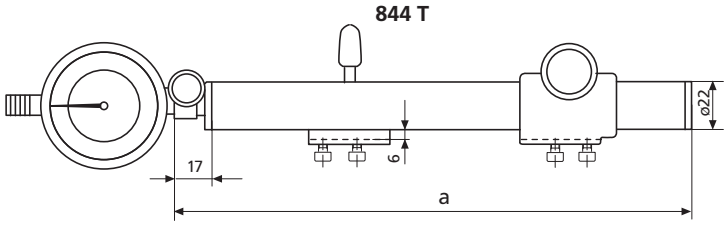
Indicating Instrument	Readings mm/*inch*	Order no. mm/*inch*
MarCator 810 S	0.01 mm	**4311000**
Zentimess 1010 / *1010 Z*	0.01 mm / ***.0005"***	**4332000/ *4332900***
Compramess 1004 / *1004 Z*	5 µm / ***.0001"***	**4333000/ *4333900***
Digital Indicator MarCator 1087 B	0.001 mm* / ***.00005"***	**4337062**
µMaxµm XL (XLI-30000)	1 µm / ***.00005"****	**XLI-30000**

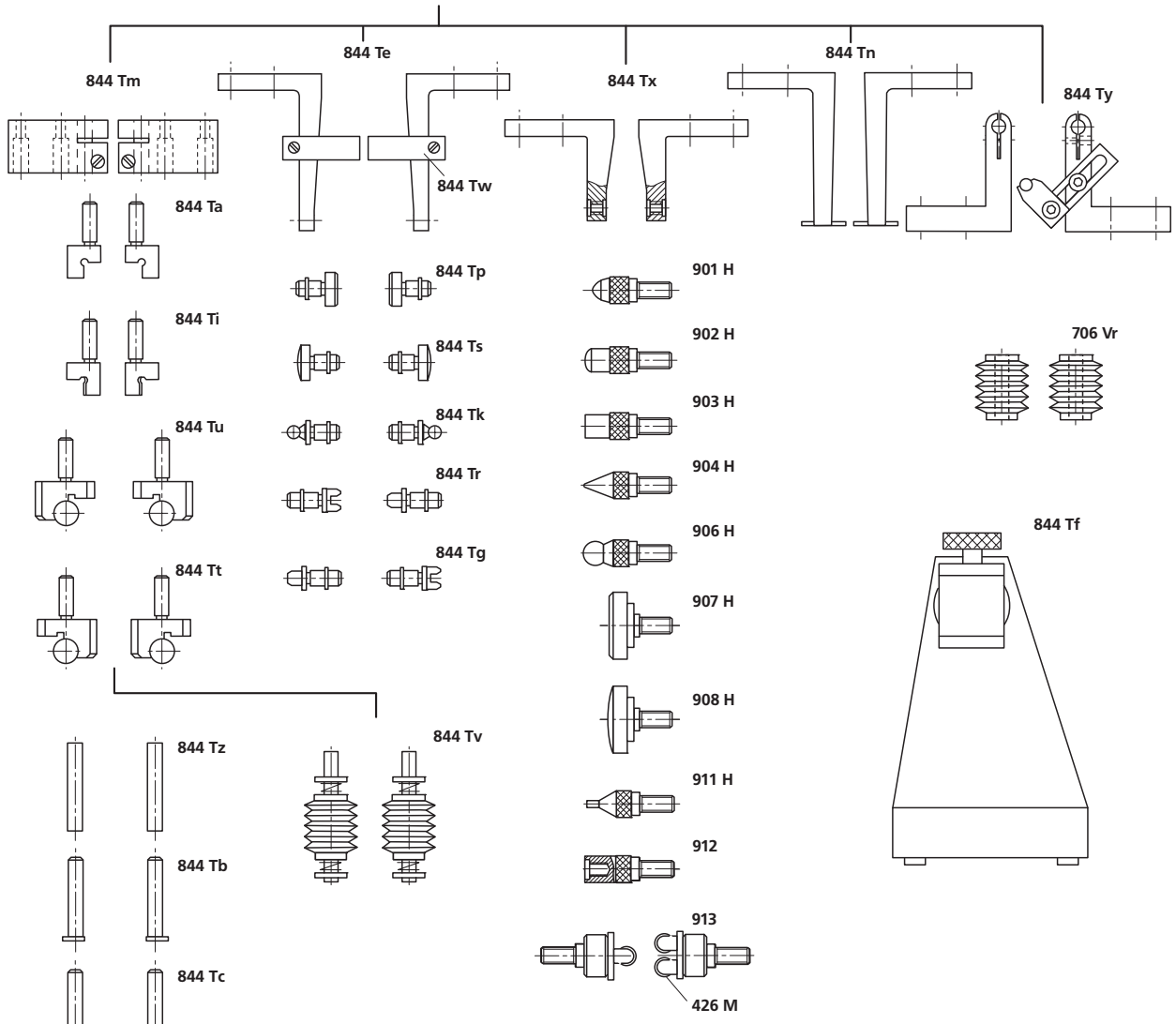
* Resolution
For further digital indicators please refer to Chapter 5

Overview. Measuring Arms, Stops, Mounting Attachments and Anvils

Dimensions

Range of application mm *(inch)*	a mm/*inch*
25 - 110 *(1 - 4.33")*	245 / *9.6"*
100 - 260 *(4 - 10.24")*	395 / *15.5"*
250 - 610 *(10 - 24.02")*	745 / *29.3"*
600 - 1010 *(24 - 39.75")*	1145 / *45.0"*
1000 - 1500 *(39.37 - 59.06")*	1675 / *65.9"*
1500 - 2000 (*59.06 - 78.74")*	2175 / *85.6"*
2000 - 2500 (*78.74 - 98.43"*	2675 / *105.3"*



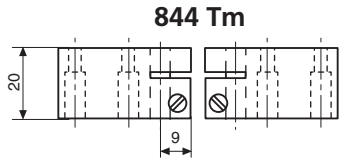


Overview. Measuring Arms, Stops and Mounting Attachments

Mounting Attachments 844 Tm

- Accommodates the following anvils 844 Ta, 844 Ti, 844 Tu, 844 Tt, 844 Tz, 844 Tb und 844 Tc
- Faces can also be used as stops
- Reversible arm holders for extending measuring range

Order no. **4500030**

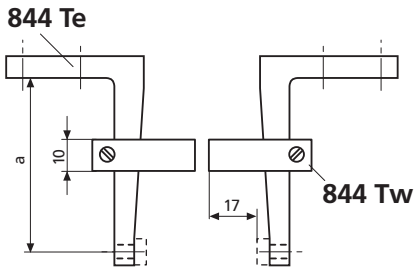


Measuring Arms 844 Te

- For external and internal diameters
- With a 3.5 mm (0.138") diameter mount, accommodates the interchangeable anvils 844 Tp, 844 Ts, 844 Tk, 844 Tr and 844 Tg
- Reversible arm holders for extending measuring range

Throat depth a in mm	25	50	100
Order no.	**4500020***	**4500021***	**4500022***

** Not suitable for Digital Caliper 25 ES*



Stops 844 Tw

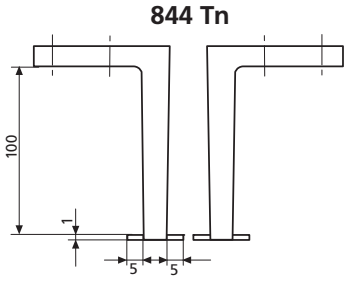
- To set the measuring depth limit. Can be attached and relocated on the following measuring arms 844 Te, 844 Tn, 844 Tx. Reversible for external and internal measurements

Order no. **4500109**

Measuring Arms 844 Tn

- Hardened steel
- To measure external and internal diameters on recesses and grooves at a greater measuring depth

Throat depth a in mm	100
Order no.	**4500036**

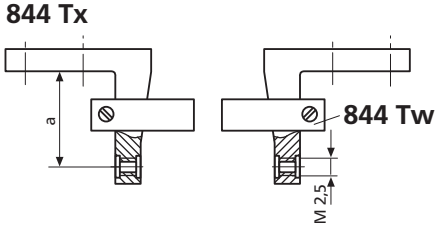


Measuring Arms 844 Tx

- With an M 2.5 connection thread to screw in interchangeable anvils
- For internal and external dimensions on specially formed work pieces
- Measuring arms in conjunction with the measuring arms holder is reversible thus extending the range of measurement / application

Throat depth a in mm	25	50	100
Order no.	**4500080***	**4500081***	**4500082***

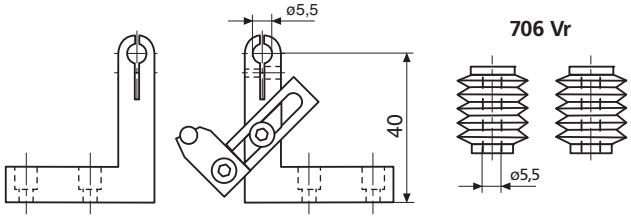
** Not suitable for Digital Caliper 25 ES*



Holder for Measuring Rollers 844 Ty

- With location bolts for the Measuring Rollers 706 Vr, plus a stop and stop pin

Order no. **4502463**



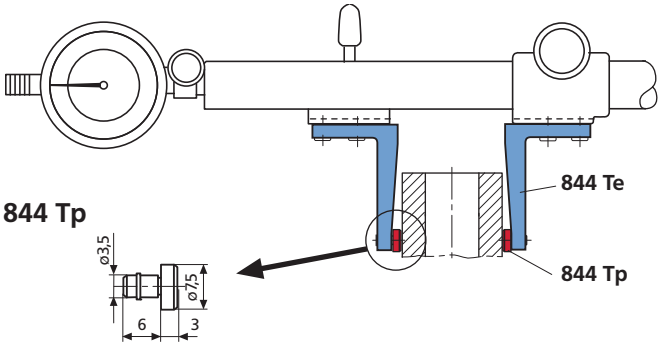
Measuring external and internal dimensions

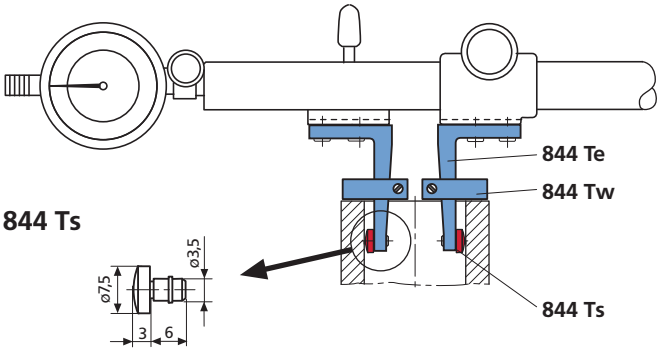
Anvils for Measuring Arms 844 Te

- Hardened steel
- With a cylindrical mounting shank and retainer ring that allows free rotation in the bore of measuring arms 844 Te

Cat. no.		Order no.
844 Tp	Flat; for external diameters, distance and widths	**4500040***
844 Ts	Spherical; for internal diameters	**4500045***

** 2 pieces are required*

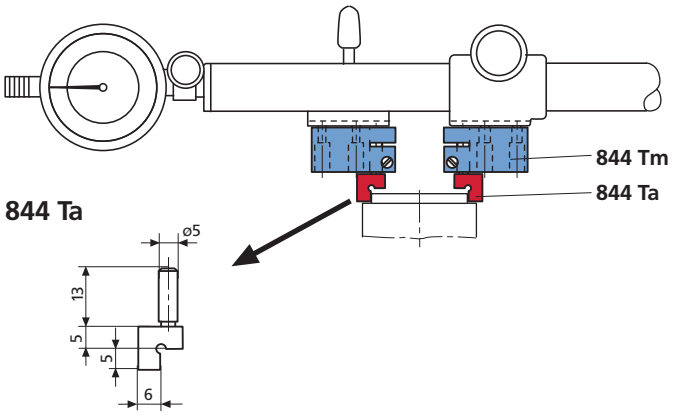


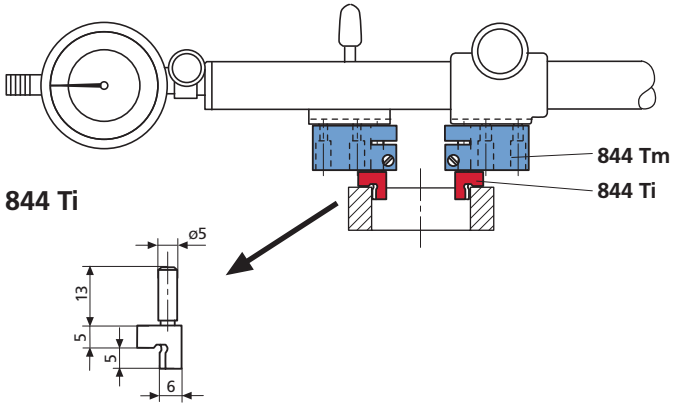


Shoulder anvils for mounting attachments 844 Tm

- Made from hardened steel
- For measuring narrow collars such as centering shoulders and other similar measuring tasks
- With cylindrical mounting shaft to attach into the mounting attachments 844 Tm

Cat. no.		Order no.
844 Ta	Flat; for external diameters	**4500050**
844 Ti	Semi-cylindrical, for internal diameters	**4500055**





Measuring tapers and distances

Roller Anvils 844 Tu* for Mounting Attachments 844 Tm

- To measure the diameter of **outside tapers and dovetail guides**
- Roller is made of hardened steel

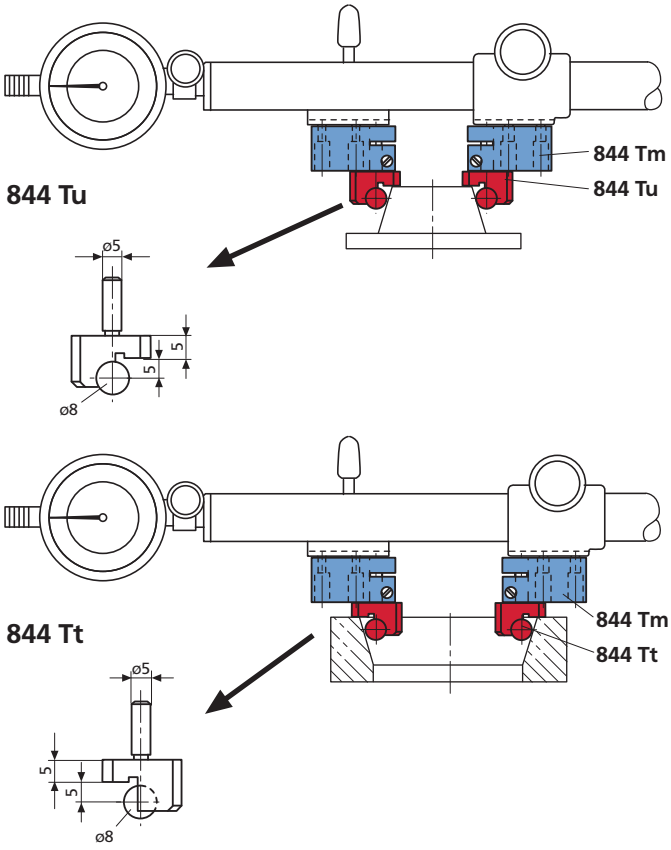
Cat. no.			Order no.
844 Tu*	Roller dia. Roller length Distance of the roller to the stop face	8 mm 14 mm 5 mm ±3 µm	**4500047**

Ball Anvils 844 Tt* for Mounting Attachments 844 Tm

- To measure the diameter of **inside tapers** with a distance of 5 mm from the taper face
- Ball is made of hardened steel

Cat. no.			Order no.
844 Tt*	Ball dia. Distance of the ball to the stop face	8 mm 5 mm ±3 µm	**4500046**

** Outer and inner surfaces that are parallel to one another a combination sets (pair) consisting of a Roller Anvil 844 Tu and a Ball Anvil 844 Tt, are recommended.*



Measuring recesses

Anvils with Measuring Blades for Mounting Attachments 844 Tm

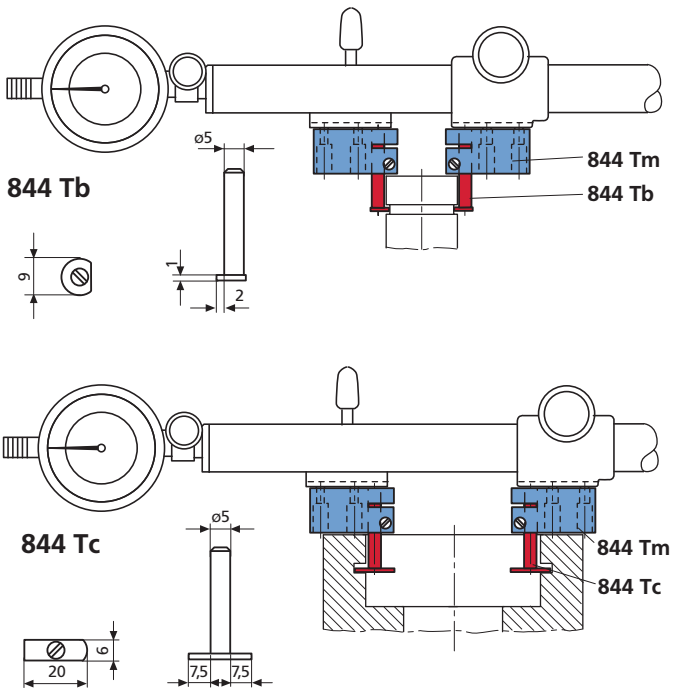
- For measuring centering shoulders and recesses on internal and external diameters; consists of a pin type holder, which is be moved to set the measuring depth in Mounting Attachment 844 Tm and a mounted measuring blade
- The face of the Mounting Attachment 844 Tm serves as stop

844 Tb
- With round measuring blades
- Ideal for workpieces that have a recess up to 2 mm in depth

844 Tc
- With long measuring blades
- Ideal for workpieces that have a recess up to 7.5 mm in depth

Cat. no.	Blade Length mm	Blade dia. mm	Range of adjustment	Order no.
844 Tb	–	9	0 – 10	**4500015***
844 Tc	20	–	0 – 10	**4500114***
	20	–	40 – 50	**4500115***

** 2 pieces are required*



Measuring external and internal tooth profiles

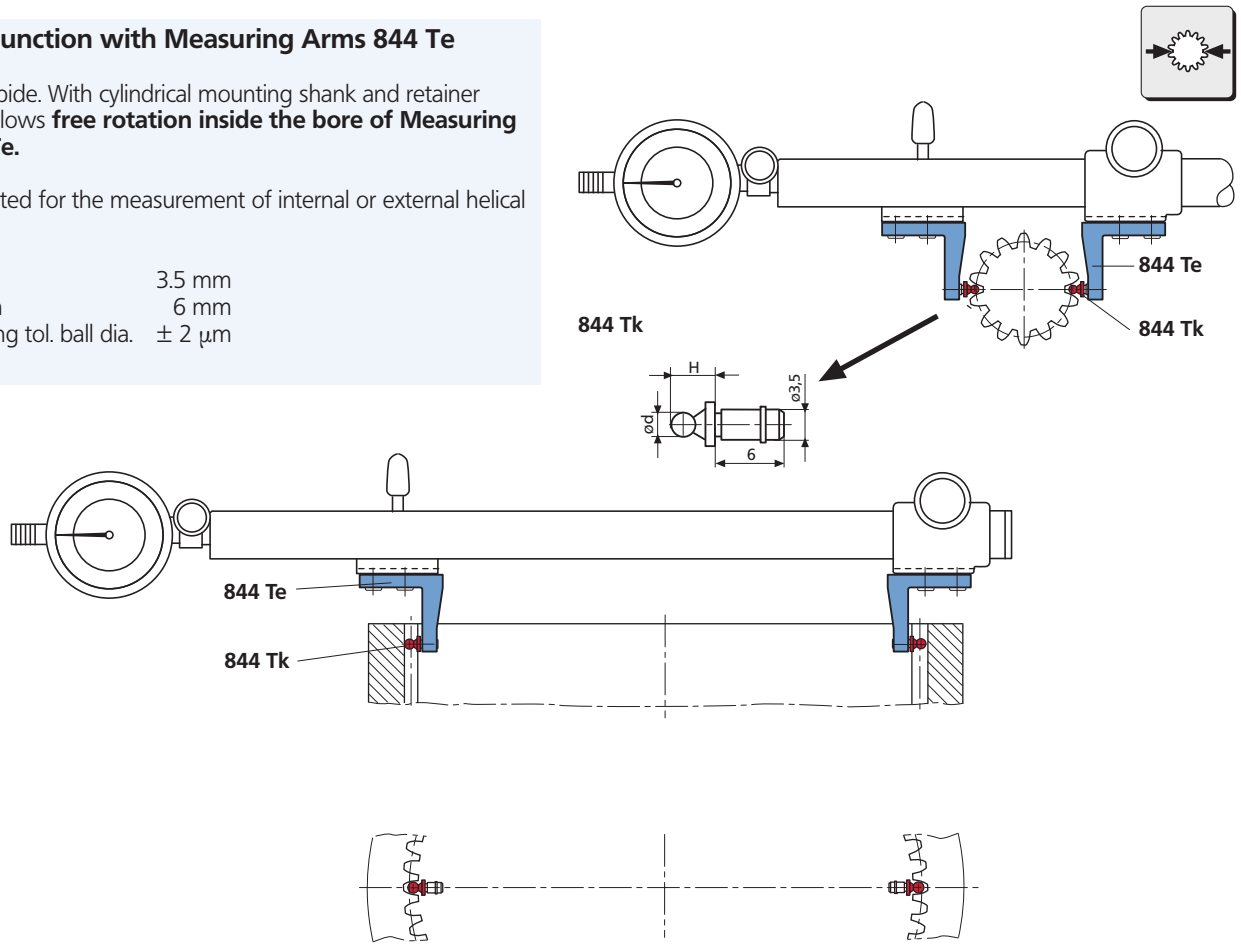
Ball Anvils 844 Tk

Use in conjunction with Measuring Arms 844 Te

- Made of carbide. With cylindrical mounting shank and retainer ring which allows **free rotation inside the bore of Measuring Arms 844 Te.**

Especially suited for the measurement of internal or external helical gear wheels.

Shank dia.	3.5 mm
Shank length	6 mm
Manufacturing tol. ball dia.	± 2 µm



dia. **d** mm	**H** mm	**Order no.***	dia. **d** mm	**H** mm	**Order no.***	dia. **d** mm	**H** mm	**Order no.***	dia. **d** mm	**H** mm	**Order no.***
0.5	3.0	**4502620**	1.5	4.0	**4500352**	2.438	4.9	**4502646**	4.5	7.0	**4500360**
0.551	3.1	**4502621**	1.524	4.0	**4502635**	2.5	5.0	**4500356**	4.835	7.3	**4502655**
0.62	3.1	**4502622**	1.54	4.0	**4502636**	2.667	5.2	**4502647**	5	7.5	**4500361**
0.623	3.1	**4502623**	1.6	4.1	**4502637**	2.704	5.2	**4502648**	5.25	7.8	**4502656**
0.63	3.1	**4502624**	1.65	4.2	**4502638**	2.713	5.2	**4502649**	5.486	8.0	**4502657**
0.722	3.2	**4502625**	1.7	4.2	**4502639**	2.721	5.2	**4502650**	5.5	8.0	**4500362**
0.862	3.4	**4502626**	1.75	4.3	**4500353**	2.743	5.2	**4502651**	6	8.5	**4500363**
0.895	3.4	**4502627**	1.782	4.3	**4502640**	2.75	5.3	**4500618**	6.096	8.6	**4502658**
0.965	3.5	**4502628**	1.8	4.3	**4502641**	3	5.5	**4500357**	6.35	8.9	**4502545**
1	3.5	**4500350**	1.829	4.3	**4502642**	3.048	5.5	**4502652**	6.5	9.0	**4502542**
1.1	3.6	**4502629**	1.9	4.4	**4502643**	3.25	5.8	**4502541**	7	9.5	**4502547**
1.118	3.6	**4502630**	2	4.5	**4500354**	3.4	5.9	**4502653**	8	10.5	**4502548**
1.125	3.6	**4502631**	2.032	4.5	**4502543**	3.5	6.0	**4500358**	9	11.5	**4502549**
1.25	3.8	**4500351**	2.25	4.8	**4502540**	3.658	6.2	**4502654**	10	12.5	**4502550**
1.35	3.9	**4502632**	2.284	4.8	**4502644**	4	6.5	**4500359**			
1.372	3.9	**4502633**	2.3	4.8	**4502544**						
1.385	3.9	**4502634**	2.386	4.9	**4502645**						

** 2 pieces are required*

Further sizes are available upon request (material: Steel)

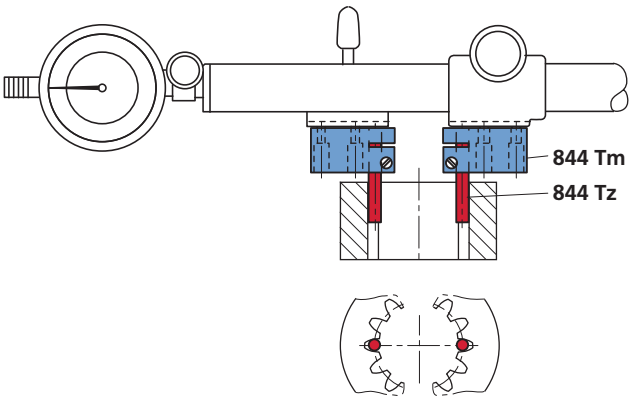
Measuring external and internal tooth profiles

Cylindrical Measuring Pins 844 Tz

Use in conjunction with Mounting Attachments 844 Tm

- Made from steel, with shank for mounting into the Mounting Attachment 844 Tm.

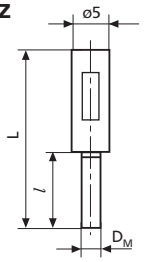
Manufacturing tol. ± 2 µm



dia. D_M mm	Length l mm	Length L mm	Order no.
1	6	19.5	**4500500**
1.25	6	19.5	**4500501**
1.5	6	19.5	**4500502**
1.75	10	23.5	**4500503**
2	10	23.5	**4500504**
2.5	10	23.5	**4500506**
3	15	28.5	**4500507**
3.5	15	28.5	**4500508**
4	15	28.5	**4500509**
4.5	20	33.5	**4500510**
5	20	33.5	**4500511**
5.5	20	33.5	**4500512**
6	20	33.5	**4500513**

Further sizes are available upon request (material: Steel)

844 Tz

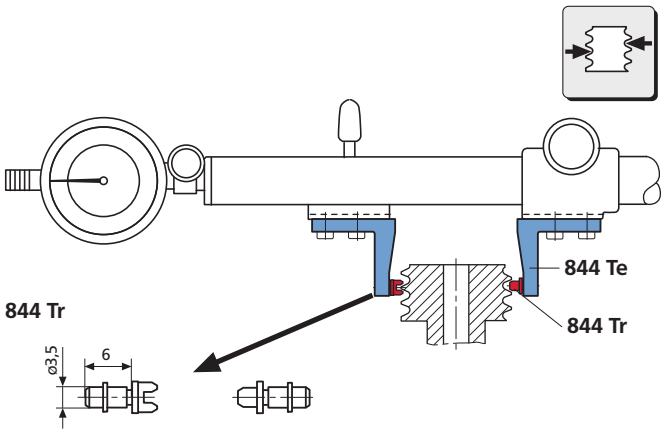


Measuring external threads

Interchangeable Anvils 844 Tr

Used in conjunction with Measuring Arms 844 Te

• Pair consists of V-anvil and blade



For pitch diameters

Shank dia.	3.5 mm
Shank length	6 mm

Metric external thread (60°)

Pitch mm	V-anvil Order no.	Blade Order no.
0.5 - 0.7	**4501000**	**4501200**
0.7 - 1	**4501001**	**4501201**
1.25 - 2	**4501002**	**4501202**
2 - 3.5	**4501003**	**4501203**
3.5 - 5	**4501004**	**4501204**
5 - 7	**4501005**	**4501205**
7 - 9	**4501006**	**4501206**

Whitworth external thread (55°)

Pitch range tpi	V-anvil Order no.	Blade Order no.
40 - 32	**4501007**	**4501207**
32 - 24	**4501008**	**4501208**
24 - 18	**4501009**	**4501209**
18 - 14	**4501010**	**4501210**
14 - 10	**4501011**	**4501211**
10 - 7	**4501012**	**4501212**
7 - 4.5	**4501013**	**4501213**
4.5 - 3	**4501014**	**4501214**
3 - 2.5	**4501015**	**4501215**

American UST external thread (60°)

Pitch range tpi	V-anvil Order no.	Blade Order no.
40 - 32	**4501018**	**4501418**
32 - 24	**4501019**	**4501419**
24 - 18	**4501020**	**4501420**
18 - 14	**4501021**	**4501421**
14 - 10	**4501022**	**4501422**
10 - 7	**4501023**	**4501423**
7 - 4.5	**4501024**	**4501424**
4.5 - 3	**4501025**	**4501425**

For pitch diameters

Trapezoid external thread

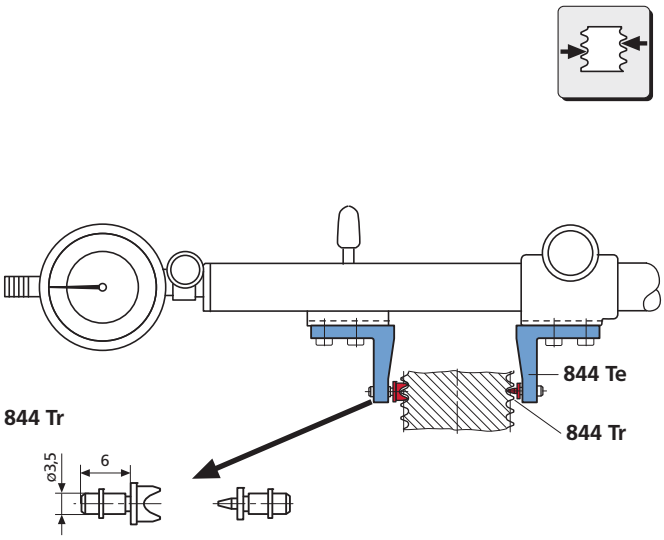
Pitch mm	V-anvil Order no.	Blade Order no.
1	**4501150**	**4501350**
1.5	**4501151**	**4501351**
2	**4501152**	**4501352**
3	**4501153**	**4501353**
4	**4501154**	**4501354**
5	**4501155**	**4501355**
6	**4501156**	**4501356**
7	**4501157**	**4501357**
8	**4501158**	**4501358**
9	**4501159**	**4501359**
10	**4501160**	**4501360**

Measuring external threads

Interchangeable Anvils 844 Tr

Used in conjunction with Measuring Arms 844 Te

- Pair consists of V-anvil and blade
- Each pitch requires a separate V-anvil
- Blade can be used for several pitches



For root diameters

Shank dia.	3.5 mm
Shank length	6 mm

Metric external thread (60°)			Whitworth external thread (55°) American UST external thread (60°)		
Pitch	V-anvil	Blade	Pitch range	V-anvil	Blade
mm	**Order no.**	**Order no.**	tpi	**Order no.**	**Order no.**
0.5	**4501026**		40	**4501083**	
0.6	**4501027**		36	**4501108**	**4501284**
0.7	**4501028**		32	**4501084**	
0.75	**4501029**	**4501232**	28	**4501085**	
0.8	**4501030**		26	**4501086**	
0.9	**4501031**		24	**4501087**	
1	**4501032**		22	**4501088**	**4501290**
1.25	**4501033**		20	**4501089**	
1.5	**4501034**	**4501235**	19	**4501090**	
1.75	**4501035**		18	**4501091**	
2	**4501036**		16	**4501092**	**4501293**
2.5	**4501037**	**4501238**	14	**4501093**	
3	**4501038**		12	**4501094**	**4501296**
3.5	**4501039**		11	**4501095**	
4	**4501040**	**4501241**	10	**4501096**	
4.5	**4501041**		9	**4501097**	**4501299**
5	**4501042**		8	**4501098**	
5.5	**4501043**	**4501244**	7	**4501099**	
6	**4501044**		6	**4501100**	
7	**4501045**		5	**4501101**	**4501302**
8	**4501046**	**4501247**	4.5	**4501102**	
9	**4501047**		4	**4501103**	
			3.5	**4501104**	**4501306**
			3.25	**4501105**	
			3	**4501106**	

Measuring internal threads

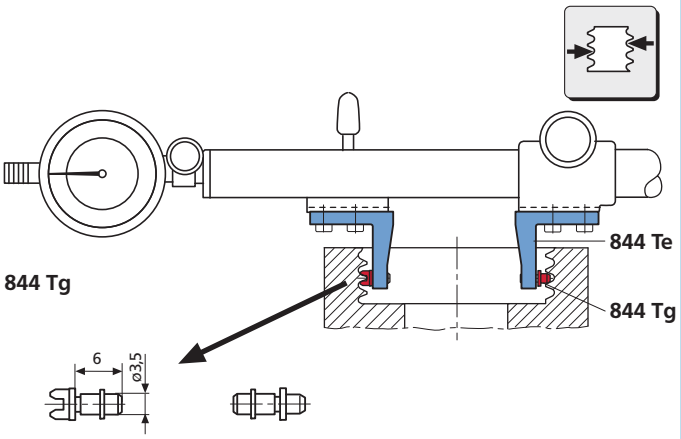
Interchangeable Anvils 844 Tg

Used in conjunction with Measuring Arms 844 Te

• Pair consists of V-anvil and blade.

For pitch diameter

Shank dia.	3.5 mm
Shank length	6 mm



Metric internal thread (60°)

Pitch mm	V-anvil **Order no.**	Tapered anvil **Order no.**
0.5 - 0.7	**4174300**	**4174600**
0.7 - 1	**4174301**	**4174601**
1.25 - 2	**4174302**	**4174602**
2 - 3.5	**4174303**	**4174603**
3.5 - 5	**4174304**	**4174604**
5 - 7	**4174305**	**4174605**
7 - 9	**4174306**	**4174606**

Whitworth internal thread (55°)

Pitch range tpi	V-anvil **Order no.**	Tapered anvil **Order no.**
40 - 32	**4174343**	**4174643**
32 - 24	**4174344**	**4174644**
24 - 18	**4174345**	**4174645**
18 - 14	**4174346**	**4174646**
14 - 10	**4174347**	**4174647**
10 - 7	**4174348**	**4174648**
7 - 4.5	**4174349**	**4174649**
4.5 - 3	**4174350**	**4174650**
3 - 2.5	**4174351**	**4174651**

American UST internal thread (60°)

Pitch range tpi	V-anvil **Order no.**	Tapered anvil **Order no.**
40 - 32	**4174415**	**4174615**
32 - 24	**4174416**	**4174616**
24 - 18	**4174417**	**4174617**
18 - 14	**4174418**	**4174618**
14 - 10	**4174419**	**4174919**
10 - 7	**4174420**	**4174620**
7 - 4.5	**4174421**	**4174621**
4.5 - 3	**4174422**	**4174622**

Trapezoid internal thread

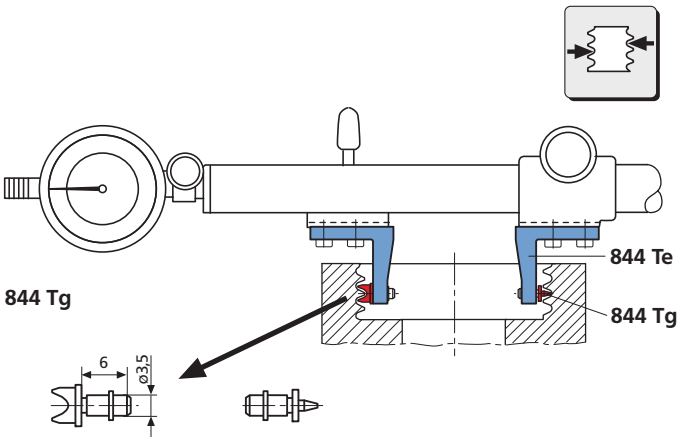
Pitch mm	V-anvil **Order no.**	Tapered anvil **Order no.**
1	**4501830**	**4501831**
1.5	**4501832**	**4501833**
2	**4501834**	**4501835**
3	**4501836**	**4501837**
4	**4501838**	**4501839**
5	**4501840**	**4501841**
6	**4501842**	**4501843**
7	**4501844**	**4501845**
8	**4501846**	**4501847**
9	**4501848**	**4501849**
10	**4501850**	**4501851**

Measuring internal threads

Interchangeable Anvils 844 Tg

Used in conjunction with Measuring Arms 844 Te

- Pair consists of V-anvil and blade
- Each pitch requires a separate V-anvil
- Pointed anvil can be used for several pitches.



For root diameters

Shank dia.	3.5 mm
Shank length	6 mm

Metric internal thread (60°)

Pitch mm	V-anvil Order no.	Pointed anvil Order no.
0.5	**4174313**	
0.6	**4174314**	
0.7	**4174315**	
0.75	**4174316**	**4174619**
0.8	**4174317**	
0.9	**4174318**	
1	**4174319**	
1.25	**4174321**	
1.5	**4174322**	**4174623**
1.75	**4174323**	
2	**4174325**	
2.5	**4174326**	**4174627**
3	**4174327**	
3.5	**4174329**	
4	**4174330**	**4174631**
4.5	**4174331**	
5	**4174333**	
5.5	**4174334**	**4174635**
6	**4174335**	
7	**4174337**	
8	**4174338**	**4174639**
9	**4174339**	

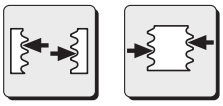
Whitworth internal thread (55°)
American UST internal thread (60°)

Pitch range tpi	V-anvil Order no.	Pointed anvil Order no.
40	**4174431**	
36	**4174427**	**4174632**
32	**4174432**	
28	**4174433**	
26	**4174435**	
24	**4174436**	
22	**4174437**	**4174939**
20	**4174438**	
19	**4174439**	
18	**4174440**	
16	**4174442**	**4174943**
14	**4174443**	
12	**4174445**	**4174947**
11	**4174446**	
10	**4174447**	
9	**4174449**	**4174949**
8	**4174450**	
7	**4174451**	
6	**4174453**	
5	**4174454**	**4174655**
4.5	**4174455**	
4	**4174457**	
3.5	**4174458**	**4174660**
3.25	**4174459**	
3	**4174460**	

Measuring external and internal threads

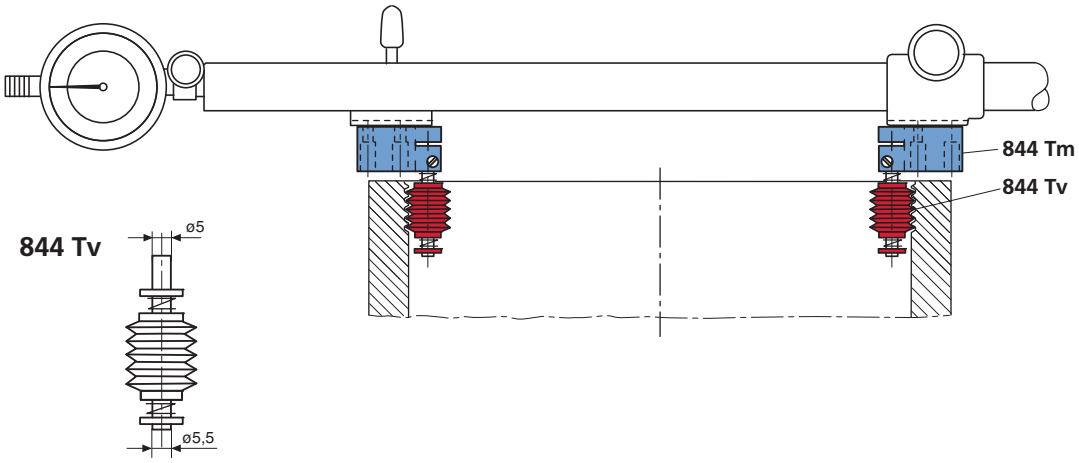
Interchangeable Measuring Rollers 844 Tv

Used in conjunction with Mounting Attachment 844 Tm



- Mounting shank fits into Mounting Attachment 844 Tm
- Each has two springs to alleviate the positioning on the correct pitch thread

Mounting Shank dia.: 5 mm



Metric Thread (60°)		Whitworth Thread (55°)		American UST Thread (60°)	
Pitch mm	**Order no.**	Range tpi	**Order no.**	Range tpi	**Order no.**
0.5	**4501705**	40	**4501769**	40	**4501819**
0.6	**4501706**	36	**4501768**	36	**4501818**
0.7	**4501707**	32	**4501767**	32	**4501817**
0.75	**4501708**	30	**4501766**	30	**4501816**
0.8	**4501709**	28	**4501765**	28	**4501815**
0.9	**4501710**	24	**4501764**	24	**4501814**
1	**4501711**	22	**4501763**	22	**4501813**
1.25	**4501712**	20	**4501762**	20	**4501812**
1.5	**4501713**	19	**4501761**	19	**4501811**
1.75	**4501714**	18	**4501760**	18	**4501810**
2	**4501715**	16	**4501759**	16	**4501809**
2.5	**4501716**	14	**4501758**	14	**4501808**
3	**4501717**	13	**4501757**	13	**4501807**
3.5	**4501718**	12	**4501756**	12	**4501806**
4	**4501719**	11	**4501755**	11	**4501805**
4.5	**4501720**	10	**4501754**	10	**4501804**
5	**4501721**	9	**4501753**	9	**4501803**
5.5	**4501722**	8	**4501752**	8	**4501802**
6	**4501723**	7	**4501751**	7	**4501801**
		6	**4501750**	6	**4501800**

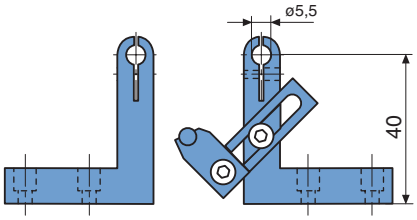
Special Threads. Interchangeable Measuring Rollers for special threads are also available on request.

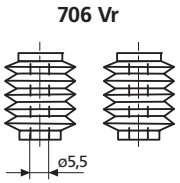
Measuring external threads

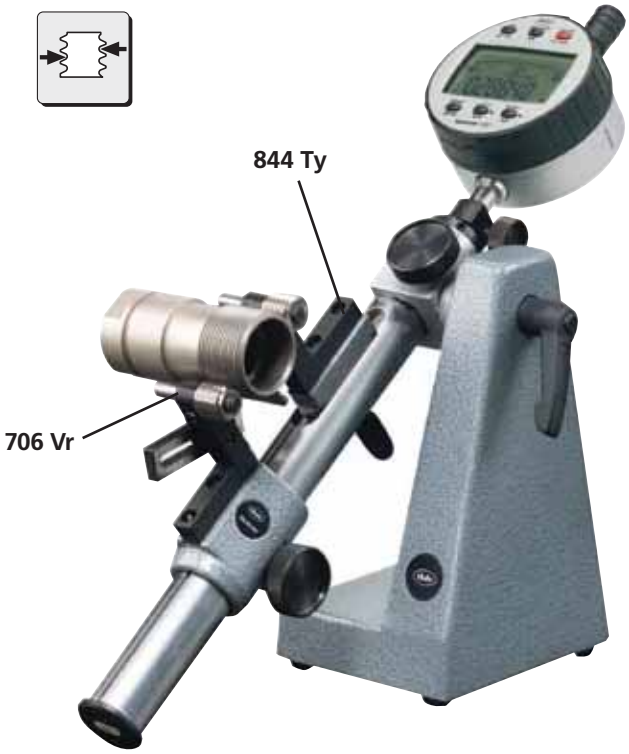
Measuring Roller Holder 844 Ty

- With location bolts for the Measuring Rollers 706 Vr
- With stop and stop pin

Order no. **4502463**







Thread Measuring Rollers 706 Vr

Used in conjunction with Measuring roller holder 844 Ty

Metric Thread (60°)		Whitworth Thread (55°)		American UST Thread (60°)	
Pitch mm	**Order no.**	Range tpi	**Order no.**	Range tpi	**Order no.**
0.5	**4521105**	40	**4521219**	40	**4521319**
0.6	**4521106**	36	**4521218**	36	**4521318**
0.7	**4521107**	32	**4521217**	32	**4521317**
0.75	**4521108**	30	**4521216**	30	**4521316**
0.8	**4521109**	28	**4521215**	28	**4521315**
0.9	**4521110**	24	**4521214**	24	**4521314**
1	**4521111**	22	**4521213**	22	**4521313**
1.25	**4521112**	20	**4521212**	20	**4521312**
1.5	**4521113**	19	**4521211**	19	**4521311**
1.75	**4521114**	18	**4521210**	18	**4521310**
2	**4521115**	16	**4521209**	16	**4521309**
2.5	**4521116**	14	**4521208**	14	**4521308**
3	**4521117**	13	**4521207**	13	**4521307**
3.5	**4521118**	12	**4521206**	12	**4521306**
4	**4521119**	11	**4521205**	11	**4521305**
4.5	**4521120**	10	**4521204**	10	**4521304**
5	**4521121**	9	**4521203**	9	**4521303**
5.5	**4521122**	8	**4521202**	8	**4521302**
6	**4521123**	7	**4521201**	7	**4521301**
		6	**4521200**	6	**4521300**

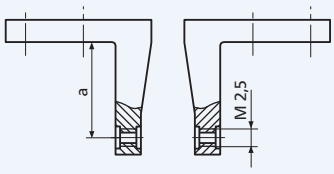
Special Threads. Interchangeable Measuring Rollers for special threads are also available on request.

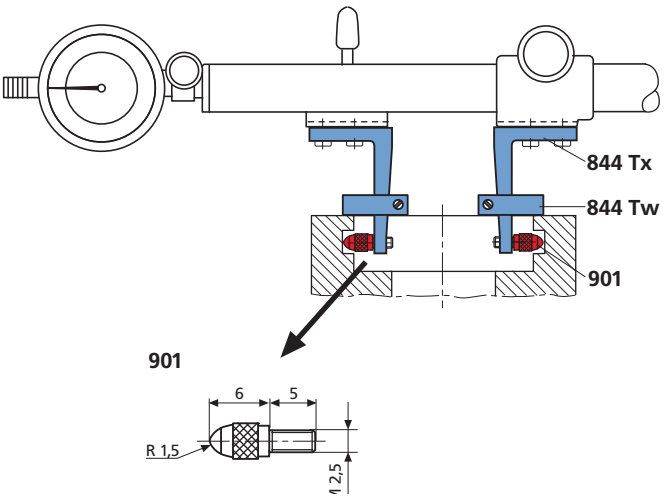
Measuring external and internal dimensions

Measuring Arms 844 Tx and associated Anvils

- With an M 2.5 connection thread to screw in the inter-changeable anvils
- For internal and external dimensions on specially formed work pieces
- Measuring arms on the measuring arm holder are reversible, therefore extending the range of measurement / application

844 Tx





Throat depth a mm	25	50	100
Order no.	**4500080***	**4500081***	**4500082***

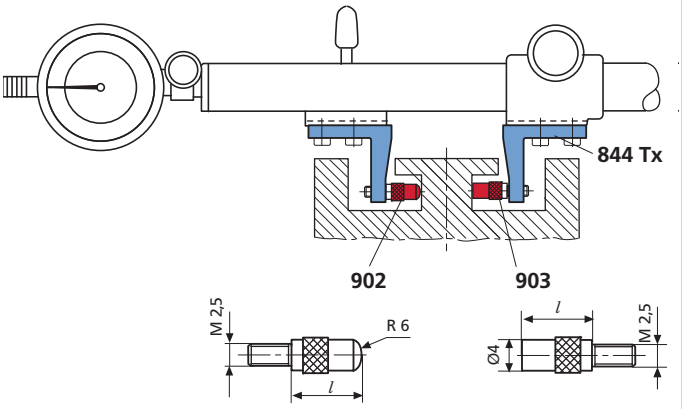
** Not suitable for Digital Caliper 25 ES*

Standard Contact Points / Anvils 901, Ball dia. 3 mm

Cat. no.		Order no.
901	with Steel ball	**4360001**
901 H	with Carbide ball	**4360002**
901 R	with Ruby ball	**4360003**

Spherical Contact Points 902/Flat Contact Points 903

Length *l* mm	**902** Steel **Order no.**	**902 H** Carbide meas. face **Order no.**	**903** Steel **Order no.**	**903 H** Carbide-tipped **Order no.**
4	**4360007**	**–**	**4360070**	**–**
6	**4360009**	**–**	**4360071**	**4360101**
8	**4360010**	**4360040**	**4360072**	**4360102**
10	**4360011**	**4360041**	**4360073**	**4360103**
12	**4360012**	**4360042**	**4360074**	**4360104**
15	**4360013**	**4360043**	**4360075**	**4360105**
20	**4360014**	**4360044**	**4360076**	**4360106**
25	**4360015**	**4360045**	**4360077**	**4360107**
30	**4360016**	**4360046**	**4360300**	**4360110**
35	**4360017**	**4360047**	**4360078**	**4360108**
40	**4360019**	**4360049**	**4360310**	**4360111**
45	**4360026**	**4360050**	**4360303**	**–**
50	**4360018**	**4360048**	**4360079**	**4360109**
55	**4360031**			
65	**4360035**			
75	**4360020**			
85	**4360036**			
95	**4360029**			



Measuring external and internal dimensions

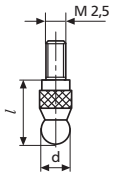
Measuring Arms 844 Tx and associated Anvils

Ball Contact Points 906 H

With carbide ball. manufacturing tolerance ball dia. 0/-6 µm

Ball dia. d mm	*l* mm	Order no.	Ball dia. d mm	*l* mm	Order no.
1	8.5	**4360150**	5.5	9	**4360161**
1.25	8.5	**4360151**	6	9	**4360162**
1.5	8.5	**4360152**	6.35 ***(1/4")***	9	**4360163**
1.75	8.5	**4360153**	6.5	10	**4360164**
2	8.5	**4360154**	7	10	**4360165**
2.5	8.5	**4360155**	7.5	11	**4360166**
3	8.5	**4360156**	8	11	**4360167**
3.5	8.5	**4360157**	8.5	12	**4360168**
4	8.5	**4360158**	9	12	**4360169**
4.5	8.5	**4360159**	10	13	**4360170**
5	9	**4360160**			

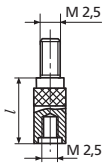
906 H



Measuring Spindle Extensions 912

Length *l* mm	Order no.	Length *l* mm	Order no.
10	**4360250**	35	**4360254**
15	**4360251**	50	**4360255**
20	**4360252**	75	**4360256**
25	**4360253**	100	**4360257**

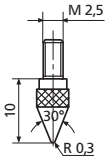
912



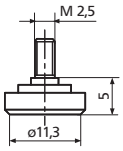
Special Contact Points / Anvils

		Order no.
Conical Contact Points, carbide tipped	**904 H**	**4360131**
Flat Contact Points*, steel, A = 1 cm²	**907**	**4360200**
carbide tipped, dia. 7 mm	**907 H**	**4360201**
Spherical Contact Points, steel	**908**	**4360210**
carbide tipped	**908 H**	**4360211**
Pin Contact Point, carbide tipped, dia. 1 mm, flat	**911 H**	**4360240**
Flat Contact Point, for mounting a pin gage holder 426 M for measuring threads using the 3 wire method	**913**	**4360400**

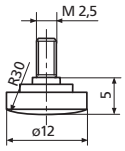
904 H



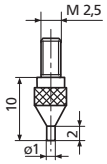
907



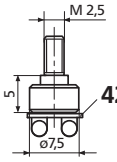
908 H



911 H



913



426 M

** When using an anvil with a flat contact face the opposite anvil must have an spherical contact face.*

Note:
The Order no's on pages 10-18 and 10-19 only related to one piece.

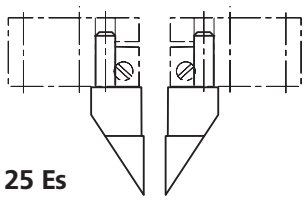
Scribing with Digital Universal Caliper 25 ES

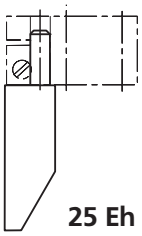
Scriber Point 25 Es
- For straight lines and circles
- Made of hardened steel

Order no. **4118530**

Counter Holder 25 Eh
- In conjunction with 25 Es to scribe straight lines, for example; along an edge
- Made of hardened steel

Order no. **4118535**

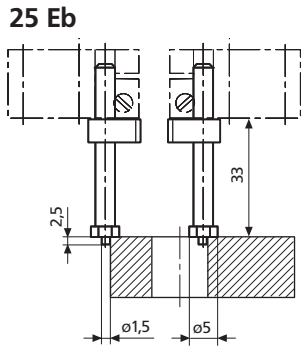




Anvils for Distances for Digital Universal Caliper 25 ES

Mounting Inserts 25 Eb
- For distances between the center of bores and between the center of a bore and an edge
- Carbide tipped
- Longest distance between hole centers corresponds with half the measuring range

Order no. **4118525**



Stand 844 Tf for Universal Measuring Instrument 844 T

- For stationary use of the Universal Measuring Instrument 844 T Measuring range 25 - 110 mm
- User has both hands free for insertion of work piece
- The indicating instrument is always in the operator's line of vision
- Strong, stable cast base with clamping device for Universal Measuring Instrument

Order no. **4450512**

I.D./O.D. Indicator Gage 36 B for Internal and External Dimensions

The economical way to check outside diameters on the shop floor.

EMD-36B-10

Features

- Adjustable retraction of sensitive contact allows measurement of grooves and races. Retraction, normally set at 6 mm / 0.25", is adjustable to 10 mm / 0.40".
- Frictionless reed-spring (pantograph) motion transfer for repeatability.
- Gaging pressure is adjustable from 0 - 35 N / 0 - 8 lb.
- Two styles available. 2-point "T"-Plate or 3-point "V"-Plate.
- Two sizes available.
- Adjustable base: Gage can be positioned on any angle from horizontal to vertical.
- Variety of readout devices available.
- Reverse the top-plate to change from I.D. to O.D. measurement.
- Supplied with JW-9 Jaws.

Indicating Instruments

All indicating instruments that has a 8 mm mounting shank may be used. Recommended are:

Catalog no.	Resolution	Order no.
MarCator 1087	1 µm	**4337060**
µMaxµm	1 µm	**EDI-10302**

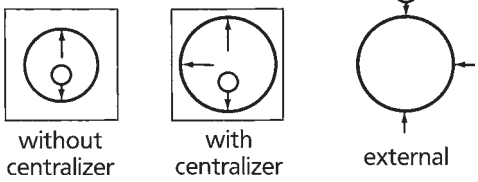
Technical Data

Style	Capacity I.D.	Capacity O.D.	Order no. With 0.0001" Dial Indicator	Order no. With 0.002 mm Dial Indicator	Order no.* With Maxµm®///	Order no.* With Maxµm®/// & Output	Order no.* With µMaxµm & Output	Order no. w/o Indicator, metric 8 mm mount shank
"T" Plate	*.75 - 3.5"* 19 - 89 mm	*.25 - 5"* 6 - 127 mm	**36B-10**	**36B-10M**	**EMD-36B-10**	**EMD-36B-10D**	**EDI-36B-10**	**2003200**
"T" Plate	*.75 - 7.75"* 19 - 197 mm	*.25 - 8.75"* 6 - 222 mm	**36B-20**	**36B-20M**	**EMD-36B-20**	**EMD-36B-20D**	**EDI-36B-20**	**2003201**
"V" Plate	*.812 - 4.625"* 21 - 117 mm	*.312 - 5"* 8 - 127 mm	**36B-9**	**36B-9M**		**EMD-36B-9D**	**EDI-36B-9**	
"V" Plate	*.812 - 9"* 21 - 229 mm	*.312 - 9.5"* 8 - 241mm	**36B-19**	**36B-19M**		**EMD-36B-19D**	**EDI-36B-19**	

* *Selectable Resolution*

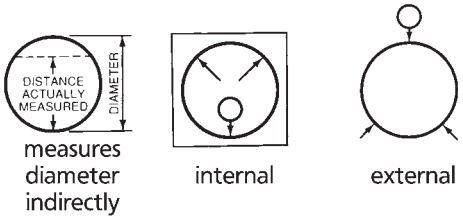
I.D./O.D. Indicator Gage 36 B for Internal and External Dimensions

"T" Plates



"T"-plates give a diameter reading directly across the diameter. A third contact may be used as a side-stop or centralizer.

"V" Plates



"V"-plates are self-centralizing. Three jaws are used and the measurement is of the distance between the sensitive contact and the chord formed by the two reference contacts. This measurement bears a direct relationship to the diameter and compensation is made by a special ratio indicator so diameter is read directly.

Used to inspect parts with odd number lobing conditions.

Jaw Sets

Model numbers on the preceding page include a set of **Model JW-9** Jaws. **Model JW-58** Jaws (tungsten carbide)

JW-9 Jaws (normally furnished)

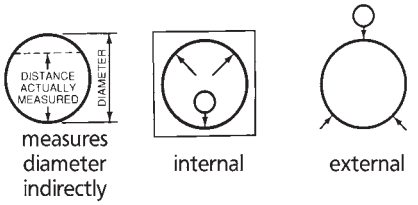
Order no. (3 jaw set)	Adjustment Height	Material: Contact and Rest Surface	Replacement Contact Pins (3 required)
JW-9	0.79-19 mm / ***.031-.75"***	Steel	**PS-55**
JW-58	0.79-18 mm / ***.031-.72"***	Carbide	**PS-226**
2220461*	0.79-18 mm	Carbide	**2225694**

* *Normally furnished with Metric Version.*
For special jaw configurations or for other indicators contact Mahr Federal Customer Resources Center.

Maxμm®*III* Indicator for "V"-Plate Models

Digital Range	Stem Length	Order no.
± 1 mm / **±*.040"*** or ± .199 mm / **±*.020"***	17 mm / ***.670"***	**2033145***

* *Maxμm® III 4:5 ratio model includes Data Output (6 pin) and user selectable setup for range, resolution, units and measuring direction.*



EMD-36B-19D
I.D./O.D. Gage

I.D./O.D. Indicator Gage 36 B for Internal and External Dimensions

Special Contacts: Steel

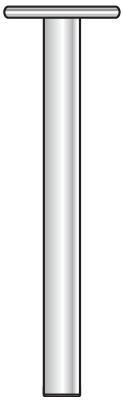
Special steel ball contacts can be made in a variety of different diameters for your measurement applications.

Special Contacts: Tungsten Carbide

Side mounted Tungsten Carbide spherical contacts can be made for measuring internal and external gears and splines.

Special Contacts: Doughnut

Specially designed Doughnut shaped contacts are used, as an example, in the bearing industry calling out for wider than normal contacts to reach into bearing raceways.

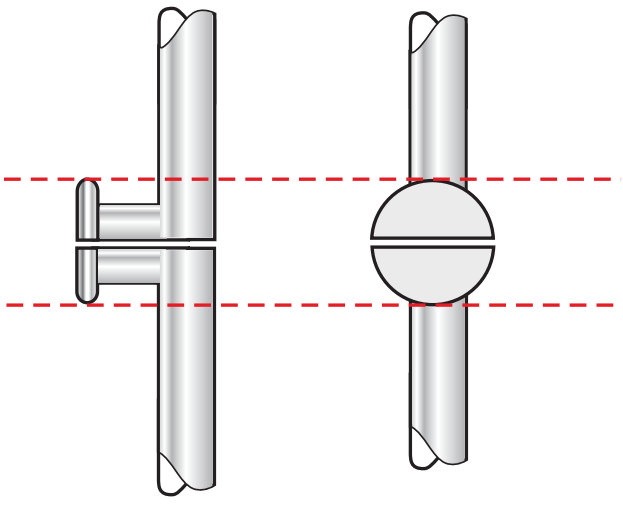


Special Contacts: TC Ball

Spherical diameter tips are ideal for measuring inside or outside radial formed recesses of precision parts.

Special Contacts: Pie Plate

Special jaws shaped like large half-discs, are used by the plastic industry to accurately measure semi-flexible round cups where reduced deflection is important.



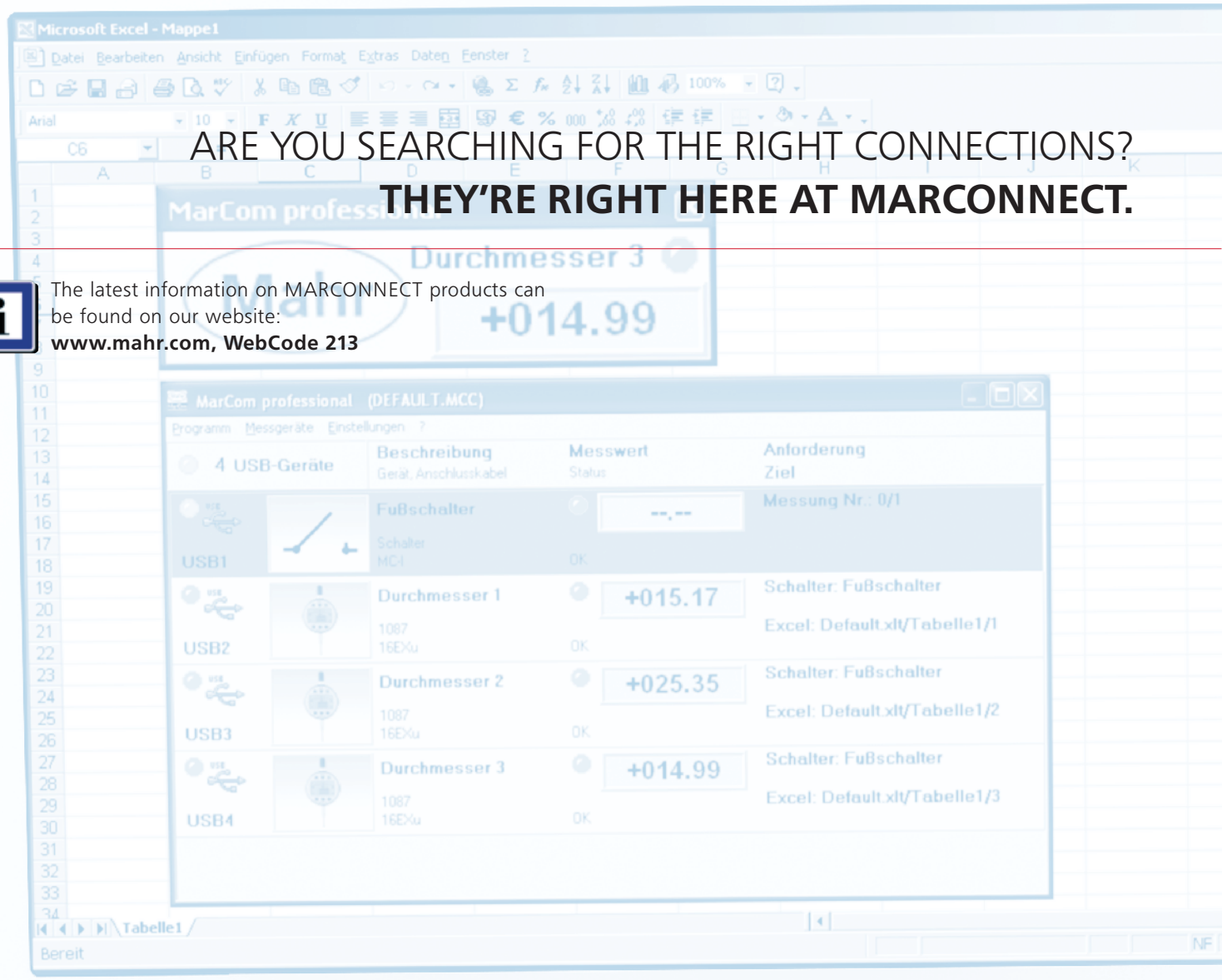
Side View **Front View**

JW-9 w/TC Wear Pads

Specially designed jaws supplied with Tungsten Carbide wear surfaces provide extra long jaw life.

ARE YOU SEARCHING FOR THE RIGHT CONNECTIONS?
THEY'RE RIGHT HERE AT MARCONNECT.

The latest information on MARCONNECT products can be found on our website:
www.mahr.com, WebCode 213



► | Our new digital hand held measuring instruments are equipped with MarConnect interface capability. Regardless of which interface standard you use, whether USB, Opto RS232 or Digimatic; MarConnect will always provide you with the optimal connection. | ◄

MarConnect. Data Processing

USB Ready / MarCom Software

Statistics Printer

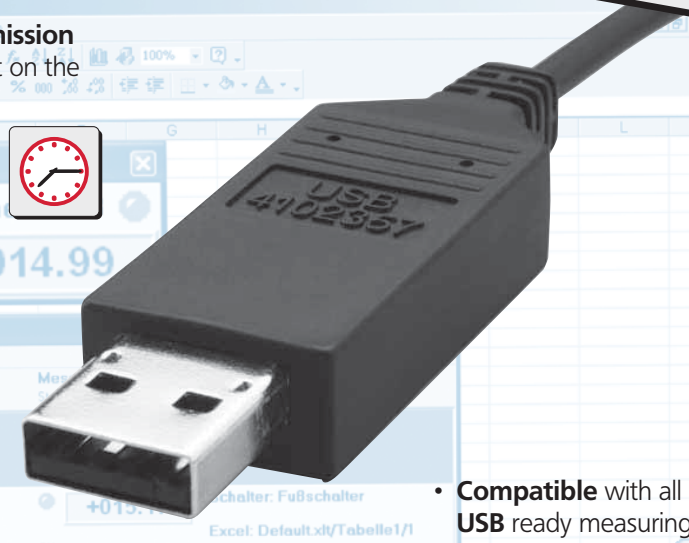
Interfaces

Radio Transmission

MarConnect. USB ready

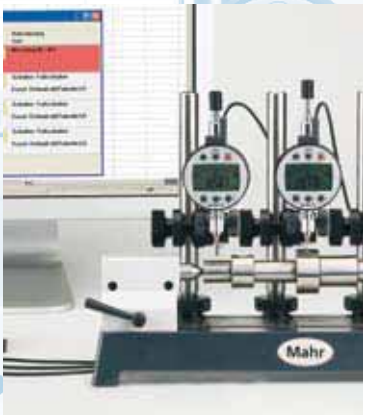
►| The new flexible **MarConnect** interface from Mahr. Simplifies both data transmission to a PC and enables quick and universal assembly of a multiple measuring station. |◄

- **Choose alternative methods of data transmission** either with a foot switch or a PC keyboard, direct on the measuring instrument or with the Timer function

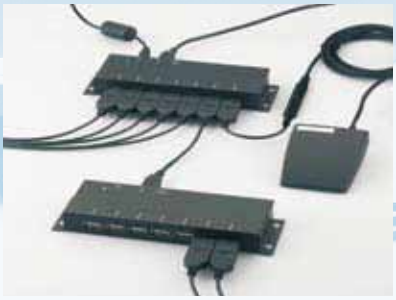


- **Compatible** with all **MarConnect USB** ready measuring instruments

- **Clear and flexible data acquisition** with the easy to use **MarCom** Professional Software

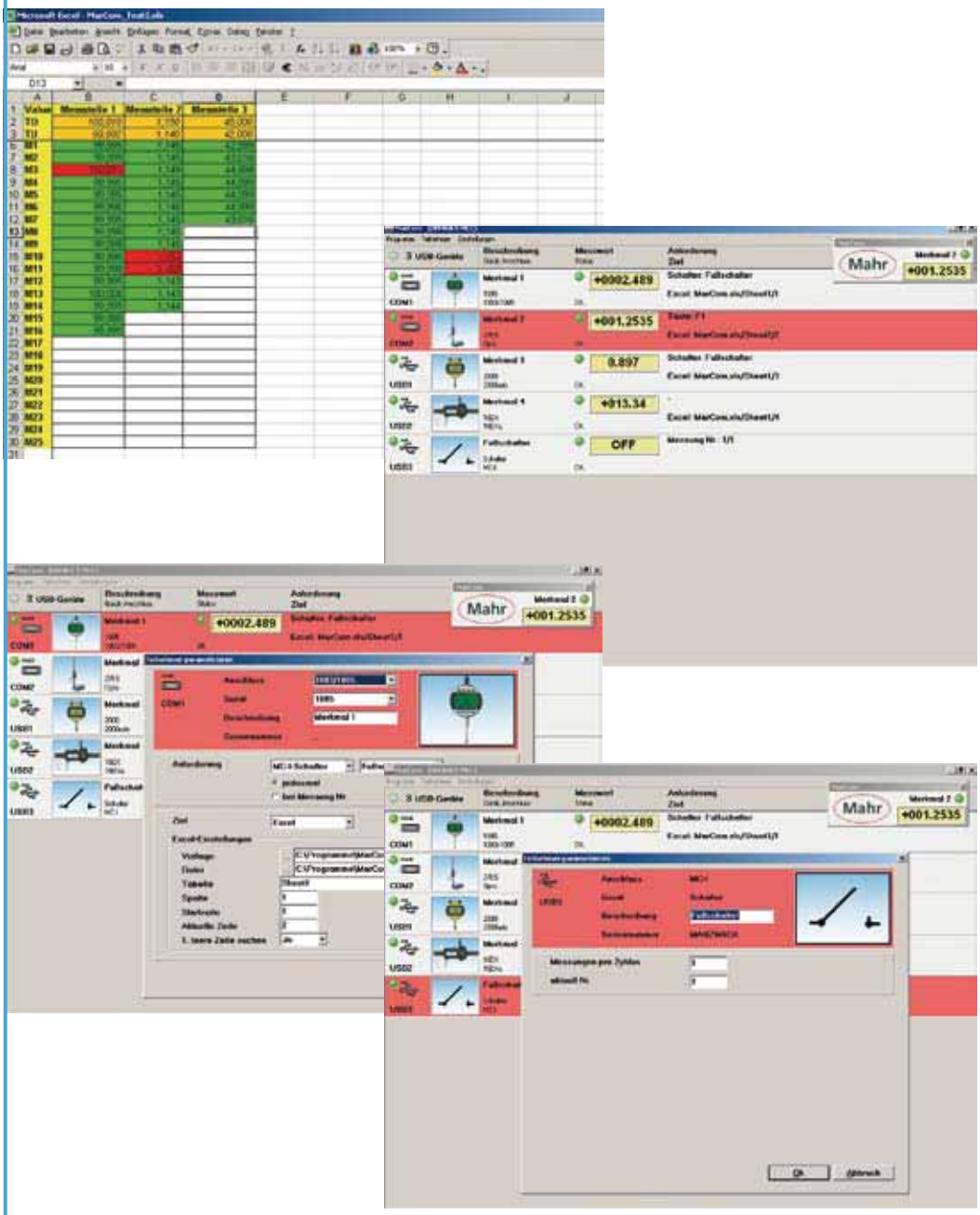


- **Multiple measuring station** is easily set up with a USB hub, up to 100 measuring devices can be simultaneously connected



- **Easily extendable** with additional USB hubs

MarCom Software



Features

Software MarCom Professional

- Measured values can be directly transferred into either MS Excel (from version 97) or into a text file or key code
- The measured values from each instrument can be sent to a different column, table or folder in Excel
- Data transmission is possible via. USB and 2 serial COM interfaces
- USB hub is also suitable as a measuring instrument interface
- Up to 100 measuring instruments can be connected with USB data cable
- Clear portrayal of the chosen measuring instrments with the aid of icons
- Several foot switches can be connected up via USB. Measuring instruments can be freely assigned
- Freely definable and configurable measurement cycles
- There are a variety of ways to transmit data, you can either press the "Data" button on the measuring instrument or on the data cable; via a computer, timer, keyboard; or by activating a foot switch connected to a USB interface
- Text file can be edited thus translated in diverse languages

Software MarCom Standard
(USB cable is not included in the scope of supply)

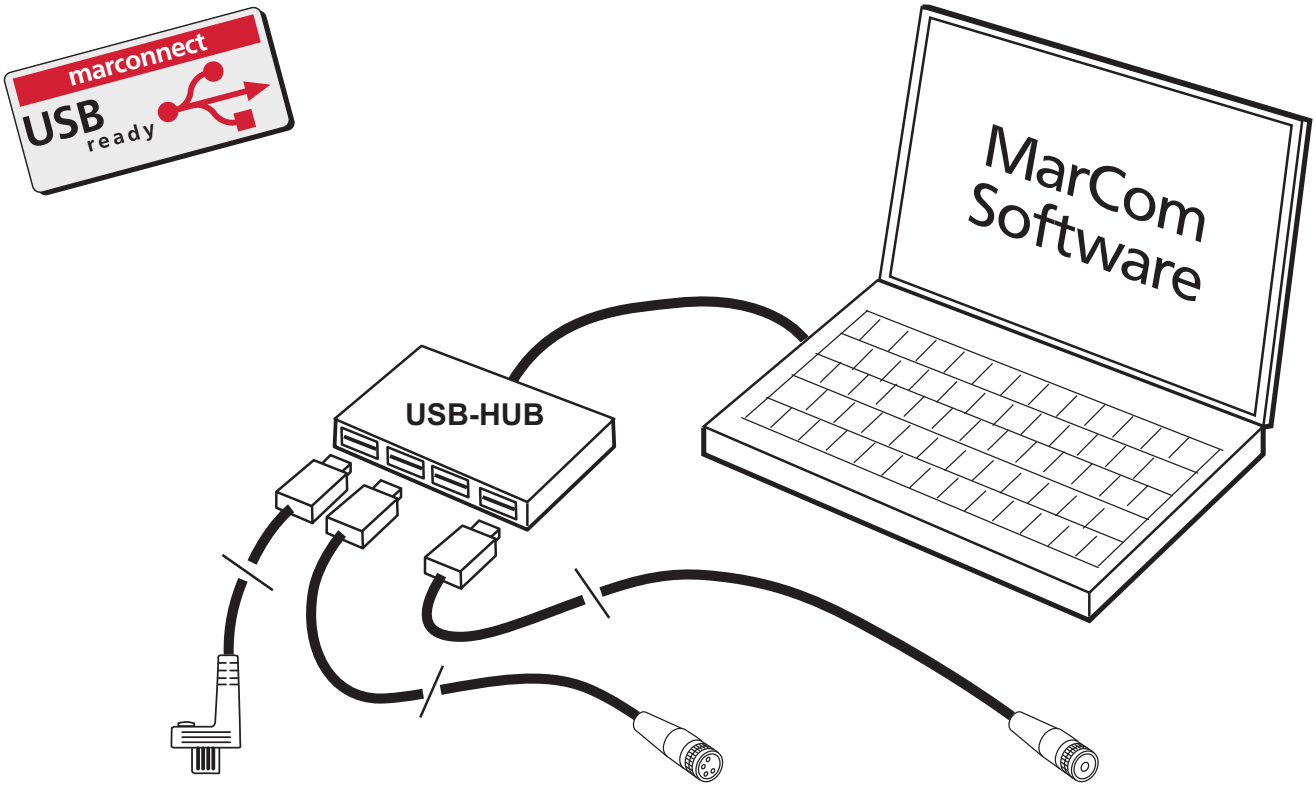
Features and system requirements are identical to MarCom Professional, except that it only has one USB and one serial COM interface

System Requirements

IBM AT compatible PC
MS Windows® 2000, XP, Vista
USB interface, higher than 1.1
up to 10 MB
CD / DVD drive
Recommended: MS Excel from Version 97 onwards

	Order no.
Software MarCom Professional	**4102552**
Software MarCom Standard	**4102551**

USB ready Measuring Instruments



Data Connection Cable **16 EXu**
Order no. 4102357
incl. MarCom Standard

for **MarCal.** Calipers
16 EX / EXP
16 EXV
18 EX / EXP
30 EX / EXN

for **Digimar.** Height Gages
814 S

for **Micromar.** Micrometers
40 EX, 40 EWS, 40 EWV
44 EX, 46 EX

for **MarCator.** Dig. Indicators
1075, 1080, 1081,
1086, 1087

Data Connection Cable **2000 usb**
Order no. 4346023
incl. MarCom Standard

for **MarCator.** Dig. Indicators
1088

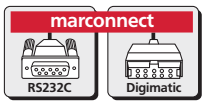
for **Millimess.** Digital
Comparators
2000
2001
2100

Data Connection Cable **MC-I**
Order no. 4102782
incl. MarCom Standard

for **Foot switch**
Order no. 4102058

USB-HUB 7-fold industrial model
220 V **Order no. 4102553**
110 V (US type) **Order no. 2245786**

Statistics Printer MSP 2 with integrated Data Logger



The above illustration shows the use of the Statistics Printer in the Transport Bag MSP 2t

Features

- Areas of application include; incoming goods department, on the production floor, in quality assurance department and in dispatch
- Can be connected to any of the following: Mahr Hand Measuring Instruments, Mahr Millimar Instruments, Digimatic compatible instruments and measuring instruments with a RS232C interface
- Two-line display for a simple dialog mode
- Real-time clock with date
- Measured values can easily be stored and transferred to a PC
- The following statistical parameters can be determined: process mean x, range R, standard deviation σn and σn-1, Min and Max of the measured values, > UTol, < LTol, machine capability Cm and Cmk, process capability Cp and Cpk for sampling sizes 2-25
- 3 types of print protocols: statistics, statistics with a histogram, sample charts
- List of measured values can be printed from the memory at any time
- Individual values can be chosen and deleted as desired
- Quiet and fast Thermo-printer (5 lines/sec.)
- Automatic data transfer with adjustable time interval parameter from between 1 sec. to 99 hrs.
- Alternative power sources include: mains adapter (100 - 240 V, batteries or NIMH-accumulator, type AA
- Can be deployed as an interface to the PC
- Languages can be selected, German, English and French
- Supplied with: Mains adapter, paper roll

Technical Data

Max. measured values	999
Characters per line	24
Paper width	58 mm
Paper length	25 m
LxWxH	215 x 116 x 85 mm
Battery operation at 1100 mAh	> 7000 printed lines
Data logger powered by accu.	ca. 24 Hrs.
Protection class	IP40
Total weight incl. accu.	600 g
Order no.	**4102040**

Accessories

	Order no.
Foot Switch to trigger data transmission	**4102058**
Paper Rolls 1 Pack = 5 rolls	**4102041**
Transport Bag MSP 2t	**4102042**
Data Cable to connect **MSP 2** to a PC (Data transfer / Interface mode)	**4102711**

Data Cable for connecting measuring instruments
See cable overview on Page 11-8

MarCom Software see Page 11-3

T-Box interface to connect to measuring instruments to the keyboard input jack of a IBM compatible PC

T-Box 204 USB

Features

- Measuring data is converted into **keyboard codes**, therefore suitable for any software with a manual input (e.g. MS-Excel®)
- No special driver software required
- Independent of operating system (DOS, Windows, OS/2, Unix, Linux)
- Measuring values can be processed individually or as a group
- The measured values can be directly triggered on the measuring instrument or with the optional foot switch
- Every Multi-RS232C interface is individually adjustable via the setup switch
- Termination character (e.g. Enter) can be selected via switch
- The power is supplied by the USB interface
- Supplied with:
  USB cable
  PS/2 cable

Note:
Only suitable for German, French, US keyboards or compatible!

Technical Data

	Inputs	Dimensions mm (L x W x H)	Order no.	Remarks
T-Box 204 USB	3 x Multi-RS232C Input 1 x Digimatic Input	130 x 180 x 40	**9102519**	When connecting Digimatic-measuring instruments the standard cable of the manufacturer can be used
T-Box 205 USB	2 x Multi-RS232C Input 3 x Digimatic Input	130 x 180 x 40	**4102579**	

Accessories

	Order no.
Foot Switch for connection to T-Box	**4102556**
Data Cable for connecting measuring instruments See cable overview on Page 11-8	

Digi-USB-1 Interface USB Interface with one Digimatic input port

Technical Data

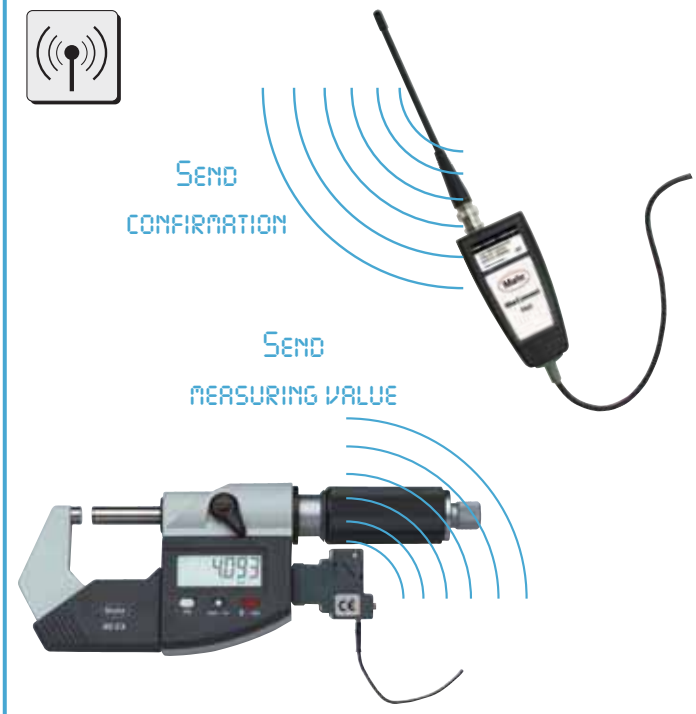
1 x Digimatic - measuring instrument - input
Dimensions 20 x 57 x 33 mm

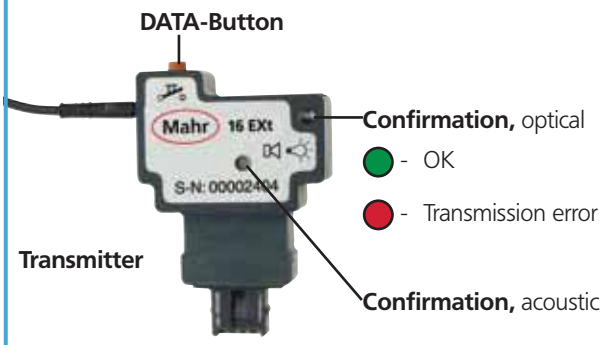
Order no. **4102523**

Features

- Power supplied by the USB interface
- No driver required for the USB interface
- The USB interface is recognized as a keyboard
- Termination character such as Enter or TAB can be set up on the USB interface
- Data- key for data transmission
- Supplied with:
  USB-Interface

Radio Transmission Radio system FM 1*





* *Only available in North America, Canada and Mexico*

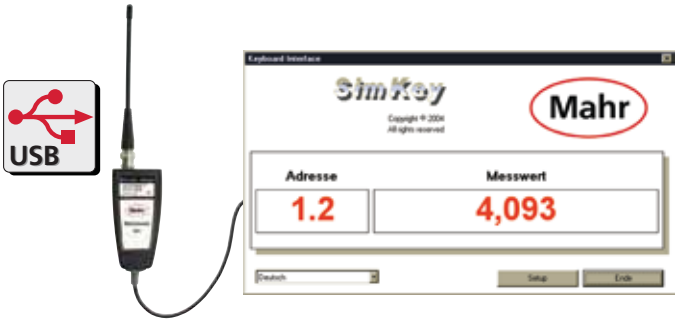
Features

- Secure data transmission with dialogue between receiver and transmitter
- Acoustic and optical confirmation of receipt by the transmitter
- Compact transmitter is connected directly on the interface of the measuring instrument
- Power is supplied for the receiver via a USB-Interface on the PC
- Up to 120 measuring instruments can be connected to the receiver
- Radio transmission distance is from 10 m up to 200 m (depending on the environment)
- Radio frequency is 433.926 MHz

The transmission of the measured value takes place via actuation of the DATA button on the transmitter. The transmitter supplements the measured value with an address number, a communication control word and a double check sum. The special data coding and the feedback from the PC to the transmitter ensures absolute data security.
A transmission error is recognized by the dialogue between PC and transmitter.
The data transmission is then repeated up to three times automatically within a few milliseconds
When the data is successfully transmitted the green light on the transmitter flashes and a short beep is heard confirming transmission.

Receiver

		Order no.
Receiver for USB interfaces incl. driver and basic software. Basic software consists of a software keyboard interface and software to store measured values in an MS-Excel® column.	**FM 1**	**4102320**



Transmitter

For Measuring Instruments			Order no.
MarCal **Digimar** **Micromar** **MarCator**	16 EX, 16 EXC, 16 EXV, 18 EX, 30 EX, 30 EXN 814 S 40 EX, 44 EX, 46 EX, 40 EWS, 40 EWV 1075, 1080, 1081, 1086, 1087	**16 EXt**	**4102321**
MarCal **Digimar** **MarTool**	25 ES, 30 EWD, 31 ES, 32 ES 27 ES, M 814 106 ES	**16 ESt**	**4102322**
Millimar **Digimar**	C1208, C1216, C1245, S1840 CX1, CX2, 817 CLM	**RS232 t**	**2121315**

Contact Mahr Federal for transmitters to be used with:
µMaxµm
Digimatic devices
Digimatic data cables

Optional Software

	Order no.
Mahr_EXDLL (optional) Software for storing measuring data of several radio modules in any Excel table. Contact Mahr Federal for optional MS Excel based software that allow for: • Data manipulation of up to 120 data inputs • Full SPC and graphical displays	**4102323**

MarConnect. Interfaces

Overview

Connect to . . . / Instrument	PC			
	USB **direct via USB and MarCom Software**	RS232C **direct via RS232C and MarCom Software**	Digimatic **via Digi-USB 1**	**via T-Box**
Foot Switch	4102058+4102782 ③	4102058+4102782 ②③	--------	4102556
16 EX / EXC 16 EXV 18 EX 30 EX / EXN 40 EX, 40 EWS, 40 EWV, 46 EX, 44 EX 1075, 1080, 1081, 1086, 1087 814 S	4102357	4102410	4102411	4102411
2000, 2001, 2100 1088	4346023	4346020	4346021	4346021
838 EA, 838 EI	--------	--------	4495084 ⑥	4495084 ⑥
Maxμm /// (10 pin output) (6 pin output)	--------	--------	2239038 2239036	2239037 2239035
μMaxμm, μMaxμm XL	--------	SCB-4	2001025	2001025
25 ES 30 EWD 31 ES, 32 ES 106 ES M 814	4102510+4102330	4102510	--------	4102510
MSP 2	4102711+4102334 ④	4102711 ④	--------	--------
1240, S1840, C1245, C1208, C1216	7024634+4102331 ⑤	7024634 ⑤	--------	4102715
Digimar CX 1, CX 2, 817 CLM	7024634+4102333 ④	7024634 ④	--------	--------

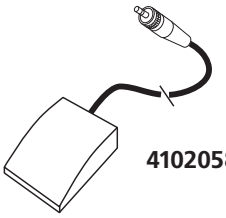
① Only available in North America, Canada and Mexico
② Foot switch; only with an additional USB Port
③ Cable length 18 cm / 7"
④ Data transmission only with the "Data" key or "automatic transmisison" on the measuring instrument
⑤ Foot switch to transfer data on the measuring instrument Millimar - Order no. 5330956 / Millimar 1240 - Order no. 5312431

▶| **MarConnect.** Regardless of which interface standard you use, whether; USB, OptoRS232 oder Digimatic, MarConnect always provides you with the optimum connection. |◀

	Data printer MSP 2
Transmitter ① FM 1 via USB	
--------	4102058
4102321	4102411
--------	4346021
Contact Mahr Federal	4495084 ⑥
--------	2239037 2239035
Contact Mahr Federal	2001025
4102322	4102510
--------	--------
2121315 ⑦	7024634
2121315	7024634 ④

⑥ Cable length 1.5 m / 5 ft
⑦ Not for Millimar 1240

Standard cable length 2 m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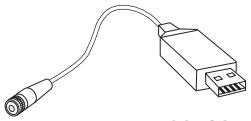
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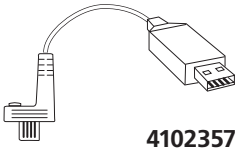
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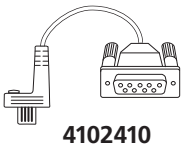
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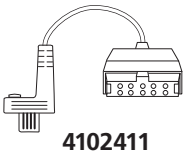
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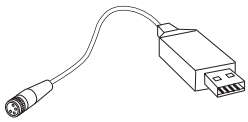
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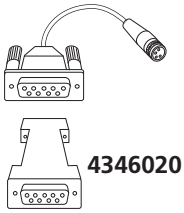
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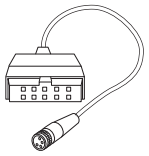
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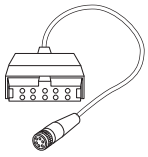
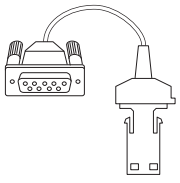

2001025 / 2239037 / 4495084 ⑥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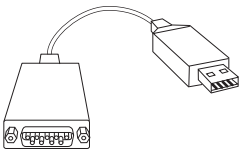
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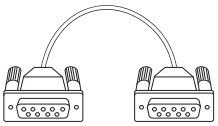
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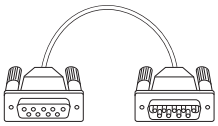

4102711

THE COMPLETE SUPPORT FOR YOUR INSPECTION.
MARTOOL

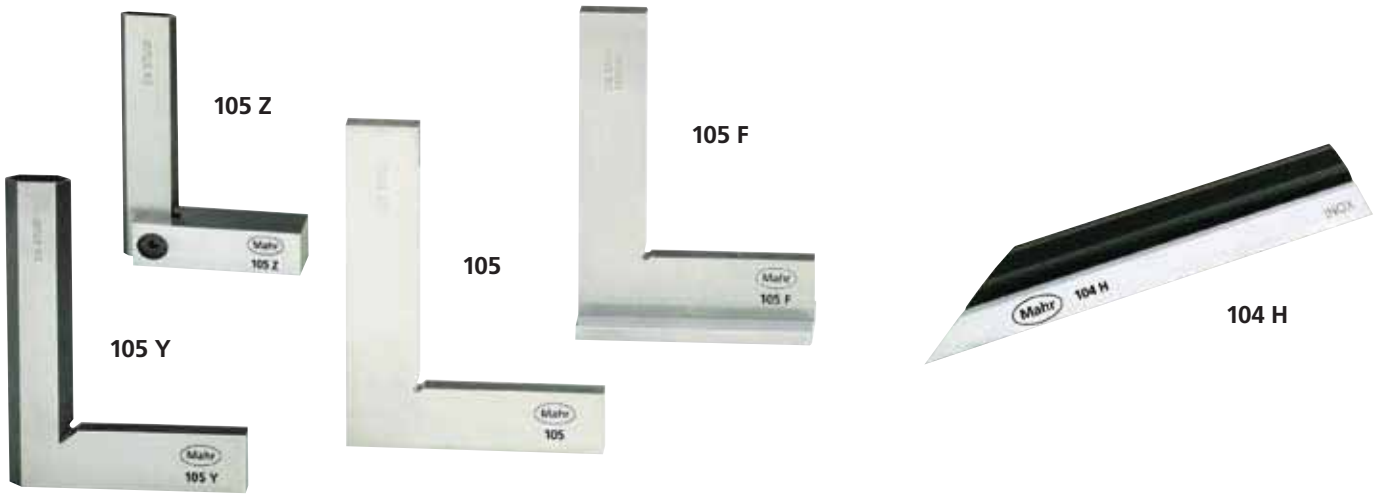
The latest information on MARTOOL products can be found on our website:
www.mahr.com, WebCode 10436-5062

► | MarTool measuring and inspection equipment are indispensable aids for dimensional metrology. Their simple handling make them the most versatile instruments for daily use in either the inspection room or the workshop, whether measuring an angle on a work piece or inspecting the surface plate for a height measuring instrument with the outstanding quality from MarTool you cannot go wrong. | ◄

► | MarTool. Measuring and Inspection Equipment

MarTool. Measuring and Inspection Equipment

Overview Straight Edges and Squares



Knife-edge Straight Edge 104 H

Features

- Stainless steel, hardened throughout and ground
- Heat insulators
- One end has a pointed tip
- Supplied with: case

Accuracy

according to DIN 874, sheet 2

To determine the straightness tolerance t of the knife edge use the following formula:

$$t = 2 + \frac{l}{250}\ \mu m$$

Length l in mm

Technical Data

Length mm	*(inch)*	Cross section mm	Weight kg	Order no.
75	***(3")***	22 x 6	0.05	**4205000**
100	***(4")***	22 x 6	0.07	**4205001**
125	***(5")***	22 x 6	0.09	**4205002**
150	***(6")***	22 x 6	0.11	**4205003**
200	***(8")***	22 x 6	0.15	**4205004**
300	***(12")***	30 x 7	0.25	**4205005**
400	***(16")***	40 x 7	0.75	**4205007**
500	***(20")***	40 x 7	0.91	**4205006**

Flat Square 105/0

Features

- Hardened stainless steel
- Supplied with: case

Accuracy

Grade 0 DIN 875

Technical Data

Length of beams mm	*(inch)*	Cross section mm	Weight kg	Order no.
50 x 40	***(2 x 1.6")***	14 x 4	0.04	**4207008**
75 x 50	***(3 x 2")***	15 x 4	0.05	**4207009**
100 x 70	***(4 x 3")***	20 x 5	0.11	**4207000**
150 x 100	***(6 x 4")***	25 x 6	0.22	**4207001**
200 x 130	***(8 x 5.1")***	30 x 7	0.54	**4207002**
300 x 200	***(12 x 8")***	40 x 8	1.12	**4207004**

Flanged Beam Square 105 F/0

Features

Accuracy

Grade 0 DIN 875

To determine the right angle tolerance t of the test surface use the following formula:

$$t = 5 + \frac{l}{50}\ \mu m$$

(Length l is the longer beam in mm)

Technical Data

Length of beams mm	*(inch)*	Cross section mm	Weight kg	Order no.
50 x 40	***(2 x 1.6")***	13.5 x 5	0.05	**4208008**
75 x 50	***(3 x 2")***	15 x 4	0.08	**4208009**
100 x 70	***(4 x 3")***	20 x 5	0.20	**4208000**
150 x 100	***(6 x 4")***	25 x 6	0.46	**4208001**
200 x 130	***(8 x 5.1")***	30 x 7	0.75	**4208002**
300 x 200	***(12 x 8")***	40 x 8	1.68	**4208004**

Knife-edge Square 105 Y

Features

- Hardened stainless steel
- Supplied with: case

Accuracy

Grade 00 DIN 875

Technical Data

Length of beams mm	*(inch)*	Cross section mm	Weight kg	Order no.
50 x 40	***(2 x 1.6")***	14 x 4	0.03	**4210000**
75 x 50	***(3 x 2")***	16 x 4	0.05	**4210001**
100 x 70	***(4 x 3")***	20 x 5	0.10	**4210002**
150 x 100	***(6 x 4")***	25 x 6	0.26	**4210003**
200 x 130	***(8 x 5.1")***	30 x 7	0.43	**4210004**
300 x 200	***(12 x 8")***	40 x 8	0.96	**4210005**
500 x 330	***(20 x 13")***	45 x 10	2.20	**4210006**

Square 105 Z

Features

- Hardened stainless steel
- Precision ground narrow beam (blade) and a wide beam (stock)
- Without a knife edge
- Supplied with: case

Accuracy

Grade 0 DIN 875

To determine the right angle tolerance t of the test surface use the following formula:

$$t = 5 + \frac{l}{50}\ \mu m$$

(Length l is the longer beam in mm)

Technical Data

Length of beams mm	*(inch)*	Cross section narrow beam mm	Cross section wide beam mm	Weight kg	Order no.
50 x 40	***(2 x 1.6")***	16 x 2	14 x 10	0.05	**4211005**
75 x 50	***(3 x 2")***	16 x 2	14 x 10	0.06	**4211000**
100 x 70	***(4 x 3")***	20 x 3	18 x 12	0.13	**4211001**
150 x 100	***(6 x 4")***	26 x 3	24 x 14	0.32	**4211002**
200 x 130	***(8 x 5.1")***	30 x 4	28 x 16	0.75	**4211003**
300 x 200	***(12 x 8")***	40 x 6	38 x 20	1.60	**4211004**

Universal Bevel Protractor 106 UF

Features

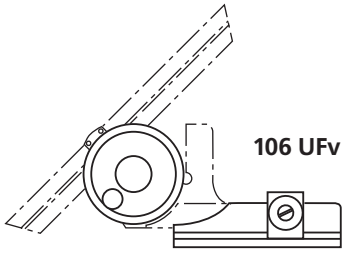
- With fine adjustment
- Stainless steel
- Vernier scale and main scale both have a satin chrome finish to prevent glare and to enable parallax free reading on the same plane
- Knurled screw for clamping the interchangeable beam into position
- Supplied with: Magnifying reading lens, interchangeable beam and case

Technical Data

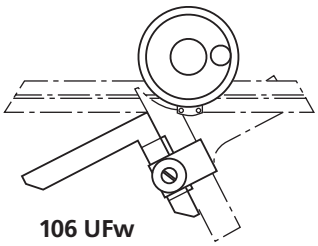
Blade length mm	**Range** degrees	**Readings** minutes	**Deviation** minutes	**Order no.**
150	360°	5′	5′	**4214050**
200	360°	5′	5′	**4214051**
300	360°	5′	5′	**4214052**

Accessories

		Order no.
Interchangeable Beams Stainless steel, hardened (standard accessories) beam length	**106 Us**	
	150 mm / ***6″***	**4214010**
	200 mm / ***8″***	**4214011**
	300 mm / ***12″***	**4214012**
Additional Accessories		
Stand Featuring flat and V-surface for dia. 5 – 30 mm length 90 mm, width 25 mm	**106 UFv**	**4214061**
Acute Angle Attachment for particularly small acute angles. Screws onto the beam	**106 UFw**	**4214062**



106 UFv



106 UFw

Digital Universal Bevel Protractor 106 ES

RS232C IP51

Features

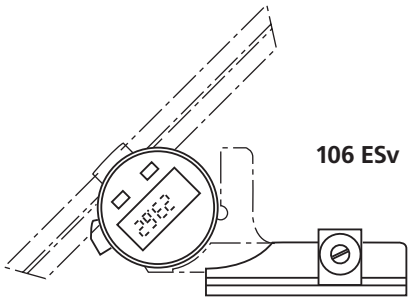
- Easy to read high contrast 8,5 mm high LCD
- Displays the angular degrees and angular minutes or decimal degrees
- Zero setting at any position of the measuring range
- Beam can be clamped with a push button
- Fine adjustment for easy setting of a desired angle
- Locking lever to prevent accidental adjustment
- Base plate and beam are made of stainless steel, the measuring edges hardened
- Data output: Opto RS232C
- Max. setting speed 3 rotations per second
- Capacitive measuring system, life of the battery ca. 2 years
- Supplied with: Battery, 300 mm beam and case

Technical Data

Range	Resolution switchable	Deviation	Order no.
1 x 360° or 2 x 180° or 4 x 90°	1 minutes or 0.01°	± 2 minutes	**4214600**

Accessories

		Order no.
Interchangeable Beams Stainless steel, hardened beam length	**106 ESs**	
	150 mm / ***6"***	**4214620**
	200 mm / ***8"***	**4214621**
	300 mm / ***12"***	**4214622**
Battery 3V, Type CR 2032		**4102520**
Data Connection Cable Opto RS232C (2 m), with SUB-D Jack 9 pin	**16 ESv**	**4102510**
Stand Featuring flat and V-surface for dia. 5 – 30 mm, length 90 mm, width 25 mm	**106 ESv**	**4214630**
Acute Angle Attachment for particularly small acute angles. Screws onto the beam	**106 UFw**	**4214062**



Surface Plate 107 G made from granite

Features

- For measuring tasks, layout work, for touching up and lapping precision parts
- Made of choice fine-grain black granite (Diabas)
- High density structure thus extremely homogeneous
- Hardness 6-7 on the Mohs' hardness scale
- Surface plate is lapped and has a satin matt finish to prevent glare
- 100 % corrosion-proof
- Non-magnetic and non-conductive
- Measuring instruments and test equipment are easy to slide over surface

Technical Data

Size of plates mm	Thickness of plate mm	Weight kg	Order no.* Grade 00 DIN 876	0 DIN 876	1 DIN 876
400 x 250	60	18	**4221500**	**4221520**	**4221540**
400 x 400	60	29	**4221501**	**4221521**	**4221541**
630 x 400	80	60	**4221502**	**4221522**	**4221542**
630 x 630	80	95	**4221503**	**4221523**	**4221543**
800 x 500	100	120	**4221504**	**4221524**	**4221544**
1000 x 630	100	190	**4221505**	**4221525**	**4221545**
1200 x 800	150	432	**4221506**	**4221526**	**4221546**
1500 x 1000	150	675	**4221507**	**4221527**	**4221547**
2000 x 1000	200	1200	**4221508**	**4221528**	**4221548**

Flatness tolerance t_1 of the surface plate are derived from the following formulas:

Grade acc to DIN 876	**Flatness tolerance** in µm
00	$t_1 = 2\ (1 + l/1000)$
0	$t_1 = 4\ (1 + l/1000)$
1	$t_1 = 10\ (1 + l/1000)$

Length l in mm

Surface plates are available in other dimensions upon request

* *Excludes stand with cabinet*

Accessories

	Quantity	Order no.
Adjustable Plate Supports 107 Asa For mounting the surface plates upon work benches or cabinets; three are for support and two to prevent tilting	**1 pce.**	**4221069**

Stand with Cabinet 107 Us

Features

- Extremely sturdy design due to the rectangular tubes, covered with sheet metal
- With three height adjustable supports
- For plates sizes that are greater than 1000 mm, two additional height adjustable supports are required to prevent tilting
- All 4 corners have a support to prevent slipping and to protect against a collision
- Doors can be locked

Technical Data

For plate sizes mm	Height mm	Order no.*
630 x 400	900 - 1000	**4221560**
630 x 630		**4221561**
800 x 500		**4221562**
1000 x 630		**4221563**
1200 x 800		**4221564**
1500 x 1000		**4221565**
2000 x 1000		**4221566**

** Excludes surface plate*

Stand 107 Ug

Features

- Extremely sturdy design due to the rectangular tubes
- With three height adjustable supports
- For plates sizes that are greater than 1000 mm, two additional height adjustable supports are required to prevent tilting
- All 4 corners have a support to prevent slipping and to protect against a collision

Technical Data

For plate sizes mm	Height mm	Order no.*
630 x 400	900 - 1000	**4221570**
630 x 630		**4221571**
800 x 500		**4221572**
1000 x 630		**4221573**
1200 x 800		**4221574**
1500 x 1000		**4221575**
2000 x 1000		**4221576**

** Excludes surface plate*

Magnetic V-Blocks 107 MH

Features

- To used in an inspection room and workshop for both measuring and scribing
- To clamp work pieces during drilling, grinding and light milling work
- Integrated magnetic system, protected against the intrusion of moisture
- Constant magnetic force
- With the switch the upper, lower and opposite face are all simultaneously magnetized
- Surfaces and measuring faces and both hardened and ground
- Available individually or as a matched pair

Technical Data

Accuracy (deviation):	
Flatness and parallelism	≤5 µm
Angle between front and side faces resp. V-slots	≤5 µm
Symmetry of the V-slots	≤5 µm
Height difference of the V-slots of pairs	≤5 µm
Length x Width x Height	100 x 70 x 95 mm
For shaft dia.	5 - 65 mm
V-angle	90°
Weight per piece	4 kg
Magnetic force on a flat surface	≈1000 N (100 kp)
Magnetic force of V-block	≈750 N (75 kp)
Order no. V-block	**4230000**
Order no. pair of V-blocks	**4230001**

Accessories

	Order no.
Wooden case (for 1 V-block)	**4230005**

V-Block 107 V

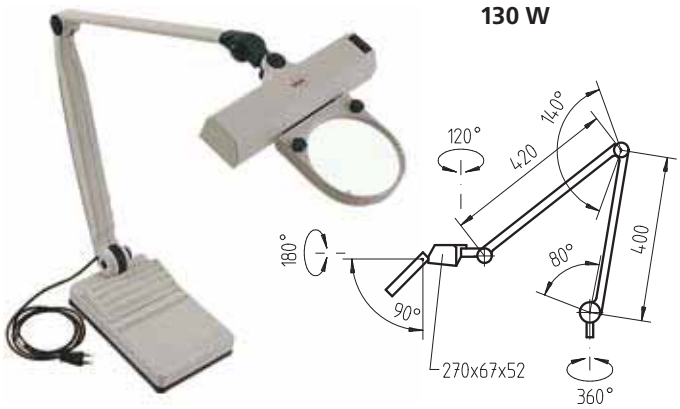
Features

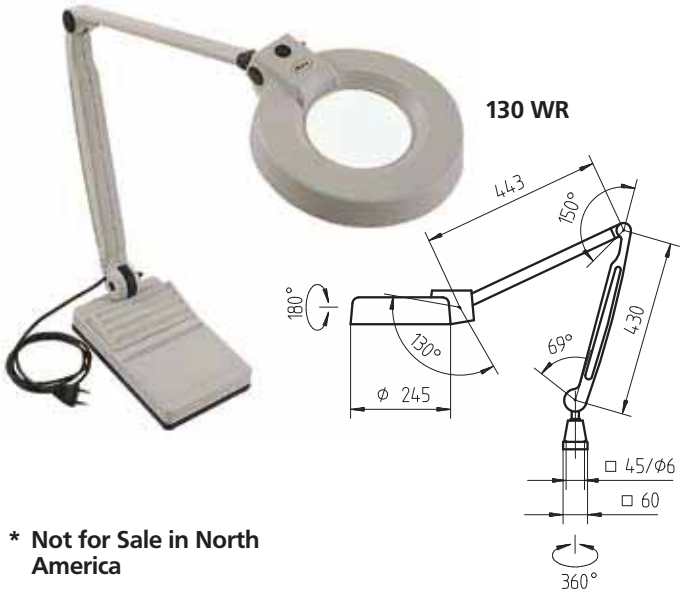
- For testing of small cylindrical work pieces for there ovality and polygon error
- With 108° V-slot
- Made from special hardened and ground steel
- Available individually or as a matched pair

Technical Data

Accuracy (deviation):	
Parallelism of the V-slot to the underside of the base	≤2 µm
Height difference of the V-slots of pairs	≤5 µm
Length x Width x Height	30 x 30 x 30 mm
For shaft dia.	2 - 25 mm
V-angle	108°
Weight per piece	0.2 kg
Order no. V-block	**4229000**
Order no. pair of V-blocks	**4229001**

Illuminated Magnifiers*





*** Not for Sale in North America**

Features

- Aid for visual spot checks, adjustments, assembly of small parts, precision work
- Illumination head with swiveling arm has to be used either with Table Base 130 t or Table Clamp 130 kl
- 3D-joint illumination head can be positioned at any level
- Spring-relieved joints for easy positioning over a large-scale action range without any re-adjustments
- Large-diameter, cut glass lens with sharpness to the edge provides distortion free magnification
- Lens diameter 120 mm with double magnification
- Fluorescent tubes provide a bright, almost shadow free illumination of objects and working area
- Low energy consumption due to energy-saving lamp
- Supplied with: Fluorescent tube and operating instructions

Illuminated Magnifier 130 W with compact fluorescent tube
For inspecting flat parts and for assembly work

Illuminated Magnifier 130 WR with circular fluorescent tube
or checking sunken surfaces, e.g. bores, internal threads, etc.

Attention:
Table Base 130 t or Table Clamp 130 kl have to be ordered separately!

Technical Data

	Type of lamp	Power supply	Dioptric power	Magnification	Order no.
130 W*	Compact fluorescent tubes	230 V~ / 50 Hz	4	2	**4298300**
130 WR*	Circular fluorescent tubes	230 V~ / 50 Hz	4	2	**4299300**

Accessories

		Order no.
Table stand for stable installation on working table	**130 t**	**4298310**
Table Clamp for mounting on work bench or working table clamping range: 0 – 140 mm	**130 kl**	**4298320**
Compact fluorescent tube for **130 W** with integrated starter		**4298325**
Circular fluorescent tube for **130 WR**		**4299005**


130 kl

MADE TO MEASURE.
MARGAGE

The latest information on MARGAGE products can be found on our website:
www.mahr.com, WebCode 10397

► | In 1871, at the foundation of the German Empire and during the introduction of the metric system, Mahr was already supplying dimensional standards to the weights and measurement office of several individual German states. Today, the measurement standards such as gage blocks are the basis of dimensional metrology, they are used as a setting standard for an indicating measuring instrument or applied in the calibration laboratory as a reference standard. Due to our accreditation from the PTB - Physikalisch-Technischen Bundesanstalt (German metrology institute providing scientific and technical services) and the careful selection of the materials we use, we can grant you the highest possible quality! | ◄

► | MarGage. Standards, Gages and Gage Blocks

MarGage. Standards, Gages and Gage Blocks

Rectangular Gages Blocks

Application

- As comparison reference and utilization standards in the field of length measurement
- For checking gages and measuring instruments
- For setting devices of all types designed for length measurement and in particular their displays
- Can be used individually or in combinations by wringing several blocks together (see illustration)

Accuracy

The manufacturing process is based on DIN EN ISO 3650, Mahr gage blocks are produced with the utmost care.

Marking

Gage blocks of all grades are clearly and individually marked with an identification number.

Material

Mahr gage blocks are made either of stainless steel or of the ceramic compound zirconium oxide ZrO2 (Circonimar).

Heat Expansion Coefficient

Steel	11.5 x 10^{-6} K^{-1}
Circonimar	9.5 x 10^{-6} K^{-1}

Calibration Certificate

Gage blocks in sets are supplied with a Mahr calibration certificate stating deviations from the nominal size, this confirms the trace-ability to National Standards.
For single gage blocks Mahr calibration certificates are available on request.
A calibration certificate from the Mahr DKD Calibration Laboratory is recommended for gage blocks of calibration grade K in the range between 0,5 and 100 mm

Dimensions

	Nominal dimension mm	Cross section mm
from	0.5 - 10	30 x 9
over	10 - 1000	35 x 9

DEUTSCHER KALIBRIERDIENST

DKD

GERMAN CALIBRATION SERVICE
Calibration Laboratory for Length Measurement
ACCREDITED BY THE PHYSIKALISCH-TECHNISCHE BUNDESANSTALT (PTB)

As a part of the German Calibration Service, the Mahr Calibration Laboratory calibrates steel and ceramic gage blocks of all brands in the range between 0.5 and 100 mm and issues calibration certificates. The gage block sets are marked with the official DKD calibration label.
Calibration is based on the contract concluded between the Physikalisch-Technischen Bundesanstalt in Braunschweig and the company Mahr.

Selection of Rectangular Gage Block Sets

There are three criteria's to be considered:

1 Calibration and Tolerance classes according to DIN EN ISO 3650

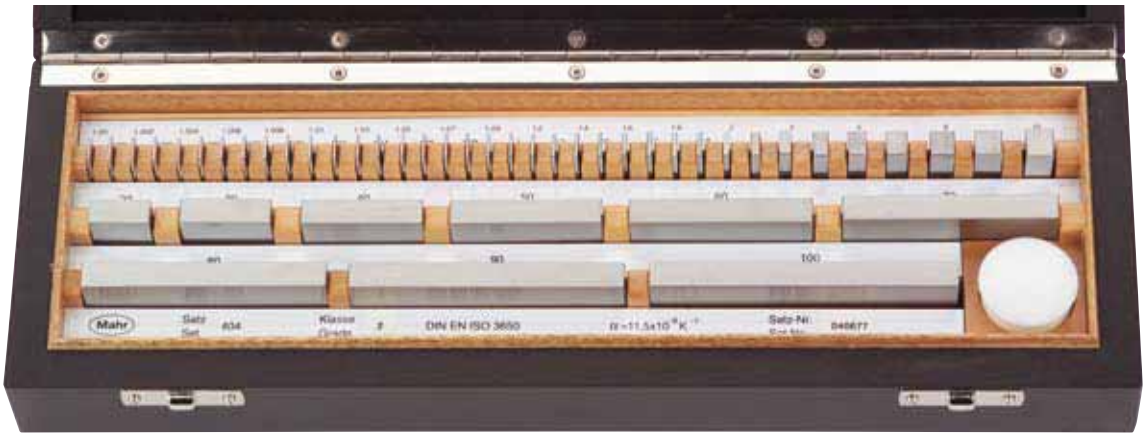
Four tolerances classes are available.

Calibration class K
As primary factory standard, particularly for the calibration of subsidiary test laboratories, e.g. for gage blocks of lower tolerance classes. Supplied on request with DKD calibration certificate, indicating the deviation from the nominal size for each gage block.

Calibration class 0
For maximum accuracy requirements. To be used as basic standards in test laboratories and precision inspection rooms, where other gage blocks and high accuracy measuring instruments are calibrated.

Tolerance class 1
For high standards of accuracy. As reference gage block for the inspection room. Designed to perform particularly accurate measurements. For setting indicating measuring instruments and for checking precision gages.

Tolerance class 2
For checking production gages of quality IT 6 and IT 7. For setting indicating measuring instruments and for checking accurate dimensions in the jig and tool industry.



404

2 Material

Steel or ceramic, depending on application.

3 Size of Sets

The 404 or 404 C is a particularly convenient set with 46 gage blocks including one for each decimal. Larger sets are particularly suited to inspection rooms and gage testing facilities, since they offer the following advantages:

- A required dimension can be made up quicker as fewer gage blocks are needed
- Several gage block combinations can be formed from the same dimension
- Greater accuracy as individual deviations add up to smaller overall error
- Less wear as a given gage block is not used as often

Rectangular Gage Blocks made of Steel

Sets

- Vertical arrangement to save space
- Scope of supply: wooden case with clear labeling strips, Mahr calibration certificate (see Page 13-2)
- See the following table for nominal sizes, increments and tolerance classes:

Catalog no.	Tolerance class	Order no.	Quantity per set	Nominal sizes mm	Increments mm	Gage blocks
402/K	K	**4800403**	32	1.005	-	1
402/0	0	**4800400**		1.01 - 1.09	0.01	9
402/1	1	**4800401**		1.1 - 1.9	0.1	9
402/2	2	**4800402**		1 - 9	1	9
				10 - 30	10	3
				50	-	1
404/K	K	**4800003**	46	1.001 - 1.009	0.001	9
404/0	0	**4800000**		1.01 - 1.09	0.01	9
404/1	1	**4800001**		1.1 - 1.9	0.1	9
404/2	2	**4800002**		1 - 9	1	9
				10 - 100	10	10
406/K	K	**4800014**	87	0.5	-	1
406/0	0	**4800010**		1.001 - 1.009	0.001	9
406/1	1	**4800011**		1.01 - 1.49	0.01	49
406/2	2	**4800012**		1 - 9.5	0.5	18
				10 - 100	10	10
408/K	K	**4800027**	111	0.5	-	1
408/0	0	**4800020**		1.001 - 1.009	0.001	9
408/1	1	**4800021**		1.01 - 1.49	0.01	49
408/2	2	**4800022**		1 - 24.5	0.5	48
				25 - 100	25	4
409/K	K	**4800033**	121	0.5	-	1
409/0	0	**4800030**		1.001 - 1.009	0.001	9
409/1	1	**4800031**		1.01 - 1.49	0.01	49
409/2	2	**4800032**		1.6 - 1.9	0.1	4
				1 - 24.5	0.5	48
				25, 30, 40, 50, 60, 70, 75, 80, 90, 100		10

Test Sets for Calipers

Catalog no.	Tolerance class	Order no.	Quantity per set	Nominal sizes mm
411/1	1	**4800343**	4	41.3 / 131.4 / 243.5 / 281.2
411/2	2	**4800344**	4	41.3 / 131.4 / 243.5 / 281.2
415/1	1	**4800339**	5	41.3 / 131.4 / 243.5 / 281.2 / 481.2
415/2	2	**4800340**	5	41.3 / 131.4 / 243.5 / 281.2 / 481.2

Individual Rectangular Gage Blocks 417

- Tolerance classes K, 0, 1, 2
- From nominal dimension of greater than 125 mm, gage blocks are supplied in a wooden case
- Special sizes are available on request

	Nominal sizes mm	Increments mm
	0.5 - 1	0.05
over	1 - 100	same a set 409
	125 - 200	25
	250 - 500	50
	600 - 1000	100

Rectangular Gage Blocks made of Ceramic

406 C

Features

- Resistant to both impact and breakage. Virtually no warping of material if surfaces become scratched or edges damaged. Longer retention of wringing ability
- Extremely durable, thus providing a long service life as well being highly robust compared to all other materials currently be used in metrology. Therefore the interval between inspections are distinctly greater
- Corrosion-resistant, Circonimar is even without protective measures extremely resistant to alkalis, acids, oil, grinding fluid and other aggressive media
- Similar coefficient of expansion to steel, thus allowing unrestricted use even at unfavorable temperatures
- Non-magnetic Circonimar is anti-static, anti-magnetic and non-conductive. It does not attract dust or dirt and is suitable to use in the presence of magnetic fields
- Ideal for all applications. The outstanding features of all ceramic gage blocks from Mahr provide unrivalled flexibility in practical use. Circonimar is equally well suited to inspection-room conditions and the rigors of workshop applications
- Easy to handle. No material is easier to deal with than Circonimar; Circomimar has excellent wringing properties, no corrosion, no need for lubrication, low weight and scratch-resistant

Rectangular Gage Blocks made of Ceramic

Sets

- Vertical arrangement to save space
- Scope of supply: wooden case with clear labeling strips, Mahr calibration certificate (see Page 13-2)

Nominal sizes, increments and tolerance classes

Please refer to the table below:

Catalog no.	Tolerance class	Order no.	Quantity per set	Nominal sizes mm	Increments mm	Gage blocks
402 C/K	K	**4800094**	32	1.005	-	1
402 C/0	0	**4800095**		1.01 - 1.09	0.01	9
402 C/1	1	**4800096**		1.1 - 1.9	0.1	9
402 C/2	2	**4800097**		1 - 9	1	9
				10 - 30	10	3
				50	-	1
404 C/K	K	**4800088**	46	1.001 - 1.009	0.001	9
404 C/0	0	**4800008**		1.01 - 1.09	0.01	9
404 C/1	1	**4800009**		1.1 - 1.9	0.1	9
404 C/2	2	**4800004**		1 - 9	1	9
				10 - 100	10	10
406 C/K	K	**4800016**	87	0.5	-	1
406 C/0	0	**4800018**		1.001 - 1.009	0.001	9
406 C/1	1	**4800019**		1.01 - 1.49	0.01	49
406 C/2	2	**4800017**		1 - 9.5	0.5	18
				10 - 100	10	10
408 C/K	K	**4800025**	111	0.5	-	1
408 C/0	0	**4800028**		1.001 - 1.009	0.001	9
408 C/1	1	**4800029**		1.01 - 1.49	0.01	49
408 C/2	2	**4800026**		1 - 24.5	0.5	48
				25 - 100	25	4
409 C/K	K	**4800036**	121	0.5	-	1
409 C/0	0	**4800038**		1.001 - 1.009	0.001	9
409 C/1	1	**4800039**		1.01 - 1.49	0.01	49
409 C/2	2	**4800037**		1.6 - 1.9	0.1	4
				1 - 24.5	0.5	48
				25, 30, 40, 50, 60, 70, 75, 80, 90, 100		

Single Rectangular Gage Blocks 417 C

- Tolerance classes K, 0, 1, 2
- Special sizes are available on request

Nominal sizes mm	Increments mm
0.5	-
1	-
1.0005	-
1.001 - 1.009	0.001
1.01 - 1.5	0.01
1.6 - 2.0	0.1
2.5 - 25.0	0.5
30 - 100	10

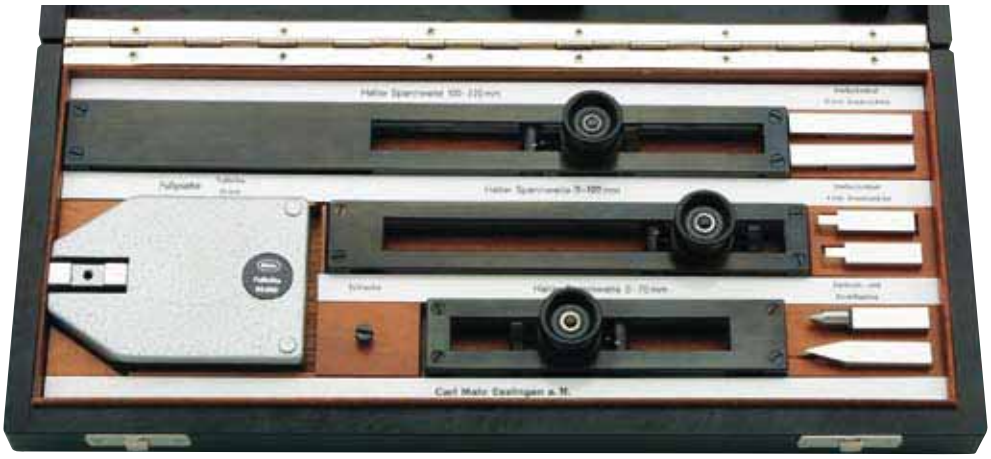
Pair of Protective Rectangular Gage Blocks 418 C

Catalog no.	Tolerance class	Order no.	Quantity per set	Nominal sizes mm	Increments mm	Gage blocks
418 C/0	0	**4800085**	2	2	-	2
418 C/1	1	**4800086**	2	2	-	2

Test Set for Micrometers 419 C (DIN 863)

Catalog no.	Tolerance class	Order no.	Quantity per set	Nominal sizes mm
419 C/1	1	**4800090**	10	2.5 / 5.1 / 7.7 / 10.3 / 12.9 / 15.0 / 17.6 / 20.2 / 22.8 / 25 plus 1 optical parallel dia. 30 mm

Accessories for Rectangular Gage Blocks



Rectangular Gage Block Holder and Measuring Jaws Accessory Set 420

- In conjunction with Gage Blocks for gaging both work pieces and fixtures
- To check, set and adjust setting gages and measuring instruments
- For scribing and marking
- Delivered in a wooden case

Order no. **4800100**

Components include:

2 Pairs of Measuring Jaws 420 m
1 Scriber Point 420 a
1 Centering Point 420 z
3 Holder 420 h for Gages Blocks
clamping width 0-70, 0-120, 100-220 mm
1 Stand 420 f for Gage Block Holder

Individual Accessories

Components included in the 420 set are also individually available:

Measuring Jaws 420 m

Cross section 9 x 9 mm

For internal and external measurements in conjunction with a Gage Block Holder 420 h and Gage Blocks

Thickness mm	**Order no.**
2 x 2 mm = 4 mm	**4800110**
2 x 5 mm = 10 mm	**4800111**

Scriber Point 420 a cross section 9 x 9 mm

Order no. **4800112**

Centering Point 420 z cross section 9 x 9 mm

Order no. **4800113**

Holder 420 h for Rectangular Gage Blocks

Clamping width mm	**Order no.**
0 - 70	**4800120**
0 - 120	**4800121**
100 - 220	**4800122**
100 - 420	**4800123**
400 - 820	**4800124**

Stand 420 f for Holder 420 h*

Hardened and lapped. Height 25 mm
Tolerance ± 2 µm

Order no. **4800114**

** Clamping width up to 420 mm*

Optical Flat 421

- To test the surface flatness on precision components or measuring instruments according to the interference principle
- Supplied in a wooden case

Dia. mm	Thickness mm	Flatness deviation µm	Order no.
45	11	≤ 0.1	**4800140**
100	20	≤ 0.1	**4800135**
150	30	≤ 0.1	**4800136**
300	50	≤ 0.4	**4800137**

Optical Parallel 421 P

Dia. mm	Thickness mm	Flatness deviation µm	Parallelism deviation µm	Order no.
30	12	≤ 0.15	0.4	**4800180**

Contact Thermometer 422

- For checking/taking the temperature
- With silver contact base, gold-plated to prevent tarnishing
- With a holding magnet to be attached to the thermometer in vertical or on inclined surfaces
- U-shaped with clamping screw
- Scope of supply: thermometer, magnet and wooden case

Readings 0.2°C
Measuring range 16-26°C

Order no. 4800170

Wooden Tongs 423

- To prevent heat transfer when handling gage blocks
- Self closing. See illustration below.

Order no. 4800142

Maintenance Set 424

- The most important equipment for inspecting and maintaining gage blocks
- Delivered in a wooden case.

Order no. 4800130

Components include:

Optical Flat 421
- To test the surface flatness of measuring surfaces according to the interference principle. Diameter 45 mm

Wooden Tongs 423
- To prevent heat transfer when handling gage block, self closing

Granite lapping stone
- To remove burr and other damage on surfaces of gage blocks. High accuracy version

Jar of special Vaseline
- To protect steel gage blocks against the rust

Brush and suede cloth
- To clean the gage blocks

Inch Gage Blocks

Features

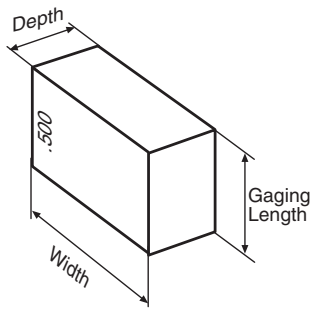
- Long used as the practical standards of dimensional measurement in precision manufacturing. With accuracies, materials and manufacturing methods greatly refined, gage blocks are now of highest quality and precision.
  - As comparison reference and utilization standards in the field of length measurement.
  - For checking gages and measuring instruments.
  - Used individually or in combinations by wringing several blocks together.
- Mahr Federal gage blocks are available from stock individually and as full sets in inch (rectangular only).
- Sets are manufactured to Grade **0** only, which meet or exceed ASME B89.1.9-2002 specifications.
- Offered in steel to suit a wide range of service conditions. Steel blocks are extremely stable, hardened to Rc 62 minimum, and processed through a thorough seasoning cycle to relieve internal stresses before finish lapping.
- All sets blocks are serialized and supplied in a fitted storage case. Certification priced seperately.

Mahr Federal Calibration System is certified to ISO-17025 and accredited by NVLAP and ISO-9001 certified by NQA

Technical Data

Dimensions – Standard Size Blocks

Block Style	Gaging Length	Width mm / ***inch***	Depth mm / **inch**
Inch – Rectangular	.400" or less	30 / ***1.181"***	9 / ***.352"***
	.400" and over	35 / ***1.378"***	9 / ***.352"***



Inch Gage Blocks Set

Ordering Information

Inch Rectangular

An 81 block set containing

Series	Number of blocks	Size
.0001″	9	.1001 - .1009
.001″	49	.101 - .149
.050″	19	.050 - .950
1.000″	4	1.000 - 4.000

Order No. **2176361**

Inch Square

An 49 block set containing

Series	Number of blocks	Size
.0001″	9	.1001 - 1.009
.001″	9	.101 - .109
.01″	9	.010 - .090
.01″	9	.110 - .190
.10″	9	.100 - .900
1.000″	4	1.000 - 4.000

Order No. **2176362**

Technical Data

Grade 0 Length Tolerances

Nominal Length

Greater than	Less than or equal to	Unit 0.000001″ (1 µinch)
0	0.4	± 5
0.4	1	± 6
1	2	± 8
2	3	± 10
3	4	±12

Pin Gages 426 according to DIN 2269

426

426 G

Features

- To be used as setting standards for indicating measuring instruments, testing the distances between axes, tapers and other work pieces in conjunction with gage blocks. Also for determining pitch diameter of threads or pitch circle diameter on gears and serrations

Pin Gages 426 made from steel, without a handle from dia. 5.01 mm inscribed with diameter on the end face

Ø mm			Wear-resistant gage steel, hardened, multi-aged, ground and **lapped** Grade 0, DIN 2269 Manufacturing tolerance ± 0.5 µm **Length** mm	**Increments** 0.01 mm **Order no.**	0.001 mm **Order no.**	Wear-resistant gage steel, hardened, multi-aged, ground and **lapped** Grade 1, DIN 2269 Manufacturing tolerance ± 1.0 µm **Length** mm	**Increments** 0.01 mm **Order no.**	0.001 mm **Order no.**	Wear-resistant gage steel, hardened, multi-aged and precision ground **Better** than Grade 2, DIN 2269 Manufacturing tolerance ± 1.5 µm **Length** mm	**Increments** 0.01 mm **Order no.**
0.06	-	0.09	20	**4828100**	**4828300**	20	**4828110**	**4828310**	20	**4828130**
0.10	-	0.19	32	**4828101**	**4828301**	32	**4828111**	**4828311**	40	**4828131**
0.20	-	0.29	32	**4828102**	**4828302**	32	**4828112**	**4828312**	40	**4828132**
0.30	-	0.49	32	**4828103**	**4828303**	32	**4828113**	**4828313**	40	**4828133**
0.50	-	0.99	32	**4828104**	**4828304**	32	**4828114**	**4828314**	40	**4828134**
1.00	-	2.99	32	**4828105**	**4828305**	32	**4828115**	**4828315**	40	**4828135**
3.00	-	5.99	40	**4828106**	**4828306**	40	**4828116**	**4828316**	***	**4828136**
6.00	-	9.99	50	**4828107***	**4828307***	50	**4828117**	**4828317**	70	**4828137**
10.00	-	11.99				70**	**4828118**	**4828318**	70	**4828138**
12.00	-	13.99				70	**4828119**	**4828319**	70	**4828139**
14.00	-	15.99				70	**4828120**	**4828320**	70	**4828140**
16.00	-	18.99				70	**4828121**	**4828321**	70	**4828141**
19.00	-	20.00				70	**4828122**	**4828322**	70	**4828142**

* *applies up to dia. 10 mm*

** *dia. 10 mm = 50 mm long*

*** *dia. 3 - 4 mm = 50 mm long,*
> 4 - 5 mm = 60 mm long,
> 5 mm = 70 mm long

Pin Gages 426 G made from steel, with a handle

Ø mm			Wear-resistant gage steel, hardened, multi-aged, ground and **lapped** Grade 0, DIN 2269 Manufacturing tolerance ± 0.5 µm **Effective Length** mm	**Increments** 0.01 mm **Order no.**	0.001 mm **Order no.**	Wear-resistant gage steel, hardened, multi-aged, ground and **lapped** Grade 1, DIN 2269 Manufacturing tolerance ± 1.0 µm **Effective Length** mm	**Increments** 0.01 mm **Order no.**	0.001 mm **Order no.**	Wear-resistant gage steel, hardened, multi-aged and precision ground **Better** than Grade 2, DIN 2269 Manufacturing tolerance ± 1.5 µm **Effective Length** mm	**Increments** 0.01 mm **Order no.**
0.06	-	0.09	10	**4828150**	**4828350**	10	**4828160**	**4828360**	10	**4828170**
0.10	-	0.19	25	**4828151**	**4828351**	25	**4828161**	**4828361**	33	**4828171**
0.20	-	0.29	25	**4828152**	**4828352**	25	**4828162**	**4828362**	33	**4828172**
0.30	-	0.49	25	**4828153**	**4828353**	25	**4828163**	**4828363**	33	**4828173**
0.50	-	0.99	25	**4828154**	**4828354**	25	**4828164**	**4828364**	33	**4828174**
1.00	-	2.99	25	**4828155**	**4828355**	25	**4828165**	**4828365**	33	**4828175**
3.00	-	5.99	25	**4828156**	**4828356**	25	**4828166**	**4828366**	***	**4828176**
6,00	-	10,00	42*	**4828157**	**4828357**	42**	**4828167**	**4828367**	62	**4828177**

* *dia. 6 mm = 25 mm long*

** *dia. 6 mm = 25 mm long*

*** *Ø 3 - 4 mm = 43 mm long,*
> 4 - 5 mm = 53 mm long,
> 5 mm = 62 mm long

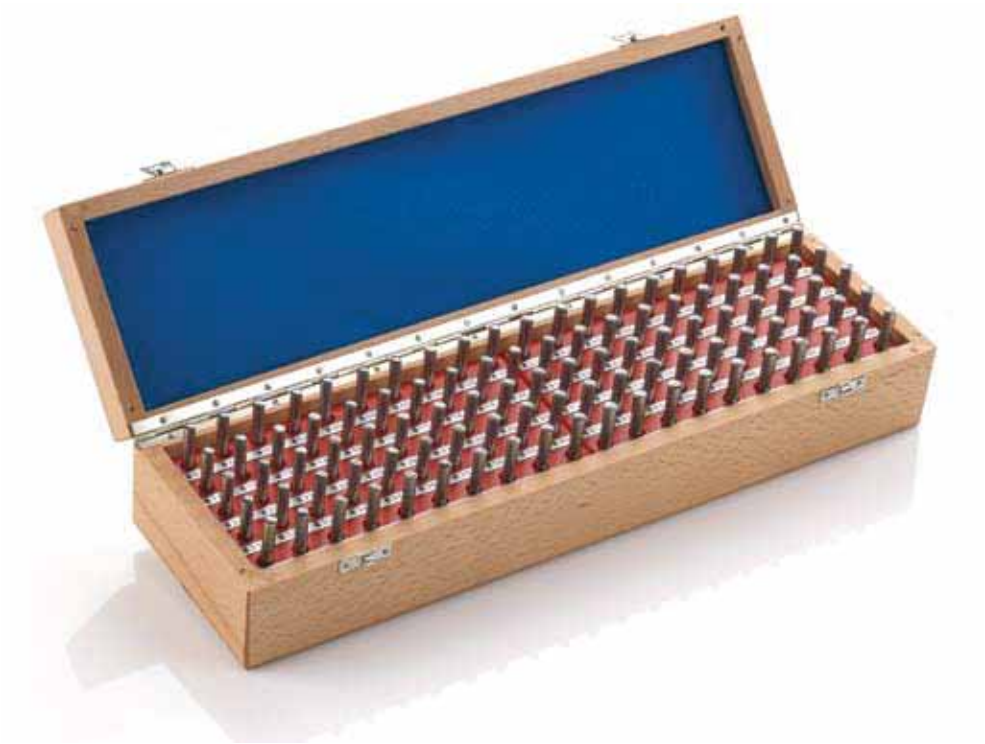
Length of handle see Page 13-12 (426 D)

Accessories

Wooden case with plastic inlay for pin gages up to D = 10 mm

Number of pin gages	**Order no.**
max. 50 Pin gages (without handle)	**4827609**
max. 50 Pin gages (with handle)	**4827610**
max. 100 Pin gages (without handle)	**4827611**

Pin Gage sets 426 S made of steel, without a handle in a high quality wooden box with pedestral



Technical Data

ø mm	Wear-resistant gage steel, hardened, multi-aged, ground and **lapped** Grade 0, DIN 2269 Manufacturing tolerance ± 0.5 µm			Wear-resistant gage steel, hardened, multi-aged, ground and **lapped** Grade 1, DIN 2269 Manufacturing tolerance ± 1.0 µm			Wear-resistant gage steel, hardened, multi-aged and precision ground **Better** than Grade 2, DIN 2269 Manufacturing tolerance ± 1.5 µm		
	Increments	**Quantity of pin gages**	**Order no.**	**Increments**	**Quantity of pin gages**	**Order no.**	**Increments**	**Quantity of pin gages**	**Order no.**
1.00 - 10.00	0.1	91	**4828190**	0.1	91	**4828210**			
0.10 - 0.50	0.01	41	**4828181**	0.01	41	**4828191**	0.01	41	**4828211**
0.50 - 1.00	0.01	51	**4828182**	0.01	51	**4828192**	0.01	51	**4828212**
0.10 - 1.00	0.01	91	**4828183**	0.01	91	**4828193**	0.01	91	**4828213**
1.00 - 2.00	0.01	101	**4828184**	0.01	101	**4828194**	0.01	101	**4828214**
2.00 - 3.00	0.01	101	**4828195**	0.01	101	**4828215**			
3.00 - 4.00	0.01	101	**4828196**	0.01	101	**4828216**			
4.00 - 5.00	0.01	101	**4828197**	0.01	101	**4828217**			
5.00 - 6.00	0.01	101	**4828198**	0.01	101	**4828218**			
6.00 - 7.00	0.01	101	**4828199**	0.01	101	**4828219**			
7.00 - 8.00	0.01	101	**4828200**	0.01	101	**4828220**			
8.00 - 9.00	0.01	101	**4828201**	0.01	101	**4828221**			
9.00 - 10.00	0.01	101	**4828202**	0.01	101	**4828222**			

Pin gage lengths are the same as the individual pin gages

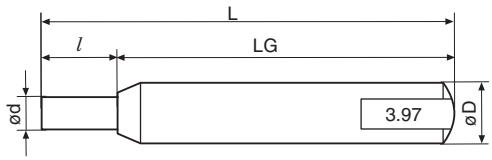
Individual Plug Gages 426 D made from steel, with a handle

Features

- For testing diameters of small bores
- To be used as setting standards for indicating measuring instruments, testing the distances between axes, grooves and slots on work pieces in conjunction with gage blocks
- Unbreakable plastic handle inscribed with the diameter
- Set with pin gages in diameter increments of 0.01 mm
  Manufacturing tolerance ± 0.5 µm
- Supplied with:
  Wooden case with plastic inlay

Technical Data

Wear-resistant gage steel. hardened. multi-aged, ground and **lapped**
plastic handle inscribed with the diameter
Manufacturing tolerance ± 0.5 µm
Increment 0.01 mm



dia. d mm	Order no.	dia. d mm	l mm	Dimensions dia. D	LG	L
0.06 - 0.09	**4828230**	0.06 - 0.30	2.0	4	32	34
0.10 - 0.19	**4828231**	> 0.30 - 0.50	3.5	4	32	35.5
0.20 - 0.29	**4828232**	> 0.50 - 1.50	5.0	4	32	37
0.30 - 0.49	**4828233**	> 1.50 - 2.00	6.0	4	32	38
0.50 - 0.99	**4828234**	> 2.00 - 3.50	8.0	5	35	43
1.00 - 2.99	**4828235**	> 3.50 - 6.00	10.0	5	45	55
3.00 - 5.99	**4828236**	> 6.00 - 8.00	14.0	10	45	59
6.00 - 10.00	**4828237**	> 8.00 - 10.00	18.0	10	45	63

Plug Gage Sets 426 DS made from steel, with a handle in a high quality wooden box with pedestral

Technical Data

Wear-resistant gage steel, hardened, multi-aged, ground and **lapped**
plastic handle inscribed with the diameter
Manufacturing tolerance ± 0.5 µm

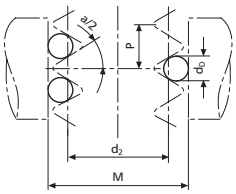
dia. mm	Increment	Quantity	Length	Order no.	dia. mm	Increment	Quantity	Length	Order no.
0.06 - 0.50	0.01	45	2*	**4825000**	5.01 - 5.50	0.01	50	10	**4825010**
0.51 - 1.00	0.01	50	5	**4825001**	5.51 - 6.00	0.01	50	10	**4825011**
1.01 - 1.50	0.01	50	5	**4825002**	6.01 - 6.50	0.01	50	14	**4825703**
1.51 - 2.00	0.01	50	6	**4825003**	6.51 - 7.00	0.01	50	14	**4825704**
2.01 - 2.50	0.01	50	8	**4825004**	7.01 - 7.50	0.01	50	14	**4825705**
2.51 - 3.00	0.01	50	8	**4825005**	7.51 - 8.00	0.01	50	14	**4825706**
3.01 - 3.50	0.01	50	8	**4825006**	8.01 - 8.50	0.01	50	18	**4825707**
3.51 - 4.00	0.01	50	10	**4825007**	8.51 - 9.00	0.01	50	18	**4825708**
4.01 - 4.50	0.01	50	10	**4825008**	9.01 - 9.50	0.01	50	18	**4825709**
4.51 - 5.00	0.01	50	10	**4825009**	9.51 - 10.00	0.01	50	18	**4825710**

**dia. > 0.3 mm = 3.5 mm long*

Thread Pin Gages 426 M in holders 426 A with an eyelet

426 M

426 A



Features

426 M

- For determining pitch diameter of external threads according to the three-wire method
- In conjunction with micrometers, indicating measuring instruments or measuring machines
- Each pair consists of: 1 holder with 1 pin gage and 1 holder with 2 pin gages
- Holder has a satin chrome finish, the retainer ring can be locked yet the measuring spindle can still rotate
- Pin gages are hardened and lapped. Freely floating in holder to allow proper positioning and contact with thread flanks

Manufacturing tolerance ± 0.5 µm
Mounting hole 7.5 mm
(Mounting hole 6.35 mm = 1/4", 6.5 mm and 8 mm
on request)

426 MS
Set of thread Pin Gages in Holder consists of:
18 Holder Pairs 426 M

Diameter 0,.7 - 3.2 mm
Delivered in a wooden box

		Order no.
Mounting hole	7.5 mm	**4820000**
Mounting hole	6.5 mm	**4820003**

426 A

- For determining pitch diameter of external threads according to the three-wire method
- Designed to be suspended over a test specimen
- Set consists of 3 Pin Gages

Manufacturing tol. ± 0.5 µm
Pin gage length 32 mm

Technical Data

Pin Gage	**Order no.**			**for thread pitch**										
				Metric				Whitworth range tpi			American UST range tpi			Trapezoid
dia. mm	426 M Pair dia. 7.5 mm	426 M Pair dia. 6.5 mm	426 A Set	mm										mm
0.17	**4820010**	**4820132**	**4821000**	0.25		0.3								
0.195	**4820011**	**4820149**	**4821001**								80			
0.22	**4820012**	**4820133**	**4821002**		0.35						72			
0.25	**4820013**	**4820131**	**4821003**		0.4						64			
0.29	**4820014**	**4820134**	**4821004**	0.45		0.5					56			
0.335	**4820015**	**4820135**	**4821005**		0.6						48			
0.39	**4820016**	**4820150**	**4821006**					40			44		40	
0.455	**4820017**	**4820137**	**4821007**	0.7	0.75	0.8		32			36			
0.53	**4820018**	**4820151**	**4821008**					28			32		28	
0.62	**4820019**	**4820139**	**4821009**		1		26		24		24			
0.725	**4820020**	**4820140**	**4821010**		1.25		22		20		20			
0.895	**4820021**	**4820141**	**4821011**		1.5		19	18	16		18			
1.1	**4820022**	**4820142**	**4821012**		1.75		14	16	14		13			2
1.35	**4820023**	**4820143**	**4821013**		2		12		11		12		11	
1.65	**4820024**	**4820144**	**4821014**		2.5		10		9		10		9	3
2.05	**4820025**	**4820145**	**4821015**	3		3.5	8		7		8		7	4
2.55	**4820026**	**4820146**	**4821016**	4		4.5		6				6		5
3.2	**4820027**	**4820147**	**4821017**	5		5.5	5		$4^1/_2$		5		$4^1/_2$	6
4	***4820028**	***4820152**	**4821018**		6		4		$3^1/_2$			4		7

* *These holder pairs require the use of a 3 mm gage block for the holder with 2 pin gages to enlarge the measuring face. This gage block is inserted into the holder recess provided.*

417/1 Gage Block -steel
Nominal size 3 mm

Grade 1
Order no. **4801285**

Setting Standards for indicating measuring instruments

AGD Masters

Master Rings

- Traceable certification and calibration available on request.
- Lapped to size and polished.
- Non-gaging areas black oxidized – ring faces ground.
- Meet all requirements of ANSI Specification B47.1-1988
- Manufactured in accordance with ANSI Specification B89.1.6-1984.

Master Discs AGD Style 3

- Traceable certification and calibration available on request.
- Lapped to size and polished.
- Non-gaging areas black oxidized – ring faces ground.
- Meet all requirements of ANSI Specification B47.1-1988
- Manufactured in accordance with ANSI Specification B89.1.5.
- Furnished with clear insulators.
- All dimensions are AGD style 3.

Master Plugs

- Traceable certification and calibration available on request.
- Stabilized and hardened.
- 100 % usable gaging surface.
- Ends ground square
- Lapped finish.

Setting Standards for indicating measuring instruments

355 E

390

715 E

Ring Gages 355 E

- Special wear-resistant gage steel. Hardened and lapped

Dimensions	DIN 2250, Type C
Manufacturing tolerance	DIN 2250
Uncertainty of actual deviation	1/2 IT 1
Nominal diameter	0.5 - 200 mm

Pin Gages 426

- Special wear-resistant gage steel. Hardened and lapped. Available with or without handles.
- According to DIN 2269

For further details please refer to Page 13-15
Nominal diameter 0.1 - 10 mm

Reference Discs 390

- Special wear-resistant gage steel. Hardened and lapped. .

Manufacturing tolerance	± 1/2 IT 2
Uncertainty of actual deviation	1/2 IT 0
Nominal diameter over	10 - 100 mm

Setting standards with a DKD calibration certificate from the Mahr Calibration Laboratory are available on request (threads are excluded:

Pin Gages from dia.	3 mm
Ring Gages dia.	10 - 100 mm
Reference Discs dia.	3 - 100 mm

Thread Setting Ring Gage 708 E

- With full thread profile
- Actual deviation is engraved on the gage
- For setting indicating thread measuring instruments
- For metric threads for tolerance class "H" according to DIN 2241
- For other thread types please state tolerance requirements

Thread Setting Plug Gage 715 E

- With full thread profile
- Actual deviation is engraved on the gage
- For setting indicating thread measuring instruments
- Metric threads in accordance with DIN 2241: Tolerance class h applies to standard threads dia. 1 - 1.4 mm and for pitches 0.2 and 0.25, for all other sizes the tolerance class g is applicable
- For other thread types please state tolerance requirements

Thread Gages, Checking Plug Gages

705

708 N

708 G

Thread Limit Plug Gage 705

- Special wear-resistant gage steel. Hardened and ground
- GO end with full thread profile, pitch diameter corresponds to minimum permissible dimension of internal thread
- NO-GO end has only 3 threads and a shortened flank profile, pitch diameter corresponds to maximum permissible dimension of internal thread
- Accuracy for metric ISO threads according to DIN ISO 1502 (up to 40 mm the GO end and NO-GO end are on a common handle. Over 40 mm the GO / NO-GO end are on separate handles for easier handling)
- Nominal diameter 1 - 100 mm. For all standard and special threads

Thread Ring Gages

- Special wear-resistant gage steel. Hardened and ground Accuracy of metric ISO threads according to DIN ISO 1502
- Nominal diameter 1 - 200 mm
- For all standard and special threads

GO Thread Ring Gage 708 G

- With full thread profile. Pitch diameter corresponds to the maximum permissible dimension of an external thread. The external diameter is relieved

NO-GO Thread Ring Gage 708 N

- With reduced thread profile. For checking minimum permissible dimension of pitch diameter on external thread

Master Thread Plug Gages

- Special wear-resistant gage steel. Hardened and lapped. Accuracy for metric ISO thread DIN ISO 1502. Other threads are in accordance to the respective standards
- Diameter 1 - 200 mm
  Available for all standard and special threads

Go Thread Checking Gage 715 G

Counter Plug Gage for GO Thread Ring Gage

Go Thread Checking Gage 715 N

Counter Plug Gage for NO-GO Thread Ring Gage

- With full thread profile and outside diameter with maximum dimension of external thread. Plug Gage must screw easily into Ring Gage

Wear Testing Plug Gage 716 G

For GO Thread Ring Gage

Wear Testing Plug Gage 716 N

For NO-GO Thread Ring Gage

- Three threads with considerably shortened flanks. Must not screw in more than one turn

Calibration Services

International Standards require complete documentation and calibration of all gaging instruments. Mahr Federal Inc., as well as being a manufacturer of quality dimensional measuring instruments, is an established primary source or high accuracy dimensional measurement services.

Mahr Federal offers an inspection and recalibration program for dimensional standards including:

- gage blocks / master rings / master discs and plugs / masterballs (roundness)
- cylindrical form and precision reference specimens surface roughness standards.

For these services, we have created an ideal environment - a metrology laboratory in Providence, Rhode Island that is ranked as one of the world's finest.:

- High quality measurements - 0.06 micron / 2.3 microinch uncertainty of measurement on gage blocks (up to 50 mm / 2" long).
- All measurements traceable to the Standards of the United States.
- Grand Masters/Primary standards used in our Measurement Center have been certified by NIST.
- Calibration system is certified to ISO-9001:2000 by NQA, USA and accredited to ISO 17025 NVLAP Lab Code 200605-0.
- We offer Fast turnaround and competitive prices.

Mahr Federal also specializes in the calibration and certification of the following gages including:

- Dial, Digital & Test Indicators
- Mikrokators®
- Micrometers
- Dial & Vernier Calipers
- Pin & Radius Gages
- Snaps, I.D. / O.D. & Bore Gages
- Dimentron® Plugs
- Plug & Ring Gages
- Groove, Caliper, Thickness
- Air Gages & Magnification Kits
- Electronic Amplifiers & Gage Heads
- Surface Finish Gages
- Level Systems

NQA
NATIONAL QUALITY ASSURANCE, USA

CERTIFICATE OF REGISTRATION

This is to certify that the Quality Management System of:

MAHR FEDERAL, INC.
1144 EDDY STREET
PROVIDENCE, RI 02940

has been assessed and approved by National Quality Assurance, U.S.A., against the following quality assurance management system standard:

ISO 9001: 2000

The Quality Management System is applicable to:

DESIGN, MANUFACTURE AND SERVICING OF DIMENSIONAL GAGES AND GAGING SYSTEMS AND DIMENSIONAL CALIBRATION SERVICES INCLUDING FIELD SERVICE FOR MASTERS, STANDARDS AND GAGES

The approval is subject to the company maintaining its system to the required standards, which will be monitored by NQA, U.S.A.

Certificate No: 10057

Date: October 6, 1995
Reissued: October 29, 2004
Valid Until: September 1, 2007

For and On Behalf of NQA, USA
Acton, MA 01720

United States Department of Commerce
National Institute of Standards and Technology

NVLAP®

Certificate of Accreditation to ISO/IEC 17025:2005

NVLAP LAB CODE: 200605-0

Mahr Federal Inc.
Providence, RI

is accredited by the National Voluntary Laboratory Accreditation Program for specific services, listed on the Scope of Accreditation, for:

CALIBRATION LABORATORIES

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer to joint ISO-ILAC-IAF Communique dated 18 June 2005).

2007-04-01 through 2008-03-31
Effective dates

For the National Institute of Standards and Technology

METROLOGY SYSTEMS

► | **Rising to the challenge.** High-precision, powerful measuring instruments for complex workpieces that need to meet high quality requirements, combined and configured with your particular needs in mind – measuring systems from Mahr set the standard in the market.

► | **Our two-tier information program.** If you are interested in a specific product family (Millimar, MarSurf, MarForm, etc.), we will happily send you the relevant brochure with detailed information on request. If you require details on individual products, we will send you the appropriate data sheets.

DIVISION

► | See what we can do – simply ask for detailed information

ALL INFORMATION AND SERVICES CAN BE FOUND AT

WWW.MAHR.COM

SEND YOUR ORDER TO YOUR MAHR PARTNER OR ORDER DIRECTLY FROM

MAHR GMBH GÖTTINGEN

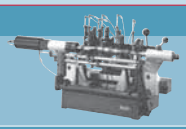
POSTFACH 18 53

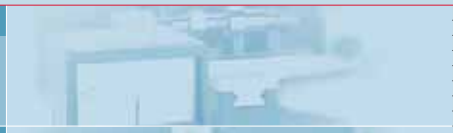
D-37008 GÖTTINGEN

TEL.: +49 551 7073-800

FAX: +49 551 7073-888

E-MAIL: INFO@MAHR.DE





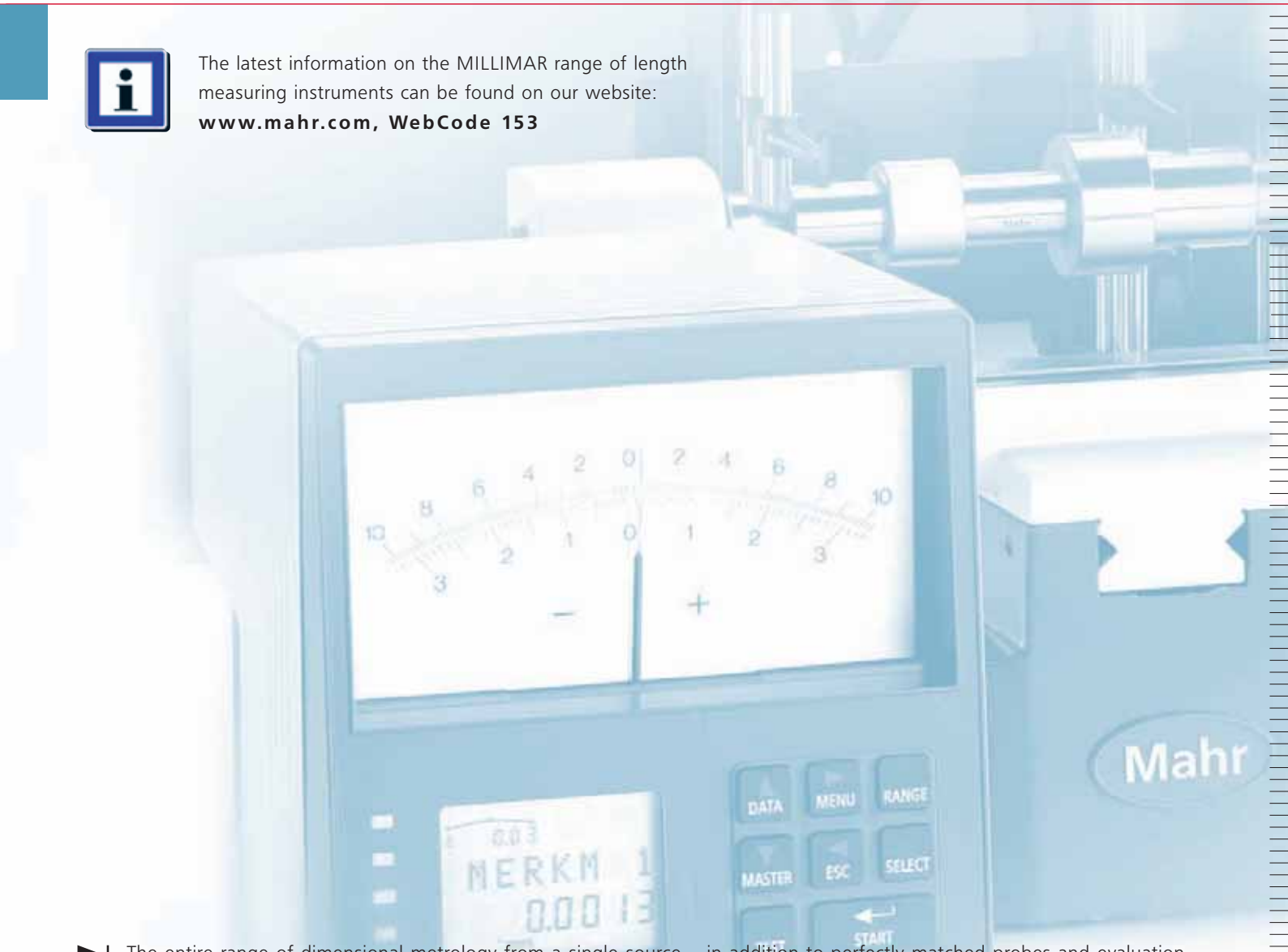
MAHR SYSTEMS

Contents

DIMENSIONAL METROLOGY FROM A SINGLE SOURCE.

MILLIMAR FROM MAHR

The latest information on the MILLIMAR range of length measuring instruments can be found on our website:
www.mahr.com, WebCode 153



► | The entire range of dimensional metrology from a single source – in addition to perfectly matched probes and evaluation instruments, Millimar also offers high-precision mechanical components and engineered solutions for every length measurement task. Our portfolio features an impressive selection of high-quality probes for all requirements relating to measuring range, resolution, and the surface properties of the workpiece and the application environment in which the measurement is to be performed. Our range of reliable, state-of-the-art evaluation instruments uses many different top-class sensor technologies. The robust, high-precision Diamar ID/OD gages are perfectly suited to our customers' requirements. Mahr gages from standard elements are available as a modular system comprising mechanical components for high-precision, stable measuring devices in production environments. Our special engineered solutions are based around the design and manufacture of high-precision, ergonomic, highly reliable part-specific measuring instruments. Flexible components for different workpieces and levels of automation round off our comprehensive portfolio. | ◄

► | Millimar. Length Metrology

Millimar. Probes

PRECISION BEGINS AT THE START OF THE MEASURING PROCESS

► | Probes are the most influential component of a measuring chain. Their characteristics determine the quality of the whole measurement. Different technologies are available depending on the particular application, including: Millimar inductive probes which are robustly built, flexible in their range of applications and attractively priced; Millimar incremental probes which are ideal for large measuring ranges and small linearity deviations over the whole measuring range; or Millimar air gages which enable reliable, contact-free measurement of even soiled workpieces, have a long lifespan and excel in terms of reproducible measuring results. | ◄

Inductive Probes

The **Millimar P 2000** inductive probe series features 8 basic types complying with different manufacturer standards. Its key features are:

- Excellent pricing, immediate delivery
- Precise linearity
- Outstanding electromagnetic shielding (high EMC)
- Graphic measuring record supplied free of charge
- Highly resistant to wear and tear

For details, see Section 7-4.

Incremental Probes

Millimar incremental probes are used for absolute measurements in the inspection room, testing laboratory and production environment. They feature long measuring range and high resolution. Their high accuracy is achieved thanks to a precision incremental glass scale. Accuracies of ±0.2 µm (±8 µin), ±0.5 µm (±20 µin) and ±1 µm (±40 µin) can be achieved depending on the type.

Electronic Indicating Plug Gages

Indicating plug gages are designed for rapid testing of the diameter, roundness and conicity of bores and are ideal for serial checks of parts with tight tolerances. Because no swiveling in the bore is necessary to determine the reversal point, indicating plug gages **844D** combined with Millimar indicating units is ideal for further processing of measuring results.

Air Gages

Air gages record dimensional deviations fast and accurately. They are tried-and-tested measuring systems in industrial production environments and the inspection room. Highly accurate and with a long service life, these gages have a low sensitivity to environmental influences. Contact-free measurement ensures there is no risk of damage to workpieces..

Millimar 1940. Air/Electronic Converter

Air-controlled probes are becoming more and more widespread in dimensional metrology. Air/electronic converters convert the measuring signal (air pressure) into an electronic signal.
Millimar 1940 is particularly well-suited to measurements with narrow tolerances. Its cutting-edge carrier frequency measuring system means it can be connected to the evaluation instruments in the same way as an inductive probe.

Millimar X 1941. Air/Electronic Converter

Air/electronic converters convert the signals from pneumatic measuring equipment (air pressure) into electrical signals. The piezo-electrical measuring system means that the **X 1941** air/electronic converter can be finely aligned with most of the pneumatic systems on the market. The **Millimar X 1941** has an analog signal output. It can therefore be very easily connected to the measuring computer and control system.

Millimar 1901 TA Measuring Amplifier

Features

- The 1901 TA measuring amplifier is used to connect inductive probes to measurement control systems
- It supplies the inductive probe with an alternating voltage and converts the carrier frequency measuring signal into an output voltage
- Output voltage ± 10 V (additional option: ± 5 V / 0 V to 10 V) at the end of measuring range
- An output signal in the form of a ± 5 mA current is also available at the end of the measuring range
- Supply voltage 24 V DC
- The 1901 TA casing is designed to form an integral part of the machine environment

Millimar. Evaluation Instruments

GETTING THE MEASURE OF COMPLEX MEASUREMENT TASKS

Evaluation instruments have many different applications and therefore need to meet a broad range of requirements. They can perform anything from simple measurements on the shop floor to complex applications with a whole host of test features in fully automated production lines. These applications require high levels of reliability and precision combined with straightforward operation. Millimar evaluation instruments meet these requirements perfectly. Robust, compact, bright light-strip instruments, measurement interfaces for a wide range of applications and easy-to-use measuring computers can all be adapted for different probes and tailored to suit your particular application.

Millimar C 1208 / C 1216

Compact, user-friendly length measuring instrument

Description

Millimar C 1208 / C 1216 are ideal for performing simple measuring tasks quickly. Measuring results are arranged clearly on the large backlit LCD display. Millimar C 1208 / C 1216 are very easy to operate thanks to the use of preferences.

Features

Display
- Backlit LCD display with an analog and a digital display

Functions
- Preferences: Frequently required settings can be called up directly by pressing SELECT
- Static and dynamic measurements
- Auto-detect mode: Two measuring devices can be operated independently of each other
- One- or two-point master measurement

Connections
- Inputs for inductive probes or pneumatic measuring devices
- RS 232 interface
- Analog output
- 3 digital inputs and outputs

Accessories / Versions

Millimar C 1208 / C 1216
- 2 inputs for inductive probes with 3 compatibility options
- 1 inputs for pneumatic measuring devices (only C 1208)
- Millimar **D1000S** configuration software
- **Millimar C 1216** also has:
  Programmable analog output voltage,
  Resolution 0.1 µm to 0.01 µm (5.0 µin to 1.0 µin) (switchable)

Millimar C 1245

Flexible length measuring instrument for a wide range of tasks

Description

The modular design of the **Millimar C 1245** means it can also be easily adapted to future measuring tasks. This considerably improves the cost-effectiveness of your measuring equipment.

Features

Display
- Analog indicator instrument and two-line LCD display

Functions
- Static and dynamic measurements
- Equation editor
- Auto-detect mode: up to 6 measuring devices can be operated independently of each other
- One- or two-point master measurement

Connections
- 1 to 8 measuring device inputs
- RS 232 interface
- Analog output
- 3 digital inputs and 6 digital outputs

Accessories / Versions

Millimar C 1245
- 4 inputs for inductive probes with 2 compatibility options
- Up to 2 inputs for pneumatic measuring devices
- 2 inputs for incremental probes
- 4 inputs for DC signals

Millimar S 1840

Length measuring instrument with three-color illuminated bar graph

If you want to record and evaluate measured values at a glance, the **Millimar S 1840** column gage is the perfect tool for the job, both for measurements using inductive probes and for probes with air gages.

Features

Display
- Three-color illuminated bar graph, two-line LCD display

Functions
- Static and dynamic measurements
- Auto-detect mode: Two measuring devices can be operated independently of each other
- One- or two-point master measurement

Connections
- Inputs for inductive probes or pneumatic measuring devices
- RS 232 interface
- Analog output
- 3 digital inputs and outputs

Accessories / Versions

Millimar S 1840
- 2 inputs for inductive probes with various compatibility options
- 1 input for pneumatic measuring devices
- Millimar **D1000S** configuration software

Millimar S 1841

Intelligent recording and clear display of complex measuring tasks

The **Millimar S 1841** multiple column measuring instrument is the ideal multi-gaging unit for the production environment. It combines the power of a state-of-the-art measuring computer with the clarity of an illuminated bar graph.

Features

Display
- Up to 4 indicating strips with three-color illuminated bar graph and LCD display

Functions
- Static and dynamic measurements
- Equation editor
- Auto-detect mode: Up to 6 measuring devices can be operated independently of each other
- One- or two-point master measurement

Connections
- 1 to 16 measuring device inputs
- RS 232 interface
- Analog output
- 6 digital inputs and 12 digital outputs

Accessories / Versions

Millimar S 1841
Up to 4 displays and up to 4 modules with measuring channels for each of the following: 4 inductive probes, 1 pneumatic measuring device, 2 incremental probes, 4 DC signals

Millimar X 1715

Intelligent measurement interface system

Description

Millimar X 1715 is a smart, universal measurement interface system for complex measuring tasks in production environments. It acts as a signal transformer between sensors and the electronic measurement data processing system.

Features

Functions
- Static and dynamic measurements
- Equation editor
- Definition of 16 features possible
- One- or two-point master measurement

Connections
- 1 to 8 measuring device inputs
- RS 232 interface
- Analog output
- 3 digital inputs and 6 digital outputs

Accessories / Versions

Millimar X 1715
- Up to 2 modules, each with
  - 4 channels for inductive probes
  - 1 channel for pneumatic measuring devices
  - 2 channels for incremental probes
  - 4 channels for DC signals
  - 2 channels for temperature sensors

Millimar X 1741

Intelligent measurement interface system

Description

Record measured values and calculating them directly in the interface as early as possible is child's play with the **Millimar X 1741**. By giving you the option of transferring just a few calculated features, it also helps increase the reliability of your automated application.

Features

Functions
- Static and dynamic measurements
- Equation editor
- Definition of up to16 features
- One- or two-point master measurement

Connections
- 1 to 16 measuring device inputs
- RS 232 interface
- 2 analog outputs
- 6 digital inputs and 12 digital outputs

Accessories / Versions

Millimar X 1741
- Up to 4 modules, each with
  - 4 channels for inductive probes
  - 1 channel for pneumatic measuring devices
  - 2 channels for incremental probes
  - 4 channels for DC signals
  - 2 channels for temperature sensors

Millitron 1260

Multi-gaging measuring computer

Description

Millitron 1260 is a process computer for measuring and evaluating several measuring values simultaneously. It is very easy to change the settings. The **Millitron 1260** can be very rapidly adapted to new measuring tasks.

Features

Display
- Color LCD display, status lamps

Functions
- Static and dynamic measurements
- Equation editor
- One- or two-point master measurement
- SPC functions

Connections
- 12 measuring device inputs
- RS 232 interface
- 3 digital inputs and 3/27 digital outputs
- VGA monitor connection, printer connection

Accessories / Versions

Millitron 1260
- Compatible with 19.4 kHz inductive probes

Millitron 1260
- Compatible with 13 kHz inductive probes

Millitron 1260 T
- In IP54 casing and additional digital outputs

SPC Software D1100X

SPC measuring computer software for length metrology

Description

Combining the Millimar X 1715 / X 1741 measurement interface with a standard PC creates a universal SPC measuring computer for length metrology.

Input masks result in simple configuration for all manner of measurement tasks.

In addition to the probes' adjustment and working ranges, the free stroke and lift-off limits can also be monitored in order to enhance the measuring certainty of a system or instrument.

The software is operated using the function keys of a standard ASCII keyboard or an operator keyboard for industrial applications. The required peripherals, such as probe boxes, inputs and outputs, are connected via an RS-232C interface and/or a network connection.

Features

Computer-independent software package for Windows 2000® and Windows XP® Professional operating systems.
- Displays bar charts, measuring records, images of parts, control charts and histograms
- Evaluation of tolerances, warning limits, machine capability (cm, cmk) and process capability (cp, cpk)
- Up to 32,000 measuring programs in mixed operation
- Maximum 192 statistical characteristics per measuring program
- Static and dynamic measuring functions as well as free formula editor to link the measuring channels
- One- or two-point master measurement
- Data export in the ASCII, Excel or qs-STAT format

Millimar. Overview of Evaluation Instruments

Millimar




	C 1208 / C 1216	C 1245	S 1840	S 1841
Display	LCD display with analog indicator, and two-line digital display	Analog indicator instrument Two-line digital display	1 illuminated bar graph, two-line digital display	1 to 4 illuminated bar graphs, 1 to 4 two-line digital displays
Measuring channels	Depending on the type, up to: • 2 inductive probes • 1 pneum. meas. device	Depending on the type, up to: • 8 inductive probes • 4 incremental probes • 2 pneum. meas. devices • 8 analog signals • 2 temperature sensors or a mixture of these inputs	Depending on the type, up to: • 2 inductive probes • 1 pneum. meas. device	Depending on the type, up to: • 16 inductive probes • 8 incremental probes • 4 pneum. meas. devices • 8 analog signals • 4 temperature sensors or a mixture of these inputs
Inductive probe compatibility (carrier frequency)	19.4 / 13 / 5 kHz	19.4 / 13 / 5 kHz	19.4 / 13 / 5 kHz	19.4 / 13 / 5 kHz
Display range	± .10, 30, 100, 300, 1,000, 3,000, 10,000 µm ± .0003, .0001, .0003, .001, .003, .01, .03 inch	± .10, 30, 100, 300, 1,000, 3,000, 10,000 µm ± .0003, .0001, .0003, .001, .003, .01,.03 inch	± .10, 30, 100, 300, 1,000, 3,000, 10,000 µm ± .0003, .0001, .0003, .001, .003, .01, .03 inch	± .10, 30, 100, 300, 1,000, 3,000, 10,000 µm ± .0003, .0001, .0003, .001, .003, .01, .03 inch
Resolution	0.1 µm or 0.01 µm 5 µin or 1 µin	0.1 µm or 0.01 µm 5 µin or 1 µin	0.1 µm 5 µin	0.1 µm 5 µin
Combination	A/-A/B/-B/ A+B/A-B/-A+B/-A-B	Equation editor for 80 characters Functions: + / -/ */ ÷ / () / factor	A/-A/B/-B/ A+B/A-B/-A+B/-A-B	Equation editor for 80 characters Functions: + / -/ */ ÷ / () / factor
Features / program	2 / 2	16 / 6	2 / 2	16 / 6
Test steps	1	6	1	6
Dynamic measurement	MAX, MIN, MAX-MIN, (MAX+MIN)/2, mean value	MAX, MIN, MAX-MIN, (MAX+MIN)/2, mean value	MAX, MIN, MAX-MIN, (MAX+MIN)/2, mean value	MAX, MIN, MAX-MIN, (MAX+MIN)/2, mean value
Statistical functions	No	N, x-bar, S, Xmax, Xmin, Range	No	N, x-bar, S, Xmax, Xmin, Range
Classification	No	Max. 998, max. 79 on I/O	No	Max. 998, max. 79 on I/O
Control inputs and outputs / SPC connection	3 digital inputs 3 digital outputs	3 digital inputs 6 digital outputs	3 digital inputs 3 digital outputs	6 digital inputs 12 digital outputs
Analog output	1 (only C 1216)	1	1	2
Network	Via COM server	Via COM server	Via COM server	Via COM server
Measured value memory	400 values	5,000 values	400 values	5,000 values
SPC statistics	No	No	No	No
Data export	ASCII	ASCII	ASCII	ASCII
Printer	Mahr MSP2	Serial printer with ASCII mode	Mahr MSP2	Serial printer with ASCII mode
Configuration	PC, keyboard	PC, keyboard	PC, keyboard	PC, keyboard
System	Controller	Controller	Controller	Controller
Dimensions	160 x 205 x 165 mm 6.30 x 8.07 x 6.50 in	160 x 205 x 165 mm 6.30 x 8.07 x 6.50 in	47 x 487 x 150 mm 1.85 x 19.17 x 5.91 in	235 x 487 x 245 mm 9.25 x 19.17 x 9.65 in

Millimar. Overview of Evaluation Instruments

Millimar

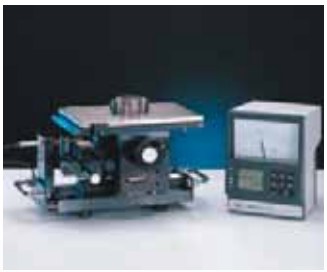


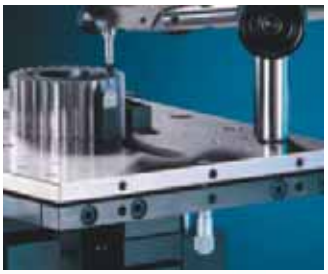

	X 1715	X 1741	1260	M.A.C.-6E Touch
Display	None Only via PC D1000X software incl. in the scope of delivery	None Only via PC D1000X software incl. in the scope of delivery	6" color LCD	15" TFT screen Touchscreen
Measuring channels	Depending on the type, up to: • 8 inductive probes • 4 incremental probes • 2 pneum. meas. devices • 8 analog signals • 2 temperature sensors or a mixture of these inputs	Depending on the type, up to: • 16 inductive probes • 8 incremental probes • 4 pneum. meas. devices • 8 analog signals • 4 temperature sensors or a mixture of these inputs	for: • 12 inductive probes • 2 incremental probes • 4 digital meas. instruments	Depending on the configuration level 4 to 496 for • inductive probes • incremental probes • pneum. meas. devices, analog signals
Inductive probe compatibility (carrier frequency)	19.4 / 13 / 5 kHz	19.4 / 13 / 5 kHz	19.4 / 13 / 5 kHz	19.4 / 13 / 5 kHz
Display range	± .10, 30, 100, 300, 1,000, 3,000, 10,000 µm ± .0003, .0001, .0003, .001, .003, .01, .03 inch	± .10, 30, 100, 300, 1,000, 3,000, 10,000 µm ± .0003, .0001, .0003, .001, .003, .01, .03 inch	± .10, 30, 100, 300, 1,000, 3,000, 10000 µm ± .0003, .0001, .0003, .001, .003, .01, .03 inch	± .10, 30, 100, 300, 1,000, 3,000, 10,000 µm ± .0003, .0001, .0003, .001, .003, .01, .03 inch
Resolution	0.1 µm 5 µin	0.1 µm 5 µin	0.1 µm 5 µin	0.1 µm or 0.01 µm 5 µin or 1 µin
Combination	Equation editor for 80 characters Functions: + / -/ */ ÷ / () / factor	Equation editor for 80 characters Functions: + / -/ */ ÷ / () / factor	Equation editor for 38 characters Functions: + / -/ */ ÷ / factor	Freely programmable
Features / program	16 / 6	16 / 6	50 / 40	192 / 32,000
Test steps	6	6	40	8
Dynamic measurement	MAX, MIN, MAX-MIN, (MAX+MIN)/2, mean value	MAX, MIN, MAX-MIN, (MAX+MIN)/2, mean value	MAX, MIN, MAX-MIN, (MAX+MIN)/2, mean value	MAX, MIN, MAX-MIN, mean value freely programmable
Statistical functions	N, x-bar, S, Xmax, Xmin, Range	N, x-bar, S, Xmax, Xmin, Range		Optional
Classification	Max. 998, max. 79 on I/O	Max. 998, max. 79 on I/O	50 / 18 on I/O	128
Control inputs and outputs / SPC connection	3 digital inputs 6 digital outputs	6 digital inputs 12 digital outputs	3 digital inputs 3 digital outputs (27 digital outputs with 1260T)	32 digital inputs 32 digital outputs Profibus, …
Analog output	1	2	No	No
Network	Via COM server	Via COM server	Via COM server	Network card
Measured value memory	5,000 values	5,000 values	10,000 values	Measured value files on hard disk
SPC statistics	No	No	Yes	Yes
Data export	ASCII	ASCII	ASCII, VISUSTAT	ASCII, EXCEL, qs-STAT
Printer	Serial printer with ASCII mode	Serial printer with ASCII mode	Parallel printer with ASCII mode	Windows system USB standard printer
Configuration	PC, keyboard	PC, keyboard	Keyboard	Panel PC
System	Controller	Controller	Controller	µP: Celeron M WIN 2000, XP Prof.
Dimensions	160 x 205 x 165 mm 6.30 x 8.07 x 6.50 in	235 x 180 x 160 mm 9.25 x 7.09 x 6.30 in	330 x 240 x 350 mm 12.99 x 9.45 x 13.78 in	

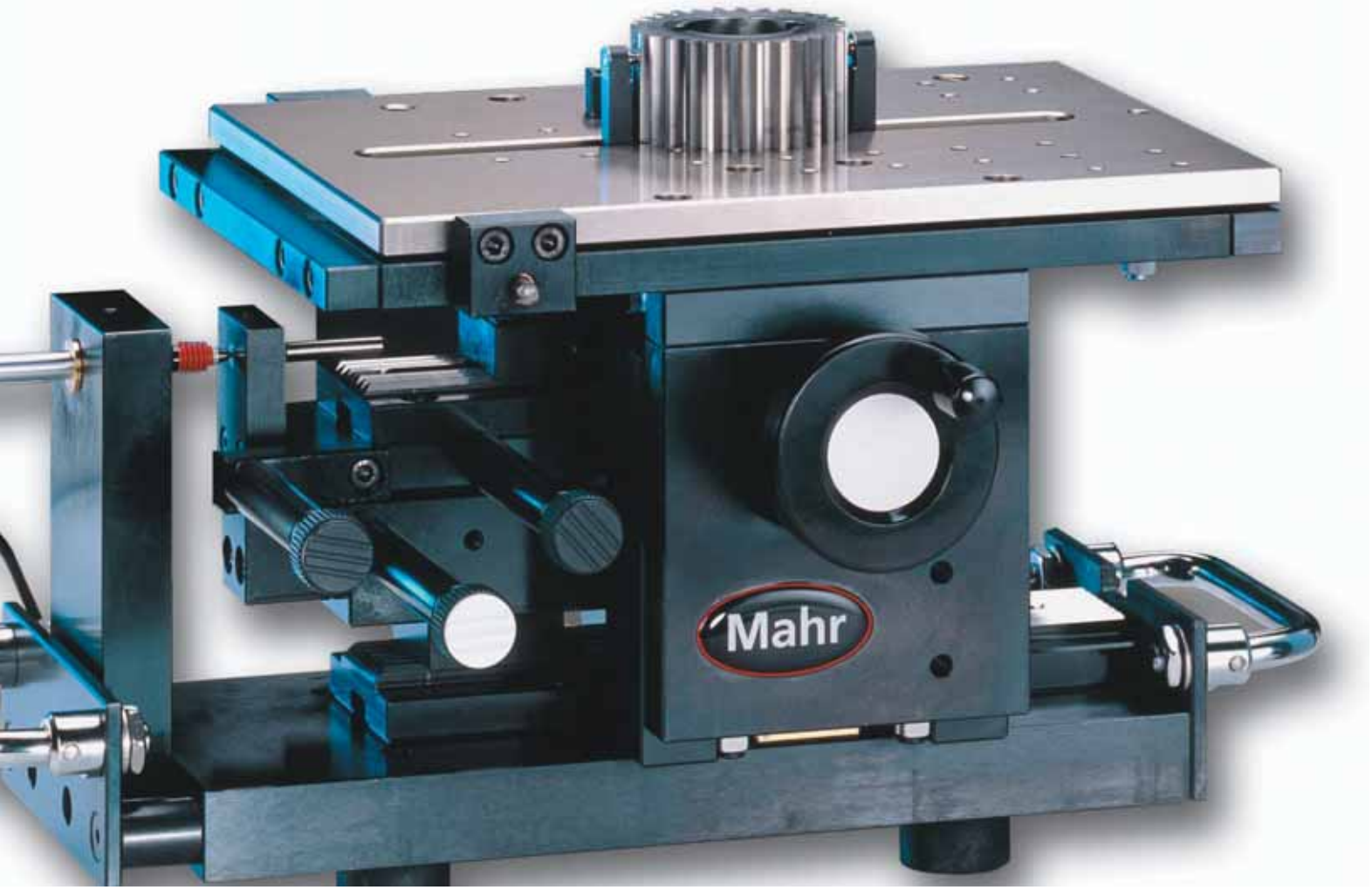
Millimar. Measuring Instruments

HIGH PRECISION AND RELIABILITY

► | The heart of any measuring system lies in the measurement mechanics. The stability of the measuring circuit governs the precision and repeatability of the measured values that the gage can achieve. As well as precise positioning of the workpiece being tested, moving parts such as slides and levers are also very important. The guides and precision bearings used make a crucial difference to the quality of your application. Diamar ID/OD gages from Mahr provide ergonomic solutions for all your inside and outside diameter testing needs. The comprehensive modular system of Millimar gages from standard elements is based on state-of-the-art elements for all measurements on shaft-shaped workpieces that is robust, easy to use and highly accurate. | ◄







Diamar nk

Universal length measuring instrument

Description

Diamar has an extremely wide range of applications.

It can be used for testing lengths, diameters, heights, toothing and much more. It also features numerous accessories.

Technical Data

	DIAMAR nk	DIAMAR 280
Measuring ranges:		
Outside diameter	0 mm to 225 mm (0 in to 8.86 in)	0 mm to 150 mm (0 in to 5.9 in)
Inside diameter	5 mm to 225 mm (.197 in to 8.86 in)	5 mm to 150 mm (.197 in to 5.9 in)
Measuring uncertainty	< 2 µm (78 µin)	< 2 µm (78 µin)
Repeatability	< 2 µm (78 µin)	< 2 µm (78 µin)
Measuring arm lift-off	25 mm (1 in)	20 mm (.78 in)
Measuring force	0.1 N to 10 N, adjustable	0.5 N to 3 N fixed
Setting range of the support table:		
Height setting	50 mm (1.96 in)	45 mm (1.77 in)
Angle of tilt	-	2 degrees
Length of the column	220 mm (8.66 in)	220 mm (8.66 in)
Dimensions		
Length	420 mm (16.5 in)	300 mm (11.8 in)
Width	180 mm (7.0 in)	180 mm (7.0 in)
Height	155 mm (6.1 in)	160 mm (6.29 in)

Diamar 280

Universal length measuring instrument

Versions

Diamar nk
- Base with 350 mm x 180 mm (13.7 in x 7.0 in) table top
- Probe holder / dial indicator holder
- Height-adjustble table top, adjustment range 50 mm (1.96 in)

Diamar nk
- As above, but table top not height-adjustable

Diamar 280
- As above, but height-adjustable table top 255 mm x 180 mm (13.7 in x 7.0 in), with height adjustment range of 45 mm (1.77 in) and table tilt facility

Accessories

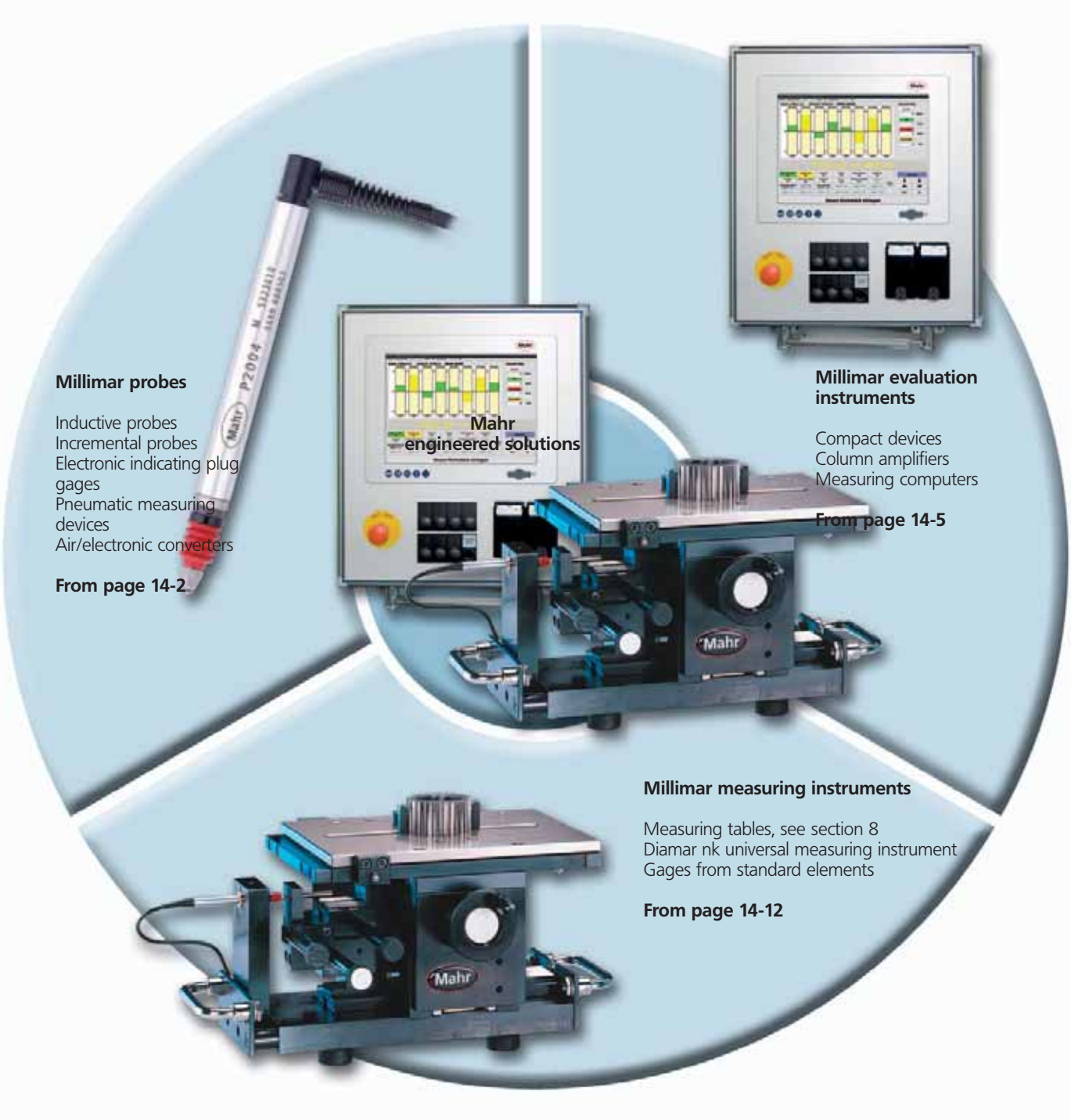
Part-specific accessories such as measuring arms, anvils, stop rail, locating plate and locating pin available on request.

All **Millimar probe-based instruments**, dial gages and dial comparators can be used as evaluation instruments.

Millimar. Engineered Solutions

MEASURING INSTRUMENTS FOR DIMENSIONAL METROLOGY

► I The design and manufacture of high-precision, reliable part-specific gages requires extensive metrological experience and expertise. Cutting-edge Millimar length measurement components provide reliable measuring instruments for a wide range of different workpiece geometries with different levels of automation. Our portfolio covers all the necessary project stages up to the point where the measuring device is handed over, ready for operation, to the customer. These include project planning, design, manufacture, assembly, putting into service and training. I ◄



Millimar. Engineered Solutions

The ever growing precision and productivity of machine tools is increasingly shaping the development of production technology. This is leading to improved stability and reliability in production processes. It also means full testing is no longer needed within the manufacturing chain. Nonetheless, the need for test equipment for use outside the production process is increasing accordingly.

The requirements for these – generally – single-purpose measuring instruments are:

- Appropriate precision in the mechanical sector which represents the core of the measuring instrument
- Reliability, robust design and ergonomic handling for use in demanding production environments
- Probes with appropriate resolutions and linearities for repre-senting narrower and narrower manufacturing tolerances
- Evaluation systems that take into account the increased speed of IT development and are able to condense measured values into statistical data and transfer this data to control consoles for process monitoring

Project planning

Workpiece drawings are used in close cooperation with the customer to define the requirements of the gage in terms of: Measurement task, test quantity, test scope, test cycle, recording and processing of measured values, loading and unload, level of automation, classification, evaluation, calibration, documentation, system environment, system interfaces, special acceptance testing regulations and much more.

Design

Experienced designers develop the ideal technical solution for your measuring task, taking into account all the special requirements that the measuring instrument needs to satisfy. A part-specific gage is produced based on the high-precision, reliable components in the Mahr *Length Metrology* product range. This includes an extensive amount of data relating to modules and assemblies for existing gages.

Manufacture and assembly

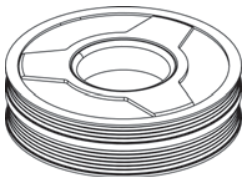
Individual parts are manufactured and assembled by skilled experts in our DIN EN ISO 9001 and VDA 6.4 certified plant in Göttingen or in our ISO 9001 certified plant in Providence RI, USA.

Putting into service

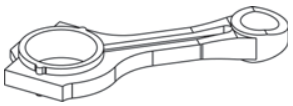
Instruments can be put into service, including integration into the production line, and acceptance testing can be performed either at the Mahr plant or at the installation location. If required, this can also be done in accordance with the customer's own procedures and/or internal standards (i.e. measuring instrument compatibility certificate).

Gear shaft
Smooth and interrupted diameters, length measurements, radial run-out, axial run-out, etc.

Pulley
Concentricity and axial run-out of the keyway relative to the reference surface, keyway diameter and height dimensions, etc.

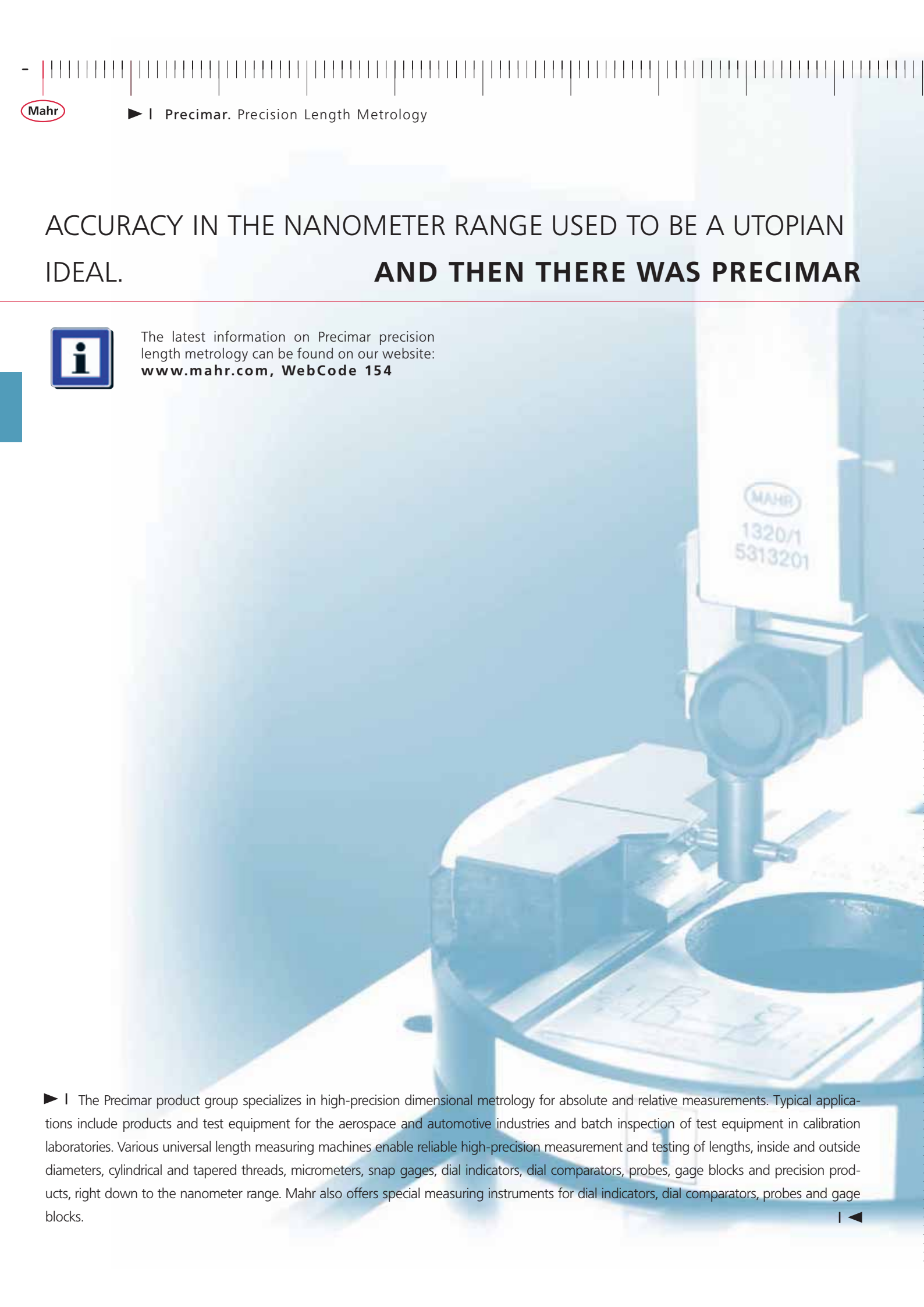


Connecting rod
Diameter, ovality, conicity, parallelism, distortion, perpendicularity, center distance, etc.



ACCURACY IN THE NANOMETER RANGE USED TO BE A UTOPIAN IDEAL. **AND THEN THERE WAS PRECIMAR**

The latest information on Precimar precision length metrology can be found on our website:
www.mahr.com, WebCode 154



► | The Precimar product group specializes in high-precision dimensional metrology for absolute and relative measurements. Typical applications include products and test equipment for the aerospace and automotive industries and batch inspection of test equipment in calibration laboratories. Various universal length measuring machines enable reliable high-precision measurement and testing of lengths, inside and outside diameters, cylindrical and tapered threads, micrometers, snap gages, dial indicators, dial comparators, probes, gage blocks and precision products, right down to the nanometer range. Mahr also offers special measuring instruments for dial indicators, dial comparators, probes and gage blocks. | ◄

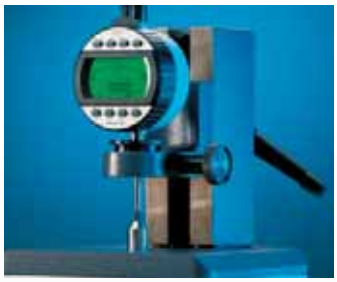
Precimar. Precision Length Metrology

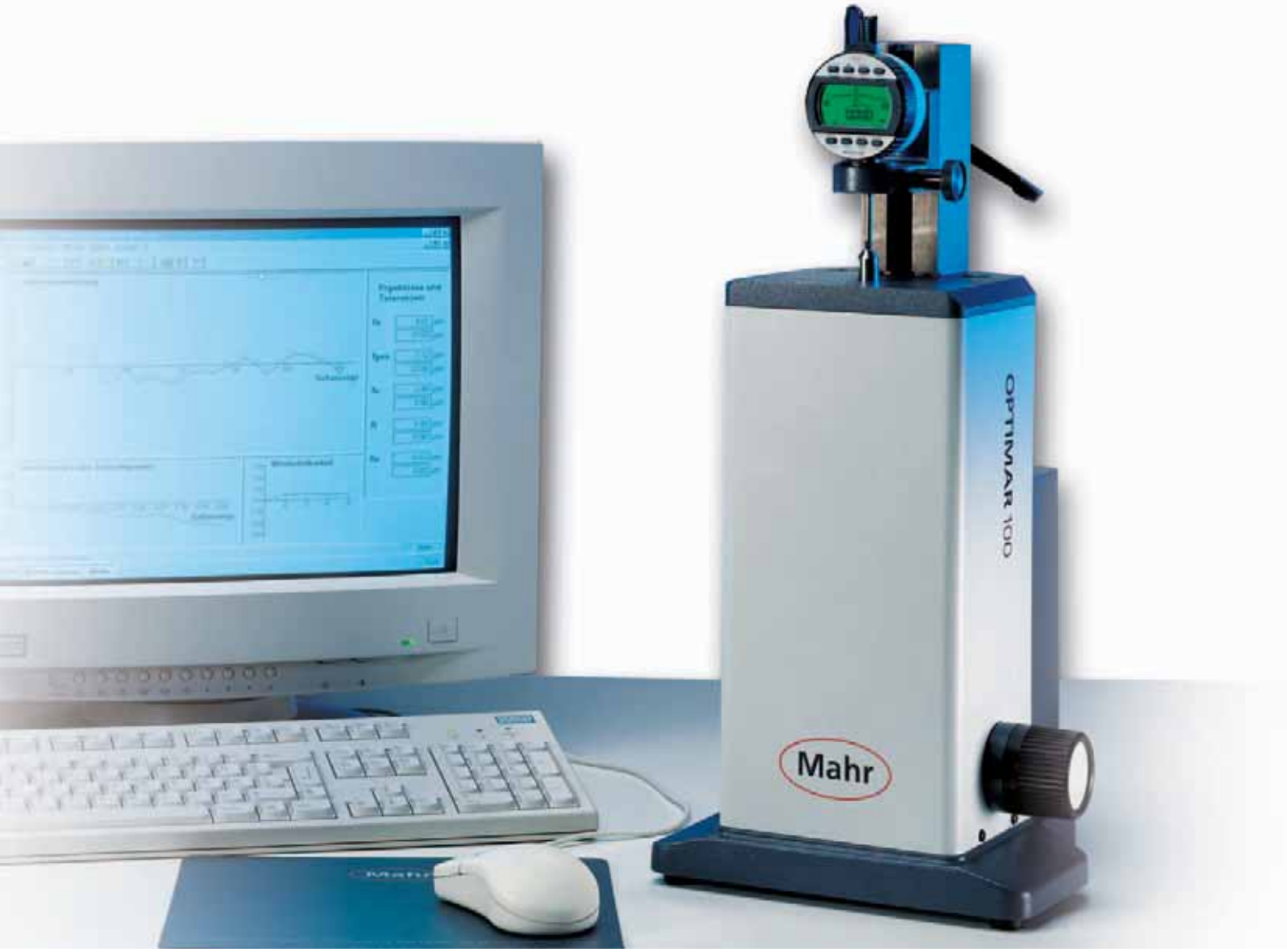
Request a brochure.

Precimar. Dial Indicator Testing Instruments

SEMI- AND FULLY AUTOMATED TESTING OF MEASURING EQUIPMENT WITH DISPLAYS

► | Dial indicator testing instruments from Mahr ensure efficient and precise metrology. These instruments provide absolute measurements for dial indicators, dial comparators, lever-type test indicators, dial bore gages and inductive and incremental probes. Typical applications include dial indicator testing in all branches of industry, inspection rooms, calibration laboratories and production at dial indicator manufacturers. With the Optimar 100, Mahr offers a practical solution for both cost-effective, semi-automated testing of analog dial indicators and efficient, fully automated testing of digital measuring equipment. | ◄



Optimar 100

Universal dial indicator testing machine

Description

The cost-effective testing station for semi- or fully automated testing of dial indicators, dial comparators, lever-type test indicators, dial bore gages and inductive and incremental probes.

Designed as a table-top unit, the **OPTIMAR 100** is user-friendly and ensures fast test runs. It features a motorized drive and is equipped with a high-resolution measuring system. The test run is software-controlled.

Features

- For dial indicators, dial comparators, lever-type test indicators, dial bore gages, digital dial indicators and inductive and incremental probes
- Automation of sub-processes (automated pre-positioning) using motorized measuring spindle drive
- Fully automated measuring run for digital devices
- **OPTIMAR 100** may be used horizontally (e.g. for measuring dial bore gages)
- Testpiece mounting via vertical guide. Height can be adjusted quickly (adaptation of testpieces to different measuring ranges)
- Rigid machine casting
- For testpieces with a shaft diameter of 8 mm, 28 mm or optionally 3/8 in
- Electronic handwheel for manual control of the measuring spindle's movement. Self-adjusting sensitivity of the electronic handwheel for adaptation to the specific action or measuring task
- Ergonomic design of all control elements
- Compliance with the Abbe comparator principle for maximum measuring accuracy
- LIF 101 measuring system with computer-aided error compensation. Testing of dial bore gages without loss of accuracy
- Measuring uncertainty in vertical and horizontal directions: MPEE1 = ± (0.2 + L/100) µm, L in mm at T = 20 °C ± 0.5 °C, permissible temperature gradient 0.1 K/h
- **Mahr software** or **QMSOFT software**

Applications

- For both analog dial indicators, dial comparators, lever-type test indicators and dial bore gages and digital dial indicators and inductive / incremental probes.

Request a brochure or see WebCode 2421.

Accessories

- Mount for lever-type test indicators
- Large selection of adapters for digital dial indicators and inductive / incremental probes
- Please ask for customized adapters if required
- Probe can be connected to Optimar via probe box
- Holder for dial bore gages; dial bore gage measurements are performed as for a dial comparator
- Device for force sensor on request
- **OPTIMAR** can be recalibrated by your Mahr service center

Technical Data

Optimar 100	**Order No. 5320005**
Range of measuring spindle	100 mm (4 inch)
Measuring system	LIF 101 with correction of measured values
Digital increment	0.02 µm (1 µin)
Measuring uncertainty (MPE_{E1})	(0.2 + L/100 with corr.) µm, L in mm
Positioning speed	Max. 2 mm/s (0.08 in/s)
Positioning Pre-positioning: Fine positioning:	 Automatic Electronic knob
Supply voltage	Via plug-in power supply unit 110/230 V/9 V AC, 18 VA
Dimensions (L x W x H)	235 mm x 216 mm x 480 mm (9.25 in x 8.50 in x 18.9 in)

Precimar. Gage Block Comparator Models 130B-24 and 130B-16

Better than ever: Models 130B-24 and 130B-16
– the industry standard

Description

The **130B-24** gage block comparator from **Mahr Federal** is the preferred choice of many major calibration laboratories. It is exclusively designed for comparative gage block measurements. The **130B-24** model measures the industry's key dimensional standards with the ultimate in resolution and reproducibility.

Features

- A unique "floating measuring frame" ensures precise point-to-point measurement
- Single-sensor design minimizes electronic noise
- Finely balanced system optimizes control of measuring forces
- Resolution of 0.1 µin (0.001 µm)
- Reproducibility of 0.2 µin (0.005 µm) ($6\sigma < 1$ µin/0.025 µm)
- Measuring capacity of 0.010 in to 4 in (0.25 mm to 100 mm)
- Integrated measuring software and user interface
- Built-in positioner for reproducible measuring positions
- Thermometer with precision probes available as an option

Gage block positioner
An accurate positioner is built into the platen of the 130B-24. The reference gage block and the testpiece gage block are loaded into the openings in the template. The mechanism swings into place between the contact points and positions the gage blocks – first the reference gage block and then the testpiece gage block in its reference position and in its corners. Three easily exchangeable templates are included, one for square and two for rectangular (30 mm and 35 mm) gage blocks. Other templates are available as optional extras. The positioner is suitable for gage blocks from 0.02 in (0.5 mm) to 4 in (100 mm) long.

It can be fitted for right- or left-handed users or removed completely if necessary.
An acrylic breath shield is included to protect the measuring area against body heat. Please see our special brochure for further information on the **software.**

Technical Data for 130B-24 / 130B-16

Size (without computer)	Approx. 15 in x 15 in x 23 in (385 mm x 385 mm x 590 mm)
Weight (without computer)	Approx. 225 lbs (100 kg)
Max. gage block length	0.010 in to 4 in (0.25 mm to 100 mm)
Measuring force	
(upper contact)	3 oz (0.8 N)
(lower contact)	1 oz (0.3 N)
Contact tip material	Tungsten carbide (diamond - optional)
Contact tip radius	0.125 in (3.175 mm)
Sensor range	± 0.015 in (± 0.38 mm)
Measuring range	± 500 µin (±10.0 µm)
Reproducibility	6 σ < 1 µin (25 nm) measured on a 1 in gage block without removing the gage block
Linearity	Deviation <1 µin over the central ± 50 µin and <1 µin in any 50 µin within the ± 500 µin meas. range < 20 nm over the central ± 1 µm and < 20 nm in any ± 1 µm within the 10 µm meas. range

Precimar 130B-16

Model 130B-16 for longer gage blocks

The same highly linear, stable electronics as the 130B-24

Designed for gage blocks of up to 600 mm (24 in) but can also measure shorter blocks.
Approx. size (without computer)
385 mm x 385 mm x 1,016 mm
(15 in x 15 in x 40 in)
Approx. weight (without CPU)
140 kg (309 lbs)
Measuring length
2.5 mm to 600 mm (0.10 in to 24 in)
Measuring force

(upper probe)	1.1 N
(lower probe)	0.6 N

All other data as for the **130B-24**.

Request a brochure or see WebCode 10259.

Precimar 826 PC Gage Block Measuring Unit

Description

The **826 PC** gage block measuring unit is fast, reliable and extremely precise. In comparative measurement, it achieves a reproducibility of ± 0.01 µm (± 1 µin).

An open and extremely rigid L-shaped stand forms the basis for the two opposing high-precision probes, and the perfectly level measuring table.

Work is made easy thanks to straightforward one-handed operation for manipulating reference and test gage blocks on the measuring table.

The open design provides visual contact during testing. The user is able to view the measuring process at all times which helps to ensure a unique level of process reliability.

Two professional measuring and evaluation programs (software) meet all the needs of internal gage block tests, calibration laboratories and gage block manufacturers.

The **826** enables quick and straightforward high-precision testing of rectangular and square gage blocks in both inch and metric up to 170 mm (6.69 in) long in accordance with ISO 3650.

Features

- Rigid cast-iron stand ensures a stable temperature
- Vertical slide with upper probe easily adjustable
- Very ergonomic and convenient one-handed operation for positioning the gage blocks under the probe
- Fine adjustment via rigidly connected parallelogram springs
- Electropneumatic lifting of the probes
- Extremely smooth manipulator operation thanks to high-precision ball bushings
- Measurement not influenced by manual force applied
- Gage blocks easy to move on the measuring table thanks to round, hardened high-precision support pins
- No zero point setting required because the set value is offset by the stored actual allowance of the respective reference gage block
- Very effective protection from heat due to an acrylic glass screen along the front and sides of the unit (available as an option)
- Flattening correction
- Correction of differing coefficients of thermal expansion
- Calculation of mean values
- Two measuring and evaluation programs:
  Calibration and data management or additionally with customer management, gage block storage management and multi-test-unit management

Technical Data

826 gage block measuring unit Order No. 4448003

Application range	0.5 mm to 170 mm (0.02 in to 6.69 in)
Usable table surface	60 mm x 55 mm (2.36 in x 2.17 in)
Reproducibility	± 0.01 µm (1 µin)
Stylus ball radius, upper probe	1.5 mm (0.06 in)
Stylus radius, lower probe	1.5 mm (0.06 in)
Direct measuring range	0.2 mm (0.008 in)
Weight	37 kg (81.6 lbs)

For testing gage blocks over 170 mm long (central length lm) we recommend the **ULM**, **828 CiM** or **PLM** universal measuring machines.

Request a brochure or see WebCode 2335.

Accessories

- **QM-Block** calibration software for calibration and data management of gage blocks and sets of gage blocks
- The evaluation software runs under Windows® NT/2000/XP

Precimar. Length Metrology for Any Application

► | Nowadays, length metrology is used in many very different areas. LINEAR length measuring instruments are used as setting and measuring instruments for general shop floor applications. The well-established ULM universal length measuring instruments are the standard quality assurance instruments for calibration metrology. They are used for high-precision length measurements on precision parts. The motorized PLM and CiM instruments enable user-friendly, fast and reliable measurement with minimum uncertainty. Typical applications include precision products and test equipment. With an extensive selection of products – ranging from the straightforward LINEAR length measuring instrument and the ULM instruments to the high-precision, semi-automated CiM universal measuring machine – Mahr offers practical solutions for production environments, inspection rooms and calibration laboratories. In other words, it provides high-precision metrology with extremely efficient measurement processes. | ◄

Precimar. LINEAR 100

Description

LINEAR 100 is a universal, user-friendly length measuring instrument for rapid, precise internal and external measurements up to 100 mm (3.94 in), directly in the production environment. The unit's simple design makes it possible to carry out measurements in no time at all and adapt quickly to new measurement tasks.

Features

- Damped measuring spindle with selectable measuring forces
- Measuring force remains virtually constant over the entire measuring range
- Direct measuring range of 50 mm (1.97 in)
- Integrated measuring system based on the Abbe principle
- Adjustable measuring table for precise measuring position adjustment
- Combined internal/external measurement possible without resetting
- Easily exchangeable anvils which can be tailored to suit the specific measurement task
- Solid cast body to avoid stresses and twisting errors
- UNITRON 2CHA 2-channel display (with optional stand)
- The UNITRON display has an RS 232 interface, making it easy to transfer measured values to PCs

Universal single-axis length measuring instrument with two-channel display

Request a brochure or see WebCode 12282-8090.

Precimar LINEAR 400 / 800 / 1200 / 1600 / 2000

Description

LINEAR length measuring instruments from **Mahr** are ideal for use as setting and adjusting instruments in the manufacturing environment. They allow precise setting of internal and external comparators, internal precision measuring instruments, snap gages with displays and many other measuring instruments.

Features

Applications

- Setting measuring instruments with displays such as the Multimar 844T
- Setting two-point internal measuring instruments such as the 844 N
- Checking setting standards
- Checking calipers
- Checking dial bore gages
- Measuring cylindrical parts
- Measuring internal dimensions and bores, etc.

Versions

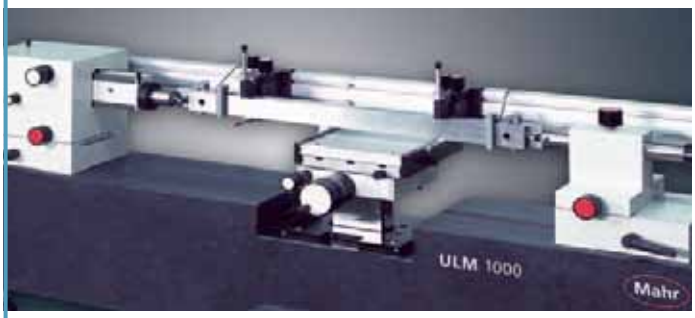
LINEAR 400
LINEAR 800
LINEAR 1200
LINEAR 1600 (on request)
LINEAR 2000 (on request)

Universal single-axis length measuring and setting instruments

Request a brochure or see WebCode 12283.

Precimar ULM 300 / 600 / 1000 / 1500 for Calibration Metrology

Universal length measuring instruments



Description

Model
Comparator with horizontal base (highly homogeneous and rigid granite)

Measuring system

X-axis:	Incremental, high-precision Heidenhain length measuring system, 100 mm (3.94 in) long
Z-axis	Incremental Heidenhain reflected light measuring system, 80 mm (3.15 in) long

Drives

X-axis:	Manual movement and fine motion control
Y-axis:	Micrometer, 25 mm (0.98 in) (analog or digital)
Z-axis:	Permanent field motor for motorized adjustment of object table height with 3 speeds

Measuring force generation
Mechanical using weights

Operation
- Measuring spindle, manual
- Air bearings make it very easy to position the measuring element and counter-element manually (not with ULM 300)
- Height of object table can be adjusted using keypad

Features

- Excellent measuring accuracy
- 100% compliance with Abbe comparator principle
- Online temperature measurement with 2 to 4 sensors
- Computer-aided correction of systematic machine errors (CAA)
- Computer-aided stabilization of instrument zero point
- Computer-aided correction of temperature and measuring force influences
- Measuring force remains constant over the entire measuring spindle adjustment range
- Large object table (load capacity 25 kg / 55.12 lbs) guided with high precision in the Z-direction
- Automatic reversal point recognition for static and dynamic measured value acquisition
- Great flexibility in the application range
- Large number of modular accessory sets and components to solve the most diverse measurement tasks, including threads, tapers, tapered threads and gears
- Measuring and evaluation software runs under MS Windows

Details on metrological accessories are available on request.

Versions

ULM 300
ULM 600
ULM 1000
ULM 1500

Request a brochure or see WebCode 10454.

Precimar ULM 520 S / 1000 S / 1400 S / 1700 S

Description

Model
Comparator with horizontal base (highly homogeneous and rigid granite)

Measuring system

X-axis:	In the measuring element, incremental high-precision Heidenhain length measuring system, 100 mm (3.94 in) long; in the base, incremental Heidenhain reflected light measuring systems over entire length of base to left and right of object table
Z-axis:	Incremental Heidenhain reflected light measuring system, 80 mm (3.15 in) long

Drives

X-axis:	Manual movement and fine motion control
Y-axis:	Micrometer, 25 mm (0.98 in) (analog or digital)
Z-axis:	Permanent field motor for motorized adjustment of object table height with 3 speeds

Measuring force generation
Mechanical using weights

Operation
- Measuring spindle, manual
- Air bearings make it very easy to position the measuring element and counter-element manually
- Height of object table can be adjusted using keypad

Features

- Combined measuring instrument for very high-precision measurements in the range up to 100 mm (3.94 in) and standard-precision measurements over the entire range of movement of the measuring element and counter-element. X measured value formed from the measuring systems of the measuring element and the base
- Particularly recommended for measurements on large testpieces, but also suitable for measurements on smaller testpieces
- Online temperature measurement with 3 sensors
- Computer-aided stabilization of instrument zero point and correction of systematic machine errors (CAA)
- Measuring force remains constant over the entire measuring spindle adjustment range
- Computer-aided correction of temperature and measuring force influences
- Large object table (load capacity 25 kg / 55.12 lbs) guided with high precision in the Z-direction
- Large number of modular accessory sets and components to solve the most diverse measurement tasks, including threads, tapers, tapered threads, gears and balls

Large universal length measuring instruments with large direct measuring range

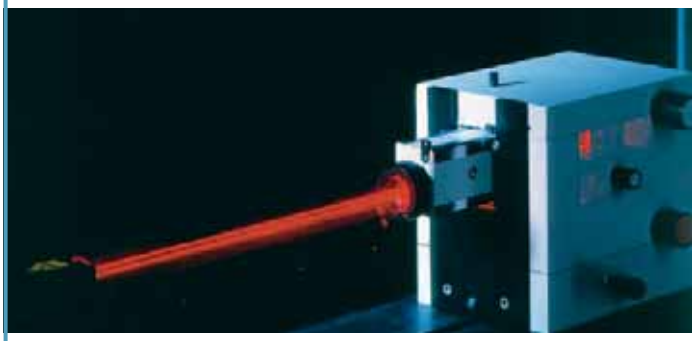
Versions

ULM 520 S
ULM 1000 S
ULM 1400 S (on request)
ULM 1700 S (on request)

Request a brochure or see WebCode 10455.

Precimar ULM 800 L / 1500 L

Universal length measuring instruments with laser measuring system



Description

Model
Comparator with horizontal base (highly homogeneous and rigid granite)

Measuring system

X-axis:	Interferential laser measuring system, 525 or 1,115 mm (20.67 or 43.90 in) long
Z-axis:	Incremental Heidenhain reflected light measuring system, 80 mm (3.15 in) long

Drives

X-axis:	Manual movement and fine motion control
Y-axis:	Micrometer, 25 mm (0.98 in) (analog or digital)
Z-axis:	Permanent field motor for motorized adjustment of object table height with 3 speeds

Measuring force generation
Mechanical using weights

Operation
- Measuring spindle, manual
- Air bearings make it very easy to position the measuring element (with laser reflector) and counter-element manually
- Height of object table can be adjusted using keypad

Features

- A high-end length measuring instrument with a large direct measuring range
- 100% compliance with Abbe comparator principle
- Correction of laser in terms of environmental influences such as temperature and air pressure (humidity optional)
- Separate laser generating unit outside the measuring instrument and supply by means of light-conducting cable plus laser unit cover
- Computer-aided stabilization of instrument zero point and correction of systematic machine errors (CAA)
- Online temperature measurement and computer-aided correction of temperature and measuring force influences
- Measuring force remains constant over the entire measuring spindle adjustment range
- Large object table (load capacity 25 kg / 55.12 lbs) guided with high precision in the Z-direction
- Automatic reversal point recognition for static and dynamic measured value acquisition
- Very flexible application range (both the very smallest and large testpieces can be measured)
- Large number of modular accessory sets and components to solve the most diverse measurement tasks, including threads, tapers, tapered threads and gears
- Evaluation software 828 WIN

Main Applications

Calibration of

- Plain plug and ring gages
- Setting rings
- Snap gages
- Spherical gages, gages for deep bores
- Gage blocks
- Thread gages
- Taper and tapered thread gages
- Spline gages
- Dial indicators
- Dial comparators
- 2-point dial bore gages
- Micrometers

Versions

ULM 800 L
ULM 1500 L

Request a brochure or see WebCode 10456.

Precimar PLM 600-2 for Precision Length Metrology

Description

The motorized **Precimar PLM 600-2** enables user-friendly, fast and reliable measurement with minimum uncertainty. Typical applications include precision products and test equipment.

Maximum measuring accuracy is achieved thanks to single-step measured-value generation, exact compliance with the Abbe comparator principle, the high-quality incremental length measuring system and the CNC-controlled measuring carriage.

Other key features are the low-friction measuring force generation and the CNC-controlled measuring height adjustment. The machine bed is made of granite and uses an air-bearing measuring slide with a 200 mm (7.87 in) active travel range.

828 WIN from **Mahr** or external evaluation software.

Universal length measuring machine

Features

- The Precimar **PLM 600-2** features a universal measuring table with 5 finely adjustable axes and 20 kg (44 lbs) load capacity, a state-of-the-art PC-based multiple-axis machine control system with PC workstation, the **828 WIN** "Free Measurement" basic software and a calibration certificate
- Straightforward operation using a measuring force-controlled, joystick-operated measuring slide, with progressive deflection characteristic and automatic contact detection
- Automatic detection of internal and external measurements and computer-aided reversal point detection
- A motorized measuring slide allows high travel speeds
- The CNC-controlled motorized vertical movement of the support table results in excellent measuring efficiency
- State-of-the-art machine control, data recording, processing, logging and transfer with powerful software and menu-driven operation
- Software compensates for thermal dimensional deviations
- Software enables very straightforward setting and changing of measuring force
- Low measuring uncertainty due to the use of aerostatic guides for all slides supported by the machine bed
- Electronic measuring force control and automatic contacting minimize subjective influences and prevent unintentional collisions with the testpiece

Versions

- **PLM 600-2** with **CNC-**controlled object table (Z-axis)

Machine for absolute and relative measurement.
Typical applications include products and test equipment for the aerospace and automotive industries and series testing of test equipment in calibration laboratories.
The machine is designed for measuring lengths, inside and outside diameters, cylindrical and tapered threads, dial indicators, dial comparators, probes, long gage blocks, etc.

Accessories

- Wide range of accessories for measuring
  - inside diameters (bores and rings, including large rings)
  - outside diameters (longitudinal, transverse and vertical mounting devices for use between centers or V-blocks)
- Huge variety of internal and external measurements thanks to numerous easily exchangeable styluses
- Fast, straightforward thread measurements on rings and mandrels thanks to semi-automated processes and a wide range of stylus balls / wires

Details on metrological accessories are available on request.

Request a brochure or see WebCode 2380.

Precimar 828 CiM 1000

Precision length measuring machine

- Operation is simplified by a measuring force-controlled, joystick-operated measuring slide with progressive deflection characteristic, automatic contact detection, automatic detection of internal and external measurements and computer-aided reversal point detection
- High measuring slide travel speeds and motorized vertical movement of the support table
- Machine control, data recording, processing, logging and transfer using powerful, menu-driven software
- Minimum measuring uncertainty due to the use of aerostatic guides for all slides supported by the machine bed, the mobile bearing of the measuring spindle over a spring parallelogram which is free of both play and friction, electronic regulation of measuring forces and automatic contacting. This minimizes subjective influences and prevents unintentional collisions with the testpiece
- Correction of systematic deviations and reduction of random deviations result in a standard MPE_{E1} measuring uncertainty of (0.075 + L/1,000) µm (L in mm) (at 20.0 °C in inspection room, class 1 VDI/VDE 2627)
- Measuring force is easy to set with a software click and compensation of thermally induced dimensional deviations can be switched on and off

Description

Superb performance, measuring runs of unique perfection and high-quality computer technology allow quality management that far exceeds the EN 29 000... / ISO 9000 guidelines.

The motorized **CiM 1000** allows user-friendly, fast, reliable measurement with uniquely low measuring uncertainty. Typical applications include precision products and test equipment.

The extremely high measuring precision is achieved using air-bearing components, practically friction-free measuring force generation, exact adherence to the Abbe comparator principle, a high-quality incremental length-measuring system and a CNC-controlled measuring slide. The machine bed is made of granite and uses an air-bearing measuring slide with a 300 mm (11.81 in) active travel range. The object table and left-hand measuring support can be moved to vary the application range from 0 to 1,000 mm (0 to 39.37 in) (external measurements). The 5-axis object table allows very efficient measurement with its CNC-controlled vertical movement.

828 WIN measuring software from Mahr or external software.

Features

- The **Precimar 828 CiM 1000** features a universal measuring table with 5 finely adjustable axes and 20 kg (44 lbs) load capacity, a state-of-the-art Power PC-based multiple-axis machine control system with PC workstation, the 828 WIN "Free Measurement" basic software and a calibration certificate

Versions

- **828 CiM 1000** with CNC-controlled object table (Z-axis)

Machine for absolute (up to 300 mm / 11.81 in) and relative measurement with maximum precision. Typical applications include products and test equipment for the aerospace and automotive industries and series testing of test equipment in calibration laboratories.

The 828 CiM 1000 is designed for measuring lengths, inside and outside diameters, cylindrical and tapered threads, dial indicators, dial comparators, probes, long gage blocks, snap gages, external micrometers, etc.

Accessories

- Wide range of accessories for measuring
  - inside diameters (bores and rings, including large rings)
  - outside diameters (longitudinal, transverse and vertical mounting devices for use between centers or V-blocks)
- Huge variety of internal and external measurements thanks to numerous easily exchangeable styluses
- Fast, straightforward thread measurements on rings and mandrels thanks to semi-automated processes and a wide range of stylus balls / wires

Details on metrological accessories are available on request.

Request a brochure or see WebCode 2092.

Precimar Dial Indicator Testing Instruments

	Optimar 100
Measuring range (mm)	100
Length measuring deviation MPE_{E1} (µm)	0.2 + L/100
Testing direction	Vertical and horizontal
Mode of operation	Semi-automated, fully automated

Precimar Gage Block Measuring Units

	826 PC	130B-24	130B-16
Testing range (mm)	0.5 to 170	0.25 to 100	2.5 to 600
Gage blocks (in)	European (rectangular) and U.S. (square)	0.010 to 4	0.10 to 24
Reproducibility (µm)	0.01	6 σ <1 µin (25 nm)	

Precimar Length Measuring Instruments for Production Environments

	LINEAR 100	LINEAR 400	LINEAR 800	LINEAR 1200
Outside measuring range (mm)	0 to 100	9 to 420	0 to 820	0 to 1,120
Inside measuring range (mm)	15 to 100	2 to 250	2 to 650	2 to 1,050
Length measuring deviation MPE_{E1} (µm)	1 + L/100	0.7 + L/1,000	0.7 + L/1,000	0.7 + L/1,000
Mode of operation	manual	manual	manual	manual

Precimar Length Measuring Machines for Calibration and Precision Metrology

	ULM Series	PLM 600-2	CiM 1000
Outside measuring ranges (mm)	0 to 1,740*	0 to 600	0 to 1,000
Inside measuring ranges (mm)	0.5 to 1,605*	0.5 to 445	0.5 to 845
Direct meas. range (mm)	100 to 1,740*	200	300
Length meas. deviation MPE_{E1}(µm)	0.1 + L/2,000 / 0.3 + L/1,500	0.15 + L/1,500	0.075 + L/1,000
Reproducibility (µm)	0.05 / 0.1	0.05	0.03
Measuring force (N)	in steps from 1 to 11	0.1 to 13.9 infinitely adjustable	0.1 to 13.9 infinitely adjustable
Size of object table (mm)	160 x 160	350 x 150	350 x 150
Object table load capacity (N)	250	200	200
Mode of operation	manual	motorized - CNC	motorized - CNC

* according to unit type

FROM THE THUMBNAIL TEST…

… TO MARSURF.

The latest information on MARSURF products can be found on our website: **www.mahr.com, WebCode 158**

► | Wherever surface structures influence the function, processing or appearance of components or products, careful testing is essential. But how can surfaces be tested? At the beginning of the 20th Century, experts still had to test by eye and touch. A practiced eye can detect features in the µm range, and even the much maligned thumbnail test delivered perfectly acceptable results. Now however, we live in an age of interchangeable parts and globalization, where subjective tests like this are no longer adequate. Today, computer-aided measuring instruments provide objective data. Measurement and evaluation have become considerably easier. For decades, Mahr has been a worldwide pioneer in this area, as demonstrated by the company's numerous innovations and patented solutions in the field of surface roughness metrology. The interplay between the stylus, drive and measuring setup plays a key role in influencing the quality of surface measurement tasks. This is where Mahr's core expertise comes in, as demonstrated by the company's numerous innovations and patented solutions. Over this time, we have succeeded in perfecting the stylus method, which is now in widespread use throughout the world. We can meet even the most demanding requirements for non-contact measurement, e.g. where extremely soft materials or ultra-short measuring times are involved, thanks to the range of optical sensors offered in the MarSurf product family. Developed with Mahr quality, expertise and know-how, MarSurf is the solution for all your surface metrology needs. | ◄

MarSurf. Surface Metrology

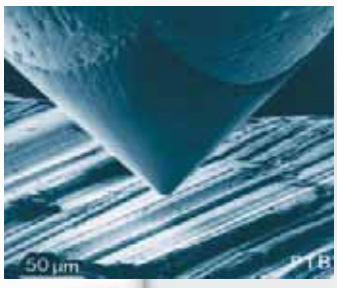
MarSurf. The Surface Metrology System for all Your Industry's Needs

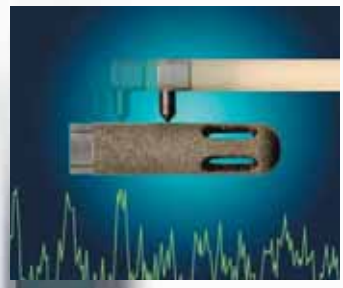
THE RIGHT SOLUTION FOR EVERY TASK

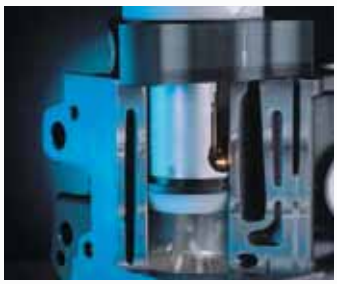
► | MarSurf has a universal range of applications. Key industries include:

- Automotive industry
- Electronics industry
- Mechanical engineering industry
- Medical industry

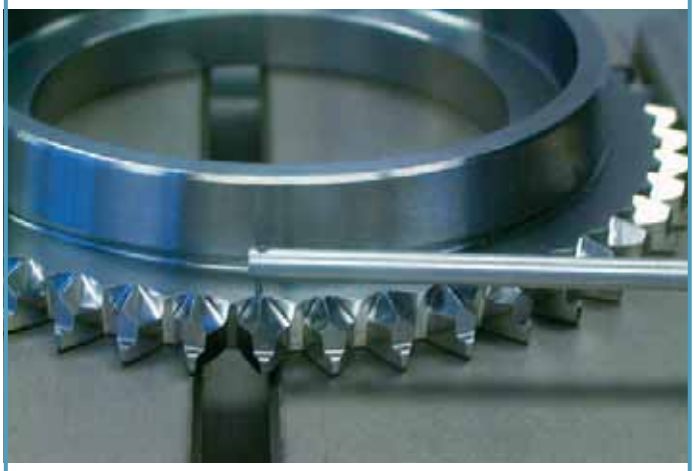
| ◄







Automotive Industry



Measurements on synchronous rings

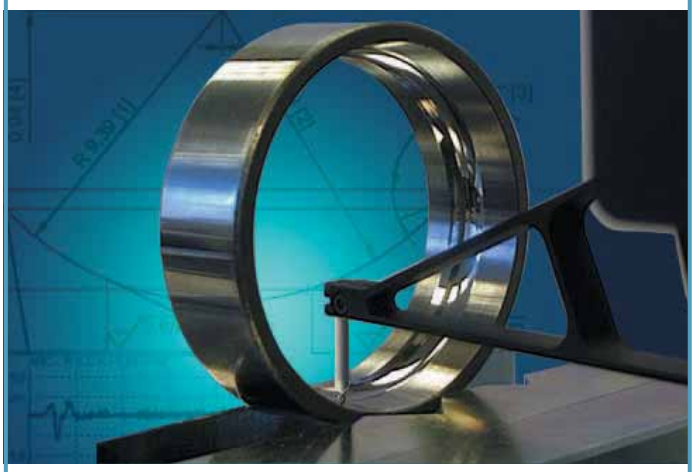
The automotive industry is often at the forefront of surface and contour measurement. Typical applications include measurements on crankshafts, camshafts, transmission components and engine parts. The measurement of the root geometry including roughness measurement for synchronous rings ensures both easy and smooth gear changing and a long service life.

Electronics Industry

Measurements on wafer surfaces

Measurements can be performed in no time at all using optical sensors such as the **MarSurf WS1** system in this example, which uses the principle of white light interferometry. The vertical resolution of 0.1 nm (0.004 µin) ensures maximum precision. The powerful MarWin software platform with the **MarSurf XT 20** allows quick and easy topography evaluation.

Mechanical Engineering Industry



Measurements on ball rings

Ball races today need high-precision radii and minimum form deviation. Roughness measurement ensures smooth running and long service life with as little running noise as possible. MarSurf meets these requirements through user-friendly evaluation software and extremely quiet drive units.

Medical Technology

Measurements on hip joints

Hip joint measurements need to be extremely accurate. Both the contour and roughness of the ball and/or socket affect the durability and performance of the joint.

MarSurf. Handy and Precise for On-site Roughness Measurements

MOBILE ROUGHNESS MEASUREMENT DEVICES

► I Mahr has played a key role in ensuring the success of mobile roughness measurement devices. As early as the 1980s, Mahr was setting new standards with the M4P. The products have developed in line with changing production monitoring requirements. Today's devices meet the highest international standards. Mobile roughness measurement devices from Mahr are lightweight with a convenient shape for flexible handling. They offer high-precision measurements in different positions and easy positioning using V-blocks. I ◄

Request a brochure or see WebCode 2409.

MarSurf PS1. Absolute Mobility in Surface Metrology

Entry-level roughness measurement

Description

The **MarSurf PS1** lives up to its claim of "**Absolute mobility**" in all manner of ways, providing:

- **Battery operated**
  Over 500 measurements without having to recharge the instrument
- **An all-in-one solution** that is no larger than a digital camera. Small and lightweight (400 g / 0.88 lbs)
- **Instrument flexibility**
  The standard range of functions is sufficient for this all-purpose smart little instrument to perform your measuring tasks
- **All the measuring positions you need**
  Can be used horizontally, vertically, upside down or in any other position required by the component
- **24 parameters**
  Offer the same range of functions as a laboratory instrument
- **Error-free operation** thanks to an integrated roughness standard
- **Automatic cutoff selection** (patented) so that even non-specialists are ensured correct measuring results
- **Simple operation**
  The brief guide in pocket diary format reflects how simple the PS1 is to use. You quickly get to grips with the essential features, enabling you to complete your measuring tasks with excellent results

MarSurf PS1. The Set

The **MarSurf PS1** comes in a complete set. Thanks to the carrying case, you always have your surface roughness measuring instrument with you as you pass through the production floor. Quick and reliable on-the-spot measurements ensure your quality requirements are met during the production process or incoming goods inspection.

The set contains:

- MarSurf PS1 base unit
- Drive unit
- 1 standard probe conforming to standards
- Built-in battery
- Roughness standard integrated into casing
- Height adjustment accessory
- Probe protection
- Charger / mains adapter
- Operating instructions
- Carrying case with shoulder strap and belt loop
- USB cable
- Mahr calibration certificate.

Order No. 6910210

MarSurf PS1. Technical Data

Unit of measurement	Metric, inch
Measuring principle	Stylus method
Probe	Inductive skidded probe, 2 µm (80 µin) stylus tip, measuring force approx 0.7 mN
Parameters (24, with tolerance limits)	Ra, Rq, Rz (Ry (JIS) corr. to Rz), Rz (JIS), Rmax, Rp, Rp (ASME), Rpm (ASME), Rpk, Rk, Rvk, Mr1, Mr2, A1, A2, Vo, Rt, R3z, RPc, Rmr (tp (JIS, ASME) corr. to Rmr), RSm, R, Ar, Rx
Languages	14 including 3 Asian languages
Measuring range	350 µm, 180 µm, 90 µm (0.014 in, 0.007 in, 0.004 in)
Profile resolution	32 nm, 16 nm, 8 nm (1.3 µin, 0.6 µin, 0.3 µin)
Filter*	Phase-correct profile filter (Gaussian filter) as per DIN EN ISO 11562, special filter as per DIN EN ISO 13565-1, ls filter as per DIN EN ISO 3274 (can be disabled)
Cutoff lc*	0.25 mm, 0.8 mm, 2.5 mm; automatic (0.010 in, 0.030 in, 0.100 in)
Traversing length Lt*	1.75 mm, 5.6 mm, 17.5 mm; automatic (0.070 in, 0.22 in, 0.70 in)
Traversing length (MOTIF)	1 mm, 2 mm, 4 mm, 8 mm, 12 mm, 16 mm (0.04 in, 0.08 in, 0.16 in, 0.32 in, 0.48 in, 0.64 in)
Short cutoff*	Selectable
Evaluation length ln*	1.25 mm, 4.0 mm, 12.50 mm (0.050 in, 0.15 in, 0.50 in)
Sampling lengths*	Selectable: 1 to 5
Calibration function	Dynamic
Memory capacity	Max. 15 profiles, max. 20,000 results
Other functions	Blocking of settings (code-protected), date/time
Dimensions	140 mm × 50 mm × 70 mm (5.51 in × 1.97 in × 2.76 in)
Weight	400 g (0.88 lbs)
Battery	Li-ion battery
Interfaces	USB, MarConnect (RS232)
Long-range power supply	100 V to 264 V

* in accordance with ISO/JIS

MarSurf PS1. Accessories

80 mm (3.15 in) probe extension **Order No. 6850540**
for example, for measuring points located deep within cylinders.

PHT 3-350 probe **Order No. 6111521**
for measurements in bores from dia. 3 mm (0.12 in).

PHT 11-100 probe **Order No. 6111524**
for measurements at recessed measuring points,
e.g. in grooves from 2.5 mm (0.10 in) wide and up to 7.5 mm (0.30 in) deep.

PHTR 100 probe **Order No. 6111525**
for measurements on concave and convex surfaces.

PHTF 0.5-100 probe **Order No. 6111522**
for measurements on tooth flanks.

PT 150 probe **Order No. 6111523**
Dual-skid probe for measurements on metal sheets and roller surfaces according to DIN EN 10049 (SEP).

Probe set (not illustrated) **Order No. 6910213**
consisting of
- PHT 3-350 probe (6111521)
- PHT 11-100 probe (6111524)

Accessory set (not illustrated) **Order No. 6910212**
consisting of
- Probe extension (6850540), length 80 mm (3.15 in)
- Adapter for transverse tracing (6850541)
- Measuring stand mount (6910201)
  Allows the MarSurf PS1 to be mounted on the Mahr ST-D / ST-F / ST-G family of measuring stands
- End face V-block (6910203)
  Suitable for measurements on flat faces of cylindrical and planar components

Printer set **Order No. 6910211**
consisting of **MSP2** printer with connection cable (**MarConnect**)

Multilingual PS1 Explorer PC Software **Order No. 6910205**
for documenting results and saving profiles on a PC. 14 languages.

MarSurf XR 20 evaluation software **Order No. 6299009**
for easy **MarWin**-based evaluation and documentation.

Perthometer M1

Entry-level roughness measurement

Description

The **Perthometer M1** is an investment that soon pays for itself, offering outstanding performance, straightforward operation, a minimum number of keys, convenience and value for money.

Features

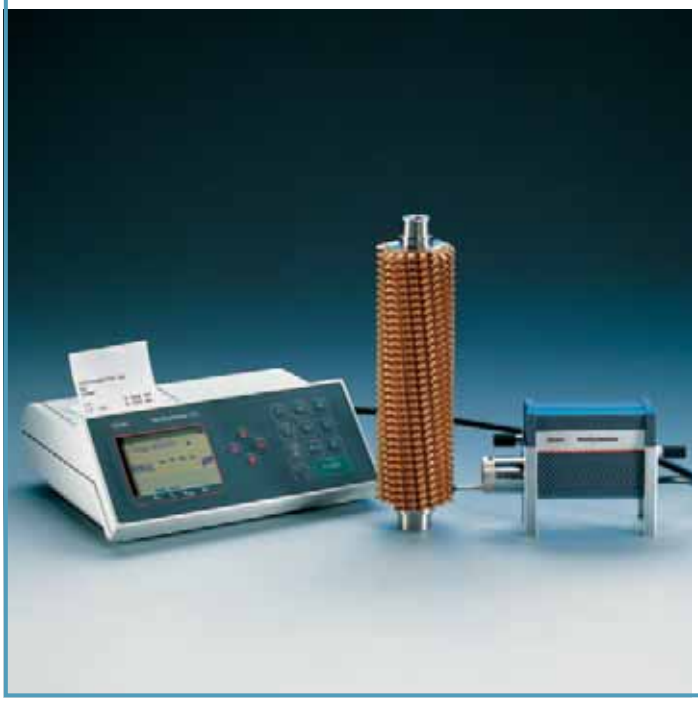
- Patented automatic function for profile detection and standardized setting of filters and associated traversing lengths
- Parameters as per DIN / ISO / ASME/ SEP: Ra, Rz, Rmax, RPc, JIS: Ra, Rz
- Handy shape and lightweight design of evaluation and drive unit ensure maximum flexibility

Accessories

- The scope of delivery includes a handy carrying case with probe, drive unit and other accessories
- Other application aids are available as optional extras to ensure easy handling in line with manufacturing requirements

Perthometer M2

Highly mobile, high-performance unit



Description

In addition to all the features of the M1, the **Perthometer M2** also supports the most common parameters, characteristic curves and parameter lists (e.g. material ratio) and evaluation in accordance with JIS or ISO (including CNOMO).

Features

- The **Perthometer M2** features integrated storage for approx. 200 measurements
- Further functions include tolerance monitoring, vertical scale selection and setting of asymmetric intersection lines for peak count calculations
- Support as per DIN EN ISO 12085 (Motif)
- Date and time of measurement specified

Accessories

- The scope of delivery includes a serial cable and an M-trans software that converts the data in the internal memory into a txt file

Mobile Roughness Measurement

Efficient application aids for manufacturing

Description

Surface measurements on workpieces in the manufacturing environment require special tools.

In addition to the standard axial measurement direction with the **PFM** drive unit, a transverse measurement is also required in some cases. The **PFM 2** drive unit of the M series is ideal for this task.

Typical applications for transverse tracing include:

- Measurements on bearings
- Measurements on crankshafts and camshafts
- Measurements in confined spaces

Perthometer M Equipment Sets

Supplied complete in a carrying case

Perthometer M1 set	**Order No. 6910134**
Traceable calibration	**Order No. 9963102**
Perthometer M2 set	**Order No. 6910135**
Traceable calibration	**Order No. 9963102**

For PC Evaluation

- Current MarSurf XR 20 software
- USB dongle
- License file on 3.5" diskette
- Serial data cable – 9s/9s

Order No. 6299009

Request a brochure or see WebCode 2451.

Mobile Roughness Measurement

Efficient application aids for manufacturing

MarSurf BF-1

Description

Tough manufacturing environments require quick and easy roughness measurement. The shop floor is particularly demanding on measuring instruments. **Application aids** from **Mahr** are the perfect solution.

Features

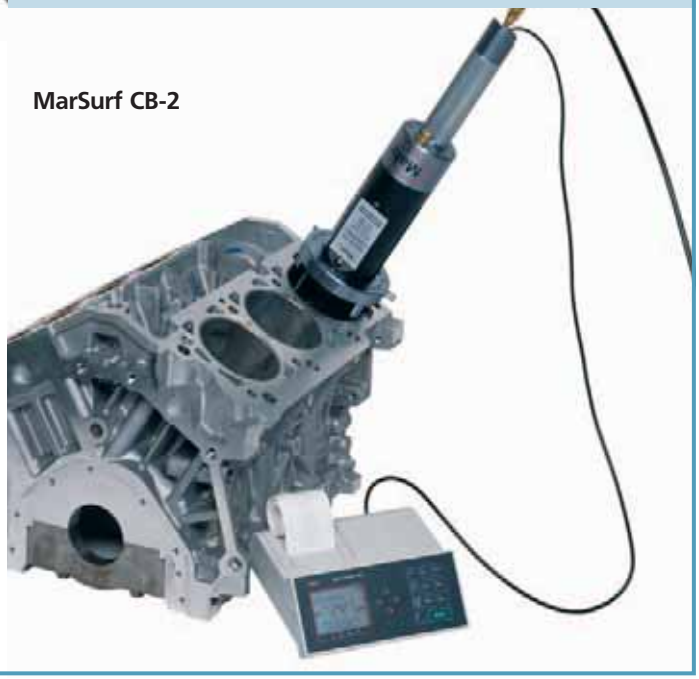
Our application aids work with evaluation instruments in the **M1** or **M2** series. A calibration and storage station is included in the scope of delivery. Calibration standards are available, with a calibration certificate if required.

- Special design allows precise, easy positioning of measuring instrument
- Easy to use even without specialist metrological knowledge
- Drive unit protected from environmental influences that might disrupt the measurement
- Probe protection, i.e. probe is only extended during measurement
- Surface protection material ensures measurement leaves no marks on the workpiece

MarSurf CS-1

MarSurf DR-1

MarSurf CB-2



MarSurf. Surface Measuring Instruments for Manufacturing Environments

SURFACE MEASURING STATION FOR MANUFACTURING ENVIRONMENTS AND INSPECTION ROOMS

► I Mahr stationary surface measuring instruments for manufacturing environments are high-performance and user-friendly devices. Their flexibility they offer for evaluation and documentation makes them ideal for the increasingly demanding tasks on the shop floor. Standardized roughness, waviness and profile parameters are evaluated in accordance with international standards like ISO, JIS and ASME. Skidless probes with easily exchangeable stylus tips support rapid adaptation to frequently changing measurement tasks. I ◄

Request a brochure or see WebCode 2413.

Perthometer S2

Stationary and mobile surface measuring instrument

Description

The **Perthometer S2** meets all the surface evaluation requirements of today's manufacturing environments. It is easy to use and offers an excellent price-performance ratio.

Features

- More than 40 parameters can be selected
- Simple operation and extensive documentation options
- Easy creation of measuring programs
- Automatic or variable selection of filters and traversing lengths
- Various calibration functions
- Integrated statistical functions
- SPC and RS 232 interface
- Mobile measurements with non-skidded probes

Accessories

- Connection and evaluation options for **Mahr** roughness drive units with datum plane **PZK**, **GD 25**, **PGK 120**
- Carrying and storage case
- Extensive range of accessories including measuring stands, V-blocks, X/Y tables, etc.

Perthometer S2 for the Sheet Metal Industry

Roughness measurement on metal sheets and rollers

Description

The roughness depth structure on sheet metal surfaces significantly affects ductility and the coating process. The **Perthometer S2** with special accessories is ideally suited to the needs of the sheet metal industry.

Features

- Standard-compliant measurement as per SEP 1940 V3 (EN 10049:2004)
- Battery-operated mobile measurement on coil / roller with high battery capacity
- Simple operation and extensive documentation options
- Automatic calibration function
- SPC and RS 232 interface
- Unit configuration allows immediate measurement without prior alignment

Accessories

- **PZK** drive unit with adapter and hand-held V-block
- **RT 250** probe as per SEP
- Carrying case

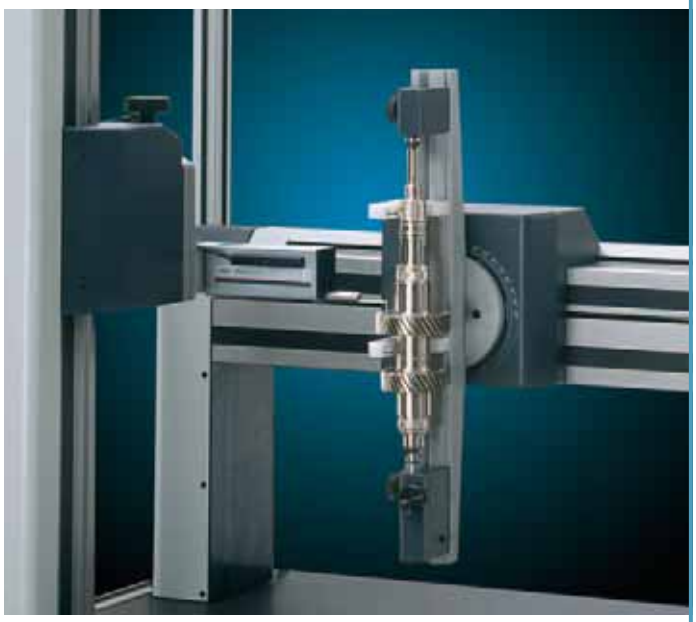
MarSurf. PC-based Stationary Surface Measuring Stations
VERSATILE, HIGH-PERFORMANCE UNITS FOR INSPECTION ROOM AND LABORATORY

► | In surface metrology, a distinction is made between mobile units, stationary shop-floor units and PC-based surface measuring instruments. The latter provide the very best measurement and evaluation performance for surface measurement tasks. They fulfill all the key requirements of a state-of-the-art PC-based measuring and evaluation system, including compliance with international standards, versatile evaluation methods, comprehensive documentation, large storage capacity, data export and import and networking with other systems. Comprehensive QA procedures ensure the highest quality and stability of software and hardware. | ◄

Request a brochure or see WebCode 2564.

MarSurf XR 20

Roughness and waviness measurement made easy



Description

MarSurf XR 20 is the perfect unit for moving into top-flight surface metrology. This PC-based unit supplies all the common parameters and profiles in accordance with international standards, both in the inspection room and on the shop floor. The high-performance **MarSurf XR 20** is the fruit of decades of surface metrology experience combined with forward-looking technology, clear symbols and straightforward operating aids.

Features

- Over 65 parameters may be selected for R, P and W profiles as per ASME / ISO / JIS or MOTIF (ISO 12085)
- Tolerance monitoring and statistics for all parameters
- Fast creation of Quick & Easy measuring programs using Teach-in mode
- Comprehensive logging
- Automatic function for selecting standard-compliant selection of filters and traversing lengths (patented)
- Support for different calibration methods (static / dynamic) with specification of Ra or Rz parameter
- Adjustable servicing and calibration intervals
- Simulation mode to help users familiarize themselves with the system quickly
- Numerous measuring station configurations for customized applications
- Different user levels can be set up
- Flexible system thanks to various options and creation of customer-specific parameters
- Different user levels protect unit from operator error and ensure that no unauthorized users are able to operate the device

Accessories

- Connection options for Mahr **PZK**, **GD 25**, **PGK 20**, **PGK 120** and **PRK** drive units
- Dominant Waviness option available
- Software can also be used as evaluation software for **M** and **S** units
- Optional **qs-STAT**-based data transfer

MarSurf XC 2

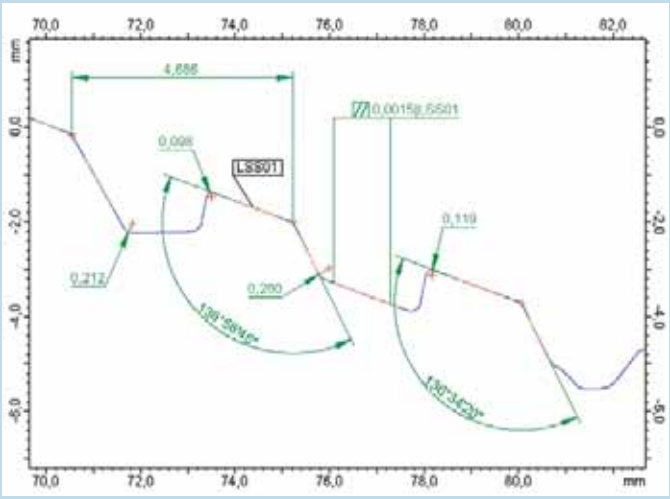
For entry-level, high-precision contour measurement

Features

- Creates regression straight lines and circles
- Creates points, intersection points, free points, center points, maximum and minimum points
- Determines radii, distances, angles, coordinates and line form deviations
- Performs nominal/actual comparisons
- Tolerance monitoring
- Associative elements, i.e. immediate change of variables dependent on reference elements when changes occur
- User access rights using password protection prevents incorrect operation
- Excellent calibration procedure thanks to many years' experience, i.e. including geometry calibration, measuring force calibration, bend compensation, etc.
- Stability and rigidity of the probes
- The drive unit is very smooth-running, highly stable and extremely accurate

Description

Measuring and evaluating geometries of workpieces and tools that are relevant for correct functioning is one of the primary requirements of research, technology and industry. The fast, straightforward and cost-effective 2D contour measuring system is increasingly winning out over other systems. The tried-and-tested, user-friendly **MarSurf XC 2** is the best example of this. Not only does it meet all requirements in terms of accuracy and different evaluation criteria, it also delivers reliable results time after time.



CD 120 Drive Unit

The **CD 120** drive unit has a patented probe arm mount for fast and flexible changing of probe arms without the need for tools. The calibration data for each probe arm is stored separately. It is also easy to calibrate several identical probe arms.

Features

- Max. measuring range of 120 mm (4.72 in) measuring length and 50 mm (1.97 in) measuring stroke
- Automatic lifting and lowering of the probe arm with adjustable speed
- Variable setting of measuring force from 1 mN to 120 mN
- High positioning speed
- Collision protection thanks to patented probe arm mount

MarSurf XC 20

The new generation of contour measurement systems

Description

When it comes to contour evaluation, **MarSurf XC 20** is simply the best. What started over 30 years ago with the Conturograph – consisting of a drive unit and x-y plotter – has today developed into a state-of-the-art contour measurement system with the very latest technology. This perfectly coordinated configuration of instruments meets the highest performance standards. Both the drive unit and the measuring stand are controlled and positioned using the reliable measurement and evaluation software.

Features

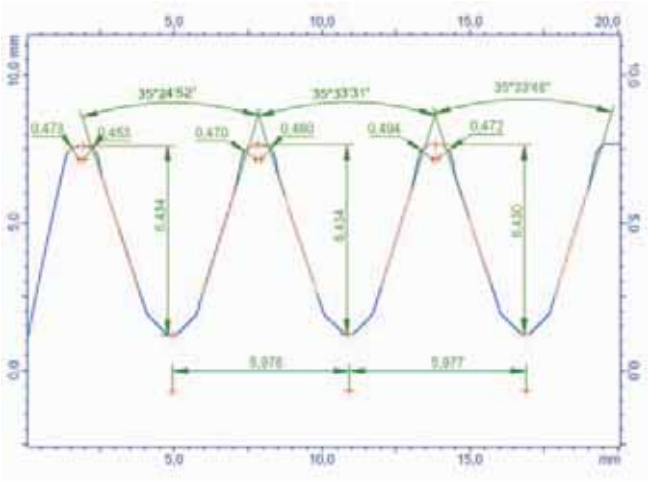
In addition to the functions of the **MarSurf XC 2** entry-level unit, **MarSurf XC 20** also provides additional features:

- Notes on the operating sequence can be displayed
- Interactive control elements support evaluations and automatic operating sequences
- Measurement of upper and lower contours with "twin stylus probe"; these contours can also be evaluated in relation to each other
- Creation of profile sections with evaluations of different parameters for each section
- Segmented measurement across obstacles such as bores or steep sides is possible
- Import and export of DXF files for nominal/actual comparison
- **PCV 200** drive unit with patented probe arm mount allows tool-free, reproducible changeover of probe arms
- Flexibility measuring station thanks to patented probe system
- Manual, freely variable tracing forces also support flexibility
- Synthetic creation of nominal profiles from straight lines and arcs
- Straightforward comparison of nominal and actual profiles. Several ranges can be defined within a measured profile and each of these ranges can be assigned a different tolerance and different evaluations

Versions

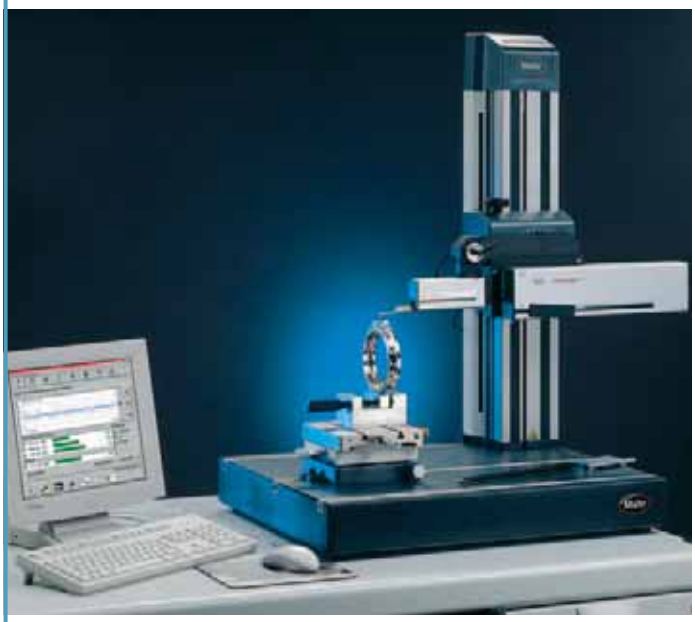
By combining the **MarSurf XC 20** software with the high-precision **LD 120** drive and probe system and the **ST 500** or **ST 750** measuring stand, resolutions in the nm range can be achieved, thereby allowing contour and roughness depth to be determined in a single measuring run.

Additional functions such as **qs-STAT**-based data export or evaluation of dominant waviness are further optional extras.



MarSurf XCR 20

The new generation of combined roughness and contour measurement systems



Description

MarSurf XCR 20 is ideal for combining contour and roughness depth evaluation.
Marsurf XC 20 + **MarSurf XR 20** = **MarSurf XCR 20**
This system includes absolutely everything you need, saving both time and space. There are separate user interfaces for the roughness and contour software. **MarSurf XCR 20** is **Mahr**'s top surface measurement system and enables even semi-automated operating sequences such as measuring stand positioning (**ST 750 CNC**) to be performed with ease.

Features

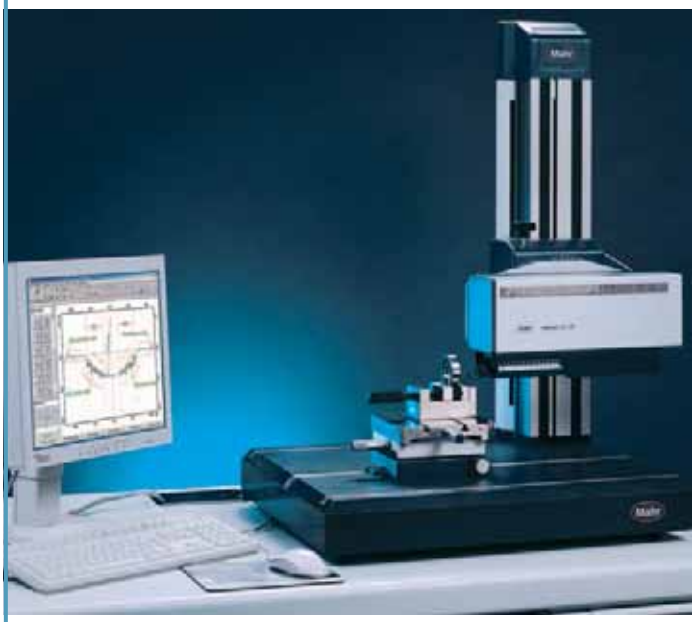
- Saves space because both drive units (**MarSurf PCV 200** contour drive unit and **GD 25** roughness drive unit) can be adapted using the corresponding combi-mount on the **ST 500** or **ST 750** measuring stand
- Roughness and contour evaluations possible from a single measurement
- High-precision contour and roughness evaluation with the **MarSurf LD 120** measuring system on components requiring a large stroke and very high resolution
- Option of rapidly switching between roughness and contour measurements thanks to straightforward changeover within the software platform and changing of mechanical components such as drive unit and probe

Versions

- Combi-measuring station with one measuring stand and two drive units (**PCV 200** and **MarSurf GD 25**)
- Combi-measuring station with quick-change mounts (**PGK 120**, **PCV 200**)
- **MarSurf LD 120** enables high-precision contour and roughness evaluation on components

MarSurf LD 120

Two in one. Contour and roughness depth measurement in a single stoke



- Increased precision due to morphological filtering of the **MarSurf X series**
- Probe arms changed without re-calibration. Storage of calibration data for each probe arm and the magnetic probe mount ensure high reproducibility

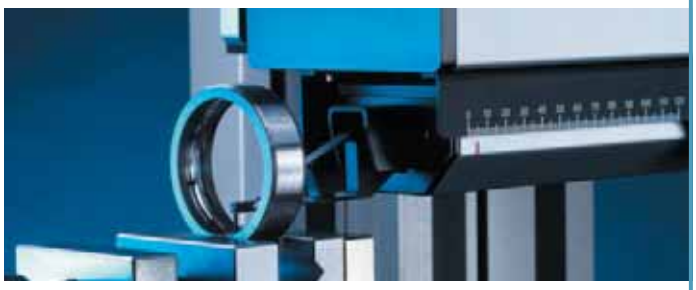
Versions

MarSurf LD 120 with measuring stand
This combination including measuring stand makes for a highly flexible measuring station.

MarSurf LD 120 compact measuring station
The **compact version** is designed for smaller workpieces and maximum accuracy. Vibration is minimized by the rigid compact stand with **small** measuring circle.

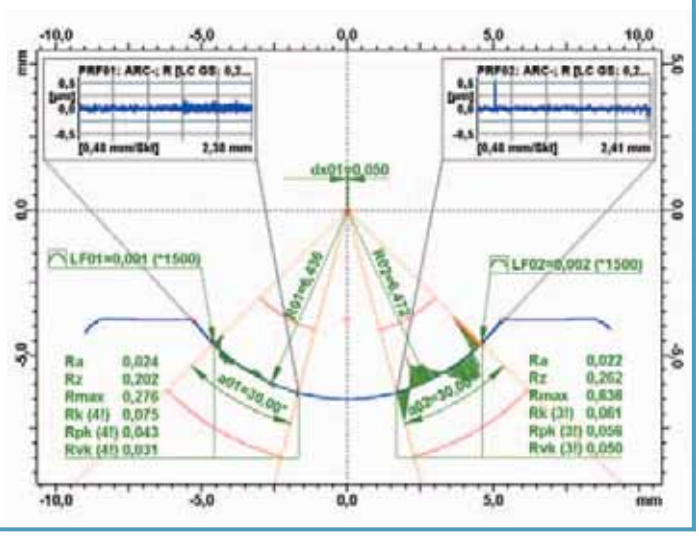
Description

MarSurf LD 120 is the new high-quality, high-precision **contour** and **roughness measuring station** with integrated laser measuring system. It performs roughness and contour evaluations in a single stroke. To complete both these measurement tasks with a single measurement, you need a high-precision measuring system that supports both the relatively large measuring stroke for the contour in radii, on slopes or in freeform areas and the resolution in the nm range for the roughness depth measurement.



Features

- The magnetic probe mount ensures flexibility by supporting a wide range of probes that can be easily exchanged, while maintaining a high level of reliability
- Positioning accuracy in the µm range when exchanging probes, and collision protection, rigidity and stability with resolutions in the nm range
- Reliable results thanks to a calibration procedure specially geared to high accuracy
- Software can be used to set measuring forces from 0.5 to 30 mN which remain constant over the entire measuring stroke, ensuring flexibility and reliability. You can select the optimum measuring force to match the material characteristics of the workpiece and the probe of your choice



MarSurf XP 20

A measuring station for all occasions

- Depending on the measurement task, the measuring station can be set up using modules with automatic linear/rotation axes
- Modular system affords flexibility
- One software language for all systems

Versions

Manual measuring stations:
- Roughness measuring station
- Contour measuring station
- Combined roughness and contour measuring station

Automatic measuring stations:
- Roughness measuring station
- Contour measuring station
- Combined roughness and contour measuring station

Description

The new Mahr software platform **MarWin** is a modular control and evaluation system with significant advantages.

This multi-product software platform provides users with a uniform basis, thereby ensuring the operational and functional reliability particularly required in automated processes.

Quick and easy configuration is achieved through the use of standardized mechanical and electronic measuring station components.

Features

- **MarTalk** coordinates the interface between the software and the machine
- **MarScript** handles the measuring language and control systems
- Tried-and-tested **Mahr quality** components and software together with a straightforward user interface provide reliable measuring results
- Safety for your system and operators through compliance with all relevant guidelines
- Modularity, i.e. depending on the measurement task, additional axes and workpiece supports can be used in addition to the standard components
- Time saved through significant reduction in setup times for the automatic measuring station

MarSurf. M and S Instrument Data Overview



	MarSurf M1	MarSurf M2	MarSurf S2
Parameters	Ra, Rz, Rmax, RPc; Jis: Ra, Rz	Over 25 roughness parameters	Over 40 roughness, waviness and P profile parameters
Probe	NHT probe range (skid probe system)	NHT probe range (skid probe system)	MFW 250, R probes, FRW 750*, Focodyn*, LS1/LS10* *Depending on drive unit
Drive unit	PFM (standard drive unit) Option: PFM 2 (transverse drive unit)	PFM (standard drive unit) Option: PFM 2 (transverse drive unit)	Applicable: PZK, GD 25, PGK 120, PGK 20, PRK via PAV 62
Traversing lengths	1.75 / 5.6 / 17.5 mm (0.069 / 0.22 / 0.69 in) with PFM drive unit 1.75 / 5.6 mm (0.069 / 0.22 in) with PFM 2 drive unit	1.75 / 5.6 / 17.5 mm (0.069 / 0.22 / 0.69 in) with PFM drive unit 1.75 / 5.6 mm (0.069 / 0.22 in) with PFM 2 drive unit	0.56 / 1.75 / 5.6 / 17.5 / 56 mm (0.069 / 0.22 / 0.69 / 2.20 in) Lt var 0.56 to 120.0 mm (0.02 to 4.72 in). Depending on drive unit
Profile resolution	12 nm (0.5 µin)	12 nm (0.5 µin)	Measuring range / 65,536 steps
Languages	13 languages 3 Asian languages	13 languages 3 Asian languages	13 languages 3 Asian languages
Dimensions (L x W x H)	Approx. 190 x 170 x 75 mm (7.48 x 6.69 x 2.95 in)	Approx. 190 x 170 x 75 mm (7.48 x 6.69 x 2.95 in)	Approx. 150 x 320 x 250 mm (5.91 x 12.60 x 9.84 in)
Weight	< 1 kg (2.20 lbs)	< 1 kg (2.20 lbs)	< 3 kg (6.61 lbs)
Power supply	Primary: 90 V to 264 V Secondary: 12 V	Primary: 90 V to 264 V Secondary: 12 V	Primary: 90 V to 264 V Secondary: 9 V

MarSurf. PS1 Data Overview

USB

	MarSurf PS1
Parameters (24, with tolerance limits)	Ra, Rq, Rz (Ry (JIS) equiv. to Rz), Rz (JIS), Rmax, Rp, Rp (ASME), Rpm, Rsk (ASME), Rpk, Rk, Rvk, Mr1, Mr2, A1, A2, Vo, Rt, R3z, RPc, Rmr (tp (JIS, ASME) equiv. to Rmr), RSm, R, Ar, Rx
Measuring range	350 µm, 180 µm, 90 µm
Cutoff lc**	0.25 mm, 0.8 mm, 2.5 mm
Traversing length Lt**	1.75 mm, 5.6 mm, 17.5 mm
Traversing length (as per MOTIF)	1 mm, 2 mm, 4 mm, 8 mm, 12 mm, 16 mm
Dimensions	140 mm x 50 mm x 70 mm
Weight	400 g
Long-range power supply	100 V to 264 V

*in accordance with ISO/JIS

MarSurf. LD 120 Data Overview

	MarSurf LD 120
Parameters	Roughness parameters, waviness parameters, P-profile parameters (see MarSurf XR 20)
Contour elements	Radii, distances, angles (see MarSurf XC 20)
Probe	LD A14-10-2 with diamond tip 2 µm (80 µin), 90°
Drive unit	MarSurf LD 120
Traversing lengths	0.1 mm to 120 mm (0.004 in to 4.72 in)
Measuring range	10 mm (0.39 in)
Resolution (Z)	2 nm (0.08 µin)
Measuring force (in Z)	0.5 mN to 30 mN, adjustable
Dimensions (L x W x H) of compl. ST 500 meas. stand	Approx. 700 x 550 x 720 mm (27.56 in x 21.65 in x 28.35 in)
Weight incl. ST 500	Approx. 160 kg (353 lbs)
Power supply	230 V (or 115 V possible)

MarSurf. XC Data Overview

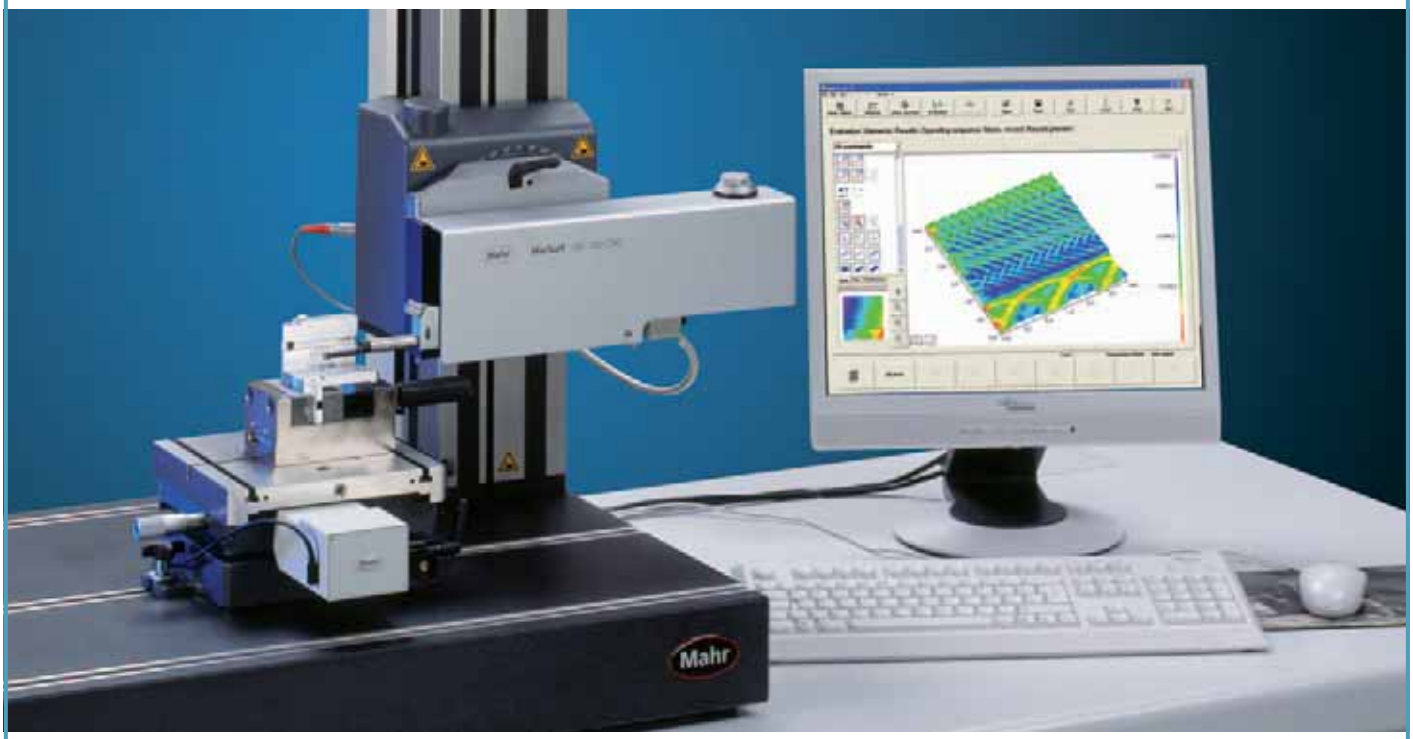
	MarSurf XC 2	**MarSurf XC 20**
Parameters	Radii, angles, distances, coordinates, fitting in of regression straight lines, best-fit circles, circle sections. Defining points, circles and circle sections and much more	Radii, angles, distances, coordinates, fitting in of regression straight lines, best-fit circles, circle sections. Defining points, circles and circle sections, multiple measurements, double contours, DXF import and much more
Probes	350 mm (13.78 in) probe arms, 175 mm (6.89 in) probe arms complete with stylus tips	350 mm probe arms, 175 mm probe arms complete with stylus tips
Drive unit	MarSurf CD 120	MarSurf PCV 200
Traversing lengths	1 mm to 120 mm (0.04 in to 4.72 in)	1 mm to 200 mm (0.04 in to 7.87 in)
Measuring range	±25 mm (±0.001 in) with 350 mm probe arm	±25 mm (±0.001 in) with 350 mm probe arm
Resolution (Z) referred to measuring system	350 mm probe arm = 0.5 µm (20 µin) 175 mm probe arm = 0.25 µm (10 µin)	350 mm probe arm = 0.5 µm (20 µin) 175 mm probe arm = 0.25 µm (10 µin)
Measuring force (in Z)	1 mN to 120 mN, adjustable	1 mN to 120 mN, adjustable
Dimensions (L x W x H) of compl. ST 500 meas. stand	Approx. 700 mm x 550 mm x 720 mm (27.56 in x 21.65 in x 28.35 in)	Approx. 700 mm x 550 mm x 720 mm (27.56 in x 21.65 in x 28.35 in)
Weight of measuring station with ST 500 measuring stand	Approx. 160 kg (353 lbs)	Approx. 160 kg (353 lbs)
Power supply	230 V (or 115 V possible)	230 V (or 115 V possible)

MarSurf. Data Overview XR and XT

	MarSurf XR 20	**MarSurf XT 20**
Parameters	Over 75 roughness, waviness, P-profile and motif parameters	Color-coded height presentation, grid models, photo simulation, 2D top view, any profile sections
Probes	MFW 250, R probes, FRW 750*, Focodyn*, LS 1 / LS 10*	zoom function, distances, angles, radii, extreme points, comprehensive,
Drive unit	Suitable: PZK, GD 25, PGK 120, PGK 20, PRK via PAV 62	filter functions such as Gaussian filter, median filter, polynomial filter,
Traversing lengths	Depending on drive unit 0.56 / 1.75 / 5.6 / 17.5 / 56 mm, (0.02 / 0.069 / 0.22 /0.69 / 2.20 in) Lt var 0.56 to 120.0 mm (0.02 to 4.72 in)	interpolation of invalid sections, remove spherical form, remove cylindrical form, alignment functions across sections, 3D surface roughness,
Profile resolution	±25 µm = 0.5 nm, ±250 µm = 5 nm	parameters, export and evaluation of any
Dimensions (L x W x H) of compl. ST 500 meas. stand	Approx. 700 x 550 x 720 mm (27.56 x 21.65 x 28.35 in)	profile sections in MarSurf XR 20 roughness software or MarSurf XC 2 / XC 20
Weight of measuring station	With ST 500 measuring stand, approx. 160 kg (353 lbs)	contour software
Power supply	230 V (115 V possible)	Measuring data can be recorded using stylus instruments with Y-drive or MarSurf WS1 optical surface sensor.
	*Depending on drive unit	

MarSurf XR 20 with XT 20 Topography

Upgrade to a powerful topography measuring station



Description

For some applications, a single tactile profile of the surface form is inadequate. 3D topographic representation and evaluation offers the opportunity to obtain more comprehensive profile information. The **MarSurf XR 20** measuring station can be turned into a topography measuring station both simply and cost-effectively, whether based on an order or an upgrade requirement. All that is needed in addition to the standard scope of delivery is a **CT 200-MOT** Y-drive for the **CT 200** XY table and the **MarWin XT 20 software**.

CT 200-MOT Technical Data

CT 200-MOT technical data as for CT 200 but with motorized Y-drive.

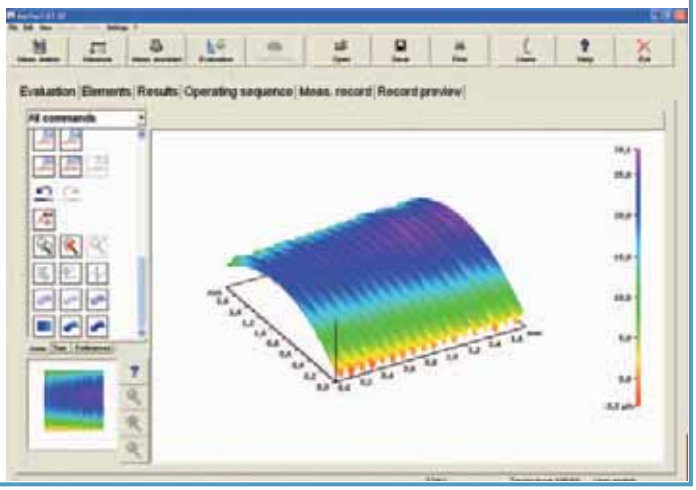
Adjustment path in Y	17.5 mm (0.7 in)
Resolution	0.375 µm (15 µin)

Measuring Station Components

As described on page 16-13, plus:

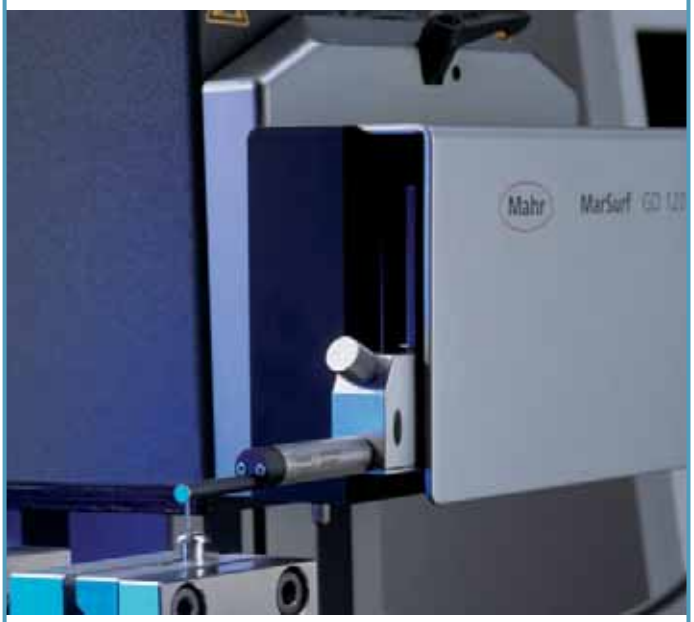
Topography measuring station extension

MarSurf XT 20 software	**Order No. 6299034**
CT 200-MOT Y-drive	**Order No. 6710543**



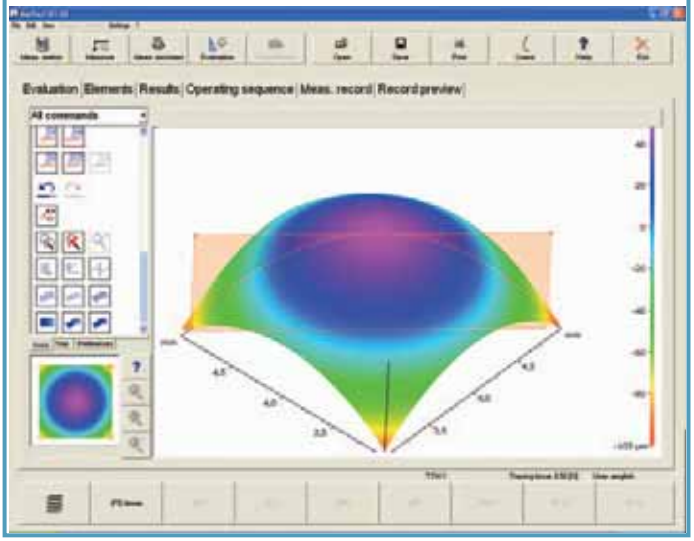
MarSurf XR 20 with XT 20 Topography

3D measurement of molds for use in the medical industry



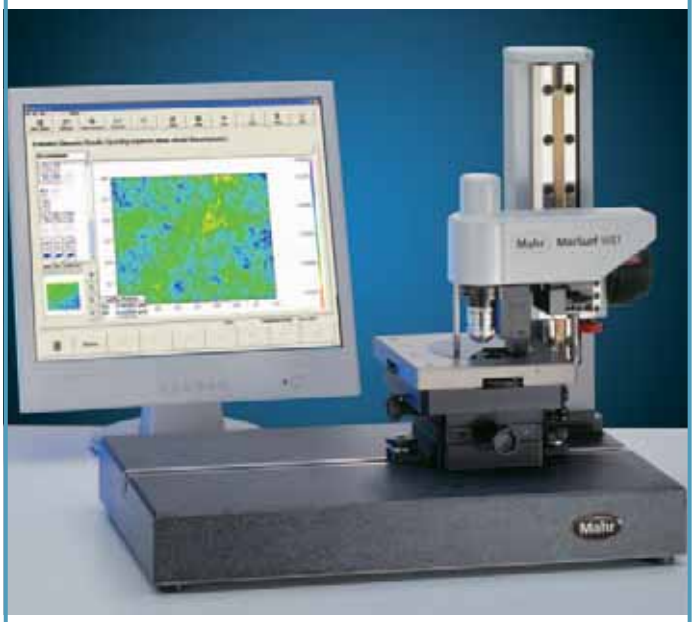
Description

In the case of molds for items such as contact lenses, the surface topography is also of interest in addition to the individual profile for determining the roughness depth. The form and surface roughness depth over the entire topography range are critical when it comes to product function.



MarSurf. WS1 White Light Sensor Measuring Station

Non-contact measurement of surface structures



Description

Ever higher surface qualities are being produced thanks to new processing methods and materials. This places much greater demands on a measuring system in terms of resolution and measuring accuracy.
The MarSurf WS1 is an optical surface sensor which operates according to the principle of white light interferometry. This technology enables rapid, high-precision recording of surface topographies on a wide range of materials.

Features

- The impressive vertical resolution of 0.1 nm (0.004 µin) enables the finest of structure to be recorded
- Can be used in inspection rooms and the manufacturing environment
- The compact design saves space
- The optical design is specifically geared to the demands of industrial processing methods
- Illuminated using LED technology with a long service life
- Evaluation with the MarSurf XT 20 topography software enables a comprehensive, user-friendly topography analysis
- Can be incorporated as an OEM component

MarSurf PCV 200

Contour drive unit

Description

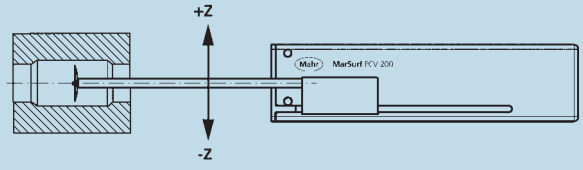
The **PCV 200** contour drive unit supports measuring paths of up to 200 mm (7.87 in).

Many contour measurement tasks, e.g. calculating double contours using the twin stylus, can be performed in conjunction with the **MarSurf XC 20** software

Features

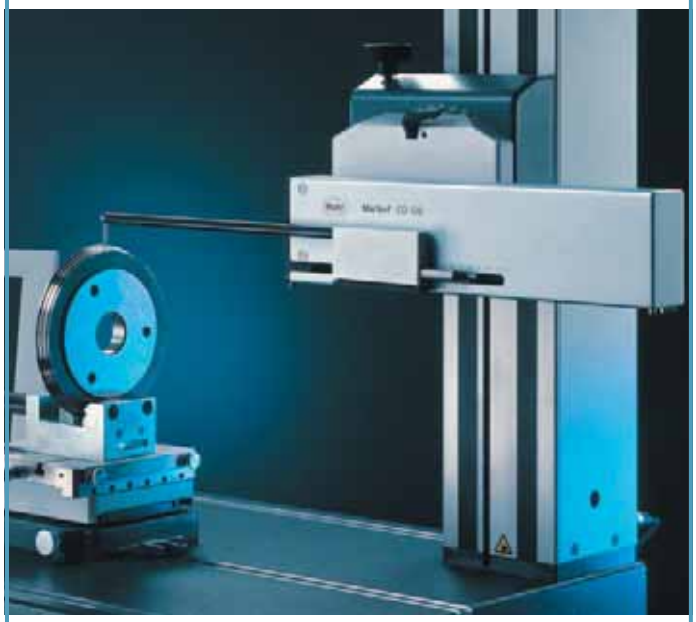
- Probe arm collision protection thanks to patented probe arm mount
- Programmed measuring run with lifting and lowering of the probe arm and positioning
- Selection of different measuring speeds ranging from 0.2 mm/s to 4 mm/s (0.008 in/s to 0.16 in/s)
- Variable setting of measuring force from 1 mN to 120 mN
- Measuring force remains constant over the entire measuring range

The drive unit supports a large number of probe arms of different shapes and sizes.



MarSurf CD 120

Contour drive unit



Description

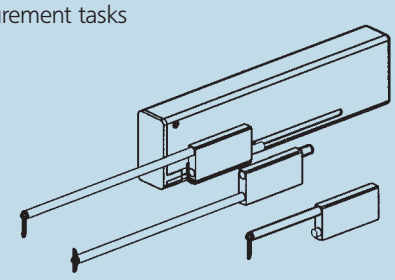
The **CD 120** contour drive unit is based on the technology of the **PCV 200** drive unit. It measures contour elements such as radii, distances, angles, etc. simply and precisely.

In conjunction with the **MarSurf XC 2** software, it constitutes the basic contour measurement unit.

Features

- Automatic lifting and lowering of the probe arm with adjustable speed
- Probe arms available for bores larger than 2 mm (0.079 in)
- Selection of different positioning speeds ranging from 0.2 mm/s to 10 mm/s (0.008 in/s to 0.39 in/s)
- Variable setting of measuring force from 1 mN to 120 mN
- Patented probe arm mount for reproducible probe arm exchange without the need for tools

The use of complete probe arms, each with their own separately stored calibration data, allows the evaluation system to switch between different measurement tasks
quickly and flexibly.



MarSurf. PZK Drive Unit

Small and handy

Description

This set consists of the small, handy **PZK** drive unit and the integrated, inductive **MFW 250** probe. The probe arms can be changed very quickly. The built-in datum plane allows both skidded and skidless measurements. The **PZK set** also includes a hand-held mount. The bottom of the hand-held mount takes the form of a V-block, enabling flat and cylindrical workpiece contours to be measured. This makes the **PZK** a universal system.

MarSurf. MarSurf GD 25 Drive Unit

The standard drive unit for surface measurements

Description

This unit provides excellent straightness precision and smooth running over a measuring length of 25.4 mm (1 in). A patented motorized height adjustment accessory ensures the probe is positioned in the range of 4 mm (0.15 in) and enables motorized probe zero setting. The **MFW 250** skidless probe can be used, along with all probes of the **R series**.

MarSurf. PGK 120 Drive Unit

Straightforward roughness measurement for long traversing lengths

Description

In addition to high-precision roughness measurements, the **PGK 120** drive unit is used for waviness measurements over long traversing lengths of up to 120 mm (4.72 in). Patented motorized probe zero setting over 22 mm (0.866 in) saves both setup work and time. The drive unit optionally supports problematic measuring positions such as transverse or vertical tracing using simple, adaptable probe mounts.

MarSurf. GD 120 CNC Drive Unit

Specially designed for automated operation

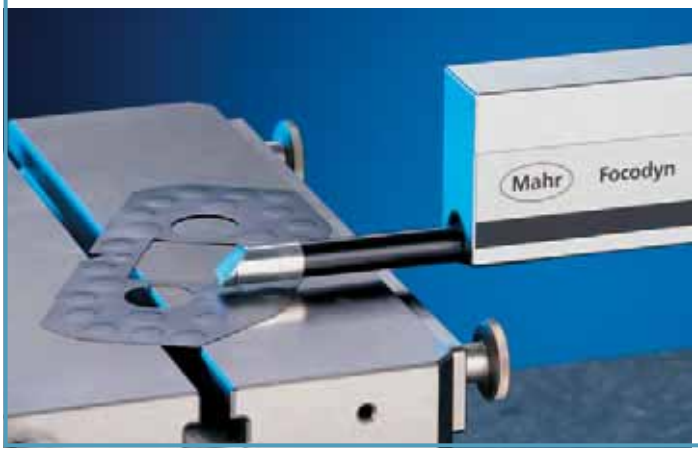
Description

Precise positioning on the horizontal axis is very important for automatic operating sequences. The **GD 120 CNC** allows precise positioning on the X-axis.

This drive unit also offers the same outstanding features as the **PGK 120**, which guarantees the precision and reliability required for automatic operation under **MarSurf XP**.

MarSurf. Surface Probes

Probes for virtually any application



Description

Non-skidded probes

Today there is a clear trend towards skidless probes. Their strength lies in the fact that they are very versatile. The diamond tip is deflected relative to the ideal geometric profile of the datum plane in the drive unit.

Advantages
- No skid-related filter effect
- Very short traversing lengths possible
- Calculation of W- and P-profile parameters
- Recording of profile angularity and increments

Single-skid probes

The most widespread in practice, single-skid probes are supported on just one skid on the workpiece and therefore need to be aligned relative to the surface.

Advantages
- Not sensitive to vibration because of very small measuring circle
- Suitable for curved test surfaces
- Inclination of the drive unit is uncritical

Dual-skid probes

Dual-skid probes are linked to the drive unit via hinges and align themselves automatically relative to the surface. They are ideal for flat workpieces.

Advantages
- Very insensitive to vibration
- Minimal alignment required

Optical probes
(Focodyn, LS 1 and LS 10 laser sensors)

These optical probes work in a similar way to mechanical non-skidded probes. Following the principle of dynamic focusing, the probe generates a sharp, delimited focal point on the surface.

Advantages:
- Non-contact profile recording
- Also suitable for soft and sensitive workpiece surfaces

PGN Geometric Standard

DIN EN ISO 5436 type C1 sinusoidal groove profile

Surface standard with sinusoidal groove profile for dynamic monitoring of the roughness measuring station. Ra, Rz, Rmax. Optical flat. The following versions are available:
PGN 1 Profile depth approx. 1.5 µm (60 µin), groove distance approx. 0.10 mm (0.0039 in)
PGN 3 Profile depth approx. 3 µm (120 µin), groove distance approx. 0.12 mm (0.0047 in)
PGN 10 Profile depth approx. 10 µm (394 µin), groove distance approx. 0.20 mm (0.0079 in)
DKD (German Calibration Service) and Mahr Calibration Certificates on request.

PEN 10-1 Setting Standard

DIN EN ISO 5436 type A1 depth setting standard

Depth setting standard for static calibration of the vertical stroke for all non-skidded probes, single-skid probes and dual-skid probes. Measuring groove depth approx. 10 µm (394 µin), diameter 44 mm (1.73 in).

- 2 calibration grooves
- Optical flat

DKD and Mahr calibration certificates on request.

PRN 10 Geometric Standard

Turned roughness profile

Including Mahr calibration certificate. Surface standard with turned profile, chrome-plated, profile depth approx. 10 µm (394 µin), for monitoring the roughness measuring station. Ra, Rz, Rmax.

KN 100 Contour Standard

Standard for monitoring contour measurement systems

The **KN 100** contour standard was developed in cooperation with the PTB, the German national metrology institute.
It is the first standard to allow confirmation and acceptance tests to be performed so that they are traceable to realistic geometries through concrete references. It conforms to the requirements of VDI/VDE Guideline 2629.

IN OUR VIEW, FORM DEVIATION IS NOT A QUESTION OF PERCEPTION. **THAT IS WHY WE HAVE MARFORM**

The latest information on MARFORM products can be found on our website: **www.mahr.com, WebCode 155**

► | To ensure the problem-free functioning and durability of a workpiece, the key factors are its dimensions and, above all, its form. Requirements in terms of roundness, flatness, straightness, coaxiality or run-out – particularly when it comes to axis-symmetrical workpieces – are becoming increasingly tough. These requirements can only be reliably tested and met using high-precision formtesters optimized for this specific purpose. Whether you are dealing with fuel injection technology, microelectronics, precision mechanics or medical technology, the key functional components are becoming ever smaller and ever more precise. To enable the production department to take advantage of the specified tolerances, measuring uncertainty must be kept as low as possible. MarForm helps you to cut process costs without increasing testing costs thanks to stable, innovative instruments with the highest possible level of automation, flexibility and precision. MarForm offers the ideal combination for all requirements. | ◄

MarForm. Form Measuring Instruments

MarForm. Formtesters for a Wide Range of Applications

FORM MEASURING INSTRUMENTS FOR THE WORKBENCH OR INSPECTION ROOM

► | There are many aspects of our daily lives where we need to be able to rely on technical components functioning correctly. Take for example the ABS braking system, injection system or gearbox of a car, the drive of a PC, the compressor in an air-conditioning system, the blade of an electric razor or the landing flaps of an aircraft. For the moving components to function efficiently over long periods of time, it is vital they work together smoothly. To ensure this is the case, axis-symmetrical workpieces with narrow tolerances from the ideal are needed. Compliance with these tolerances can only be verified reliably using precision formtesters that have been specifically optimized for this application. MarForm helps you to cut process costs without increasing testing costs thanks to stable, innovative instruments exhibiting the highest possible precision. MarForm offers the ideal combination for all requirements. | ◄

MarForm MMQ 100/MMQ 10

The Formtester with the simplest operation

MarForm MMQ 100 Formtester

MarForm MMQ 10 Formtester

Features

The MarForm MMQ 100 Formtester offers outstanding accuracy in a robust package designed for use in production environments. Used in combination with EasyForm software, it represents the perfect solution for performing measurement tasks simply, yet effectively.

- Precise and fast measurement results
- Reliable thanks to mechanical bearings
- Large measuring volume
- Mobile due to its low weight and convenient size
- Fast computer-assisted workpiece alignment
- Centering and tilting screws for rough and fine adjustment
- Universal and reliable
- Suitable for use on the shop floor as no compressed air connection is required
- Touch screen, this no keyboard or mouse required
- Digital transmitters in Z and X transmit the measuring position directly to the software

The **MMQ 100** can also be operated from a laptop, thereby enabling mobile use. All you need is a power outlet!

Optimized for frequent form measuring tasks

- Roundness (also in a section)
- Flatness (from a circle)
- Concentricity
- Coaxiality
- Radial run-out
- Axial run-out
- Plane parallelism from opposite circles
- Fourier/waviness analysis

Versions

MMQ 10 with integrated form computer to evaluate form and positional tolerances (DIN ISO 1101) for roundness, radial run-out, concentricity and coaxiality.

MMQ 100 with EasyForm as a powerful, PC-based evaluation system running on Windows® XP offers informative color records with easy-to-use software for evaluation of form and position tolerances (DIN ISO 1101) for roundness, roundness sector, radial run-out, axial run-out, concentricity, coaxiality, flatness(1), straightness(1), parallelism(1) and perpendicularity(1).

The **MMQ 10 measuring station,** consisting of an **MMQ 10** Formtester with integrated computer and printer and a T20W probe, is available under **Order no. 5440088.**

The **MMQ 100 EasyForm measuring station** comes complete:

Form Measuring Station MMQ 100 Plus consisting of:	**Order no. 9999116**
MarForm MMQ 100 Plus with digital encoders in X/Z and with T20W probe	Order No. 5440691
EasyForm PC	Order No. 3xxxxxx
WIN XP country package	Order No. 62682xx
17" TFT monitor	Order No. 5460041

Options for MMQ 100:
Advanced Form for comprehensive evaluations, based on EasyForm.

Fourier analysis to enhance roller bearing evaluation capabilities.

Mahr Data Transfer Tools for simple transfer of measuring results into statistical evaluations such as qs-STAT or MS Excel.

Request a brochure or see WebCode 1412/10146.

(1) from a polar trace

MarForm MMQ 34

The MMQ 34 is the standard form measuring instrument for all your production needs and the precision inspection room

Features

The **MMQ 34** features a high-precision motorized Z column, opening up a whole new dimension in form metrology compared to roundness measuring instruments.

In addition to
- Roundness (also in a sector)
- Flatness(1)
- Concentricity
- Coaxiality
- Radial run-out
- Axial run-out

the **MMQ 34** can also evaluate:
- Cylindricity
- Straightness (from linear or circular profiles)
- Total radial run-out
- Parallelism (from linear or circular profiles)
- Perpendicularity (from linear or circular profiles)
- Angularity (vertical)
- Conicity (vertical)
- Taper

The **MMQ 34** Formtester offers an unbeatable volume with a small footprint.

Versions

The MarForm **MMQ 34** is available in two versions:
In addition to the C-axis, both versions offer a Z-axis length of 350 mm (13.78 in) or 500 mm (19.67 in) and a motor-driven 180 mm (7.09 in) positioning axis as the X-axis.
The **MMQ 34** is operated using the **MarWin EasyForm** software. It utilizes touchscreen technology and requires no keyboard or mouse. Creating high-performance measuring runs for all manner of workpieces is child's play thanks to the interactive wizards.

MMQ 34 X motorized form measuring station
Order no. 9999482

consisting of:

MarForm MMQ 34	
Z = 350 mm, X = 180 mm pos. axis	5440667
MarWin and **EasyForm 2.0** software	5450185
17" TFT monitor	5460041
T20W probe	5400152
T20W mount	7028306
Rim chuck with diameter of 100 mm	6710620
Deskjet printer	5460030
Windows XP Professional country package	62682xx
Cable	3018232

MMQ 34 X motorized form measuring station
Order no. 9999483

consisting of:

MarForm MMQ 34	
Z=500 mm, X=180 mm pos. axis	5440668
MarWin and software **EasyForm 2.0**	5450185
17" TFT monitor	5460041
T20W probe	5400152
T20W mount	7028306
Rim chuck with diameter of 100 mm	6710620
Deskjet printer	5460030
Windows XP Professional country package	62682xx
Cable	3018232

Option for **MMQ 34 measuring stations**

15" touchscreen TFT monitor 3017725 instead of 17" standard TFT monitor 5460041	9999540

Request a brochure or see WebCode 1479.

(1) from a polar trace

MarForm MMQ 400

The MMQ 400 is the universal form measuring machine for production and laboratory

Features

The **MMQ 400** is the universal measuring machine for extensive workpiece evaluation as per DIN ISO 1101. High-precision measuring axes in Z and X make every form measurement task possible.
MarForm MMQ 400 for:

- High-precision workpieces
- Unusually long workpieces
- Large and heavy workpieces
- Use in production environments or precision inspection rooms

The **MarForm MMQ 400** is available for your demands in four versions and is optimally designed for each task:

- Motorized or manual centering and tilting table
- Vertical axis (Z) with measuring length of 500 mm (19.67 in) and horizontal axis (X) with measuring length of 280 mm (11.02 in) or
- Vertical axis (Z) with measuring length of 350 mm (13.78 in) and horizontal axis (X) with measuring length of 180 mm (7.09 in)
- With digital rotary decoder in the linear axes X and Z for best reproducability of measurements.

Your **MarForm MMQ 400** is available as a semi-automated measuring station with manual centering and tilting table or as a fully automated measuring station which, in conjunction with a motorized centering and tilting table and T7W probe, is perfect for the high-precision testing of your parts without any operator intervention.

Versions

MMQ 400 form measuring station **Order No. 9999490**
consisting of:
MarForm MMQ 400
Z = 350 mm, X = 180 mm

Manual centering and tilting table	5440713
MarWin PC Advanced Form	5450186
17" TFT monitor	5460041
T20W probe	5400151
T20W mount	7028306
Rim chuck with diameter of 100 mm	6710620
Deskjet printer	5460030
Windows XP Professional country package	62682XX

MMQ 400 form measuring station **Order No. 9999496**
consisting of:
MarForm MMQ 400
Z = 350 mm, X = 180 mm

Motorized centering and tilting table	5440763
MarWin PC AdvancedForm	5450186
17" TFT monitor	5460041
T20W probe	5400151
T20W mount	7028306
Rim chuck with diameter of 100 mm	6710620
Deskjet printer	5460030
Windows XP Professional country package	62682XX

MMQ 400 form measuring station **Order No. 9999491**
consisting of:
MarForm MMQ 400
Z = 500 mm, X = 280 mm

Motorized centering and tilting table	5440743
MarWin PC AdvancedForm	5450186
17" TFT monitor	5460041
T20W probe	5400151
T20W mount	7028306
Rim chuck with diameter of 100 mm	6710620
Deskjet printer	5460030
Windows XP Professional country package	62682XX

MMQ 400 form measuring station **Order No. 9999498**
consisting of:
MarForm MMQ 400
Z = 500 mm, X = 280 mm

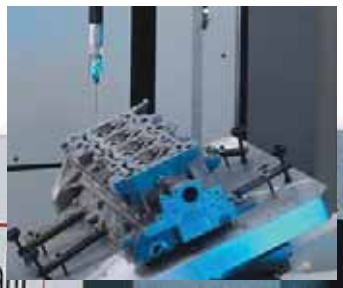
Motorized centering and tilting table	5440793
MarWin PC AdvancedForm	5450186
17" TFT monitor	5460041
T20W probe	5400151
T20W mount	7028306
Rim chuck with diameter of 100 mm	6710620
Deskjet printer	5460030
Windows XP Professional country package	62682XX

Request a brochure or see WebCode 11321.

MarForm. The Reference Machines for Form and Positional Tolerances

OUR MOST ACCURATE FORM MEASURING INSTRUMENTS EVER

► | **High-precision form measurement cuts costs!** MarForm is the name of our ultra-precise form measuring systems. They can be used wherever there is a need to obtain information about the geometry of workpieces with very narrow tolerances. ISO 1101 describes roundness, cylindricity, straightness, parallelism etc. as form and positional deviations. These features are monitored by formtesters. The high precision of form measuring instruments cuts costs because the tolerance ranges are those actually required in your production environment. With MarForm, you have a high-precision roundness and cylindricity measuring instrument at your disposal. | ◄



MarForm MFU 100

Taking the reference form measuring center to a new level

The road from high-precision measuring axes to reliable measurements is often a long one – and no instrument is better suited for this purpose than the **MFU 100**. Only the **MFU 100** has integrated reference elements for real-time spatial compensation of geometrical deviations and therefore records all profiles as high-precision 3D coordinates.

For decades, MarForm measuring instruments have been renowned for their precision and stability. The new **MarForm MFU 100** was developed with the objective of testing the form and positional features of parts with measuring volumes of a liter cost-effectively in a production environment. Our many years of experience have taken the new **MFU 100** to a new level.

With the **MarForm MFU 100**, you have a high-precision measuring instrument at your disposal whose extremely low measuring uncertainty increases the tolerance range in production environments and thus cuts production costs.

Features

The **MarForm MFU 100** comes complete with:

- Roundness axis, circular (C)
- Motorized centering and tilting table (X, Y, A, B)
- Straightness measuring axis, vertical (Z)
- Straightness measuring axis, horizontal (X)
- Tangential multi-function axis (Y)
- T7W motorized length measuring probe
- MarWin evaluation software for form and positional features

All the axes are coordinated to ensure maximum measuring certainty.
The horizontal X-axis extends beyond the center of the workpiece, therefore making it possible to test the "true parallelism" free from other measuring influences.
The tangential Y-axis is a new and innovative feature. This additional new axis for conventional formtesters helps to locate the zenith of very small workpiece geometries in motorized applications and does so free from user influence. This means that the actual precision measurement can be started at exactly the right location, thus significantly increasing the process accuracy.

The Y-axis is also the instrument that, in combination with the vertical Z-axis and the horizontal X-axis, enables you to determine the workpiece diameter. As a result, standards-compliant testing of tolerances in the sub-µm range is possible for the first time using the maximum-material principle, while still offering a unique price/performance ratio.

In combination with the machine electronics, high-resolution digital scales ensure a level of positioning quality that makes it possible to test even the smallest component geometries.
The **MarForm MFU 100** is also ideally suited to scanning surfaces.

The **MarWin** software package offers the complete range of functions you would expect from a modern measuring and evaluation software package, including attractive records and electronic documentation in your corporate network.

Due to the deliberate separation of control and evaluation, the **MarForm MFU 100** is future-proof and expandable.
New language versions, special evaluations and new standards can all be incorporated with ease. The **MFU 100** has also been designed to accommodate sensors developed in the future.

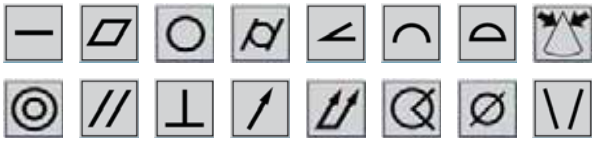
In short, the **MarForm MFU 100** represents a new generation of reference form measuring instrument for precision inspection rooms and production environments.

The new **MarForm MFU 100 WP** is also available with an optional optical sensor to alternate with the T7W (motorized).

Request a brochure or see WebCode 1336.

MarForm MFU 800

The ultra-precise form and positional tolerance testing system for the laboratory and inspection room



The **MFU series of Mahr form measuring instruments** has been setting the standard for high-precision form measurement tasks for more than 30 years.

Whether you are dealing with injection components, brake pistons or the calibration of gages, the **MarForm MFU** is the instrument of choice when producing high-precision fitting parts with tolerances of < 1 µm (40 µin).

The **MarForm MFU 800** is a high-precision, fully automatic reference form measuring station which offers maximum universality thanks to its large measuring volume and the high table load capacity of up to 1,000 N.

Features

- Three high-precision measuring axes:
  Roundness measuring axis (C),
  vertical straightness measuring axis (Z = 500 mm / 19.67 in) and
  horizontal straightness measuring axis (X = 200 mm / 7.87 in)
- Each measuring axis has an air bearing and is fitted with a high-precision incremental scale system
- Fully automatic CNC workpiece alignment
- High load capacity – up to 1,000 N workpiece weight
- Motorized probe swivel unit and motorized measuring direction reversal enable measuring runs with an exceptional level of automation
- Can be used universally for a wide range of ISO 1101-compliant workpiece assessments, with evaluation of roundness, radial run-out, axial run-out, concentricity, coaxiality, total radial run-out, total axial run-out, cylindricity, straightness, parallelism, perpendicularity, angularity, flatness, conicity, line profile and taper
- Standards-compliant evaluation and filtering

MarForm measuring instruments are ideally suited to complex measurement tasks that demand high accuracy. This encompasses the automotive sector, injection pump technology, ABS brakes, aerospace and comprehensive measurement of automotive pistons.

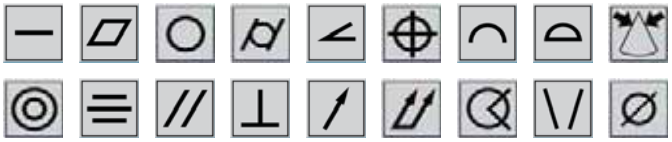
The secret behind the unique reproducibility of the measurement results produced by MarForm is the high basic accuracy of the axes and its extremely high positioning accuracy.

This makes the **MarForm MFU** the reference machine of choice in the precision pyramid – guaranteed.

Request a brochure or see WebCode 1326.

MarForm MFK 500 and MFK 600

The reference form measuring centers for the laboratory and inspection room



MFK form measuring center for comprehensive workpiece assessment
MFK formtesters are particularly suited to testing engine blocks, cylinder heads, gearboxes, hydraulic components, crankshafts and camshafts.
Generous, optimized construction ensures high measuring accuracy over the entire machine volume. Large measuring and travel paths enable easy and safe changing of workpieces.

The **MarForm MFK 600** and **MFK 500**, made from coordinated components, offer flexibility and can be adapted for a wide range of metrology applications.

The formtester has a distortion-free granite base which is oscillation-isolated. Its high-precision horizontal surface forms the reference plane for the measuring setup. The workpiece mounting table carries and guides heavy workpieces over the granite surface using air bearings.

Features

- Universal form measuring station with large measuring volume for heavy workpieces
- The MFK 600 has 5 measuring axes and 2 (4) calibration axes for measuring form elements and determining positions
- The MFK 500 has 3 measuring axes and 4 calibration axes for measuring form elements
- Rotating probe and automatically positioned workpieces for easy use and quick setup
- Low maintenance and able to handle continuous loads thanks to air bearings
- Collision-protected tracing systems for a wide range of measurement tasks
- Large workpiece mounting area for large individual workpieces or pallets holding several workpieces
- Roundness measuring unit with automatic adjustment to the diameter of the workpiece even if the position is eccentric
- Straightness measurements in 3 main coordinate directions
- ISO 1101-compliant workpiece evaluation
- Testing in machine and workpiece coordinates in line with manufacturing requirements
- Comprehensive evaluation of form and positional features, diameters and positional values
- A wide range of accessories and probes offer an optimum solution for all measurement tasks
- Easy expansion option with additional axes of movement for rotating workpieces while the program is running. This means that highly complex measurement tasks, such as those required for V engine blocks, can be performed "unmanned" without operator intervention

Roundness measuring device
In addition to the measuring spindle (C-axis), the roundness measuring instrument includes an axis for automatically adjusting the probe to the workpiece diameter (R-axis). When performing roundness measurements, the R-axis guides the probe according to the form of the workpiece, even with eccentric deviations beyond the probe range.

Straightness measuring device
The vertical straightness measuring device (Z-axis) also guides the roundness measuring device on a granite surface. With the **MFK 600**, the accuracy of the horizontal straightness measuring device (X- and Y-axes) is not affected by the workpiece's size, form or weight because the guides are separated from the supporting air bearings.
With the **MFK 500**, the X/Y-axes of the motorized centering and tilting table are available as motorized positioning axes.

Calibration axes (A and B) are integrated in the workpiece mounting table and can automatically align workpieces mechanically within the machine volume.

Measuring capacity
Automatic calibration functions integrated in measuring runs allow continuous operation. Recording and processing measured values in parallel cuts the measurement time. The form measuring station's range of applications is extended by a comprehensive range of accessories.

Request a brochure or see WebCode 1307.

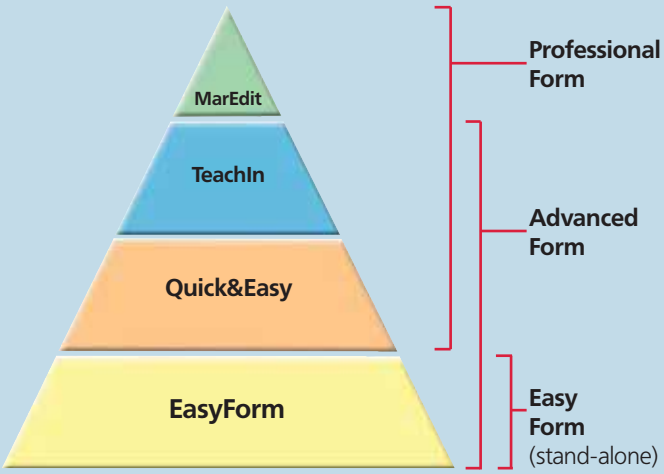
MarWin. Software Modules for MarForm

AdvancedForm gives you total control over your form measuring station. You can perform positioning, alignment, measurement or documentation tasks with a click of the mouse – and the graphical user interface gives you a constant overview.

As with other Windows® applications, functions can be selected from menu bars with pull-down menus using the mouse.

Many functions, such as printing results, loading measuring programs or changing a program step, can be activated simply by clicking the appropriate icons.

With **AdvancedForm** you always have complete control over the form measuring station. For example, you can track the profile during measurement and intervene if necessary. Operation can be adapted to suit individual requirements, regardless of whether you want to perform a quick single measurement, conduct a program run on a series part or convert a complex measurement task into a measuring program. **AdvancedForm** provides the ideal operating strategy whatever the task. Given that tasks can vary a great deal, no operating strategy is exactly right for every application. Consequently, **AdvancedForm** provides several different operating strategies:



- **Measuring run preferences**
  for measurement with an existing measuring program
- **Quick&Easy**
  for rapid measurement, obtaining a measuring result quickly with the minimum of effort
- **Teach-in programming**
  for creating, modifying and running a measuring program with a large number of options
- **MarEdit (optional)**
  the operating level for applications engineers and trained specialists, to solve the most challenging and complex of tasks.

AdvancedForm provides a clear overview of all the required measuring and evaluation parameters. Many of these parameters have default settings which simply have to be confirmed for the majority of measurement tasks. It is, of course, also possible to adapt individual parameters to the relevant task.
AdvancedForm has a powerful **teach-in programming** function to create measuring programs for workpieces that are to be measured repeatedly. It can also be used for measuring runs with special positionings, measurements, evaluations and forms of presentation.

With teach-in programming, as soon as you click the mouse on an icon – e.g. for a run-out measurement and evaluation – a window opens where you can describe the feature in more detail if necessary (e.g. radial or axial run-out, datum, brief designation, tolerance, etc.). The number of measurements and their type (original measurement or new evaluation of profiles already measured) are also specified in this window. Separate windows can be opened to change measuring, evaluation and display parameters but in many cases this is not necessary because logical defaults that apply to a large number of measurement tasks have already been entered. If different settings are required for specific measurement tasks, the clear way the window is divided means that you can quickly find what you are looking for and optimize the settings in no time at all.

The layout of a measuring record, for example, can be modified right down to the finest detail. The color of the profile, reference and borders can be selected individually, and the scaling (in µm/µin per scale division), type of graph (polar or linear, centered or uncentered) and additional display parameters can be set in any combination you choose.

Measuring programs for series parts to be measured repeatedly can be saved and called up at any time to start a measuring run (see above).

Informative profile graphs – if required with several profiles in a single graph, displayed in different colors and in different ways – are then immediately available on the large color screen. If you are looking for exact numerical values, you can opt to display the results in a table.

With the new **AdvancedForm**, standards-compliant measurements and evaluations are displayed in a way which is both clear and representative.
Even interactive layout options with a 3D preview in real time are possible.

MarWin. Software Modules for MarForm

MarWin software modules in detail

If you need to carry out form measurements, rather than creating long measuring programs you may prefer to gain direct access to a comprehensive and informative measuring record. In order to be able to do so, it is particularly important for the software to be transparent. Immediately after logging on in the **MarWin** user administration, you are directed to the MarShell, a clearly arranged user interface comparable with the Windows Desktop. It is from this **MarShell** that you start the finished measuring programs in the Preferences view. These preferences can be easily identified by means of saved images or graphics for each operator. One click is all that is needed to start the measuring program.
The **MarShell is** also used to start the measuring wizard module, Quick&Easy (QE).

The **Quick&Easy** wizards provide support for "quick interim measurements" and, with little effort, guide the user quickly to his objective, namely a highly informative measuring record.
A further click results in all **Quick&Easy** wizards that have so far been run being adopted as a chronological sequence into **AdvancedForm**, the **MarWin** teach-in programming function. This sequence merely has to be saved and the measuring program is then ready.
In **AdvancedForm** mode, additional functions can be added to the measuring program. The following Quick&Easy wizards assist in this process:

1. PREPARATION FOR MEASUREMENT

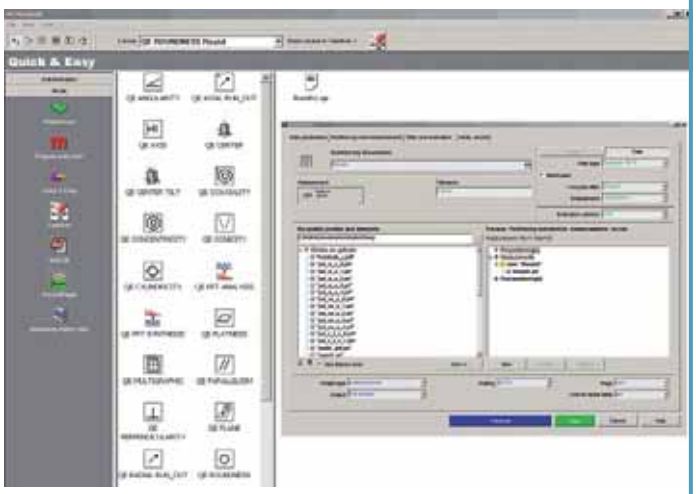
- **QE Determine starting position**
- **Measuring station, positioning**
- **QE Axial run-out alignment**
- **QE Centering**
- **QE Centering and tilting**

- **QE Set parameters**
- **QE Zenith**
- **QE Edge search**
- **QE Switch coordinate system**
- **QE Move to calculated position**

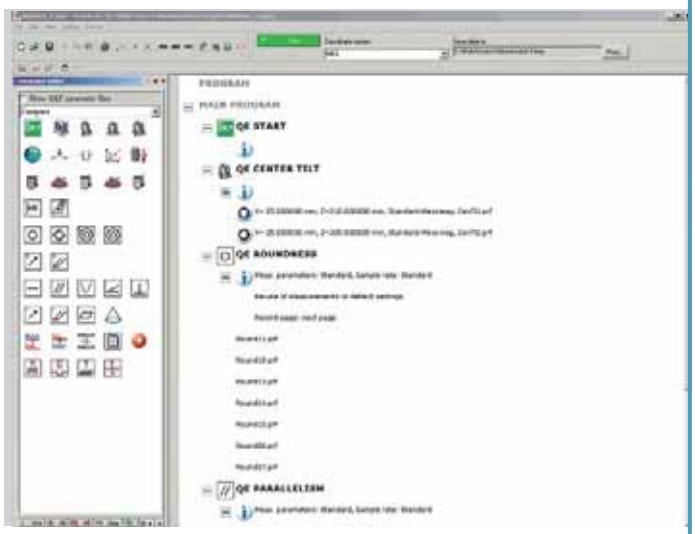
2. PROFILE RECORDING

- **QE Circles on cylinder**
- **QE Circles on plane/end face**
- **QE Lines on cylinder**
- **QE Lines on plane/end face**

Preferences view for starting the measuring programs



Quick&Easy Roundness



Teach-in listing

MarWin. Software Modules for MarForm

3. EVALUATION

- QE Axis
- QE Plane

- QE Roundness
- QE Cylindricity
- QE Coaxiality
- QE Concentricity

- QE Radial run-out
- QE Total radial run-out

- QE Straightness
- QE Parallelism
- QE Conicity
- QE Angularity
- QE Perpendicularity

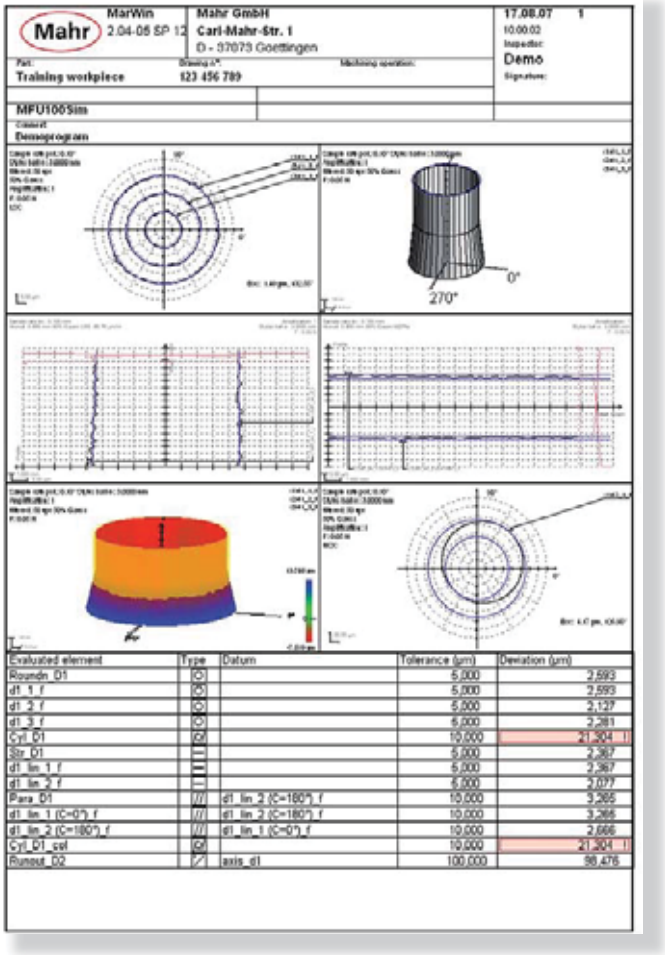
- QE Axial run-out
- QE Total axial run-out
- QE Flatness
- QE Taper

4. SPECIAL EVALUATION

- QE Fourier analysis
- QE Fourier synthesis (optional)
- QE Profile arithmetic

5. RECORD

- QE Multigraphic



Multigraphic record

6. DATA EXPORT

- QE Result export (optional)

Software Packages for Special Applications

Expansion package for twist testing and evaluation

Can be used in conjunction with **MarForm MMQ 400** with **T7W** probe and Mahr's **MarWin** evaluation software, consisting of:
- Twist evaluation software package based on MarWin evaluation software
- Probe arm for **T7W** for twist measurement, double-ended, with diamond tip and carbide ball with 3 mm dia. for alignment

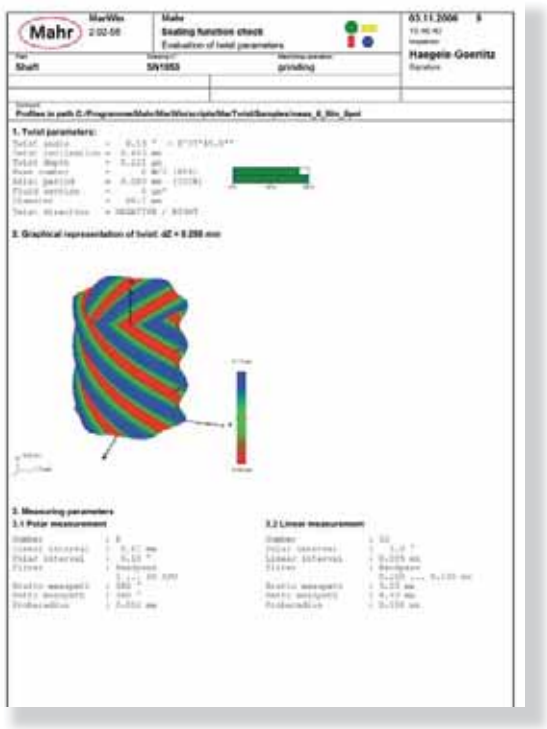
Form and twist evaluation
- Form/positional evaluation for ovality / conicity / parallelism / parallel to twist evaluation
- Form/positional/twist evaluation of several upr values

Evaluation and recording
After the measurements have been performed, measurement records with the following content are generated:

Twist parameters:
- Movement rate DG (upr) 1 to 50
- Period length DP (mm) > 0.05
- Twist angle Dγ (degrees) maximum of 5°, minimum depending on dia. = 50 mm and DG (e.g. 15' if dia. = 50 mm/DG = 15 upr)
- Twist direction negative/positive or right/left
- Twist depth Dt (µm) > 0.1

Graphic output:
The measured profiles are output in the record as a graphic. Various types of graphic output are available:
- 3D cylinder (in color, traditional and unwound)
- Polar display of polar profiles for individual assessment of the workpiece form
- Amplitude spectra of the polar profiles in a bar graph
- Display of individual generating lines as a straightness profile for individual assessment of form and position parameters
- Amplitude spectra of the linear profiles in a bar graph

Record with indication of measurement conditions



Twist measurement record

Recording measured values:

Various contacting strategies can be easily parameterized:
- Measurement of n generating lines (e.g. 72 according to DC standard)
- Combination measurement of n generating lines and m polar profiles (e.g. 4 + 4; high precision and low measurement time)
- Patented adaptive method (optimization of strategy and measurement time in computer)

A probe arm for **T7W** equipped with two styluses is used to record measured values:
- **Stylus #1** with 3 mm dia. carbide ball for mechanical workpiece centering and tilting on the **MMQ 400** Formtester
- **Stylus # 2** with diamond tip for measuring twist and form parameters

Expansion package for piston testing and evaluation

Can be used in conjunction with **MarForm MMQ 400** with **T7W** probe and Mahr's **MarWin** evaluation software, consisting of:
- Software package for piston-specific evaluation based on **MarWin** evaluation software
- Probe arms for piston measurement optional and customized on request

Within the framework of the piston testing and evaluation option, piston-specific features and evaluations are implemented, for example
- Determining the position of the main ovality axis
- Determining the position of the pin bore (using segment measurements in the bore) and using this to determine the ovality distortion
- Testing up to 10 ovalities using tolerance tables (symmetrical and asymmetrical) / radius- or diameter-based input and output / records for each oval: polar and linear graphs and results table; changes possible at the customer's request depending on the work involved
- Testing 2 meridians using tolerance tables (symmetrical and asymmetrical) / radius- or diameter-based input and output / records: both meridians on a single page with graphic and results table; changes possible at the customer's request depending on the work involved
- Determining the offset of the head relative to the defined piston axis
- Testing the following features in the grooves (for each groove, measurements possible at up to 4 angle positions)
  - Long-wave (0 to 50 upr) and short-wave (15 to 150 upr) properties of upper and lower groove flanks
  - Groove opening angle (total and individual) of trapezoidal grooves, output in either degrees, minutes, seconds or as a decimal
  - Straightness, axial run-out and perpendicularity of upper and lower groove flanks relative to the piston axis
- Determining special linear forms of the piston's pin bore using tolerance tables (e.g. "trumpet shape") in the same clamping operation as items 1-6 (2 measurements for each bore section)
- Determining special linear (e.g. "trumpet shape") and polar (e.g. "ovalities on one side") forms of the piston's pin bore using tolerance tables, clamped with centered bore (up to 4 linear and up to 2 polar measurements for each bore section)

Request a brochure or see WebCode 1292.

MarForm Overview of Standard Form Measuring Instruments

Formtester	**MMQ 100**	**MMQ 34** Z=350 mm Z=500 mm	**MMQ 400** Z=350 mm	**MMQ 400** Z=500 mm
Roundness measuring device, C-axis				
Roundness deviation (µm+µm/mm meas. height)**	0.050 + 0.0006	0.02 + 0.0005	0.02 + 0.0005	0.02 + 0.0005
Roundness deviation (µm+µm/mm meas. height)*	0.025 + 0.0003	0.01 + 0.00025	0.01 + 0.00025	0.01 + 0.00025
Axial run-out deviation (µm+µm/mm meas. radius)**	0.040 + 0.0006	0.04 + 0.0002	0.04 + 0.0002	0.04 + 0.0002
Axial run-out deviation (µm+µm/mm meas. radius)*	0.020 + 0.0003	0.02 + 0.0001	0.02 + 0.0001	0.02 + 0.0001
Centering and tilting table	Manual	Manual	Man. / autom.	Man. / autom.
Table diameter (mm)	160	220	285	285
Table load capacity, centric (N)	200	600	600	600
Speed (rpm) 50 Hz / 60 Hz	5 / 6	1.66 / 5 / 10	1 / 10	1 / 10
Vertical unit, Z-axis				
Positioning path (mm)	300, manual	-	-	-
Manual or motorized positioning	Manual	-	-	-
Motorized measuring path (mm)	-	350/500	350	500
Straightness deviation /100 mm meas. path (µm)**	-	0.25	0.15	0.15
Straightness deviation /total meas. path (µm)**	-	0.7/0.8	0.3	0.4
Parallelism deviation of Z/C-axis in tracing direction (µm)	-	-	0.5	0.8
Measuring speed (mm/s)	-	0.5 / 1 / 5	0.5 to 10	0.5 to 10
Positioning speed (mm/s)	-	5 / 10 / 30	0.5 to 100	0.5 to 100
Horizontal unit, X-axis				
Positioning path (mm)	180	180	-	-
Manual or motorized positioning	Manual	Mot.	Mot.	Mot.
Motorized measuring path (mm)	-	-	180	280
Straightness deviation /100 mm meas. path (µm)***	-	-	0.4	0.5
Straightness deviation /total meas. path (µm)**	-	-	0.8	1.5
Perpendicularity of X/C-axis (µm)	-	-	1	2
Measuring speed (mm/s)	-	-	0.5 to 10	0.5 to 10
Positioning speed (mm/s)	-	5 / 10 / 30	0.5 to 30	0.5 to 30

* Values as maximum deviation from reference circle LSC, filter 15 upr.
** All values in accordance with DIN ISO 1101 at 20 °C ± 1 °C in vibration-free environment, filter 15 upr LSC or 2.5 mm LSS, 5 rpm or 5 mm/s and standard probe arm with ball dia. 3 mm.
Tested on standard, taking into account compensation algorithms.
Due to the large number of possibilities, only a few examples of machines are given here. Technical data for "your" MMQ can be obtained from Mahr on request.

MarForm Overview of Reference and Large Formtesters

Formtester	MFU 800	MFU 100
Roundness measuring device, C-axis		
Roundness deviation (µm+µm/mm meas. height)**	0.02 + 0.0004	0.02 + 0.0004
Roundness deviation (µm+µm/mm meas. height)*	0.01 + 0.0002	0.01 + 0.0002
Axial run-out deviation (µm+µm/mm meas. radius)**	0.04 + 0.0002	0.04 + 0.0004
Axial run-out deviation (µm+µm/mm meas. radius)*	0.02 + 0.0001	0.02 + 0.0002
Resolution (interpolated)	0.0005°	0.0001°
Centering and tilting table	Automatic	Automatic
Table diameter (mm)	300	180
Table load capacity, centric (N)	1,000	200
Speed (rpm) 50 Hz/60 Hz	0.1 to 15	0.1 to 15
Vertical straightness measuring device, Z-axis		
Measuring path (mm)	480	320
Straightness deviation /100 mm (µm)**	0.1	0.1
Straightness deviation /200 mm (µm)**	-	0.2
Straightness deviation / measuring path (µm)**	0.3	0.3
Parallelism deviation of Z/C-axis in tracing direction (µm)	0.6	0.6
Measuring speed (mm/s)	0.1 to 50	0.1 to 50
Positioning speed (mm/s)	0.1 to 50	0.1 to 50
Positioning uncertainty (µm) with backward probe positioning	-	1
Positioning uncertainty (µm) (total positioning P in accordance with VDI 3441)	10	2
Resolution (interpolated) (µm)	0.001	0.001
Horizontal straightness measuring device, X-axis		
Measuring path (mm)	180	190
Straightness deviation /100 mm (µm)**	0.15	0.15
Straightness deviation /meas. path (µm)**	0.3	0.3
Perpendicularity of X/C-axis (µm)	0.3	0.3
Measuring speed (mm/s)	0.1 to 50	0.1 to 50
Positioning speed (mm/s)	0.1 to 50	0.1 to 50
Positioning speed (µm) with backward probe positioning	-	1
Positioning uncertainty (µm) (total positioning P to VDI 3441)	4	2
Diameter measuring accuracy (µm)	2	0.2
Resolution (interpolated) (µm)	0.001	0.001
Horizontal straightness measuring device, Y-axis		
Measuring path (mm)	6	6
Straightness deviation / (µm/ 5 mm, filter 0.25 mm)	0.5	0.5
Perpendicularity of Y/X-axis (µm)	1	1
Resolution (interpolated) (µm)	0.005	0.005

* Values as maximum deviation from reference circle LSC, filter 15 upr.
** All values in accordance with DIN ISO 1101 at 20 °C ± 1 °C in vibration-free environment, filter 15 upr LSC or 2.5 mm LSS, 5 rpm or 5 mm/s and standard probe arm with ball dia. 3 mm.
Tested on standard, taking into account compensation algorithms.

MarForm Overview of Standard Form Measuring Instruments – Inch

Formtester	**MMQ 100**	**MMQ 34** Z = 13.8 in Z = 19.7 in	**MMQ 400** Z = 13.8 in	**MMQ 400** Z = 19.7 in
Roundness measuring device, C-axis				
Roundness deviation (µin+µin/in meas. height)**	2.0 + 0.024	0.8 + 0.020	0.8 + 0.020	0.8 + 0.020
Roundness deviation (µin+µin/in meas. height)*	1.0 + 0.012	0.4 + 0.010	0.4 + 0.010	0.4 + 0.010
Axial run-out deviation (µin+µin/in meas. radius)**	1.6 + 0.024	1.6 + 0.008	1.6 + 0.008	1.6 + 0.008
Axial run-out deviation (µin+µin/in meas. radius)*	0.8 + 0.012	0.8 + 0.004	0.8 + 0.004	0.8 + 0.004
Centering and tilting table	Manual	Manual	Manual / autom.	Manual / autom.
Table diameter (in)	6.3	8.7	11.2	11.2
Table load capacity, centric (lbs)	44	134	134	134
Speed (rpm) 50 Hz / 60 Hz	5 / 6	1.66 / 5 / 10	1 / 10	1 / 10
Vertical unit, Z-axis				
Positioning path (in)	11.8 manual	-	-	-
Manual or motorized positioning	Manual	-	-	-
Motorized measuring path (in)	-	13.8/19.7	13.8	19.7
Straightness deviation / 100 in meas. path (µin)**	-	9.84	5.9	5.9
Straightness deviation / total meas. path (µin)**	-	27.56/31.50	11.8	15.7
Parallelism deviation of Z/C-axis in tracing direction (µin)	-	-	19.7	31.5
Measuring speed (in/s)	-	0.02 / 0.04 / 0.20	0.02 to 0.40	0.02 to 0.40
Positioning speed (in/s)	-	0.20 / 0.4 / 1.18	0.02 to 4	0.02 to 4
Horizontal unit, X-axis				
Positioning path (in)	7	7	-	-
Manual or motorized positioning	Manual	Mot.	Mot.	Mot.
Motorized measuring path (in)	-	-	7.1	11
Straightness deviation / 100 in meas. path (µin)**	-	-	15.7	19.7
Straightness deviation / total meas. path (µin)**	-	-	31.5	59.0
Perpendicularity of X/C-axis (µin)	-	-	39.4	78.7
Measuring speed (mm/s)	-	-	0.02 to 0.40	0.02 to 0.40
Positioning speed (mm/s)	-	0.20 / 0.4 / 1.18	0.02 to 1.18	0.02 to 1.18

* Values as maximum deviation from reference circle LSC, filter 15 upr.
** All values in accordance with DIN ISO 1101 at 20 °C ± 1 °C in vibration-free environment, filter 15 upr LSC or 2.5 mm LSS, 5 rpm or 5 mm/s and standard probe arm with ball dia. 3 mm.
Tested on standard, taking into account compensation algorithms.
Due to the large number of possibilities, only a few examples of machines are given here. Technical data for "your" MMQ can be obtained from Mahr on request. Information on US models MMQ 6xxx is also available on request.

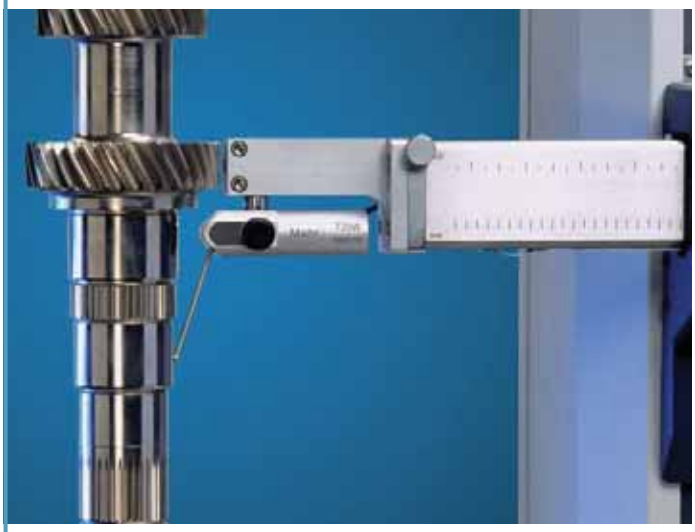
MarForm Overview of Reference and Large Formtesters - Inch

Formtester	MFU 800	MFU 100
Roundness measuring device, C-axis		
Roundness deviation (µin+µin/in meas. height)**	0.8 + 0.016	0.8 + 0.016
Roundness deviation (µin+µin/in meas. height)*	0.4 + 0.008	0.4 + 0.008
Axial run-out deviation (µin+µin/in meas. radius)**	1.6 + 0.008	1.6 + 0.008
Axial run-out deviation (µin+µin/in meas. radius)*	0.8 + 0.004	0.8 + 0.008
Resolution (interpolated)	0.0005°	0.0001°
Centering and tilting table	Automatic	Automatic
Table diameter (in)	11.8	7.1
Table load capacity, centric (lbs)	225	44
Speed (rpm) 50 Hz / 60 Hz	0.1 to 15	0.1 to 15
Straightness measuring device vertical, Z-axis		
Measuring path (in)	18.9	12.6
Straightness deviation / 3.9 in (µin)**	3.9	3.9
Straightness deviation / 7.9 in (µin)**	-	7.9
Straightness deviation / meas. path (µin)**	11.8	11.8
Parallelism deviation of Z/C-axis in tracing direction (µin)	23.6	23.6
Measuring speed (in/s)	0.004 to 1.97	0.004 to 1.97
Positioning speed (in/s)	0.004 to 1.97	0.004 to 1.97
Positional uncertainty (µin) with backward probe positioning	39.4	-
Positional uncertainty (µin) (total positioning P to VDI 3441)	393.7	78.7
Resolution (interpolated) (µin)	0.0394	0.0394
Straightness measuring device horizontal, X-axis		
Measuring path (in)	7.1	7.5
Straightness deviation / 100 in (µin)**	5.9	5.9
Straightness deviation / meas. path (µin)**	11.8	11.8
Perpendicularity of X/C-axis (µin)	11.8	11.8
Measuring speed (in/s)	0.004 to 1.97	0.004 to 1.97
Positioning speed (in/s)	0.004 to 1.97	0.004 to 1.97
Positional uncertainty (µin) with backward probe positioning	-	39.4
Positional uncertainty (µin) (total positioning P to VDI 3441)	157.5	78.7
Diameter measuring accuracy (µin)	78.7	7.9
Resolution (interpolated) (µin)	0.0394	0.0394
Straightness measuring device horizontal, Y-axis		
Measuring path (in)	0.2	0.2
Straightness deviation (µin/0.2 in, filter 0.010 in)	19.7	19.7
Perpendicularity of Y/X-axis (µin)	39.4	39.4
Resolution (interpolated) (µin)	0.2	0.2

* Values as maximum deviation from reference circle LSC, filter 15 upr.
** All values in accordance with DIN ISO 1101 at 20 °C ± 1 °C in vibration-free environment, filter 15 upr LSC or 2.5 mm LSS, 5 rpm or 5 mm/s and standard probe arm with ball dia. 3 mm.
Tested on standard, taking into account compensation algorithms.

Accessories for MarForm

The optimum solution using accessories



T20W Probe

The inductive **T20W** probe is a universal device. The fact that the probe arm can be moved in a range of 190° and that there are a variety of damping options for the probe means that measurements can also be performed in areas that are difficult to access. You can combine easily exchangeable probe arms with a variety of styluses in order to adapt the probe to the relevant measurement tasks or workpieces.

T20W probe with probe arm range of 190°

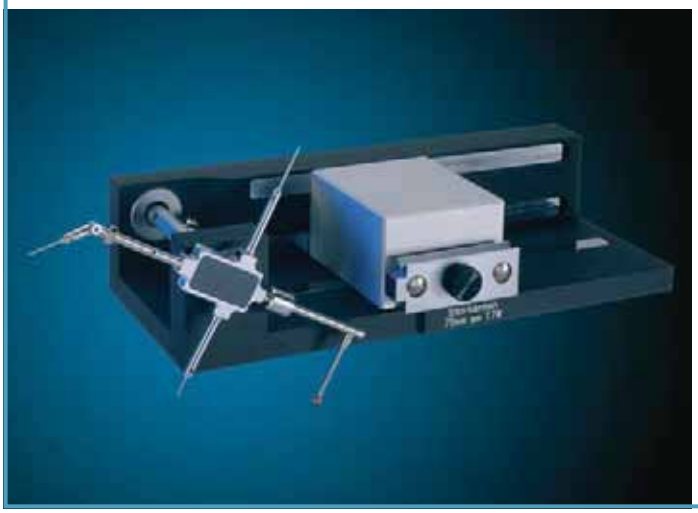
- Measuring range ± 1,000 µm (0.039 in)
- Measuring force adjustable from 0.01 N to 0.12 N
- Switchable measuring direction
- Exchangeable probe arm
- Free travel limitation adjustable in contacting direction
- Clamping shaft dia. 8 mm (0.31 in)

Motorized T7W Probe

The **T7W probe** is fitted with a motorized rotational axis. This makes it possible to move the probe arm gradually to the required contacting position. As a result, measurements can be performed on cylindrical surfaces and end faces. As a zero position probe, the **T7W** can also switch automatically between internal and external measurements or between end face measurements from above and below without operator intervention. Fully automatic measurement runs on complex workpieces can be carried out without operator intervention too. The probe arms of the **T7W** are exchangeable. Its motorized rotational axis enables the construction of multi-point probe arms – i.e. probe arms with several different contacting elements – making it possible to switch between different stylus ball geometries within a single measurement run.

Motorized T7W probe
with probe arm moveable around 360° for MMQ 400, MMQ 400 CNC and MFU 100

- Total range of 2,000 µm (0.079 in)
- Zero probe working range ± 500 µm (0.02 in)
- Measuring force adjustable from 0.01 N to 0.2 N
- Two-way measuring direction
- Contacting angle freely selectable in 1° steps
- 360° adjustable (motorized)
- Probe arms easily exchangeable (magnetic mount)
- Flexible multi-point probe possible
- Probe arm module with adjustment device available
- Mechanical and electrical overload protection



Accessories for MarForm

The optimum solution using accessories

Clamps

Three-jaw chuck, dia. 100 mm (3.94 in)
with mounting flange dia. 160 mm (6.30 in) and reversible jaws for external and internal clamping. External clamping range 1 to 100 mm (0.040 to 3.93 in), internal 36 to 90 mm (1.42 to 3.54 in). Total height with flange 47 mm (1.85 in). Adjustment by means of rotating ring.

Rim chuck with 8 jaws, dia. 150 mm (5.91 in)
with mounting flange dia. 198 mm (7.80 in) and separate jaws for external and internal clamping. External clamping range 1 to 152 mm (0.039 to 5.98 in), internal 24 to 155 mm (0.94 to 6.10 in). Total height with flange 52 mm (2.05 in). Cannot be used with MMQ 10/MMQ 100 Formtester.

Three-jaw chuck, dia. 110 mm (4.33 in) (not illustrated)
with mounting flange dia. 164 mm (6.46 in). External clamping range 3 to 100 mm (0.12 to 3.94 in), internal 27 to 100 mm (1.06 to 3.94 in). Total height with flange 73 mm (2.87 in).

Three-jaw chuck, dia. 80 mm (3.14 in)
with mounting flange dia. 124 mm (4.88 in). External clamping range 2 to 78 mm (0.079 to 3.07 in), internal 26 to 80 mm (1.02 to 3.15 in). Total height with flange 65.5 mm (2.58 in). Adjustment by means of T-wrench.

Quick-clamping device (collet chuck)
Dia. 1 to 12 mm (0.039 to 0.47 in) with mounting flange dia. 124 mm (4.88 in), for external clamping. Supplied with collet chucks of dia. 1 to 8 mm (0.039 to 0.31 in) in 0.5 mm (0.02 in) steps. Total height 80 mm (3.15 in).
Further collet chuck devices are available on request.

Clamping disks/clamping jaws
Clamping disk set. Adjustable workpiece stop for pre-centering and clamping in series measurements.
For clamping diameter of 36 to 232 mm (1.42 to 9.13 in) depending on machine type. Comprises two stop disks with slot and an eccentric clamping disk.

Clamping jaws (2). With M5 fastening thread. Clamping height 40 mm (1.57 in).
Further part-specific clamps are available on request.

Test Standards

Roundness standard, 40 nm
Ultra-precise measuring sphere for testing measuring spindle radial run-out accuracy. Dia. approx. 50 mm (1.97 in). Roundness deviation 0.04 µm (1.57 µin).

Roundness standard, 100 nm (not illustrated)
High-precision measuring sphere for testing measuring spindle radial run-out accuracy. Dia. approx. 12.7 mm (0.5 in). Roundness deviation 0.10 µm (3.94 µin).

Optical flat
Dia. 150 mm (5.91 in), for testing and adjusting the horizontal measuring device for the measuring spindle axis. Flatness deviation 0.2 µm (8 µin).

Universal cylinder square with calibration standard
High-precision cylinder square with two surfaces for dynamic testing of probe calibration. Dia. 20 mm (0.79 in), length 150 mm (5.91 in).

Cylinder square
for checking and adjusting the measuring spindle axis for vertical guidance. Length 250 mm (9.84 in), dia. 80 mm (3.15 in). Deviation from cylindricity max. 1 µm (40 µin). Weight approx. 11.5 kg (25.35 lbs).

Cylinder square (not illustrated)
for checking and adjusting the measuring spindle axis for vertical guidance. Length 360 mm (14.17 in), dia. 100 mm (3.94 in). Deviation from cylindricity max. 1 µm (40 µin). Weight approx. 13 kg (28.66 lbs).

Magnification standard with a flick (not illustrated)
Cylinder L = 50 mm (1.97 in), dia. 20 mm (0.79 in) with minimally flattened section for testing probe sensitivity.

Multi-wave standard (not illustrated)
Cylindrical base unit with sinusoidal waves on outside diameter. 15, 50, 150 and 500 upr. Used to test the sensitivity of the probe signal and the filters in form testing.

Request a brochure or see WebCode 1292.

Primar. The Universal Form Measuring Instrument

THREE IN ONE

► | You only need to clamp your test items once and start the measuring program – the Primar runs through all the test parameters completely automatically. The system could not be more efficient because no time is lost changing setups and transporting test items from one test machine to another. Primar covers form, gearwheel and 3D features in a single clamping operation. The broad range of applications not only saves you money in terms of investment and maintenance, but also saves you time. | ◄

Primar MX 4

A successful combination of formtester and polar coordinate measuring instrument

Features

The **Primar** dynamically scans axis-symmetrical workpieces for form and positional deviations. It provides µm-accurate measuring data quickly for your production needs.

When used with the CNC centering and tilting table, the Primar is able to perform **true form measurements**. With this type of measurement, only one axis (the high-precision C spindle) is moved to record the data, thus minimizing the measuring uncertainty. Thousands of 3D measurement values are recorded. As a result of prior CNC-controlled tilting and leveling to align the workpiece, the measurement is completely without error in accordance with the Abbe principle.

The four measuring axes of the Primar are designed such that even large and heavy workpieces can be measured.

- **X-axis 300 mm (11.81 in)**
- **Y-axis 600 mm (23.62 in)**
- **Z-axis 700 mm (27.56 in)**

The easily accessible turntable is generously proportioned and makes it easy to load test items.

The **Primar** enables you to perform a wide range of measurement tasks more cost-efficiently than ever before. It is the first unit capable of checking eccentric parts with formtester accuracy. This is thanks to easy-to-use family programs for gearwheels, geared tools, bevel gears, camshafts, crankshafts, pistons and connecting rods or customized measuring programs developed specifically for your workpiece.

The **Primar** can be used in the following applications:

- Mechanical and electrical engineering: Gearwheels, rotors, spindles, ball bearing cages, spur gear shafts, involute gear teeth, hollow shafts with internal toothing, pinion shafts, planetary gears, ring gears, control valves, tappets, camshafts and connecting rods
- Automotive engineering: Pistons, steering components, axle and shaft journals, propeller shafts, gearwheels, worms, bevel gears, etc.
- Customized axis-symmetrical workpieces

Primar measuring station components

The **Primar** is customized to your specific requirements and workpieces. The machine concept allows you to add on extra options. These, like the software, are modular.

- MarForm Primar MX 4 XXL
- MarForm Primar MX 4 CNC
- Center support for fixing between centers

Primar MX 4 Versions

MarForm Primar MX 4 XXL

Description

Crankshafts have specific requirements in terms of form and positional measurements. The **Primar MX 4 XXL** is ideally suited to this application. Thanks to the extra-large adjustment paths (centering range ± 72 mm (2.83 in) in X- and Y-directions), the centering and tilting table is able to align main and stroke bearings relative to the C-axis with µm precision. The XXL table is also used when measuring connecting rods. The diagonal travel of 180 mm (7.09 in) enables both eyes to be centered.

Application
- Crankshaft measurements
- Connecting rod measurements

The **Primar MX4 XXL** can also optionally be fitted with a center support to mount workpieces between centers.

MarForm Primar MX 4 CNC

Description

High-precision form, positional and 3D measurements on cylindrical workpieces can be performed with ease thanks to the centering and tilting table.

Application
Geometry elements can be measured perpendicular to the main workpiece axis in a single clamping operation. This enables straightness or roundness measurements to be performed on items such as a piston's pin bore. The Primar is also ideal for fast, comprehensive testing of camshafts, including the cam form.

Primar Software Solutions

Description

Primar software solutions
The process of creating a measuring program and measuring workpieces must be fast and not involve a lot of programming. This is no problem with the Primar family program. It defines each new measuring program using masks. The operator only has to enter the geometry of the workpieces and select the required features. The part is then measured automatically. It also responds quickly and flexibly when it comes to measuring part families or in the event of rapid changes. It is available for the following:

- Crankshafts
- Camshafts
- Pistons
- Shaving gears
- Hobs
- Bevel gears
- Spur gears
- Worms

There are also application programs for the following:
- Connecting rods
- Engine blocks
- Cylinder heads
- Other workpieces

Crankshafts

Family program for crankshafts
When used in combination with an XXL centering and tilting table on the C-axis, Primar is a high-performance measuring station for crankshafts. Form, position and 3D features can be measured in a single clamping operation. The family program offers a large number of features at main and stroke bearings and at the flange and journal of the crankshaft. The form features on the workpiece are always measured in formtester mode. This ensures maximum accuracy for the results. To perform the measurements, the main and stroke bearings are automatically aligned with the C-axis of the measuring instrument. The large number of measuring points provides the basis for the high quality of the measurement results. This results in high-precision workpiece axes.

Camshafts

Family program for camshafts
To use the family program for camshafts, you need both a Formtester that records the features at the bearing points and, in order to measure the cam form, a continuous-path control system in combination with low contacting forces and recording of as many measuring points as possible. The Primar offers a simple solution to both these tasks. The combination of the measuring station for camshafts and the family program offers everything you will need for fast, efficient and comprehensive camshaft measurement. The nominal cam form can be imported as a file. The probe moves along this nominal cam contour. The distance between the measuring points is kept constant. This means that you get a detailed view of your cam profiles with your desired tolerance bands.

Pistons

Family program for pistons
The family program makes the Primar the ideal measuring station for pistons. The workpiece is aligned with the piston bore. Ovality, meridian form, diameter, the pin bore of the piston and the grooves are measured in the workpiece coordinate system. The measurements are output in piston-specific records as a graphic or as results tables.

Connecting Rods

Family program for connecting rods
When used in combination with the XXL centering and tilting table, the Primar can be utilized to its full benefit with this workpiece. The workpiece is measured in its entirety. The large and small eyes are positioned automatically into the C machine axis and all the form features are measured in form mode with maximum precision. Further features such as diameter, distance, thickness and the set of teeth are measured according to the drawing requirements in the same clamping operation. Primar is thus able to perform an evaluation of the entire workpiece in a single clamping operation and offers unique determination of datum elements. The evaluation results are available in table and graphic form.
The universal clamp enables you to quickly change to other conrod types with a simple adjustment of the workpiece supports.

INNOVATIVE METROLOGY IMPROVES YOUR GEAR QUALITY.

THAT IS WHY WE HAVE MARGEAR

The latest information on MARGEAR products can be found on our website:
www.mahr.com, WebCode 157

► I Maximum precision in the production environment is an important factor for a company's success. MarGear gear metrology solutions enable you to perform measurement tasks on gears and gearing tools quickly, simply and precisely in a single setup. The flexible systems – requiring no mechanical alignment or reclamping and combining gear metrology with form and positional analysis – create the ideal conditions to ensure your business remains competitive. Fully integrating metrology into the manufacturing process creates a closed-loop quality control system for gear manufacture. I ◄

MarGear. Gear Metrology

Request a brochure or see WebCode 2266.

MarGear. Gear Metrology from Experienced Specialists

GEAR METROLOGY SOLUTIONS

► I The highly precise and flexible GMX systems represent the ideal combination of gear and form measurement in a single system. From highly specialized gear analysis to fully integrated series measurement, MarGear is your perfect partner for all levels of modern gear manufacturing. I ◄

MarGear. GMX 275/400

Universal gear measurement centers

Description

For fast and precise measurement and analysis of gears of all types up to an outside diameter of 275 or 400 mm (10.83 or 15.75 in). The ideal solution for both universal and specialized gear manufacturing processes. System solutions ensure maximum flexibility and availability within modern gear component manufacturing environments.

Fully automatic inspection of:
- Straight and helical cylindrical gears
- Spiral and hypoid bevel gears
- Crown gears
- Cylindrical worm shafts
- Conical cylindrical gears
- Segment gears
- Hobs
- Shaving cutters
- Pinion-shaped cutters
- Synchronous gears
- 3D geometry form measurements and analysis

Accuracies
Class I accuracy gear measuring machine for gear measurements in accordance with **VDI/VDE 2612/2613 Group 1** at 20 °C ± 2 °C, *rotational axis: formtester accuracy*.

MarGear. GMX 600

Universal form and gear inspection system

Description

The perfect combination for gear and form testing applications in a single setup. This combination saves time as well as investment and maintenance costs.

Full form testing functionality for outside diameters up to 600 mm (23.62 in). The **GMX 600** is a complete solution that can also be used to measure crankshafts, camshafts and pistons.

Fully automatic inspection of:
- Straight and helical cylindrical gears
- Spiral and hypoid bevel gears
- Cylindrical worm shafts
- Conical cylindrical gears
- Segment gears
- Shaving cutters
- Hobs
- Synchronous gears
- 3D geometry
- Form measurements with centering and tilting table
- Camshafts, crankshafts & pistons *

(* optional)

Accuracies
Class I accuracy gear measuring machine for gear measurements in accordance with **VDI/VDE 2612/2613 Group 1** at 20 °C ± 2 °C, *rotational axis: formtester accuracy*.

MarGear. Industry Solutions

Measurement of spur gears
- Measurement and analysis of internal and external gears up to a 90° helix angle
- Crowned and conical gears
- Analysis according to DIN 3962 or free tolerances
- Measurement and analysis of profile, flank lines (lead), pitch, run-out errors, tooth thickness and diameter over balls/pins
- Root and tip reliefs
- Tolerance bands, K-charts
- Measurement of twist
- Measurement of tip and root diameter
- Measurement of segment gears
- Measurement and analysis up to modulus of 0.3

Measurement of bevel gears
- Measurement and analysis of flank topography based on nominal data or a master gear plus gear pitch and run-out errors
- Topography point matrix definition with up to 15 x 15 points
- Calculation of the average flank form
- Calculation of tooth thickness in normal and transverse section
- Measurement and analysis of tooth depth, face angle and root angle
- Calculation of pressure and spiral angles
- Deviation from flank form measurement
- Calculation of pitch errors according to DIN 3965

Measurement of shaving cutters
- Measurement and analysis of shaving cutters
- Analysis according to DIN 3962 or free tolerances
- Measurement and analysis of profile, flank lines (lead), pitch, run-out errors, tooth thickness and diameter over balls/pins
- Analysis of crowning
- Automatic adjustment of measurement paths
- Automatic recognition of serration positions of plunge-type shaving cutters
- Measurement and analysis of burnishing cutters

Measurement of worm shafts
- Measurement and analysis of profile, flank lines (lead), pitch and tooth thickness on worm shafts
- Analysis of worm shafts with A, N, I or K profile
- Measurement and analysis of duplex worm shafts
- Measurement of pitch in axial or transverse plane
- Measurement of twist
- Analysis of crowning
- Analysis based on K-charts
- Analysis based on freely definable tolerances

MarGear. Industry Solutions

Hob measurement

- Measurement and analysis of axial and radial run-out on the collar
- Measurement of flute spacing and flute direction
- Profile measurement across or behind the cutting edge
- Measurement of thread and base pitch variation
- Analysis of form and position errors of the cutting face
- Calculation of tooth thickness
- Analysis conforming to DIN 3968 and other standards
- Measurement of special hobs as spline-shafts hobs, sprocket hobs etc.*

* optional

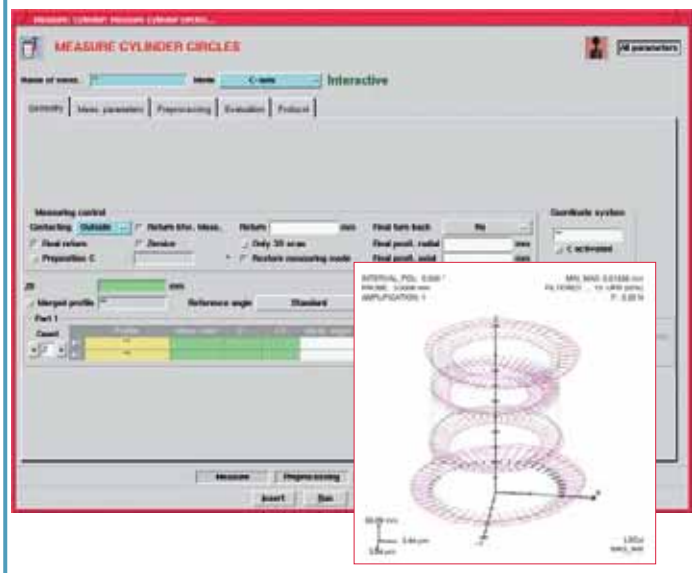
Measurement of camshafts

- Measurement and analysis of camshafts based on design data
- Analysis of cam form and cam angle position relative to the reference groove
- Analysis of cam curves, angles and diameters and acceleration curves
- Measurement and analysis of unknown cam profiles, which can be stored as nominal or reference data
- Flexible record design
- Mask-based input without the need for time-consuming teach-in processes

Measurement of crankshafts (GMX 600 only)

- The software package for crankshaft testing offers a wide variety of functions to measure and analyze parameters on the crankshaft's main and stroke bearings, flange and journals. All form parameters are always measured in form testing mode
- Fully automatic measurement of roundness, cylindricity, parallelism and diameter on main and stroke bearings
- Fully automatic measurement of roundness, cylindricity, parallelism, diameters and distances on the crankshaft flange
- Data input direct from the drawing
- Flexible record design

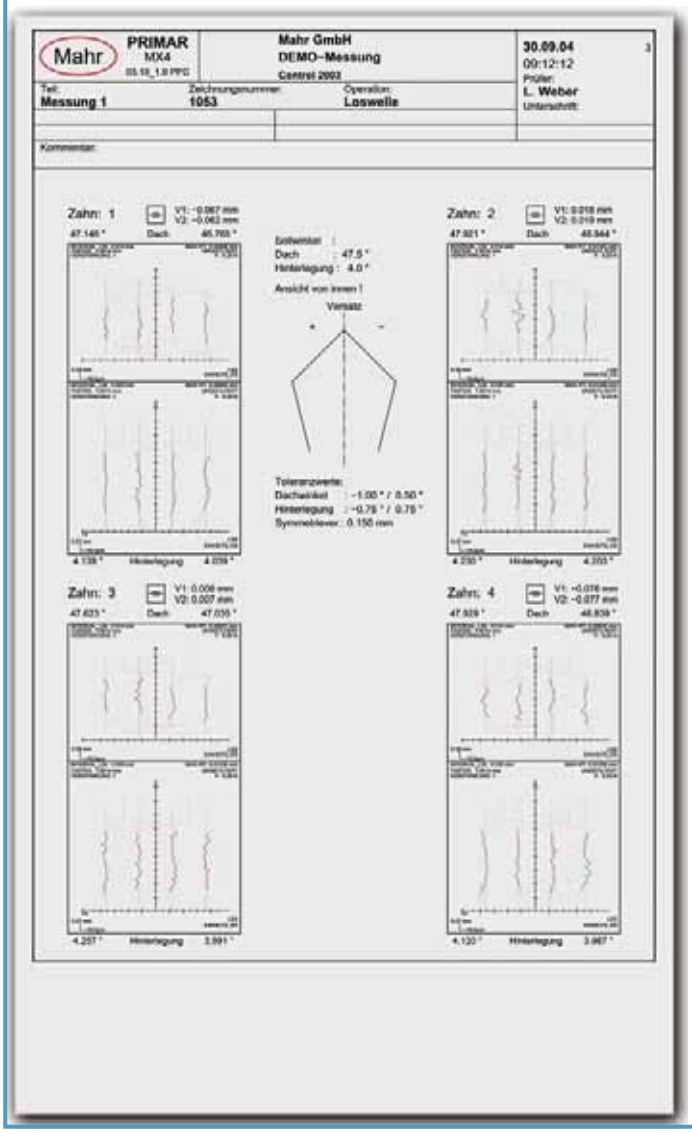
MarGear. Software solutions – MarLib. 3D Form and Position Measurements

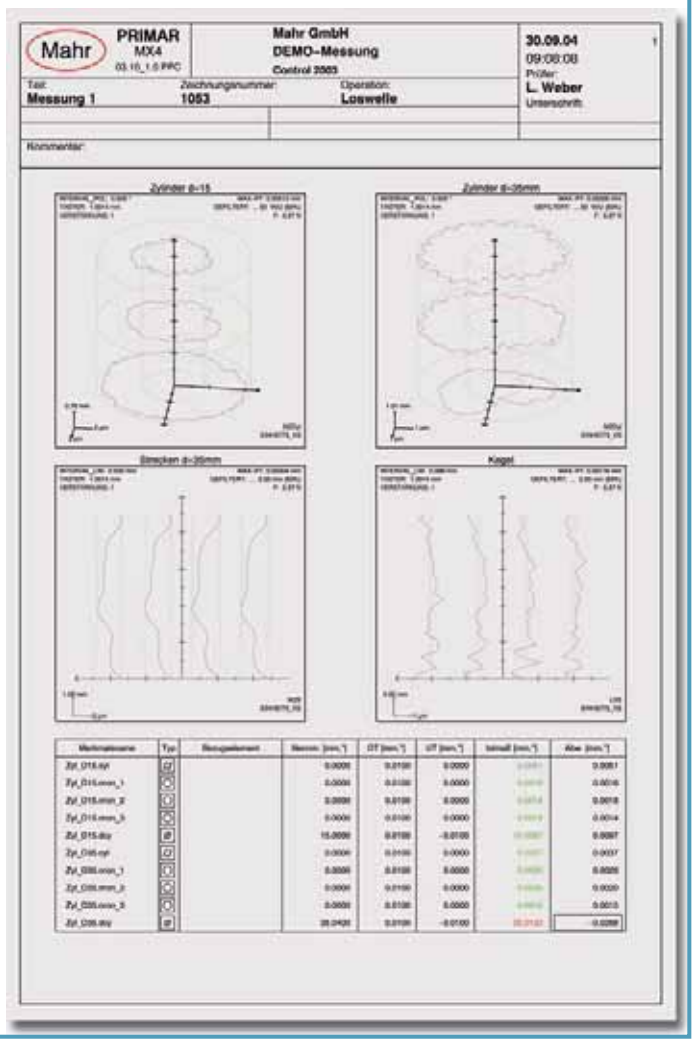


Measurement philosophy
- Includes approx. 30 complex functions defined using parameter masks
- Geometry-oriented programming
- Each module is split into measurement, analysis and recording

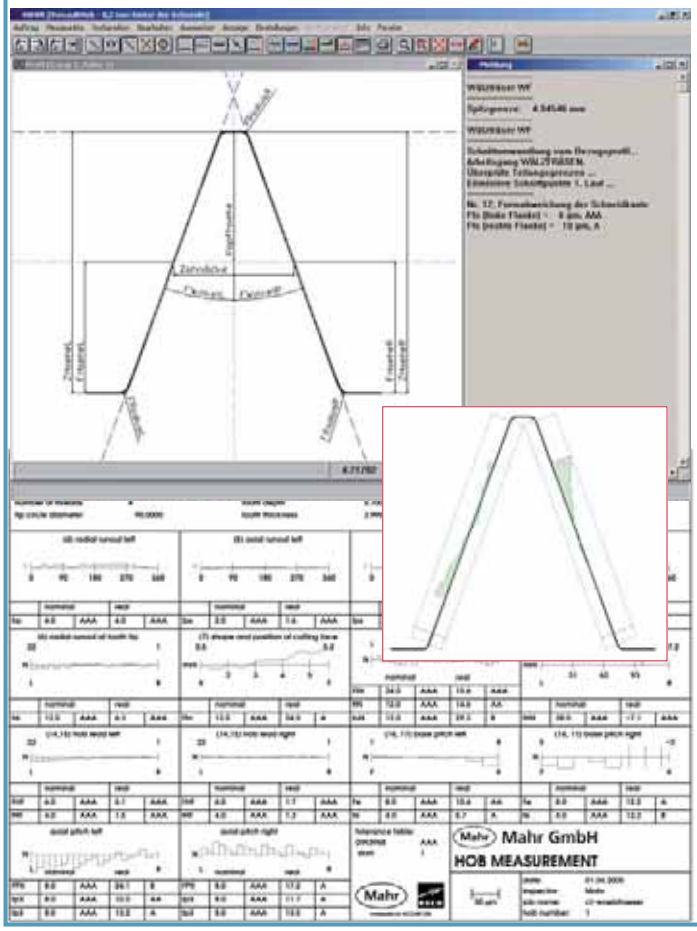
Advantages
- Short, clear and structured programs
- Quick and easy programming
- **MarLib** modules can be saved as a program
- Analysis of specific parameters such as roundness, cylindricity, diameter, etc.
- Analysis of various parameters from a single geometric element

Below: Sample record for form and position analysis, taking the example of a synchronous gear and camshaft





MarGear. Software Solutions – Gear CuT

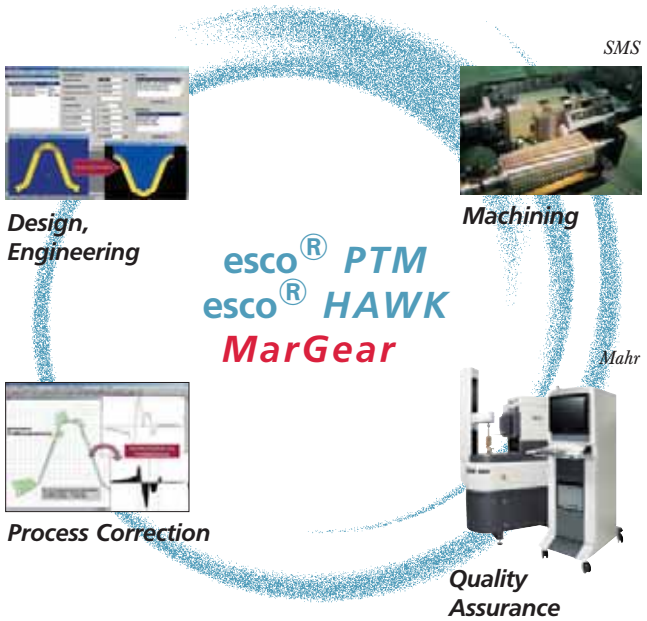


Gear CuT – software for manufacturers of gearing tools for standard and special profiles

Measurement philosophy
- Tactile scanning of the geometry
- Comparison of nominal and actual contours and analysis for in-process inspection
- Creation of input data for quality controlled manufacturing of gears and gear cutting tools

Advantages
- Measuring machine programmed simply by setting dimensions in the inspection drawing (additional, non standard measures, special profiles)
- Parameter programs for standard gear cutting tools, automated generation of inspections programs and inspection drawings
- Parameterized description of the basic rack profile
- Choice between analysis in the axial section or reference profile
- Profile measurement across or behind the cutting edge
- CAD link as input for special profiles

MarGear. Software Solutions – Closed Loop



Philosophy
- Quality controlled manufacturing of gears and gear cutting tools
- Measuring machine becomes part of production

Principle
- Production data available for input via CAx interfaces
- Measuring programs created automatically control the measuring machine. The scanned geometries are directly available in **Gear CuT** for profile comparison
- The high accuracy of the measuring machines and the sheer density of information that can be obtained from the measurements permit precise corrections which result in reproducibly tolerance-compliant workpieces after a single correction run

Advantages
- Time savings of up to 80%
- High reproducible manufacturing accuracies
- Operator influence is minimized

THE THIRD DIMENSION IN METROLOGY.

OPTICAL METROLOGY FROM MAHR

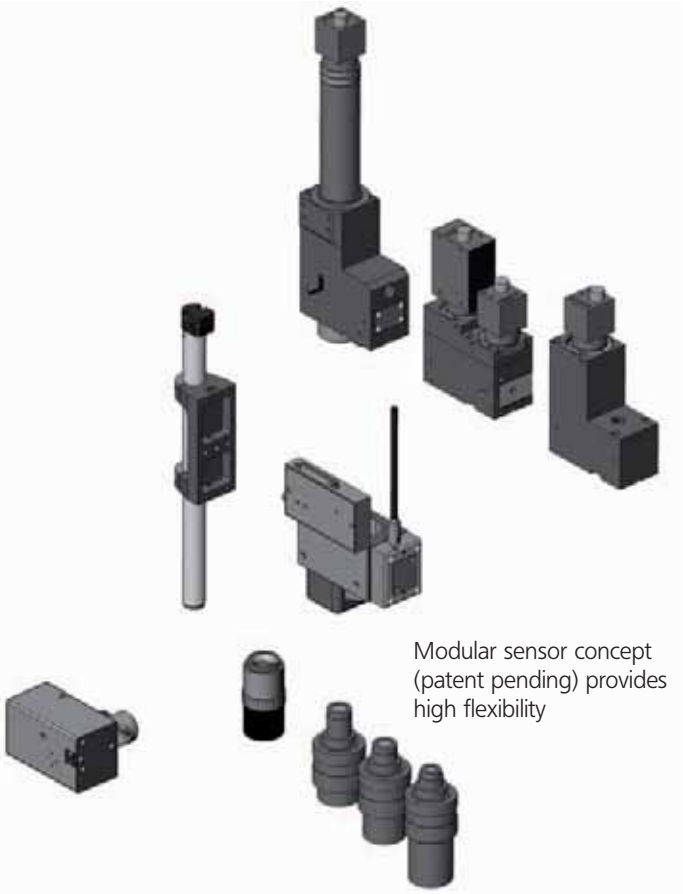
The latest information on MARVISION multisensor technology can be found on our website:
www.mahr.com, WebCode 87

► I Maximum manufacturing and quality control precision is key to your company's success. With MarVision optical coordinate measuring machines and multisensor measuring machines, Mahr offers you a quick and reliable solution to many different 2D and 3D measurement tasks – from cutting tools and precision products for the manufacturing industry and medical technology to miniaturized electronic components. Ultra-precise measuring machines, powerful image processing algorithms, part-specific evaluation software and decades of experience in optical metrology lay the foundation for meeting your high demands. I ◄

MarVision. Optical Measuring Machines

Request brochures.

MarVision Multisensor Technology from Mahr



Modular sensor concept (patent pending) provides high flexibility

Why use Mahr multisensor technology?

- Carrying out complete measurements without reclamping workpieces saves setup time and avoids having to invest in several separate machines
- Extremely quick optical measurements (camera, laser, white light) and tactile scanning save time during testing
- Incredibly simple operation and a standardized user interface make it quicker to get to grips with the machines

What is multisensor technology?

Our multisensor technology allows you to solve any measurement task with the best sensor for the job. If a number of different sensors need to be combined during the measurement, this is no problem either.

- The multisensor system combines technologies for contact-free and tactile measurements (patent)
- Contact-free sensors stop the workpiece surface being deformed or damaged
- Very small features can also be reliably recorded using contact-free sensors
- Maximum optical precision in conjunction with highly accurate state-of-the-art positioning systems ensure the ultimate in measuring accuracy
- Good acceleration and positioning speed in conjunction with rapid sensors ensure a high throughput

Which is the right sensor for my measurement task?

To save time:

- Use the **camera** to record a large number of measuring points in the shortest possible time
- Use the **focusing laser sensor (FLS**) to focus rapidly in order to align 3D workpieces
- Use the **measuring laser sensor (MLS)** to measure contours quickly
- Use the **SP25** for tactile scanning
- Use the **white-light surface sensor** to fully digitize surfaces

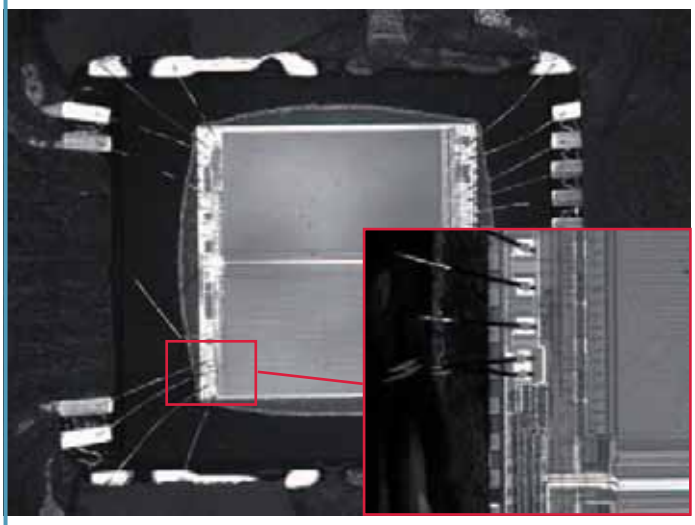
To maximize precision:

- Telecentric lens system with fixed focal distance and high enlargement factor in conjunction with **high-resolution camera** and Mahr image processing
- Record contour and topography point for point with the **chromatic white-light sensor (CWS)**
- Ultra-precise topography and roughness measurement with a resolution of 0.1 nm (0.004 µin) using the **interferometric white-light sensor (IWS)**

MarVision Multisensor Technology from Mahr

Digital Zoom, Optoelectronic

Enlargement 1:2, for example with 1x lens



Ultra-precise optical measurement does not mean having to compromise on flexibility. You can have both precision and flexibility by using our digital zoom with fixed focal distance lens system.

On the one hand, the fact that the digital zoom is integrated in the head of the multisensor means that it is possible to work with extremely high-resolution exchangeable lenses. On the other, it is possible to activate a digital zoom that halves the field of vision and doubles the resolution with a click of the mouse.

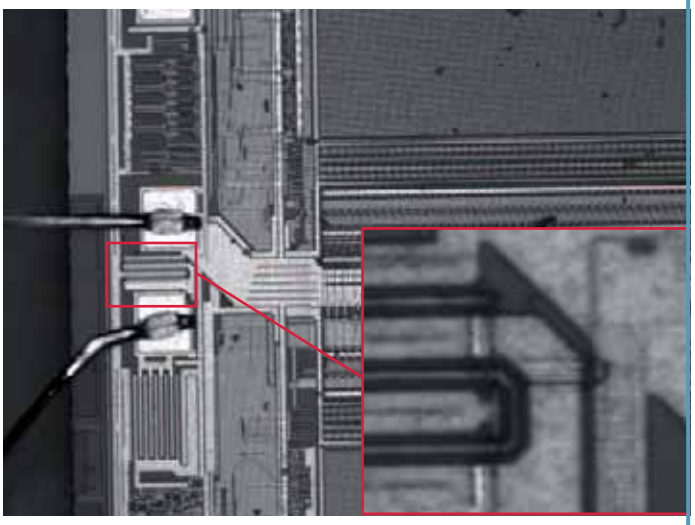
Various exchangeable lenses give you numerous options for optimizing both resolution and the field of vision to suit all manner of measurement tasks.

Features

- Variation of resolution and field of vision by switching the two zoom levels (1:2) electronically
- Digital CMOS camera with optoelectronic zoom
- Maximum precision for optical measurements
- Additional variation of resolution and field of vision thanks to exchangeable lenses (1x, 3x, 5x, 10x, 20x)
- High light efficiency
- Fast video focus, applicable to surfaces and at edges, to measure genuine 3D points with the lens system

2-stage Zoom (patent pending)

Enlargement 1:3.3, for example with 5x lens



As an alternative to the digital zoom, we offer the option of switching to a different resolution level with a click of the mouse. This is done by splitting the optical path of the beam and routing the image data via an additional lens to a second camera chip (patent pending). As a result, there are two fields of view and, accordingly, two resolutions.

Electronic switching creates the effect of a two-stage zoom. Key advantages of this type of zoom are the fixed focal distance and the low-distortion lens system calculated without compromise. This system only requires a small number of lenses, thereby achieving excellent light efficiency.

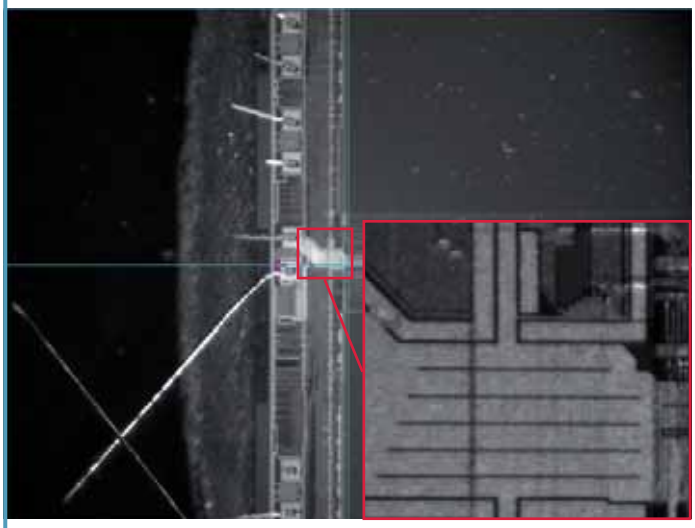
Features

- Variation of resolution and field of vision by switching of the two zoom levels (1:3.3) electronically
- Maximum precision for optical measurements
- Additional variation of resolution and field of vision thanks to exchangeable lenses (1x, 3x, 5x, 10x, 20x)
- High light efficiency
- Can be combined with the laser sensor from front lens 10x or larger
- Fast video focus, applicable to surfaces and at edges, to measure genuine 3D points with the lens system

MarVision Multisensor Technology from Mahr

Infinitely Adjustable Motorized Zoom

Enlargement 1:10, for example with 5x lens



Taking into account the tolerances to be measured, it can sometimes make sense to select a measuring window and thus a field of vision that is as large as possible. This option is available with our motorized zoom. The fact that it is infinitely adjustable offers the advantage of large fields of view for alignment and high resolution with precise measurements.

With the motorized zoom function, motorized movement of lens groups adjusts the focal distance. This makes it easy to zoom in on the testpiece. Mechanical errors such as wobbling, tilting or eccentricity of the lens group are eliminated during calibration by a sophisticated compensation function, as are optical distortion and illumination changes. This compensation ensures appropriately precise and traceable measurements. The motorized zoom is available with 10x enlargement.

- Maximum flexibility for optical measurements
- Infinitely variable resolution and field of vision, electronically controlled and motor-driven (1:10)
- A number of different front lenses can be used
- Can be combined with the laser sensor from front lens 5x or larger
- Fast video focus, applicable to surfaces and at edges, to measure genuine 3D points with the lens system

Illumination

The basic requirement for optical measurement is adequate illumination of the features for the task in hand. Three types of illumination are available and these can be used individually or combined.

Coaxial incident light
- Vertical light for measuring 3D features
- Extremely powerful LED light sources for incident light

Backlight
- This type of illumination offers the greatest contrast
- Reliable measurement of openings or outer edges
- High light intensity
- Telecentric design
- Line type design (patent pending)

LED ring light
- Lateral illumination to increase the contrast of 3D features
- Independent control of all segments
- Simple operation thanks to anti-twist protection and stop notches at various heights
- Different colors are available, including RGB
- Several irradiation angles are available

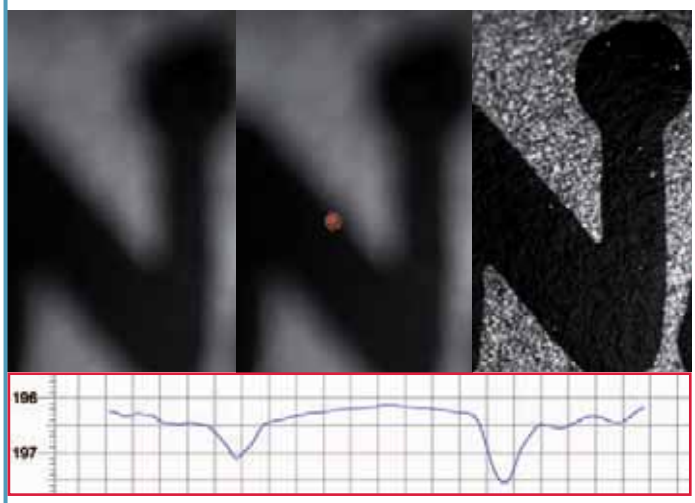
Video Filter

Two kinds of video filters have been developed to obtain reproducible geometric elements from the video image:
The geometry filter eliminates all image points no longer belonging to the required geometry, e.g. radius transitions on straight lines. Unwanted soiling, burring or splash effects at the edges are identified by the speckle filter and excluded from the measuring result. In both cases, the measurement is very stable and independent of the operator.
- Geometry filter
- Speckle filter

MarVision Multisensor Technology from Mahr

Focusing Laser Sensor (FLS)

Focuses in just 200 ms



Pin-sharp images are essential for high-precision measurement. The quickest way to achieve this is with the focusing laser sensor. Thanks to its coaxial arrangement, the laser focuses precisely in the field of vision being recorded by the camera.

In conjunction with the high resolution and accuracy of the Z-axis, this makes it possible to perform precise measurements of items such as blind holes.

The fact that all the axes move during focusing enables contours to be recorded in the same way as with a contourograph, but with the advantage that there is no contact.

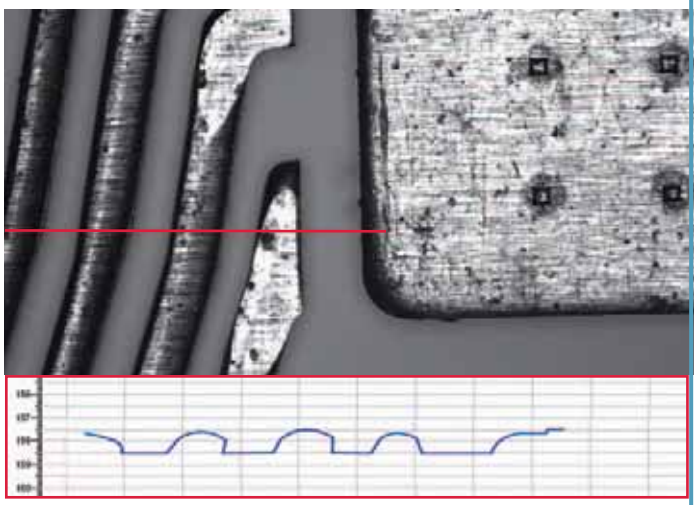
- Rapid focusing (200 ms) is essential for precise camera measurements
- Precise measurement of heights or bore depths
- Contour recording using several thousand points
- Contour evaluation with MarContour software
- Can be used on systems with a fixed focal distance (from front lens 10x) and on the motorized zoom system (from front lens 5x)

This sensor has many different applications. With almost any 3D measurement of workpieces there are features that it is advantageous to test using the focusing laser sensor:

- Depths of narrow grooves and small bores
- Heights of small features (e.g. pins)
- Calculating the alignment plane with 3D coordinate systems
- Form testing (e.g. flatness)
- Contour evaluation

Measuring Laser Sensor (MLS)

Scans without the Z-axis moving



If a high scanning speed is your top priority when recording a profile, the measuring laser sensor is the best option. Height and depth measurements can be performed quickly without moving the Z-axis based on the conoscopic principle.

- Quick measurement of heights or bore depths
- Rapid contour recording using several thousand points
- Contour evaluation with MarContour software
- Large measuring range, depending on the front-lens system (8 mm to 38 mm / 0.31 in to 1.50 in)
- Large working distance, depending on the front-lens system (35 mm to 80 mm / 1.38 in to 3.15 in)
- Can be used on the motorized zoom system

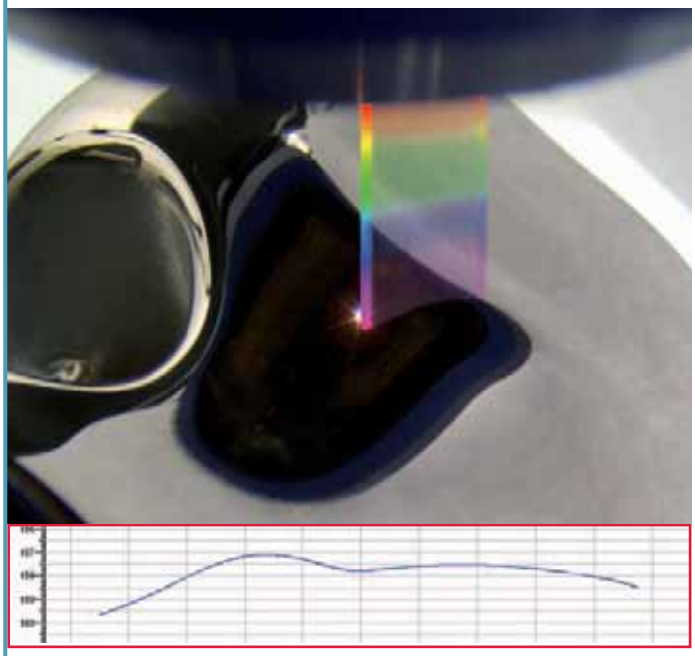
The applications of the conoscopic laser sensor are ideal for recording contours quickly:

- Digitization of freeform areas
- Topography recording

MarVision Multisensor Technology from Mahr

Chromatic White-Light Sensor (CWS)

High-resolution point-based measurement



A very high-resolution system is needed to measure with micro-accuracy.
Metrologically speaking, glossy surfaces also represent a major challenge. In both cases, the chromatic white-light sensor is ideal.

- Topographic recording of microstructures
- Digitization on glossy surfaces (e.g. glass, polished metal)
- Digitization of transparent materials
- Measuring range of 300 µm to 3 mm (0.012 in to 0.12 in)
- Working distance of 4.5 mm to 22 mm (0.18 in to 0.87 in)
- Resolution of up to 10 nm (0.4 µin)

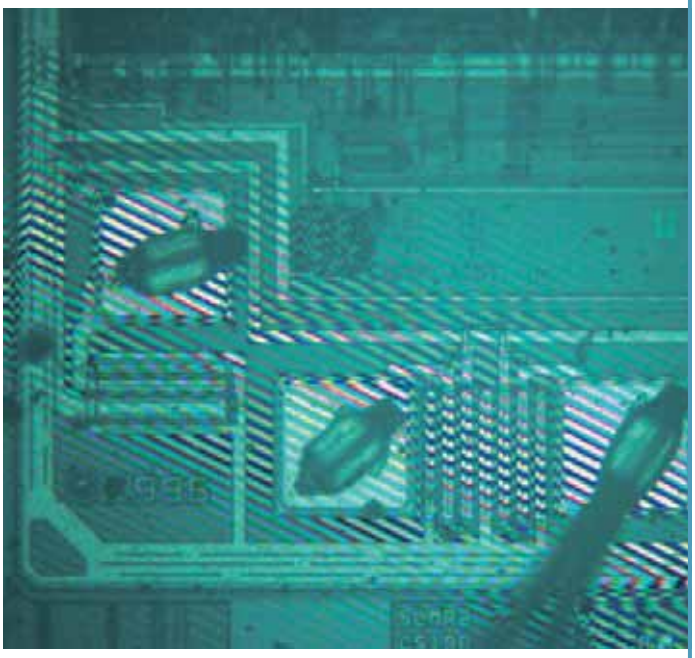
This sensor technology is primarily used in electronics, micromechanics, optics and medical technology.

- Microlenses
- Ball grid arrays (BGA)
- Integrated circuits
- Medical implants

Due to the use of the confocal principle, measurements with this sensor are very robust.

Interferometric White-Light Sensor (IWS)

Topography recording with maximum resolution



If both maximum precision and a high measuring speed are required, the latest technology from Mahr is your only option. With the interferometric white-light sensor it is possible to record the entire topography of a surface in a single measuring run. The time-consuming and comparatively inaccurate scanning of individual contours is no longer necessary. This sensor's high precision can only be achieved using the OMS air bearing systems.

- Quick and precise recording of surface topographies
- Digitization of microstructures
- Resolution of up to 0.1 nm (0.004 µin)

This sensor technology is primarily used for testing surface structures.

- Contact-free roughness measurement
- Integrated circuits

MarVision Multisensor Technology from Mahr

Trigger Probes – TP20 and TP200

Point-based measurement – robust and precise

Trigger probes are 5- or 6-way probes with the special feature of being able to switch styluses without recalibrating. These probes comprise the probe mount and the removable probe modules, which can automatically be placed in the probe changer and removed again if necessary.

The probe module supports the styluses and allows tracing along all the measuring machine's axes. The connecting thread on the probe module is compatible with all standard M2 styluses. The module is held in position on the probe mount by a permanent magnet and a kinematic coupling that can be reproduced highly precisely.

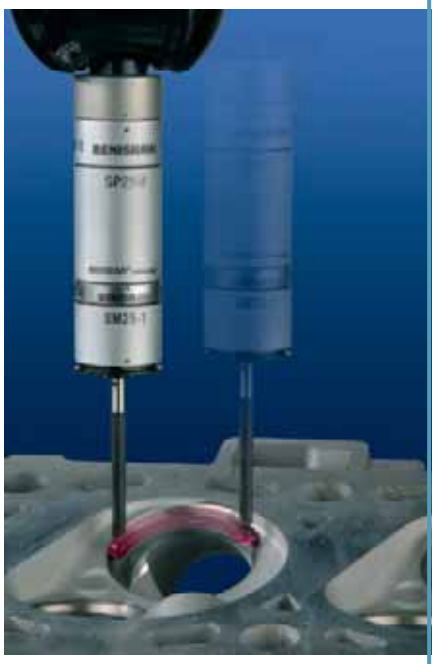
- Compact size (diameter of just 13.2 mm / 0.52 in)
- Point-based contacting of measuring points
- Many different stylus combinations possible
- Wide range of stylus lengths available
- 2-, 3- or 6-position changer
- Simple calibration
- M2 stylus sets can be used for different configurations and diameters

The strengths of this sensor are its ability to record 3D elements (spheres, cones, cylinders) and all features that do not show up on a top view. Features on the sides or bottom of the workpiece can be measured during the same clamping operation that is used for contact-free optical or laser recording of the top.

Scanning Probe – SP25

Continuous measurement – quick and effective

The SP25 is a touch probe system that can be used to perform both single-point measurements and continuous scanning. The measuring probe system provides the option of recording form features and contour profiles very quickly with a high point density. This also works at locations which cannot be accessed by optical sensors.



The system comprises a probe head, probe module, stylus holder and stylus.

The SP25 is available as an optional extra for the OMS 443, OMS 663, OMS 10106, MS 664 and MS 442 systems (ex works only, retrofitting not possible).

- Compact size (diameter of just 25 mm / 0.98 in)
- 3D touch scanning with high point density
- Two sensors in a single system – triggering and measuring probes
- Rapid data recording
- Collision protection in the probe module triggering mechanism
- 3 probe modules with a wide range of stylus lengths available
- 3- or 6-position changer
- Simple calibration
- M3 stylus sets can be used for different configurations and diameters

This sensor features high point densities for the evaluation of form features and contour profiles.

MarVision MS Product Line

Quick and robust 3D metrology for the shop floor

The MS product line is designed to monitor quality on the shop floor. The machines do not take up much space and the mechanical support of their axes of motion makes them resistant to hostile environmental influences (temperature, vibrations).
The various machines in the product line have different measuring volumes.

Description

Multisensor measuring machines including optical sensor, laser and touch probe system implement the latest test procedures to support your quality documentation.

Shop-floor installation possible
Reduces the rejection rate and saves money by providing immediate feedback in the event of production errors.

High measuring precision
Maximizes manufacturing tolerances, thereby cutting your production costs.

High testing speed
Improves the reliability of testing through rapid measurement, even of large quantities.

Automation
Cuts your personnel costs with automatic test runs and automatic testpiece delivery.

Features

Designed to monitor quality on the shop floor, the machines in the MS product line not only save space. The mechanical support of their axes of motion also makes them extremely resistant to hostile environmental influences such as temperature or vibrations.

A compressed air connection is only required for the optional vibration damper.

Some machines also offer several levels of precision.

Design type
MarVision MS is available either as a portable table-top measuring machine with granite base (**MS 2VT** and **MS 222**) or as a bridge-type measuring center with fixed bridge design, mobile measuring table and separate control cabinet (**MS 442**, **MS 660**, **MS 662** and **MS 664**). All 3 axes are equipped with high-precision linear guideways and driven by backlash-free precision spindles at the center of gravity. The machine is driven by DC servo motors.

Control unit
3- to 5-axis CNC with vector path control

Measuring system
Incremental length measuring system, resolution 0.1 µm (4 µin)

Computer
Industrial computer, Pentium, Windows® XP Multilingual

Technical Data in Brief

Power supply

Mains voltage	115 V / 230 V ± 10%
Frequency	50 Hz / 60 Hz ± 5%
Power consumption	1,000 VA

Installation conditions

Ground vibrations	$< 5 \times 10^{-3}$ m/s² (corresponds to an amplitude of < 5 µm at 5 Hz)
Humidity	40% to 70% RL
Permissible temperature gradient (relative to the reference temperature)	0.8 K/h 1.0 K/d 0.6 K/m

Remarks on length measuring uncertainty
- The length measuring uncertainty relates to a temperature of 20°C
- Optical measurements are performed at the maximum enlargement or with the 10x lens
- Mahr's conditions of acceptance apply
- The E_3 value is determined using the touch sensor

Camera-probe offset
If using a camera and a probe, the measuring range in the X-direction is reduced by 50 mm (1.97 in) with the TP20 and TP200 and by 80 mm (3.15 in) with the SP25.

MarVision MS 2VT

The XY table design of this portable table-top machine ensures easy access from all sides. The precise mechanical linear guideways are located on a solid granite slab for the X- and Y-axes and on a robust aluminum column for the Z-axis. With the optical digital zoom and the optional TP20, this system represents the most cost-effective introduction to the world of multisensors.

Measuring ranges

X	250 mm (9.84 in)
Y	200 mm (7.87 in)
Z	150 mm (5.91 in)

Length measuring uncertainty

As per VDI/VDE 2617 or ISO 10360-2 (L = measuring length in mm)	$E_2(XY) = (3.2 + L/125)$ µm $E_1(Z) = (2.2 + L/150)$ µm*
Travel speed	150 mm/s (5.91 in/s)
Weight	260 kg (573 lbs) incl. control cabinet
Workpiece weight on glass plate	10 kg (22 lbs)
Installation conditions	
Ambient temperature	20 °C ±2 K (other reference temperatures on request)

* Only applies to the touch probe system with probe package option

Your introduction to the world of multisensors

MarVision MS 222 and MS 222 HA

The MS 222 also uses the tried-and-tested XY table design. With its optional base and integrated control cabinet, it is particularly compact for use on the shop floor/in production environments. The high-precision version (HA) turns this compact system into a precision measuring machine.

Measuring ranges

X	250 mm (9.84 in)
Y	200 mm (7.87 in)
Z	200 mm (7.87 in)

Length measuring uncertainty (Standard)

As per VDI/VDE 2617	$E_1 = (2.2 + L/150)$ µm
or ISO 10360-2	$E_2 = (3.2 + L/125)$ µm
(L = measuring length in mm)	$E_3 = (3.9 + L/100)$ µm

Length measuring uncertainty (HA version)

As per VDI/VDE 2617	$E_1 = (1.9 + L/200)$ µm
or ISO 10360-2	$E_2 = (2.4 + L/150)$ µm
(L = measuring length in mm)	$E_3 = (2.9 + L/100)$ µm
Travel speed	150 mm/s (5.91 in/s)
Weight	260 kg (573 lbs) incl. control cabinet
Workpiece weight on glass plate	10 kg (22 lbs)
Installation conditions	
Ambient temperature	20 °C ±1 K (other reference temperatures on request)

Economical measuring machine for monitoring production

MarVision MS 442

High-precision measurement on the shop floor

Compact, fast and robust – the granite bridge-type measuring center with its large, mobile measuring table and precision mechanical linear guideways sits on a fixed, solid granite base. With the accuracy of an MS 222 HA, the MS 442 supports four times the measuring volume at a comparatively low additional cost.

Measuring ranges

X	400 mm (15.75 in)
Y	400 mm (15.75 in)
Z	200 mm (7.87 in)

Length measuring uncertainty

As per VDI / VDE 2617	$E_1 = (1.9 + L / 200)$ µm
or ISO 10360-2	$E_2 = (2.4 + L / 150)$ µm
(L = measuring length in mm)	$E_3 = (2.9 + L / 100)$ µm

Travel speed	250 mm/s (9.84 in/s)
Weight	960 kg (2,116 lbs) incl. control cabinet
Workpiece weight on glass plate	30 kg (66 lbs)

Installation conditions

Ambient temperature	20 °C ±2 K (other reference temperatures on request)

MarVision MS 660

Economical measuring machine for fast 2D measurements

This bridge-type measuring center with fixed single-component bridge design and a measuring table that only moves in the Y-direction maximizes measuring speeds.
Combined with the high depth of field of 5 mm (0.20 in) and the large field of view of the special lens system, the MS 660 is the ideal measuring system for all flat and intricate testpieces, such as PCBs, films or stampings.

Measuring ranges

X	610 mm (24.02 in)
Y	610 mm (24.02 in)

Length measuring uncertainty

As per VDI/VDE 2617	$E_1 = (1.9 + L/150)$ µm
or ISO 10360-2	
(L = measuring length in mm)	$E_2 = (2.9 + L/125)$ µm

Travel speed	350 mm/s (13.78 in/s)
Weight	1,180 kg (2,601 lbs) incl. control cabinet
Workpiece weight on glass plate	20 kg (44 lbs)

Installation conditions

Ambient temperature	20°C ± 1 K (other reference temperatures on request)

MarVision MS 662

The granite bridge-type measuring center with large, mobile measuring table and precision mechanical linear guideways sits on a fixed, solid granite base. Its appeal lies in its high-speed measuring, robust design and easy accessibility.

The series measurement of large quantities, ideally with palletized workpieces, improves the efficiency of this system enormously.

Measuring ranges

X	600 mm (23.62 in)
Y	600 mm (23.62 in)
Z	200 mm (7.87 in)

Length measuring uncertainty

As per VDI / VDE 2617	$E_1 = (1.9 + L/200)$ µm
or ISO 10360-2	$E_2 = (2.4 + L/150)$ µm
(L = measuring length in mm)	$E_3 = (2.9 + L/100)$ µm

Travel speed	250 mm/s (9.84 in/s)
Weight	1,190 kg (2,624 lbs) incl. control cabinet
Workpiece weight on glass plate	40 kg (88 lbs)

Installation conditions

Ambient temperature	20 °C ± 2K (other reference temperatures on request)

Universal machine for shop-floor measurement tasks

MarVision MS 664

The measuring range of 400 mm (15.75 in) in the Z-direction means that this mechanically supported bridge-type measuring center is ideal for taller and larger testpieces.

More complex probe configurations for the triggering probe or different lengths for the scanning probe can easily be used for this larger measuring volume and can be combined with contact-free sensors in any way required.
This results in a universal measuring system with maximum flexibility.

Measuring ranges

X	600 mm (23.62 in)
Y	600 mm (23.62 in)
Z	400 mm (15.75 in)

Length measuring uncertainty

As per VDI / VDE 2617	$E_1 = (2.4 + L/150)$ µm
or ISO 10360-2	$E_2 = (3.2 + L/125)$ µm
(L = measuring length in mm)	$E_3 = (3.9 + L/100)$ µm

Travel speed	250 mm/s (9.84 in/s)
Weight	1,290 kg (2,844 lbs) incl. control cabinet
Workpiece weight on glass plate	40 kg (88 lbs)

Installation conditions

Ambient temperature	20 °C ±1 K (other reference temperatures on request)

Robust measurement of large workpieces

MarVision OMS Product Line

Maximum precision and large measuring volumes

The OMS product line combines universal multisensor technology and large measuring volumes with maximum precision. This is achieved thanks to the solid fine-grained granite bridge-type design with air bearing axes.

These features make the OMS a reference machine in your measurement laboratory. The various machines in the product line have different measuring volumes.

All the systems are available with two different levels of precision.

Description

With its optical sensor, laser, touch probe systems and state-of-the-art test procedures, this multisensor machine reliably documents product quality.

Maximum measuring precision
Permits greater production tolerance, reduces rejection rates and cuts your production costs.

Reference in the measurement laboratory
Universal testing options provide proof of quality for you and your customers.

High testing speed
Improves the reliability of testing through rapid measurement, even for large quantities.

Features

OMS systems can be operated standing up or sitting down thanks to their adjustable base. The high-end control unit developed by Mahr is operated from an innovative terminal with integrated speed selection, emergency stop and release buttons.
The SP25 measuring probe can be adapted directly to the integrated interface of this control unit. The path measuring systems used are temperature-compensated and this is also an option for the workpieces.

Design type
Bridge-type measuring center with fixed bridge, mobile measuring table and lower center of gravity. The side sections are integrated into the basic structure and the bridge sides are partly supported on this. All the axes are based on lapped granite guideways, precision air bearings and backlash-free ball screws. The guideway for the Y table is incorporated in the machine base in a V-shaped arrangement. The X cage around the bridge is made from just two separate sections. The backlight has a telecentric design.

Control unit
3- to 5-axis Mahr high-end control unit with integrated path correction

Measuring system
Incremental length measuring system with resolution of 5 nm (0.2 µin) for standard systems and 1 nm (0.04 µin) for high-precision systems

Computer
Industrial computer, Pentium, Windows® XP Multilingual

Technical Data in Brief

Power supply

Mains voltage	115 V / 230 V ±10 %
Frequency	50 Hz / 60 Hz ±5 %
Power consumption	1,500 VA

Installation conditions

Ground vibrations	$< 5 \times 10^{-3}$ m/s² (corresponds to an amplitude of < 5 µm at 5 Hz)
Humidity	40 % bis 70 % RL
Permissible temperature gradient (relative to the reference temperature)	0.8 K/h 1.0 K/d 0.6 K/m

Remarks on length measuring uncertainty

- The length measuring uncertainty relates to a temperature of 20 °C
- Optical measurements are performed with the 10x lens
- Mahr's conditions of acceptance apply
- The E_3 value is determined using the touch sensor

Camera-probe offset

If using a camera and a probe, the measuring range in the X-direction is reduced by 50 mm (1.97 in) with the TP20 and TP200 and by 80 mm (3.15 in) with the SP25.

MarVision OMS 443

Bridge-type measuring center with fixed bridge and mobile measuring table. All the axes are based on lapped granite guideways, precision air bearings and backlash-free ball screws. The machine's base and bridge are made from fine-grained granite. The system is driven by DC servo motors.

Measuring ranges	
X	450 mm (17.72 in)
Y	400 mm (15.75 in)
Z	300 mm (11.81 in)
Length measuring uncertainty	
As per VDI / VDE 2617	$E_1 = (1.1 + L/500)$ µm
ISO 10360-2	$E_3 = (2.0 + L/300)$ µm
(L = measuring length in mm)	
Travel speed	200 mm/s (7.87 in/s)
Weight	1,890 kg (4,167 lbs) incl. control cabinet
Workpiece weight	
on glass plate	50 kg (110 lbs)
on granite plate	100 kg (220 lbs)
Installation conditions	
Ambient temperature	20 °C ±0.5 K
Compressed air supply	min. 6 bar ±0.1 bar

Maximum precision for the toughest demands

MarVision OMS 663

Bridge-type measuring center with fixed bridge, mobile measuring table, lapped granite guideways and precision air bearings – cutting-edge technology that ensures maximum precision and a long service life.

Measuring ranges	
X	650 mm (25.59 in)
Y	600 mm (23.62 in)
Z	300 mm (11.81 in)
Length measuring uncertainty	
As per VDI / VDE 2617	$E_1 = (1.1 + L/500)$ µm
ISO 10360-2	$E_3 = (2.0 + L/300)$ µm
(L = measuring length in mm)	
Travel speed	200 mm/s (7.87 in/s)
Weight	2,600 kg (5,732 lbs) incl. control cabinet
Workpiece weight	
on glass plate	50 kg (110 lbs)
on granite plate	200 kg (441 lbs)
Installation conditions	
Ambient temperature	20 °C ±0.5 K
Compressed air supply	min. 6 bar ±0.1 bar

The universal reference for documenting quality

MarVision OMS 10103 / 10106

Measuring large workpieces with maximum precision

Bridge-type measuring center with fixed bridge and mobile measuring table. All the axes are based on lapped granite guideways, precision air bearings and backlash-free ball screws. The machine's base and bridge are made from fine-grained granite. The system is driven by DC servo motors.

Measuring ranges

X	1,050 mm (41.34 in)
Y	1,000 mm (39.37 in)
Z	300 mm (11.81 in) (OMS 10103)
Z	600 mm (23.62 in) (OMS 10106)

Length measuring uncertainty

As per VDI / VDE 2617	$E_1 = (1.3 + L/400)$ µm
ISO 10360-2	$E_3 = (2.2 + L/300)$ µm
(L = measuring length in mm)	

Travel speed	200 mm/s (7.87 in/s)
Weight	7,600 kg (16,755 lbs) incl. control cabinet
Workpiece weight	
on glass plate	50 kg (110 lbs)
on granite plate	300 kg (661 lbs)

Installation conditions

Ambient temperature	20 °C ±0.5 K
Compressed air supply	min. 8 bar ±0.1 bar

High-Precision Versions of the OMS Range (HA)

OMS systems are also available in a high-precision version (HA) in terms of length measuring uncertainty. This offers benefits for demanding applications.

OMS 443 HA and OMS 663 HA*

Length measuring uncertainty

As per VDI/VDE 2617	$E_1 = (0.5 + L/900)$ µm
or ISO 10360-2	$E_3 = (1.5 + L/500)$ µm
(L = measuring length in mm)	

* in the measuring volume 550 mm/500 mm/300 mm (21.65 in/19.69 in/11.81 in) in X/Y/Z

OMS 10103 und OMS 10106 HA:

Length measuring uncertainty

As per VDI/VDE 2617	$E_1 = (0.9 + L/600)$ µm
or ISO 10360-2	$E_3 = (1.9 + L/400)$ µm
(L = measuring length in mm)	

MarVision PMC Product Line

For rapid measurement of heavy items with small features

The machines in the PMC product line can support heavy loads on a solid granite base without compromising the multisensor capability.

For items that are not heavy but simply bulky, these systems can also work with a fixed backlight table which utilizes the benefits of high-contrast optical measurement.

Description

This coordinate measuring machine with multisensor capability delivers the ultimate in quality documentation for you and your customers.

Multisensor technology
No need for additional investment in optical measuring machines

High testing speed
Improves the reliability of testing through rapid measurement of large quantities.

Good price-performance ratio
Large measuring volumes at very attractive prices

Features

The MarVision PMC product line consists of coordinate measuring machines with a solid granite measuring table for reliable measurement of heavy workpieces.

The multisensor combination of touch and optical sensors allows rapid measurement, even of small features.

MarVision PMC is available in numerous variants with different measuring ranges.

Design type
Bridge-type measuring center with fixed measuring table and laterally driven bridge. Granite measuring table, cross-bar and spindle. All axes are equipped with high-precision air bearing guideways. The system is driven by DC servo motors.

Control unit
3- to 5-axis CNC with vector path control.

Measuring system
Incremental length measuring system, resolution 0.1 µm (4 µin).

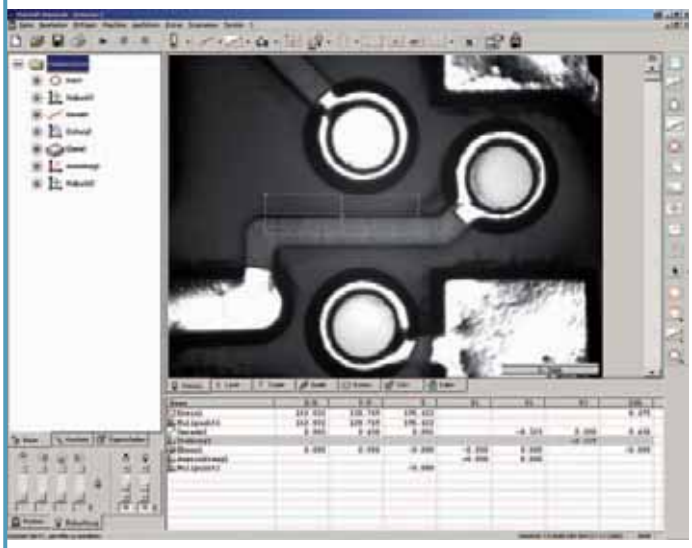
Computer
Industrial computer, Pentium, Windows® XP Multilingual.

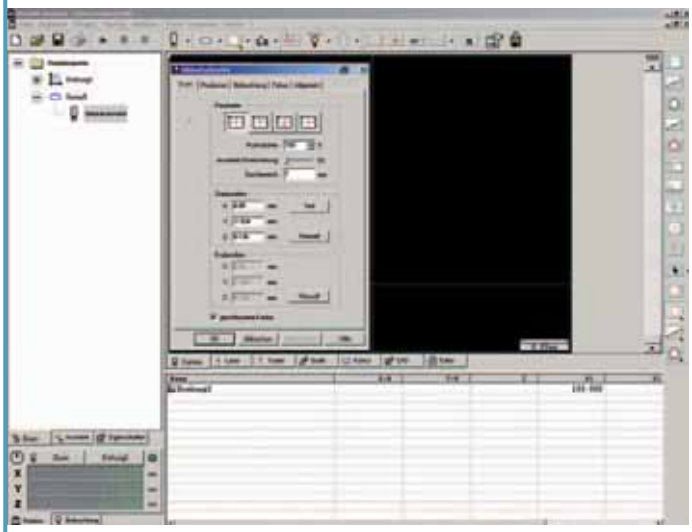
Technical Data in Brief

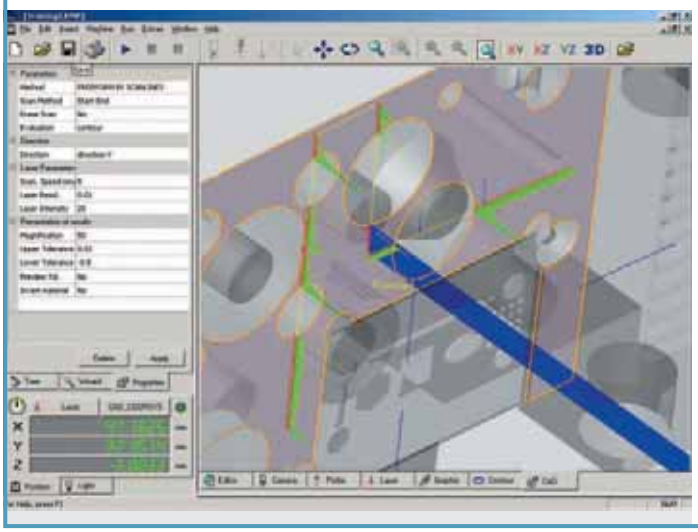
Length measuring uncertainty	
(e.g. for PMC 650)	
As per VDI / VDE 2617	$E_1 = (2.5 + L/450)$ µm
	$E_2 = (2.75 + L/375)$ µm
ISO 10360-2	$E_3 = (3.0 + L/350)$ µm
(L = measuring length in mm)	
Power supply	
Mains voltage	115 V / 230 V ±10 %
Frequency	50 Hz / 60 Hz ±5 %
Power consumption	1,500 VA
Installation conditions	
Ambient temperature	20 °C ±1 K
Ground vibrations	$< 5 \times 10^{-3}$ m/s² (corresponds to an amplitude of < 5 µm at 5 Hz)
Humidity	40 % bis 70 % RL
Permissible temperature gradient (relative to the reference temperature)	0.8 K/h 1.0 K/d 0.6 K/m
Compressed air supply	min. 6 bar ±0.1 bar

Remarks on length measuring uncertainty
- The length measuring uncertainty relates to a temperature of 20 °C
- Optical measurements are performed at the maximum enlargement or with the 10x lens
- Mahr's conditions of acceptance apply
- The E_3 value is determined using the touch sensor

MarVision Software – Simple Operation of High-Performance Systems







With **Vision 3D, Mahr Multisensor** offers you a software package geared specifically to multisensor technology for intuitive operation of our measuring machines.
It integrates all the various functions and sensors, such as cameras, laser sensors and touch probe systems, in a single graphic user interface.

- Comprehensive 3D measuring and evaluation software
- Extremely simple operation thanks to teach-in mode and CAD data import (both 2D and 3D)
- Clear program creation wizard
- Results output in graphs and tables
- Powerful program editor
- Uncomplicated export of measuring results into standard file formats (e.g. Excel, ASCII, MDB, etc.)
- Simple programming with automated routines
- Can be extended, with many options that can be integrated directly

Features

User-friendly system
- Simplified, customized operating environment (start/stop) for use on the shop floor
- User-friendly interactive programming with the help of icons for fast results
- Powerful program editor for complex measurement tasks and complete control over all machine parameters and the Windows environment
- Rapid program creation with direct CAD data import using MarCAD 3D and MarCAD 2D, including offline
- Comprehensive online help function with sample applications

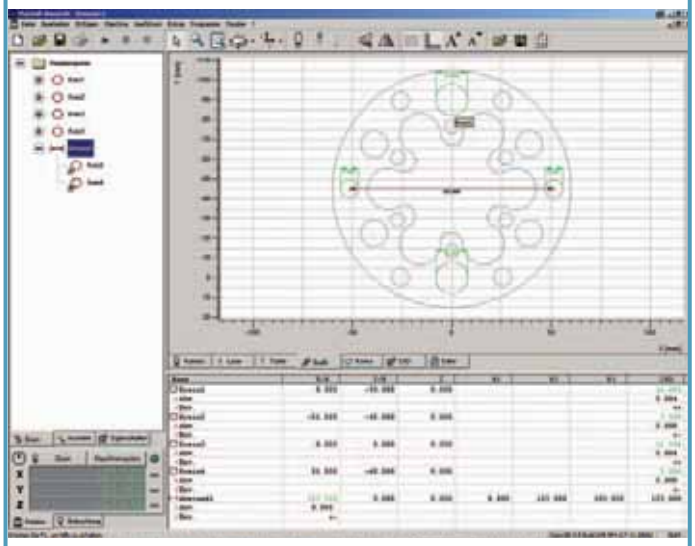
Comprehensive geometry analysis
- Geometric elements: Point, line, circle, ellipse, plane, cylinder, cone and sphere
- Geometric functions: Intersection, distance, angle, perpendicular line and symmetry
- Freeform areas, contours incl. nominal/actual comparison (MarContour option)
- Form and positioning tolerances: Straightness, roundness, flatness, cylindricity, parallelism, perpendicularity, angularity, position, symmetry, concentricity/coaxiality, radial run-out, total radial run-out, axial run-out, total axial run-out, linear profile and 2D profile
- Maximum material conditions (MMC)
- DIN tolerance tables: DIN 2768 (fine, medium, coarse) + DIN 1690 (A, B) and in-house tolerance tables that can be defined by the customer

Effective measuring reports and data export
- Clear output of measuring results in graphic form
- Table with full details
- Integrated online statistics (optional) or export to qs-STAT
- Results can also be output in text or Excel format

Flexible integration in existing IT environment
- Windows® XP Multilingual on industrial PC
- Can be integrated into customer networks
- Enabled for remote maintenance (optional)
- Full version of Vision 3D included with all machines
- Offline versions (for programming away from the machine – separate PC required) for Vision 3D and options available
- Upgrade packages for older installations
- Training workpiece with measuring program for independent training
- Tailored training course program for users of MarVision machines via Vision 3D and all software options

MarVision MarCAD 2D Software

Generating measuring programs with 2D drawings



Description

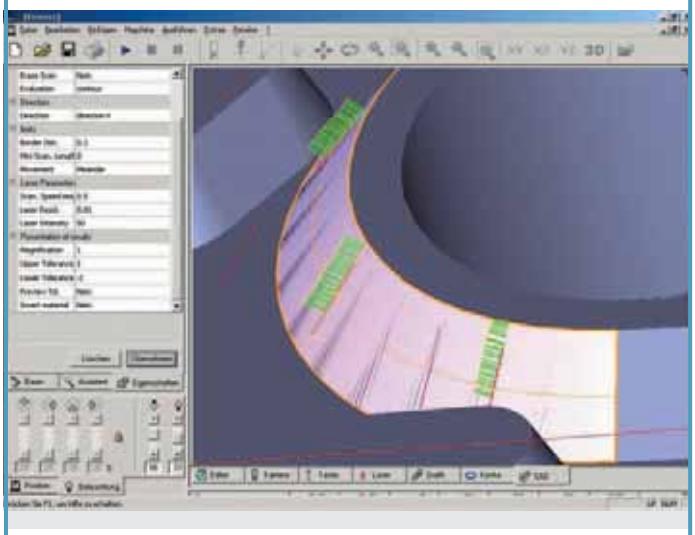
Importing 2D DXF files from your design in **MarCAD 2D**, you can generate measuring programs quickly and easily by selecting drawing elements. The elements measured in this way are then displayed in the drawing.

Features

- Import of 2D CAD format DXF
- User-friendly graphic user interface
- Automatic program generation
- Full multisensor capability for optical sensors, lasers and touch probes
- All 2D geometric elements from Vision 3D are integrated (line, circle, point, plane, ellipse)
- Results displayed in graphic (2D drawing) and numeric (table) form
- Offline programming on separate PC (Vision 3D offline programming license required)
- Use of tolerance tables (in accordance with DIN or in-house standard)
- Adjustment of imported DXF data

MarVision MarCAD 3D Software

Measuring programs with a click of the mouse



Description

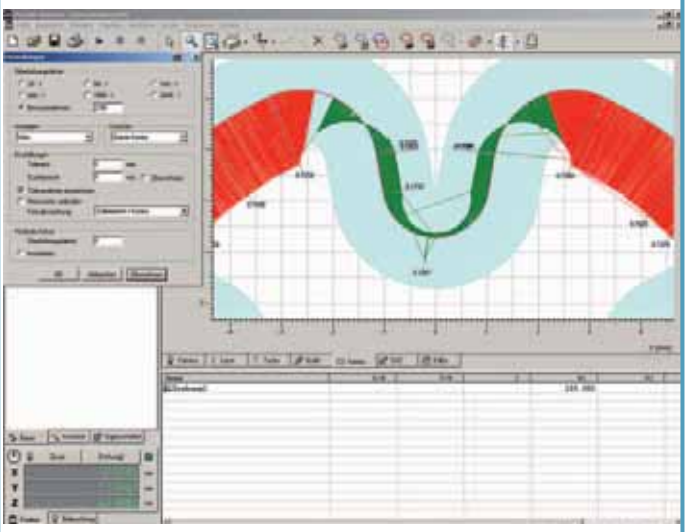
MarCAD 3D is a fully integrated Vision 3D software option. It enables solids to be imported, measuring programs for geometry testing to be created with a click of the mouse and the results to be displayed graphically together with the associated deviations.

Features

- Import of STEP, IGES, BREP and DXF (optional) formats; further formats on request
- Standard geometric elements with sensor recommendation and automatic parameterization:
  Line, circle, plane, cylinder, cone, sphere (including segments)
- Results displayed graphically
- Nominal/actual comparison with results displayed graphically
- Freeform areas for optical and touch sensors
- Laser scanning on freeform areas with deviations displayed graphically
- Measurement path planning with collision recognition
- Offline programming on separate PC (Vision 3D offline programming license required)
- Offline simulation of measurement process
- Offline collision recognition
- Use of tolerance tables (in accordance with DIN or in-house standard)
- Use of automated routines for optical and tactile measurements

MarVision MarContour Software

Processing digitized contours



Description

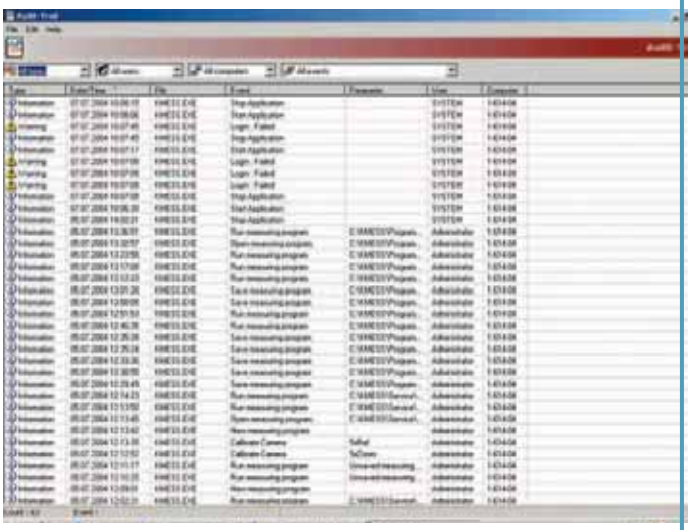
MarContour is a Vision 3D software option that allows a scanned contour to be automatically broken down into geometric elements and compared with nominal values, displaying the results and associated deviations graphically.

Features

- Full multisensor capability for optical sensors, lasers and touch probes
- User-friendly graphic user interface
- Automatic geometry recognition of lines and circles (contour breakdown)
- Automatic 2D best-fit adaptations
- Evaluation of minimum and maximum points
- Tolerance exploitation displayed graphically
- Offline programming on separate PC (Vision 3D offline programming license required)
- Sensor-independent import of contour data
- Import of 2D CAD format DXF as nominal values (MarCAD 2D option required)

MarVision MarValid Software

Fully documented 100% check



Description

MarValid is a Vision 3D software option. It provides manufacturers in the medical and pharmaceutical sectors with the prerequisites for validation in compliance with FDA CFR 21 Part 11 for the Mahr multisensor machines used in the process.

Features

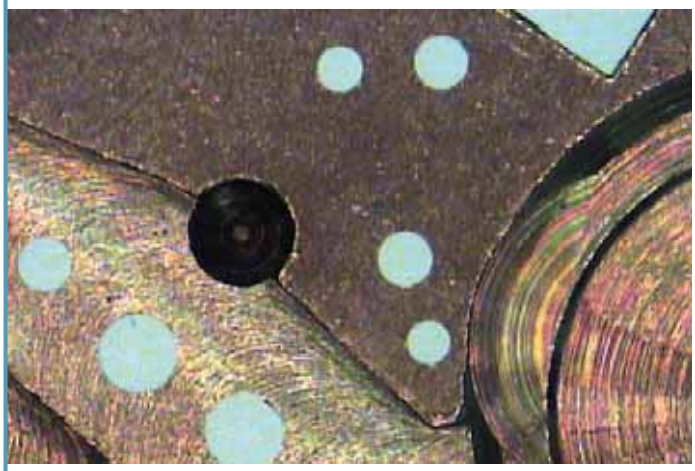
- Password administration for different users in secure database
- Controlled system access by means of password prompt
- Electronic signature for measuring records consisting of user name and password
- Computer-generated audit trail to document changes to the system and files
- Cyclical system tests
- Data backup

The aim of the provisions in FDA 21 CFR Part 11 is to improve process reliability when using computer-aided systems. With **MarValid**, they are applied in such a way that it is easy for the user to carry out the validation.

An optional comprehensive documentation package for faster implementation of a validation is available.

MarVision. Universal Measuring Microscopes for Shop Floor and Laboratory

Introduction to optical metrology for the shop floor



Do your requirements involve 2D measurement? Are you looking to get into optical metrology on the shop floor too? Is a manual instrument completely adequate for your tasks? If that is the case, our measuring microscopes are the ideal products for you.

QC 200 Geometric Measuring Computer

- Universal measuring and recording functions for 2D form elements (point, straight line, circle)
- Form elements can be combined and evaluated (distance, angle, point of intersection, form)
- Teach-in programming
- Measuring results displayed graphically
- Measuring results output via parallel and serial interfaces (e.g. PC or printer)
- Record generation options
- Linear correction option

CZW 1 Video Measuring Microscope

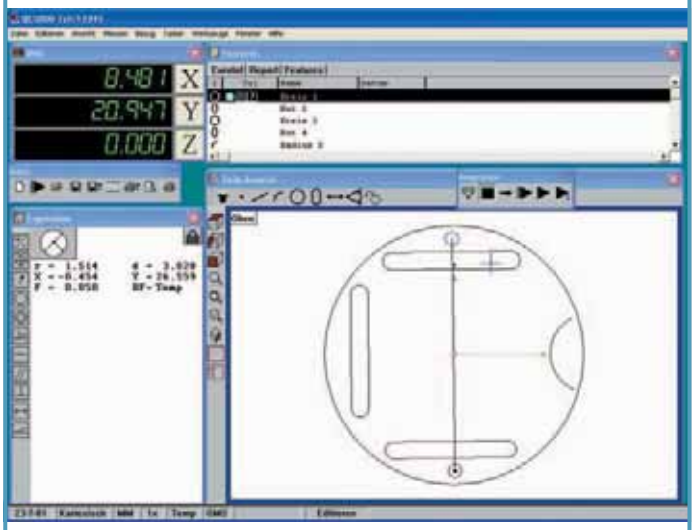
Image processing and PC evaluation are both possible with the CZW 1, but if you do not require these functions, we offer the QC 200 geometric measuring computer as an alternative. Because your testpieces may be different sizes, we offer a variety of measuring ranges and enlargements. A wide range of additional accessories is available.

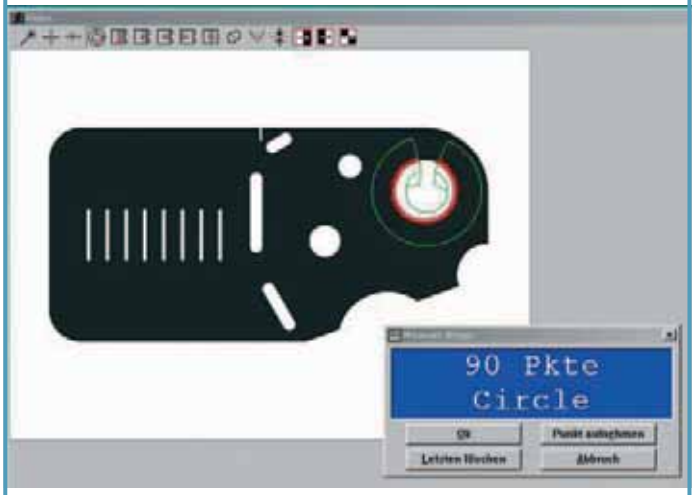
- Manual zoom from 22x to 155x
- Measuring tables from 100 mm x 100 mm to 250 mm x 170 mm (3.94 in x 3.94 in to 9.84 in x 6.69 in)
- Maximum workpiece height 150 mm (5.91 in)
- Maximum table load 15 kg (33 lbs)
- Incremental length measuring system and rapid adjustment, resolution 1 µm (40 µin)
- Color camera (1/2")
- Display detail in X: 9 to 1.4 mm or 18 to 0.7 mm (0.35 to 0.055 in or 0.71 to 0.028 in)
- Incident light illumination with ring light
- LED backlight
- Measuring computer with 17" TFT monitor
- VideoMess software for video image display with cross-hairs
- QC 200 geometric measuring computer or QC 5000 PC evaluation software
- VED image processing software (in conjunction with QC 5000 as an option)

Accessories

- Measuring system for Z-axis
- Z-axis extension
- Round table
- Light conductor
- Pair of V-blocks
- Center support
- Precision vice
- 0.5x and 2x front lenses
- TV adapter
- Foot-operated switch
- Calibration standard

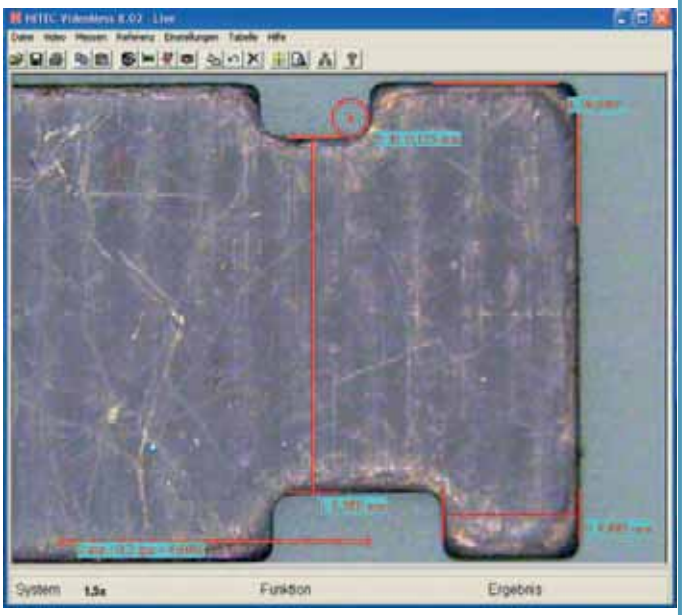
QC 5000 Evaluation Software





- Comprehensive measuring and evaluation software
- Defines and creates geometric elements
- Displays measured form elements graphically
- Tolerance testing
- Teach-in programming
- Form and positional tolerances
- Data export formats (e.g. DXF, ASCII)
- Data import formats (e.g. DXF, IGS)
- Best-fit function

VideoMess Software



- Software for displaying the camera image with cross-hairs
- Option of saving the video image for documentation purposes
- Insertion of comments and marks in the video image
- Measuring functions for circles, distances and angles in the image
- Loading of masks as an overlay (also as DXF)

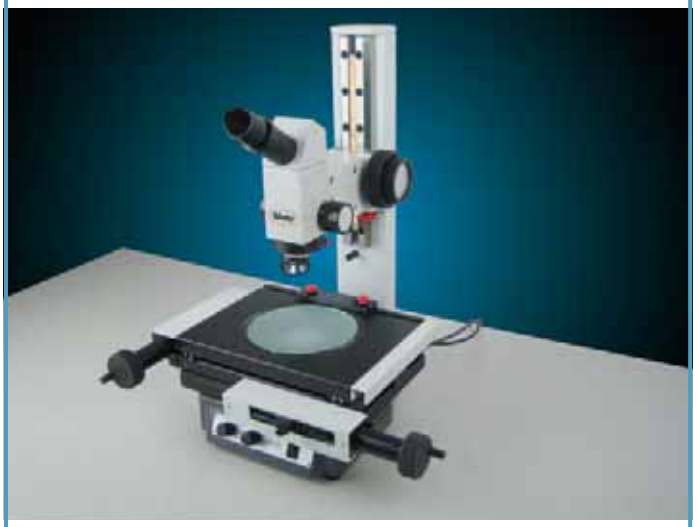
VED Image Processing Software

- Optical image processing, automatic edge recognition using measuring fields
- Quick measurement of complex geometries
- Accurate measuring results thanks to a much greater point density
- Measuring point filter

Video Zoom Station VZS 1

- Manual macro zoom lens 22x to 155x
- Working distance 77 mm (3.03 in)
- Maximum workpiece height 150 mm (5.91 in)
- Halogen incident and transmitted light
- 1/2" color camera
- Display detail in X: 9 to 1.4 mm or 18 to 0.7 mm (0.35 to 0.055 in or 0.71 to 0.028 in)
- Measurements in image (circle, distance, angle)
- Option of saving the video image for documentation purposes
- Measuring computer with 17" TFT monitor

WMZ Measuring Microscope



- Zoom enlargement 8 x to 40x
- Working distance 77 mm (3.03 in)
- Measuring table with incremental measuring system, resolution of 1 µm (40 µin) and rapid adjustment
- Measuring ranges from 100 mm x 100 mm to 250 mm x 170mm (3.94 in x 3.94 in to 9.84 in x 6.69 in)
- Max. workpiece height 200 mm (7.87 in), Max. table load 15 kg (33 lbs)
- Halogen incident and transmitted light
- Display detail in X: 23 to 4 mm or 46 to 2 mm (0.91 to 0.16 in or 1.81 to 0.08 in)
- Digital display with data output
- Optional QC 200 geometric measuring computer

WMS Measuring Microscope

- Zoom enlargement 8x to 40x
- Working distance 77 mm (3.03 in)
- Measuring table with measuring spindles
- Measuring range 50 mm x 50 mm (1.97 in x 1.97 in)
- Max. workpiece height 200 mm (7.87 in), Max. table load 15 kg (33 lbs)
- Halogen incident and transmitted light
- Display detail in X: 23 to 4 mm or 46 to 2 mm (0.91 to 0.16 in or 1.81 to 0.08 in)

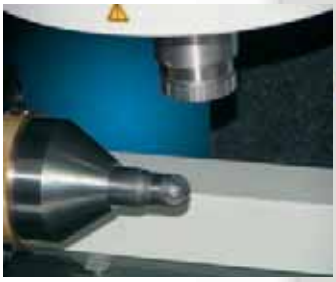
Further Products (on Request)

- Small microscope
- Monocular microscope
- Stereo microscope
- Stereo zoom microscope

MarVision. Optical Coordinate Measuring Machines

QUICK AND PRECISE TOOL MEASUREMENT FOR EVERY SITUATION

► | Thanks to their modular design, optical coordinate measuring machines provide excellent configuration flexibility based on the many hardware and software modules and can be tailored to meet specific user requirements. The applications for this coordinate metrology range from comprehensive measurement of precision/cutting tools and rotationally symmetrical parts to diamond-tipped grinding tools. | ◄



MarVision. ACCURE 250 / UNI-VIS 250 / TAURUS 650s

MarVision. ACCURE 250 / 250H

Precision measurements of helical cutting tools by setting the pivoted measuring head to the lead angle.

- Hobs
- Grinding worms
- Taps and thread milling cutters
- Bandsaw milling cutters

Fully automatic measurement of complex cutting tools as
- Stepped and form-cutting tools
- Ball-track milling cutters and ball-end milling cutters
- Standard and special cutting tools

ACCURE 250	$MPE_{E1} = (1.1 + L/450)\ \mu m$ $MPE_{E2} = (1.6 + L/360)\ \mu m$
ACCURE 250 H	$MPE_{E1} = (0.7 + L/500)\ \mu m$ $MPE_{E2} = (1.1 + L/300)\ \mu m$

MarVision. UNI-VIS 250

Precision measurements of complex tools and rotationally symmetrical parts using tried-and-tested system solutions.

Fully automatic measurement of:
- Shafts, pistons, jet needles, precision cylindrical components
- Grinding wheels and bright-finished bodies of revolution
- Stepped tools
- Ball-track milling cutters and ball-end milling cutters
- Tool bits (inserts)

UNI-VIS 250 AR/ARZ	$MPE_{E1} = (1.3 + L/450)\ \mu m$ $MPE_{E2} = (1.8 + L/360)\ \mu m$
UNI-VIS 250 HR/HRZ	$MPE_{E1} = (0.7 + L/500)\ \mu m$ $MPE_{E2} = (1.1 + L/300)\ \mu m$

MarVision. TAURUS 650s

Precision measurements on long, heavy rotary cutting tools.

Full integration into production environments.

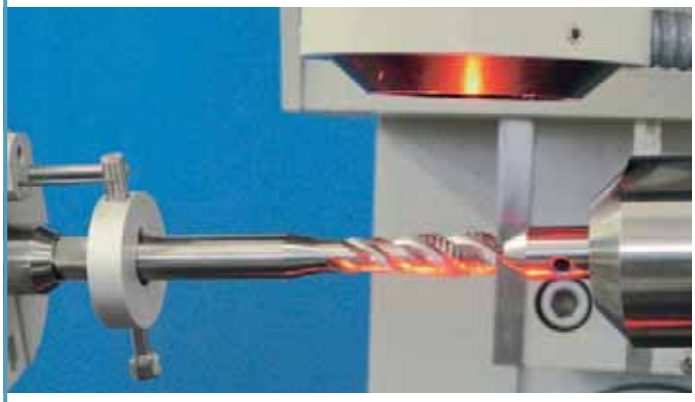
Fully automatic measurement of:
- Stepped tools
- Ball-end milling cutters
- Ball-track milling cutters
- Reamers
- Pine-tree milling cutters

TAURUS 650s	$MPE_{E1} = (1.8 + L/200)\ \mu m$ $MPE_{E2} = (2.5 + L/100)\ \mu m$

MarVision. Industry Solutions

Measurement of hobs (ACCURE 250 only)

- Comprehensive hob measurement for standard and special profiles
- Maximum tool weights up to 15 kg (33 lbs)
- Diameters up to 200 mm (7.87 in)
- Lead angle ± 15°
- Free contour scanning up to a meas. point density of 1 µm (40 µin)
- Measurements conforming to DIN 3968:
  profile form (O), pitch (O), base pitch (O), radial runout of head (O), radial runout of proof diameter (O), flute direction (O/T); form and position of cutting faces (O/T), flute pitch (T), axial runout of proof shoulder (T).
  (O - optical probing / T - touch probing)



Measurement of taps (ACCURE 250 only)

- Comprehensive measurement of right-hand and left-hand cutting taps
- Diameters from 1.4 mm to 70 mm (0.055 in to 2.76 in)
- Lead angle ± 15°
- Free contour scanning up to a meas. point density of 1 µm (40 µin)
- Axial section profile including starting taper, calculation of outer and core diameters, half-angle of thread, lead, taper and other dimensions are measured in transmitted light
- Rake angle, flute pitch and web diameter are measured in incident light

Measurement of ball-track milling cutters (UNI-VIS 250 / TAURUS)

- Comprehensive measurement of ball-track milling cutters in axial and axis-parallel sections
- Automatic tool wobble correction
- Free contour scanning up to a meas. point density of 1 µm (40 µin)
- Diameters up to 150 mm (5.91 in)
- Import of CAD data for programming the measuring machine
- Optical measurements of profile forms, lengths, angles, radii, rake angles, relief angles and radial run-out

Measurement of ball-end milling cutters (UNI-VIS 250 / TAURUS)

- Comprehensive axial-section measurement of ball-end milling cutters
- Analysis in freely selectable angular divisions of the nominal or actual circle
- Automatic tool wobble correction
- Free contour scanning up to a meas. point density of 1 µm (40 µin)
- Optical measurements of profile forms, position errors relative to the nominal profile, position errors relative to the shank, radial run-out, rake angles and relief angles

MarVision. Industry Solutions

Measurement of rotationally symmetrical parts (UNI-VIS 250 / TAURUS)

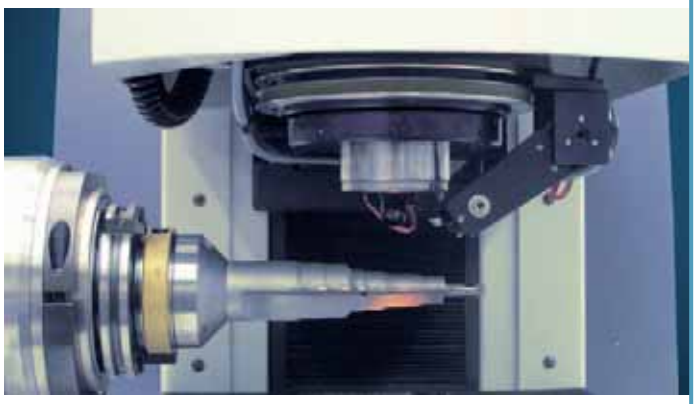
- Comprehensive axial-section measurement of rotationally symmetrical parts in freely selectable angle positions
- Automatic tool wobble correction
- Free contour scanning up to a measuring point density of 1 µm
- High repeatability for small radii and angles thanks to intelligent correlation of measuring points with the nominal contour
- Import of CAD data for programming the measuring machine
- Optical measurements of profile forms, axial and radial lengths and distances, radii, angles and diameters

Measurement of tool bits (inserts) (UNI-VIS 250 / TAURUS)

- Comprehensive measurement of the cutting edge contour
- Free contour scanning up to a measuring point density of 1 µm
- Import of CAD data for programming the measuring machine
- Automatic contour scanning in X, Y and Z according to CAD data
- Optical measurements of profile forms, lengths, radii, angles and rake angles

Measurement of stepped tools (TAURUS 650s)

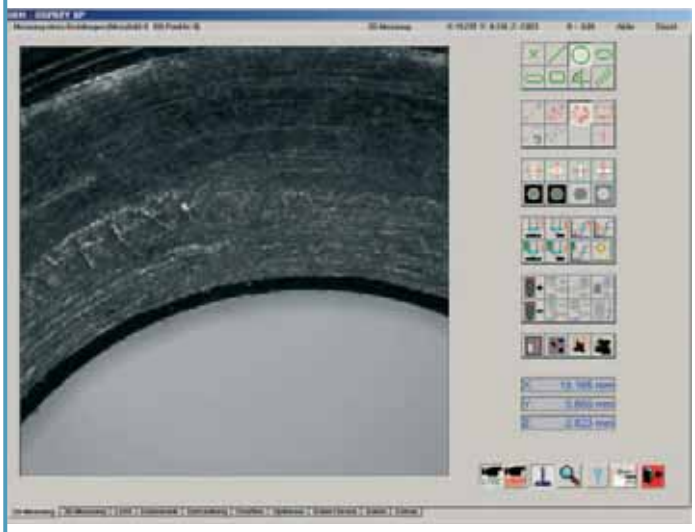
- Comprehensive measurement of the cutting edge contour
- Optical measurement of profile form, lengths, radii and angles
- Optional: Optical or tactile measurement of rake angles and relief angles
- Pneumatic chucks

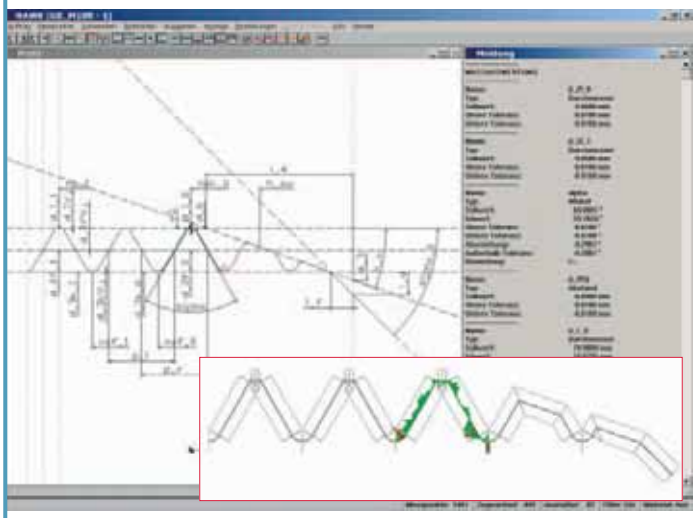


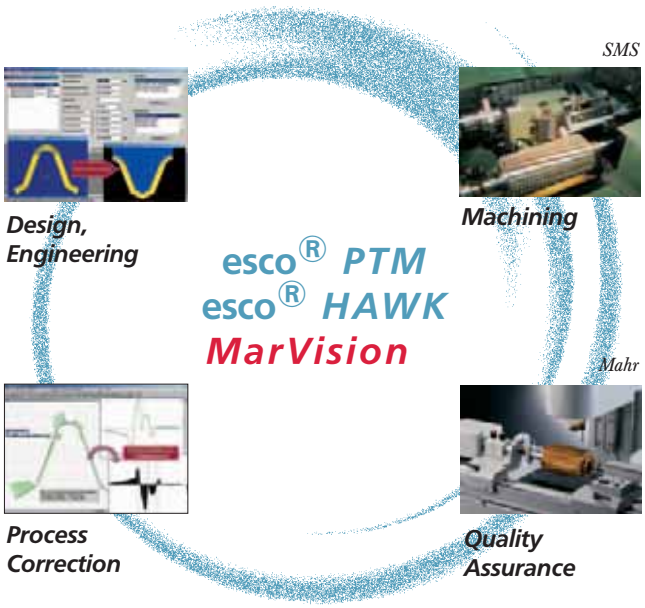
Measurement of PCD milling tools (TAURUS 650s)

- Comprehensive measurement of the cutting edge contour
- Optical measurement of profile form, lengths, radii and angles
- Optional: Optical or tactile measurement of rake angles and relief angles
- Tactile measurement of bit seat
- Determination of overall geometry resulting from individual cutting edges
- Pneumatic chucks
- Cutting edge parameterization for flat tool bits (inserts)
- Measurement of cutting edge running

MarVision. Software Solutions







Networking: CAD / CAM – Measurement – Machining – Quality Assurance – Analysis

OSPREY measurement software

- Very simple operation thanks to a clearly structured user interface
- Single-monitor solution
- Very simple creation of CNC programs
- Separate settings for illumination, edge criteria, focus, measurement and data analysis functions
- Image processing – gray level analysis using a subpixel technique
- Open communication platform between optical coordinate measuring machines and data analysis modules such as **HAWK**

HAWK programming, data analysis and documentation tool

Measurement philosophy
- Complete optical contour scanning
- Actual contour assigned to nominal contour
- Measured points assigned to geometric elements using adjustable best-fit ranges
- High repeatability even with small angular and radius segments
- Data import formats: DXF, ASCII, IGES
- Data export formats: ASCII (CSV), qs-STAT

Advantages
- Very simple program creation by setting dimensions at the nominal contour
- Customized parameter programs for the automatic creation of measuring jobs
- Offline programming of measuring jobs at separate workstations
- Full functionality for the system owner, "single-button" control for staff

MarVision. Software solutions – Closed Loop Precision tool grinding

Philosophy
- Influencing the manufacturing process
- Measuring machine becomes part of production

Principle
- Production data available for input via CAx interfaces
- Measurement programs created automatically control the measuring machine and the scanned geometries are directly available in **HAWK** for profile comparison
- The high accuracy of the measuring machines and the sheer density of information that can be obtained from the measurements permit precise corrections which result in reproducibly tolerance-compliant workpieces after a single correction run

Advantages
- Time saving of up to 80%
- Higher manufacturing accuracies
- Operator influence is minimized

MarVision. Accessories

Multisensor Technology

Optical measuring head (1, 2)
- With interchangeable lenses (1) of fixed magnification (0.7x, 1.0x, 1.5x, 3x, 5x, 10x)
- With zoom lens (zoom range 1x to 10x)

Probe retractor (3)
- CNC-controlled, reproducible probe extension from and retraction into the measuring head without the need for recalibration

Renishaw TP 20 (4)
- Probe system for tactile probing of contours

Illumination Types

Annular slit illuminator 42/2000
- Bright field surface illumination for optical measuring head

Work-Holding Fixtures

Set of precision collet chucks (5)
- For HSK hollow-shank chucking and internal taper

Shop-floor Installation

Do you want to integrate your measuring machine into your production line and still get accurate measurement results? We offer various systems that protect your measuring machine against dust, vibration, oil mist and other detrimental ambient influences.

- Cabinet system (6) for the integration of all peripheral units (with or without air conditioning)
- Protective machine enclosure (7)
- Vibration damping system (8)

MAXIMUM PRECISION FOR MEASUREMENT ON THE SHOP FLOOR.

SHAFT METROLOGY FROM MAHR

The latest information on MARSHAFT products can be found on our website:
www.mahr.com, WebCode 11935

► | In order to be able to produce the growing variety of parts cost-effectively, manufacturers now require not only flexible production facilities, but also equally flexible measuring equipment. This is particularly true of the automotive industry and its suppliers. Given that customized vehicles with different engines and transmission systems are now the norm, items such as shaft-shaped parts need to be manufactured in a number of different designs, then measured and tested for quality assurance purposes. To measure the different parts produced in small lots, it is not cost-effective to purchase and maintain the individual multi-gaging units that were used in the past for these customized designs. A better option is to use a universal measuring machine. Such a machine should be able to adapt very quickly and flexibly to a number of different designs while also allowing fast quality assurance thanks to short measuring times. Mahr has a number of appropriate solutions.

| ◄

► I MarShaft. Shaft Measuring Systems

Request a brochure.

MarShaft.

MEASUREMENT OF SHAFT-SHAPED PARTS ON THE SHOP FLOOR

► | MarShaft shaft measuring machines are primarily used on the shop floor but their excellent measuring accuracy means they can also be used in measurement laboratories. The machines come in various sizes and, thanks to their modular design, can be optimized to suit the relevant measuring tasks. Measuring directly on the shop floor during production saves you having to perform time-consuming measurements in the inspection room and improves product reliability. | ◄

MarShaft HELIO-PAN Manual

Description

The modular design of the HELIO-PAN shaft measuring machine allows rotationally symmetrical parts to be measured quickly and flexibly.
- No operator influence
- Highly accurate measuring results
- Excellent repeatability
- Measuring system for all typical measuring tasks such as length, diameter, radial run-out, axial run-out, groove width, taper angle, roundness, coaxiality, concentricity and many others besides

Features

- Measuring force regulator to avoid operator influences
- Ideal for use on the shop floor so can be used directly in production environments
- **HELIO-CHECK** display unit which is easy to operate

Applications

Measurement of round parts such as:
- Gear shafts, camshafts, crankshafts, drive shafts, hollow shafts, etc.

Manually operated shaft measuring machine

MarShaft HELIO-SCOPE

Description

Optical measuring instrument for turned parts with matrix camera for direct use on the shop floor.
- Flexible optical measuring system for round parts
- Maximum precision directly on the shop floor
- Reliable measuring results without operator influence

Features

- Matrix camera, camera picture approx. 8 x 8 mm (0.31 x 0.31 in)
- Easy operation thanks to touchscreen monitor
- Record generator

Applications

Measurement of round parts such as:
- Camshafts, drive shafts, gear shafts, toothed racks, hollow shafts, etc.
- Tactile measuring unit for radial and axial run-outs (optional)
- Temperature compensation (optional)

Optical shaft measuring machine

MarShaft HELIO-PAN SNC

Automatic shaft measuring system

Description

The flexible HELIO-PAN SNC shaft measuring system automatically inspects shaft-shaped parts with maximum precision during production.

- Automatic measuring process
- Maximum flexibility as virtually no changeover time required
- Simple operation

Features

- No operator influence on the measuring results
- Short measuring times
- Ideal for use on the shop floor

Applications

Measurement of shaft-shaped parts with all kinds of different geometries

- Gear shafts, drive shafts, toothed racks, hollow shafts, camshafts

MarShaft HELIO-PAN ONC

Automatic crankshaft measuring machine

Description

The flexible HELIO-PAN ONC shaft measuring system automatically inspects crankshafts using both optical and tactile measurements during production.

- Automatic measuring process
- Maximum flexibility as virtually no changeover time required
- Simple operation
- Measuring system for virtually all typical measuring tasks on a crankshaft (see data sheet)

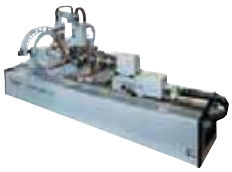
Features

- No operator influence on the measuring results
- Short measuring times
- High measuring accuracy even under shop-floor environment conditions

Applications

Measurement of different types of crankshafts directly in the production line.

MarShaft Data Overview



	HELIO-PAN	HELIO-SCOPE	HELIO-PAN SNC	HELIO-PAN ONC
Measuring range				
Length (Z)	400/800/1,200 mm (15.75/31.50/47.24 in)	350 or 750 mm (13.78 or 29.53 in)	700/1,100/1,600 mm (27.56/43.31/62.99 in)	800 mm (31.50 in)
Diameter (X)	120 or 220 mm (4.72 or 8.66 in)	80 or 120 mm (3.15 or 4.72 in)	120 or 220 mm (4.72 or 8.66 in)	220 mm (8.66 in)
Workpiece				
Weight (max.)	20 kg (44 lbs)	30 kg (66 lbs)	30 or 80 kg (66 or 176 lbs)	60 kg (132 lbs)
Resolution adjustable				
Lengths/diameters	0.0001 mm (4 µin)	0.01 to 0.0001 mm (400 to 4 µin)	0.001/0.0001 mm (40/4 µin)	0.001/0.0001 mm (40/4 µin)
Angle	0.001°	0.01 to 0.0001°	0.01°	0.01°
Error limits*				
Length (µm)	(2+L/100), L (length) in mm	(4+L/200), L (length) in mm	(2+L/100), L (length) in mm	(2+L/100), L (length) in mm
Diameter (µm)	(1+L/100), L (length) in mm	(2+L/200), L (length) in mm	(0.5+L/100), L (length) in mm	(0.5+L/100), L (length) in mm
Drive	Manual	Servo motors	Servo motors	Servo motors
Lens system	Projector or measuring microscope possible	Telecentric precision lens system, high-resolution CCD array	-	Telecentric precision lens system, high-resolution CCD array

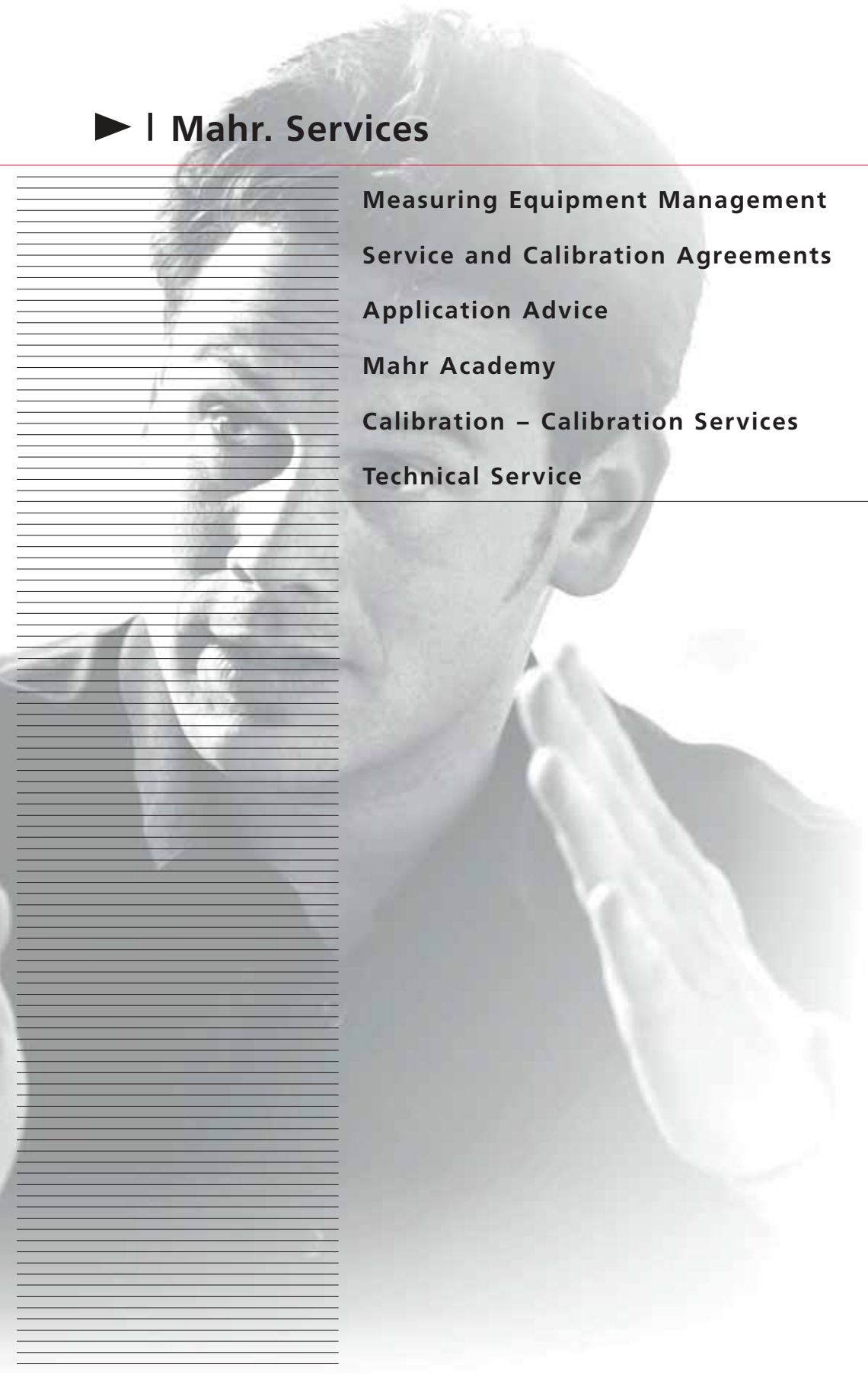
* (2 σ at 20 °C ± 1 °C relative to reference standard)

MORE THAN JUST PRODUCTS.

THE MAHR SERVICE PORTFOLIO

The latest information on the MAHR SERVICECENTER can be found on our website:
www.mahr.com, WebCode 9628

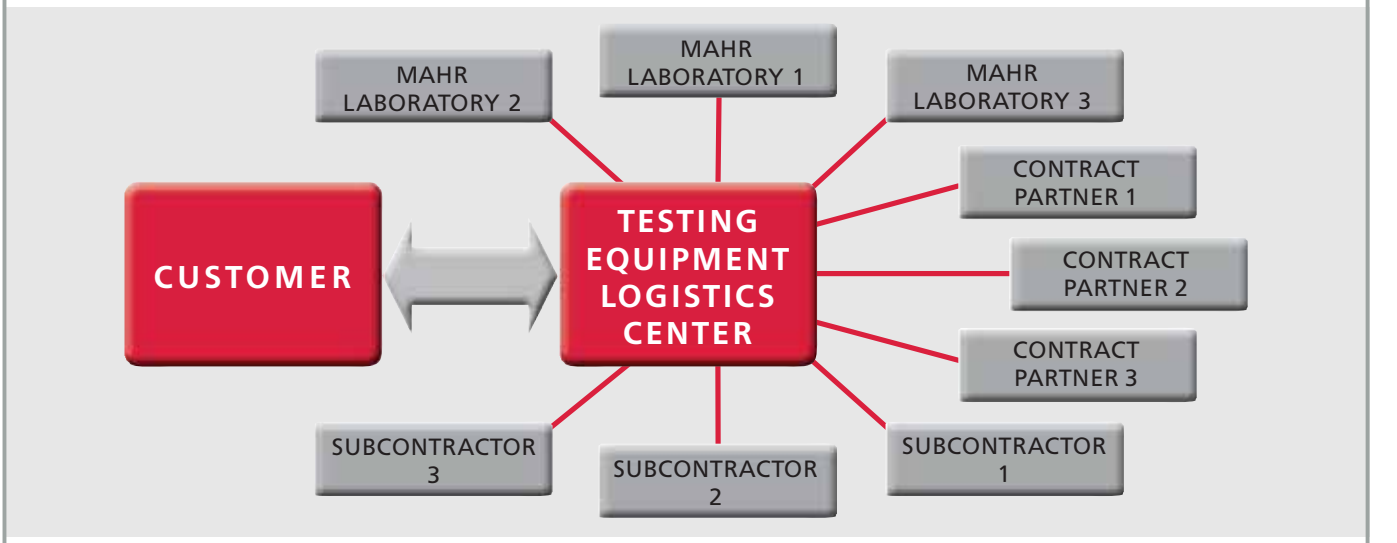
► | In addition to its many branches and agencies, Mahr also has a worldwide service network. To find your contact partner, visit the Mahr website at **www.mahr.com** or see the back page of this catalog. In addition to the services that accompany our products, further services are also available from various Mahr sites, where the skill and experience of the staff reflects Mahr quality standards. We are happy to help with all your metrology questions, however specific. Just ask us! | ◄



Mahr. Services

Request a brochure.

Mahr Measuring Equipment Management



The tendency of producers to concentrate on core skills is increasing all the time. Ancillary processes such as testing equipment management or tool management are outsourced to specialists who can perform these tasks more effectively. For testing equipment, Mahr offers **Mahr service modules**, providing a **high level of service** that frees the customer from having to manage this secondary process. By taking over tasks such as calibration, repair, internal reminders and spare-parts acquisition, **Mahr** also saves the customer the administrative outlay that they involve. Description of service:

Calibration / metrology
- Calibration of all makes of measuring and test equipment in one of the Mahr laboratories
- Calibration data received from/forwarded to partners
- On-site calibration

Inventory management and inventory organization

Repair of testing equipment
- General overhaul of Mahr measuring equipment
- Repair of all makes of measuring equipment

Direct exchange of testing equipment
- Exchange instead of repair
- Exchange if calibrations produce a negative result

Acquisition of measuring instruments and equipment (general contractor)
- Acquisition of all makes of measuring equipment
- Incl. measuring sizes outside the standard Mahr product range

System advice, training

Simplified order processing/transport/logistics
- Internal administration no longer required
- Collection service

Peripheral services
- Internal transport

When adapting these modules to the customer's organizational structures, **Mahr Measuring Equipment Management** is very flexible and offers various configuration levels and options. Customized system pre-planning is therefore also part of the service, to ensure the best all-round performance for customers. Naturally, **Mahr's services** comply with international standards such as ISO 17025. Whether the services need to comply with specific international standards or in-house requirements, high internal quality standards ensure that complex processes such as the control of measuring and testing equipment, which can be costly and involved, are performed efficiently and professionally.

Measuring services (length metrology)
The various laboratories run by the Mahr Group and our cooperation partners have a whole range of **measurement** equipment available. Our service primarily includes the following measuring tasks:

Tactile and optical coordinate metrology,
Surface metrology (roughness),
Contour metrology,
Form metrology,
Precision length metrology.

Depending on the measuring task, required accuracy and machine availability, **Mahr Measuring Equipment Management (MMM)** coordinates measuring orders and performs **measurement** in its own laboratories or via the Group's laboratories or cooperation partners. Measurement services are invoiced by the hour at a fixed rate. Depending on your requirements, we can supply appropriate measurement records.

Service Agreements

Service and calibration agreements

The operational availability of your measuring equipment is very important to you. To ensure smooth operation over many years, Mahr recommends you have your equipment regularly inspected. The inspection of your measuring equipment, which is dependent on your conditions of use and defined with your agreement, brings you considerable advantages:

- Unscheduled equipment failures are prevented
- Wear parts are exchanged in good time and within the framework of the agreed service intervals
- Regular servicing keeps your equipment running at peak performance, including incorporation of future product improvements
- Regular inspections of your measuring equipment provide the best conditions for your quality assurance system. A sticker on your measuring equipment reminds you when the next service is due. All servicing performed is noted in the service plan and can serve as a condition for acceptance of any claims during the warranty period.

Application Advice

Application advice

Do you need support when working on solutions for metrological tasks? Do you need to create measuring programs for complex workpieces? Do your users need thorough product training?

Take advantage of the services offered by our applications engineering specialists, with their extensive knowledge and many years of experience in the dimensional metrology sector.

The names **Precimar**, **MarSurf**, **MarForm** and **MarVision** represent core skills in the fields of length metrology, form, contour and roughness metrology and coordinate metrology. Our applications engineering and technical service specialists also offer:

- Sample measurements
- Assistance with putting equipment into service
- Program creation
- Product training
- Measuring equipment capability investigations
- User training

Mahr Academy

Mahr Academy

The **Mahr Academy** offers you applications-specific product training and basic seminars, either at predefined seminar venues on specific dates or arranged internally within your company. Whichever type of training you choose, the aim is the same – to help your business become even more reliable and efficient and produce even higher quality goods in future. The subjects offered are relevant to all employees that work either directly or indirectly on production tasks, from new employees on the shop floor, in the inspection room and in the design department to long-serving employees and staff with management duties.

You can find detailed information on the Mahr Academy training and seminar portfolio on our website, or ask your contact partner at Mahr who will be happy to help.

Summary of subjects on offer

- Introduction to length metrology
- Surface metrology
- Form metrology
- Monitoring of testing equipment
- Measuring uncertainty according to GUM

Product training and advanced training seminars for designers on request.

Calibration Services


United States Department of Commerce
National Institute of Standards and Technology

NVLAP®

Certificate of Accreditation to ISO/IEC 17025:2005

NVLAP LAB CODE: 200605-0

Mahr Federal Inc.
Providence, RI

is accredited by the National Voluntary Laboratory Accreditation Program for specific services, listed on the Scope of Accreditation, for:

CALIBRATION LABORATORIES

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer to joint ISO-ILAC-IAF Communique dated 18 June 2003).

2007-04-01 through 2008-03-31
Effective dates

For the National Institute of Standards and Technology

Calibration laboratories

Mahr operates **laboratories** for **various instruments** and **sizes** in the field of **length metrology**. These ensure high dimensional accuracy and **very low measuring uncertainties**. In principle, **all measuring equipment** can be calibrated. Specific core skills are offered for the following calibration services:

- Setting rings* / ring gages*
- Setting plug gages* / plug gages*
- Setting disks*
- Setting masters
- Setting standards for inside micrometers
- Setting standards for outside micrometers*
- Dial comparators*
- Lever-type test indicators*
- Geometry and roughness standards*
- Thread plug gages, thread ring gages
- Internal and external measuring instruments
- Inductive measuring instruments and probes*
- Calibration spheres
- Tall cylinder squares*
- Rulers
- Micrometers*
- Calipers*
- Dial indicators*
- Measuring anvils
- Measuring tables and V-blocks
- Angularity measuring instruments
- Roughness measuring instruments
- Roughness standards*
- Snap gages
- Radius, thread-form and sensor gages
- Standard cylinder squares*
- Parallel gage blocks* made of steel, ceramic and hardened metal
- Parallel pieces
- Optical flats
- Pin gages*

- Flats
- Roundness standards*
- Depth setting standards*
- Magnification standards* (flicks)
- Spline gages
- Angle standards
- Bevel protractors
- Customized objects on request

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* Calibrations with officially recognized calibration certificates that comply with national and international standards, e.g. **NIST** (National Institute of Standards and Technology), and **DKD** (German Calibration Service).
NIST is the national standards institute in the United States.

The **DKD** (German Calibration Service) is a signatory of the multi-lateral agreement of the *European cooperation for Accreditation* (**EA**) and the *International Laboratory Accreditation Cooperation* (**ILAC**) for mutual recognition of calibration certificates.

Your **Mahr contact partner** will provide you with information on national and international recognition, e.g. as part of the multi-lateral agreement
www.european-accreditation.org/.

Technical Service

Technical Service

Mahr measuring instruments are developed and produced with the utmost care according to **Mahr quality guidelines** and using the very latest technology. This ensures your measuring instrument is of the very highest quality.

To provide your machine/measuring station with optimum care, Mahr has an efficient worldwide Service Organization. The **Mahr Service Organization**, run by trained expert personnel, is equipped with cutting-edge tools and instruments, many of which have been specially developed, and has an extensive selection of spare parts.

Mahr works according to progressive, tried-and-tested guidelines and offers a range of complementary services. To ensure the best results from your **Mahr measuring instruments** at all times, we recommend you use only the services offered by the **Mahr Service Organization**. This is the only way to ensure that only **original Mahr spare parts** and servicing procedures are used, reflecting the **Mahr quality standard**.

Visit the Mahr website at
www.mahr.com
to find out where your
Mahr ServiceCenter
is located.

Nummerverzeichnis

Stand: 160807

AMERICAS

USA

Mahr Federal Inc.

Headquarters:
1144 Eddy Street,
Providence, RI 02905
Phone: +1-401-784-3100
+1-800-343-2050 (toll-free)
Fax: +1-401-784-3246
e-mail: information@mahr.com

Cincinnati Resource Center:
11435 Williamson Road,
Cincinnati, OH 45241
Phone: +1-513-489-6116
Fax: +1-513-489-6302
e-mail: information@mahr.com

Los Angeles Resource Center:
11145 Knott Avenue, Suite G
Cypress, CA 90630
Phone: +1-714-379-7051
Fax: +1-714-379-0468
e-mail: information@mahr.com

Mahr Metering Systems Corporation

1415 A Cross Beam Dr.
Charlotte, NC 28217
P.O. Box 7547
Charlotte, NC 28241
Phone: +1-704-525-7128
+1-800-459-7867 (toll-free)
Fax: +1-704-525-8290
e-mail: Info@MahrMeteringSystems.com
info@mmscusa.com

Mexico

Mahr Corp. de Mexico S.A. de C.V.

Francisco Garza Sada #690,
Col. Chepevera
C.P. 64030 Monterrey,
Nuevo León, México
Phone: +52-81-8333-20-10
Fax: +52-81-8347-27-93
e-mail: ventas@mahr.com.mx

Brazil

Mahr do Brasil Ltda.

Av. Washington Luis, 703
04662-001 São Paulo, SP
Brazil
Phone: + 55-11-6687 5566
Fax: + 55-11-6687 5550
e-mail: apoio.vendas@mahr.com.br

EUROPE

Germany

Mahr GmbH Göttingen

Postfach 1853
37008 Göttingen
Carl-Mahr-Str. 1
37073 Göttingen
Phone: +49-551-7073-800
Fax: +49-551-7073-888
e-mail: info@mahr.de

Mahr GmbH Esslingen

Postfach 100254
73702 Esslingen
Reutlinger Straße 48
73728 Esslingen
Phone: +49-711-9312-600
Fax: +49-711-9312-725
e-mail: mahr.es@mahr.de

Mahr Multisensor GmbH

Wendelstraße 90
66787 Wadgassen
Phone: +49-6834-9411 0
Fax: +49-6834-48785
e-mail: info.marvision@mahr.de

Mahr OKM GmbH

Carl-Zeiss-Promenade 10
07745 Jena
Phone +49-3641 642696
Fax: +49-3641 643368
e-mail: info-okm@mahr.de

Poland

Mahr GmbH
Przedstawicielstwo w Polsce

ul. Plocka 15 c / 53
01-231 Warsaw
Phone: +48-792-665446
e-mail: arkadiusz.kolakowski@mahr.com

Russian Federation

Mahr Representative Office

ul. Godovikova, dom 9, stroenie 3
129085 Moskow
Phone: +7-926-841 0011
e-mail: sergey.bryankin@mahr.com

Czech Republic

Mahr spol. s.r.o.

Ulice Kpt. Jaroše 552
41712 Proboštov
Czech Republic
Phone: +420-417-816 711
Fax: +420-417-560 237
e-mail: Info-cz@mahr.com

Austria

Mahr Austria GmbH

Hirschstettnerstraße 19-21
1220 Wien, Austria
Phone: +43 (1) 204 36 73-0
Fax: +43 (1) 204 36 73-15
e-mail: info-austria@mahr.com

France

Mahr France

B.P. 27
6, rue Lavoisier-Z.I.
91430 Igny, France
Phone: +33-1-69351919
Fax: +33-1-69351900
e-mail: info@mahr.fr

Switzerland

Mahr AG Schweiz

Zürcherstrasse 68
8800 Thalwil, Switzerland
Phone: +41-44 723 39 99
Fax: +41-44 423 39 98
e-mail: ch@mahr.com

United Kingdom / Ireland

Mahr U.K. Plc.

19 Drakes Mews
Crownhill, Milton Keynes
MK 8 0ER, Great Britain
Phone: +44-1908-563700
Fax: +44-1908-563704
e-mail: info@mahruk.com

ASIA

China

Mahr China Ltd.

Hong Kong Office:
Unit G, 14F., CDW Building,
388 Castle Peak Road,
Tsuen Wan, N.T.
Hong Kong
Phone: +852-2357 9683
Fax: +852-2763 9613
e-mail: info@mahr.com.hk or
sales@mahr.com.hk

Beijing Office:
Room 1502, Rong Xin Tower,
West Station, Fengtai District,
Beijing 100055, China
Phone: +86-10-6332 4481/2/3
Fax: +86-10-6332 4492
e-mail: info@mahr.com.hk or
sales@mahr.com.hk

Shanghai Office:
1/F., No. 1146 Jia,
West Yan An Road, Changning District,
Shanghai 200052, China
Phone: +86-21-5238 5353
Fax: +86-21-5238 6012
e-mail: info@mahr.com.hk or
sales@mahr.com.hk

Guangzhou Office:
Unit 1203, East Tower,
Guangzhou International Commercial Center,
No. 122 Tiyudong Road,
Guangzhou 510620, China
Phone: +86-20-3887 1132/1173
Fax: +86-20-3887 1172
e-mail: info@mahr.com.hk or
sales@mahr.com hk

Mahr Precision Metrology (Suzhou) Ltd.

#399 Su Hong Road
Suzhou, Industrial Park
Suzhou 215021, P.R. China
Phone: +86-512-62585862
Fax: +86-512-62585870
e-mail: info_suzhou@mahr.com

Taiwan

Mahr China Ltd.

Taiwan Branch Office:
No. 109, Sec. 1, Wunhua 1st Road,
Linkou Township, Taipei County 24447,
Taiwan R.O.C.
Phone: +886-2-2600 6360
Fax: +886-2-2600 6362
e-mail: info@mahr.com.hk or
sales@mahr.com.hk

Korea

Mahr Korea Ltd.

Panwon B/D 6 F
38-30 Jangchung-dong 1-ga,
Chung-ku, Seoul 100-391
South Korea
Phone: +82-2-579-4981
Fax: +82-2-579-498- 6/7
e-mail: sales@mahr.co.kr

Japan

Mahr Japan Co., Ltd.

712-4-1, Mamedo-cho, Kohoku-ku,
Yokohama, 222-0032, Japan
Phone: +81-45-540-3591
Fax: +81-45-540-6252
e-mail: info@mahr.co.jp

Osaka Branch
2-3-5, Andoji-cho, Chuo-ku,
Osaka-shi, 542-0061, Japan
Phone: +81-6-6763-5191
Fax: +81-6-6763-5192
e-mail: info@mahr.co.jp

Malaysia

Mahr Malaysia Sdn. Bhd.

No. 130, Block B 1,
Leisure Commerce Square
No. 9, Jalan PJS 8/9,
46150 Petaling Jaya, Selangor Darul Ehsan
Malaysia
Phone: +60-3-78772060
Fax: +60-3-78772040
e-mail: sales@mahr.com.my

Thailand

Mahr S.E.A. Co. Ltd.

719 KPN Tower, 10th Floor
Rama 9 Rd., Bangkapi, Huaykwang
Bangkok 10310, Thailand
Phone: +66-2-717 1050-4
Fax: +66-2-717 1055
e-mail: sales_msea@mahr.com

India

Mahr Metrology India Private Ltd.

II Floors, Sona Towers
71/B Millers Road,
Bangalore - 560 052, India
Phone: +91-80-41076787
Fax: +91-80-41176787
e-mail: mahrindia@mahr.com

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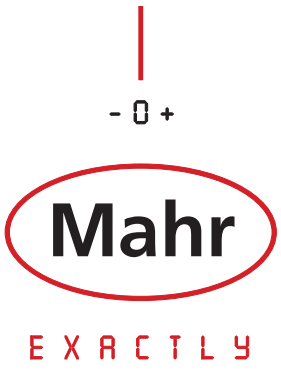

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