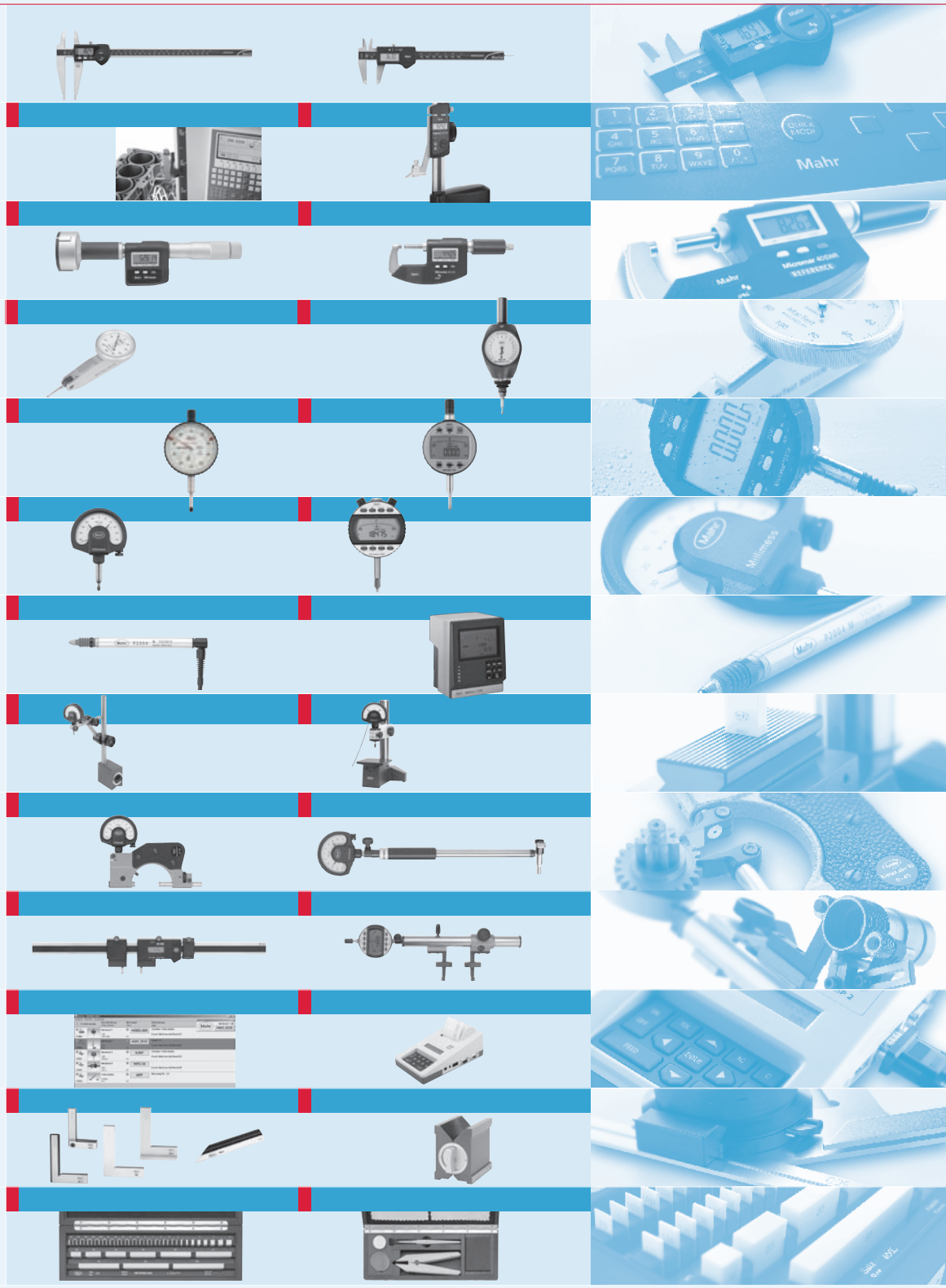
Mahr

DIMENSIONAL METROLOGY



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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 ER 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 EWR 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

Overview
MarCal Calipers 1- 2

Standard Calipers

MarCal 16 EWR 1- 4
Waterproof Caliper with a Digital Display
MarCal 16 ER 1- 8
With a Digital Display
MarCal 16 DN / 16 FN / 16 GN / 16 N 1-10
With a Line Scale (Vernier)
MarCal 16 U 1-11
With a Circular Scale

Universal Calipers

MarCal 16 EWV 1-12
With a Digital Display

Special Calipers

MarCal 16 EWR 1-14
Waterproof Caliper in special design

Workshop Calipers

MarCal 18 EWR / 18 ESA 1-20
With a Digital Display
MarCal 18 NA / 18 N / 18 DN 1-23
With a Line Scale (Vernier)

Depth Calipers

MarCal 30 EWR / 30 ER / 30 EWN 1-26
With a Digital Display
MarCal 30 N / 30 NH / 30 ND 1-30
With a Line Scale (Vernier)

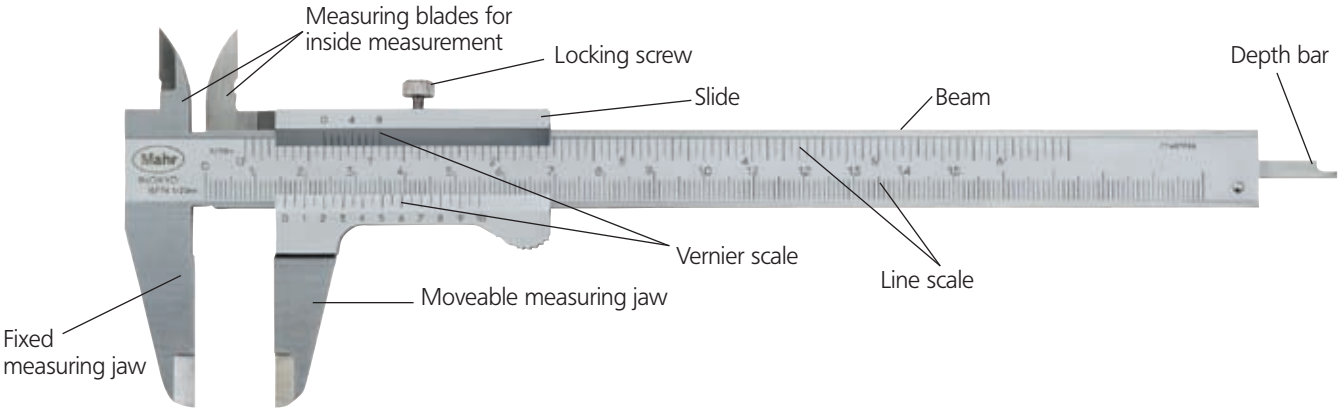
Linear Machine Scales

MarCal 31 EW 1-31
With a Digital Display

MarCal. Calipers

OVERVIEW

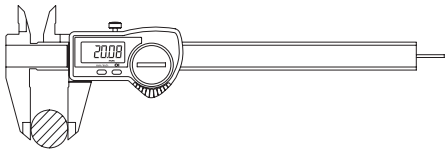
MarCal - Design Features



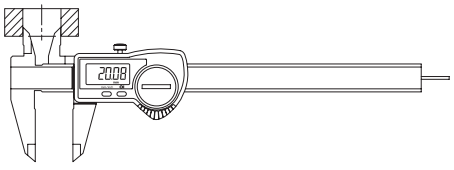
MarCal - Types on measurement

Calipers of the 16 series (e.g. 16 EWR, 16 U, 16 FN) can be used for 4 different measurements:

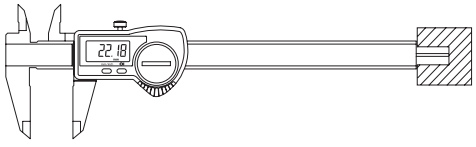
a) Outside measurement



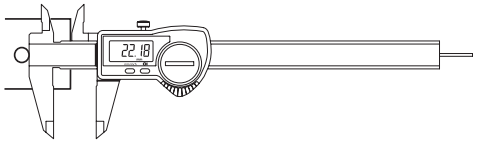
b) Inside measurement



c) Depth measurement



d) Step (Distance) measurement



Error limits *G* according to DIN 862

Measuring length	Error limits *G* in µm		
	Scale interval and/or vernier interval		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		

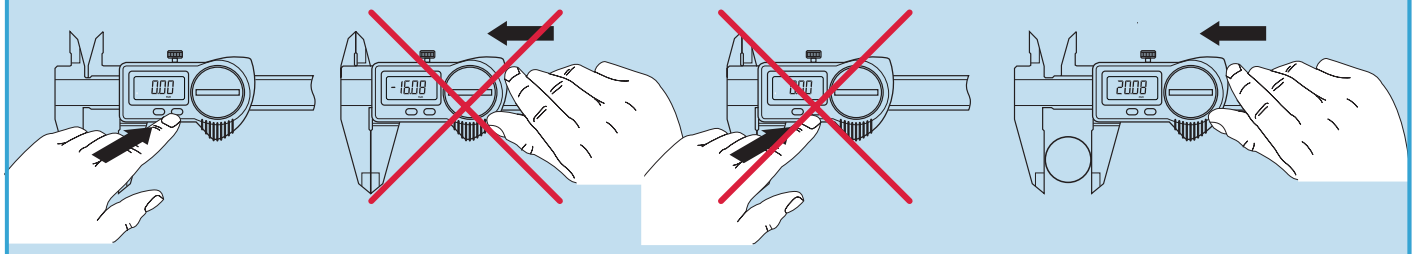
MarCal - The innovative Reference-System

Just set once to zero

All Mahr digital calipers with this logo REFERENCE are equipped with the innovative Reference-System. The zero position just has to be set once: after setting the zero position, the zero remains stored for all further measurements. Therefore, once the caliper is switched ON or the slide is moved the caliper is immediately ready for measurement. The need to reset to zero with a conventional caliper once the caliper is switched on has now become obsolete.

Conventional

① Switch ON ② Close the measuring jaws ③ Set to zero ④ Results of measurement



REFERENCE - System

① Switch ON ② Results of measurement

Press the ON key or move the slide

IP-Protection classes

First digit is the degree of protection according to IEC 60529		Second digit is the degree of protection according to IEC 60529 (approximate)	
Protection against particles, contaminants and dust		Protection against wet conditions (fluids)	
0	Not protected	**0**	Not protected
1	Particles > 50.0 mm	**1**	Falling water drops - vertical
2	Particles > 12.5 mm	**2**	Falling water drops - tilted < 15°
3	Particles > 2.5 mm	**3**	Spray water < 60°
4	Particles > 1.0 mm	**4**	Water splashing from all directions
5	Dust protected	**5**	Water jets from all directions
6	Dust tight	**6**	Powerful water jets
		7	Temporary immersion in water
		8	Continuous immersion in water

Example:
IP67 means that the product is "Dust tight" and is protected against "Temporary immersion in water".

MarCal. The new Generation with the Reference-System

WATERPROOF CALIPERS

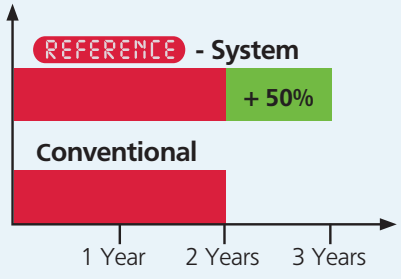
►| The water-proof digital caliper **MarCal** 16 EWR, with protection class IP67 and the Reference Lock-Function, ensures both accurate and reliable results even in the most toughest workshop conditions. |◄

Universal SPC-interface (optional). You have a choice of **MarConnect** data outputs, select either **USB, Digimatic** or **Mahr Opto RS232**

The high-contrast display with 8.5 mm high digits enables accurate, fatigue free reading of the measurement results.

The **Reference-Lock-Function** prevents operating error caused by accidental usage of the operating buttons.

The new Reference system is extremely energy efficient as when the caliper is in standby mode; almost no power is required, thus **extending the life of the battery to up to 50%.**



Lapped measuring faces for accurate measurement.

MarCal calipers have **lapped guide way surfaces**, these guarantee an even and sensitive run of the slide.

Surface of the guide way

Mahr

Lapped guide way

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

IP67

Protection class **IP67** in accordance to IEC 60529, the water proof measuring system **FPS** (Fluid Protected measuring System) with a sealed housing.

Digital Caliper MarCal 16 EWR

DIN 862 | IP67

REFERENCE

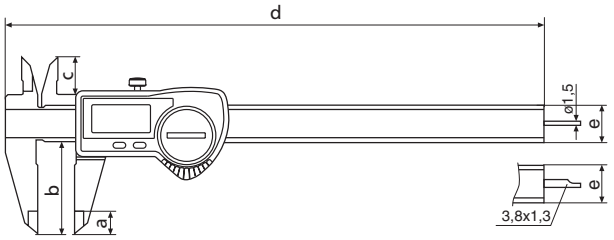
Features

Functions:
ON/OFF
RESET (Set display to zero)
mm/inch
Reference-Lock/Unlock
DATA (Data transmission via connection cable)
Auto-ON/OFF

- Immediate measurement due to the Reference system
- Excellent resistance against dust, coolants and lubricants, protection class IP67
- Dirt wipers are integrated in the slide
- Life of the battery up to 3 years
- Max measuring speed 2.5 m/s (100"/s)
- High contrast Liquid Crystal Display with 8.5 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	Depth rod		Friction wheel	Order no.
150	(6")	0.01/ .0005"	0.03	●			**4103060**
150	(6")	0.01/ .0005"	0.03		●		**4103062**
150	(6")	0.01/ .0005"	0.03	●		●	**4103061**
150	(6")	0.01/ .0005"	0.03		●	●	**4103063**

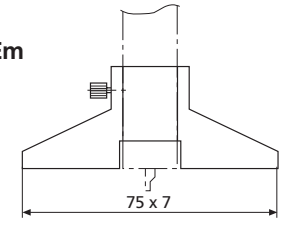


Dimensions mm	a	b	c	d	e
150	10	40	16	235	16 x 3
200	10	50	19	285	16 x 3.5
300	14	64	19	388	16 x 4

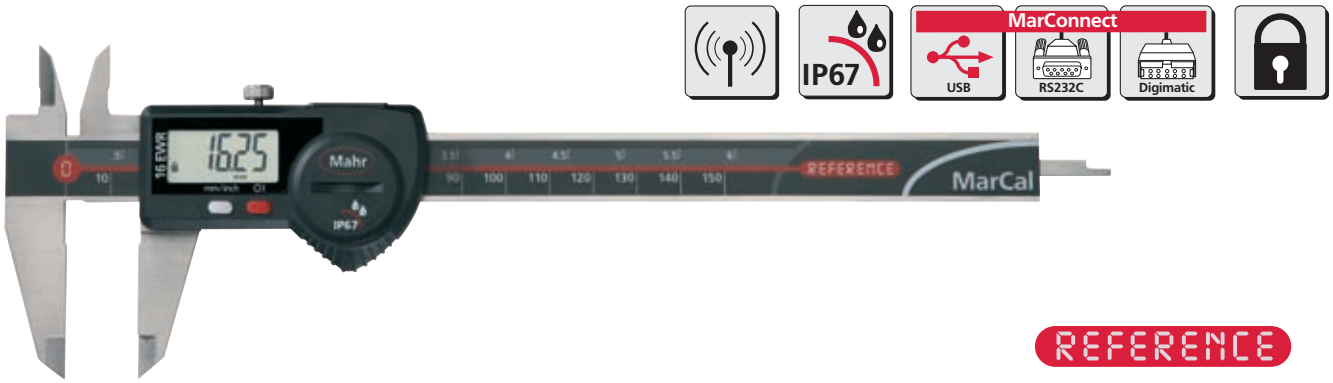
Accessories

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

16 Em



Digital Caliper MarCal 16 EWR with data output



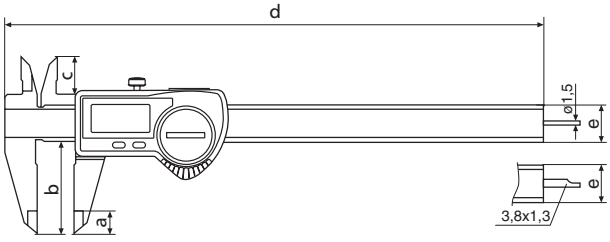
Features

Functions:
ON/OFF
RESET (Set display to zero)
mm/inch
Reference-Lock/Unlock
DATA (Data transmission via connection cable)
Auto-ON/OFF

- Immediate measurement due to the Reference system
- Excellent resistance against dust, coolants and lubricants, protection class IP67
- MarConnect data output, choose alternatively: USB, OPTO RS232C or Digimatic
- Dirt wipers are integrated in the slide
- Life of the battery up to 3 years
- Max measuring speed 2.5 m/s (100"/s)
- High contrast LCD with 8.5 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/ .001"	●	●			**4103064**
150	(6")	0.01/ .0005"	0.03/ .001"	●		●		**4103066**
200	(8")	0.01/ .0005"	0.03/ .001"	●		●		**4103068**
300	(12")	0.01/ .0005"	0.04/ .0015"					**4103070**
150	(6")	0.01/ .0005"	0.03/ .001"	●	●		●	**4103065**
150	(6")	0.01/ .0005"	0.03/ .001"	●		●	●	**4103067**
200	(8")	0.01/ .0005"	0.03/ .001"	●		●	●	**4103069**
300	(12")	0.01/ .0005"	0.04/ .0015"				●	**4103071**



Dimensions

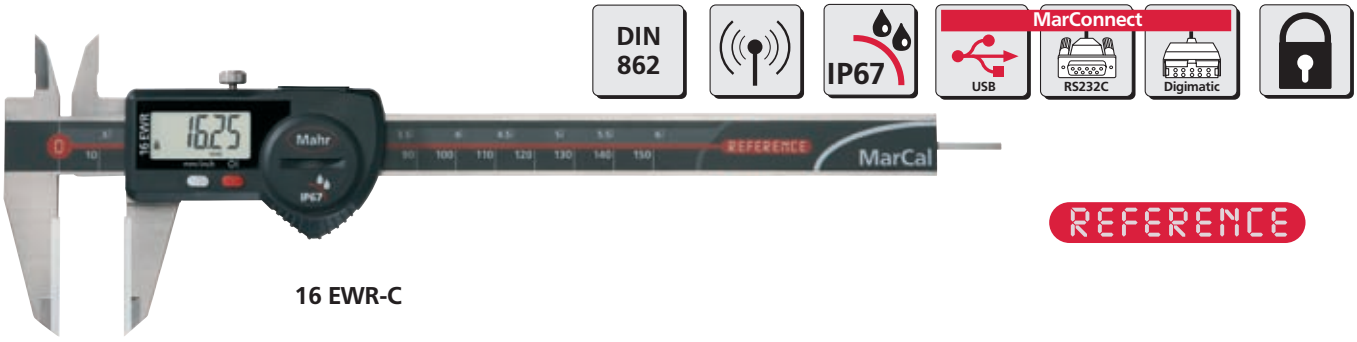
mm	a	b	c	d	e
150	10	40	16	235	16 x 3
200	10	50	19	285	16 x 3.5
300	14	64	19	388	16 x 4

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**

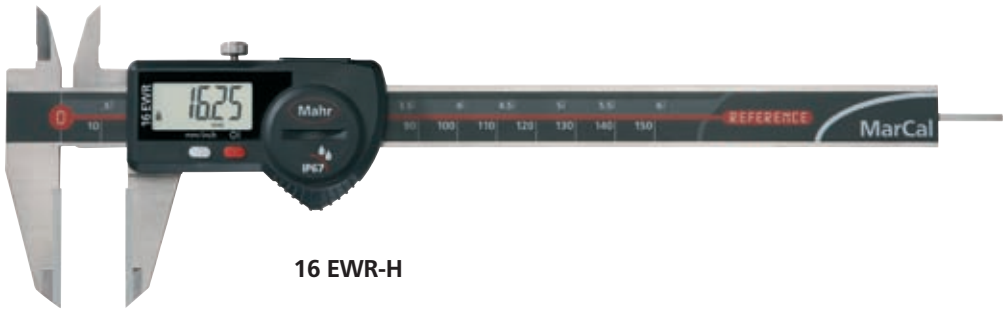
Accessories for Data Processing see Chapter 11

Digital Caliper MarCal 16 EWR special design



16 EWR-C

REFERENCE



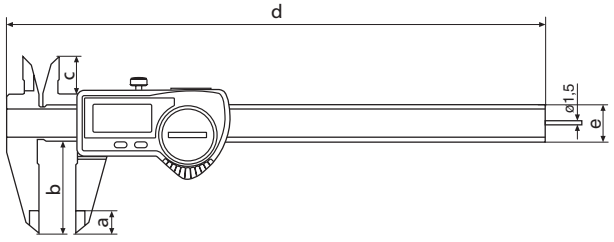
16 EWR-H

Features

Features are the same as the MarCal 16 EWR, please refer to Page 1-6, additional features can be found in the Technical Data.

Technical Data

	Measuring range		Resolution	Error limit *G*	Depth rod	Order no.	Type
	mm	(inch)	mm / inch	mm			
16 EWR-C	150	(6")	0.01/ .0005"	0.03	●	**4103072**	Ceramic outside measuring faces
16 EWR-H	150	(6")	0.01/ .0005"	0.03	●	**4103073**	Carbide outside measuring faces



Dimensions

mm	a	b	c	d	e
150	10	40	16	235	16 x 3

Accessories

Battery, Data Connection Cables see Page 1 - 6

Accessories for Data Processing see Chapter 11

Digital Caliper MarCal 16 ER

DIN 862

REFERENCE

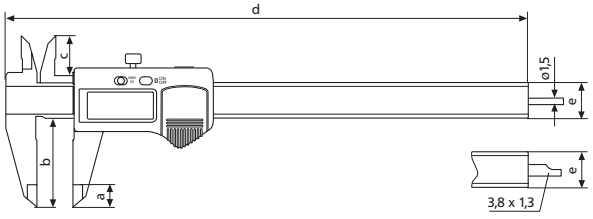
Features

Functions:
ON/OFF
RESET (Set display to zero)
mm/inch
Reference-Lock/Unlock
Auto-ON/OFF

- Immediate measurement due to the Reference system
- Dirt wipers are integrated in the slide
- Life of the battery up to 3 years
- Max measuring speed 2.5 m/s (100"/s)
- High contrast Liquid Crystal Display with 8.5 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		Resolution	Error limit *G*	Depth rod		Order no.
mm	(inch)	mm / inch	mm / inch			
150	(6")	0.01 / .0005"	0.03 / .001"	●		**4103000**
150	(6")	0.01 / .0005"	0.03 / .001"		●	**4103001**

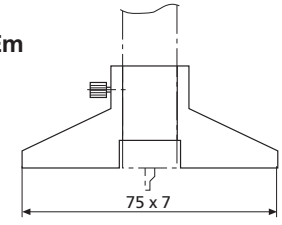


Dimensions mm	a	b	c	d	e
150	10	40	16	233	16 x 3

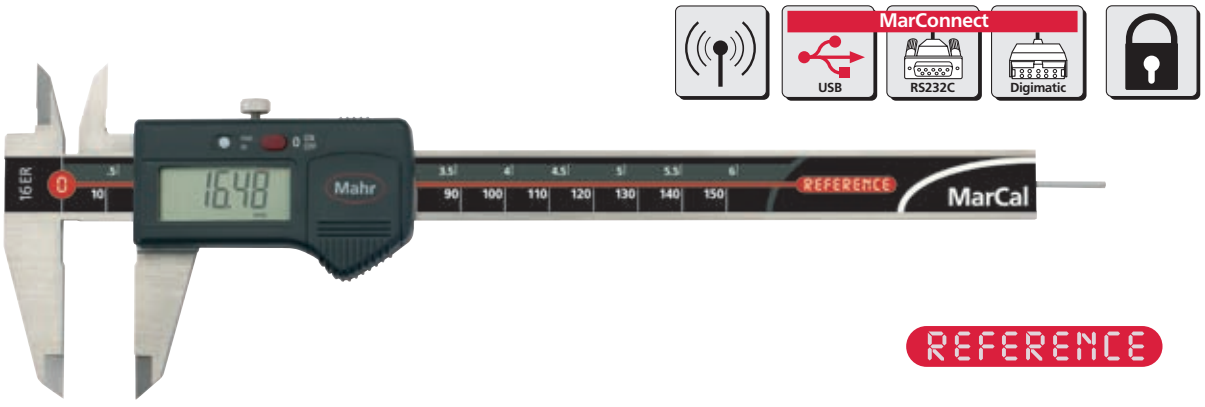
Accessories

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

16 Em



Digital Caliper MarCal 16 ER with data output



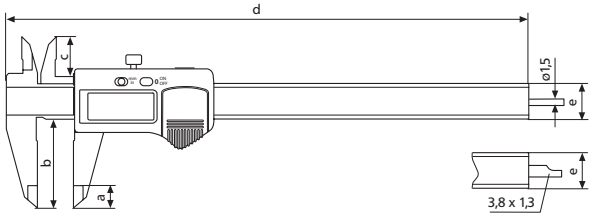
Features

Functions:
ON/OFF
RESET (Set display to zero)
mm/inch
Reference-Lock/Unlock
DATA (Data transmission via connection cable)
Auto-ON/OFF

- Immediate measurement due to the Reference system
- MarConnect data output, choose alternatively: USB, OPTO RS232C or Digimatic
- Dirt wipers are integrated in the slide
- Life of the battery up to 3 years
- Max measuring speed 2.5 m/s (100"/s)
- High contrast Liquid Crystal Display with 8.5 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		Resolution	Error limit *G*		Depth rod		Data output	Order no.
mm	(inch)	mm / inch	mm / inch	DIN 862	Ø1,5		MarConnect	
150	(6")	0.01 / .0005"	0.03 / .001"	●	●		●	**4103002**
150	(6")	0.01 / .0005"	0.03 / .001"	●		●	●	**4103003**
200	(8")	0.01 / .0005"	0.03 / .001"	●		●	●	**4103004**
300	(12")	0.01 / .0005"	0.04 / .0015"				●	**4103005**



Dimensions

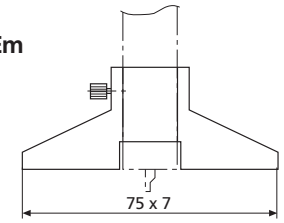
mm	a	b	c	d	e
150	10	40	16	235	16 x 3
200	10	40	16	285	16 x 3
300	14	64	18	388	16 x 4

Accessories

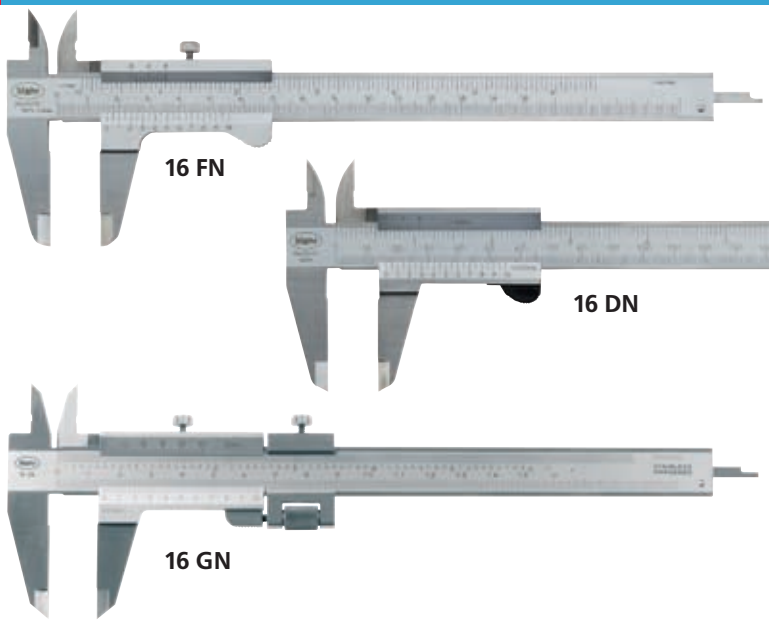
		Order no.
Depth Measuring Bridge	**16 Em**	**4102020**
Battery 3V, Type CR 2032		**4102520**
Data Connection Cable USB (2 m)	**16 EXu**	**4102357**
Data Connection Cable Opto RS232C (2 m), with SUB-D jack 9-pin	**16 EXr**	**4102410**
Data Connection Cable Digimatic (2 m), Flat plug 10-pin	**16 EXd**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

Accessories for Data Processing see Chapter 11

16 Em



Vernier Calipers MarCal 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

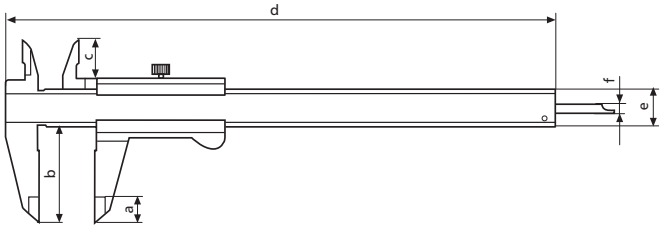
Technical Data

	Measuring range mm	(inch)	Readings upper inch	lower mm	Error limit G mm	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	●	**4100400**		Locking screw above
16 DN	150	(6")	1/128"	0.05	0.05	●	**4100600**		Thumb clamp
16 N	150	(6")	1/128"	0.05	0.05	●	**4100500**		Locking screw below
16 GN	150			0.02	0.04		**4100650**	**4100660***	
16 GN	150	(6")	.001"	0.02	0.04		**4100670**	**4100680***	
16 FN	200			0.05	0.05	●	**4100421**		
16 FN	200	(8")	1/128"	0.05	0.05	●	**4100401**		
16 GN	200			0.02	0.05		**4100651**	**4100661***	
16 GN	200	(8")	.001"	0.02	0.05		**4100671**	**4100681***	Locking screw above
16 FN	300			0.05	0.05	●	**4100422**		
16 FN	300	(12")	1/128"	0.05	0.05	●	**4100402**		
16 GN	300			0.02	0.05		**4100652**	**4100662***	
16 GN	300	(12")	.001"	0.02	0.05		**4100672**	**4100682***	

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

Dimensions

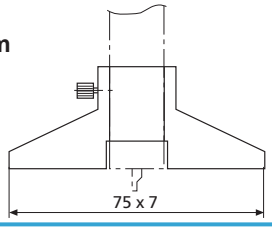
mm	a	b	c	d	e	f
150	10	40	16	228	16 x 3	3.8
200	14	50	19	290	17 x 3.5	3.8
300	16	64	23	404	20 x 4	4.8



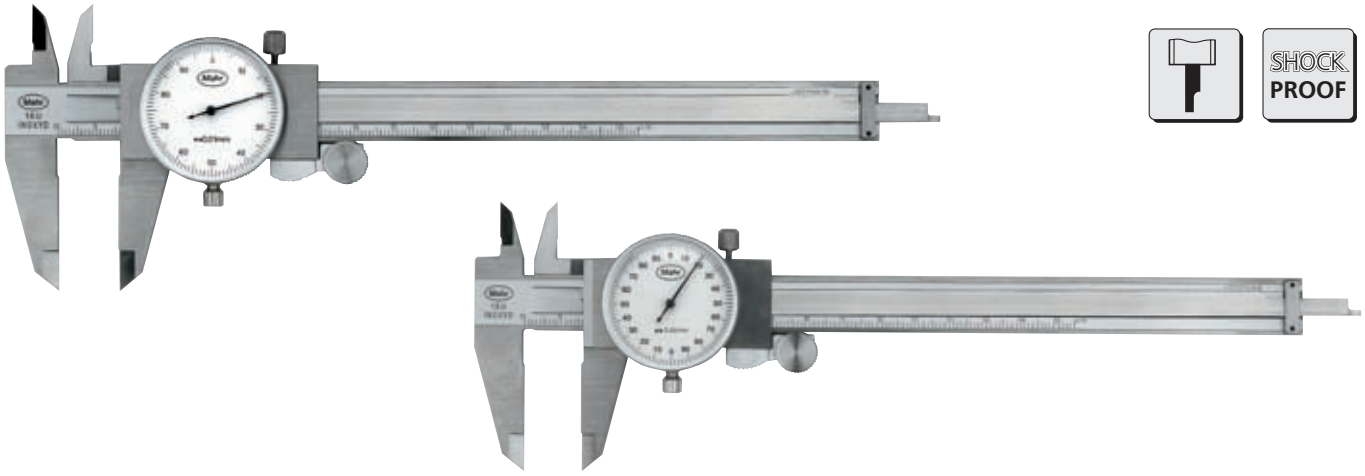
Accessories

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

16 Em



Vernier Caliper MarCal 16 U with circular scale



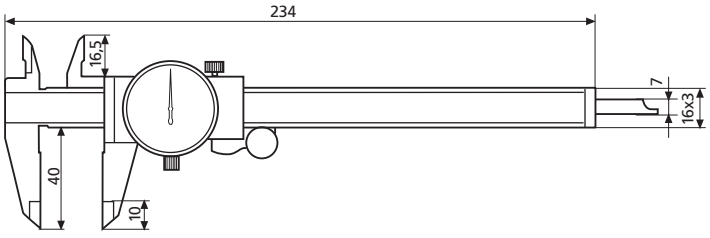
SHOCK PROOF

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

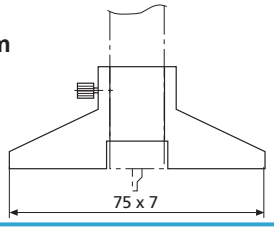
Measuring range	Readings	Diameter of circular scale	1 Pointer revolution	Dial face color	Error limit *G*	DIN 862	Order no.
150 mm	0.01 mm	34 mm	1 mm	white	0.03 mm	●	**4107005**
150 mm	0.02 mm	34 mm	2 mm	white	0.03 mm	●	**4107107**
6″	.001″	1.3″	.100″	black	.0012″		**4107900**



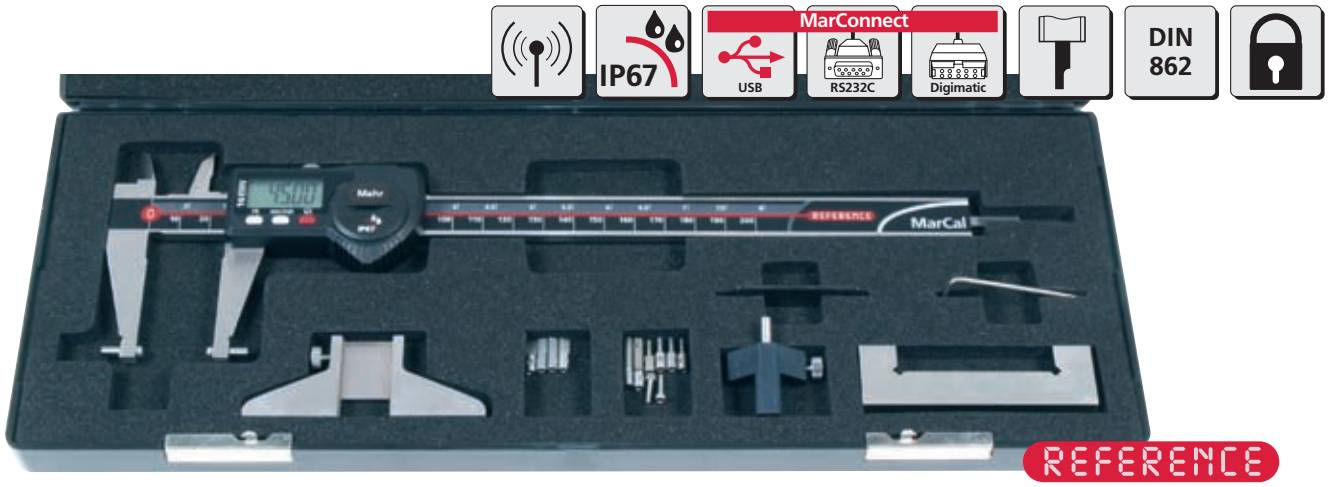
Accessories

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

16 Em



Universal Digital Caliper MarCal 16 EWV in set



Applications

- The 16 EWV can also be used as a standard caliper (4 types of measurement).

  When used in conjunction with the standard accessories; it is possible to measure recesses, grooves, etc.

  In conjunction with the additional accessories; threads, bores, serrations, etc. can be measured.

Features

Functions:
ON/OFF
RESET (Set display to zero)
mm/inch
Reference-Lock/Unlock
PRESET (for entering a numerical value)
DATA (Data transmission via connection cable)
Auto-ON/OFF

- Immediate measurement due to the Reference system
- Excellent resistance against dust, coolants and lubricants, protection class IP67
- MarConnect data output, choose alternatively: USB, OPTO RS232C or Digimatic
- Dirt wipers are integrated in the slide
- Life of the battery up to 3 years
- Max measuring speed 2.5 m/s (100"/s)
- High contrast LCD with 8.5 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

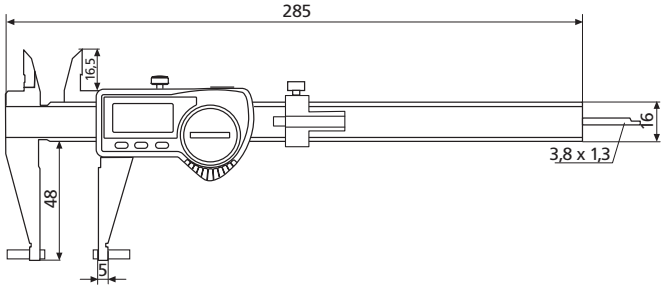
Measuring range* mm	(inch)	Resolution mm / inch	Error limit *G* mm	Order no.
200	(8")	0.01 / .0005"	0.03	**4118807****
200	(8")	0.01 / .0005"	0.03	**4118808*****

** in conjunction with accessories the measuring range may change ** includes standard accessories *** excludes standard accessories*

Accessories

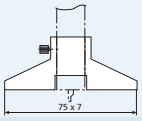
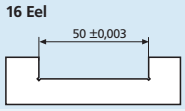
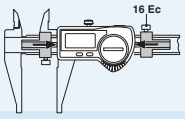
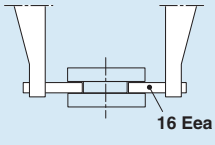
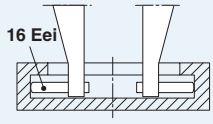
		Order no.
Battery 3V, Type CR 2032		**4102520**
Data Connection Cable USB (2 m)	**16 EXu**	**4102357**
Data Connection Cable Opto RS232C (2 m), with SUB-D jack 9-pin	**16 EXr**	**4102410**
Data Connection Cable Digimatic (2 m), Flat plug 10-pin	**16 EXd**	**4102411**

Accessories for Data Processing see Chapter 11

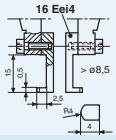
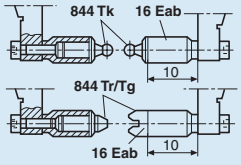


Universal Digital Caliper MarCal 16 EWV in set

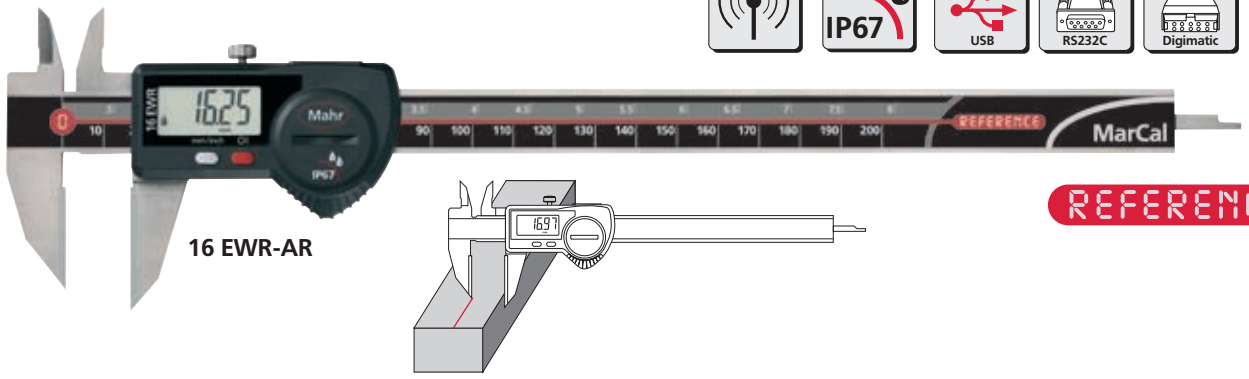
Standard Accessories are included in the set

Catalog no.	Description	Order no.	Required quantity		Remarks
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

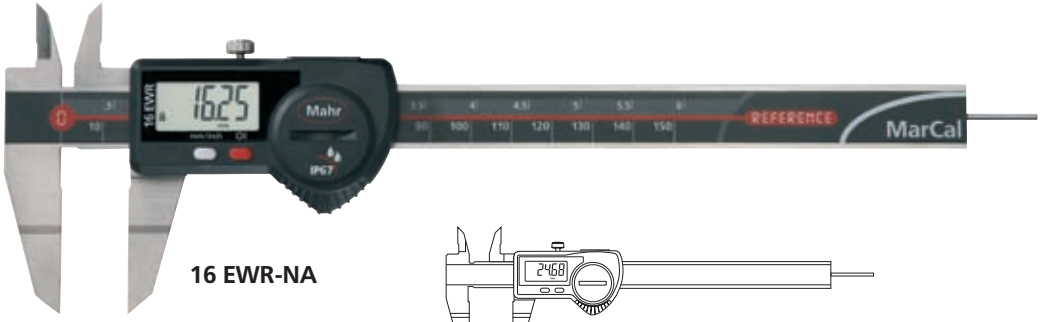
Catalog no.	Description	Order no.	Required quantity		Remarks
16 Eei 4	Anvils for inside measurement	**4118816**	2		from dia. 8.5 mm
16 Eab	Mounting Attachment for 844Tg/Tr and 844 Tk	**4118819**	2		
844 Tk	Ball Anvils		2		**see Page 10-10**
844 Tg/Tr	Thread Anvils		1 + 1		**see Pages 10-12/10-14**

Digital Caliper MarCal 16 EWR special design

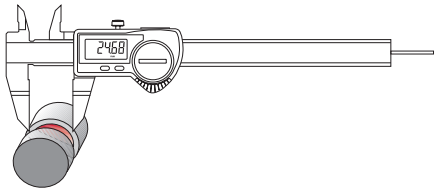


16 EWR-AR

REFERENCE



16 EWR-NA



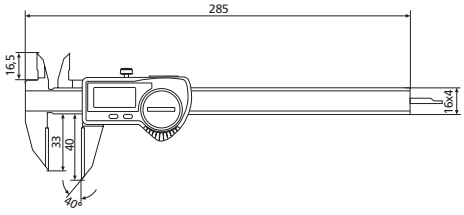
Features

Features are the same as the MarCal 16 EWR, please refer to Page 1-6, additional features can be found in the Technical Data.

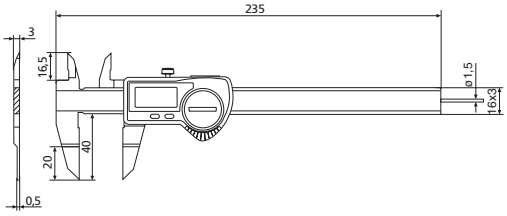
Technical Data

	Measuring range		Resolution	Error limit *G*	Depth rod		Order no.	Type
	mm	(inch)	mm / inch	mm				
16 EWR-AR	200	(8″)	0.01/ .0005″	0.03		●	**4103082**	Scribing/marking caliper
16 EWR-NA	150	(6″)	0.01/ .0005″	0.03	●		**4103074**	Keyseat caliper

16 EWR-AR



16 EWR-NA

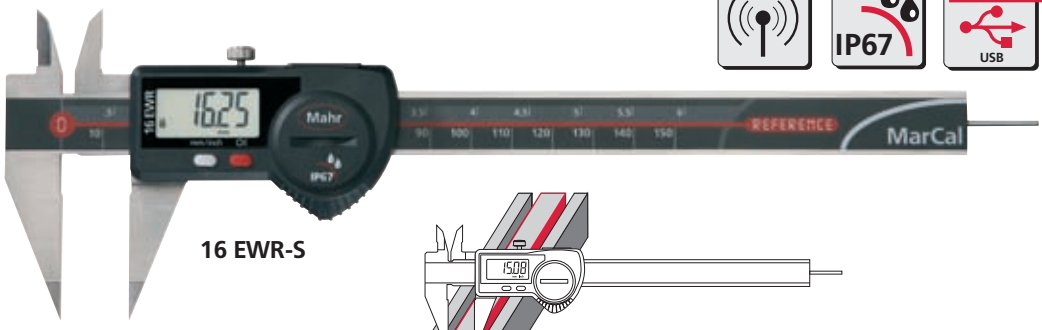


Accessories

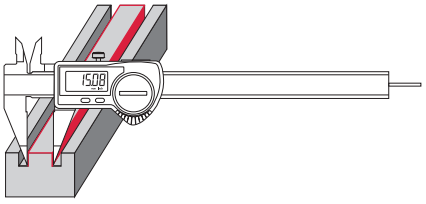
Battery, Data Connection Cables see Page 1 - 6

Accessories for Data Processing see Chapter 11

Digital Caliper MarCal 16 EWR special design



16 EWR-S



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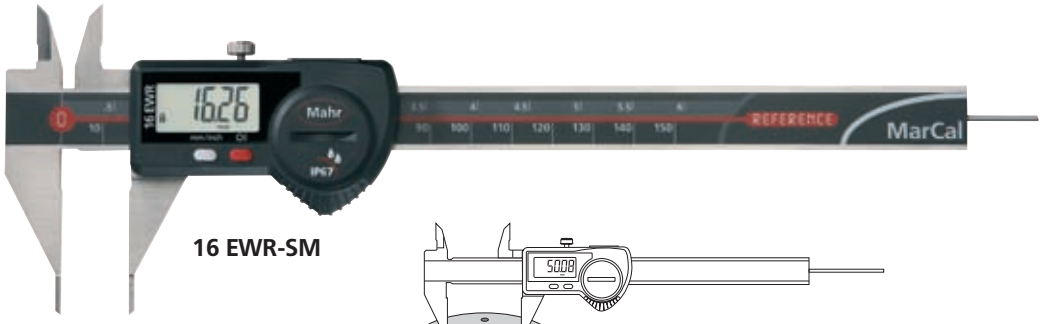
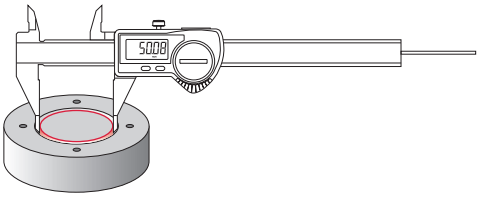


16 EWR-SM



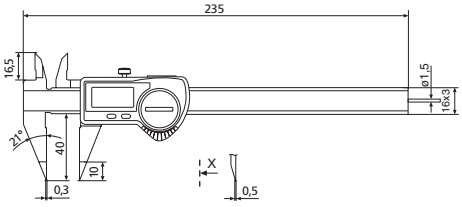
Features

Features are the same as the MarCal 16 EWR, please refer to Page 1-6, additional features can be found in the Technical Data.

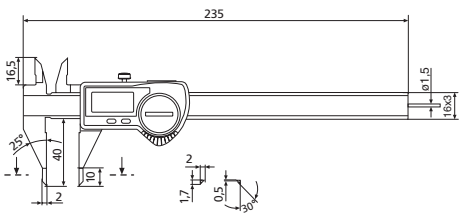
Technical Data

	Measuring range		Resolution	Error limit *G*	Depth rod	Order no.	Type
	mm	(inch)	mm / inch	mm			
16 EWR-S	150	(6")	0.01/ .0005"	0.03	●	**4103075**	Pointed caliper
16 EWR-SM	150	(6")	0.01/ .0005"	0.03	●	**4103076**	Caliper with pointed meas. jaws

16 EWR-S



16 EWR-SM

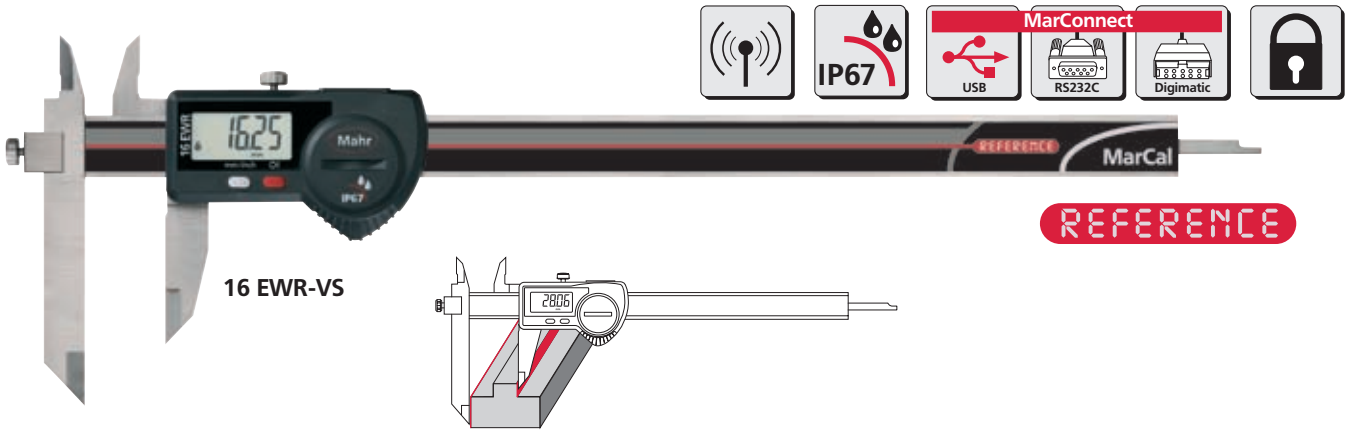


Accessories

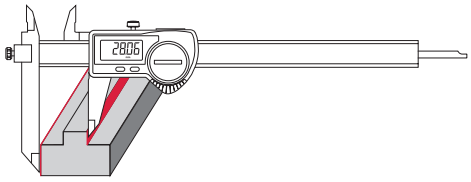
Battery, Data Connection Cables see Page 1 - 6

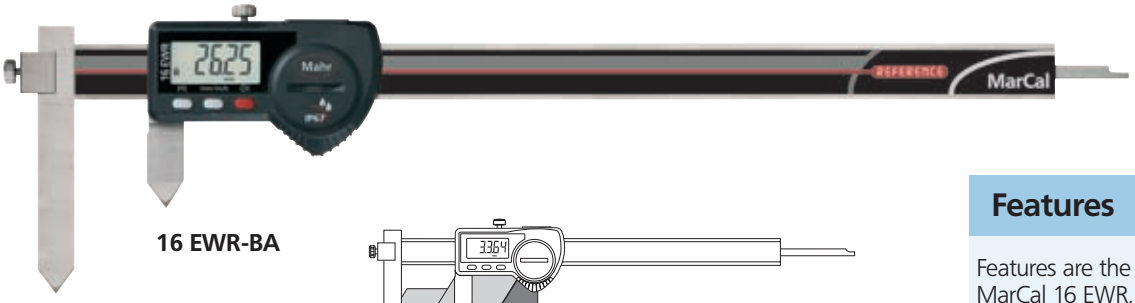
Accessories for Data Processing see Chapter 11

Digital Caliper MarCal 16 EWR special design

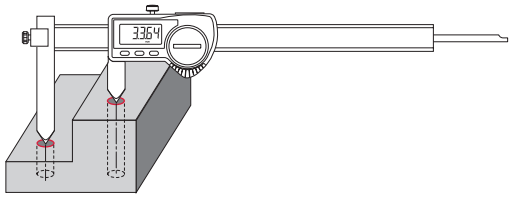


16 EWR-VS





16 EWR-BA



Features

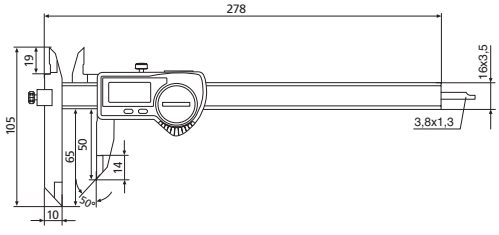
Features are the same as the MarCal 16 EWR, please refer to Page 1-6, additional features can be found in the Technical Data.

Technical Data

	Measuring range mm	(inch)	Resolution mm / inch	Error limit *G* mm	Depth rod	Order no.	Type
16 EWR-VS	0 - 200	(0 - 8")	0.01/ .0005"	0.03	●	**4103083**	Adjustable measuring jaws
16 EWR-BA	10 - 210	(.4 - 8.3")	0.01/ .0005"	0.03	●	**4103084**	Adjustable measuring jaws*

* *to measure the distance between bores*

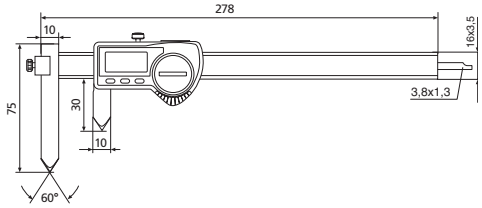
16 EWR-VS



Dimensions

mm	a	b	c	d	e
200	10	40	16	235	16 x 3

16 EWR-BA

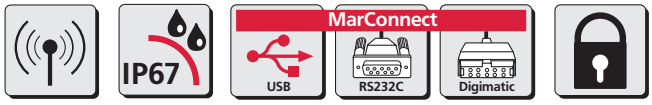


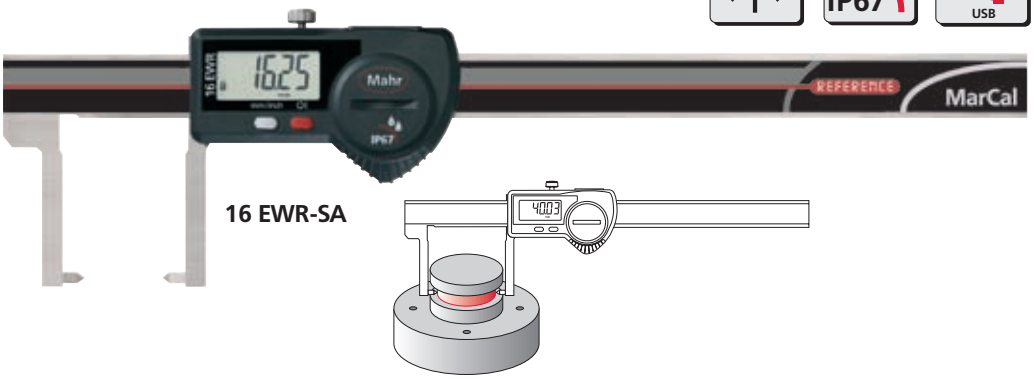
Accessories

Battery, Data Connection Cables see Page 1 - 6

Accessories for Data Processing see Chapter 11

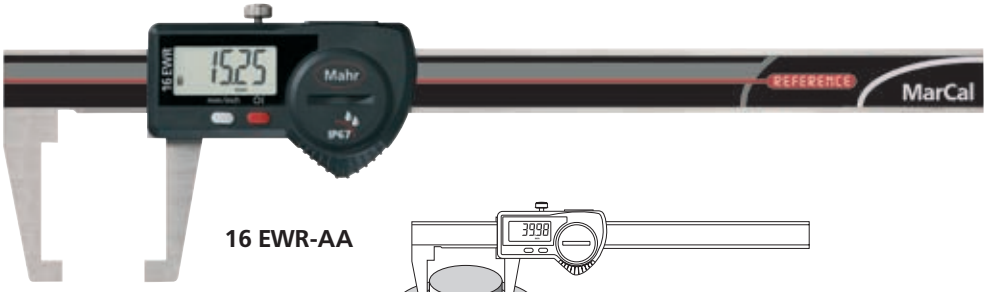
Digital Caliper MarCal 16 EWR special design



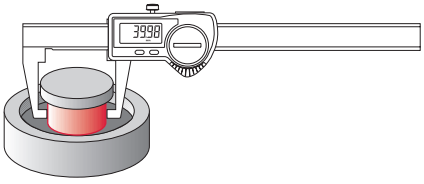


REFERENCE

16 EWR-SA



16 EWR-AA



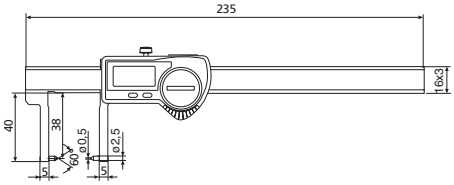
Features

Features are the same as the MarCal 16 EWR, please refer to Page 1-6, additional features can be found in the Technical Data.

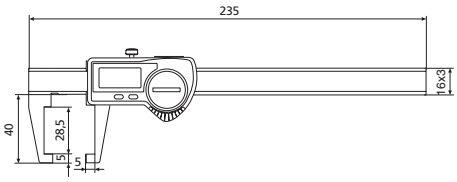
Technical Data

	Measuring range		Resolution	Error limit *G*	Order no.	Type
	mm	(inch)	mm / inch	mm		
16 EWR-SA	150	(6")	0.01/ .0005"	0.03	**4103077**	Inwardly angled anvils
16 EWR-AA	150	(6")	0.01/ .0005"	0.03	**4103079**	Inwardly angled measuring jaws

16 EWR-SA



16 EWR-AA



Dimensions

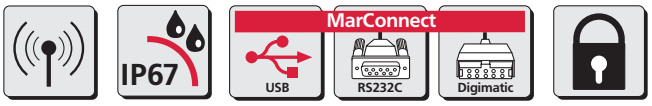
mm	a	b	c	d	e
150	10	40	16	235	16 x 3

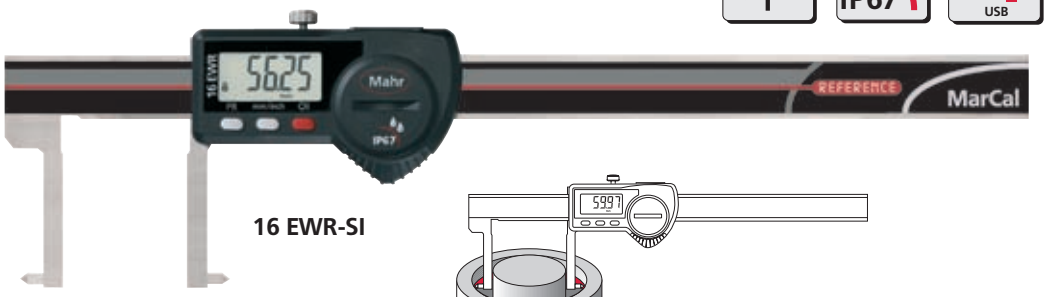
Accessories

Battery, Data Connection Cables see Page 1 - 6

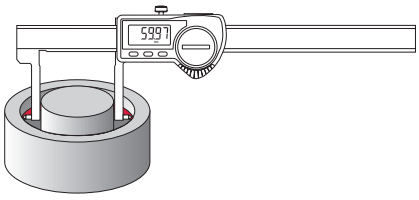
Accessories for Data Processing see Chapter 11

Digital Caliper MarCal 16 EWR special design

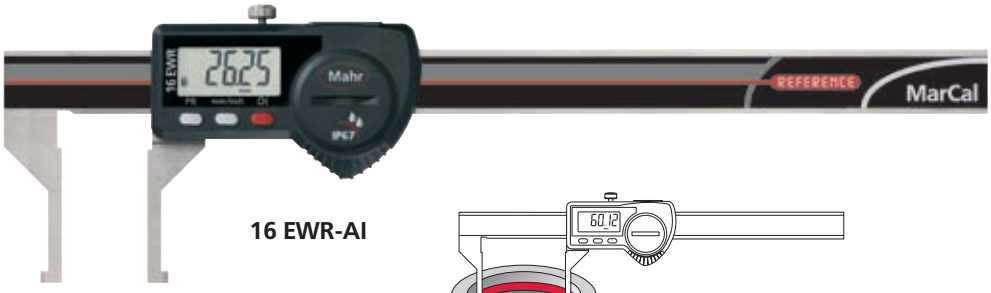




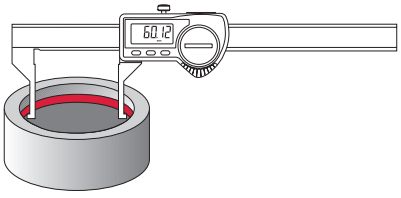
16 EWR-SI



REFERENCE



16 EWR-AI



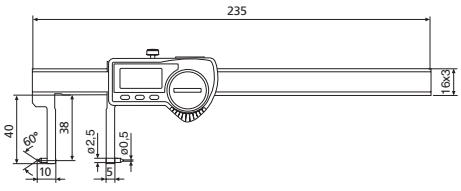
Features

Features are the same as the MarCal 16 EWR, please refer to Page 1-6, additional features can be found in the Technical Data.

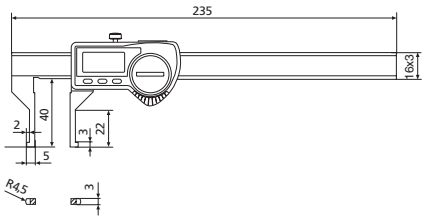
Technical Data

	Measuring range		Resolution	Error limit *G*	Order no.	Type
	mm	(inch)	mm / inch	mm		
16 EWR-SI	20 - 170	(.8 - 6.7")	0.01/ .0005"	0.03	**4103078**	Outwardly angled anvils
16 EWR-AI	10 - 160	(.4 - 6.3")	0.01/ .0005"	0.03	**4103080**	Outwardly angled measuring jaws

16 EWR-SI



16 EWR-AI

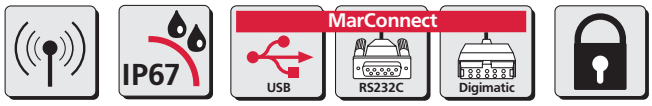


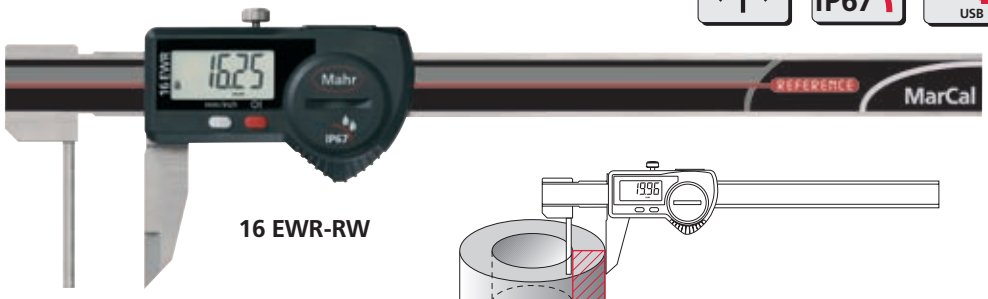
Accessories

Battery, Data Connection Cables see Page 1 - 6

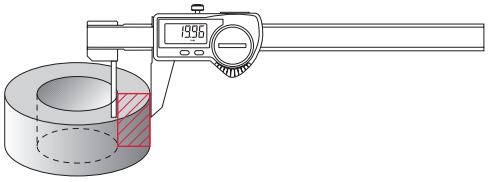
Accessories for Data Processing see Chapter 11

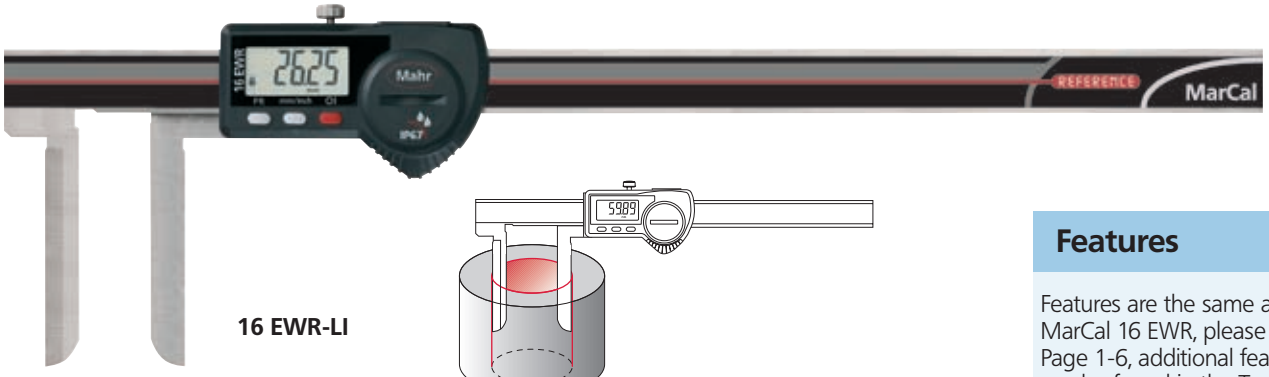
Digital Caliper MarCal 16 EWR special design



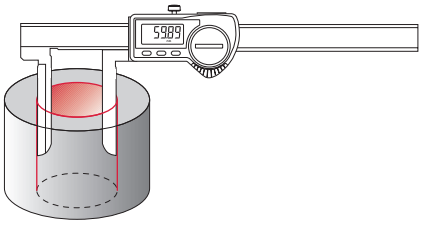


16 EWR-RW





16 EWR-LI



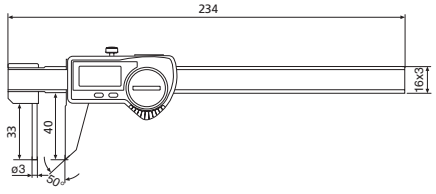
Features

Features are the same as the MarCal 16 EWR, please refer to Page 1-6, additional features can be found in the Technical Data.

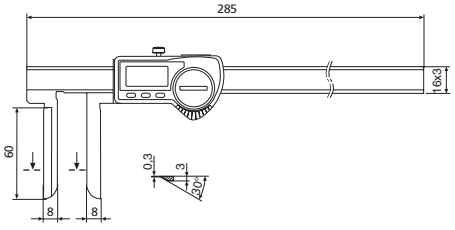
Technical Data

	Measuring range		Resolution	Error limit *G*	Order no.	Type
	mm	(inch)	mm / inch	mm		
16 EWR-RW	0 - 150	(0 - 6")	0.01/ .0005"	0.05	**4103081**	Wall thickness measuring caliper
16 EWR-LI	10 -200	(.4 - 8")	0.01/ .0005"	0.05	**4103085**	with long narrow measuring jaws

16 EWR-RW



16 EWR-LI



Accessories

Battery, Data Connection Cables see Page 1 - 6

Accessories for Data Processing see Chapter 11

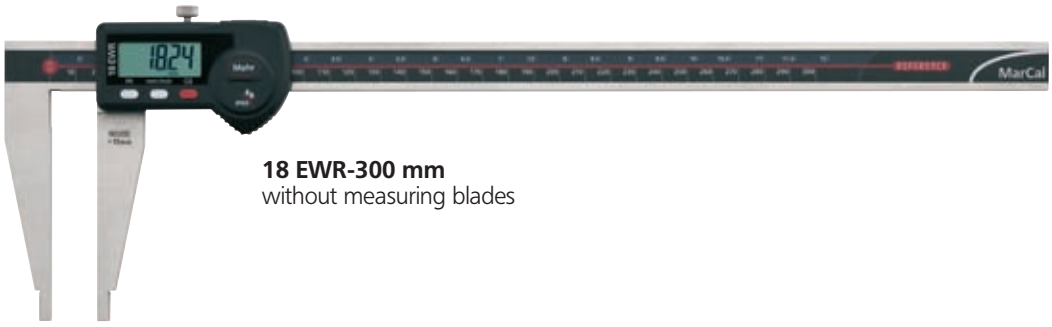
Digital Caliper MarCal 18 EWR

REFERENCE

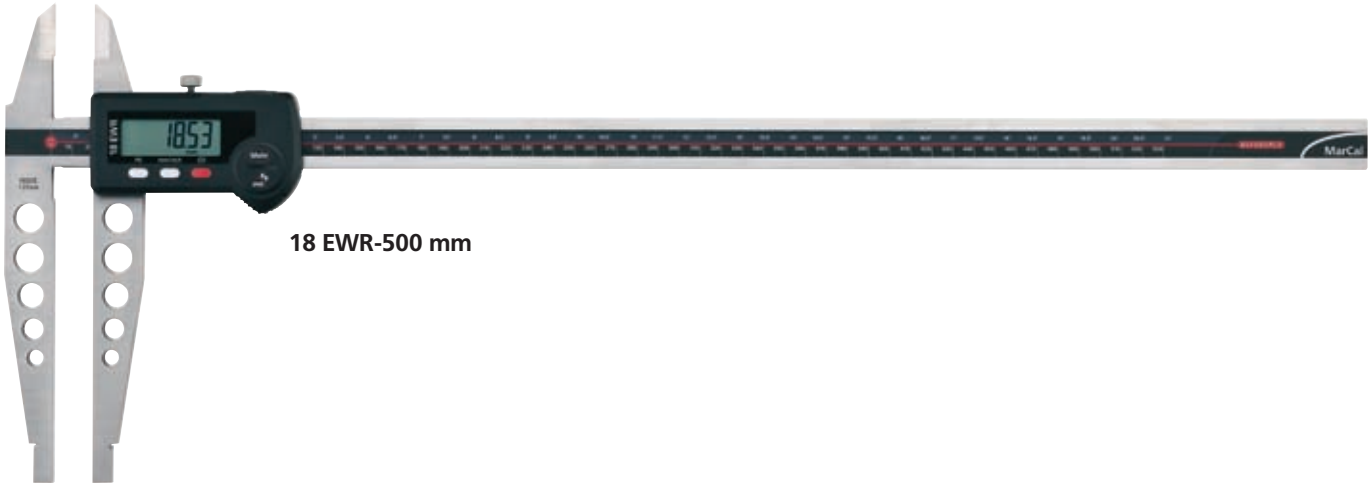
IP65

MarConnect
USB RS232C Digimatic

18 EWR-300 mm



18 EWR-300 mm
without measuring blades



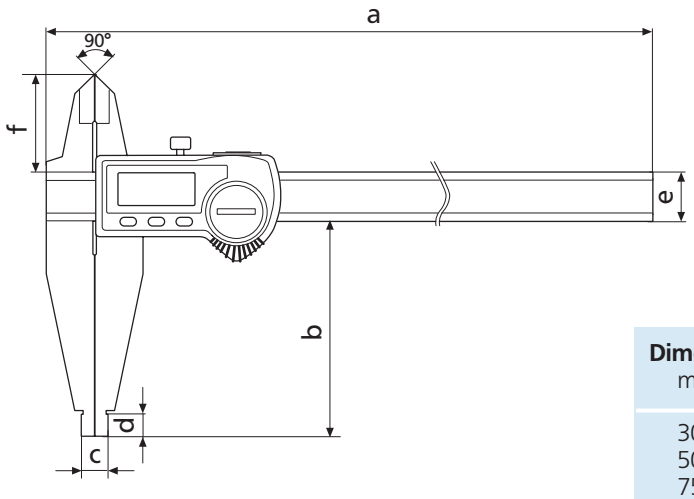
18 EWR-500 mm

Features

Functions:
ON/OFF
RESET (Set display to zero)
mm/inch
Reference-Lock/Unlock
PRESET (for entering a numerical value)
DATA (Data transmission via connection cable)
Auto-ON/OFF

- Immediate measurement due to the Reference system
- Excellent resistance against dust, coolants and lubricants, protection class IP65
- MarConnect data output, choose alternatively: USB, OPTO RS232C or Digimatic
- Dirt wipers are integrated in the slide
- Life of the battery up to 3 years
- Max measuring speed 2.5 m/s (100"/s)
- High contrast LCD with 10 mm (only 300 mm) and 12.5 mm high digits
- Slide and beam made of hardened stainless steel
- Rounded measuring blades for inside measurement
- Locking screw
- Supplied with: Case, battery, operating instructions

Digital Caliper MarCal 18 EWR with measuring blades for outside measurement



Dimensions

mm	a	b	c	d	e	f
300	410	90	10	10	20 x 4.5	40
500	650	150	20	20	25 x 5.5	55
750	905	150	20	20	25 x 5.5	55
1000	1165	150	20	20	30 x 6.5	60

Technical Data

Measuring range mm	(inch)	Resolution mm / inch	Error limit *G* mm	Weight kg	Order no. with measuring blades	Weight kg	Order no. without measuring blades
300	(12")	0.01 / .0005"	0.03	0.45	**4112704**	0.44	**4112705**
500	(20")	0.01 / .0005"	0.04	1.10	**4112712**	1.00	**4112713**
750	(30")	0.01 / .0005"	0.05	1.35	**4112714**	1.28	**4112715**
1000	(40")	0.01 / .0005"	0.06	2.20	**4112716**	2.10	**4112717**

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

Digital Caliper MarCal 18 ESA lightweight construction

Features

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

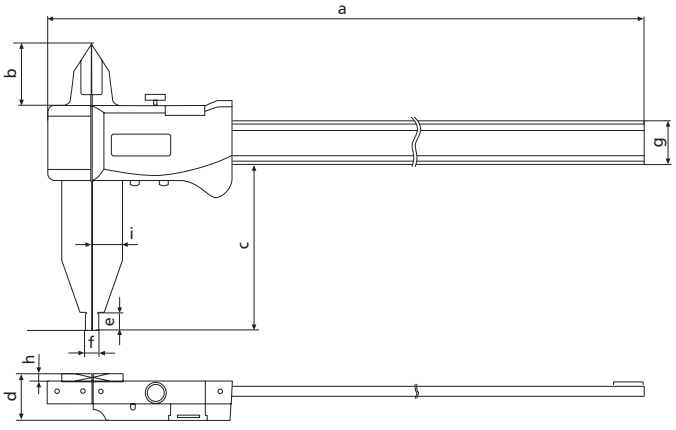
- Dirt wipers are integrated in the slide
- Max measuring speed 1.5 m/sec (60"/sec)
- Data output: Opto RS232C (only 300 mm version)
- High contrast Liquid Crystal Display with 6 mm or 10.5 mm high digits
- To reduce the overall weight the slide and beam are made from aluminum and are coated with a hard 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		Resolution	Error limit *G*	RS232C	Weight	Order no.
mm	(inch)	mm / inch	mm / inch		kg	
300	(12")	0.01 / .0005"	0.03 / .001"	•	0.50	**4112620**
500	(20")	0.01 / .0005"	0.03 / .001"	–	1.40	**4112621**
800	(32")	0.01 / .0005"	0.07 / .0025"	–	1.60	**4112622**
1000	(40")	0.01 / .0005"	0.08 / .0032"	–	1.80	**4112623**

Dimensions

mm	a	b	c	d	e	f	g	h	i
300	450	33	90	24.5	10	10	25	4.5	17
500	726	42	150	33.5	15	20	31.9	6	29
800	1026	42	150	33.5	15	20	31.9	6	29
1000	1226	42	150	33.5	15	20	31.9	6	29



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

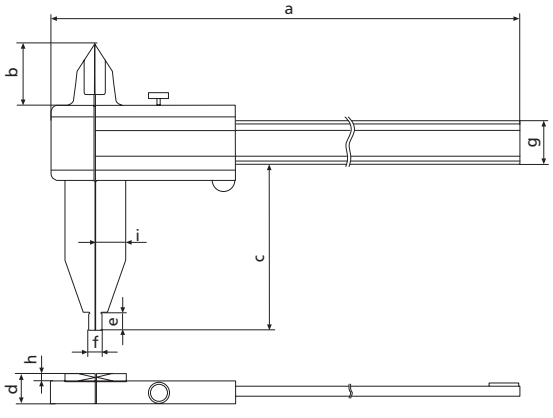
Caliper MarCal 18 NA lightweight construction

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	Readings upper	Readings lower	Error limit *G*	Weight	Order no.
mm	mm	mm	mm	kg	
300	0.02	0.02	0.03	0.50	**4112300**
500	0.02	0.02	0.03	1.40	**4112301**
1000	0.02	0.02	0.08	1.75	**4112303**
800	0.02	0.02	0.07	1.60	**4112302**
1500	0.05	0.05	0.16	2.10	**4112304**
2000	0.05	0.05	0.16	2.50	**4112305**



Dimensions

mm	a	b	c	d	e	f	g	h	i
300	450	33	90	17.5	10	10	25	4.5	17
500	726	42	150	20.7	15	20	31.9	6	29
800	1026	42	150	20.7	15	20	31.9	6	29
1000	1226	42	150	20.7	15	20	31.9	6	29
1500	1760	85	200	25	15	30	48.1	6	40
2000	2260	85	200	25	15	30	48.1	6	40

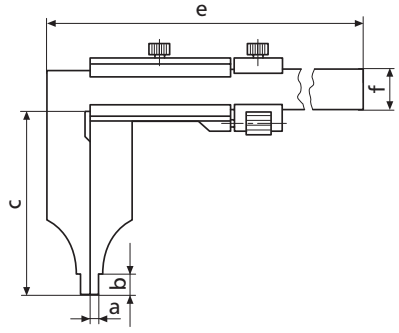
Vernier Caliper MarCal 18 N

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

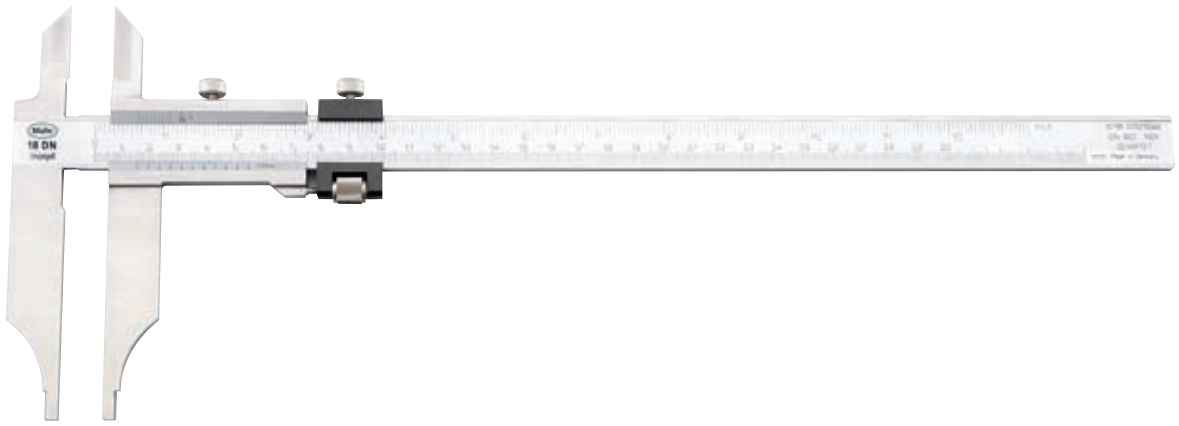
Technical Data

Measuring range mm	(inch)	Resolution upper	lower	Error limit *G* mm	DIN 862	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		a	b	c	e	f
18 N	200 mm	5	10	80	310	20 x 5
	300 mm	5	10	90	410	20 x 5
	500 mm	10	19	150	675	25 x 6
	800 mm	10	19	150	985	30 x 7
	1000 mm	10	19	150	1185	30 x 7
	1500 mm	15	19	200	1760	40 x 8
	2000 mm	15	19	200	2270	45 x 10

Vernier Caliper MarCal 18 DN with measuring blades for outside measurement

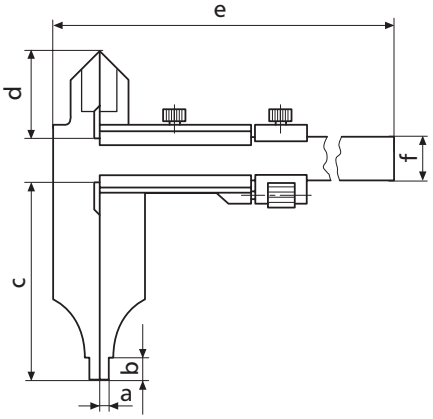


Features

- 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

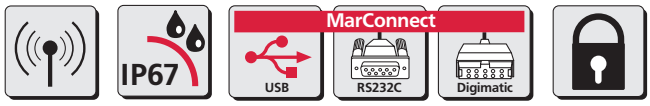
Technical Data

Measuring range mm	Resolution upper	Resolution lower	Error limit *G* mm	DIN 862	Order no. without fine adjustment	Order no. with fine adjustment
200	0.05 mm	0.05 mm	0.05	●	**4113200**	
200	0.02 mm	0.02 mm	0.05			**4113300**
300	0.05 mm	0.05 mm	0.05	●	**4113201**	
300	0.02 mm	0.02 mm	0.05			**4113301**
500	0.05 mm	0.05 mm	0.07	●	**4113202**	
500	0.02 mm	0.02 mm	0.06			**4113302**
800	0.05 mm	0.05 mm	0.10	●	**4113203**	
800	0.02 mm	0.02 mm	0.08			**4113303**
1000	0.05 mm	0.05 mm	0.12	●	**4113204**	
1000	0.02 mm	0.02 mm	0.08			**4113304**
1500	0.05 mm	0.05 mm	0.18	●	**4113205**	
2000	0.05 mm	0.05 mm	0.22	●	**4113206**	



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 MarCal 30 EWR according to protection class IP67



REFERENCE

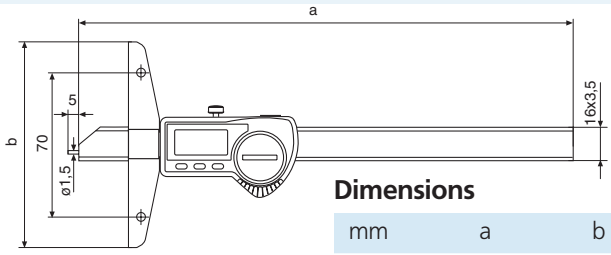
Merkmale

Functions:
ON/OFF
RESET (Set display to zero)
mm/inch
PRESET (enter a numerical value)
Reference-Lock/Unlock
DATA (Data transmission via connection cable)
Auto-ON/OFF

- Immediate measurement due to the Reference system
- Excellent resistance against dust, coolants and lubricants, protection class IP67
- MarConnect data output, choose alternatively: USB, OPTO RS232C or Digimatic
- Dirt wipers are integrated in the slide
- Life of the battery up to 3 years
- Max measuring speed 2.5 m/s (100"/s)
- High contrast LCD with 8.5 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

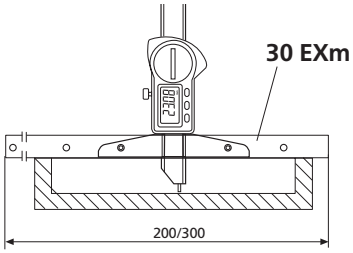
Measuring range mm	(inch)	Resolution mm / inch	Error limit G mm	Order no.
150	(6")	0.01 / .0005"	0.03	**4126700**
300	(12")	0.01 / .0005"	0.04	**4126701**
500	(20")	0.01 / .0005"	0.05	**4126702**



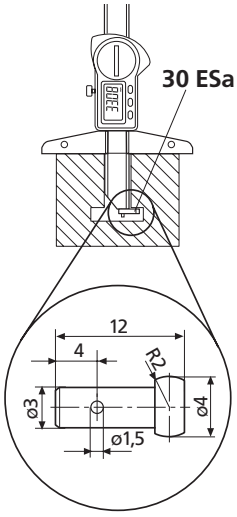
Dimensions

mm	a	b
150	234	100
300	384	150
500	584	150

Depth measurement



Distance measurement



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 to be fixed to the measuring pin	**30 ESa**	**4125611**

Accessories for Data Processing see Chapter 11

Digital Depth Gage MarCal 30 ER

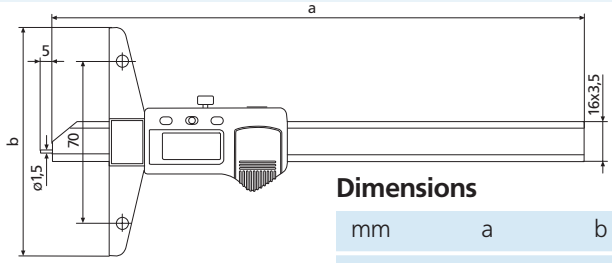
Features

Functions:
ON/OFF
RESET (Set display to zero)
mm/inch
PRESET (enter a numerical value)
Reference-Lock/Unlock
DATA (Data transmission via connection cable)
Auto-ON/OFF

- Immediate measurement due to the Reference system
- MarConnect data output, choose alternatively: USB, OPTO RS232C or Digimatic
- Dirt wipers are integrated in the slide
- Life of the battery up to 3 years
- Max measuring speed 2.5 m/s (100"/s)
- High contrast LCD with 8.5 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

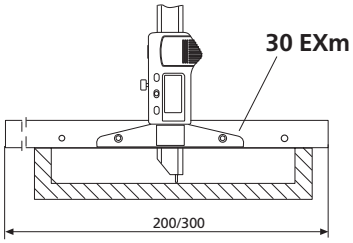
Measuring range mm	(inch)	Resolution mm / inch	Error limit *G* mm	Order no.
150	(6")	0.01 / .0005"	0.03	**4126514**
300	(12")	0.01 / .0005"	0.04	**4126515**
500	(20")	0.01 / .0005"	0.05	**4126516**



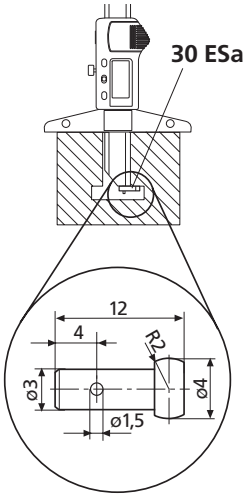
Dimensions

mm	a	b
150	234	100
300	384	150
500	584	150

Depth measurement



Distance measurement



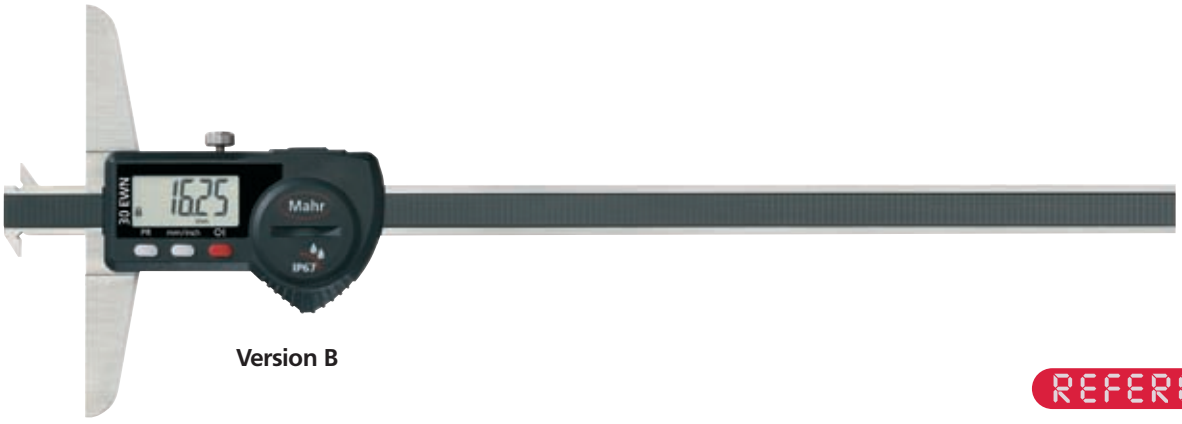
Accessories

		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 to be fixed to the measuring pin	**30 ESa**	**4125611**

Accessories for Data Processing see Chapter 11

Digital Depth Gage MarCal 30 EWN

Version A



Version B

Applications

- Ideal for measuring the width of grooves and distances between grooves

Features

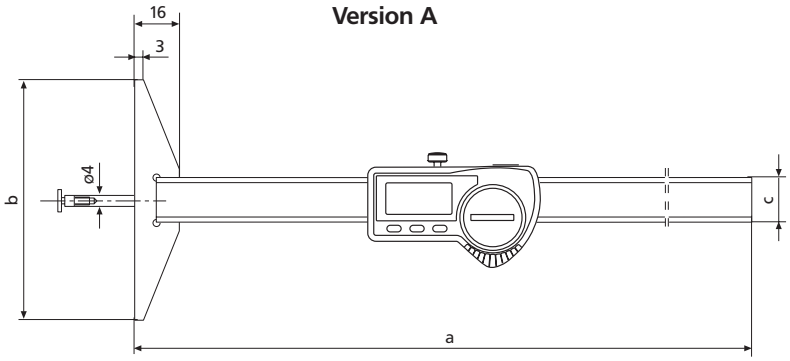
Functions:
ON/OFF
RESET (Set display to zero)
mm/inch
PRESET (enter a numerical value)
Reference-Lock/Unlock
DATA (Data transmission via connection cable)
Auto-ON/OFF

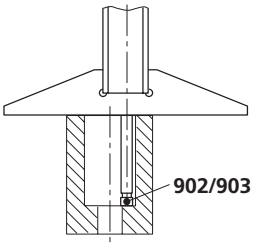
- Immediate measurement due to the Reference system
- Excellent resistance against dust, coolants and lubricants, protection class IP67
- MarConnect data output, choose alternatively: USB, OPTO RS232C or Digimatic
- Dirt wipers are integrated in the slide
- Life of the battery up to 3 years
- Max measuring speed 2.5 m/s (100"/s)
- High contrast LCD with 8.5 mm high digits
- Beam and cross beam are made of hardened stainless steel
- Locking screw
- Supplied with: Case, battery, operating instructions. Version A: Anvils 30 ENt (1 mm), 902 and 903

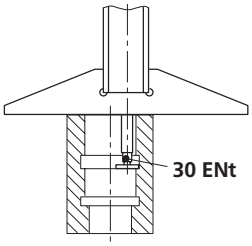
Technical Data

Measuring range		Length of cross beam	Resolution	Error limit *G*	Version	Order no.
mm	(inch)	mm	mm / inch	mm		
100	(4")	85	0.01 / .0005"	0.03	A	**4126512**
200	(8")	100	0.01 / .0005"	0.03	B	**4126517**
300	(12")	150	0.01 / .0005"	0.03	B	**4126518**

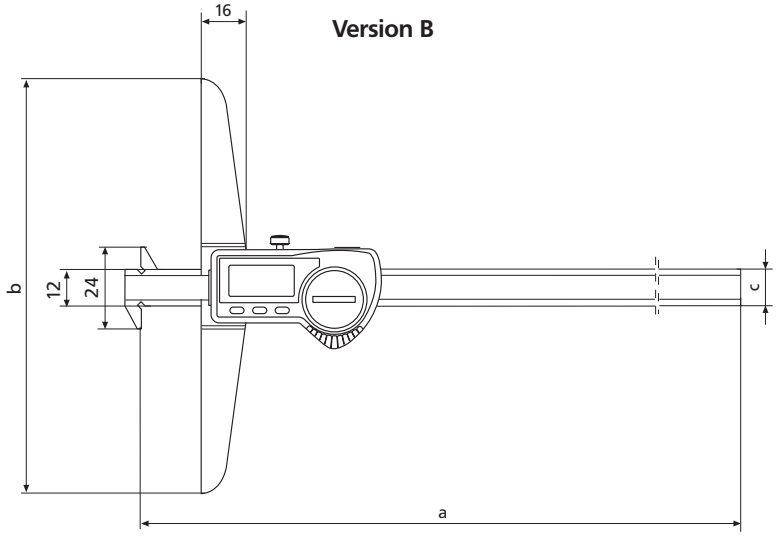
Version A

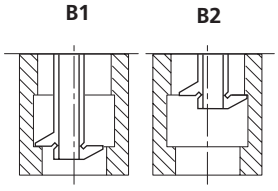






Version B





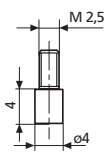
Diimensions mm	a	b	c
100	268	85 x 8.5	16 x 3
200	281	100 x 8.7	11.5 x 3.6
300	381	150 x 8.7	11.5 x 3.6

Accessories

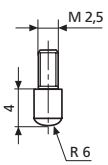
		Order no.
Battery 3V, Type CR 2032		**4102520**
Data Connection Cable USB (2 m)	**16 EXu**	**4102357**
Data Connection Cable Opto RS232C (2 m), with SUB-D jack 9-pin	**16 EXr**	**4102410**
Data Connection Cable Digimatic (2 m), Flat plug 10-pin	**16 EXd**	**4102411**
Disc Type Anvil 0.5 mm thick, hardened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

Accessories for Data Processing see Chapter 11

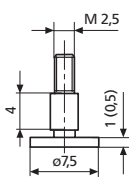
903



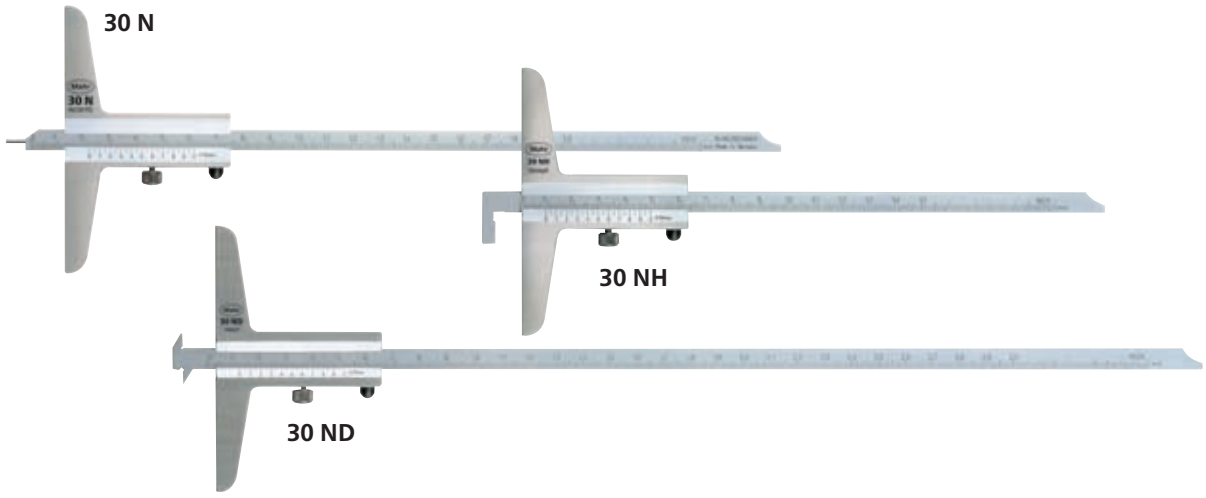
902



30 ENt



Depth Gages MarCal 30 N / 30 NH / 30 ND



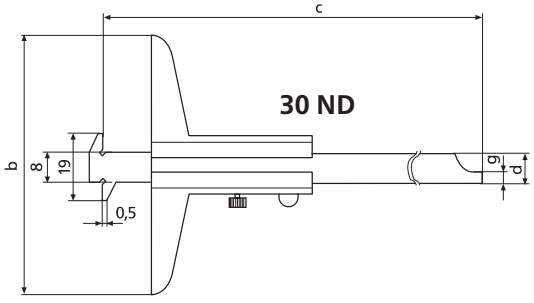
DIN 862

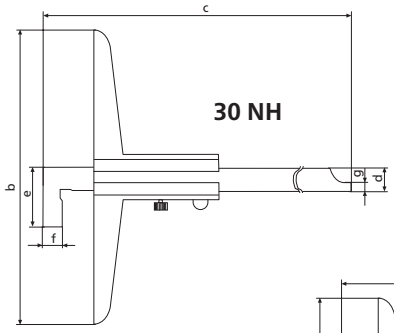
Features

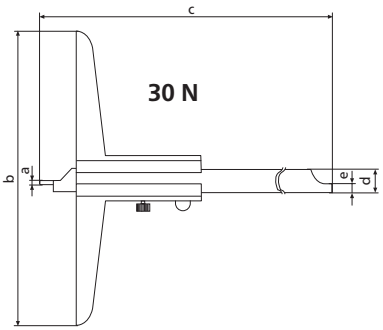
- Vernier and main scale have a satin chrome finish for glare free reading
- Slide, beam and cross beam are made of hardened stainless steel
- Raised guide ways for the protection of the scale
- Locking screw
- Supplied with: Case

Technical Data

Measuring range mm	Vernier scale mm	Error limit *G* mm	Order no. 30 N with hardened measuring pin	Order no. 30 NH with hook	Order no. 30 ND with double sided hook
80	0.05	0.05	**4127200**		
150	0.05	0.05	**4127300**	**4127350**	
200	0.05	0.05	**4127301**	**4127351**	**4127410**
300	0.05	0.05	**4127201**	**4127352**	**4127411**
500	0.05	0.07	**4127202**	**4127353**	







Dimensions

mm	dia. a	b	c	d	e	f	g
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 Gage MarCal 31 EW

Application

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

Features

Functions:
ON/OFF
RESET (Set display to zero)
mm/inch
Reference-Lock/Unlock
PRESET (for entering a numerical value)
DATA (Data transmission via connection cable)
Auto-ON/OFF

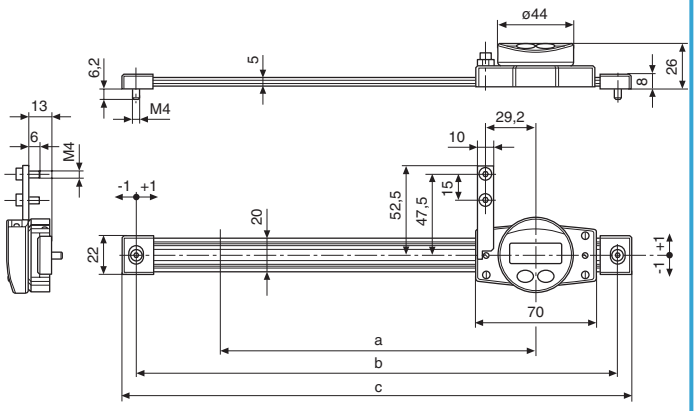
- Immediate measurement due to the Reference system
- Excellent resistance against dust, coolants and lubricants, protection class IP54
- MarConnect data output, choose alternatively:
  USB
  OPTO RS232C
- Dirt wipers are integrated in the slide
- Max measuring speed 2.5 m/s (100"/s)
- High contrast LCD
- Supplied with:
  Battery,
  operating instructions

Technical Data

Measuring range mm	(inch)	Resolution mm / inch	Error limit *G* µm	Order no.
150	(6")	0,01 / .0005"	30	**4104100**
200	(8")	0,01 / .0005"	30	**4104101**
300	(12")	0,01 / .0005"	40	**4104102**
600	(24")	0,01 / .0005"	50	**4104103**

Dimensions

mm	a	b	c
150	185	282	398
200	235	332	348
300	335	432	448
600	665	762	778



Accessories

		Order no.
Battery 3V, Type CR 2032		**4102520**
Data Connection Cable USB	800 EWu	**4305121**
Data Connection Cable Opto RS232	800 EWr	**4305122**

Accessories for Data Processing see Chapter 11

DO YOU WANT TO AIM EVEN HIGHER?
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 a complete range of products 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 816 CL 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

Overview
Digimar Height Measuring Instruments 2- 2

Motorized Height Measuring Instruments

Digimar 817 CLM Quick Height 2- 4
High-End Height Measuring Instrument with 2D and Statistics function

Digimar 816 CL 2- 8
Height Measuring Instrument for the workshop and test labs

Accessories for 817 CLM and 816 CL 2-10

Manual Height Measuring Instruments

Digimar M 814 N 2-16
With Cast Iron Base

Digimar M 814 G 2-17
With Granite Table Plate

Accessories for Digimar M 814 2-18

Height Measuring and Scribing Instrument

Digimar 814 SR 2-19

Digimar. Height Measuring Instruments

OVERVIEW

	Digimar 817 CLM „Quick Height“		
Catalog page	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
Temperature compensation	●	●	●
Air bearings	●	●	●
Integrated USB memory	●	●	●
Data interface	RS232	RS232	RS232
USB printer interface	●	●	●
Order no.	**4429010**	**4429011**	**4429012**

* *At 20°C in conjunction with a base plate in accordance to DIN 876/0 and a standard probe K6/51*

	Digimar 816 CL		Digimar M 814 N		Digimar M 814 G		Digimar 814 SR	
	2-8	2-8	2-16	2-16	2-17	2-17	2-19	2-19
	0-350 / 0-14"	0-600 / 0-24"	0-320 / 0-12"	0-620 / 0-24"	0-320 / 0-12"	0-620 / 0-24"	0-350 / 0-14"	0-600 / 0-24"
	520 / 20.47"	770 / 30.31"	320 / 12.6"	620 / 24.4"	320 / 12.6"	620 / 24.4"	350 / 14"	600 / 24"
	2.8+L/300 (L in mm)		20	30	20	30	40	50
	●	●	●	●	●	●	●	●
	●	●						
			●	●	●	●	●	●
	●	●	●	●	●	●		
	●	●	●	●	●	●		
			●	●	●	●		
	1	1						
	●	●						
	●	●						
	USB / RS232	USB / RS232	Opto RS232		Opto RS232		USB / RS232 / Digimatic	
	4429030	**4429031**	**4426540**	**4426542**	**4426541**	**4426543**	**4426100**	**4426101**

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 options and excellent operator comfort. |◄

The best solution for all measuring tasks

QUICK MODE

Fast measurement per hand
Easy to operate due to the „Quick Mode“; an innovative solution from Mahr (patented).

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.

Measurement using the keypad (speed keys) on the base

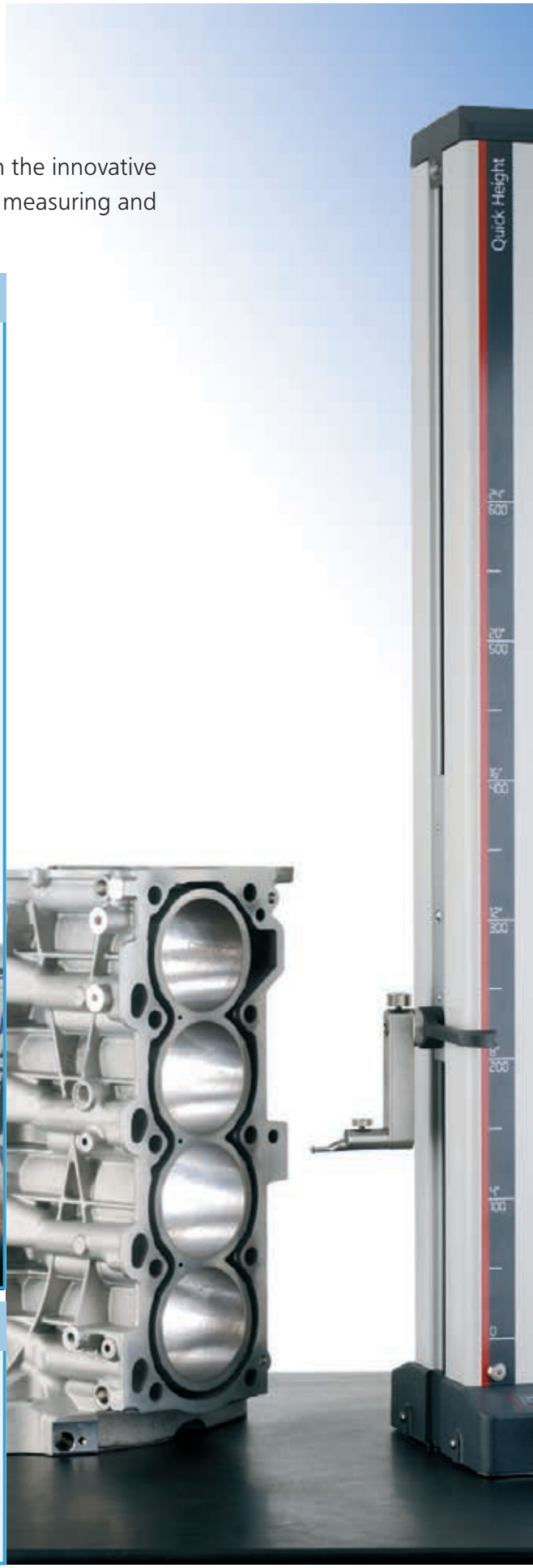
Ideal in conjunction with the air bearings for large work pieces.

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.

Highest accuracy and reliability

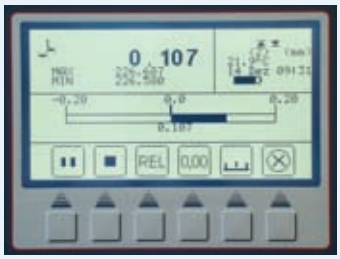
- Extremely accurate incremental measuring system with double reader head system, insensitive to the contamination of dirt
- Robust guide column, made from stainless steel
- Measuring head in precision ball bearings guide
- Temperature compensation with an integrated temperature sensor

20°C



Ergonomic operating and display unit

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



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

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

Universal measurement possibilities

- Wide range of measurement functions in 1D or 2D
- 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) or on a USB dongle
- Broad range of statistical evaluations are available

Height Measuring Instrument Digimar 817 CLM

See our brochure at
WebCode 12369

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
- Motorised 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 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 or on a USB dongle
- USB interface to connect a compatible USB printer
- Additional measuring instruments with Opto RS232-interface can be connected
- Secure the future due to software update potential
- Automatic Stand-by switch mode
- 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 817 eb,
  Operating instructions,
  Mains power adapter,
  USB cable

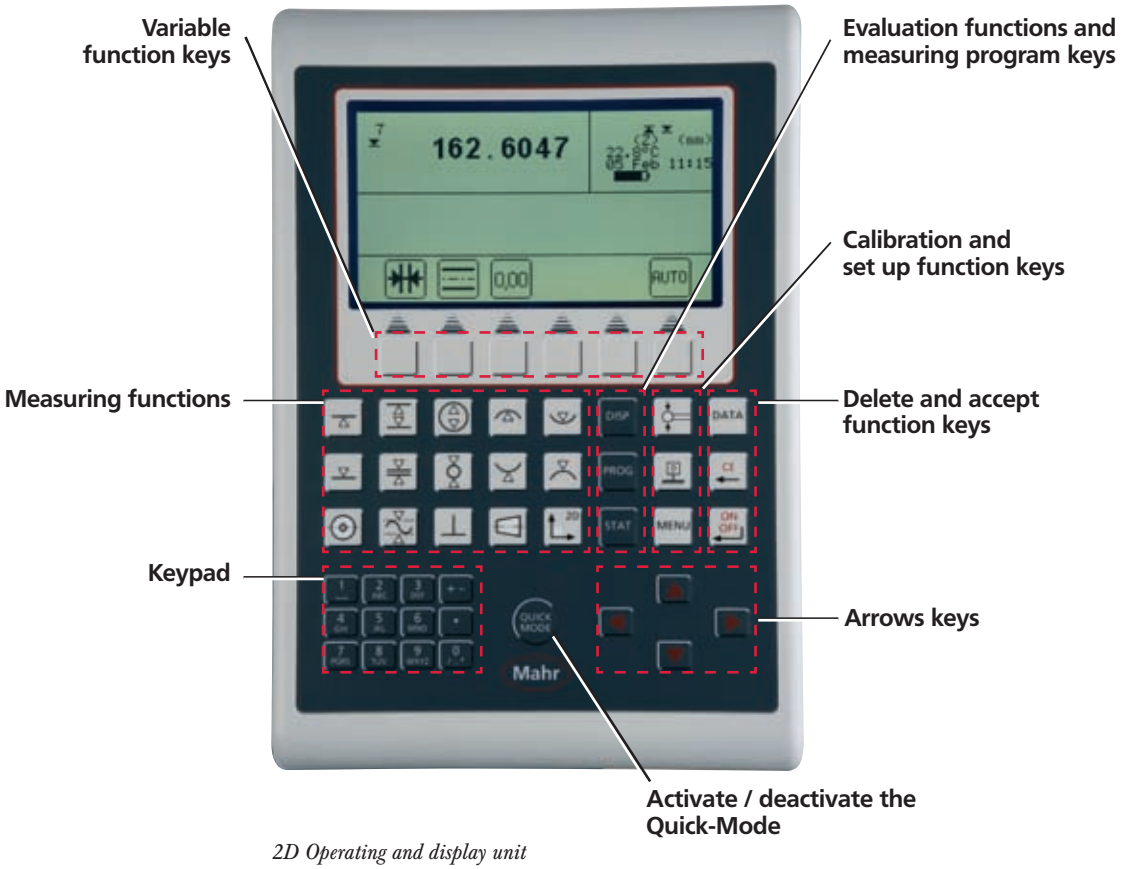
Technical Data

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	.001" / .0005" / .0001" / .00005" / .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 12		
Measuring force	N	1.0 ± 0.2		
Permissible relative air humidity	%	65 (non condensed)		
Working temperature	°C / °F	20 ± 1 / 68 ± 1.8		
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.		**4429010**	**4429011**	**4429012**

* *At 20°C in conjunction with a base plate in accordance to DIN 876/0 and a standard probe K6/51*

Height Measuring Instrument Digimar 817 CLM

Operating and display unit



2D Operating and display unit

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

Digimar 816 CL

►I The new Height Measuring Instrument **Digimar** 816 CL.
You want to obtain highly accurate measurement results without any complicated procedures? With the Digimar 816 CL you have the perfect partner for simple and accurate measurements both in the workshop or on the production line, just as you expect from Mahr! I◄

User-friendly operation. . .

. . .due to the

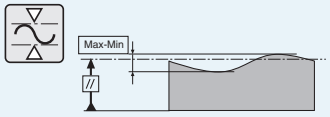
- Clearly displayed measured values
- Self-explanatory operator guidance

The operating and display unit has a background illuminated display.

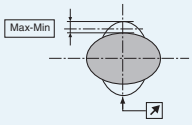
Versatile

The Height Measuring Instrument Digimar 816 CL offers numerous practical measuring and evaluation functions:

- Convenient standard measuring functions
- Dynamic measuring functions



Parallel deviation



Roundness deviation

- Wide range of options for data evaluation

Precise measuring results. . .

. . . on the production line

- Robust design
- Measuring results independent of the user
- Reliable results even outside of the inspection room

Probe contact with the motorized measuring carriage.

- Temperature compensation with an integrated temperature sensor

The measuring program. . .

. . . is essential for repetitive part measurement

- Repetitive measuring procedures can easily be automated
- Simply create a measuring program with the Teach-In-mode
- Complex procedures can be started by just pressing one key

Height Measuring Instrument Digimar 816 CL

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
- Temperature compensation with an integrated temperature sensor
- Probe constant remains after the instrument is switched off
- Integrated rechargeable battery with a long operating time for mains independent measurement

Operating and display unit
- Easy to read background lit graphic LCD display
- Large and clearly defined function keys
- Operator guidance with self-explanatory icons / pictograms
- Possible to set additional zero points on a work piece
- Memory can store up to 99 measured values
- MarConnect data output, select either:
  - USB
  - OPTO RS232C

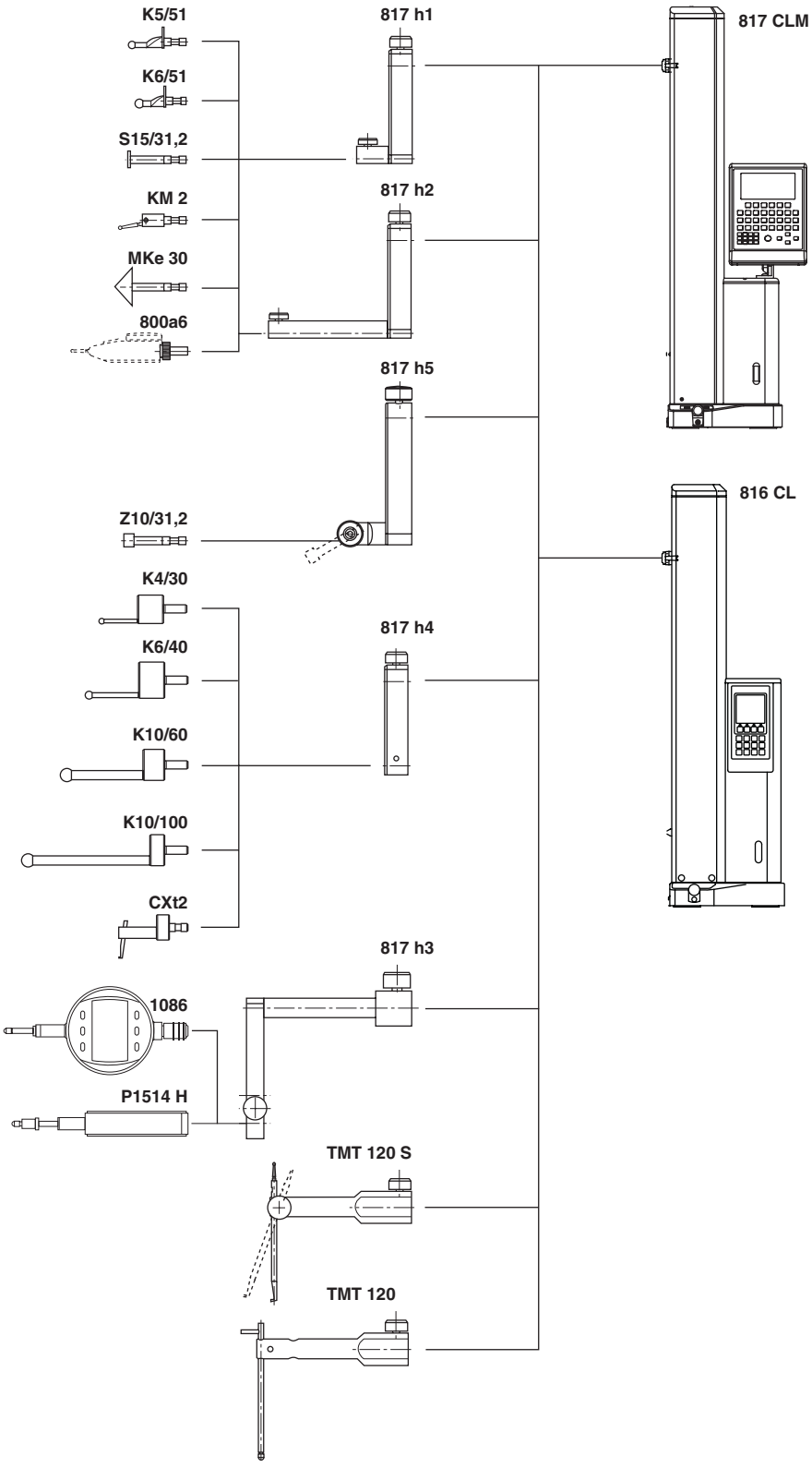
- Supplied with:
  Height Measuring Instrument incl. operating and display unit,
  Carrier 817h1,
  Probe K6/51,
  Setting block 817 eb,
  Operating instructions,
  Mains power adapter

Technical Data

Measuring range	mm / inch	350 / 14"	600 / 24"
Range of application	mm / inch	540 / 21.26"	770 / 30.31"
Resolution	mm (inch)	0.01 / 0.001 (.0001" / .00005")	
Measuring error*	µm	(2.8+L/300), L in mm	
Repeatability	µm	2 (plane) 3 (bore)	
Perpendicularity error (mech.)	µm	frontal ≤15	frontal ≤20
Operating time of rechargeable battery	h	up to 14	
Measuring force	N	1.0 ± 0.2	
Permissible relative air humidity	%	65 (non condensed)	
Working temperature	°C / °F	20 ±1 / 68 ±1.8	
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"
Base area (L x W)	mm / inch	240 x 250 / 9.45" x 9.84"	
Weight	kg / lbs	25 / 55.15	30 / 66.14
Order no.		**4429030**	**4429031**

** 20°C with surface base plate according to DIN 876/0 and standard probe K6/51*

Overview of carriers and probes for Digimar 817 CLM / 816 CL



Height Measuring Instruments Digimar 817 CLM / 816 CL

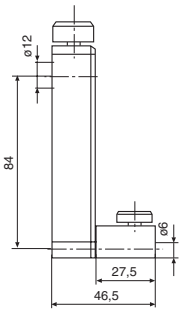
Accessories

Carrier for probes with mount dia. 6 mm

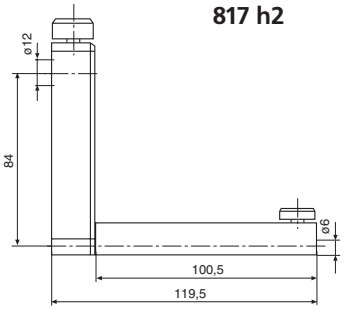
Catalog no.	Description	Shaft length mm	Order no.
817 h1	Carrier for a probe	27.5	**4429154***
817 h2	Carrier for a probe	100	**4429219**
817 h5	Carrier with a joint for a probe	35	**4429454**

** Supplied with standard accessories*

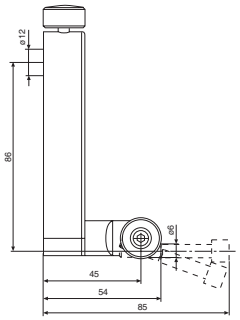
817 h1



817 h2



817 h5



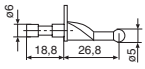
rotatable

Probes with mount dia. 6 mm

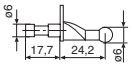
Catalog no.	Description	Order no.
K5/51	Spherical probe	**4429158**
K6/51	Spherical probe	**4429254***
S15/31,2	Disc probe	**4429226**
Z10/31,2	Cylindrical probe	**4429227**
MKe 30	Taper probe	**4429228**
KM 2	Probe M2 incl. styli 800 ts, dia. 2 mm	**4429256**
800 a6	Mounting shaft 800 a6 for MarTest	**4301865**

** Supplied with standard accessories*

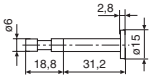
K 5/51



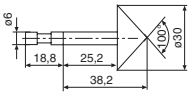
K 6/51



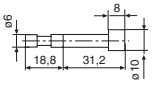
S 15/31,2



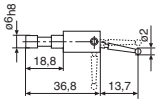
MKe 30



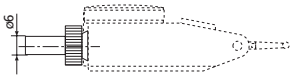
Z 10/31,2



KM 2



800 a6



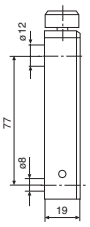
Height Measuring Instruments Digimar 817 CLM / 816 CL

Accessories

Carrier for probes with mount dia. 8 mm

Catalog no.	Description	Order no.
817 h4	Carrier for probes	**4429220**

817 h4

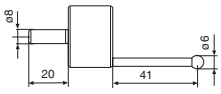


Probes with mount dia. 8 mm

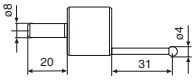
Catalog no.	**Ball** dia. D mm	Order no.
K4/30	4	**7023813**
K6/40	6	**7023816**
K10/60	10	**7023810**
K10/100	10	**7023615**

Universal probe CXt2 see page 2-14

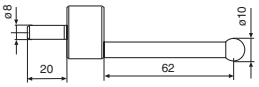
K 6/40



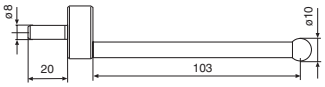
K 4/30



K 10/60



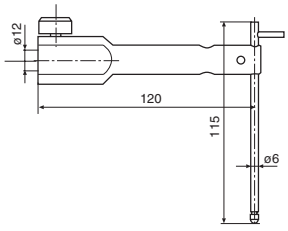
K 10/100



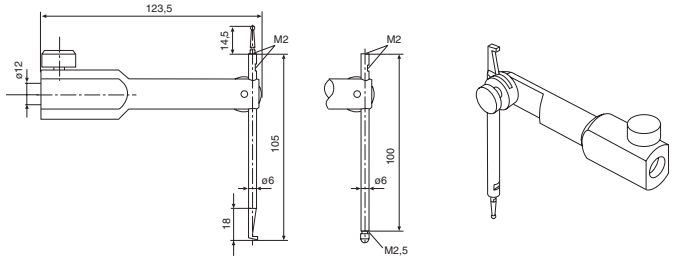
Depth probes

Catalog no.	Description	Order no.
TMT 120	Depth probe incl. carrier	**4429221**
TMT 120 S	2 depth probes incl. carrier (rotatable)	**4429421**

TMT 120



TMT 120 S



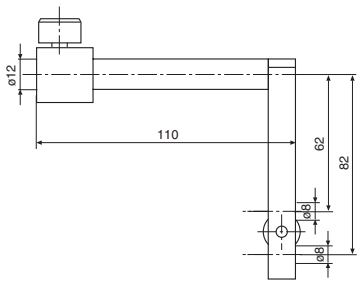
Height Measuring Instruments Digimar 817 CLM / 816 CL

Accessories for checking perpendicularity

Carrier for probes

Catalog no.	Description	Order no.
817 h3	Carrier for transducers	**4429206**

817 h3

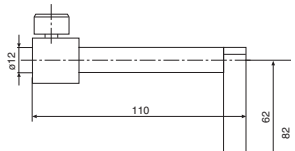


Transducers for checking perpendicularity

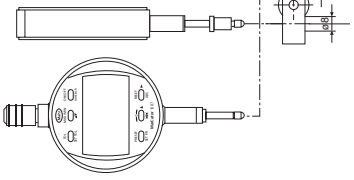
Catalog no.	Description	Order no.
P1514 H	Incremental probe, 12 mm incl. cable	**4426810***
1086 R	Digital indicator, 12.5 mm Resolution 0.001 / .00005"	**4337120**
16 EXr	Data cable for digital indicator 1086 R	**4102410***

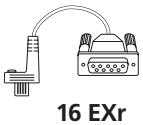
** Only for Digimar 817 CLM*

817 h3



P1514 H





16 EXr

1086 R

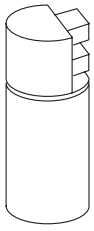
Accessories

Setting blocks

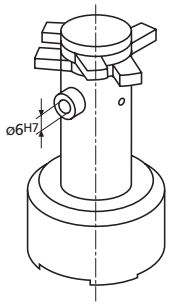
Catalog no.	Description	Order no.
817 eb	Setting block	**4419168***
EB I	Setting block for a taper probe, includes a calibration certificate	**7023827**

** Supplied with standard accessories*

817 eb



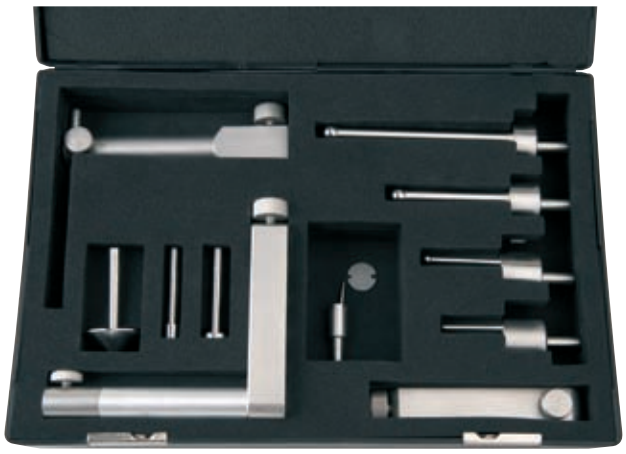
EB I



Height Measuring Instruments Digimar 817 CLM / 816 CL

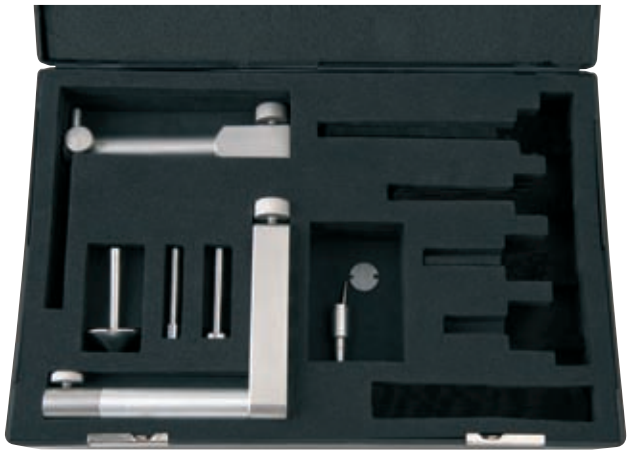
Accessory sets for probes

Probe set 817 ts1 consists of:		**4429019**
	Carrying case for accessories	**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	Depth probe incl. carrier	**4429221**
KM 2	Probe 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**



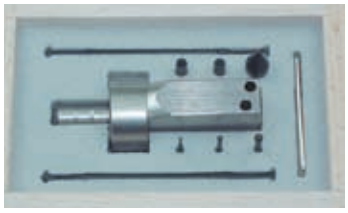
817 ts1

Probe set 817 ts2 consists of:		**4429018**
	Carrying case for accessories	**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	Depth probe incl. carrier	**4429221**
KM 2	Probe for MarTest styli M2	**4429256**

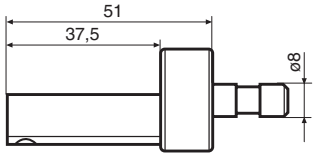


817 ts2

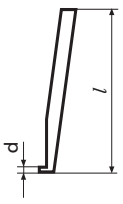
Universal probe set CXt2 consists of:			**7034000**
Case			**3015925**
Probe carrier			**3015917**
	Dimension	**Shaft length**	
Measuring crook	d = 0.5 mm	*l* = 78 mm	**3015918**
Probe pin /tip:	dia. d = 1.2 mm	*l* = 75 mm	**3015919**
		ls = 15.5 mm	
Taper probe	dia. d = 0–7.5 mm		**3015920**
Spherical 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**



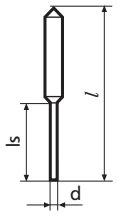
Probe carrier



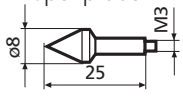
Measuring crook



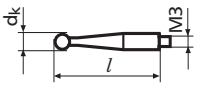
Pin probe



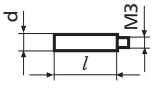
Taper probe



Spherical probe



Extension



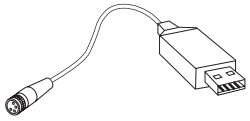
Height Measuring Instruments Digimar 817 CLM / 816 CL

Accessories for data transmission for 816 CL

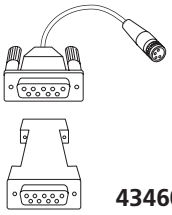
Data connection cable

		Order no.
Data connection cable incl. MarCom Standard, USB (2 m)	**2000 usb**	**4346023**
Data connection cable Opto RS232C (2 m), with SUB-D jack 9-pin	**2000 r**	**4346020**

Accessories for Data Processing see Chapter 11



4346023



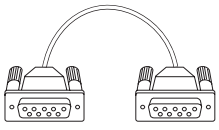
4346020

Accessories for data transmission for 817 CLM

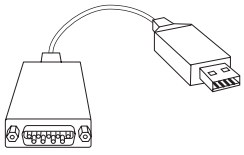
Data connection cable

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

Accessories for Data Processing see Chapter 11



7024634



4102333

Statistics printer MSP 2 for 816 CL and 817 CLM

- Can be connected via a RS232C interface
- Two-line display for a simple dialog mode
- 3 types of print protocols: statistics, statistics with a histogram and sample charts
- Retrieve at any time from the memory a list of measured values
- Individual values can be selected and deleted as required.
- Alternative power sources include: mains adapter (100 - 240 V), batteries or NIMH-accumulator, type AA
- Languages can be selected, German, English and French

- Supplied with:
  Mains adapter, paper rolls

	Order no.
MSP2 Statistics printer	**4102040**

Printer for 817 CLM

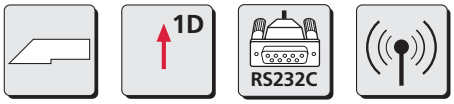
HP Ink jet printer

- Standard connectivity: USB - compatible with USB 2.0 specifications
- Compatible operating systems: Microsoft® Windows® 98 SE, Me, 2000, XP, 7
- Standard printer languages HP PCL 3

Similar to illustration

	Order no.
HP Ink jet printer	**4429015**

Height Measuring and Scribing Instrument Digimar 814 N Standard version



Applications

Ideal for measuring:
- Heights
- Center distances between bores and surfaces, widths of ledges, plus marking and scribing of workpieces

Features

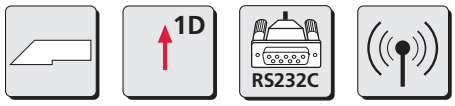
With extra rugged, cast iron base with three-point support. To be used on base plates, machine beds and work piece surfaces. Conversion to a 814 G version is quick and easy at any time.

- High accuracy
- Incremental inductive measuring system
- Measuring head with an ball bush guide
- Resistance free measuring system
- Large, easy to read digital display
- Measuring and display unit are incorporated in the measuring head
- Easy to operate due to the hand crank on the side of the measuring head
- 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

Measuring range	mm / inch	320 / 12.6"		620 / 24.4"
Resolution	mm (inch)		0.01 / 0.001 (.0005" / .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 ±1.8	
Operating temperature	°C / °F		5 . . . 40 / 41 . . .104	
Measuring system			inductive	
Total height	mm / inch	513 / 20.20"		813 / 32.01"
Cast iron base (L x W)	mm / inch	205 x 175 / 8.07" x 6.89"		205 x 175 / 8.07" x 6.89"
Weight	kg / lbs	6.2 / 13.22		10.5 / 23.15
Order no.		**4426540**		**4426542**

Height Measuring and Scribing Instrument Digimar 814 G Base plate version



Applications

Ideal for measuring:
- Heights
- Center distances between bores and surfaces, widths of ledges, plus marking and scribing of workpieces

Features

Table plate is made of fine grained black granite (greenstone) which is extremely hard and stable.
Conversion to a 814 N version is quick and easy at any time.

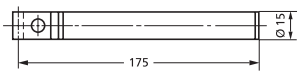
- High accuracy
- Incremental inductive measuring system
- Measuring head with an ball bush guide
- Resistance free measuring system
- Large, easy to read digital display
- Measuring and display unit are incorporated in the measuring head
- Easy to operate due to the hand crank on the side of the measuring head
- 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

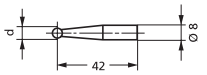
Measuring range	mm / inch	320 / 12.6"		620 / 24.4"
Resolution	mm (inch)		0.01 / 0.001 (.0005" / .00005")	
Measuring error	µm	20 / 0.0008"		30 / 0.0012"
Repeatability	µm		5 / 0.0002"	
Perpendicularity error	µm	frontal 20 (300 mm)		frontal 30 (600 mm)
Operating time of the battery	h		2000	
Measuring force	N		ca. 3	
Working temperature	°C / °F		20 ±1 / 68 ±1.8	
Operating temperature	°C / °F		5 . . . 40 / 41 . . .104	
Measuring system			inductive	
Total height	mm / inch	558 / 21.97"		858 / 33.78"
Granite plate (L x W)	mm / inch		200 x 300 / 7.87" x 11.81"	
Grade of accuracy			1 DIN 876	
Weight	kg / lbs	14 / 30.86		18.3 / 35.27
Order no.		**4426541**		**4426543**

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

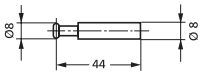
				Order no.
814 t	Probe arm with joint for mounting probes, dial indicators, dial comparators and test indicators. Length of mounting shank Mounting bore	 150 mm 8 mm	 (5.91") (.315")	**4426510***
814 m	Spherical probe To mount in probe arm 814 t	2 mm ball 3 mm ball 4 mm ball 5 mm ball 6 mm ball 7 mm ball 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 to mount the 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	Halter			**4426516**
817 ks1	Measuring taper	0 – 15	(0 - .591")	**4426071**
817 ks2	Measuring taper	14 – 20	(.551" - .787")	**4426072**
817 ks3	Measuring taper	18 – 24	(.709" - .945")	**4426073**
817 ks4	Measuring taper	23 – 30	(.906" -1.181")	**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-r	Spherical probe	4 mm ruby ball	(.157")	**4426498**
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	0–320 mm	(0 - 12.60")	**4426544**
814 X	Column with measuring head	0–620 mm	(0 - 24.41")	**4426545**
16 ESv	Data connection cable Opto RS232C,	Length 2 m	(6.56 ft)	**4102510**



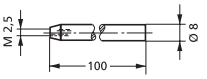
814 t



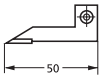
814 m



814 s

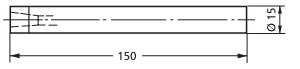


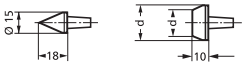
814 h



814 a

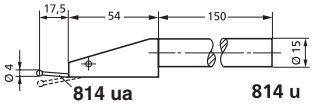
814 kh





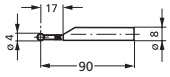
817 ks1

817 ks2
817 ks3
817 ks4

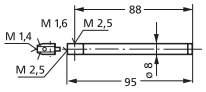


814 ua

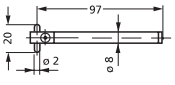
814 u



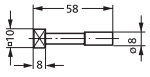
817 Cl-r



817 Cl-am



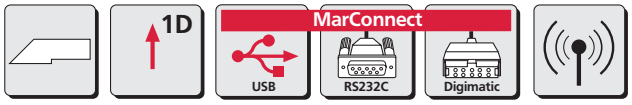
817 Cl-sa



817 Cl-p

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

Height Measuring and Scribing Instrument Digimar 814 SR



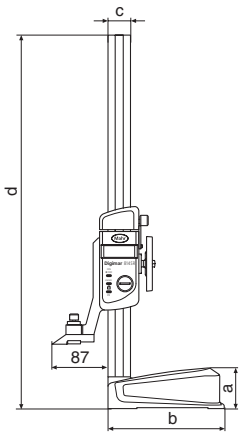
Application

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

Features

Functions:
RESET (Set the display to zero for relative measurement)
ABS (Switch between relative and absolute measurement)
mm/inch
Reference-Lock/Unlock
PRESET (To enter a numerical value)
DATA (Data transmission via connection cable)
Auto-ON/OFF

- Life of the battery up to 3 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

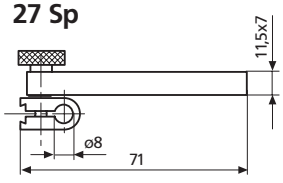
Technical Data

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**	**4426100**
600	(24")	0.01 / .0005"	0.05 / .0020"	8 / **17.64**	**4426101**

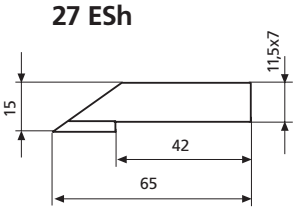
Accessories

		Order no.
Measuring / 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.de, 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 EWR, 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

Overview
Micromar Micrometers 3- 2

Micrometers

Micromar 40 EWR / 40 ER / 40 EWS / 40 EWV 3- 4
With a Digital Display
Micromar 40 A / 40 SH / 40 SD / 40 AG / 40 W 3-10
With Scales
Micromar 40 F / 40 T / 40 TS 3-14
With a Dial Comparator
Micromar 40 AB / 40 AS / 40 AR / 40 AW / 40 SM 3-17
With Special Measuring Faces
Micromar 40 Z 3-20
For Gear and Thread Measurement
Accessories for Micrometers 3-22

Inside Micrometers

Micromar 44 F / 44 Cms / 44 CB / 44 CZ 3-23
Inside Micrometers with
2-Point Contact
Micromar 44 A / 44 EWR / 844 A 3-27
Self-Centering Inside Micrometers / Measuring Pistols

Depth Micrometers

Micromar 45 T 3-31
With a Line Scale (Vernier)

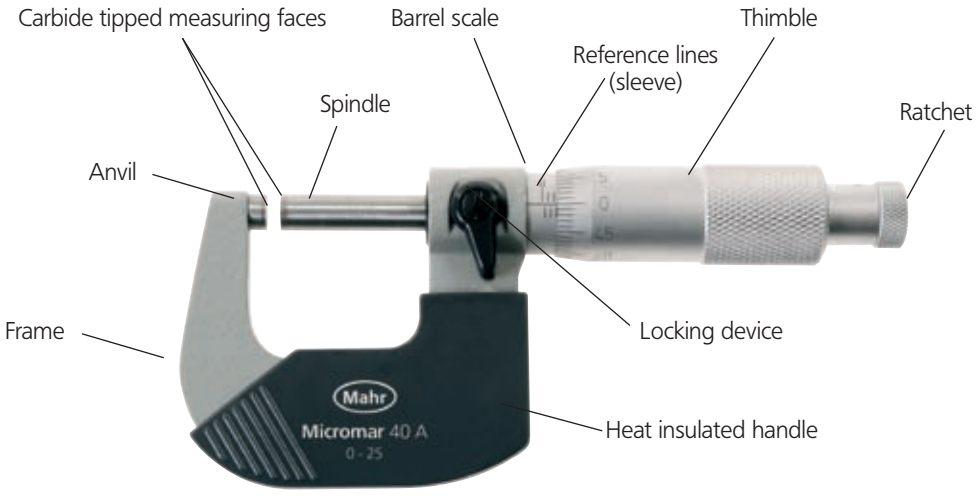
Micrometer Heads

Micromar 46 EWR / 46 / 46H 3-32
With Digital Display or Scales (Vernier)

Micromar. Micrometer

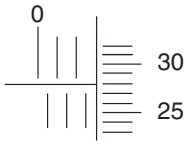
OVERVIEW

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 863-1

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 EWR 40 EWS 40 EWV 40 ER 44 EWR 46 EWR
PR	Enter a numerical value (Reference Setting)	●
mm/in	Switch between mm/inch	●
0/ABS	Set display to either 0.000 mm or ***.0000"*** for relative measurement / set to a reference or preset value (PR)	●
DATA	Data transmission	●*
		●*
		●*

* *For digital micrometers with a data output*

Micromar. Digital Micrometer Micromar 40 EWR

WATERPROOF MICROMETERS

►| The digital waterproof Micrometer **Micromar** 40 EWR. Even in the most difficult conditions precise and reliable results are obtained. |◄

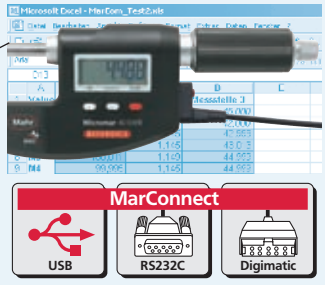
The high-contrast display with 8.5 mm high digits enables accurate, fatigue free reading of the measurement results.

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

The **Reference-Lock-Function** prevents operating error caused by accidental usage of the operating buttons.

Stainless steel, hardened spindle

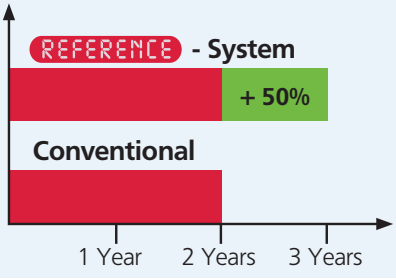
Sturdy hard lacquered steel frame



Universal SPC-interface (optional). You have a choice of **MarConnect** data outputs, select either **USB, Digimatic** or **Mahr Opto RS232**

The **ergonomically formed** and **thermally insulated handle** as well as the integrated ratchet in the thimble ensures both trouble free handling and accurate measurement results.

The new Reference system is extremely energy efficient as when the caliper is in standby mode; almost no power is required, thus **extending the life of the battery to up to 50%.**

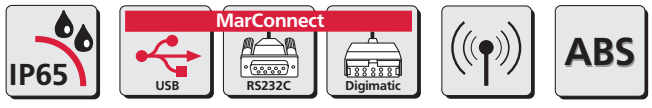


IP65

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

Protection class **IP65** in accordance to IEC 60529, the water proof measuring system **FPS** (Fluid Protected measuring System) with a sealed housing.

Digital Micrometer Micromar 40 EWR



Features

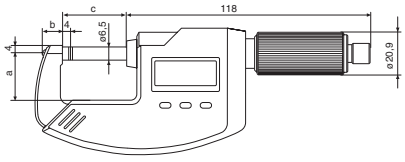
Functions:
RESET (Zero setting the display for Relative measurement)
ABS (Switch between Relative and Absolute measurement)
mm/inch
Reference-Lock/Unlock
PRESET (Reference setting)
DATA (Data transmission via connection cable)

- Immediate measurement due to the Reference system
- MarConnect data output, choose alternatively
  USB
  OPTO RS232C
  Digimatic
- High contrast Liquid Crystal Display with 8.5 mm high digits
- Hard 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)

Technical Data

	Measuring range mm	*(inch)*	Resolution mm / *inch*	Error limit *G* * µm	Spindle thread pitch mm	Data output (USB / RS232C / Digimatic)	Order no.
40 EWR	0 - 25	***(0 - 1")***	0.001 ***/.00005"***	2	0.635	–	**4151721**
40 EWR	0 - 25	***(0 - 1")***	0.001 ***/.00005"***	2	0.635	●	**4151705**
40 EWR	25 - 50	***(1 - 2")***	0.001 ***/.00005"***	2	0.635	●	**4151706**
40 EWR	50 - 75	***(2 - 3")***	0.001 ***/.00005"***	3	0.635	●	**4151707**
40 EWR	75 - 100	***(3 - 4")***	0.001 ***/.00005"***	3	0.635	●	**4151708**

* *at fixed zero point (better than DIN 863-1)*



Dimensions

mm				a	b	c
0	-	25 mm	/ 0-1"	23	9.5	31.5
25	-	50 mm	/ 1-2"	32	11.5	57
50	-	75 mm	/ 2-3"	44	13.5	82
75	-	100 mm	/ 3-4"	57	15.5	107

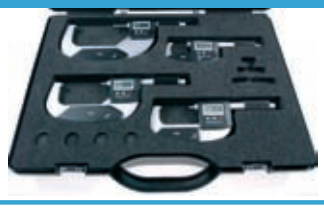
Accessories

		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

Digital Micrometer Set Micromar 40 EWR

Application range	Order no.	Remarks
0 - 100 mm	**4151709**	Includes: custom fitted plastic case, setting standards 25 mm, 50 mm and 75 mm



Digital Micrometer Micromar 40 ER

Features

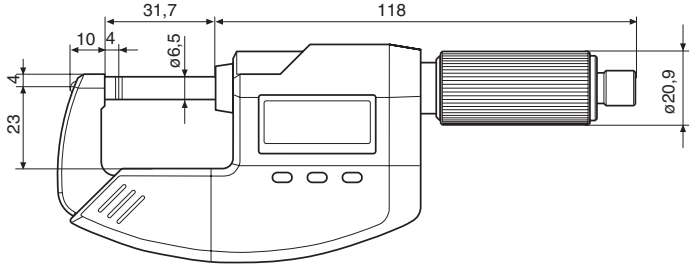
Functions:
RESET (Zero setting the display for Relative measurement)
ABS (Switch between Relative and Absolute measurement)
mm/inch
Reference-Lock/Unlock
PRESET (Reference setting)

- Immediate measurement due to the Reference system
- High contrast Liquid Crystal Display with 8.5 mm high digits
- Hard 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 and operating instructions

Technical Data

	Measuring range			Resolution	Error limit *G* *	Spindle thread pitch	Order no.
	mm		***(inch)***	mm / ***inch***	µm	mm	
40 ER	0	- 25	***(0-1")***	0.001 ***/.00005"***	2	0.635	**4151601**

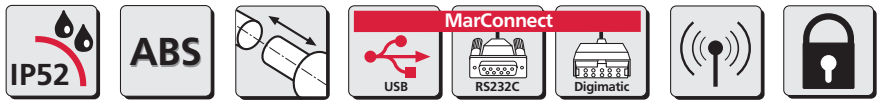
* *at fixed zero point (better than DIN 863-1)*



Accessories

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

Digital Micrometer Micromar 40 EWS with sliding spindle



Features

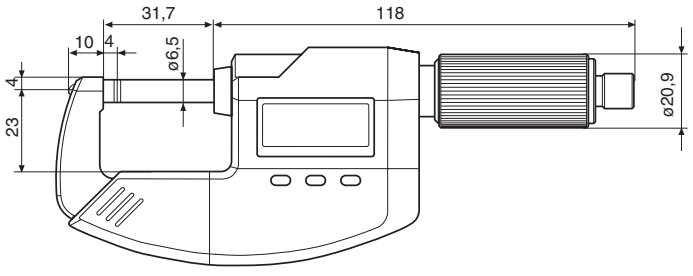
Functions:
RESET (Zero setting the display for Relative measurement)
ABS (Switch between Relative and Absolute measurement)
mm/inch
Reference-Lock/Unlock
PRESET (Reference setting)

- Immediate measurement due to the Reference system
- MarConnect data output, choose alternatively
  USB
  OPTO RS232C
  Digimatic
- High contrast Liquid Crystal Display with 8.5 mm high digits
- Hard 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 and operating instructions

Technical Data

	Measuring range mm			*(inch)*	Resolution mm / *inch*	Error limit *G* * µm	Spindle thread pitch mm	Order no.
40 EWS	0	-	25	***(0-1")***	0.001 /***.00005"***	2	0.635	**4151724**

* *at fixed zero point (better than DIN 863-1)*



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 Micromar 40 EWV with sliding spindle

Features

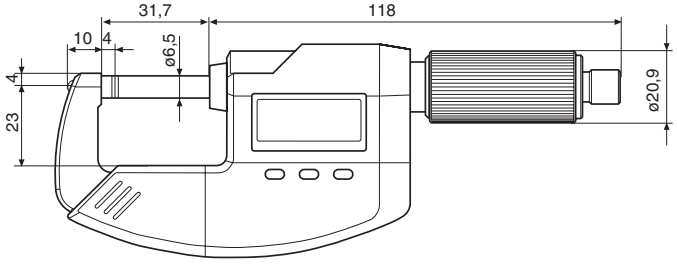
Functions:
RESET (Zero setting the display for Relative measurement)
ABS (Switch between Relative and Absolute measurement)
mm/inch
Reference-Lock/Unlock
PRESET (Reference setting)

- Immediate measurement due to the Reference system
- MarConnect data output, choose alternatively
  USB
  OPTO RS232C
  Digimatic
- High contrast Liquid Crystal Display with 8.5 mm high digits
- Hard lacquered steel frame, heat insulated
- Mounting bore for inter-changeable anvils
- Spindle is made of stainless steel, hardened throughout and ground
- Ratchet is integrated in the thimble
- Rapid drive
- Supplied with:
  Case, battery and operating instructions

Technical Data

Measuring range* mm	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	0.001 /***.00005"***	2	0.635	6.5	**4151722**	
0 - 25	0.001 /***.00005"***	2	0.635	6.5		**4151723**

** with thread anvils the measuring range is reduced*
*** with flat anvils over the full length of the anvils and at fixed zero point (better than DIN 863-3)*



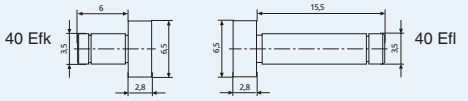
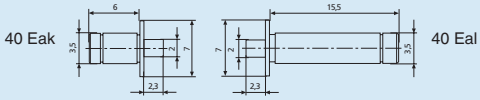
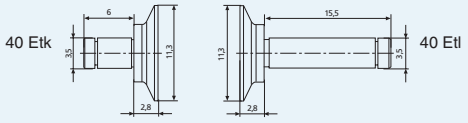
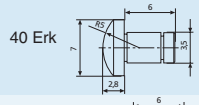
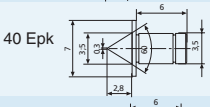
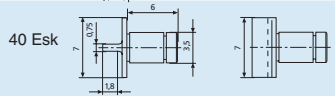
Special Accessories

		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**

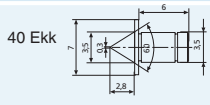
Accessories for Data Processing see Chapter 11

Universal Digital Micrometer Micromar 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	Anvils with spherical measuring faces	**4151774**	**2**	
40 Epk	Conical shaped anvil	**4151773**	**2**	
40 Esk	Wedge shaped anvil (blade)	**4151775**	**2**	

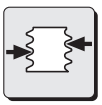
Special Accessories

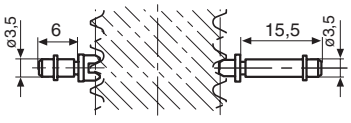
Catalog no.	Description	Order no.	Quantity required	
40 Ekk	Wedge shaped anvil (blade) 60°	**4151776**	**2**	

Thread anvils for pitch diameters*

- Pair consists of 1 V-anvil and 1 blade anvil

* *with thread anvils the measuring range is reduced by 20 mm*





Metric thread (60°) Pitch mm			V-anvil Order no.	Blade Order no.
0.5	-	0.7	**4501000**	**4173700**
0.7	-	1	**4501001**	**4173701**
1.25	-	2	**4501002**	**4173702**
2	-	3.5	**4501003**	**4173703**

Whitworth thread (55°) Pitch range TPI			V-anvil Order no.	Blade Order no.
40	-	32	**4501007**	**4173743**
32	-	24	**4501008**	**4173744**
24	-	18	**4501009**	**4173745**
18	-	14	**4501010**	**4173746**
14	-	10	**4501011**	**4173747**
10	-	7	**4501012**	**4173748**

American UST thread (60°) Pitch range TPI			V-anvil Order no.	Blade Order no.
40	-	32	**4501018**	**4173815**
32	-	24	**4501019**	**4173816**
24	-	18	**4501020**	**4173817**
18	-	14	**4501021**	**4173818**
14	-	10	**4501022**	**4173819**
10	-	7	**4501023**	**4173820**

Micrometer Micromar 40 A

DIN 863-1

Features

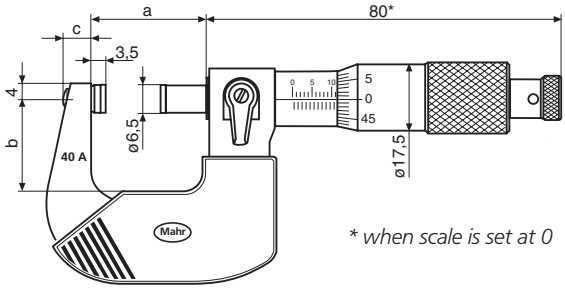
- Hard lacquered steel frame
- Spindle and anvil made of hardened steel, carbide tipped
- Scales with satin-chrome finish
- Heat insulators
- Rapid drive with integrated ratchet
- Locking device
- Supplied with: Case, setting standard (from measuring range 25-50 mm / 1-2"), operating instructions

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**

Accessories

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



** when scale is set at 0*

Dimensions

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

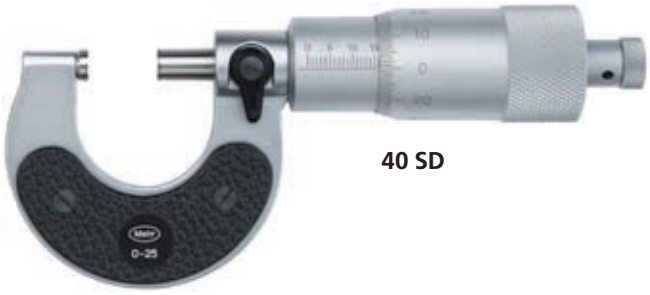
Micrometer Sets Micromar 40 SA

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 Micromar 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)

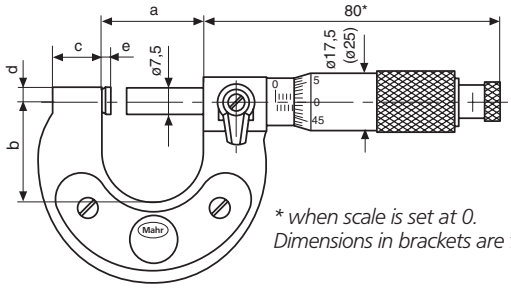
Only 40 SD:
- Reading error is reduced due to the 1 mm measuring span per rotation of the thimble

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 Micromar 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

Micrometer Micromar 40 AG

DIN 863-1

Features

- Hard 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

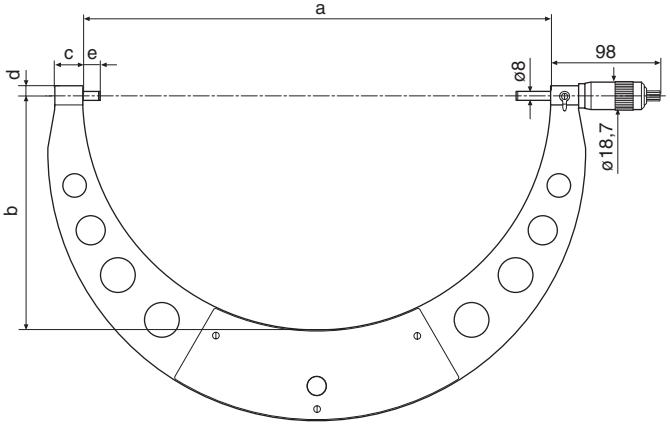
Note:
All Micrometers with measuring ranges between 400 mm to 500 mm, the frame is made from a steel tube

Technical Data

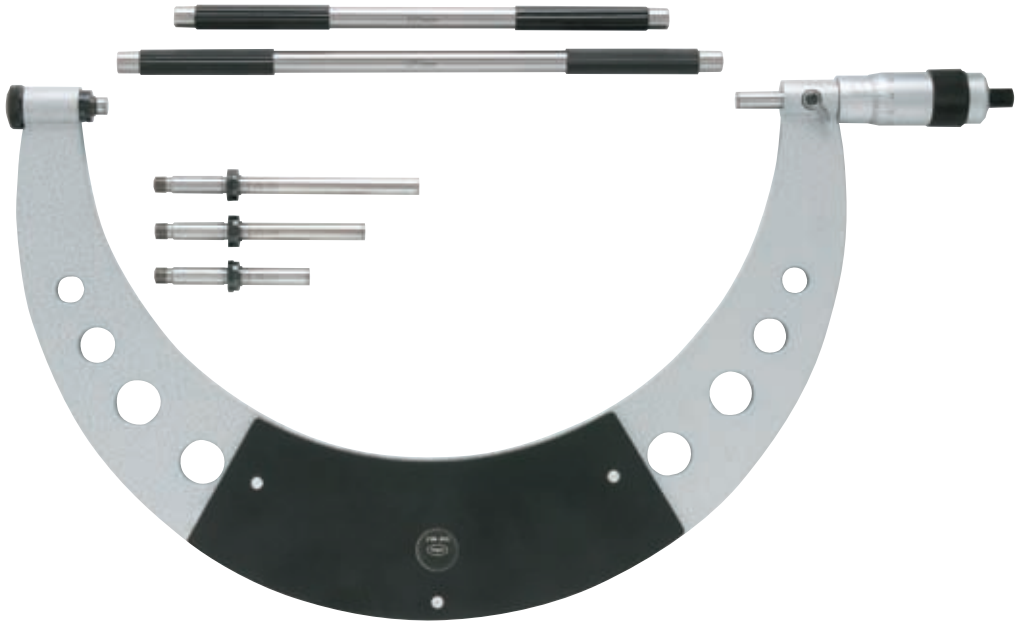
Measuring range	Readings	Error limit *G*	Spindle thread pitch	Weight	Order no.
mm	mm	µm	mm	kg	
200 - 225	0.01	8	0.5	2	**4134500**
225 - 250	0.01	8	0.5	2.2	**4134501**
250 - 275	0.01	9	0.5	2.3	**4134502**
275 - 300	0.01	9	0.5	2.7	**4134503**
300 - 325	0.01	10	0.5	3.2	**4134504**
325 - 350	0.01	10	0.5	3.4	**4134505**
350 - 375	0.01	11	0.5	3.6	**4134506**
375 - 400	0.01	11	0.5	4	**4134507**
400 - 425	0.01	12	0.5	4.2	**4134508**
425 - 450	0.01	12	0.5	4.5	**4134509**
450 - 475	0.01	13	0.5	4.9	**4134510**
475 - 500	0.01	13	0.5	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	292.5	146.5	25	5	12
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 Micromar 40 W



Features

- Hard 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

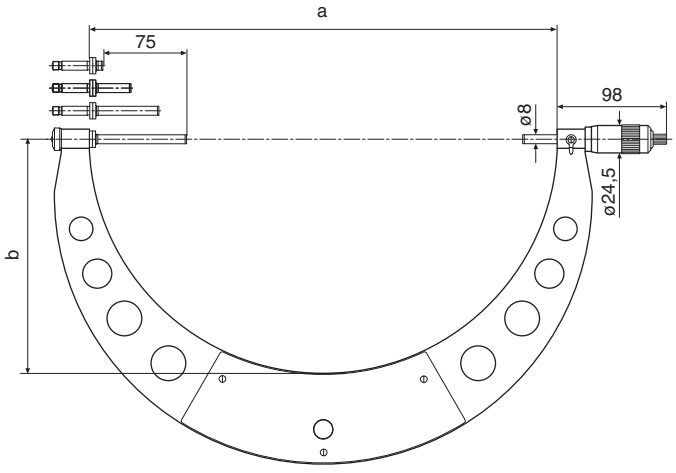
Note:
All Micrometers with measuring ranges from 400 mm up to 1000 mm, the frame is made from a steel tube

Technical Data

Measuring range mm	Readings mm	Error limit *G* µm	Spindle thread pitch mm	Weight kg	Order no.
0 - 100	0.01	5	1	1.1	**4137500**
100 - 200	0.01	7	1	2.1	**4137501**
200 - 300	0.01	9	1	3.4	**4137502**
300 - 400	0.01	11	1	5.7	**4137503**
400 - 500	0.01	13	1	2.6	**4137504**
500 - 600	0.01	21	1	3.3	**4137505**
600 - 700	0.01	23	1	4.0	**4137506**
700 - 800	0.01	26	1	4.4	**4137507**
800 - 900	0.01	28	1	5.3	**4137508**
900 - 1000	0.01	30	1	6.5	**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 Micromar 40 F / FC

DIN 863-3

Applications

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

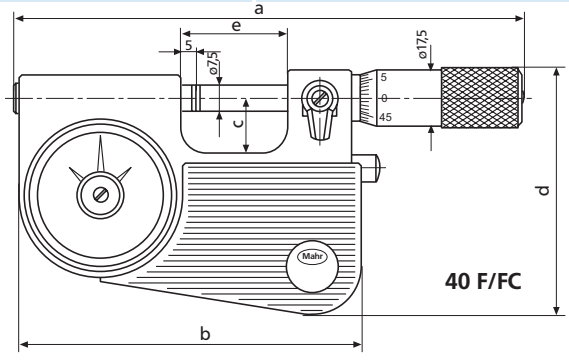
Features

- 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**	**Readings**
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 Micromar 40 T

DIN 863-3

Applications

- 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

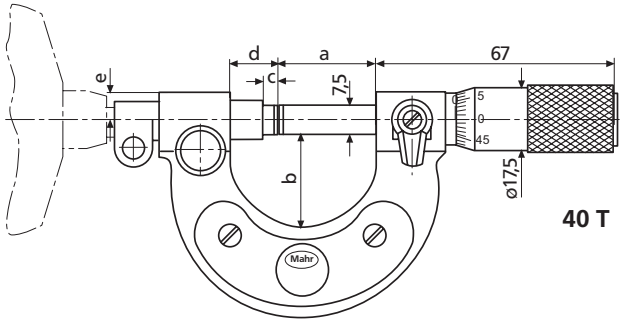
Measuring range	Retraction	Measuring faces		Measuring force	Order no.*
		Flatness	Parallelism		
0 - 25 mm	1.2 mm	≤0.2 µm	≤2 µm	6.5 N	**4154000**
25 - 50 mm	1.2 mm	≤0.2 µm	≤2 µm	6.5 N	**4154001**
50 - 100 mm	1.2 mm	≤0.2 µm	≤2 µm	6.5 N	**4154002**
100 - 150 mm	1.2 mm	≤0.2 µm	≤2 µm	7.5 N	**4154003**
150 - 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	Readings
0.01 mm	≤2 µm	0.5 mm	1 µm	±50 µm	1 µm

Dimensions

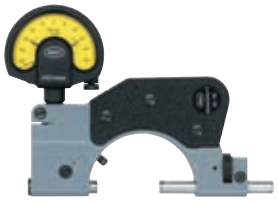
Dimensions in mm	a**	b	c	d**	e
0 - 25	27	28	4	11	8
25 - 50	52	40	4	11	8
50 - 100	76	65	5.5	30	8
100 - 150	127	87	5.5	30	8
150 - 200	177	112	5.5	30	8

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



40 T

Indicating Snap Gage 840 F
see page 9-2



Accessories

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

Precision Bench Micrometer Micromar 40 TS

DIN 863-3

Applications

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

Features

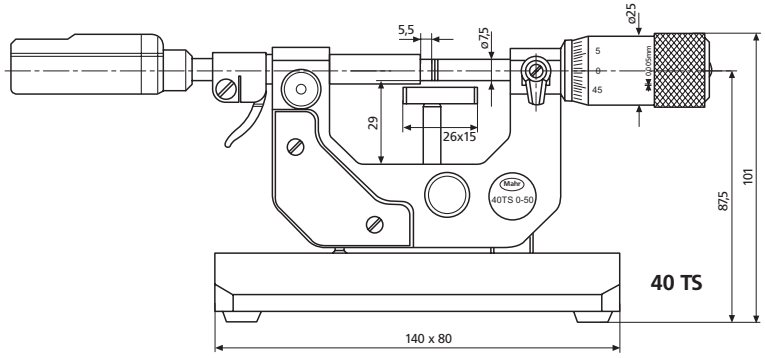
- Rugged steel frame, can be tilted up to 45° in relation to the sturdy base
- Retraction of the movable anvil and carbide-tipped measuring faces ensures maximum wear resistance
- Height-adjustable stop
- Constant measuring force
- Measuring spindle made of stainless steel, hardened throughout and ground, 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 Readings	Micrometer Error limit G_{me}	Micrometer Spindle thread pitch	Dial Comparator 1003/1003Z Error limit G_e (DIN 879)	Dial Comparator 1003/1003Z Meas. range	Dial Comparator 1003/1003Z Readings
0.01 mm .0001"	≤2 µm ≤.00008"	0.5 mm .025"	1 µm .00005"	±50 µm ±.002"	1 µm .00005"

Indicating Thread Snap Gage 852 TS see page 9-17

Accessories

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

Micrometer Micromar 40 AB with reduced measuring faces

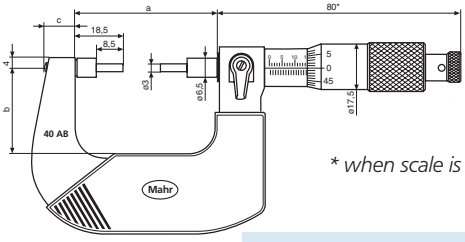
DIN 863-3

Features

- For measuring recesses, grooves, etc.
- Hard lacquered 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 instruction

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 Micromar 40 AS with sliding spindle and measuring spades

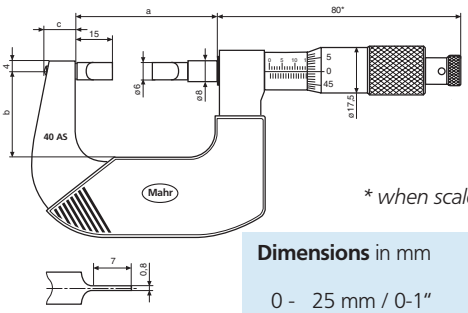
DIN 863-3

Features

- For measuring narrow recesses, grooves, etc.
- Hard lacquered 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 Micromar 40 AR with spherical anvils

DIN 863-3

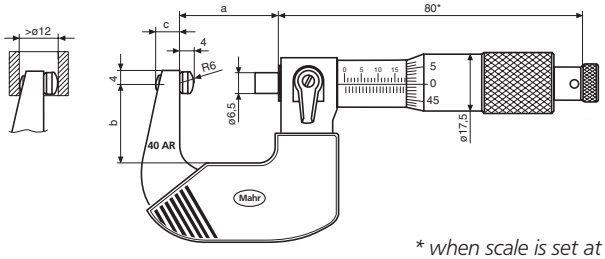
Features

- For measuring the wall thickness of a pipe, etc.
- Hard lacquered 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 (measuring range for 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*

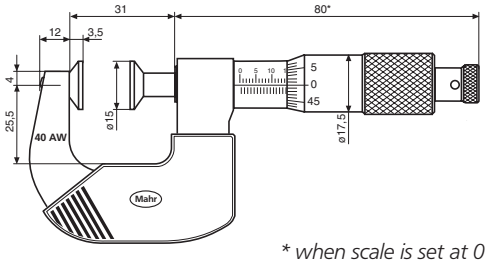
Micrometer Micromar 40 AW with sliding spindle and disc-type anvils

Features

- For measuring soft materials such as felt, rubber, cardboard, etc.
- Hard lacquered steel frame
- Spindle and anvil made of hardened steel
- Scales with satin-chrome finish
- Heat insulators
- Rapid drive with integrated ratchet
- Supplied with: Case, operating instructions

Technical Data

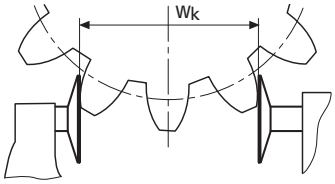
Measuring range	Readings	Error limit *G*	Parallelism	Flatness	Spindle thread pitch	Order no.
0 - 25 mm	0.01 mm	8 µm	5 µm	2 µm	0.5 mm	**4134300**
0 - 1"	***.0001"***	***.0003"***	***.0002"***	***.001"***	***.025"***	**4134950**



** when scale is set at 0*

Precision Micrometer Micromar 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)

Applications

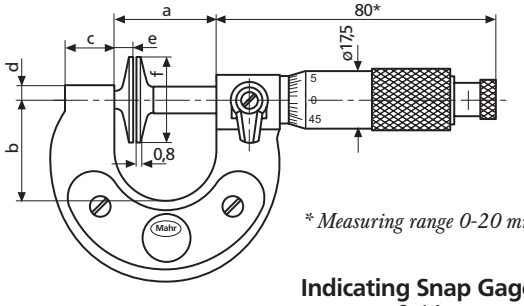
For measurements of
- Tooth spans W_k as of module 0.8 as indirect determination of tooth thickness on spur gears with straight and helical teeth
- Shoulders on shafts
- Undercut dimensions
- Registers
- Soft materials such as rubber, cardboard, felt, etc.

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**

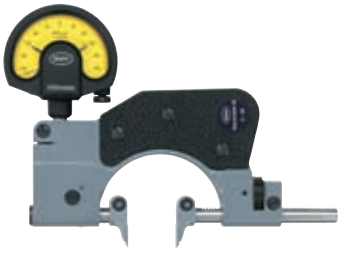
Dimensions

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 Micromar 40 Z

DIN 863-3

Features

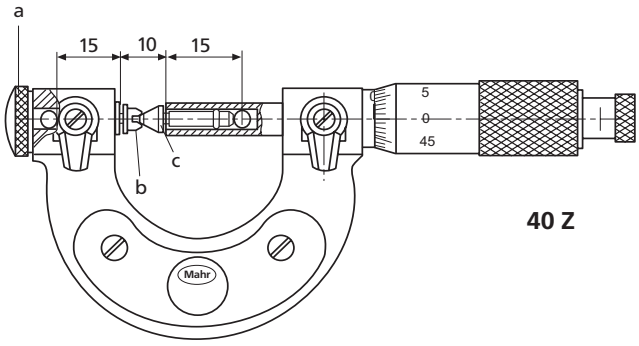
- For measuring pitch, root and outside diameters
- Rugged steel frame, heat insulated
- Spindle is hardened throughout, ground and is also provided which a locking device
- Adjustable anvil
- Spindle and anvil both have a mounting bore to accommodate inter-changeable anvils
- Flat end surface of the 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.*



40 Z

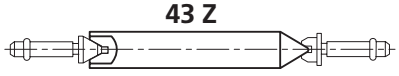
a = Regulating range ±0.5 mm
b = V-anvil
c = Tapered anvil

Indicating Thread Snap Gage 852 see page 9-20

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



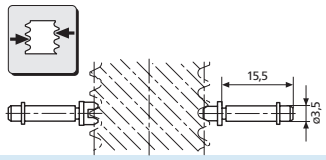
Length mm	Accuracy ± µm	Thread angle 60° Order no.	Thread angle 55° Order no.
25	4	**4175000**	**4175100**
50	4.5	**4175001**	**4175101**
75	4.5	**4175002**	**4175102**
100	4.5	**4175003**	**4175103**
125	5	**4175004**	**4175104**
150	5	**4175005**	**4175105**
175	5	**4175006**	**4175106**
200	5.5	**4175630**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

Interchangeable Anvils for Thread Micrometer Micromar 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

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



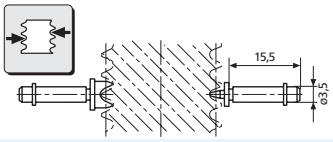
Metric thread (60°)			Whitworth thread (55°)			American UST thread (60°)		
Pitch mm	V-anvil Order no.	Tapered anvil Order no.	Pitch range TPI	V-anvil Order no.	Tapered anvil Order no.	Pitch range TPI	V-anvil Order no.	Tapered anvil Order no.
0.2	**4173007**	**4173407**	40 - 32	**4173043**	**4173443**	60 - 48	**4173113**	**4173513**
0.25	**4173008**	**4173408**	32 - 24	**4173044**	**4173444**	48 - 40	**4173114**	**4173514**
0.3	**4173009**	**4173409**	24 - 18	**4173045**	**4173445**	40 - 32	**4173115**	**4173515**
0.35	**4173010**	**4173410**	18 - 14	**4173046**	**4173446**	32 - 24	**4173116**	**4173516**
0.4	**4173011**	**4173411**	14 - 10	**4173047**	**4173447**	24 - 18	**4173117**	**4173517**
0.45	**4173012**	**4173412**	10 - 7	**4173048**	**4173448**	18 - 14	**4173118**	**4173518**
0.5 - 0.7	**4173000**	**4173400**	7 - 4.5	**4173049**	**4173449**	14 - 10	**4173119**	**4173519**
0.7 - 1	**4173001**	**4173401**	4.5 - 3	**4173050**	**4173450**	10 - 7	**4173120**	**4173520**
1.25 - 2	**4173002**	**4173402**	3 - 2.5	**4179408**	**4179409**	7 - 4.5	**4173121**	**4173521**
2 - 3.5	**4173003**	**4173403**				4.5 - 3	**4173122**	**4173522**
3.5 - 5	**4173004**	**4173404**						
5 - 7	**4173005**	**4173405**						
7 - 9	**4173006**	**4173406**						

For pitch diameters

Pair consists of V-anvil and tapered anvil.
Shank length 15,5 mm

For root diameters

Pair consists of V-anvil and pointed anvil. Each pitch requires a seperate V-anvil.
The pointed anvil can be used for several pitches.

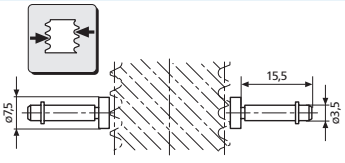


Trapezoid threads according to DIN 103			Metric thread (60°)			Whitworth thread (55°) American UST thread (60°)		
Pitch mm	V-anvil Order no.	Tapered anvil Order no.	Pitch mm	V-anvil Order no.	Pointed anvil Order no.	Pitch range TPI	V-anvil Order no.	Pointed anvil Order no.
1	**4173250**	**4173650**	0.5	**4173213**		40	**4173331**	
1.5	**4173251**	**4173651**	0.6	**4173214**		36	**4173321**	**4173334**
2	**4173252**	**4173652**	0.7	**4173215**		32	**4173332**	
3	**4173253**	**4173653**	0.75	**4173216**	**4173220**	28	**4173333**	
4	**4173254**	**4173654**	0.8	**4173217**		26	**4173335**	
5	**4173255**	**4173655**	0.9	**4173218**		24	**4173336**	
6	**4173256**	**4173656**	1	**4173219**		22	**4173337**	**4173341**
7	**4173257**	**4173657**	1.25	**4173221**		20	**4173338**	
8	**4173258**	**4173658**	1.5	**4173222**	**4173224**	19	**4173339**	
9	**4173259**	**4173659**	1.75	**4173223**		18	**4173340**	
10	**4173260**	**4173660**	2	**4173225**		16	**4173342**	**4173344**
12	**4173261**	**4173661**	2.5	**4173226**	**4173228**	14	**4173343**	
14	**4173262**	**4173662**	3	**4173227**		12	**4173345**	**4173348**
16	**4173263**	**4173663**	3.5	**4173229**		11	**4173346**	
18	**4173264**	**4173664**	4	**4173230**	**4173232**	10	**4173347**	
20	**4173265**	**4173665**	4.5	**4173231**		9	**4173349**	**4173452**
			5	**4173233**		8	**4173350**	
			5.5	**4173234**	**4173236**	7	**4173451**	
			6	**4173235**		6	**4173453**	
			7	**4173237**		5	**4173454**	**4173456**
			8	**4173238**	**4173240**	4.5	**4173455**	
			9	**4173239**		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 Micromar Micrometers

41 H

Stand 41 H

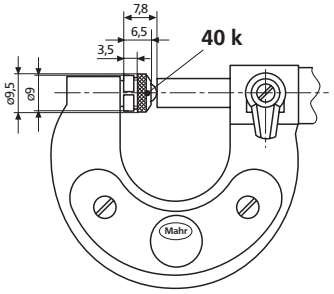
- For mounting a micrometer
- Enables the user to use both hands to operate the micrometer and / or to insert a work piece
- Sturdy, heavy-duty base, hammer-dimple enamel finish
- Jaw width 3.5 - 15 mm
- Clamping jaws are rubber lined to protect micrometer, the clamping jaws can be tilted
- Both the 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

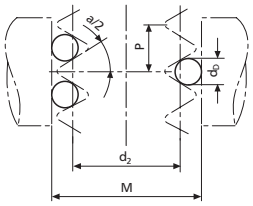
- For testing the basic setting of a micrometer
- Heat insulated handle
- Manufacturing tolerance js 2

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 13-17

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 Micromar 44 F

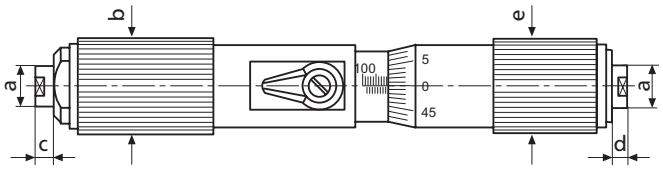
DIN 863-4

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	c	d	e
30 - 40	ø7	ø12.5	2	4	ø12.6
40 - 50	ø7	ø12.5	2.5	4.5	ø12.6
50 - 70	ø7	ø13.5	2.5	4.5	ø13.6
70 - 100	ø7	ø13.5	4.5	4.5	ø14.0
100 - 125	ø8	ø20	4.5	4.5	ø20
125 - 150	ø8	ø20	8	8	ø20
150 - 175	ø8	ø20	8	8	ø20
175 - 200	ø8	ø20	8	8	ø20

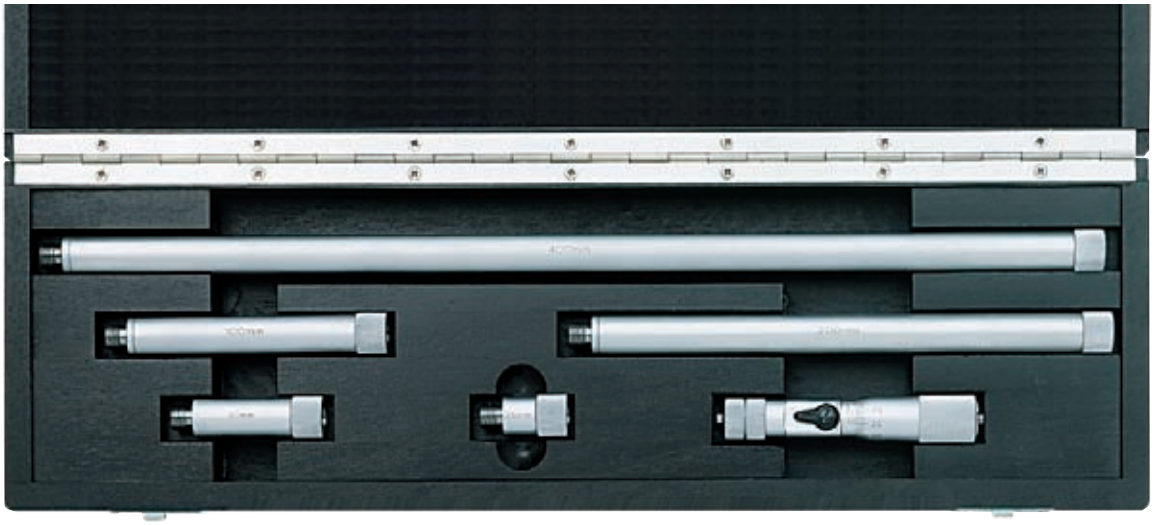
Accessories

	Page
Ring Gage 355 E for testing the basic setting	13-19

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

Inside Micrometer Micromar 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 5 µm

Basic unit in combination with any of the extensions

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

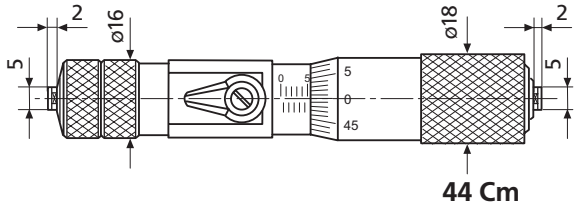
(l = length of the combination in mm)

- Supplied with:
  Case

Technical Data

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

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



Accessories

Inside Micrometers, ring gages, etc. please refer to page 3-28

Inside Micrometer Micromar 44 CB with reduced measuring faces

DIN 863-4

Features

- Basic Instrument consists of: Measuring head 44 CBm and End piece CBv
- Measuring faces have a smaller diameter for measuring grooves
- Rigid, lightweight tubular construction
- Spindle is hardened throughout and ground
- Locking lever
- 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 (Accessories)
- Protection sleeves have a satin chrome finish

Span of error
Basic unit 6 µm

Basic unit in combination with any of the extensions

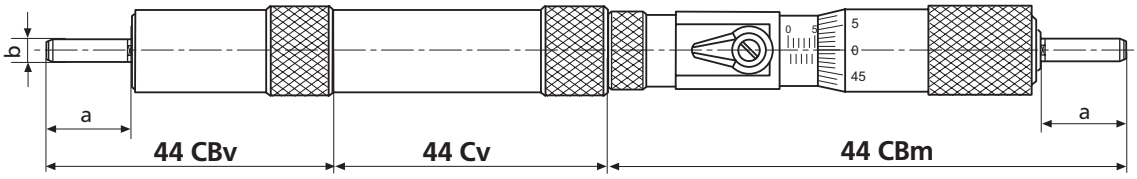
$4\ \mu m + 10 \times 10^{-6} \times l$

(l = length of the combination in mm)

- Supplied with: Case

Technical Data

Measuring range (Measuring head 44 CBm and End piece CBv) mm			Measuring head 44 CBm Readings mm	Measuring head 44 CBm Spindle thread pitch mm	Order no.
150	-	175	0.01	0.5	**4167922**
175	-	200			**4167906**
250	-	275			**4167912**
275	-	300			**4167921**



Accessories

Individual Extensions 44 Cv

Length mm	Order no.	Length mm	Order no.
25	**4167030**	200	**4167033**
50	**4167031**	400	**4167034**
100	**4167032**	800	**4167035**

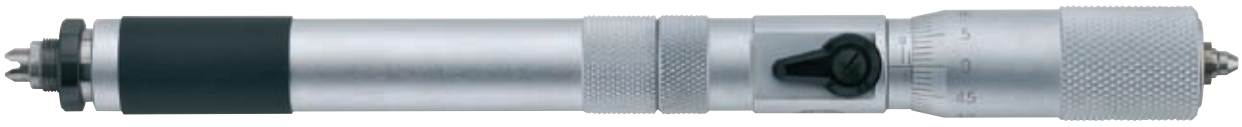
Case, wooden boxes, etc. please refer to page 3-28

Dimensions

Meas. range in mm			a	b
150	-	175	10	dia. 5
175	-	200	20	dia. 5
250	-	275	40	dia. 5
275	-	300	50	dia. 5

Inside Thread Micrometer Micromar 44 CZ

DIN 863-4



Features

- Basic Instrument consists of: Measuring head and End piece
- Measuring head and End piece with mounting bore for interchangeable anvils
- 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 (Accessories)
- Protection sleeves have a satin chrome finish

Span of error
Basic unit 6 µm

Basic unit in combination with any of the extensions

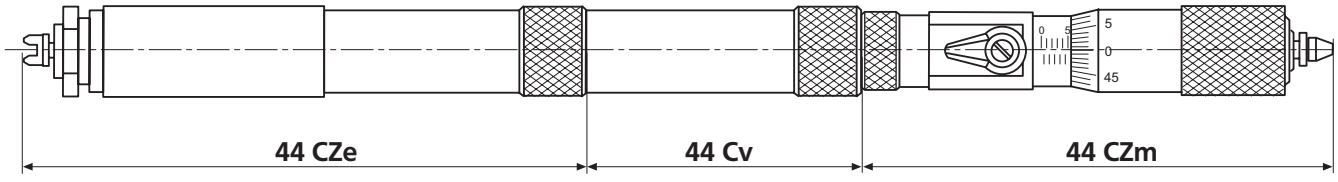
$4\ \mu m + 10 \times 10^{-6} \times l$

(l = length of the combination in mm)

- Supplied with: Case

Technical Data

Measuring range (Measuring head 44 CZm and End piece CZe) mm			Measuring head 44 CZm Readings mm	Measuring head 44 CZm Spindle thread pitch mm	Order no.
200	-	225	0.01	0.5	**4168030**



Accessories

Individual Extensions 44 Cv

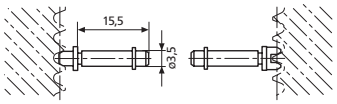
Length mm	Order no.	Length mm	Order no.
25	**4167030**	200	**4167033**
50	**4167031**	400	**4167034**
100	**4167032**	800	**4167035**

Case, wooden boxes, etc. please refer to page 3-28

Inchangeable Anvils for Inside Thread Micrometer Micromar 44 CZ

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



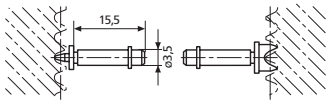
Metric thread (60°)				Whitworth thread (55°)				American UST thread (60°)			
Pitch mm			V-anvil Order no.	Tapered anvil Order no.	Pitch range TPI			V-anvil Order no.	Tapered anvil Order no.	Pitch range TPI			V-anvil Order no.	Tapered anvil Order no.
0.5	-	0.7	**4179400**	**4173400**	40	-	32	**4179043**	**4173443**	40	-	32	**4179115**	**4173515**
0.7	-	1	**4179401**	**4173401**	32	-	24	**4179044**	**4173444**	32	-	24	**4179116**	**4173516**
1.25	-	2	**4179402**	**4173402**	24	-	18	**4179045**	**4173445**	24	-	18	**4179117**	**4173517**
2	-	3.5	**4179403**	**4173403**	18	-	14	**4179046**	**4173446**	18	-	14	**4179118**	**4173518**
3.5	-	5	**4179404**	**4173404**	14	-	10	**4179047**	**4173447**	14	-	10	**4179119**	**4173519**
5	-	7	**4179405**	**4173405**	10	-	7	**4179048**	**4173448**	10	-	7	**4179120**	**4173520**
7	-	9	**4179406**	**4173406**	7	-	4.5	**4179049**	**4173449**	7	-	4.5	**4179121**	**4173521**
					4.5	-	3	**4179050**	**4173450**	4.5	-	3	**4179122**	**4173522**
					3	-	2.5	**4179407**	**4179409**					

For pitch diameters

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

For outside diameters

Pair consists of V-anvil and pointed anvil. Each pitch requires a seperate V-anvil.
The pointed anvil can be used for several pitches.

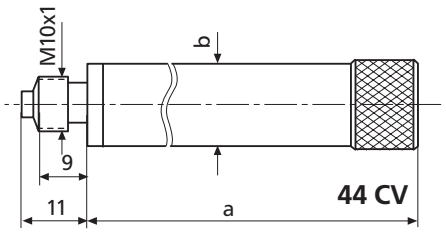


Trapezoid threads according to DIN 103			Metric thread (60°)			Whitworth thread (55°) American UST thread (60°)		
Pitch mm	V-anvil Order no.	Pointed anvil Order no.	Pitch mm	V-anvil Order no.	Pointed anvil Order no.	Pitch range TPI	V-anvil Order no.	Pointed anvil Order no.
1	**4179950**	**4173650**	0.5	**4179513**		40	**4179730**	
1.5	**4179951**	**4173651**	0.6	**4179514**		36	**4179731**	**4173334**
2	**4179952**	**4173652**	0.7	**4179515**		32	**4179732**	
3	**4179953**	**4173653**	0.75	**4179516**	**4173220**	28	**4179733**	
4	**4179954**	**4173654**	0.8	**4179517**		26	**4179735**	
5	**4179955**	**4173655**	0.9	**4179518**		24	**4179736**	
6	**4179956**	**4173656**	1	**4179519**		22	**4179737**	**4173341**
7	**4179957**	**4173657**	1.25	**4179521**		20	**4179738**	
8	**4179958**	**4173658**	1.5	**4179522**	**4173224**	19	**4179739**	
9	**4179959**	**4173659**	1.5	**4179523**		19	**4179740**	
10	**4179960**	**4173660**	2	**4179525**		16	**4179742**	**4173344**
12	**4179961**	**4173661**	2.5	**4179526**	**4173228**	14	**4179743**	
14	**4179962**	**4173662**	3	**4179527**		12	**4179745**	**4173348**
16	**4179963**	**4173663**	3.5	**4179529**		11	**4179746**	
18	**4179964**	**4173664**	4	**4179530**	**4173232**	10	**4179747**	
20	**4179965**	**4173665**	4.5	**4179531**		9	**4179749**	**4173452**
18	**4179964**	**4173664**	5	**4179533**		8	**4179750**	
20	**4179965**	**4173665**	5.5	**4179534**	**4173236**	7	**4179751**	
			6	**4179535**		6	**4179753**	
						5	**4179754**	**4173456**
						4.5	**4179755**	
						4	**4179757**	
						3.5	**4179758**	**4173461**
						3.25	**4179759**	
						3	**4179760**	

Accessories for Micromar 44 Cms / 44 CB / 44 CZ

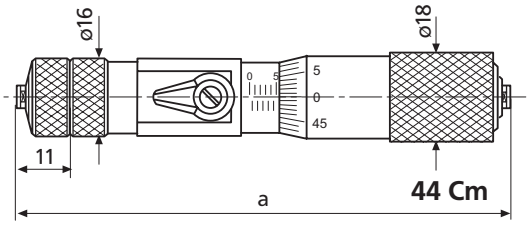
Individual Extensions 44 Cv

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**



Ring Gage 355 E

Ring Gage 355 E for testing the basic setting see page 13-149
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

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

Self-Centering Inside Micrometer Micromar 44 A

DIN 863-4

Applications

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

Technical Data

Measuring range mm	Measuring depth mm	Readings mm	Error limit *G** µm	Order no.
6 - 8	64 / (139**)	0.005	4	**4190000**
8 - 10	64 / (139**)	0.005	4	**4190001**
10 - 12.5	64 / (139**)	0.005	4	**4190002**
12.5 - 16	65 / (140**)	0.005	4	**4190003**
16 - 20	65 / (140**)	0.005	4	**4190004**
20 - 25	70 / (220**)	0.005	4	**4190005**
25 - 30	70 / (220**)	0.005	4	**4190006**
30 - 35	71 / (221**)	0.005	4	**4190007**
35 - 40	71 / (221**)	0.005	4	**4190008**
40 - 50	79 / (229**)	0.005	4	**4190009**
50 - 60	79 / (229**)	0.005	5	**4190010**
60 - 70	79 / (229**)	0.005	5	**4190011**
70 - 85	97 / (247**)	0.005	5	**4190012**
85 - 100	97 / (247**)	0.005	5	**4190013**
100 - 125	132 / (282**)	0.005	6	**4190014**
125 - 150	132 / (282**)	0.005	6	**4190015**
150 - 175	132 / (282**)	0.005	7	**4190016**
175 - 200	132 / (282**)	0.005	7	**4190017**

* *Over the full length of the anvils* ** *With the extension 44 Av*

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

Accessories

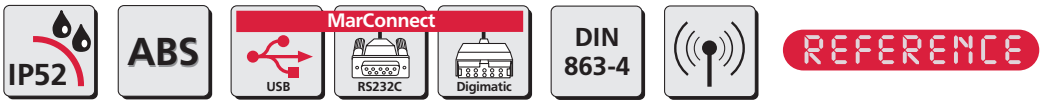
Measuring heads, ring gages, etc. please refer to page 3-32

Self-Centering Inside Micrometer Sets 44 AS

Measuring range mm	Number of Micrometers	Ring gages ø mm	Order no.
6 - 12.5	3	8 / 10	**4190050**
12.5 - 25	3	16 / 20	**4190051**
25 - 50	4	30 / 40	**4190052**
50 - 100	4	60 / 85	**4190053**

- Supplied with:
  Case and ring gage

Digital Self-Centering Inside Micrometer Micromar 44 EWR



Applications

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

Technical Data

Measuring range mm			Measuring range (inch)	Measuring depth mm	Readings mm / *inch*	Error limit G* µm	Order no.
6	-	8	***(25 - .3125")***	64 / (139**)	0.001 /***.00005"***	4	**4191020**
8	-	10	***(.3125 - .4")***	64 / (139**)	0.001 /***.00005"***	4	**4191021**
10	-	12.5	***(.4 - .5")***	64 / (139**)	0.001 /***.00005"***	4	**4191022**
12.5	-	16	***(.5 - .625")***	65 / (140**)	0.001 /***.00005"***	4	**4191023**
16	-	20	***(.625 - .775")***	65 / (140**)	0.001 /***.00005"***	4	**4191024**
20	-	25	***(.775 - 1")***	70 / (220**)	0.001 /***.00005"***	4	**4191025**
25	-	30	***(1" - 1.2")***	70 / (220**)	0.001 /***.00005"***	4	**4191026**
30	-	35	***(1.2 - 1.4")***	71 / (221**)	0.001 /***.00005"***	4	**4191027**
35	-	40	***(1.4 - 1.6")***	71 / (221**)	0.001 /***.00005"***	4	**4191028**
40	-	50	***(1.6" - 2")***	79 / (229**)	0.001 /***.00005"***	4	**4191029**
50	-	60	***(2" - 2.35")***	79 / (229**)	0.001 /***.00005"***	5	**4191030**
60	-	70	***(2.35 - 2.75")***	79 / (229**)	0.001 /***.00005"***	5	**4191031**
70	-	85	***(2.75 - 3.35")***	97 / (247**)	0.001 /***.00005"***	5	**4191032**
85	-	100	***(3.35 - 4")***	97 / (247**)	0.001 /***.00005"***	5	**4191033**
100	-	125	***(4 - 4.9")***	132 / (282**)	0.001 /***.00005"***	6	**4191034**
125	-	150	***(4.9 - 5.9")***	132 / (282**)	0.001 /***.00005"***	6	**4191035**
150	-	175	***(5.9 - 6.9")***	132 / (282**)	0.001 /***.00005"***	7	**4191036**
175	-	200	***(6.9 - 7.9")***	132 / (282**)	0.001 /***.00005"***	7	**4191037**

* *Over the full length of the anvils* ** *With the extension 44 Av*

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

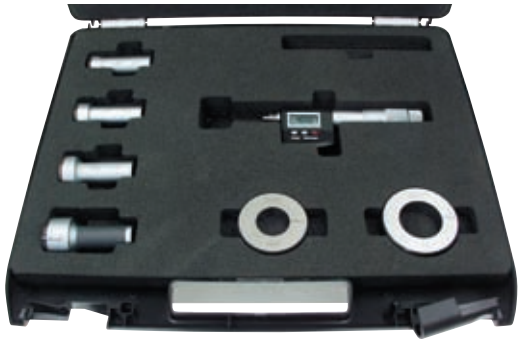
Accessories

Measuring heads, ring gages, etc. please refer to page 3-32

Digital Self-Centering Inside Micrometer Sets Micromar 44 EWR

Measuring range mm			(inch)	Number of measuring heads 44 Ak	Ring gages ø mm	Order no.
6	-	12.5	(25 - 5")	3	8 / 10	**4191060**
12.5	-	25	(.5 - .4")	3	16 / 20	**4191061**
25	-	50	(.5 - .2"	4	30 / 40	**4191062**
50	-	100	(2" - .4")	4	60 / 85	**4191063**

- Supplied with:
  1 Basic Unit 44 EXg, Measuring Heads 44 Ak, case and ring gages



Self-Centering Measuring Pistol Micromar 844 A

Applications

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

Technical Data

Measuring range mm			Measuring range *(inch)*	Measuring depth mm	Error limit *G** µm / *inch*	Order no.***
6	-	8	***(25 - .3125")***	64 / (139**)	3 / ***.00015***	**4487600**
8	-	10	***(.3125 - .4")***	64 / (139**)	3 / ***.00015***	**4487601**
10	-	12.5	***(.4 - .5")***	64 / (139**)	3 / ***.00015***	**4487602**
12.5	-	16	***(.5 - .625")***	65 / (140**)	3 / ***.00015***	**4487603**
16	-	20	***(.625 - .775")***	65 / (140**)	3 / ***.00015***	**4487604**
20	-	25	***(.775 - 1")***	70 / (220**)	3 / ***.00015***	**4487605**
25	-	30	***(.1" - 1.2")***	70 / (220**)	3 / ***.00015***	**4487606**
30	-	35	***(1.2 - 1.4")***	71 / (221**)	3 / ***.00015***	**4487607**
35	-	40	***(1.4 - 1.6")***	71 / (221**)	3 / ***.00015***	**4487608**
40	-	50	***(1.6" - 2")***	79 / (229**)	3 / ***.00015***	**4487609**
50	-	60	***(2" - 2.35")***	79 / (229**)	4 / ***.00016***	**4487610**
60	-	70	***(2.35 - 2.75")***	79 / (229**)	4 / ***.00016***	**4487611**
70	-	85	***(2.75 - 3.35")***	97 / (247**)	4 / ***.00016***	**4487612**
85	-	100	***(3.35 - 4")***	97 / (247**)	4 / ***.00016***	**4487613**
100	-	125	***(4 - 4.9")***	132 / (282**)	5 / ***.0002***	**4487614**
125	-	150	***(4.9 - 5.9")***	132 / (282**)	5 / ***.0002***	**4487615**
150	-	175	***(5.9 - 6.9")***	132 / (282**)	6 / ***.00025***	**4487616**
175	-	200	***(6.9 - 7.9")***	132 / (282**)	6 / ***.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 R	**4337121**
MarCator 1087 R	**4337161**

Accessories

Measuring heads, ring gages, etc. please refer to page 3-32

Self-Centering Measuring Pistol Set Micromar 844 AS

Measuring range mm			(inch)	Number of measuring heads	Ring Gages dia. mm	Order no. with Digital Indicator 1086 R	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

* *Indicator is not taken into consideration, over the full length of the anvils*
** *With the extension 44 Av*
*** *Excludes indicator*

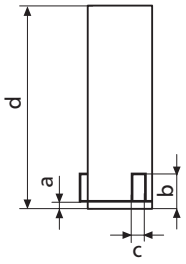
Accessories for Micromar 44 A, 44 EWR, 844 A

Measuring Heads 44 Ak for 44 EWR

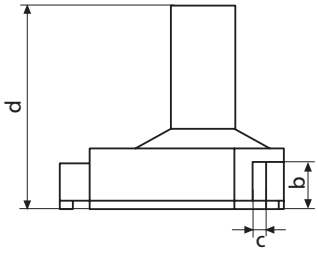
- Self-centering measuring head consists of 3 laterally positioned anvils, each are offset at intervals of 120°
- Anvils from 12.5 mm are carbide tipped
- From 12.5 mm, anvils can be used to measure to the base of a bore
- From 40 mm all measuring heads are made from aluminum to reduce weight

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")*	**4190035**
25	-	30	*(.1" - 1.2")*	**4190036**
30	-	35	*(1.2 - 1.4")*	**4190037**
35	-	40	*(1.4 - 1.6")*	**4190038**
40	-	50	*(1.6" - 2")*	**4190039**
50	-	60	*(2" - 2.35")*	**4190040**
60	-	70	*(2.35 - 2.75")*	**4190041**
70	-	85	*(2.75 - 3.35")*	**4190042**
85	-	100	*(3.35 - 4")*	**4190043**
100	-	125	*(4 - 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



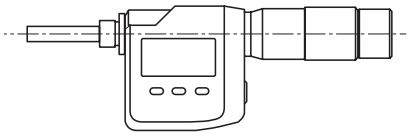
Measuring range mm			a	b	c	d
6	-	8	1.3	4.3	2	64
8	-	10	1.8	4.8	2	64
10	-	12.5	2	6	2.5	64
12.5	-	16	–	7	3	65
16	-	20	–	8.5	4	65
20	-	25	–	11	4	70
25	-	30	–	11	4	70
30	-	35	–	12	5	71
35	-	40	–	12	5	71
40	-	50	–	18	5	79
50	-	60	–	18	7	79
60	-	70	–	18	7	79
70	-	85	–	23	7	97
85	-	100	–	23	7	97
100	-	125	–	27	7	132
125	-	150	–	27	7	132
150	-	175	–	27	7	132
175	-	200	–	27	7	132

Ring Gages 355 E

- 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	**4710026**	40	**4710060**
10	**4710030**	60	**4710080**
16	**4710036**	85	**4710105**
20	**4710040**	125	**4710121**
30	**4710050**	175	**4710122**

Basic Unit 44 EWg

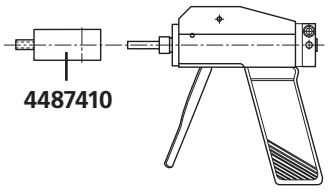


Threaded connection for changing the measuring heads

Measuring range mm			Order no.
6	-	20	**4190106**
20	-	100	**4190107**
100	-	200	**4190108**

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.

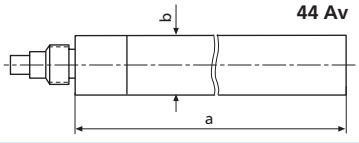


4487410

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

* *Includes adapter 4487410*

Depth Extension Rod 44 Av



Measuring range mm			*(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 Micromar 45 T

Applications

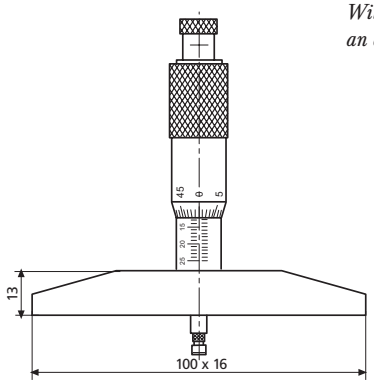
- Depth measurement
- Measuring the space between grooves and groove widths (in conjunction with a Disc anvil 45 Tm)

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

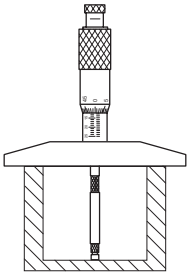
Technical Data

Total measuring range mm	Range of micrometer mm	Readings mm	Spindle thread pitch mm	Error limit with a standard anvil µm	Measuring force N	Length tolerance of extensions µm	Order no.
0-100	25	0.01	0.5	≤5	5 - 10	± 1.5	**4180000**



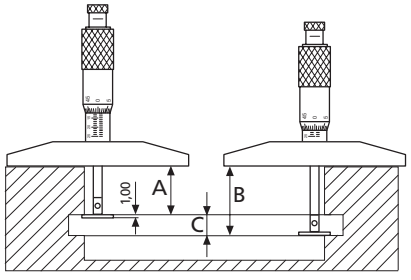
Standard depth measurements

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



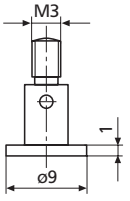
Dimension A: Can be direct read of the thimble

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**
Extensions 45 Tv	
Length L 25 mm, Length tolerance ± 1.5 µm	**4180001**
Length L 50 mm, Length tolerance ± 1.5 µm	**4180002**
Length L 100 mm, Length tolerance ± 1.5 µm	**4180003**



45 Tm

Digital Micrometer Head Micromar 46 EWR

REFERENCE

Features

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

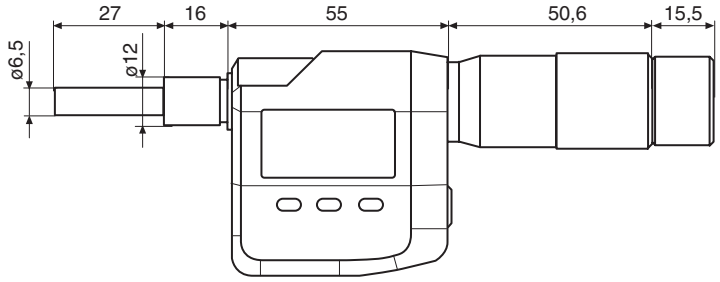
- Patented capacitive measuring system with an energy saving function, life of the battery approx. 2 years
- Ratchet with integrated coupler

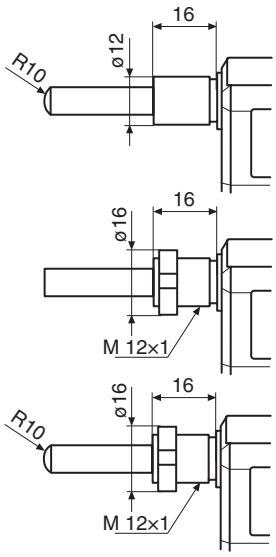
- Supplied with:
Case, end cap (in case the rapid drive is not required) and operating instructions

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	**4184305**
0-25	***(0-1")***	0.001 /***.00005"***	4	flat	12*	**4184307**
0-25	***(0-1")***	0.001 /***.00005"***	4	spherical	12	**4184306**
0-25	***(0-1")***	0.001 /***.00005"***	4	spherical	12*	**4184308**

* *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 Micromar 46

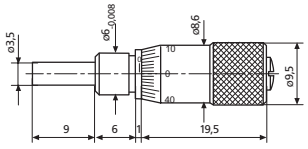
Features

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

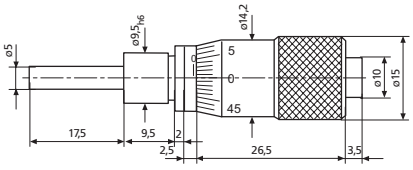
Technical Data

	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**

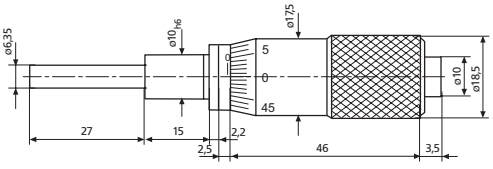
* *with locking nut*
** *with ratchet, carbide tipped*



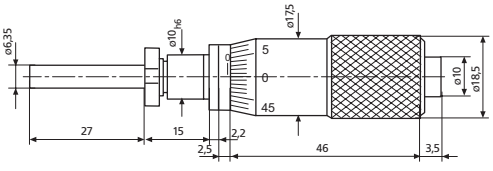
4183021
Measuring range 0-6.5 mm



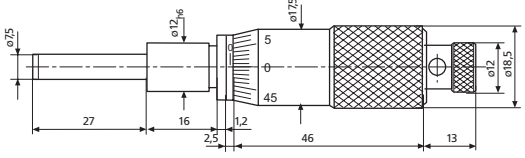
4183025
Measuring range 0-13 mm



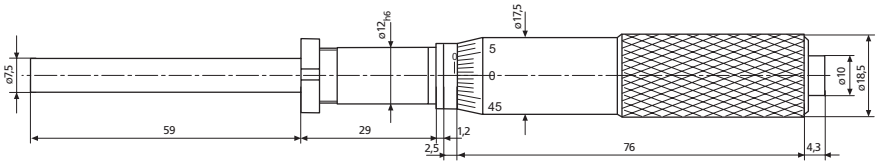
4183030
Measuring range 0-25 mm



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

Mechanical Test Indicators with Dial
Overview 4- 2

Standard version
MarTest 800 S / 800 SG / 800 SA / 800 SGA metric 4- 4
MarTest 801 S1 / 801 S / 801 SG / 801 SGI inch 4- 4

With a higher resolution
MarTest 800 SM / 800 SGM / 800 SGE metric 4- 5
MarTest 801 SM / 801 SGM / 801 SGE inch 4- 5

With a longer styli
MarTest 800 SL / 800 SGL / 800 SGB metric 4- 6
MarTest 801 SL / 801 SGL inch 4- 6

Horizontal version
MarTest 800 H metric 4- 7
MarTest 801 H inch 4- 7

Vertical version
MarTest 800 V / 800 VGM metric 4- 7
MarTest 801 V / 801 VGM inch 4- 7

With a larger measuring range
MarTest 800 SR / 800 SRM metric 4- 8
MarTest 801 SR / 801 SRM inch 4- 8

Digital Test Indicators

Standard version
MarTest 800 EW 4- 9

With a longer styli
MarTest 800 EWL 4-10

Accessories 4 - 8 / 4-11

3D-Touch Probes
Water proof, with a Digital display
MarTest 802 NW 4-14

Water proof, with an Analog display
MarTest 802 EW 4-15

MarTest. Test Indicators

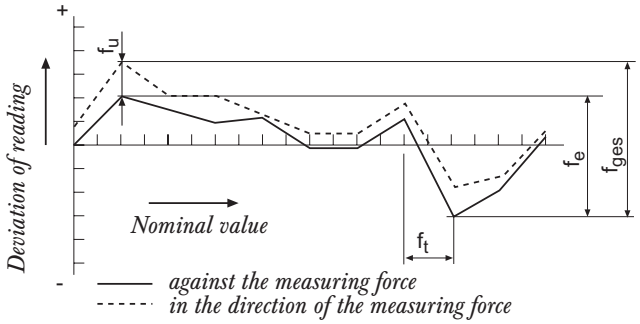
OVERVIEW

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
	800 EW	± 0.4 mm ± .015"	digital	0.001/ ***.00005"*** 0.01/ ***.0005"***	●		10 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"*** (± 0.30 mm)	***0-15-0*** (0-30-0)	***.001"*** (0.01 mm)		***.0005"***	***.0004"***	***.00012"***	***.0002"***	***.0002"***
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
	800 EWL	± 0.25 mm ± .010"	digital	0.001/ ***.00005"*** 0.01/ ***.0005"***			10 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"***

Length of styli	Order no.
14.5 mm	**4305200**
14.5 mm	**4307200**
14.5 mm	**4301200**
14.5 mm	**4301250**
14.5 mm	**4305120**
14.5 mm	**4305960**
14.5 mm	**4305950**
14.5 mm	**4307950**
14.5 mm	**4307970**
41.24 mm	**4306200**
41.24 mm	**4306250**
32.3 mm	**4301300**
41.24 mm	**4306120**
41.24 mm	**4306950**
41.24 mm	**4306960**
14.5 mm	**4308150**
14.5 mm	**4308200**
9.1 mm	**4308220**
14.5 mm	**4308960**
14.5 mm	**4308970**
14.5 mm	**4308985**
14.5 mm	**4307250**
14.5 mm	**4308250**
14.5 mm	**4307960**
14.5 mm	**4308980**
14.5 mm	**4303200**
14.5 mm	**4303950**
14.5 mm	**4302200**
14.5 mm	**4302250**
14.5 mm	**4302950**
14.5 mm	**4302960**

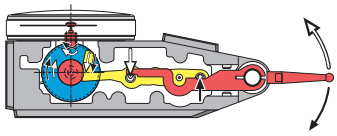
Metrological characteristics

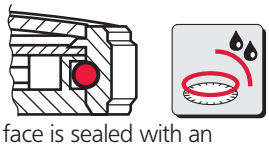


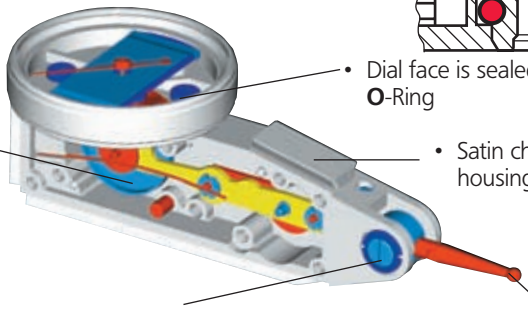
MarTest - Design features

SHOCK PROOF

Mechanism
- Shockproof
- Anti magnetic
- Movement bearings are jeweled with 8 precious stones
- Automatic matching to sensing direction, thus ensuring error-free reading







- Dial face is sealed with an **O**-Ring
- Satin chrome finished housing
- Double lever supported in ball bearings, overload protection provided by slip clutch
- Contact point with carbide ball

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

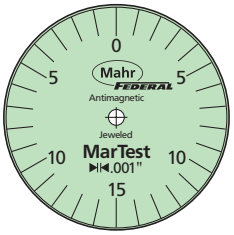
DIN 2270

Technical Data

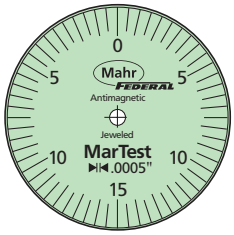
	Measuring range	Readings	Dial dia.	Measuring force	Length of styli	Order no.
800 S	± 0.4 mm	0.01 mm	27.5 mm	0.15 N	14.5 mm	**4305200**
800 SG	± 0.4 mm	0.01 mm	38 mm	0.15 N	14.5 mm	**4307200**
800 SA	± 0.25 mm	0.01 mm	27.5 mm	0.1 N	14.5 mm	**4301200**
800 SGA	± 0.25 mm	0.01 mm	38 mm	0.1 N	14.5 mm	**4301250**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

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)

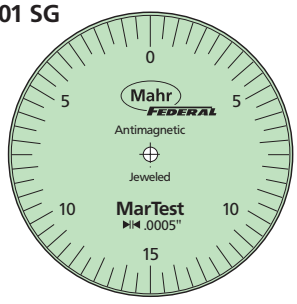
801 S1



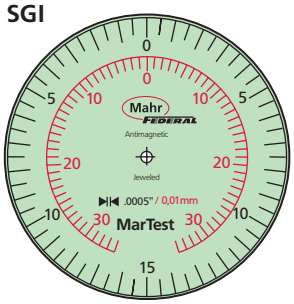
801 S

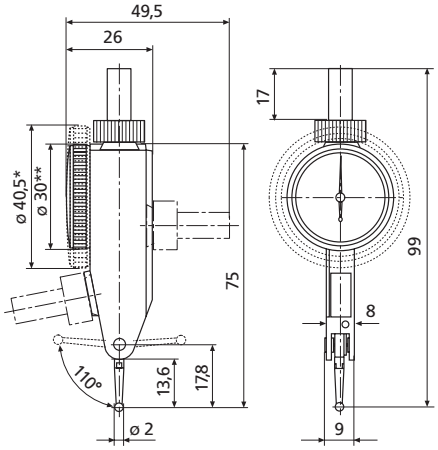


801 SG



801 SGI

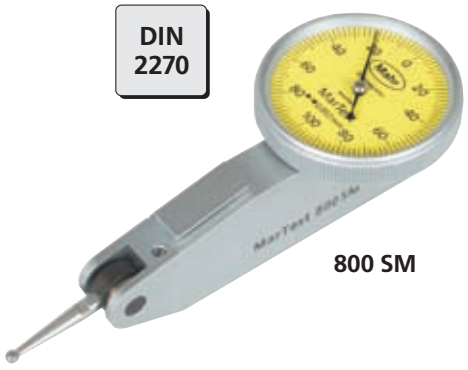




* *800 SG, 800 SGA, 801 SG, 801 SGI*
** *800 S, 800 SA, 801 S1, 801 S*

MarTest with resolution 0.002 mm/0.001 mm for higher accuracy

DIN 2270



800 SM

DIN 2270

800 SGM

SHOCK PROOF

800 SGE

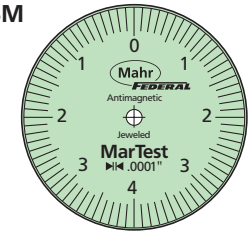
Inductive Probe Millimar 1318 see page 7-14

Technical Data

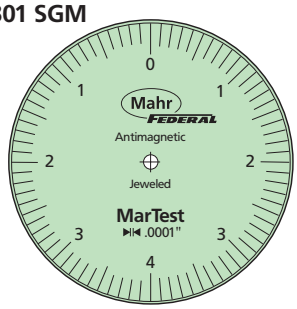
	Measuring range	Readings	Dial dia.	Measuring force	Length of styli	Order no.
800 SM	± 0.1 mm	0.002 mm	27.5 mm	0.15 N	14.5 mm	**4308150**
800 SGM	± 0.1 mm	0.002 mm	38 mm	0.15 N	14.5 mm	**4308200**
800 SGE	± 0.07 mm	0.001 mm	38 mm	0.2 N	9.1 mm	**4308220**
801 SM	***± .004"***	***.0001"***	***1.1"***	0.15 N	14.5 mm	**4308960**
801 SGM	***± .004"***	***.0001"***	***1.1"***	0.15 N	14.5 mm	**4308970**
801 SGE	***± .004"***	***.00005"***	***1.5"***	0.15 N	14.5 mm	**4308985**

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

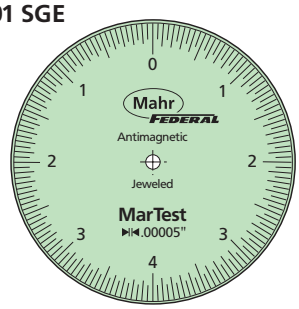
801 SM

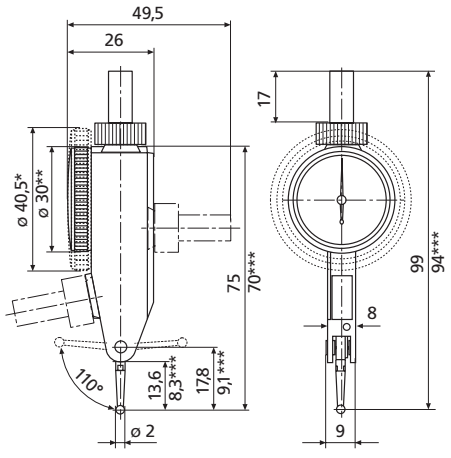


801 SGM



801 SGE





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

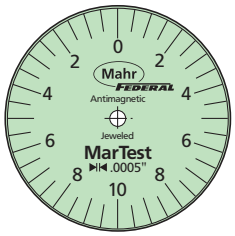
MarTest with extra long styli for measuring in even difficult to access positions

Technical Data

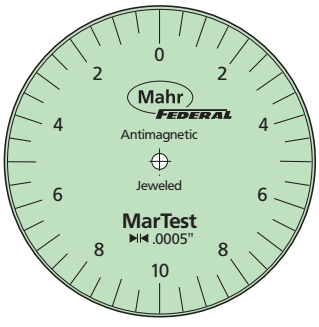
	Measuring range	Readings	Dial dia.	Measuring force	Length of styli	Order no.
800 SL	± 0.25 mm	0.01 mm	27.5 mm	0.07 N	41.24 mm	**4306200**
800 SGL	± 0.25 mm	0.01 mm	38 mm	0.07 N	41.24 mm	**4306250**
800 SGB	± 0.5 mm	0.01 mm	38 mm	0.1 N	32.3 mm	**4301300**
801 SL	***± .010"***	***.0005"***	***1.1"***	0.07 N	41.24 mm	**4306950**
801 SGL	***± .010"***	***.0005"***	***1.5"***	0.07 N	41.24 mm	**4306950**

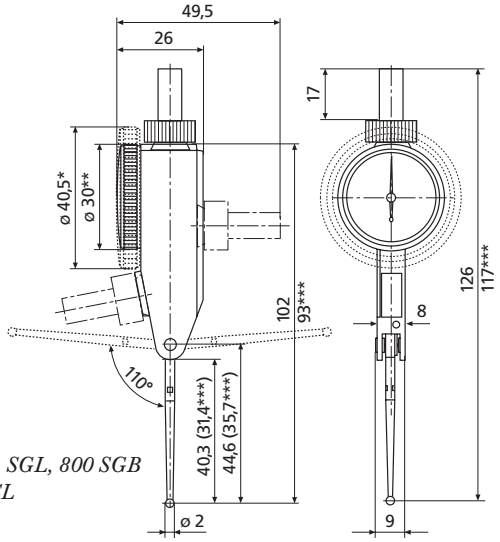
Supplied with:
Plastic storage case, spanner for changing the styli, styli dia. 2 mm, mounting shaft 800 a8 (for metric versions),
mounting shaft 800 a3/8 (for inch versions),
mounting shaft 800 a6 (800 SGB)

801 SL



801 SGL



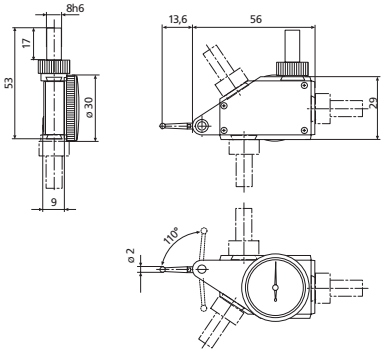


* *800 SGL, 801 SGL, 800 SGB*
** *800 SL, 801 SL*
*** *800 SGB*

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.
800 H	± 0.4 mm	0.01 mm	27.5 mm	0.25 N	14.5 mm	**4303200**
801 H	***± .015"***	***.0005"***	***1.1"***	0.25 N	14.5 mm	**4303950**

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

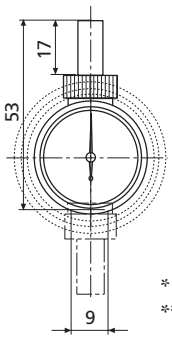
800 V

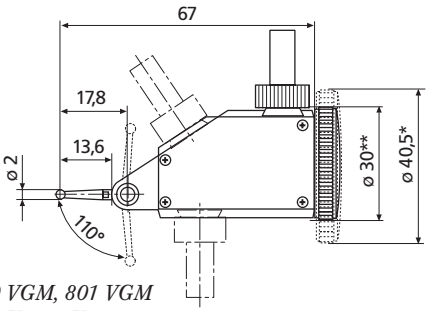
DIN 2270

800 VGM

DIN 2270

SHOCK PROOF





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

Technical Data

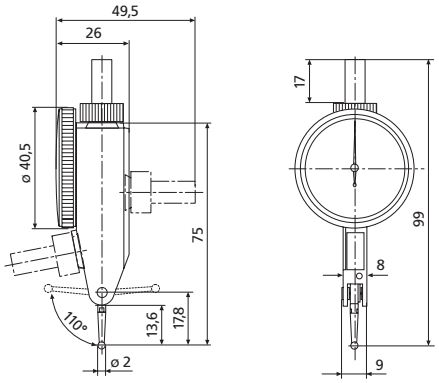
	Measuring range	Readings	Dial dia.	Measuring force	Length of styli	Order no.
800 V	± 0.4 mm	0.01 mm	27.5 mm	0.2 N	14.5 mm	**4302200**
800 VGM	± 0.1 mm	0.002 mm	38 mm	0.25 N	14.5 mm	**4302250**
801 V	***± .015"***	***.0005"***	***1.1"***	0.2 N	14.5 mm	**4302950**
801 VGM	***± .004"***	***.0001"***	***1.5"***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

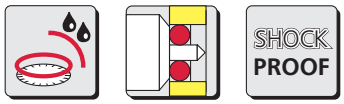
Supplied with:
Plastic storage case, spanner for changing the styli, styli dia. 2 mm, mounting shaft 800 a8 (for metric versions), mounting shaft 800 a3/8 (for inch versions)

MarTest with larger measuring range

800 SRM

800 SR/SRM





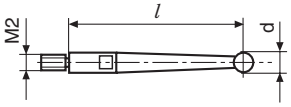
Technical Data

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

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 points



Styluses with carbide contact points

Spanner for changing the styluses **4305868**

Model	Stylus length *l*	Styluses					
		Carbide contact point				Ruby contact point	
			d				d
		Cat. no.	dia. 1 mm	dia. 2 mm	dia. 3 mm	Cat. no.	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**

Digital Test Indicator MarTest 800 EW

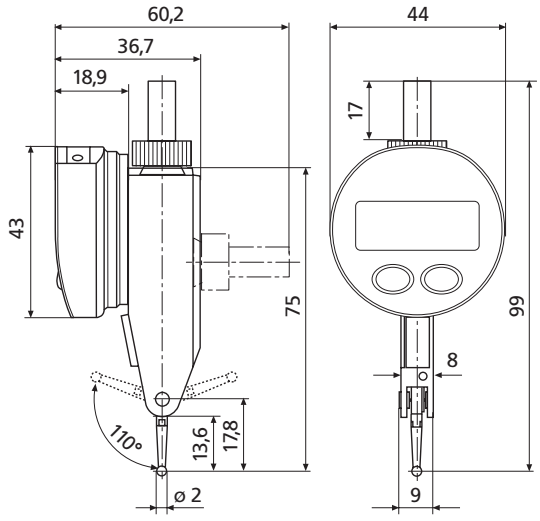
Features

Functions:
ON/OFF
RESET (Set display to zero)
mm/inch
MAX/MIN memory
MAX-MIN ideal for testing concentricity an flatness
Auto-OFF

- Inductive measuring system, battery life span ca. 2 years
- MarConnect data output, choose alternatively:
  USB
  OPTO RS232C
- Operating unit is protected against coolants and lubricants, protection class IP65
- Combined analog and digital display
- Operating and display unit (bezel) can be rotated through 360°
- Satin chrome finished housing with 3 dovetail guideways
- Shockproof, movement bearings are jewelled
- Automatic matching to sensing direction
- Anti-magnetic
- Double lever supported in ball bearings, overload protection provided by slip clutch
- Supplied with:
  Plastic case, spanner to change the styluses, contact point dia. 2 mm, mounting shaft 800h8

Technical Data

	Measuring range mm (inch)	**Resolution** switchable mm/inch	**Measuring force** N	**Length of styli** mm	**Order no.**
800 EW	± 0.4 (± .015")	0.001/ ***.00005"*** 0.01/ ***.0005"***	0.13	14.5	**4305120**



Accessories

		Order no.
Styli, with carbide contact point dia. 1 mm		**4305870**
Styli, with carbide contact point dia. 2 mm		**4305850**
Styli, with carbide contact point dia. 3 mm		**4305871**
Styli, with ruby contact point dia. 2 mm		**4309051**
Battery 3V, Type CR 2032		**4102520**
Data Connection Cable USB	**800 EWu**	**4305121**
Data Connection Cable Opto RS232	**800 EWr**	**4305122**

Accessories for Data Processing Chapter 11

Digital Test Indicator MarTest 800 EWL

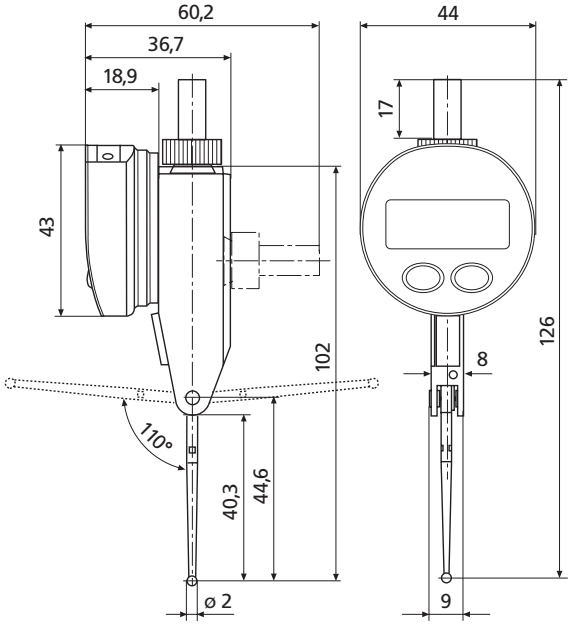
Features

Functions:
ON/OFF
RESET (Set display to zero)
mm/inch
MAX/MIN memory
MAX-MIN ideal for testing concentricity an flatness
Auto-OFF

- Inductive measuring system, battery life span ca. 2 years
- MarConnect data output, choose alternatively:
  USB
  OPTO RS232C
- Operating unit is protected against coolants and lubricants, protection class IP65
- Combined analog and digital display
- Operating and display unit (bezel) can be rotated through 360°
- Satin chrome finished housing with 3 dovetail guideways
- Shockproof, movement bearings are jewelled
- Automatic matching to sensing direction
- Anti-magnetic
- Double lever supported in ball bearings, overload protection provided by slip clutch
- Supplied with:
  Plastic case, spanner to change the styluses, contact point dia. 2 mm, mounting shaft 800h8

Technical Data

	Measuring range mm (inch)	**Resolution** switchable mm/inch	**Measuring force** N	**Length of styli** mm	**Order no.**
800 EWL	± 0.25 (± .010")	0.001/ ***.00005"*** 0.01/ ***.0005"***	0.07	41.24	**4306120**



Accessories

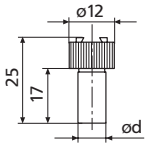
		Order no.
Styli, with carbide contact point dia. 1 mm		**4306851**
Styli, with carbide contact point dia. 2 mm		**4306850**
Styli, with carbide contact point dia. 3 mm		**4306853**
Styli, with ruby contact point dia. 2 mm		**4309853**
Battery 3V, Type CR 2032		**4102520**
Data Connection Cable USB	**800 EWu**	**4305121**
Data Connection Cable Opto RS232	**800 EWr**	**4305122**

Accessories for Data Processing Chapter 11

Martest - Accessories

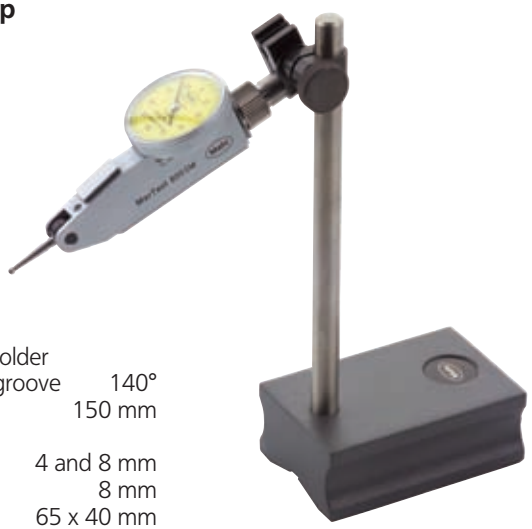
Mounting shaft for dovetail

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

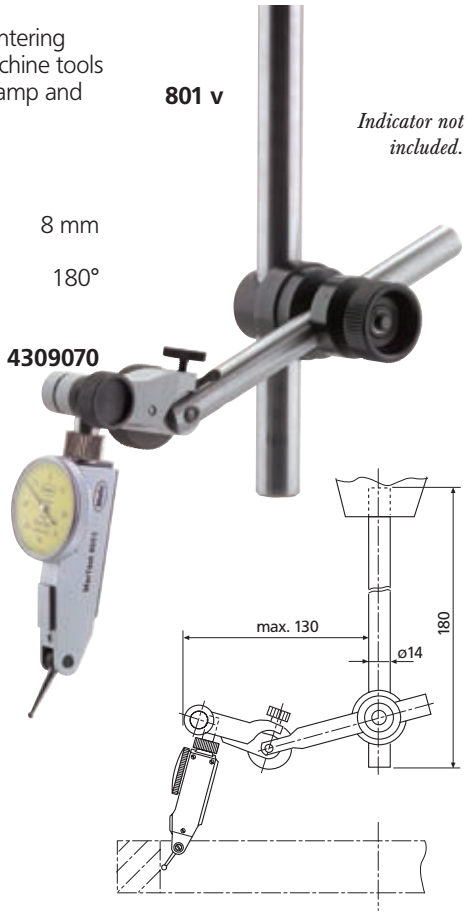
- For aligning and centering work pieces on machine tools
- Swivel mounting clamp and fine adjustment
- Stainless steel rods

801 v

Indicator not included.

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

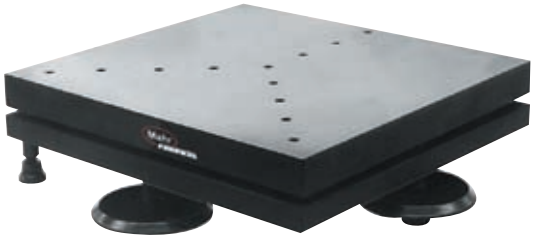
Order no. **4309070**



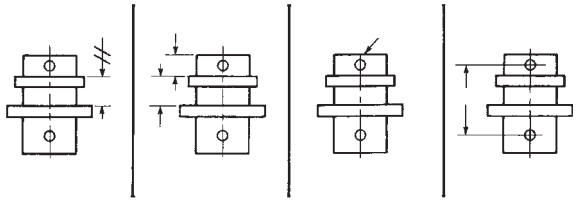
Leveling Table TE-20

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.

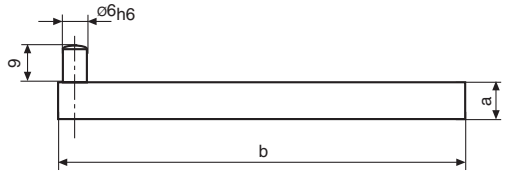


Parallelism | Step Height | Flatness | Center distance

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

Martest - Accessories

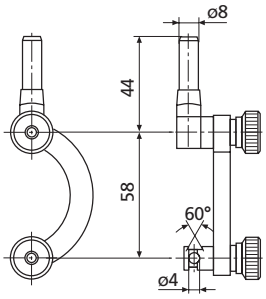
Holder 800 h



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

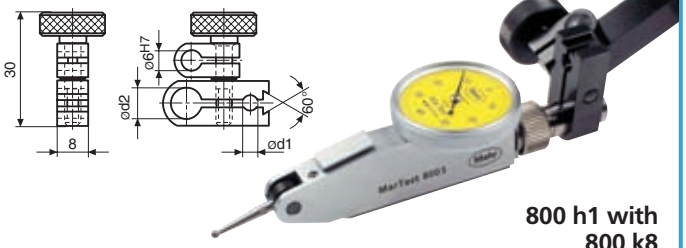
Universal centering support frame 800 b

Order no. 4305893



Indicator not included.

Universal clamp 800 k

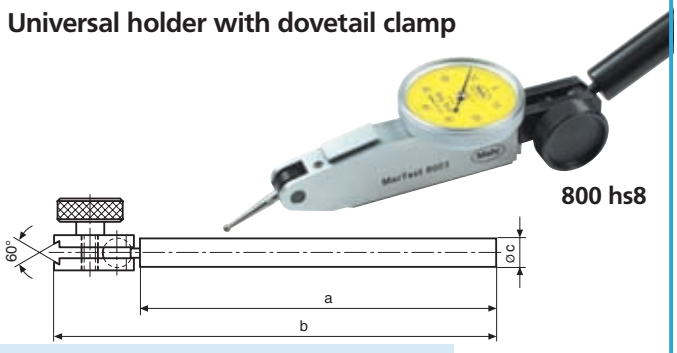


800 h1 with 800 k8

	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

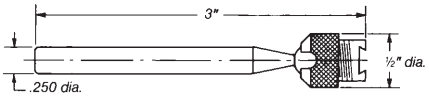
	Dimensions			Order no.
	a	b	dia. c	
800 hs8	100	124	8	**4305886**
800 hs3/8	***4"***	***5"***	***3/8"***	**4305887**

Indicator not included.

Ball Clamp

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

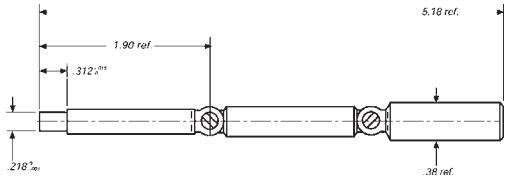
Order no. **AT-50**



Double-jointed Clamp

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

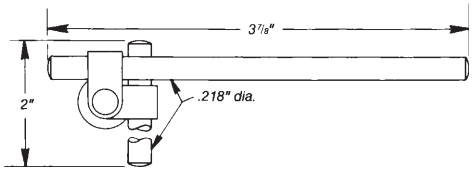
Order no. **AT-100**



Jig Borer Attachment

- Furnished with two rods and clamp for fast machine mounting

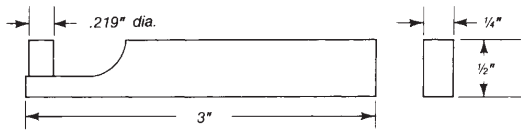
Order no. **RD-21**



Holding Bar

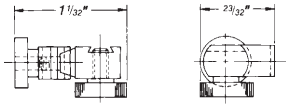
- Normally furnished with MarTest models. Three-inch length provides ample reach for most applications

Order no. **HB-2157**



Swivel Clamp

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



Order no. **CP-2199**

Martest - Accessories

Test Stand 1492B

- Use with any MarTest Indicator - Support arms stepped at one end (.218in dia.) for Swivel Clamp (CP-2199) included.
- 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	*(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.

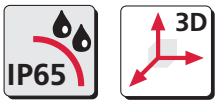
Transfer Stand 2300

- 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	*(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 MarTest 802 NW



Applications

Can be used on milling and CNC 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

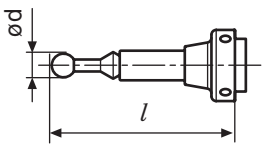
- High accuracy and linearity
  - suitable for measuring work pieces
  - measurement over the entire working range is possible
- Can be controlled independently of a machine tool
- Easy to read display
- Large working range in all axis (X, Y, Z) prevents damage to the stylus by contacting errors
- Shock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

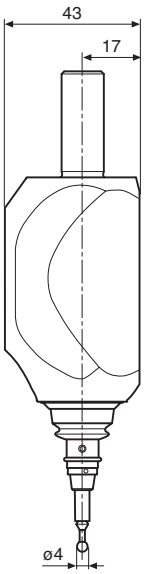
Technical Data

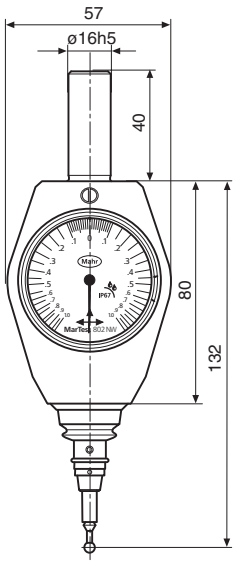
	Repeatability in zero position unidirectional	Readings	Dial dia.	Mounting shaft dia.	Order no.
802 NW	± 0.01 mm	0.01 mm	50 mm	16 mm	**4304311**

Accessories

Styli	dia. d mm	*l* mm	Order no.
802 EWt	4	31	**4304320**
802 NWt	6	56.6	**4304321**







Digital 3D-Touch Probe MarTest 802 EW

Applications

Can be used on milling and CNC 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
- Supplied with: Battery and operating instructions

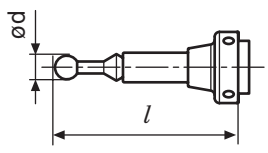
Technical Data

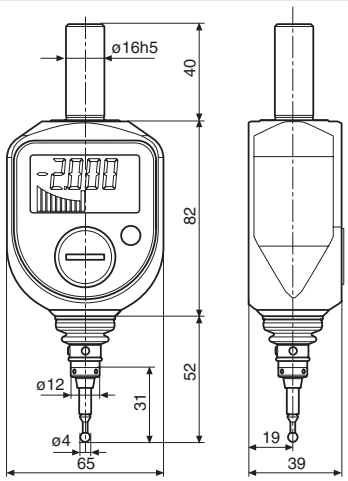
	Working range X. Y. Z-Axis	Repeatability in zero position unidirectional	Resolution of digital display	Display range	Mounting shaft dia.	Order no.
802 EW	-2 to 4 mm	± 0.005 mm	0.005 mm	± 2 mm	16 mm	**4304300**
802 EWZ	***-.0787"*** to ***.157"***	***± .0001"***	***.0001"***	***± .0787"***	***3/4"***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

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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

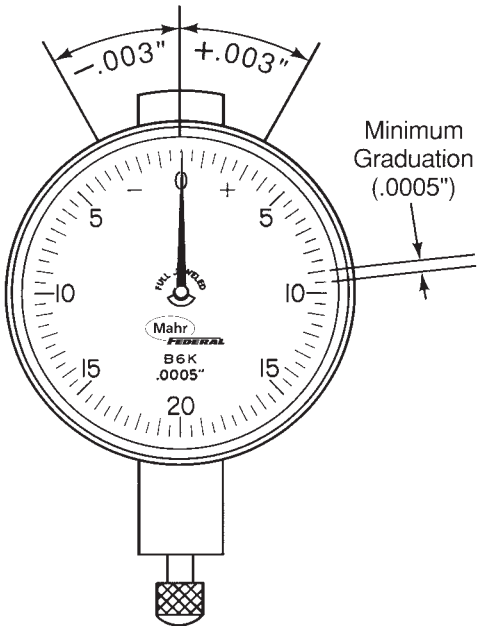
Since modern manufacturing involves a wide range of tolerances. choosing a dial indicator might be difficult, especially since the number of indicators available is so vast. The following guidelines were prepared to assist you in selecting the right model for your application.

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:

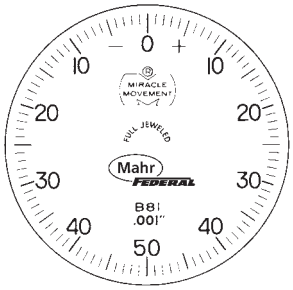
The American Society of Mechanical Engineers
ASME Order Desk
22 Law Drive
Fairfield, NJ 07007
(973)882-1167

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.

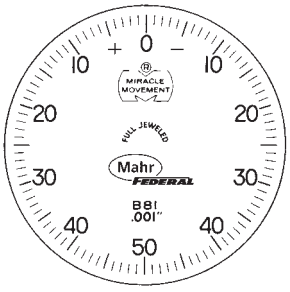
Note: If Revolution Counter models are ordered, counter dial numbered counterclockwise.



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

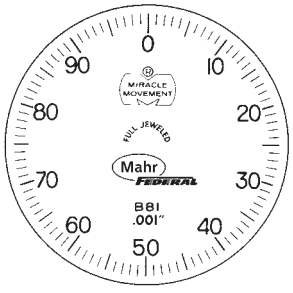
Note: With Revolution Counter models, counter dial numbered clockwise.

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



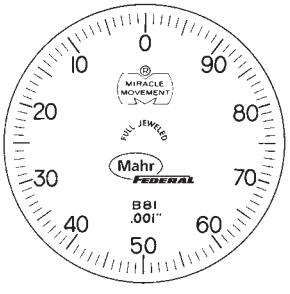
3. Continuous clockwise.
Normally furnished on Long and Extra Long Range Indicators, unless otherwise specified. Indicates an increasing value when contact is depressed as in direct-reading thickness gages.

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.

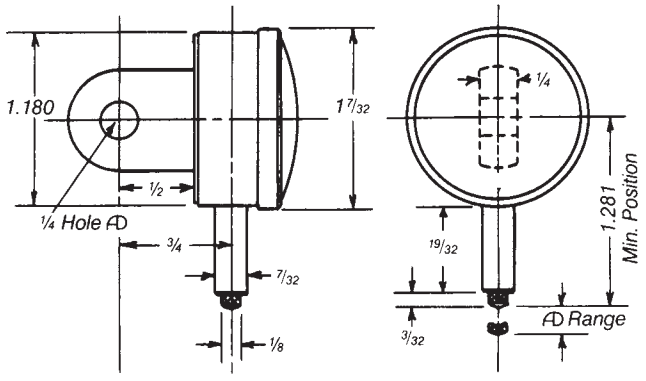
Technical Data

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

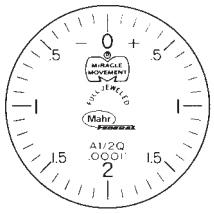
Measuring range	Graduation value	Dial style	Range per revolution	Accuracy	Order no.
0.250	0.002	0-5-0	0.100	± 0.002 mm	**N1/2O**
1.250	0.005	0-25-0	0.500	± 0.005 mm	**N3I**
2.500	0.010	0-50-0	1.00	± 0.010 mm	**N6I**



Backs can be rotated 90° and 180°

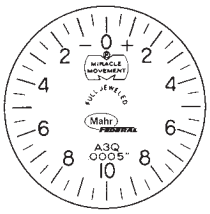
Dial Indicators per ANSI/AGD Group 0 - Mahr Federal Series A and N

Mahr Federal Series A

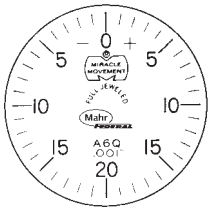


A1/2Q

A2I



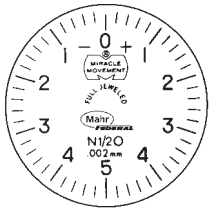
A3Q



A6Q

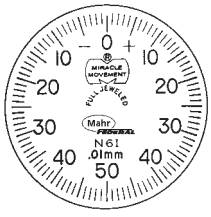
- Normally furnished: balanced dial with + on right; centered vertical lug back; regular contact point, .09" radiused, .093" long.
- Optional dials: balanced with + on left; continuous clockwise; continuous counter-clockwise. Order by part number and specify dial style desired.
- For other dial styles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

Mahr Federal Series N



N1/2O

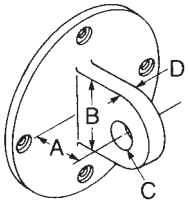
N3I



N6I

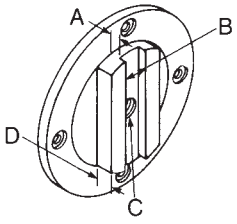
Backs for ANSI Group 0 - Series A and N

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



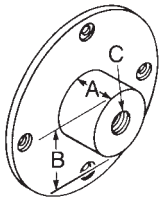
Vertical Lug (Centered)
BK-37

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



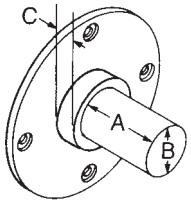
Adjustable
BK-45

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



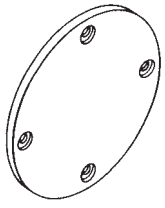
Screw Type
BK-88

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



Post
BK-38

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

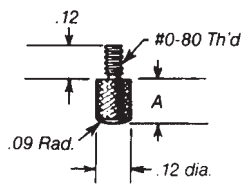


Flat
BK-32

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

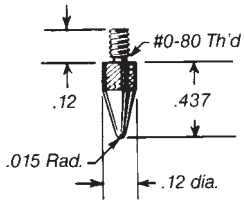
Points for ANSI Group 0 - Series A and N

Regular PT-43
normally furnished

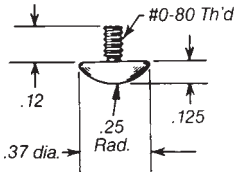


Dim. A	Style
3/32"	PT-43
1/4"	PT-204
3/8"	PT-205
1/2"	PT-207
5/8"	PT-208
3/4"	PT-209
7/8"	PT-210
1"	PT-211

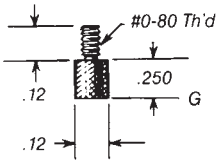
Taper
PT-119



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**

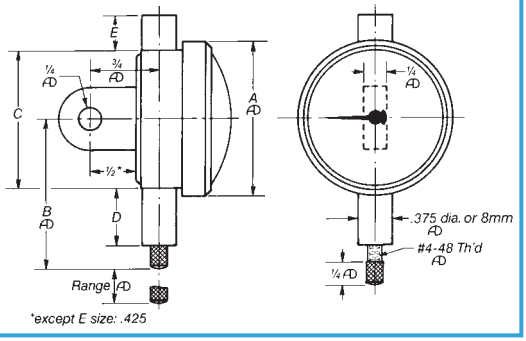
Mahr Federal Series O (Metric, mm)
Dial: approx. 45 mm dia. with yellow tint

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. 2.250" 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	± 0.004	**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	± 0.004	**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**

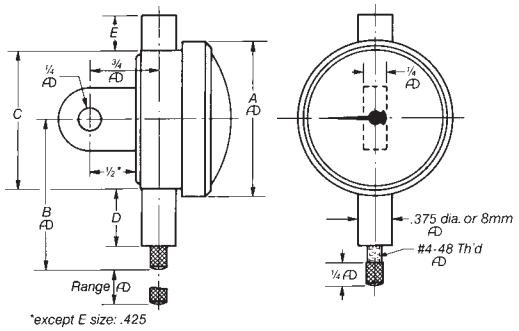
Mahr Federal Series R (Metric, mm)
Dial: approx. 92 mm dia. with yellow tint

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	± 0.004	**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
- Flat back

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, 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

2016005

2016002

Technical Data

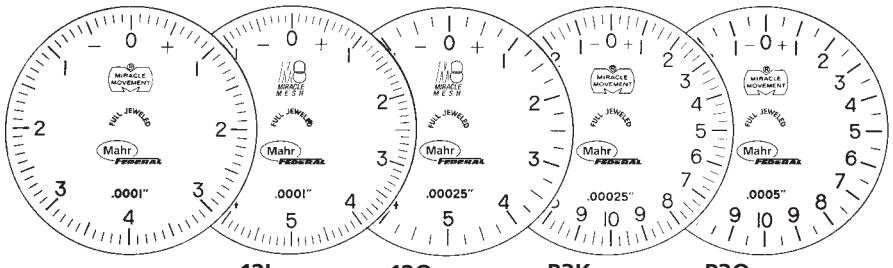
Measuring Range	Graduation value	Stem diameter	Dial style	Range per Rev.	Rev. Counter	Order no.
.250"	***.001"***	***.375"***	0-100	***.100"***	Standard	**2016005**
.500"	***.001"***	***.375"***	0-100	***.100"***	Speed read	**2016004**
1.00"	***.001"***	***.375"***	0-100	***.100"***	Speed read	**2016002**

Accessories

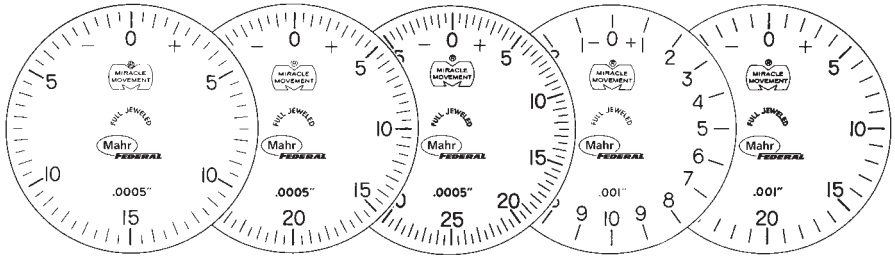
- Contact Points - see page 5-27

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

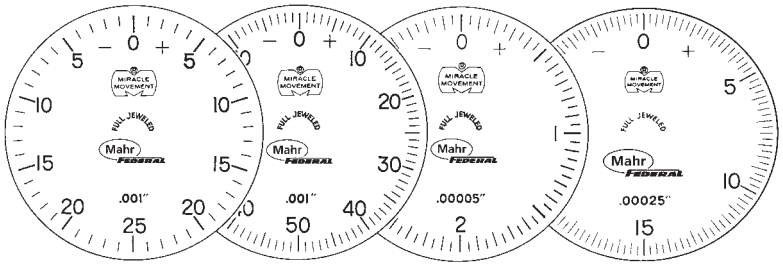
Mahr Federal Series B thru E



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

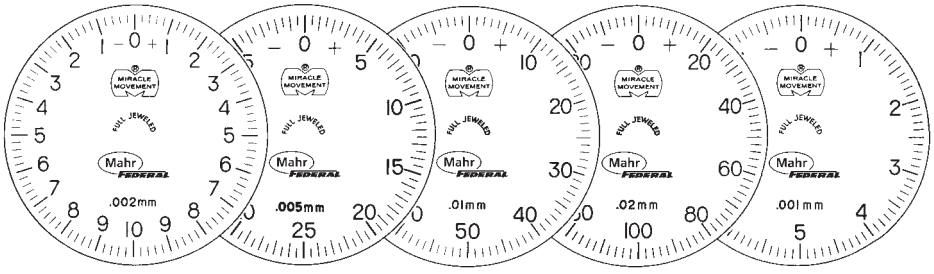


B5M	B6K	B7I	B3W	B6Q
2015786	2015787	2015790	2015785	2015789
D5M	D6K	D7I	D3W	D6Q
E5M		E7I	E3W	



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

Mahr Federal Series O thru R



O1I	O3I	O6I	Q8I	
P1I	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.

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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	**D8IS**	**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 = .0003" for full range*
*** *for first 1 inch of travel.*

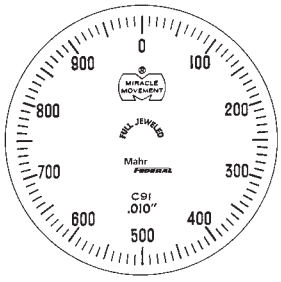
Long Range/Extra Long Range (Metric)
Dial: yellow tint

Measuring range	Graduation value	Dial style	Range per revolution	Accuracy	ANSI/AGD	Model no.	Order no.
25.000	0.010	0-100	1.000	0.020	2	**SP6IS**	
25.000	0.010	0-100	1.000	0.020	3	**SQ6IS**	
Extra Long Range							
50.000	0.025	0-25	2.500	0.025****	3	**Q8IT**	
75.000	0.025	0-25	2.500	0.025****	4	**R8IU**	

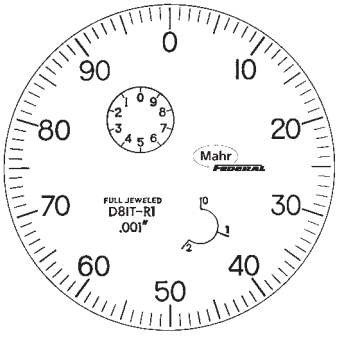
**** *for first 25 mm of travel.*

Dial Styles for Long Range and Extra Long Range Indicators

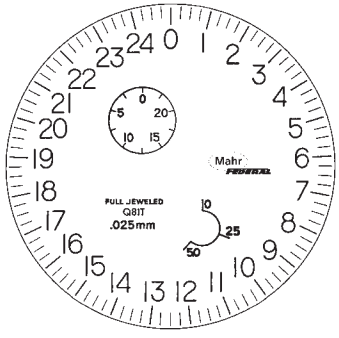
28IQN, 28ISN & D8IS



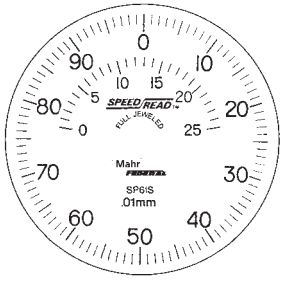
29I



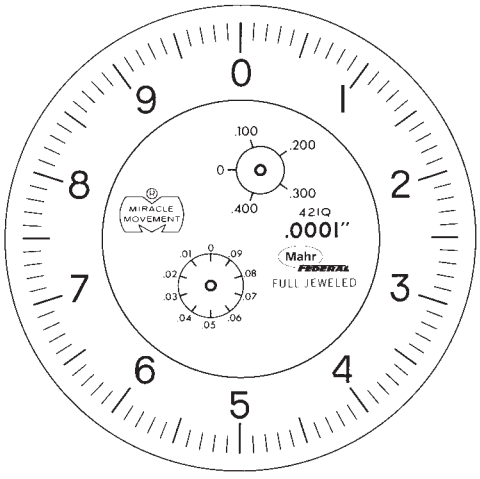
D8IT & E8IU



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.

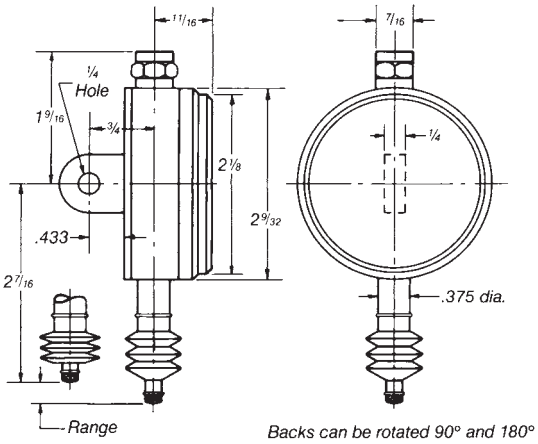
Technical Data

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

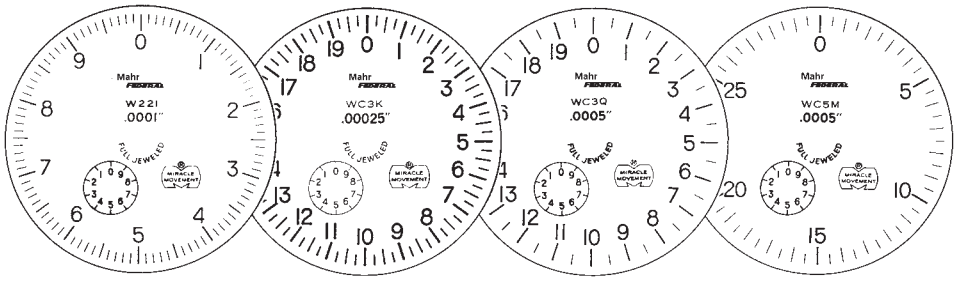
Measuring range	Graduation value	Dial style	Range per revolution	Accuracy	Order no.
0.500	0.002	0-20	0.200	0.004	**WP1I**
1.250	0.005	0-50	0.500	0.005	**WP3I**
2.500	0.010	0-100	1.000	0.010	**WP6I**



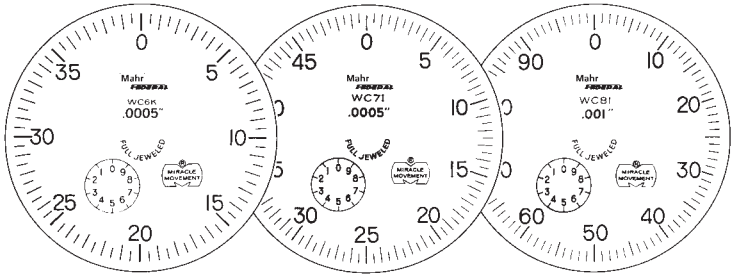
Backs can be rotated 90° and 180°

Dial Styles for WC and WP Wetproof Dial Indicators

Series WC indicators

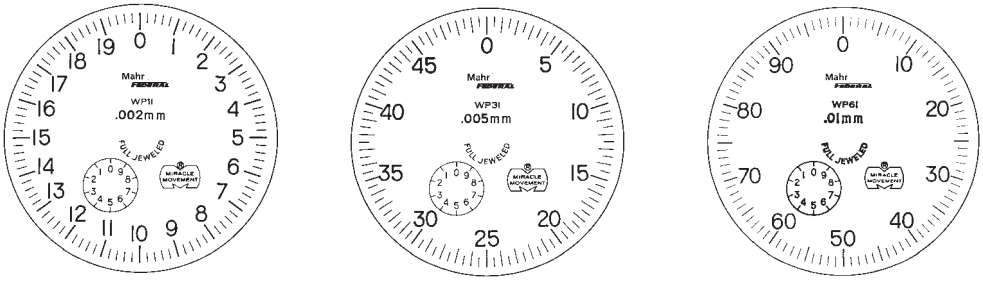


W22I **WC3K** **WC3Q** **WC5M**



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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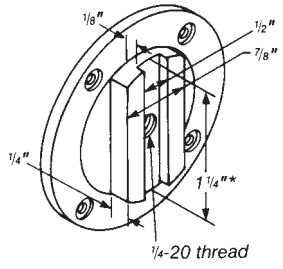
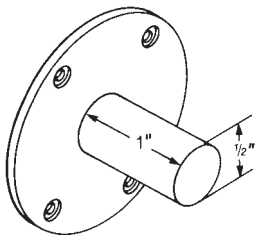
Backs for Wetproof Dial Indicators

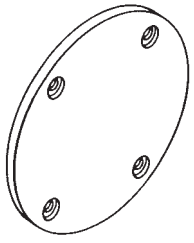
Vertical (centered) lug back is normally furnished and included in price of indicator. Back can be rotated 90° for horizontal lug mounting.



BK-68
Adjustable Back



BK-90
Post Back



BK-97
Flat Back

Perpendicular Dial Indicators

Provides improved readability where other style indicators cannot be used.

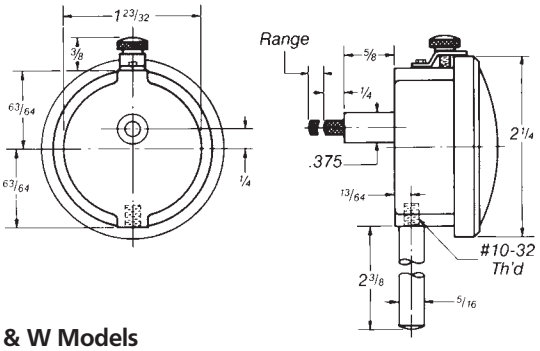
Technical Data

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

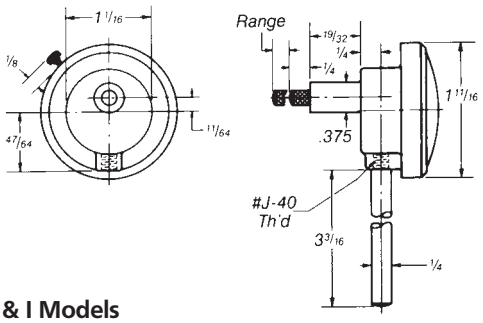
Measuring range	Graduation value	Dial style	Range per revolution	Accuracy	Gear type	Dial Dia. (approx.)	Order no.
.008"	***.0001"***	0-4-0	***.008"***	***.0001"***	crown	***2-1/4"***	**J1K**
.040"	***.0005"***	0-20-0	***.040"***	***.0005"***	crown	***2-1/4"***	**J6K**
.100"	***.0005"***	0-12-0	***.025"***	***.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



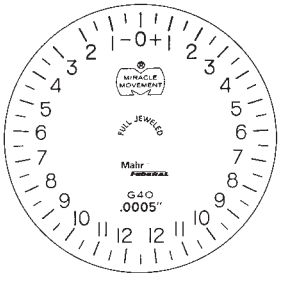
V & I Models

Dial Styles for Perpendicular Indicators

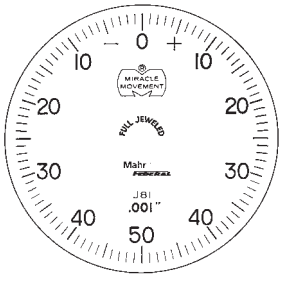
Series J, G, V, F

J1K

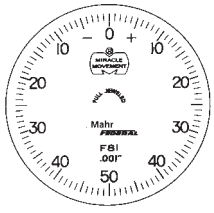
J6K



G40

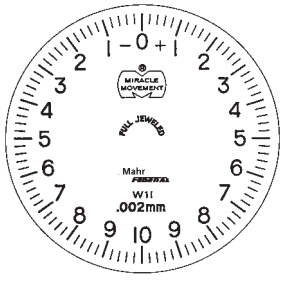


J8I & G8I

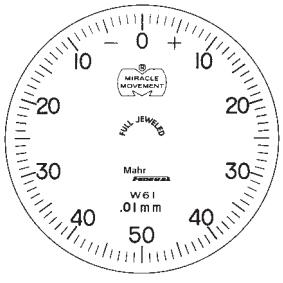


V8I & F8I

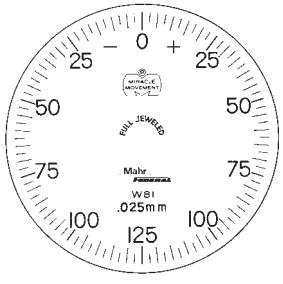
Series W, I



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.

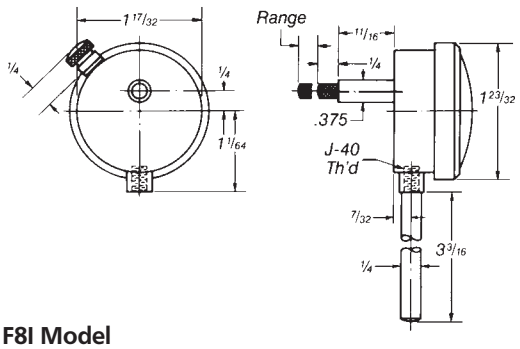
Accessories

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

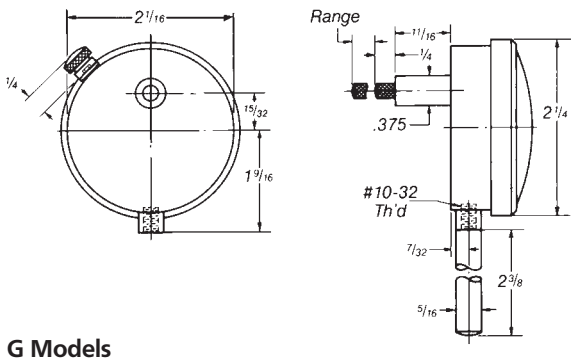
Ordering Information

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

www.mahr.com



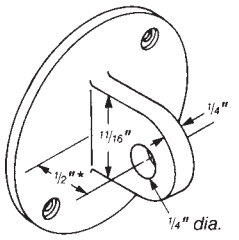
F8I Model



G Models

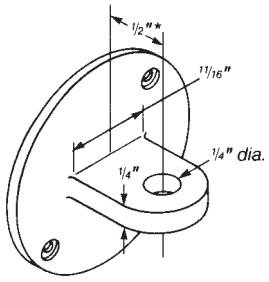
Backs for ANSI/AGD Group 1, 2, 3, and 4 Dial Indicators

Vertical Lug
(centered) normally furnished

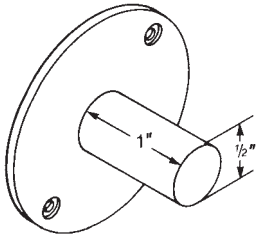


*$^{27}/_{64}$" for E/R size

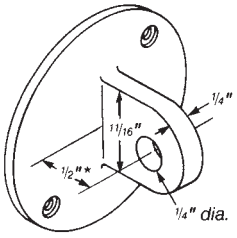
Horizontal Lug
(centered)



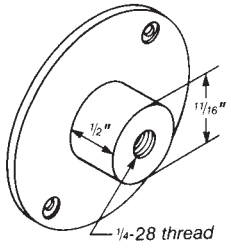
Post



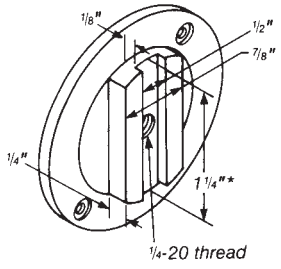
Vertical Lug
(offset) Left face of lug is on centerline of back



Screw Type

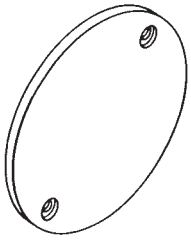


Adjustable



*$^{7}/_{8}$" 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.

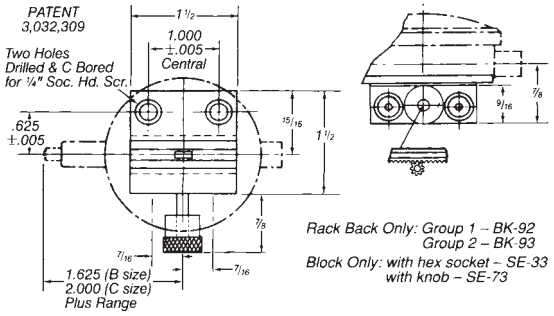
Ordering Numbers

	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

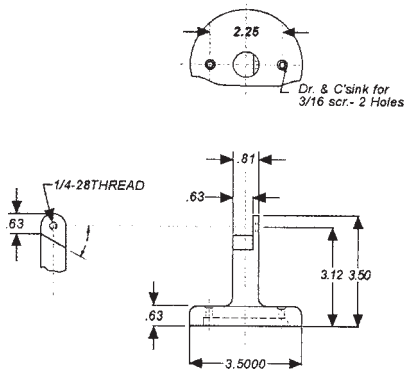
Mahr Federal Indicator	Used with	Order no.
Group 1	hex socket adjust	**AT-27**
Group 1	adjusting knob	**AT-115**
Group 2	hex socket adjust	**AT-28**
Group 2	adjusting knob	**AT-116**

Universal Mounting Base

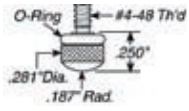
Features

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

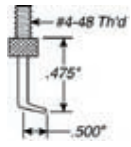
Order no. **BA-1051**



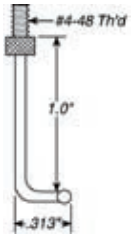
Added flexibility for your Mahr Federal Dial Indicators



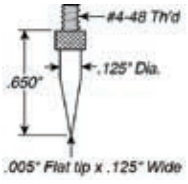
PT-2263



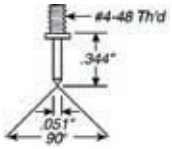
PT-2267



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, Male M2.5 thread to 4-48 Female thread (.375" length)	**AD-185**
4-48 Male to M2.5 FemaleThreaded 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**.

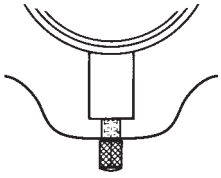
Lifting Levers - CAM Type.

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*
** *Requires case to have Bezel Clamp on Left*

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**.
8 mm stem, Order **AD-190**.

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 counter-bore, **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.
- RS232 Output.

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

All too often we have blinders on and don't look at the whole picture on how a precision gage can do more than what's its intended to do. Take for example our Dial Indicator Calibrators 400B-3 & 400B-4. We look at it and know that its purpose is to calibrate AGD dial indicators right? But let's take it a step further! If we add the Universal centering support frame 800b (part number 4305893) from the test indicator section of our catalog and an 8mm to .375" bushing (part number 4310103) we now have the ability to calibrate test indicators having a .0001" / .002mm resolution giving the once only dial indicator calibrator a DUAL PURPOSE!

- 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

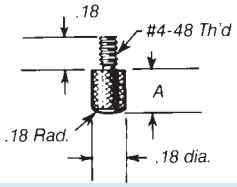
	Range	Minimum Graduation	Accuracy	Order no.
Metric (mm)	2.5 12.5	0.0002 0.001	±0.4 µm ±0.8 µm	**400B-25**
Inch	***.100"*** ***.500"***	***.000010"*** ***.000050"***	***±20µ"*** ***±30µ"***	**400B-5**

- 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 *Maxμmill*® 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

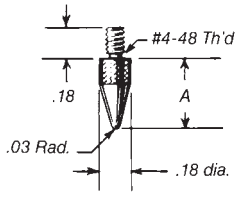
1/8" to ***1"***	PT-116

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



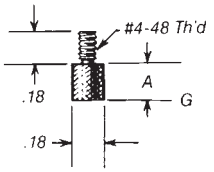
Hardened Steel (inch)

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

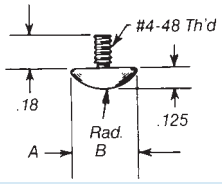
Tungsten Carbide

1/4"	AL-51

Set of 8 Steel

1/8" to ***1"***	AL-55

Button



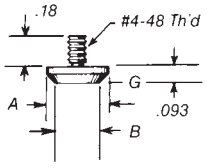
Hardened Steel (inch)

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

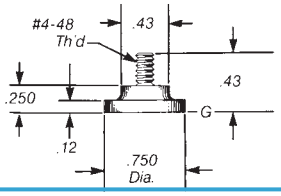
Tungsten Carbide (inch)

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

Set of 8 Steel (Metric***)

9.04	6.35	EAL-1021

Extra Wide Face



Hardened Steel

Order no.	AL-291

MarCator Dial Indicators (DIN Style)

OVERVIEW

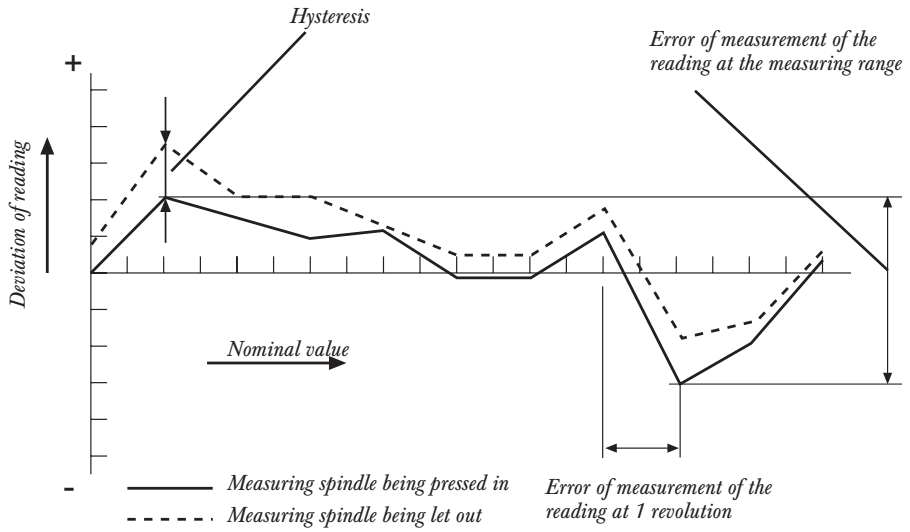
Precision Small Dial Indicators

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
DIN EN ISO 463						
Limit value for measurement error at the reading		Meas. range	10 µm	12 µm	10 µm	10 µm
		1 revolution	9 µm	9 µm	9 µm	9 µm
		1/2 revolution	8 µm	8 µm	8 µm	8 µm
		1/10 revolution	5 µm	5 µm	5 µm	5 µm
Limit value for		Repeatability	3 µm	3 µm	3 µm	3 µm
Limit value for		Hysteresis	3 µm	3 µm	3 µm	3 µm
Shockproof					●	●
Measuring force			0.7 - 1.1 N	0.7 - 1.1 N	0.7 - 1.1 N	0.7 - 1.7 N
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
DIN EN ISO 463						
Limit value for measurement error at the reading		Meas. range	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	5 µm	5 µm	5 µm	5 µm
Limit value for		Repeatability	3 µm	3 µm	3 µm	3 µm
Limit value for		Hysteresis	3 µm	3 µm	3 µm	3 µm
Shockproof					●	●
Measuring force			0.7 - 1.3 N	0.7 - 1.3 N	0.7 - 1.3 N	0.7 - 1.6 N
Order no.			**4311050**	**4311060**	**4311000**	**4315000**

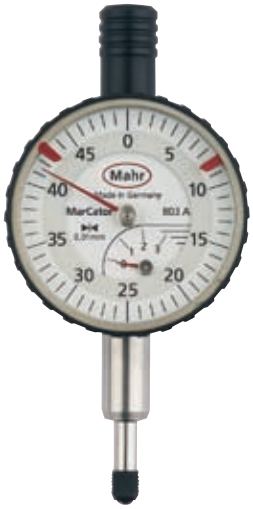
Metrological characteristics



	803 SB	803 AZ
	0.4 mm (±0.2)	***.120"***
	0.01 mm	***.0005"***
	0-20-0	0-20
	DIN 878	Factory standard
	9 µm	***.0004"***
	8 µm	
	5 µm	***.0002"***
	3 µm	***.00012"***
	3 µm	***.00012"***
	●	
	0.9 - 1.1 N	0.7 - 1.1 N
	4324250	**4324900**

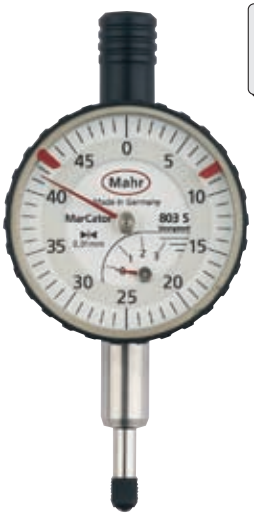
	810 SB	810 SM	810 SRM	810 AZ	810 AU	810 AX	810 AG	810 SV
	0.8 mm (±0.4)	1 mm	5 mm	***.400"***	10 mm	10 mm	10 mm	40 mm
	0.01	0.001	0.001	***.0005"***	0.01	0.1	0.01	0.01
	0-40-0	0-100	0-100	***0-45***	100-0	0-10	0-100	0-100
	DIN 878	Factory standard	Factory standard	Factory standard	Factory standard	Factory standard	Factory standard	Factory standard
	7 µm	4 µm	10 µm	***.0005"***	15 µm	50 µm	17 µm	25 µm
		3 µm	7 µm		10 µm	50 µm	15 µm	15 µm
	6 µm	2 µm	3 µm		9 µm	30 µm	10 µm	10 µm
	5 µm	1 µm	2 µm	***.0002"***	5 µm	15 µm	5 µm	5 µm
	3 µm	1.5 µm	3 µm	***.00012"***	5 µm	15 µm	3 µm	3 µm
	3 µm	1.5 µm	3 µm	***.00012"***	5 µm	15 µm	5 µm	6 µm
	●	●	●					●
	0.7 - 1.1 N	1.3 - 1.8 N	1.2 - 1.7 N	0.9 - 1.5 N	1.0 - 1.8 N	0.7 - 1.3 N	1.3 - 2.2 N	0.8 - 1.8 N
	4317000	**4311070**	**4311080**	**4311900**	**4329050**	**4331000**	**4322000**	**4321000**

Precision Small Dial Indicators 803 / 805 DIN style



803 A

805 A



803 S

SHOCK PROOF

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

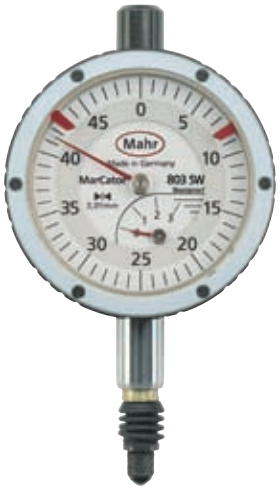
- High precision gears and pinions
- Lifter protection cap on the upper end of the measuring spindle
- Adjustable tolerance markers
- Chrome-plated housing

All indicators are 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 - 1.7	●	**4326000**
803 SB	0.4 (±0.2)	0.01	34	4.5	8h6	0.9 - 1.1	●	**4324250**
803 AZ	***.120"***	***.0005"***	***1.4"***	***.008"***	8h6	0.7 - 1.1		**4324900**

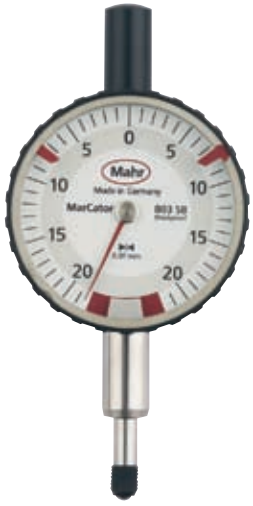
Precision Small Dial Indicators 803 / 805 DIN style



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

Small Dial Indicator 803 SB
with limited measuring range

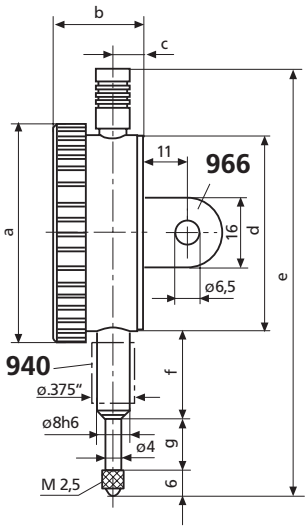
Design features identical to 803 S, with the following exceptions:
- Limited measuring range (0.4 mm) for error-free readings
- Large overtravel (ca. 4.5 mm), for easier insertion of test items in measuring devices
- Hermetically sealed upper protective measuring spindle cap

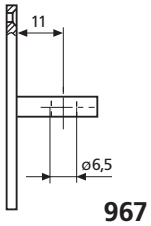
Small Dial Indicator 803 AZ
Inch version

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





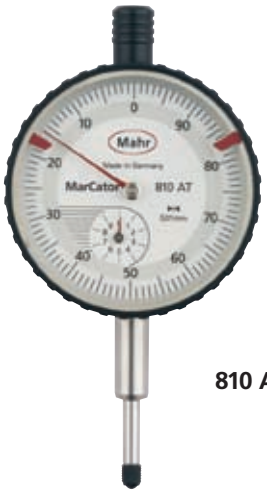
967

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**

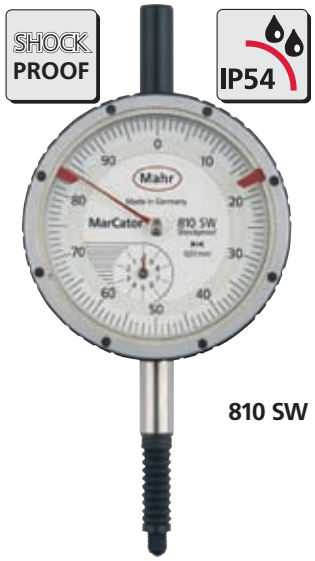
Precision Dial Indicators 810 DIN style

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

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

All indicators are 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.
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	0.7 - 1.3	●	**4311000**
810 SW	10	0.01	50	0.1	8h6	0.7 - 1.6	●	**4315000**
810 SB	0.8 (±0.4)	0.01	50	9	8h6	0.7 - 1.1	●	**4317000**
810 SM	1	0.001	50	4	8h6	1.3 - 1.8		**4311070**
810 SRM	5	0.001	50	0.1	8h6	1.2 - 1.7		**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**

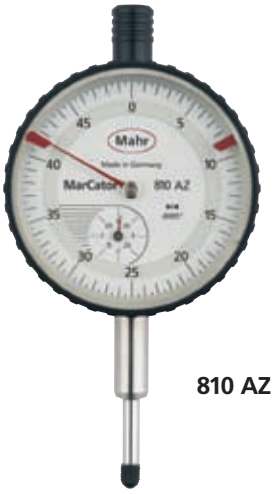
		Order no.
Mounting Lug		
Bore perpendicular to mounting shank	**961**	**4375010**
Bore parallel to mounting shank	**962**	**4375011**

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 (ca. 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

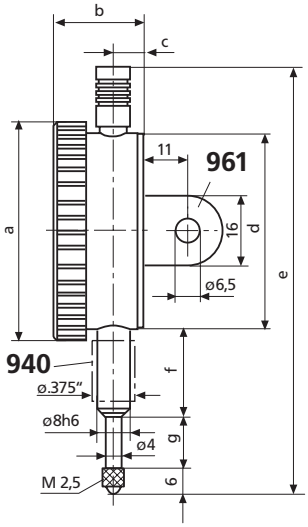
- High precision gears and pinions
- Lifter protection cap on the upper end of the measuring spindle
- Adjustable tolerance markers
- Chrome-plated housing

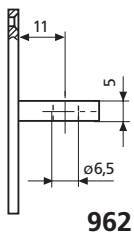
Dial Indicator 810 AZ
Inch version

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

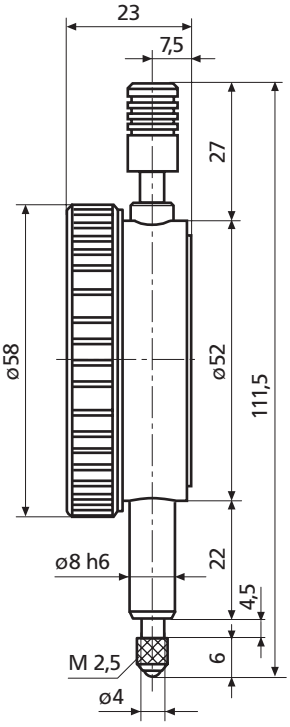
mm	a	b	c	d	e	f	g
810 A/AT	ø 58	23	7.5	52	112	21	16
810 S	ø 58	23	7.5	52	111.5	22	15
810 SW	ø 61	24.15	7.9	52	127.6	22	22.1
810 SB	ø 58	23	7.5	52	120	22	15
810 SM	ø 58	25	8.5	52	111.5	22	15
810 SRM	ø 58	23	7.5	52	111.5	22	15
810 AZ	ø 58	23	7.5	52	111.5	22	15

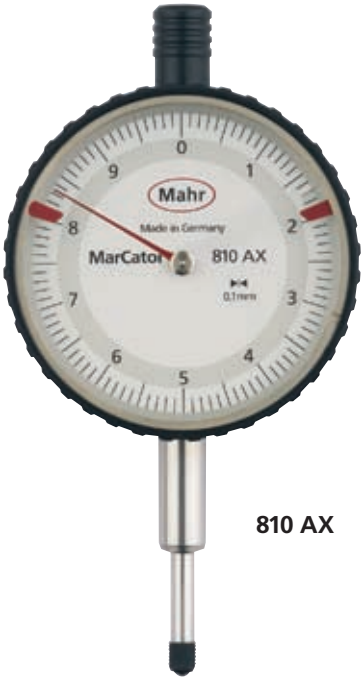




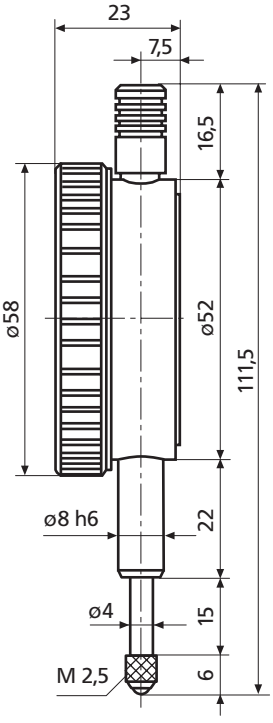
Precision Dial Indicators 810

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

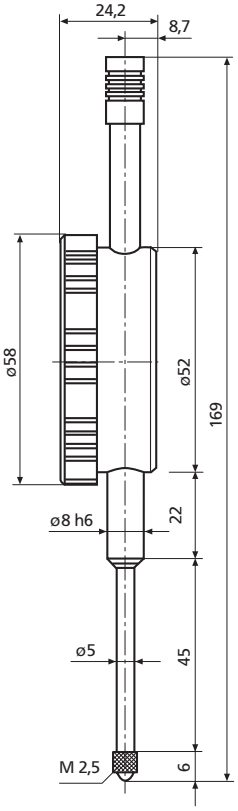
Dial Indicator 810 AX
with reading 0.1 mm

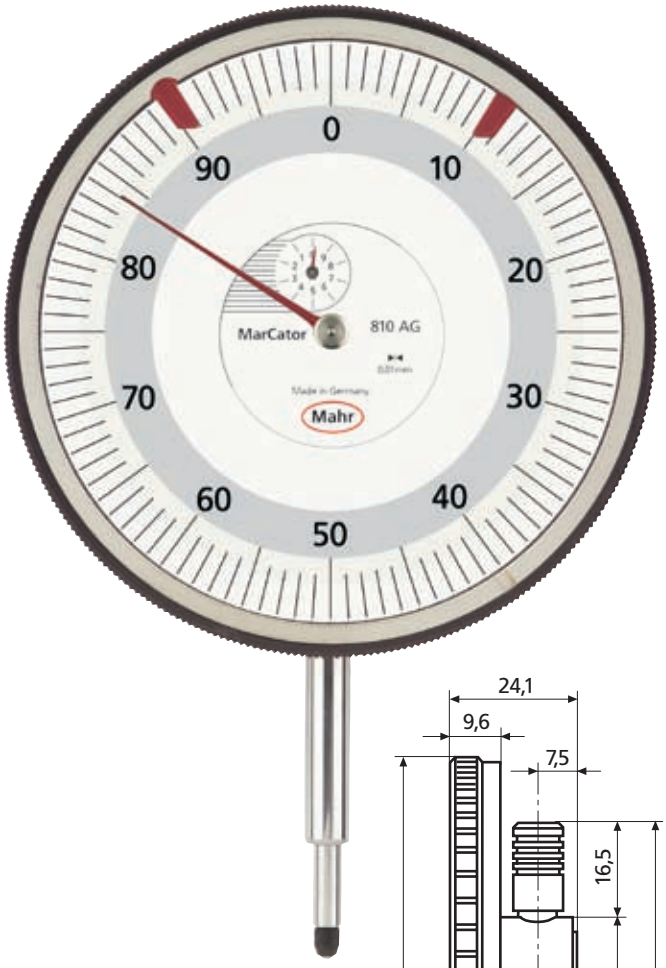
- Constant measuring force
- Chrome-plated housing
- Adjustable tolerance markers
- 1 pointer movement on 10 mm
- Delivered in plastic case

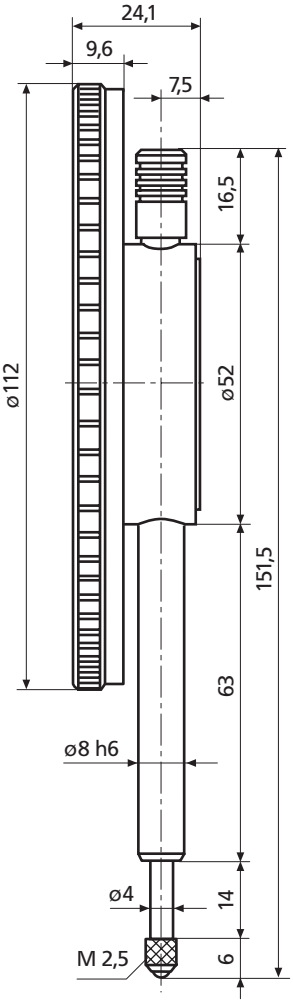
Technical Data

	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	0.7 - 1.3	**4331000**
810 SV	40	0.01	50	0.1	8h6	0.8 - 1.8	**4321000**
810 AG	10	0.01	108	0.1	8h6	1.3 - 2.2	**4322000**

Precision Dial Indicators 810







Features

Long Range Dial Indicator 810 SV
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)

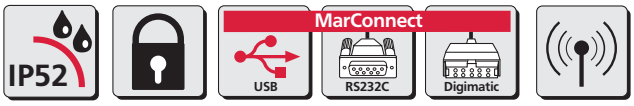
OVERVIEW

Functions of Digital Indicators

		1075 R	1075 R	1075 R	*µMaxµm II XL*
Catalog page		5 - 38	5 - 38	5 - 38	5 - 40
Measuring ranges		12.5 mm / ***.5"***	12.5 mm / ***.5"***	12.5 mm / ***.5"***	12.5 mm / ***.5"*** 25 mm / ***1"*** 50 mm / ***2"*** 100 mm / ***4"***
Resolution	metric inch 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"***	0.0002 mm ***.00001"*** 0.0005 mm ***.00002"*** 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"***
Mounting shank		8h6	8h6	8h6	8h6 / 3/8"
Protection class	IP dass acc. to IEC 60529	IP51	IP51	IP51	IP54
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)				● ●
2-point difference					●
Search for reversal point	START/STOP				
Factor set / adjust					●
Analog display					●
Switch the analog value					●
Key lock function LOC		●	●	●	Optional
Data output:	USB	●	●	●	●
	Digimatic	●	●	●	●
	Opto RS232C	●	●	●	●
Control output:					

	1086 R	1086 ZR	1086 WR	1087 R	1087 ZR	1087 BR	1088 W	1088
	5 - 42	5 - 42	5 - 45	5 - 46	5 - 46	5 - 50	5 - 48	5 - 48
	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"*** 25 mm / ***1"***	12.5 mm / ***.5"*** 25 mm / ***1"***	12.5 mm / ***.5"***	12.5 mm / ***.5"*** 25 mm / ***1"***	50 mm / ***2"***
	0.001 mm ***.00005"*** 0.01mm ***.0005"***	0.001 mm ***.00005"*** 0.01mm ***.0005"***	0.001 mm ***.00005"*** 0.01mm ***.0005"***	0.001 mm ***.00005"***	0.001 mm ***.00005"***	0.001 mm ***.00005"***	0.001 mm ***.00005"***	0.001 mm ***.00005"***
	8h6	3/8"	8h6	8h6	3/8"	8h6	8h6	8h6
	IP42	IP42	IP54	IP42	IP42	IP42	IP42	IP54
	●	●	●	●	●	●	●	●
	●	●	●	●	●	●	●	●
	●	●	●	●	●	●	●	●
	●	●	●	●	●	●	●	●
	●	●	●	●	●	●	●	●
	●	●	●	●	●	●	●	●
	●	●	●	●	●	●	●	●
	●	●	●	●	●	●	●	●
				●	●	●	●	●
				●	●		●	●
				●			●	
	●	●	●	●	●	●	●	●
				●	●	●	●	●
				●	●	●	●	●
	●	●	●	●	●	●	●	●
	●	●	●	●	●	●		●
	●	●	●	●	●	●	●	●
	●	●	●	●	●	●	●	●
							●	●

Digital Indicators 1075 R



Features

Functions:
ON/OFF
RESET (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: Individual buttons can be locked
Auto-OFF (selectable)

- Immediate measurement due to the Reference system
- Max measuring speed 1.5 m/sec (60"/sec)
- MarConnect Data output: choose either
  USB
  OPTO RS232C
  Digimatic
- High contrast Liquid Crystal Display with12 mm high digits
- Operating temperature 10-40°C
- Class of protection IP52 according to IEC 60529

Scope of supply:
Battery,
Operating instructions

Reference System - Just set once to zero

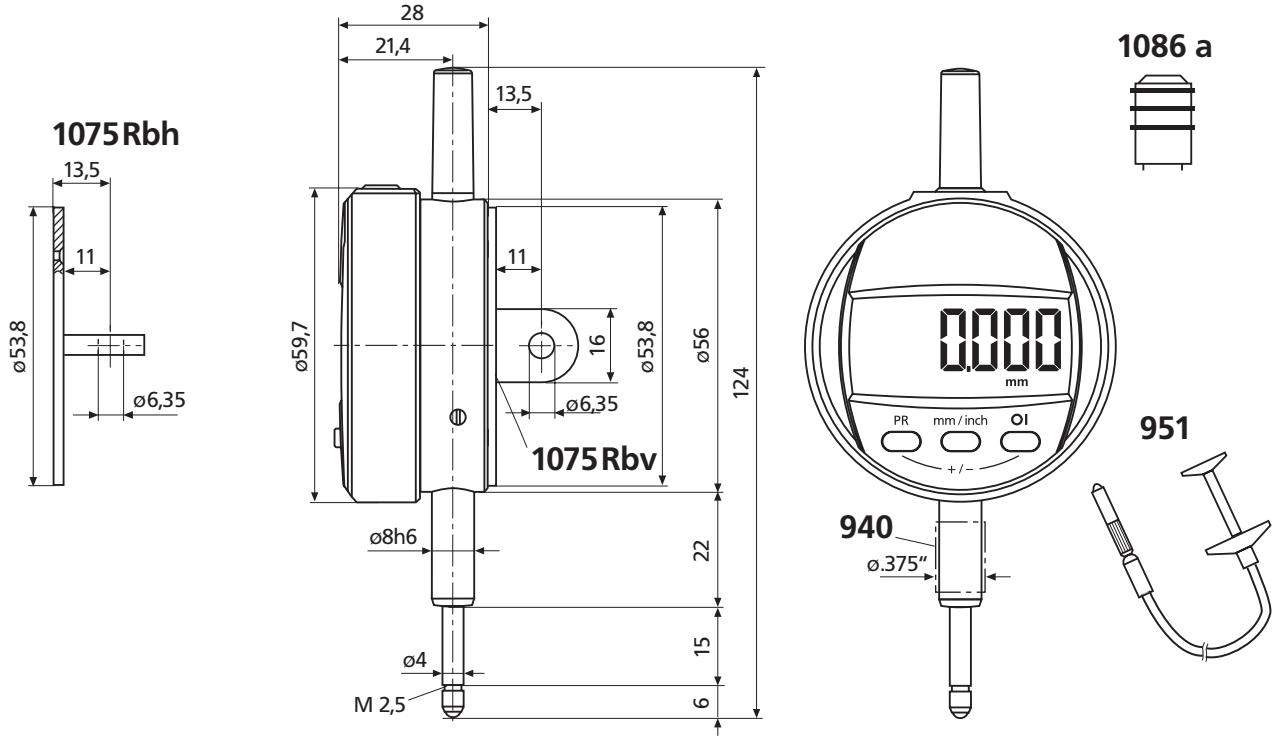
REFERENCE The new Digital Indicators 1075 R are equipped with the innovative Reference-System. The zero position only has to be set one time: once it is set, the zero remains stored for all further measurements. Therefore, when the indicator is switched ON or the measuring spindle is moved the indicator is immediately ready for measurement; thus the need to reset as with a conventional indicator is now obsolete.

Technical Data

Measuring range		Resolution			Span of error *G* *	Measuring force			Weight	Order no.
mm	***(inch)***	mm	/	***inch***	mm	N			g	
12.5	***(.5")***	0.01	/	***.0005"***	0.020	0.5	-	1	180	**4336010**
12.5	***(.5")***	0.005	/	***.0001"***	0.015	0.5	-	1	180	**4336020**
12.5	***(.5")***	0.001	/	***.00005"***	0.005	0.5	-	1	180	**4336030**

** in any zero point*

Technical Data



Shown with Mounting Lug, not included.

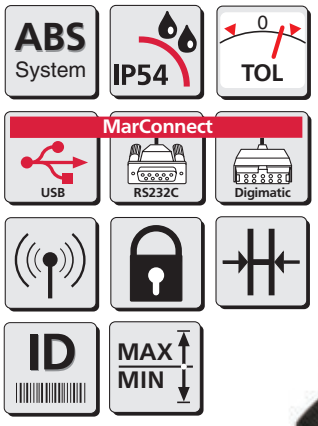
Accessories

		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**
Cable Release to raise the measuring spindle	**951**	**4372000**
Lifter Protection Cap	**1086 a**	**4337320**
Lug Back, horizontal	**1075 Rbh**	**4336041**
Lug Back, vertical	**1075 Rbv**	**4336042**

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® II XL Digital Indicators



Features

Functions:
- All the benefits of the ***µMaxµm II*** series indicator series, but with long measuring ranges
- Inch/Metric – operator selectable with switchable resolution
- Normal / Reverse Sensing
- Preset capabilities to view actual size
- High resolution digital readout and analog bar graph – digital display shows deviation from zero or actual dimension size (Preset)
- Lightweight, contamination resistant – ruggedly built to withstand hard use – gasketed case, crystal and stem assemblies resist fluid contamination
- MarConnect data output: USB, OPTO RS232C, Digimatic
- Auto-power down – provides extremely low battery consumption, assuring long life from readily available commercial batteries
- Unilateral Tolerances
- Go/NoGo Display Feature

Mode A:
Actual value + bargraph
Display of tolerance

Mode B:
GO/NOGO display

Advanced Functions:
- Dynamic mode operation: Max, Min, TIR
- Two point difference measurement – provides comparison of two readings or measuring locations
  - Calculate the distance between 2 measured values
- Multiplier factor for ratio measurements
- Hold function – holds reading on display until ready to resume measuring
- Data output with serial number identification capability
- Data output with selectable continuous output or single request of reading(s)

Optional Factory Configured Features:
- Locked Multiplier factor for ratio measurements
- Disabled sleep mode (manual ON/OFF)
- Locked inch or mm display unit
- Power up in inch or mm unit on battery change
- Setup mode lockout with password entry

Technical Data

Model	Range	Resolution mm / *inch*	Accuracy mm / *inch*	Stem diameter	Stem Length mm / *inch*	Order no
US Version	***0.5"***	multiple selections: Low: 0.1 / ***0.005"*** High: 0.0002 / ***0.00001"***	0.0005 / ***0.0002"***	***0.375"***	16 / ***0.63"***	**2034252**
US Version	***1.0"***			***0.375"***	16 / ***0.63"***	**2034212**
World Version	12.5 mm			8 mm	16 / ***0.63"***	**2034258**
World Version	25 mm			8 mm	16 / ***0.63"***	**2034218**
World Version*	25 mm			8 mm	16 / ***0.63"***	**2034410**
World Version	50 mm	Low: 0.2 / ***.01"*** High: 0.0002 / ***0.00001"***	0.008 / ***0.00032"***	8 mm	16 / ***0.63"***	**2034229**
World Version	100 mm		0.009 / ***0.00036"***	8 mm	16 / ***0.63"***	**2034249**

* *No Spring Version*

Technical Data

Display Range:	12.5 mm ***.5"***	25 mm ***1.0"***	50 mm ***2.0"***	100 mm ***4.0"***
Spindle Range:	12.8 mm ***.515"***	25.9 mm ***1.020"***	51 mm ***2.02***	102 mm ***4.02"***
Gaging Force:	***3 to 4 oz*** 0 to 1.0 N at center of travel		***7 to 14 oz*** 2.0 to 3.4 N at center of travel	
Weight:	200 g ***(7 oz)***		283 / 340 g ***(10 / 12 oz)***	
Spindle Velocity:	6"/sec. (1.5m/s) max			
Temperature				
Operating:	5° to 54°C / ***40° to 130°F***			
Storage:	-17° to 60°C / ***0° to 140°F***			
Repeatability:	± 1 LSD (Least Significant Digit)			
Battery Life:	7000 hours ~12 months normal usage*			

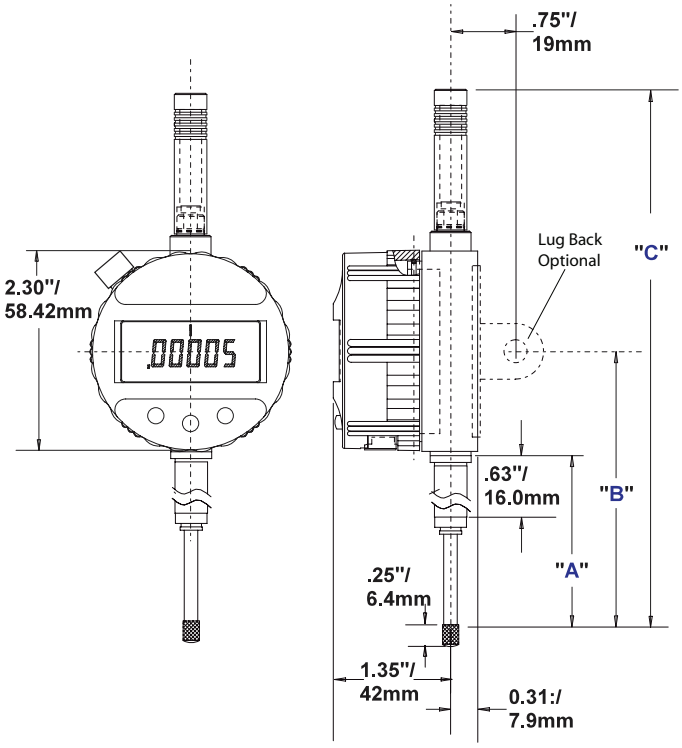
** normal usage = 12hr/day x 7day/wk*

Power: 3 Volt Lithium coin cell (2 per unit)
Type CR2450, **Order no. EBY1018**

Display: Rotates through 270°

Contact Point: (**PT-223** radiused tip, 4-48 thread, furnished on .375" dia. Stem model)

EPT-1037-W1 radiused tip, M2.5 thread furnished on 8mm dia. stem model



For contact points please refer to pages 5-22, 5-27, 5-52 & 5-53

Range mm / *inch*	A mm / *inch*	B mm / *inch*	C mm / inch
12.5 / ***.5"***	35.1 / ***1.38"***	68.6 / ***2.7"***	128.27 / **5.05"**
25 / ***1.0"***	47.5 / ***1.87"***	81.3 / ***3.2"***	153.7 / **6.05"**
50 / ***2.0"***	72.6 / ***2.86"***	153 / ***6.0"***	275.6 / **10.85"**
100 / ***4.0"***	123 / ***4.88"***	253 / ***9.9"***	427 / **16.80"**

Accessories

	Order no.
Backs:	
Flat Black (Standard on all models)	**EBK-1018**
Lug Back (Horizontal / Vertical) .5" & 1" models	**BK-183**
Lug Back (Horizontal / Vertical) 2" & 4" models	**BK-383**
Post Back (0.5" dia. x 1" long)	**BK-2093**
Screw Back (11/16" dia x 0.5", 1/4-28 thread)	**BK-692**
Adj. Slide Back (0.5" slot, 1/4-20 thread)	**BK-531**
Adj. Rack Back*	**BK-93**
**used on AT-28 or AT-116 - Sold seperately*	
Data Interface:	
USB Cable (for MarCom or PC, 2m length)	**4346023**
RS232 Cable (10 pin plug, 2m length)	**4346020**
Digimatic Cable (10 pin plug, 2m length)	**4346021**
Transmitter (Mahr t, used w/ FM1 Receiver)	**2121369**

	Order no.
Other Hardware:	
Splash Cover	**ECV-1307-W2**
Adaptor Bushing (8 mm to 3/8")	**BU-197**
Thread Adaptor (M2.5 to 4-48 thread)	**AD-185**
Lifting Lever (.05" tp 1.0" models)	**SP-351**
Right hand style	**ELR-1092**
Left hand style (offset use only)	**ELR-1093**
Ox-bow style (page 6-13)	**LR-40**
Adaptor Back	**EPL-1914**

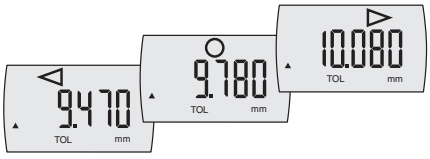
For further mounting accessories refer to page 6-13

MarCator 1086 R

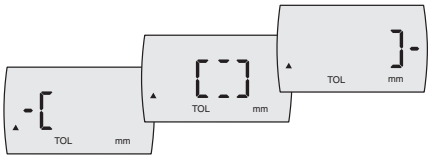
►| The new Digital Indicator **MarCator** 1086 R. With the large display and the integrated tolerance function, your measurement results are clearly visual. |◄

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.



Error free operation

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.

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 Digimatic compatible evaluation instrument
- **Mahr Opto RS232C**
  For direct connection to a COM port on a PC

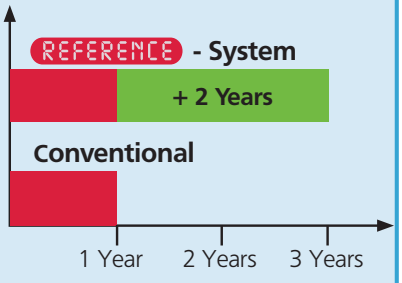
IP Protection class IP54 (optional)
- Protection cap is sealed
- Rubber bellows for the measuring spindle
- Sealed battery compartment

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

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

Battery service life is 3 years

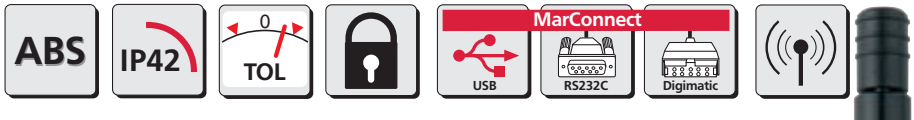
The new Reference system is extremely energy efficient as when the caliper is in standby mode; almost no power is required, thus **extending the life of the battery up to 3 years.**



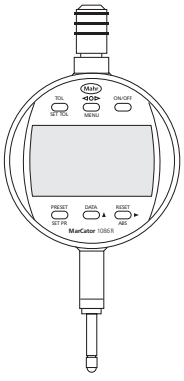
Just set once to zero

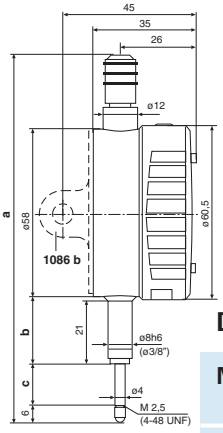
REFERENCE The new Digital Indicators 1086 R are equipped with the innovative Reference-System. The zero position only has to be set one time: once it is set, the zero remains stored for all further measurements. Therefore, when the indicator is switched ON or the measuring spindle is moved the indicator is immediately ready for measurement; thus the need to reset as with a conventional indicator is now obsolete.

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



1086 R





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)

- Immediate measurement due to the Reference system
- Individual buttons can be locked - Lock Function
- Operating and display unit (bezel) can be rotated 280°
- High contrast LCD with 11 mm high digits
- Inductive measuring system, battery life ca. 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

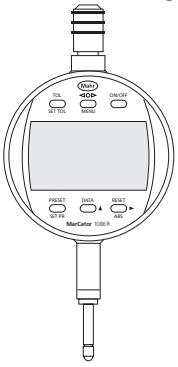
Technical Data

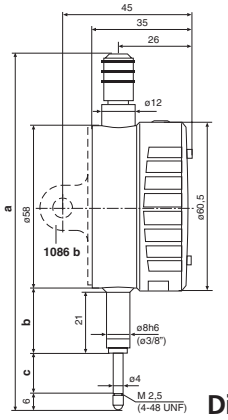
Measuring range mm	(inch)	Resolution mm	/ inch	Span of error* mm	Repeatability mm	Measuring force N	Weight g	Mounting shank dia.	Order no.
12.5	(.5")	0.01	/ .0005"	0.02	0.01	0.65 - 0.90	130	8h6	**4337130**
25	(1")	0.01	/ .0005"	0.02	0.01	0.65 - 1.15	140	8h6	**4337131**
50	(2")	0.01	/ .0005"	0.02	0.01	1.25 - 2.70	190	8h6	**4337132**
100	(4")	0.01	/ .0005"	0.02	0.01	1.60 - 3.50	235	8h6	**4337133**
12.5	(.5")	0.01	/ .0005"	0.02	0.01	0.65 - 0.90	150	3/8"	**4337155**
25	(1")	0.01	/ .0005"	0.02	0.01	0.65 - 1.15	160	3/8"	**4337156**

* *in any zero point*

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

1086 R





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)

- Immediate measurement due to the Reference system
- Individual buttons can be locked - Lock Function
- Operating and display unit (bezel) can be rotated 280°
- High contrast LCD with 11 mm high digits
- Inductive measuring system, battery life ca. 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

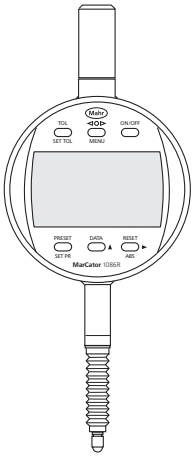
Supplied with:
Battery, operating instructions

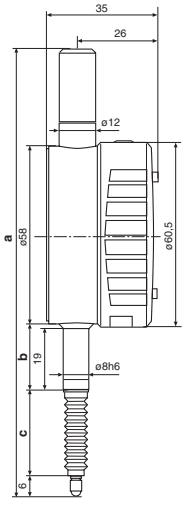
Technical Data

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	4337120
25	(1")	0.001 / .00005"	0.005	0.002	0.65 - 1.15	140	8h6	4337121
50	(2")	0.001 / .00005"	0.008	0.002	1.25 - 2.70	190	8h6	4337122
100	(4")	0.001 / .00005"	0.009	0.002	1.60 - 3.50	235	8h6	4337123
12.5	(.5")	0.001 / .00005"	0.005	0.002	0.65 - 0.90	150	3/8"	4337150
25	(1")	0.001 / .00005"	0.005	0.002	0.65 - 1.15	160	3/8"	4337151

* *in any zero point*

Digital Indicators MarCator 1086 WR, Waterproof version





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)

- Immediate measurement due to the Reference system
- Individual buttons can be locked - Lock Function
- Operating and display unit (bezel) can be rotated 280°
- High contrast LCD with 11 mm high digits
- Inductive measuring system, battery life ca. 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	Order no.
12.5	(.5")	0.001 / ***.00005"***	0.005	0.002	0.65 - 1.40	135	**4337140**
25	(1")	0.001 / ***.00005"***	0.005	0.002	1.00 - 2.25	145	**4337141**
12.5	(.5")	0.01 / ***.0005"***	0.02	0.01	0.65 - 1.40	135	**4337145**
25	(1")	0.01 / ***.0005"***	0.02	0.01	1.00 - 2.25	145	**4337146**

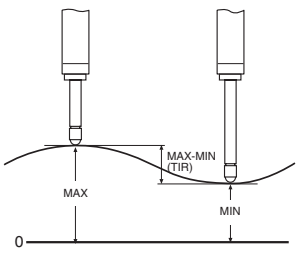
* *in any zero point*

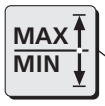
MarCator 1087 R

►| The new Digital Indicator **MarCator** 1087 R. The multi-functional Digital Indicator with a combined analog and digital display as well as tolerance and dynamic measuring functions.|◄

Dynamic measuring functions

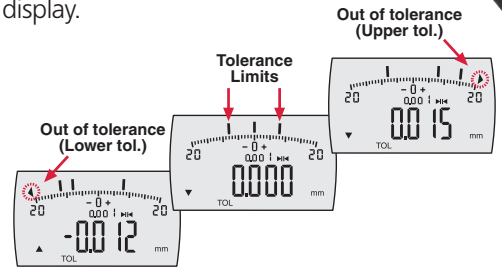
- **MAX-MIN**-Function ideal for testing flatness and concentricity
- **MAX** and / or **MIN** for searching the reversal point





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.



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 Digimatic compatible evaluation instrument

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

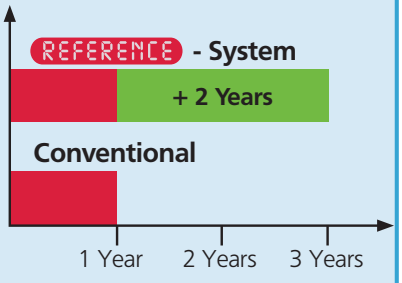
Absolute function:
Digital Indicator can be set in any position to 0.000 without losing the reference to the preset value.

Just set once to zero

REFERENCE The new Digital Indicators 1087 R are equipped with the innovative Reference-System. The zero position only has to be set one time: once it is set, the zero remains stored for all further measurements. Therefore, when the indicator is switched ON or the measuring spindle is moved the indicator is immediately ready for measurement; thus the need to reset as with a conventional indicator is now obsolete.

Battery service life is 3 years

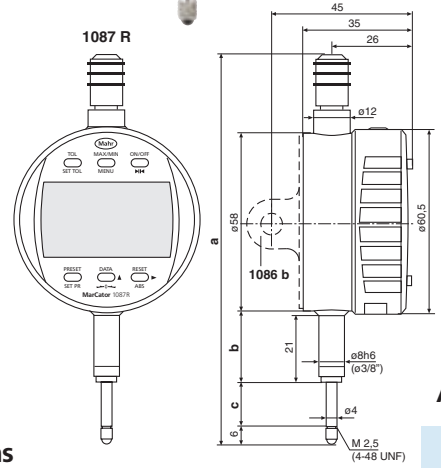
The new Reference system is extremely energy efficient as when the caliper is in standby mode; almost no power is required, thus **extending the life of the battery up to 3 years.**



Error free operation

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 1087 R / 1087 ZR, with analog display



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)
Tolerance band max, 1.6 mm
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 analog display to zero)
DATA (when connected with a data connection cable)
Factor (adjustable)

- Immediate measurement due to the Reference system
- Individual buttons can be locked - Lock Function
- Operating and display unit (bezel) can be rotated 280°
- High contrast LCD with 8.5 mm high digits
- Inductive measuring system, battery life ca. 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	**4337160**
25	***(1")***	0.001 / ***.00005"***	0.005	0.002	0.65 - 1.15	150	8h6	**4337161**
12.5	***(.5")***	0.001 / ***.00005"***	0.005	0.002	0.65 - 0.90	150	3/8"	**4337170**
25	***(1")***	0.001 / ***.00005"***	0.005	0.002	0.65 - 1.15	160	3/8"	**4337171**

* *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 Digimatic compatible evaluation instrument
- **Mahr Opto RS232C**
  For direct connection to a COM port on a PC

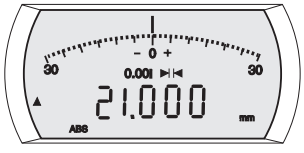
Control output can be connected to a SPS

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 (excludes measuring range 50 mm)

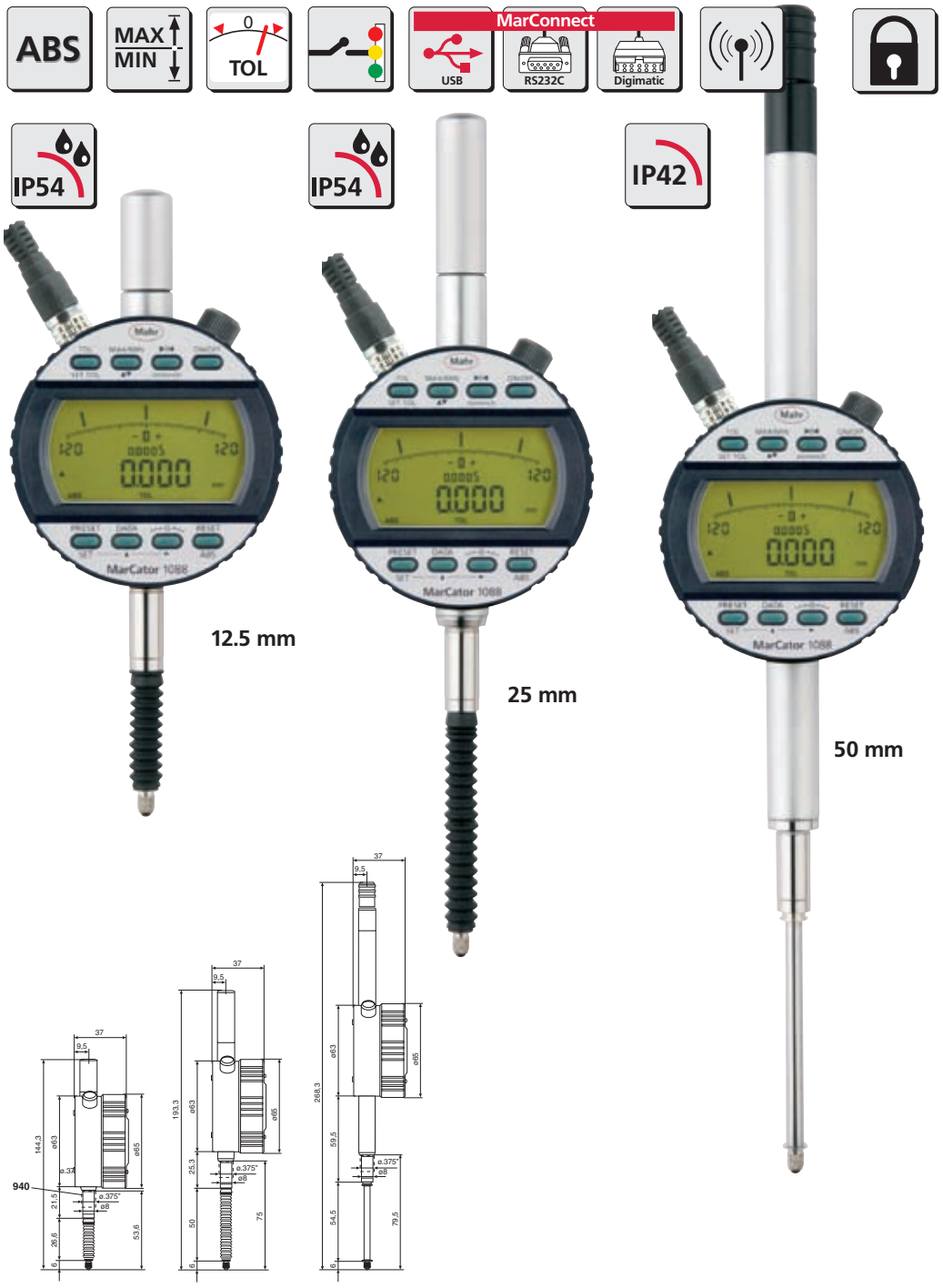
Code Initial	**IP**	International Protection
First Numeral	**5**	Dust protected
Second Numeral	**4**	Protection against splash water in all directions

Analog display



Readings (switchable)			Display range		
mm	/	***inch***	mm	/	***inch***
0.001	/	***.00005"***	± 0.030	/	***±.0015"***
0.002	/	***.0001"***	± 0.060	/	***±.0030"***
0.005	/	***.0005"***	± 0.150	/	***±.0150"***
0.01	/	***.001"***	± 0.30	/	***±.030"***

Digital Indicators MarCator 1088 / 1088 W, with analog display



Features

Functions:

ON/OFF
RESET (set digital and analog displays to zero)
- 0 - (set analog display to zero)
PRESET (enter any numerical values)
DATA (data transmission) mm/inch-switchable
Factor (adjustable)
Reversal of counting direction (switch value in digital display)
MAX-MIN memory, ideal for searching the reversal point
MAX-MIN memory, e.g. for testing flatness and concentricity
TOL (Enter tolerance limit values)
Tolerance band max, 1.6 mm
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

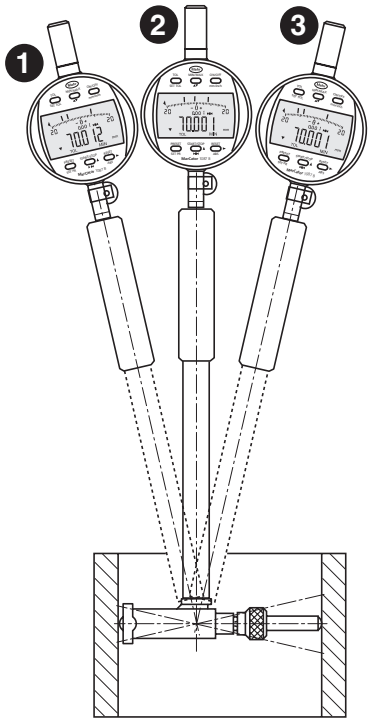
Measuring range mm	*(inch)*	Resolution mm	/	*inch*	Measuring force N			Span of error* mm	Protection class	Order no. 230 V	Order no. 115 V
12.5	***(.5")***	0.001	/	***.00005"***	0.65	-	1.40	0.005	IP54	**4337000**	**4337010**
25	***(1")***	0.001	/	***.00005"***	1.00	-	2.25	0.005	IP54	**4337001**	**4337011**
50	***(2")***	0.001	/	***.00005"***	1.25	-	2.7	0.008	IP42	**4337002**	**4337012**

* *in any zero point*

Digital Indicator MarCator 1087 BR for 2 point inside measurement

REFERENCE

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).

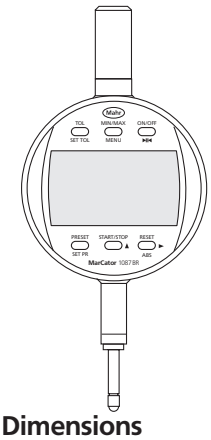
Features

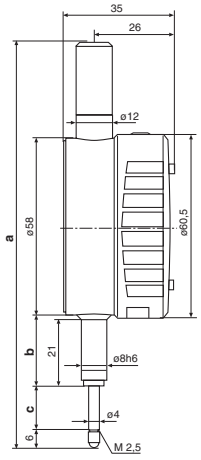
Functions:

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)
Tolerance band max. 1.6 mm
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)

- Immediate measurement due to the Reference system
- Individual buttons can be locked - Lock Function
- Operating and display unit (bezel) can be rotated 280°
- High contrast LCD with 8.5 mm high digits
- Inductive measuring system, battery life ca. 2000 hrs.
- Maximum measuring speed 1.5 m/s (60"/s)
- Sealed protection cap
- MarConnect data output: choose USB, OPTO RS232C, Digimatic
- Operating temperature 10 - 40°C
- Class of protection IP42 in accordance to IEC 60529
- Supplied with: Battery, operating instructions

1087 BR





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

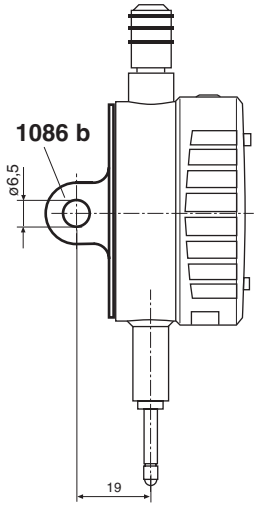
Measuring range mm	(inch)	Resolution mm	/	inch	Span of error* mm	Repeatability mm	Measuring force N	Weight g	Mounting shank dia.	Order no.
12.5	(.5")	0.001	/	.00005"	0.005	0.002	0.65 - 0.90	140	8h6	4337162

* *in any zero point*

Accessories for MarCator 1086 R, 1087 R and 1088

Accessories for MarCator 1086 R and 1087 R

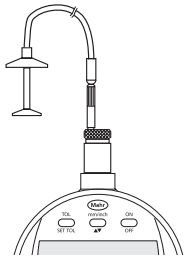
		Order no.
Battery 3V, Type CR 2450		**4884464**
Data Connection Cable USB (2 m)	**16 EXu**	**4102357**
Data Connection Cable Opto RS232C (2 m), with SUB-D jack 9-pin	**16 EXr**	**4102410**
Data Connection Cable Digimatic (2 m). Flat plug 10-pin	**16 EXd**	**4102411**
Mounting Lug	**1086 b**	**4337421**
Rubber bellows for 1086 W - 12.5 mm		**4337472**
Rubber bellows for 1086 W - 25 mm		**4337474**



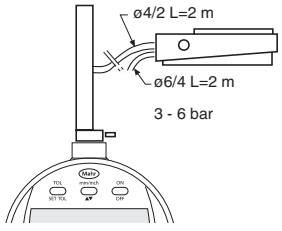
Accessories for MarCator 1088

		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**
Rubber bellows for 1088 W - 12.5 mm		**4337472**
Rubber bellows for 1088 W - 25 mm		**4337474**
Control Instrument for remote control operation	**2000 sg**	**4346035**

1085 a



1082 p (12.5/25)



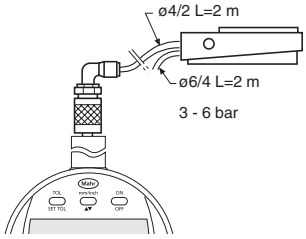
Accessories for MarCator 1086 R, 1087 R and 1088

		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**			

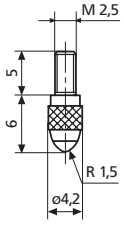
Ball Contact Point 906 H
with carbide ball, accuracy ball dia. 0/-6µm

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**			

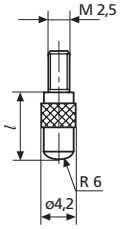
Contact Rollers 909
Concentricity error 3 µm

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

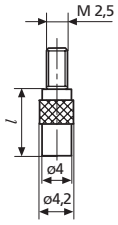
901



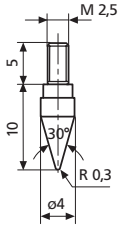
902



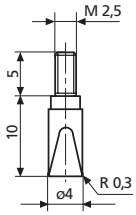
903



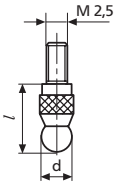
904



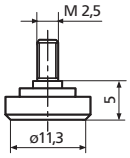
905



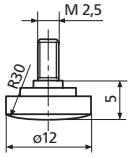
906 H



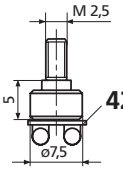
907



908 H

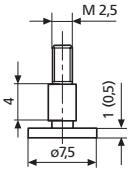


913



426 M

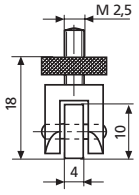
30 ENt



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**
Disc Type anvil thickness 0.5 mm, hardened	**30 ENt**	**4126310**
Disc Type anvil thickness 1 mm, hardened	**30 ENt**	**4882022**

909 A

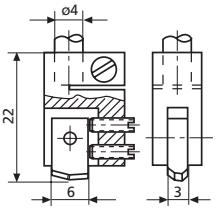


Contact Points and Accessories for Dial Indicators, Dial Comparators and Probes

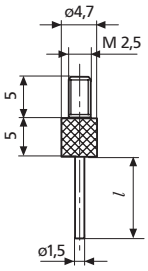
Measuring Attachment 910 H

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

910 H



911

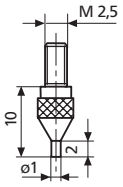


Pin Contact Point 911

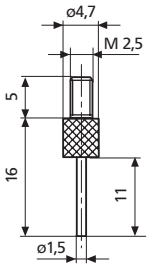
dia. 1.5 mm, flat

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

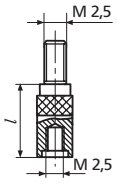
911 H1



911 H2



912



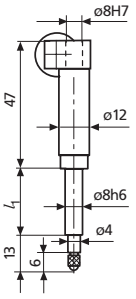
Pin Contact Point 911 H

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

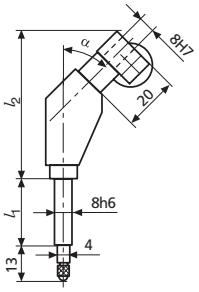
Measuring Spindle Extensions 912

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**

941 G



941 W



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

Special Holder 941

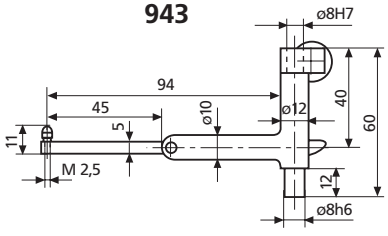
For all types of measuring equipment
For placing a dial indicator at a certain distance or angle
Travel of the measuring spindle 3 mm
Contact Point 901 (interchangeable)

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**

943



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

Overview 6- 2

Millimess 2100 6- 4
With background lit digital and analog display

Millimess 2000 / 2001 6- 6
With digital and analog display

µMaxµm® *II* 6- 8
With digital display

Maxµm® *III* 6-10
With digital and analog display, probe

Mechanical Dial Comparators

Overview 6-14

Millimess 1000 A / 1000 B 6-17
With large dial

Millimess 1002 / 1003 / 1003 XL / 1004 / 1010 / 1050 6-18
Standard versions

Millimess 1110 N / 1150 N 6-20
With limit contacts

Millimess. Digital Comparators (Short range)

OVERVIEW

Inductive Digital Comparators

		2100	2000
Catalog page		6 - 3	6 - 5
Measuring range		2.8 mm	1.8 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"***
Mounting shank		8h6	8h6
Protection class	IP class acc. IEC 60529	IP54	IP54
Functions:			
ON/OFF		●	●
Zero set the display		●	●
Zero set the analog display		●	●
Switch between mm/inch		●	●
Reversal of counting direction		●	●
Enter a numerical value Preset		●	●
Data key		●	
Data via control instrument 2000sg		●	●
ABS/REL-switchable		●	●
Tolerance display		●	
Dynamic measuring functions	Min, Max.	●	
	Max-Min (Tir)	●	
Resolution switchable		●	●
Analog display		●	●
Analog value switchable		●	●
Lock key function		●	
Data output	USB	●	●
	Digimatic	●	●
	Opto RS232C	●	●
Control output		●	

2001	***µMaxµm® II***	***µMaxµm® III***
6 - 5	6 - 7	6 - 8
1.8 mm	2 mm	2 mm / 3.98 mm
mm / ***inch***	mm / ***inch***	mm / ***inch***
0.0002 / ***.00001“***	0.0002 / ***.00001“***	0.0005 / ***.00002“***
0.0005 / ***.00002“***	0.0005 / ***.00002“***	0.001 / ***.00005“***
0.001 / ***.00005“***	0.001 / ***.00005“***	0.001 / ***.0001“***
	0.001 / ***.0001“***	0.005 / ***.0005“***
	0.005 / ***.0002“***	
	0.010 / ***.0005“***	
	0.020 / ***.001“***	
8h6	8h6 / ***3/8“***	8h6 / ***3/8“***
IP54	IP54	IP54
●	●	Auto
●	●	●
●	●	●
●	●	●
●	●	●
●	●	
	●	
●		
●	●	●
●	●	●
●	●	●
●	●	●
●	●	●
●	●	●
●	●	●
●	Optional	Optional
●	●	●
●	●	●
●	●	●
●		

Millimess 2100

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

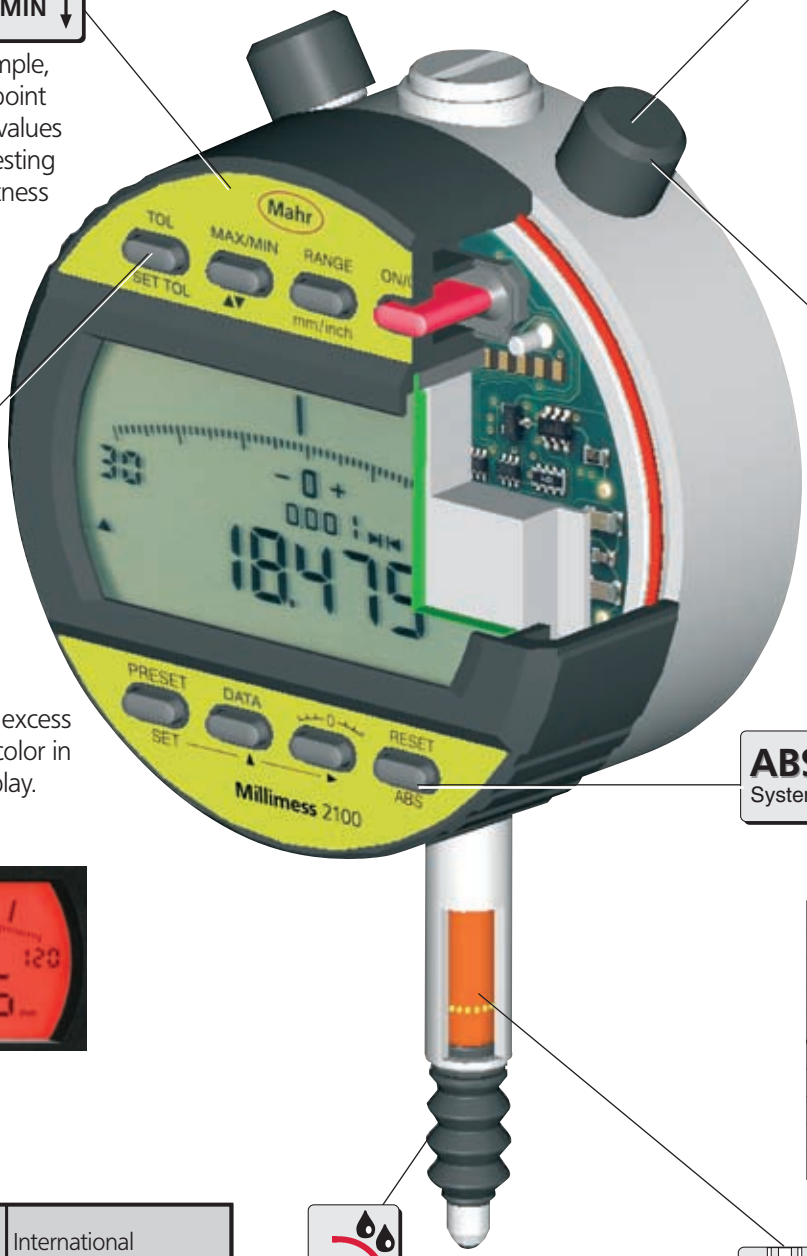
Dynamic measuring functions:
- MAX / MIN for example, finding the reversal point
- MAX - MIN storing values for example when testing concentricity and flatness

MAX / MIN

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

MarConnect: USB, RS232C, Digimatic

Control output can be connected to a SPS

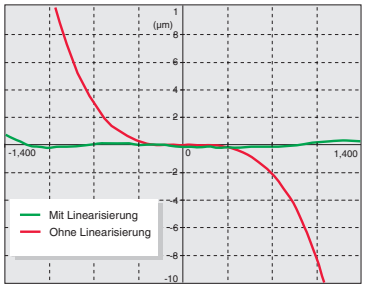


TOL

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



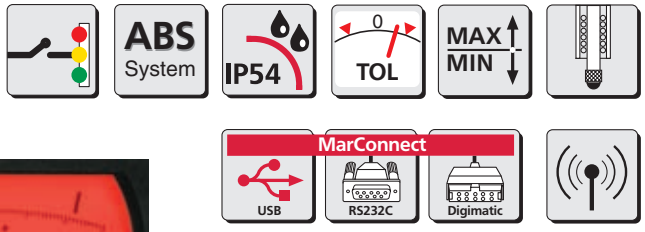
IP54

Especially suited for use in a manufacturing environment. Waterproof: **protection class IP54** in accordance 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 measuring range and resolution)
ABS (reference to electrical 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)
Tolerance band max. 2.8 mm
LOCK: operating functions can be blocked via PC-Software

- Factor can be set / adjusted
- Linearized inductive absolute measuring system
- Measurement electronic is compensated for temperature
- Power supply via the mains 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		Resolution switchable		Display range of the analog display		Span of error* G within		Over-travel	Meas. force	Order no.	Order no.
mm	*(inch)*	mm	/ *inch*	mm	*(inch)*	±0.8mm	±1.4mm	mm	N	230 V	115 V
±1.0	*(.04")*	0.0005	/ *.00002"*	±0.015	*(.0006")*	1µm	2µm	1.8	0.7 - 0.9	**4346200**	**4346201****
±1.4	*(.055")*	0.001	/ *.00005"*	±0.030	*(.0015")*						
		0.005	/ *.0002"*	±0.150	*(.0060")*						
		0.01	/ *.0005"*	±0.300	*(.0150")*						

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

Inductive Digital Comparator 2000 / 2001

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 measuring range and resolution)
ABS (reference to electrical zero point)

- Battery charge level indicator
- 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/second
- 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)
Tolerance band max. 180 µm

- 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

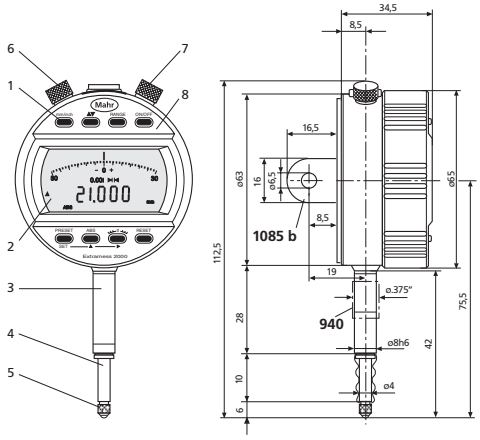
Technical Data

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



Control Instrument 2000sg

Features

- Remote control buttons:
  RESET
  PRESET
  RANGE*
- DATA-button for data transmission, option 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

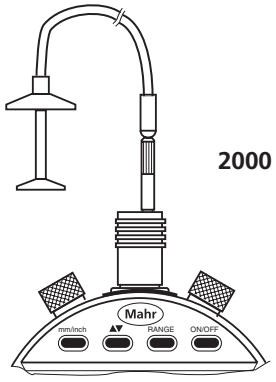
Data Connection Cable USB (2 m)	**2000 usb**	**4346023**
Data Connection Cable Opto RS232C (2 m), SUB-D jack 9-pin	**2000 r**	**4346020**
Data Connection Cable Digimatic (2 m), flat plug 10-pin	**2000 d**	**4346021**
Cable to connect control output to an SPS	**2000 sps**	**4346031**
Manual Lifter with 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**

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

Accessories for Data Processing see Chapter 11

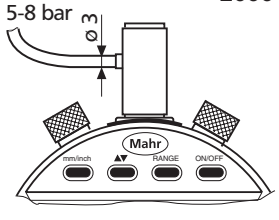
Measuring Force Springs

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**

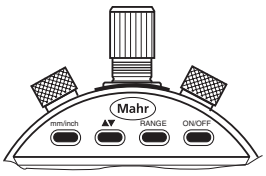


2000 h

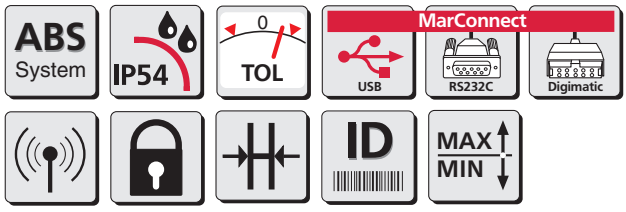
2000 p



2000 m



Inductive Digital Comparator *µMaxµm® II*



Features

Functions:
- Inch/Metric – operator selectable with switchable resolution.
- Normal / Reverse Sensing
- Preset capabilities to view actual size
- "Absolute" Transducer – no overspeed errors or constant re-zeroing. Transducer always remembers its location, even if power is off
- High resolution digital readout and analog bar graph – digital display shows deviation from zero or actual dimension size (Preset)
- 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.
- MarConnect data output: USB, OPTO RS232C, Digimatic
- Auto-power down – provides extremely low battery consumption, assuring long life from readily available commercial batteries.
- Increased resolution (0.0002 mm / 10 µinch) for today's demanding tolerances
- Unilateral Tolerances
- Go/NoGo Display Feature

Mode A:
Actual value + bargraph
Display of tolerance

Mode B:
GO/NOGO display

Advanced Functions:
- Dynamic mode operation: Max, Min, TIR
- Two point difference measurement – provides comparison of two readings or measuring locations.
  - Calculate the distance between 2 measured values
- Multiplier factor for ratio measurements
- Hold function – holds reading on display until ready to resume measuring
- Data output with serial number identification capability
- Data output with selectable continuous output or single request of reading(s)

Optional Factory Configured Features:
- Locked Multiplier factor for ratio measurements
- Disabled sleep mode (manual ON/OFF)
- Locked inch or mm display unit
- Power up in inch or mm unit on battery change
- Calibration mode lockout (with password entry)
- Setup mode lockout with password entry

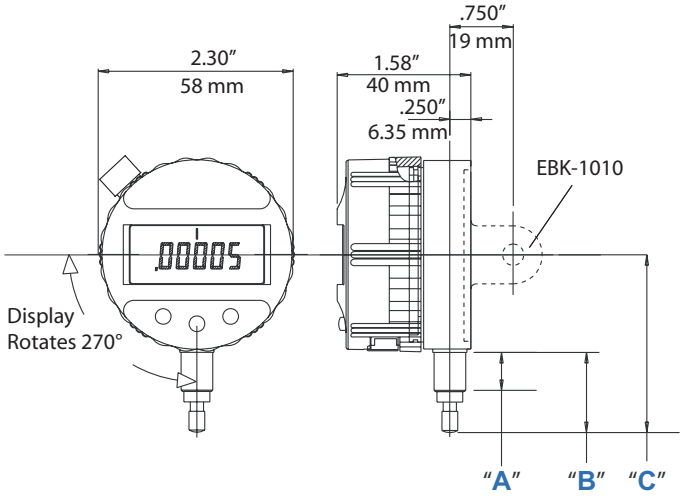
Technical Data

Model	Range mm / *inch*	Resolution mm / *inch*	Accuracy % of digital range	Stem diameter	Stem Length mm / *inch*	Order no.
Standard				***.375"***	11.7 / ***.46"***	**2034101**
Standard				***.375"***	38.0 / ***1.50"***	**2034103**
Standard		0.0002 / ***.00001"***	±0.25% over	8 mm	11.7 / ***.46"***	**2034105**
Standard		0.0005 / ***.00002"***	±0.50 mm / ***±.020"***	8 mm	38.0 / ***1.50"***	**2034107**
Advanced	±1.00 / ***±0.040"***	0.001 / ***.00005"*** 0.002 / ***.00001"***	±0.50% from ±0.50 mm / ***±.020"***	***.375"***	11.7 / ***.46"***	**2034201**
Advanced		0.005 / ***.0002"*** 0.01 / ***.0005"***	to	***.375"***	38.0 / ***1.50"***	**2034203**
Advanced		0.02 / ***.001"***	±1.00 mm / ***±.040"***	8 mm	11.7 / ***.46"***	**2034205**
Advanced				8 mm	38.0 / ***1.50"***	**2034207**
Advanced Perpendicular				***.375"***	11.7 / ***.46"***	**2034401**

Technical Data

Display Range:	±1.067 mm / ***± .042"***
Spindle Range:	-1.25 to 1.50 mm / ***- .050 to + .060"***
Resolution:	0.0002 mm / ***.00001"***
Accuracy:	±0.5 mm range: 1.25µm (0.25%)
(% of range)	±1.0 mm range: 5.0µm (0.50%)
	± .020" range: 50µin (0.25%)
	± .040" range: 200µin (0.50%)
Gaging Force:	85 to 122 g (grams) - at center of travel
	3 to 4 oz (ounce) - at center of travel
Weight:	170 g / ***6 oz***
Spindle Velocity:	Unrestricted
Temperature	
Operating:	5° to 54°C / ***40° to 130°F***
Storage:	-17° to 60°C / ***0° to 140°F***
Repeatability:	± 1 LSD (Least Significant Digit)
Battery Life:	6000 hours
	~12 months normal usage*
	** normal usage= 12 hr/day x 7 day/wk*
Contact Point:	(**PT-223** radiused tip, 4-48 thread, furnished on 0.375" dia. Stem model) **EPT-1037-W1** radiused tip, M2.5 thread furnished on 8 mm dia. stem model
Power:	3 volt lithium coin cell (2 per unit), type CR 2450. Order no. **EBY-1018**
Display:	Rotates through 270°

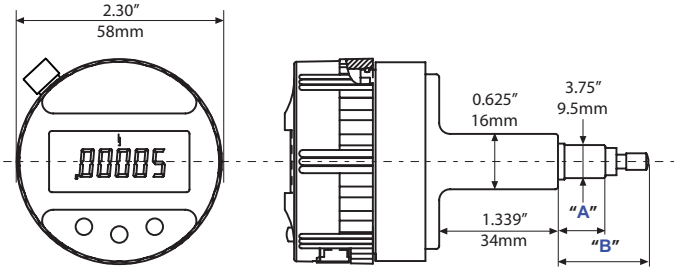
Standard Model



For contact points please refer to pages 5-25, 5-27, 5-25 & 5-53

Dimensions mm / ***inch***	**A**	**B**	**C**
	11.7 / ***.46"***	24.1 / ***.95"***	53.6 / ***2.11"***
	38.0 / ***1.50"***	57.2 / ***2.25"***	86.6 / ***3.41"***

Perpendicular Model



Accessories

	Order no.
Backs:	
Flat Black (Standard on all models)	**EBK-1018**
Post Back (.5" dia. x 1" long)	**EBK-1012**
Lug Back (Horizontal / Vertical)	**EBK-1010**
Screw Back (11/16" dia x .5", 1/4-28 thread)	**EBK-1013**
Adj. Slide Back (0.5" slot, 1/4-20 thread)	**EBK-1016**
Adj. Rack Back*	**EBK-1014**
** used on AT-28 or AT-116 - Sold seperately.*	
Data Interface:	
USB Cable (for MarCom or PC, 2 m length)	**4346023**
RS232 Cable (10 pin plug, 2 m length)	**4346020**
Digimatic Cable (10 pin plug, 2 m length)	**4346021**
Transmitter (Mahr t, used w/ FM1 Receiver)	**2121369**

	Order no.
Other Hardware:	
Splash Cover	**ECV-1307-W2**
Adaptor Bushing (8 mm to 3/8")	**BU-197**
Thread Adaptor (M2.5 to 4-48 thread)	**AD-185**
Spring (for lighter gaging force: 35g)	**SP-351**

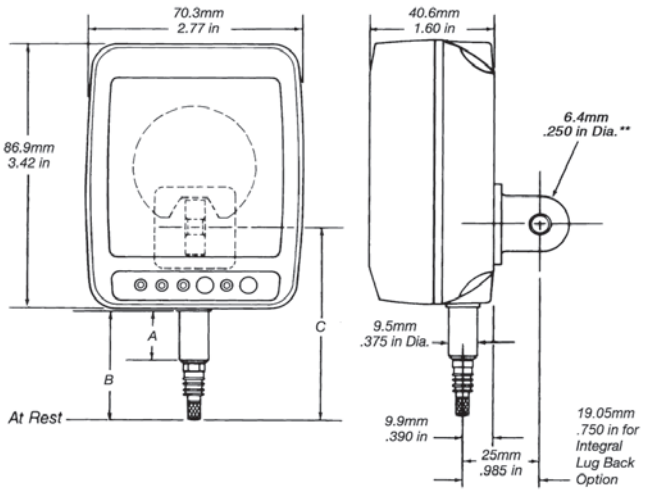
For further mounting accessories refer to page 6-13

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!

Technical Data



Easily designed into your applications . . . full-size MaxumIII® 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)

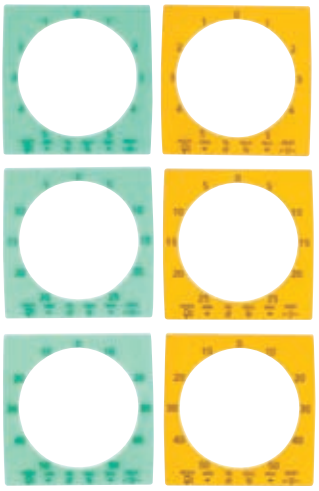
22 mm/ ***.87"***	47 mm/ ***1.84"***	73 mm/ ***2.87"***

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*
** *Back supplied with remote indicating unit only*
*** *For long stem lengths add .220" to above lengths*

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, ***.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/ ***.670"***	***.375"***	No Output	**2033101**	**2033102****
38 mm/ ***1.50"***	***.375"***		**2033103**	**2033104**
17 mm/ ***.670"***	8 mm		**2033105**	**2033106****
38 mm/ ***1.50"***	8 mm		**2033107**	**2033108**
17 mm/ ***.670"***	***.375"***	Digital Output 6 pin (D, E1)	**2033111**	**2033112****
38 mm/ ***1.50"***	***.375"***		**2033113**	**2033114**
17 mm/ ***.670"***	8 mm		**2033115**	**2033116****
38 mm/ ***1.50"***	8 mm		**2033117**	**2033118**
17 mm/ ***.670"***	***.375"***	Digital Output with Hold / Reset 10 pin (E2)	**2033121**	**2033122****
38 mm/ ***1.50"***	***.375"***		**2033123**	**2033124**
17 mm/ ***.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.*

Supplied with Lug back

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 2033099 has PT-225 - .125" long.	

*** 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/ ***.670"***	***.375"***	**2033091**	**2033092**②
Canister	38 mm/ ***1.50"***	***.375"***	**2033093**	**2033094**
Canister	17 mm/ ***.670"***	8.0 mm	**2033095**	**2033096**②
Canister	38 mm/ ***1.50"***	8.0 mm	**2033097**	**2033098**
Pencil	Body Diameter = ***.375"***		**2033099**	—

Note: Cable length 4ft

① *Digital Transducer models 203309X require an adaptor cable for use with traditional DEI-XXXXX Maxμm and Maxμm Plus Indicating 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 (Short Range)	**2239080**
For DEI with 8 pin round connector (Long Range)	**2239081**

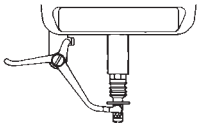
- Maxμm® and Maxμm Plus Transducers are available as Replacement Parts. Refer to Part Price List for Part Numbers and Pricing.
- Maxμm *III* Remote Indicating units sold separately from Digital Transducer.
- Any Digital Transducer may be used with a Maxμm *III* Remote Indicating unit.
- For English or 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.

Pencil

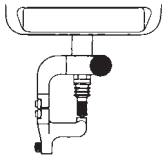
Canister

Accessories

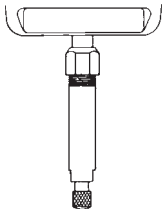
For Integral Maxμm® Indicators



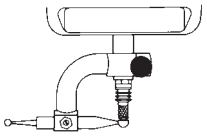
Lifting Levers[1)]
Furnished with washer and longer contact point. Left Hand (shown)
Order no. **EAS-1903***
Right Hand (not shown)
Order no. **EAS-1904**



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**



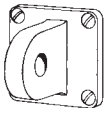
Hole Attachments
Short Lever (shown)
(1.0" pivot to contact)
Order Model **EAT-1032-W1**
Long Lever (not shown)
(1.87" pivot to contact)
Order Model **EAT-1033-W1**

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

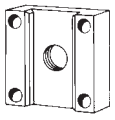
Ox-Bow Lifting Lever
Order no. **LR-40**

** 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)



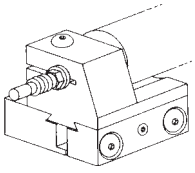
Lug Back (.250" hole)
Mounts horizontally or vertically.
Order no. **EBK-1006**



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**

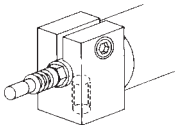
Replacement Screws
2-56 x .218"
Order no. **ESW-1252**



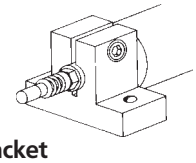
Rack Bracket (Shown mounted to SE-33 Adjustable Mounting Block.)

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 ///	
USB Cable (for MarCom / PC, length 2 m)	**2121428**
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**
Transmitter (Maxμm /// t, used w / FM 1 Receiver)	**2121368**
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 (10 pin data output model only)	**EAS-2867**
Footswitch (10 pin data output model only)	**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
Measuring range	± 100 µm	± 50 µm	± 25 µm	± 50 µm
Readings	1 µm	1 µm	0.5 µm	1 µm
Dial style	100-0-100	50-0-50	25-0-25	50-0-50
Accuracy*	Factory standard	Factory standard	DIN 879-1	DIN 879-1
G_{ges}	2 µm	2 µm	0.6 µm	1.2 µm
G^e	1.5 µm	1.5 µm	0.5 µm	1 µm
f_u	1 µm	1 µm	0.3 µm	0.5 µm
G^t	0.7 µm	0.7 µm	0.4 µm	0.7 µm
r	0.5 µm	0.5 µm	0.3 µm	0.5 µm
Order no. Standard	**4338000**	**4339000**	**4335000**	**4334000**
Order no. Waterproof IP54			**4335005**	**4334005**

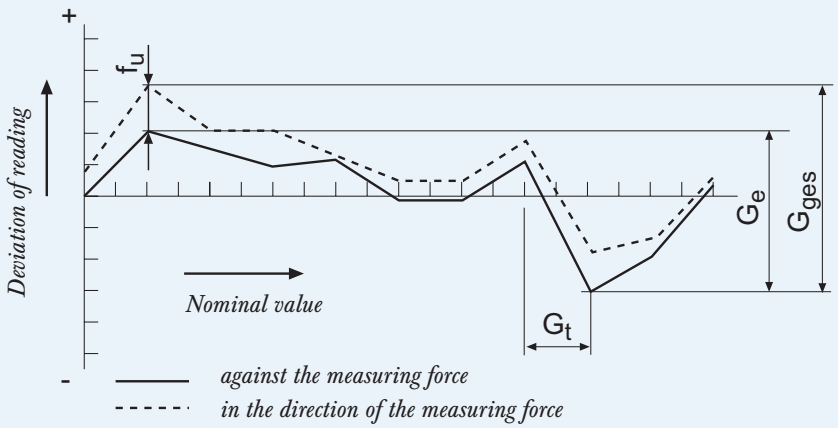
Inch			1002 Z	1003 Z
Measuring range			***± .0010"***	***± .0020"***
Readings			***.00002"***	***.00005"***
Dial style			***.001-0-.001***	***.002-0-.002***
Accuracy*			Factory standard	Factory standard
G_{ges}			***.000025"***	***.00006"***
G^e			***.00002"***	***.00005"***
f_u			***.00001"***	***.000025"***
G^t			***.000014"***	***.000035"***
r			***.00001"***	***.000025"***
Order no. Standard			**4335900**	**4334900**
Order no. Waterproof IP54			**4335905**	**4334905**

* *Accuracy of 1004, 1010, 1010 Z, 1050 exceeds DIN 879-1*
** *Accuracy of 1110 N and 1150 N exceeds DIN 879-3*

1003 XL	1004*	1010*	1050*	1110 N**	1150 N**
± 130 µm	± 0.13 mm	± 0.25 mm	± 1.5 mm	± 0.25 mm	± 1.5 mm
2 µm	5 µm	0.01 mm	0.05 mm	0.01 mm	0.05 mm
130-0-130	130-0-130	25-0-25	15-0-15		
DIN 879-1	Factory standard	Factory standard	Factory standard	Factory standard	Factory standard
2.4 µm	4 µm	8 µm	40 µm	12 µm	60 µm
2 µm	3.5 µm	7 µm	35 µm	6.5 µm	35 µm
1 µm	1 µm	2 µm	10 µm	3.5 µm	17 µm
1.4 µm	3 µm	4 µm	24 µm	5 µm	25 µm
1 µm	1 µm	2 µm	10 µm	0.5 µm	17 µm
4334001	**4333000**	**4332000**	**4330000**	**4343100**	**4342100**
4334006	**4333005**	**4332005**	**4330005**	**4343105**	**4342105**

1004 Z	1010 Z
± .0050"	***± .0100"***
.0001"	***.0005"***
.005-0-.005	***.01-0-.01***
Factory standard	Factory standard
.00012"	***.0004"***
.0001"	***.00035"***
.00003"	***.0001"***
.00005"	***.00025"***
.00003"	***.0001"***
4333900	**4332900**
4333905	**4332905**

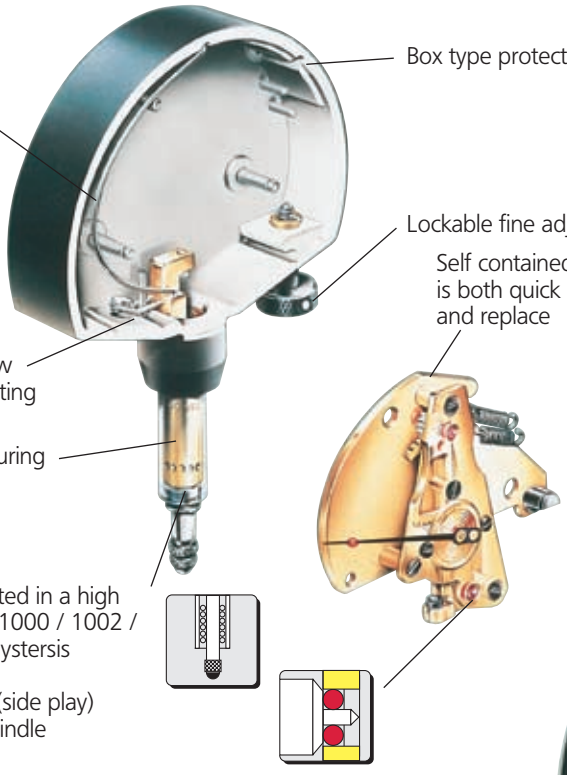
Metrological characteristics



Millimess. Dial Comparators

OVERVIEW

Design Features



Box type protective housing

Constant measuring force

Lockable fine adjustment screw

Self contained movement, which is both quick and easy to remove and replace

Measuring spindle can be retracted with either a screw in cable release or with a lifting knob.

Mounting shank and measuring spindle are both made of hardened stainless steel

Measuring spindle is mounted in a high precision ball guide (Types 1000 / 1002 / 1003 / 1004) for minimal hystersis

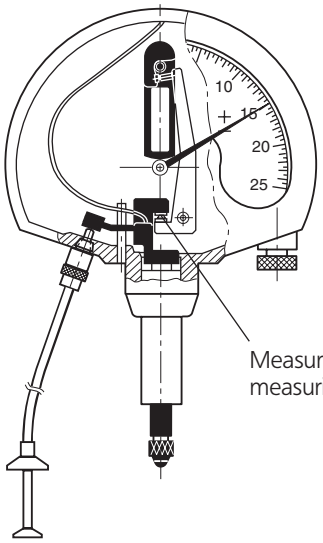
Insensitive to lateral forces (side play) acting on the measuring spindle

Maximum sensitivity and accuracy are ensured by the jeweled movement and in conjunction with the precision gears and pinions

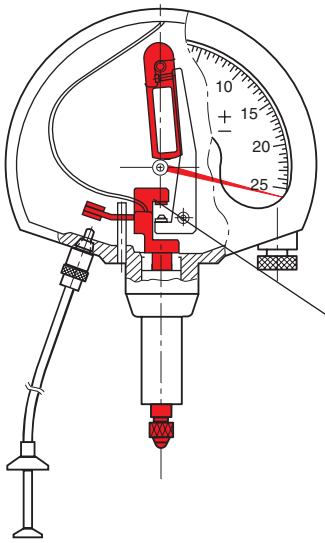
Easy to read scale

Adjustable tolerance markers

Shockproof Mechanism



Measuring spindle within the measuring range

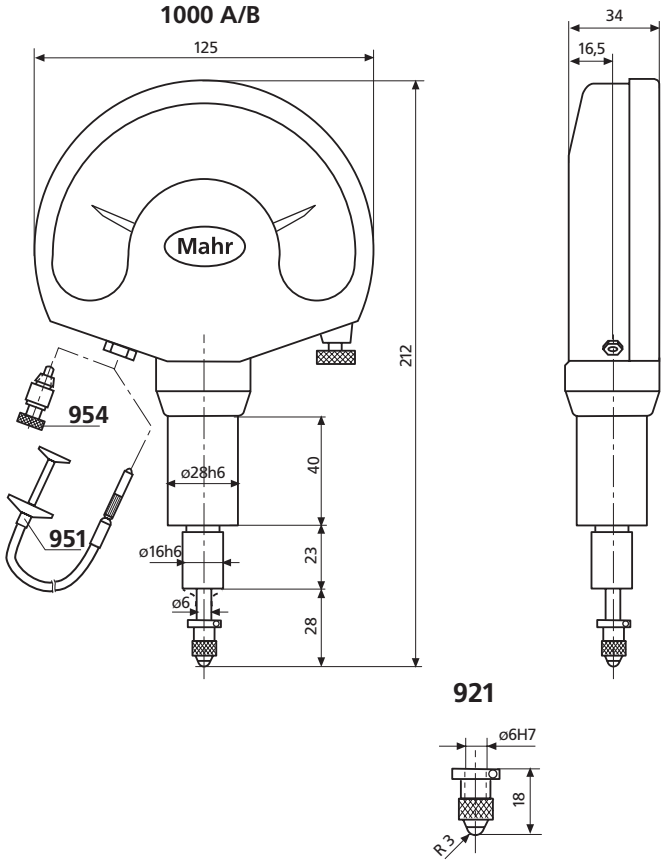


When the measuring range is exceeded the movement will be mechanically decoupled (shown in red)

SHOCK PROOF

Mechanical Dial Comparator Large Type Millimess

1000 A



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**

Mechanical Dial Comparators

1002

DIN 879-1

1003

DIN 879-1

1004

1003XL

DIN 879-1

1003T**

DIN 879-1

IP54

Technical Data

Metric		Measuring range	Readings	Overtravel	Measuring force	Order no. Standard*	Order no. Waterproof**
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	± 50 µm	1 µm	2.8 mm	0.3 N	**4334075**	
1003	Millimess	± 50 µm	1 µm	2.8 mm	0.5 N	**4334050**	
1003	Millimess	± 50 µm	1 µm	2.8 mm	0.7 N	**4334071**	
1003	Millimess	± 50 µm	1 µm	2.8 mm	2 N	**4334010**	
1003	Millimess	± 50 µm	1 µm	2.8 mm	3 N	**4334011**	
1003 XL	Millimess XL	± 130 µm	2 µm	2.5 mm	1 N	**4334001**	
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)*

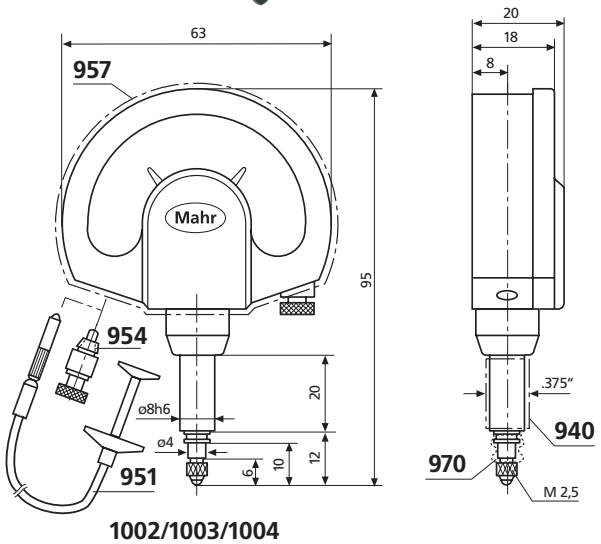
** *IP54, Incl. Plastic Case, Splash Guard Cover 957, Rubber Bellows (only for 1002/1003/1004); Adapter 940 (for inch instruments only)*

Mechanical Dial Comparators

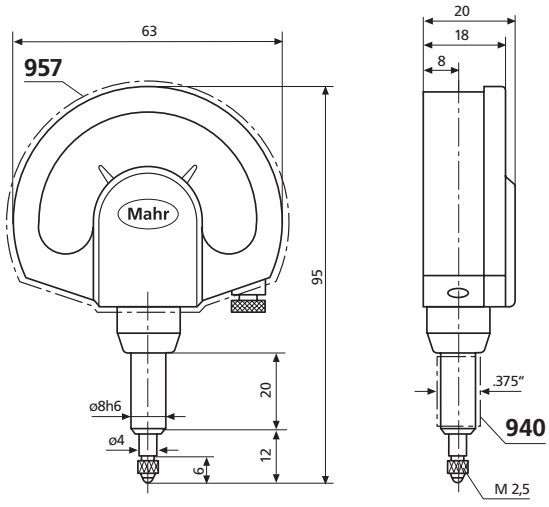
1010

1050

SHOCK PROOF



1002/1003/1004

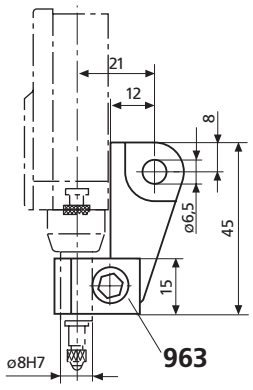


1010/1050

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 with limit contacts

1110 N

1150 N

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

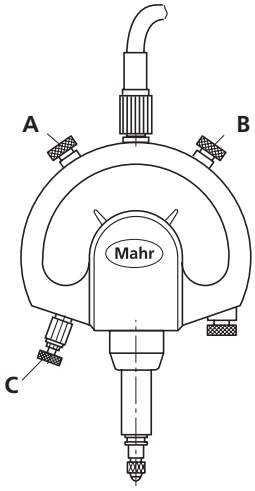
Metric	Measuring range	Readings	Over-travel	Measuring force	Order no. Standard*	Order no. Waterproof**
1110 N Elzentimess	± 0.25 mm	0.01 mm	2.3 mm	2 N	**4343100**	**4343105**
1150 N Eldezimess	± 1.5 mm	0.05 mm	0.3 mm	1.5 N	**4342100**	**4342105**

* *Incl. Plastic Case, Setting Knob 953, Cable (1.2m)*
** *IP54, Incl. Plastic Case, Splash Guard Cover 957, Rubber Bellows (only for 1110)*

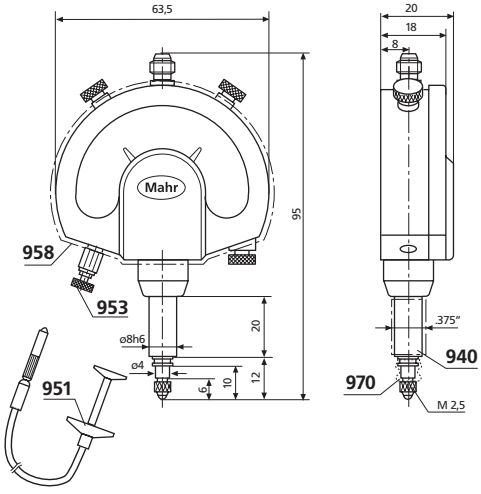
Mechanical Dial Comparators with limit contacts

Electrical Specifications

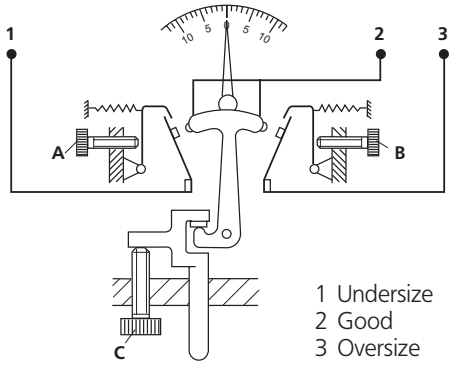
	Contact uncertainty with non-inductive load of 10 mA/24V	max. contact rating	max. contact voltage	max. contact current
1110 N	+/- 1,5 µm	240 mW	24 V	100 mA
1150 N	+/- 7 µm			



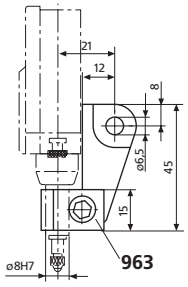
1110/1150



Wiring diagram



1 Undersize
2 Good
3 Oversize



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**	5-52
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, Air Gaging and Engineered Solutions

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Electrical Length Measuring Instruments 7- 2

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Millimar P1300 7- 6
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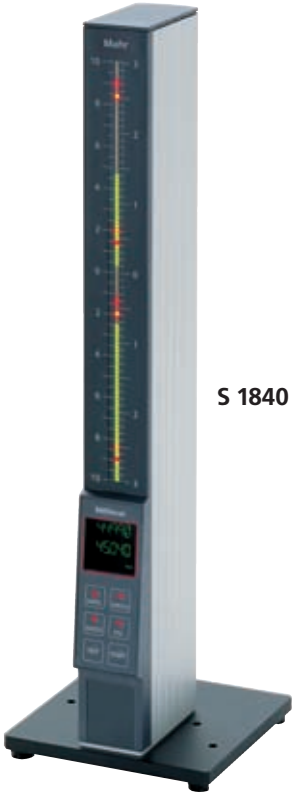
Millimar. Electrical Length Measuring Instruments

OVERVIEW

Evaluation Instruments

C 1216

C 1245



S 1840

- Compact, handy and simple to operate
- Extremely precise and easy to read due to the large clearly defined analog or digital display
- Single, sum and differential measurement; limit switches and extreme value memories
- 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
- Connect to a controller or a computer via the digital output
- 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
- Cable is plugged into the probe allowing quick and simple maintenance (P1300)
- Robust construction for use on the shop floor; further models for all applications are available.

P1300 M

P2004 M

Millimar. Electrical Length Measuring Instruments

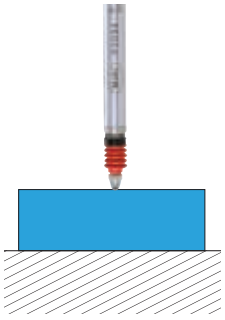
APPLICATIONS WITH INDUCTIVE PROBES

Single measurement with one probe

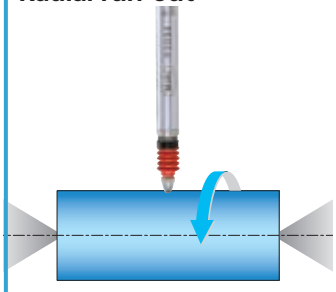
Indicating instrument instantly displays the measured value.

- 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

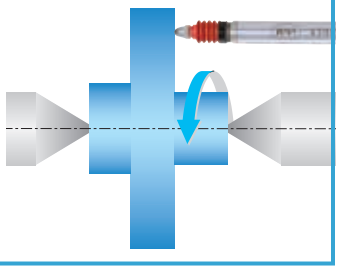
Thickness measurement



Radial run-out



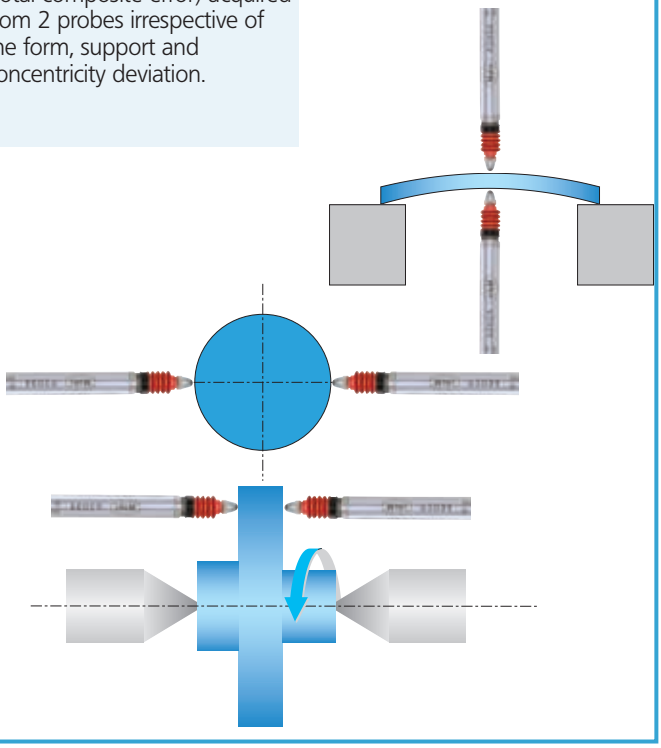
Axial run-out



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.

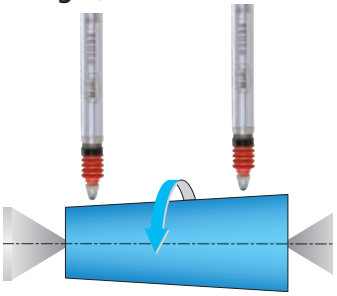
Thickness measurement



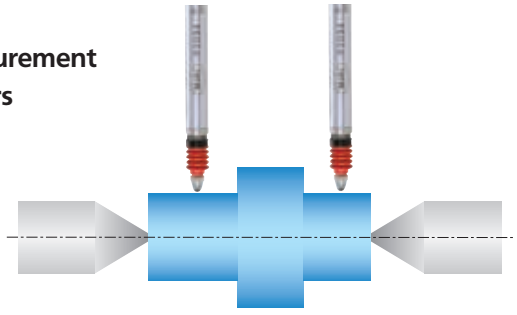
Difference measurement with 2 probes

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.

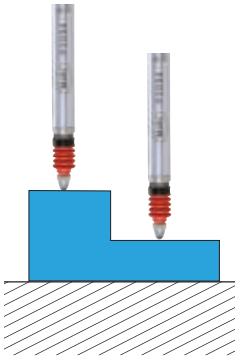
Form measurement of wedges, cones



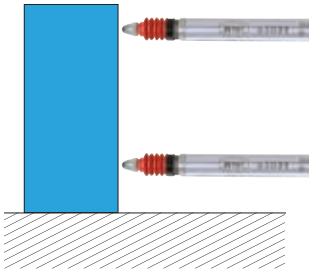
Concentricity measurement on 2 shaft diameters



Height difference between 2 steps



Perpendicularity measurement



Millimar. Electrical Length Measuring Instruments

INDUCTIVE PROBE PROGRAM

P1300-Serie (Mahr-Half bridge)

P1300 A

P1300 B

- Available in Mahr and Tesa compatibilities
- Well-proven and established Mahr-Half Bridge technology
- Easy to service: cable and probe can be seperated via the plug-in connector
- Simple to change to pneumatic lifting
- Measuring spindle runs in rotary stroke bearings

Page 7-6

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

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 7-14

1340 Mahr High Precision Probe

1340

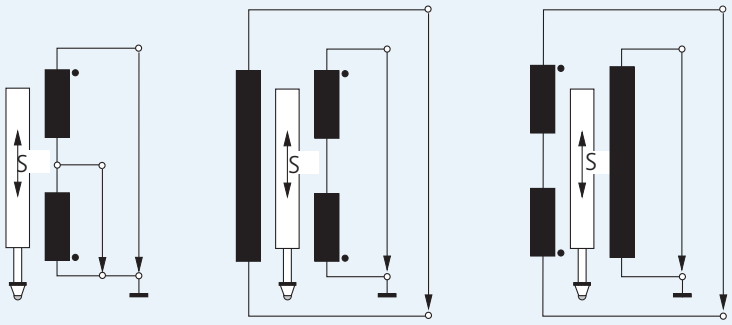
- To obtain the best results use in conjunction with Millitron 1240
- Unprecedented measuring accuracy and minimum linearity error < 0.01 %, i.e. 0.4 µm over the total measuring range

Page 7-14

General Technical Data of Inductive Probes

The measuring principle of inductive probes is based on the change of position of the 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)

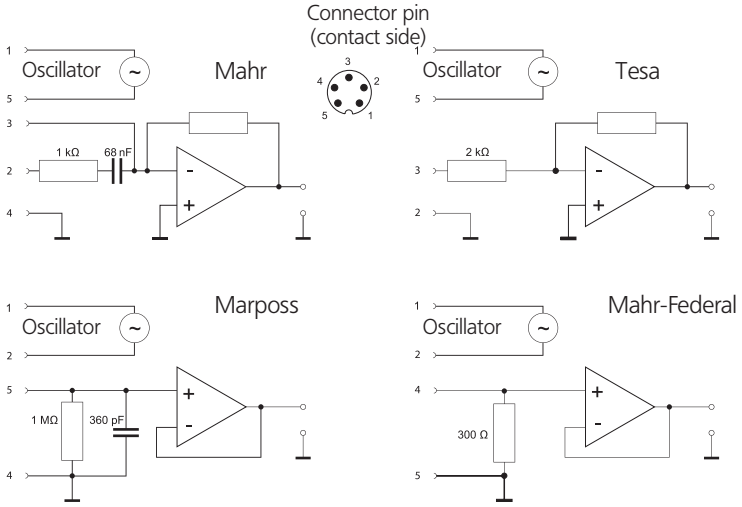
LVDT (Linear Variable Differential Transducer)

VLDT (Very Linear Differential Transducer)

Electrical specification of various compatibilities

		Type	Mahr	Tesa	Marposs	Mahr-Federal
Carrier frequency	KHz		19.4	13	7.5	5
Sensitivity	mV/V/mm	P2001 P2004 P2104	192	73.75	115	78.74
		P1300	192	73.75	–	–
		1301 1303 1304 K 1318	192	–	–	–
		P2010	19.2	29.5	11.5	7.874
Amplitude	Veff		5	3	3.5	2

Schematic drawings of Mahr input amplifiers according to the various compatibilities



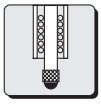
Millimar. The Plug and Play Probe

THE INDUCTIVE PROBE MILLIMAR P1300

►| 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 (with standard accessories). Simply fasten and unfasten an air hose.



Rotary stroke bearings
thus 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 / T 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

Cable and probe can be seperated with the plug-in connector.

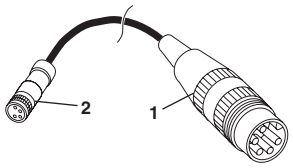
Technical Data

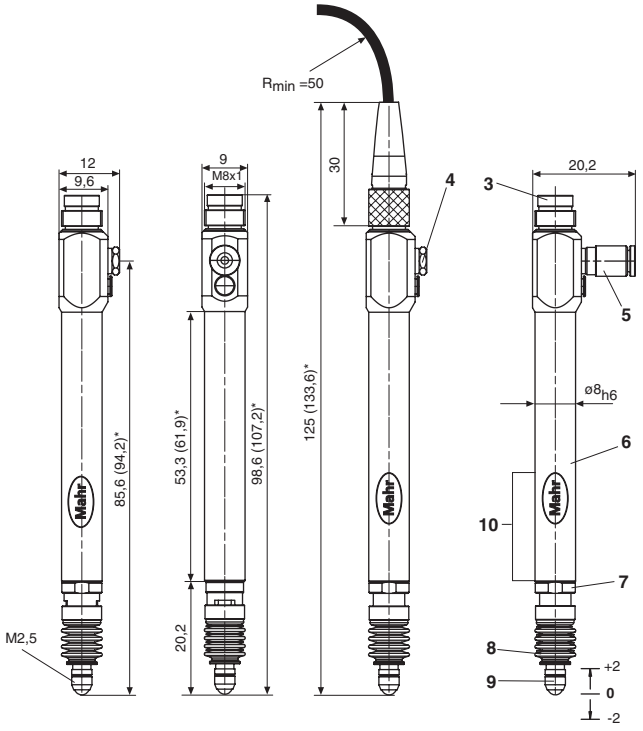
Probe type	**P1300 MA**	**P1300 TA**	**P1300 MB**	**P1300 TB**
Measuring range	± 2.0 mm / ***± 0.079"***			
Distance of lower stop[1)]	- 2.2 . . . 0 mm / ***- 0.09 . . . 0"***			
Distance of upper stop[1)]	+ 2.2 . . . 4.4 mm / ***+ 0.09 . . . 0.173"***			
Lifter/Retraction	Vacuum Lifter (Standard option)		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 f_w	0.1 µm / ***4 µin***			
Hysteresis f_u	0.5 µm / ***20 µin***			
Linearity deviation with revised sensitivity				
within range ± 0.5 mm	0.4 µm / ***16 µin***	1.0 µm / ***40 µin***	0.4 µm / ***16 µin***	1.0 µm / ***40 µin***
within range ± 1.0 mm	1.5 µm / ***60 µin***	3.0 µm / ***120 µin***	1.5 µm / ***60 µin***	3.0 µm / ***120 µin***
within range ± 2.0 mm	3.0 µm / ***120 µin***	not specified	3.0 µm / ***120 µin***	not specified
Protection class according to IEC 60529	IP64			
Length of cable	2.5 m / 8 ft (detachable)			
Compatibility - Half Bridge	Mahr	Tesa	Mahr	Tesa
Order no.	**4400180**	**4400190**	**4400181**	**4400191**

[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 / T 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





* *Values shown in brackets apply to Tesa-compatibility*

Individual Components and Accessories P1300

P1300 . . A

P1300 . . B

Connector for the air hose (90°)

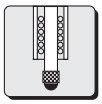
Connection cable 2.5 m / 8 ft

		Order no.
P1300 MA without cable		**4400182**
P1300 MB without cable		**4400183**
P1300 TA without cable		**4400192**
P1300 TB without cable		**4400193**
Hose connector for compressed air 90°		**4400238**
Cable for P1300 - 90°	2.5 m / 8 ft	**4885334**
Cable for P1300 - 90°	5 m / 16 ft	**4885335**
Cable for P1300 - 90°	10 m / 32 ft	**4885336**
Cable for P1300	2.5 m / 8 ft	**4885220**
Cable for P1300	5 m / 16 ft	**4885259**
Cable for P1300	10 m / 32 ft	**4885260**

	Order no.
Sealing bellows for	
P1300 . . A	**7021546**
P1300 . . B	**7028220**
Measuring force springs[1] for P1300 . . 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) including the sealing bellows have a measuring spring force of ca 0.25 N at zero point.*

Inductive Probe Millimar P2000-Series



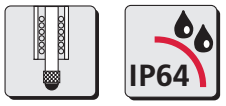
Technical Data

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 ± 0.15 N [2)]	0.75 N ± 0.15 N [2)]	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 / ***24 µin***	–		
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 acc. to DIN VDE 0470 Part 1 / IEC 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***	**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"***			- 2.2 . . .0 mm / ***-0.09 . . . 0"*** [1]	
Distance of upper stop	+ 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]	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	–	0.1 N / mm	–
Sensitivity deviation	0.3 %				
Repeatability f_w	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 acc. to DIN VDE 0470 Part 1 / IEC 60529	IP64			IP64	
Cable length	2.5 m / 8 ft [3]			2.5 m / 8 ft [3]	

Order no.	**P2010**	**P2010 A**	**P2010 B**	**P2104 A**	**P2104 B**
Compatibility - Mahr	**5324010**	**5324020**	**5324030**	**5324070**	**5324080**
Compatibility - Tesa	–	**5324021**	**5324031**	**5324071**	**5324081**
Compatibility - Marposs	–	**5324023**	**5324033**	**5324073**	**5324083**
Compatibility - Federal	–	**5324024**	**5324034**	**5324074**	**5324084**

* *Output $^1/_{10}$ sensitivity*

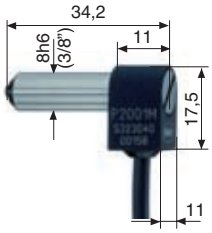
[1] *Relative to the electrical zero point. Adjustable; lower and upper stops are simultaneously adjusted*

[2] *Measuring force springs are interhangeable, additional measuring force springs are available (0.25; 0.5; 1; 1.25; 1.5 N)*

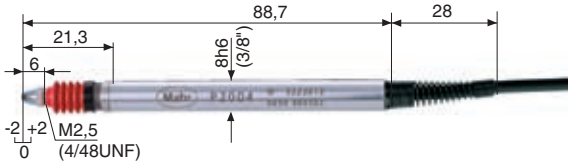
[3] *Extension cables are available, see accessories*

Inductive Probe Millimar P2000-Series

P2001

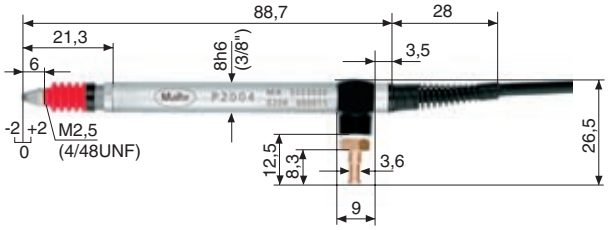


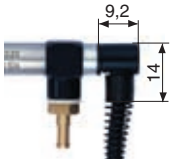
P2004



With the supplied slip-on cap, the cable can be flexed to 90° (vertical to horiziontal)

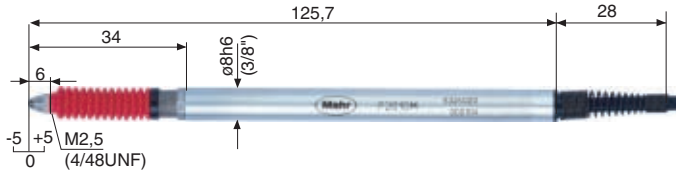
P2004 A / P2004 B





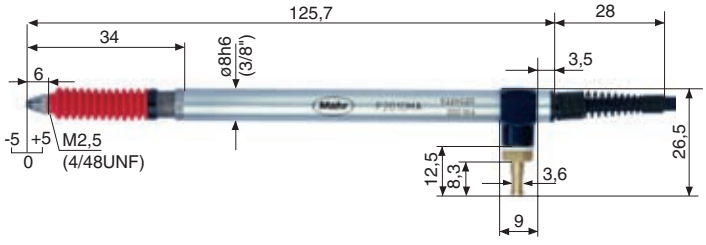
With the supplied slip-on cap, the cable can be flexed to 90° (vertical to horiziontal)

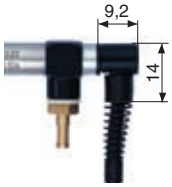
P2010



With the supplied slip-on cap, the cable can be flexed to 90° (vertical to horiziontal)

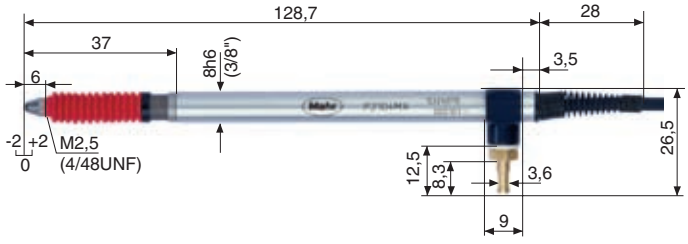
P2010 A / P2010 B

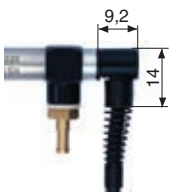




With the supplied slip-on cap, the cable can be flexed to 90° (vertical to horiziontal)

P2104 A / P2104 B





With the supplied slip-on cap, the cable can be flexed to 90° (vertical to horiziontal)

Values shown in brackets apply to Federal-compatibility

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 / 8 ft	C 2025	**5323130**	**5323131**	**5323133**	**5323134**
5 m / 16 ft	C 2050	**5323140**	**5323141**	**5323143**	**5323144**
7.5 m / 24 ft	C 2075	**5323150**	**5323151**	**5323153**	**5323154**
10 m / 32 ft	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 ca. 0.25 N in zero position.

	Order no.
Measuring force springs[1)] for P2010 and 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 ca. 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, 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 (+ 50 . . . + 131° F)
Operating temperature range	- 10 . . . + 80° C (+14 . . . + 176° F)
Information regarding chemical resistance	Resistant against oil, gasoline (petrol), water, alipate. Moderate against acids, alkaline solutions, solvents, ozone

Inductive Probe Millimar 1301 / 1303 / 1304 K / 1318 / 1340

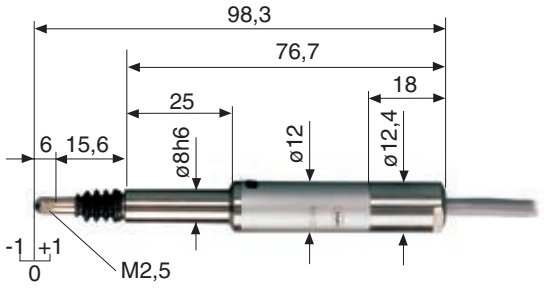
Technical Data

Probe type	**1301**	**1303**	**1304 K**	**1318**	**1340**
Measuring range	± 1.0 mm / ***± .039"***		± 1.0 mm / ***± .039"***	-0.3 . . . +1.0 mm / ***- .012 . . . + .039"***	± 2 mm / ***± .079"***
Distance of lower stop [1]	-1.1 . . . 0 mm / ***- .043 . . . 0"***		1.1 mm / ***- .043"***	-0.37 mm / ***- .0146"***	-2.2 mm / ***- .09"*** (adjustable)
Distance of upper stop [1]	+2.7 mm / ***+ .106"***		+1.1 mm / ***+ .043"***	+1.6 mm / ***+ .063"***	+3.0 mm / ***+ .118"***
Lifter/Retraction	Cable release		–	–	pneumatic
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	0.75 N ± 0.15 N
Increase in measuring force	0.4 N / mm		0.15 N / mm	0.04 N / mm	0.08 N / mm
Sensitivity deviation	0.3 %		1.0 %	0.5 %	0.3 %
Repeatability f_w	0.1 µm / ***4 µin***		0.15 µm / ***6 µin***	0.03 µm / ***1.2 µin***	≤ 0.08 µm / ***3.15 µin***
Hysteresis f_u	0.2 µm / ***8 µin***		0.2 µm / ***8 µin***	0.5 µm / ***20 µin***	0.08 µm / ***3.15 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***	–.	0.15 µm / ***6 µin***
within range ± 2,0 mm	–		–	–	0.4 µm / ***16 µin***
Protect. class acc. to IEC 60529	IP64		IP62	IP50	IP64
Cable length	1,5 m [2]				
Compatibility - Mahr	LVDT				only with Millimar 1240
Order no.	**5313010**	**5313030**	**5313049**	**5313180**	**5313400**

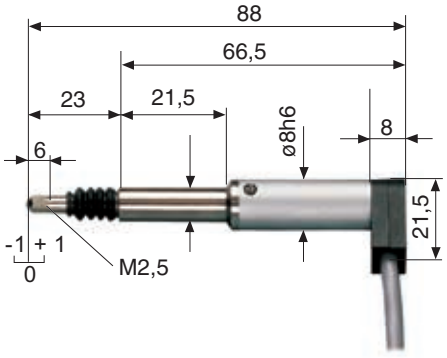
[1] *Relative to the electrical zero point*
[2] *Extension cables are available, see accessories*

Inductive Probe Millimar 1301 / 1303 / 1304 K / 1318 / 1340

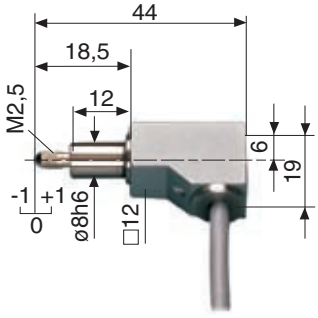
1301



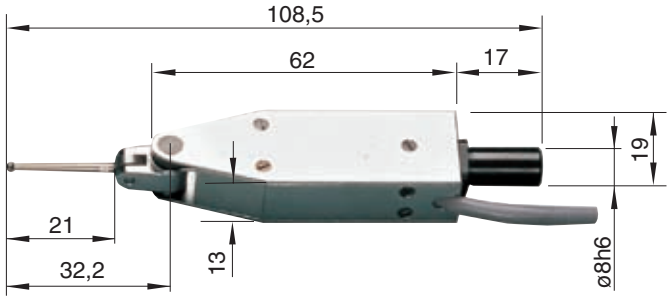
1303



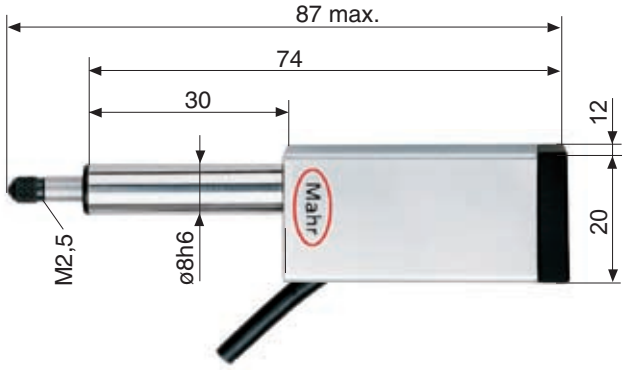
1304 K



1318



1340



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*	**3005223**
		d = 0.5 mm; L = 21 mm	**7003901**
		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**
Pneumatic Lifter for 1340 Pneumatic hand pump with an plug-in hose ca. 1 m / 3 ft	**1340/1**		**5313420**
Pneumatic Foot Switch for 1340 for connecting up to 4 P1300 Probes	**1340/1F**		**5313419**

** Supplied with 1318*

Lever Type Gage Heads F

EHE-2056

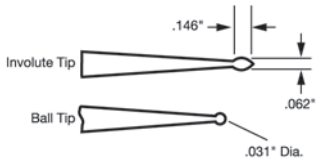
For use on test stands, surface plate work, or where light pressure is needed.

Features

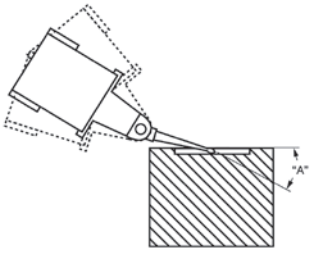
- Clutch-mounted contact swivels through 280° arc for easy positioning
- Linearity – 0.1% over full range of ±0.250 mm / ±.010"
- Gaging pressure less than 4 g / .14 oz. in either direction, with a change of less than 0.1 gram per 25 µm / .001" of contact travel. Special gaging pressures available. Contact 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.



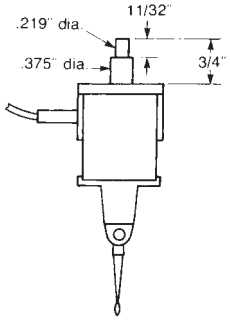
When exceeding 20°, use ball tip contact and table above. With multiplier function, 832F & 1840F Amplifiers can correct for cosine error.

Accessories

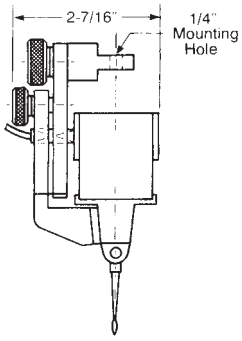
	Order no.
Adaptor to mount EHE-2048 on Model 2400 Stand	**EAM-1071**
Clamp for mounting EHE-2048 on model 2300 Stand	**CP-116**
Accessories kit for EHE-2048. Includes EAM-1071, CP-116, EPT-1013, two rectangular holding bars and a holding rod	**EAS-1333**
Replacement tip, 1.6 mm/ ***.062"*** dia. steel ball	**EPT-1004**
Replacement tip, 0.787 mm/ ***.031"*** dia. tungsten carbide ball	**EPT-1007**
Replacement tip, steel involute (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

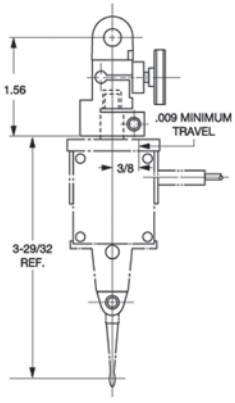
Models and Accessories



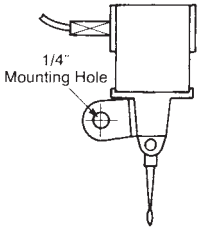
Model EHE-2048 – Post Bracket Back, (BK-108) tamper-proof mounted. Option: Conversion Bracket, EAM-1071, attaches quickly and securely in any rotational direction to suit a wide variety of mounting needs.



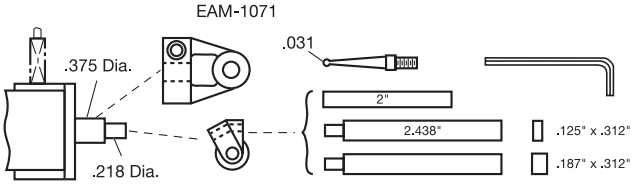
Model EHE-2056 – Adjustable Nose Mount (EAT-1010), tamper-proof mounted. Permits wide choice of positions and approximately 3.8 mm /.150" fine adjustment for quick setup with support close to gaging contact.



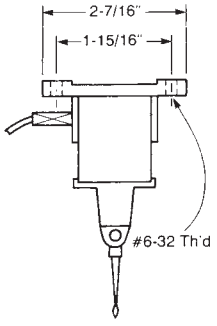
Model EAT-1026 – Fine Adjust Attachment for Lever Type Gage Heads with post mounting option, permits mounting on a wide variety of fixtures.



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 0.787 mm /.031" 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

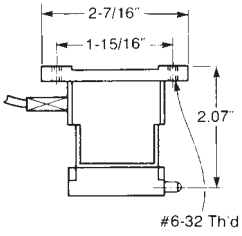
Rugged and reliable, ideal for fixtures or automatic gages

Features

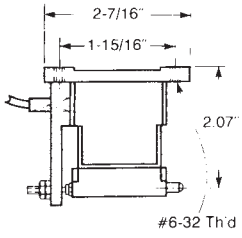
- Friction-free, straight line motion.
- Repeatability better than 0.01 µm /.5 µin
- Linearity – 0.05% over full range of ±0.250 mm / ±.010", with repeat accuracy within 0.01 µm / .5 µin.
- Adjustable pretravel.
- Gaging pressure provided by external spring, from 85 g / 3oz. to 400 g / 14 oz.
- Uses regular 4-48 threaded Contact Points (PT-223 normally furnished).
- Cable length – 2.4 m / 8 ft.

Technical Data

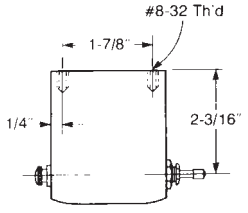
Model EHE-2053
Fixed Back Plate EPL-1140 (15.8 mm / 0.625" wide), tamper-proof mounted. Provides means of attachment for mounting on adjustable plates or slides in fixtures for continuous duty application.



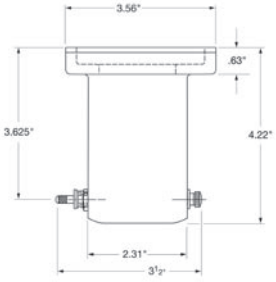
Model EHE-2049
Pressure Spring mount, tamper-proof mounted. Permits setting pre-travel and provides ample gaging pressure regardless of Gage Head position.



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.

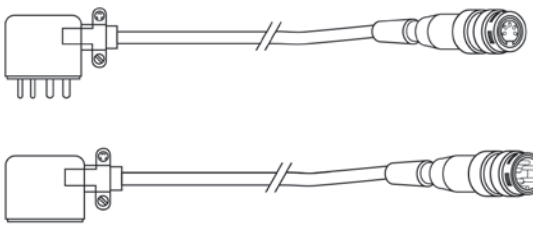


Model EGH-2006
Housing is extended and equipped with heavy duty back plate forming suitable support for use with Model 700 Comparator Stand.

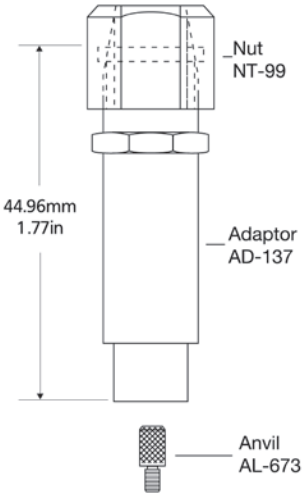


Gage Head Adapter Cables

	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**

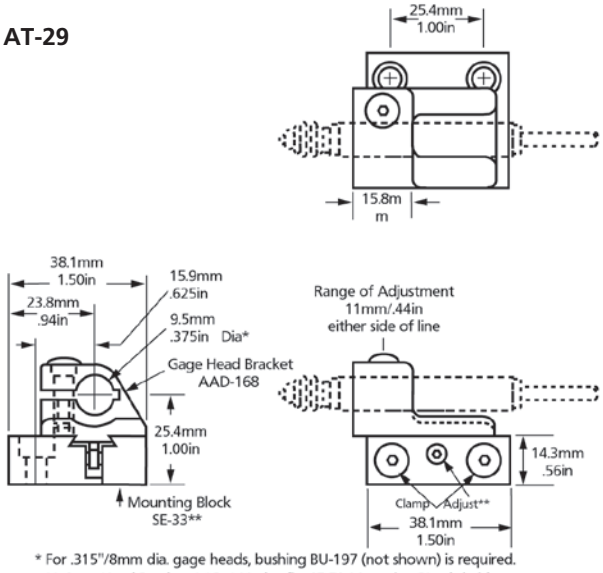


Adapters for Cartridge Type Gage Heads F

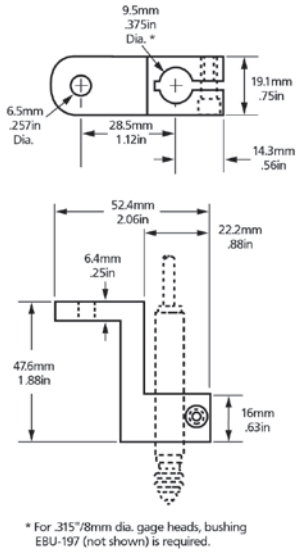


AD-138
Electronic probe adapter permits using cartridge type gage heads with any regular Mahr Federal indicator.

AT-29

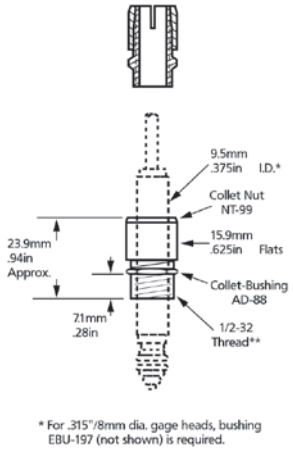


* For .315"/8mm dia. gage heads, bushing BU-197 (not shown) is required.
** Gage Head Bracket AAD-168 also fits SE-73 Mounting BLock (with adjustment knob in place of socket head adjustment screw)



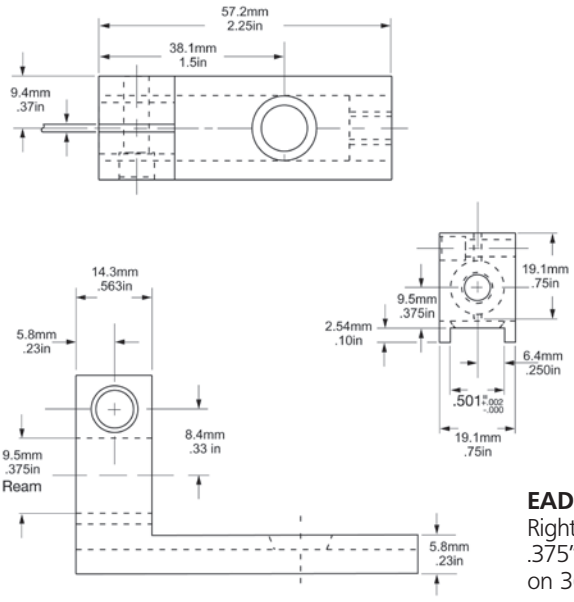
* For .315"/8mm dia. gage heads, bushing EBU-197 (not shown) is required.

AAD-66
"L" bracket used for mounting .375" diameter gage heads on comparator stands.

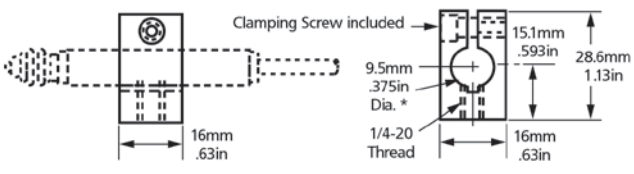


* For .315"/8mm dia. gage heads, bushing EBU-197 (not shown) is required.

AD-87
Split collar adapter for mounting .375" dia. gage heads.
For 1/2-32 taps use **V-892**

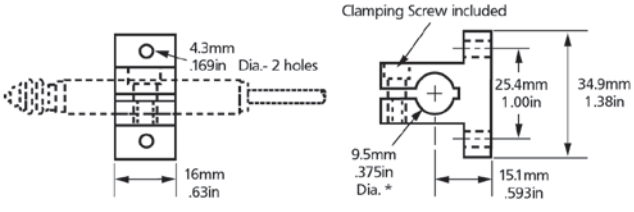


EAD-1029
Right angle adapter for mounting .375" diameter cartridge gage heads on 36B series comparators.



* 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.

Millimar. Evaluation Instruments

OVERVIEW

	C 1200 IC	830	832	C 1208 / C 1216	C 1245
Catalog page	7 - 22	7 - 23	7 - 24	7 - 26	7 - 28
Display	Large analog scale with 2 tolerance markers	Needle analog scale	Analog display with 1 digital line display	Background lit LCD with an analog display and a two line digital display	Analog scale with a two line digital display
Measuring channels	1 Inductive Probe (A)	According to type, up to: • 2 Inductive Probes (A, B)	According to type, up to: • 2 Inductive Probes (A, B) • 1 Pneumatic device (A, B)	According to type, up to: • 2 Inductive Probes (A, B) • 1 Pneumatic device	According to type, up to: • 8 Inductive Probes • 4 Incremental • Probes • 2 Pneumatic • devices 8 Analog Signals or a combination of the above
Compatible Inductive Probe (carrier frequency)	Mahr	Mahr Federal	Mahr / Mahr Federal	Mahr / Mahr Federal	Mahr / TESA / Mahr Federal
Max. Resolution	0.1 µm / ***.000005"***	0.1 µm / ***.000005"***	0.01 µm / ***.000001"***	0.1 µm / 0.01 µm * ***.000005"/.000001" ****	0.1 µm / ***.000005"***
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	+A, - A, +B , -B , A + B , A - B , B - A , -A - B	Formula editor for 80 characters Functions: + / - / * / ÷/ () / Factor
Features / Programs	1	2 / 2	2 / 2	2 / 2	16 / 6
Test steps	1	1	1	1	6
Dynamic measurements	–	–	MAX, MIN, MAX-MIN, (MAX+MIN)/2	MAX, MIN, MAX-MIN, (MAX+MIN)/2, mean	MAX, MIN, MAX-MIN, (MAX+MIN)/2, mean
Statistics functions	–	–	–	–	N, x-bar, S, Xmax, Xmin, Range
Classification	–	–	5 class LED and I/O	3 class LED and I/O	max. 998, max. 62 on I/O
Control inputs and outputs / SPS connections	–	–	3 inputs, 5 TTL Opto-coupler outputs	3 Opto-coupler inputs, 3 Opto-coupler outputs	3 Opto-coupler inputs, 6 Opto-coupler outputs
Analog output	–	1	1	1*	1
Data interfaces / ports	–	–	RS232, 9 pin, plug	RS232, 9 pin, plug	RS232, 9 pin, plug
Configuration	Turn switch	Turn switch	Keypad	PC, Keypad	PC, Keypad
Battery operated	Yes	Yes	Yes or AC powered	No, AC powered	No, AC powered
Dimensions in mm (H x W x D)	137 x 157 x 80	165 x 190 x 148	254 x 168 x 143	205 x 160 x 165	210 x 160 x 155

**Only C1216*

1240	S 1840	X 1715	X 1741	1901 TA	G 1275 incl. D1200 X
7 - 29	7 - 30	7 - 31	7 - 32	7 - 33	7 - 34
Evaluation instrument with 2 adjustable tolerance markers	1 illuminated bar and a two line digital display	None Only via PC, supplied with Software D1000X	None Only via PC, supplied with Software D1000X	None Measuring amplifier with analog output	15"-TFT-Bildschirm 1024 x 768 Pixel Touchscreen
2 Inductive Probes (A, B)	According to type, up to: • 2 Inductive Probes (A, B) • 1 Pneumatic device	According to type, up to: • 8 Inductive Probes • 4 Incremental • Probes • 8 Analog Signals 2 Temperature Sensors or a combination of the above	According to type, up to: • 16 Inductive Probes • 8 Incremental • Probes • 8 Analog Signals 4 Temperature Sensors or a combination of the above	1 Inductive Probe	According to interface 4 - 128 for: Inductive Probes, Incremental Probes, Pneumatic Probes, Analog Signals
Mahr	Mahr / Mahr Federal	Mahr / TESA / Mahr Federal	Mahr / TESA / Mahr Federal	Mahr	Mahr / TESA / Mahr Federal
0.01 µm / ***.000001"***	0.1 µm / 0.01 µm ***.000005"/.000001"***	0.1 µm / ***.000005"***	0.1 µm / ***.000005"***	–	0.1 µm or 0.01 µm ***.000005" /.000001"***
+A, -A, +B, -B A+B, +A-B, -A+B, -A-B	A, -A, B, -B, A+B, A-B, -A+B, -A-B	Formula editor for 80 characters Functions: + / - / * / ÷/ () / Factor	Formula editor for 80 characters Functions: + / - / * / ÷/ () / Factor	–	Freely programmable
2 / 2	2 / 2	16 / 6	16 / 6	1	99 / 1000
1	1	6	6	–	99
MAX, MIN, MAX-MIN, (MAX+MIN)/2, mean	MAX, MIN, MAX-MIN, (MAX+MIN)/2, mean	MAX, MIN, MAX-MIN, (MAX+MIN)/2, mean	MAX, MIN, MAX-MIN, (MAX+MIN)/2, mean	–	MAX, MIN, MAX-MIN, Freely programmable
n, xn, x, s, R	–	N, x-bar, S, Xmax, Xmin, Range	N, x-bar, S, Xmax, Xmin, Range	–	Freely programmable
max. 30 digital, 3 class LED and I/O	5 class display, 3 class I/O	max. 998, max. 5 on I/O	max. 998, max. 79 on I/O	–	Yes
3 Opto-coupler inputs, 3 TTL outputs	3 Opto-coupler inputs, 3 Opto-coupler outputs	3 Opto-coupler inputs, 6 Opto-coupler outputs	6 Opto-coupler inputs, 12 Opto-coupler outputs	–	16 Digital inputs (Optional) 16 Digital outputs (Optional)
1	1	1	2	1 Output voltage 1 Current output	–
RS232, 9 pin, plug	RS232, 9 pin, plug	RS232, 9 pin, plug	RS232, 9 pin, plug	–	1 x RS232, 3 x USB, 2 x Ethernet (RJ45)
Keypad	PC, Keypad	PC	PC	–	PC, Touchscreen
No, AC powered	No, AC powered	No, AC powered	No, AC powered	No, AC powered	No, AC powered
195 x 156 x 120	487 x 47 x 144	160 x 205 x 165	235 x 180 x 160	170 x 43 x 100	305 x 400 x 65

Millimar 1200 IC Compact amplifier M

IP40

1200 IC

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
- Test button for batteries
- Supplied with: Mains adapter and operating instructions

Technical Data

	1200 IC	1200 IC/MZ
Measuring range / Resolution	± 3 µm / 0.1 µm ± 10 µm / 0.2 µm ± 30 µm / 1 µm ± 100 µm / 2 µm ± 300 µm / 10 µm	***± .0001" / .000002"*** ***± .0003" / .00001"*** ***± .001" / .00002"*** ***± .003" / .0001"*** ***± .01" / .0002"***
Scale length	120 mm / ***4.724"***	
Response time	350 ms	
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	ca. 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**

Accessories

	Order-no.
Battery, R 14 battery 1.5 V, (6 are required)	**3004424**

For appropriate Inductive probes please refer to pages 7-6 to 7-15

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
- 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.
- The essential performer for today's slim budgets
- For appropriate inductive probes please refer to pages 7-6 to 7-18

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 / 32° to 140°F

Model	**Order-no.**			**Ranges**		**Resolution**	
Linear:	**120V**	**220V EU**	**240V UK**				
Standard Unit				±100 µm	/ ***±.004"***	5 µm	/ 200 µ"
830 F	**2121421**	**2121431**	**2121441**	±20 µm	/ ***±.001"***	1 µm	/ 50 µ"
830 M	**2121404**	**2121405**	**2121425**	±10 µm	/ ***±.0002"***	0.5 µm	/ 10 µ"
High Resolution – Inch				±200 µm	/ ***±.004"***	10 µm	/ 200 µ"
830 F	**2121424**	**2121434**	**2121444**	±50 µm	/ ***±.001"***	2.5 µm	/ 50 µ"
				±10 µm	/ ***±.0001"***	0.5 µm	/ 5 µ"
Angular:	**120V**	**220V EU**	**240V UK**				
Angular unit - ARCSEC (used with Mahr Federal Level Heads)				±1000 Sec	/ ***±.010"***	50 Sec	/ 500 µ"
830 F	**2121422**	**2121432**	**2121442**	±200 Sec	/ ***±.002"***	10 Sec	/ 100 µ"
				±20 Sec	/ ***±.0004"***	1 Sec	/ 20 µ"

Accessories

	Order-no.	**Compatible Probes** Used on 830 F	Used on 830 M
Analog Output Connector	**PRT-2380**	P2001 F	P2001 M
120V Battery Charger	**EBY-1016**	P2004 F	P2004 M
220V Battery Charger (EU)	**EBY-1019**	P2010 F	P2010 M
240V Battery Charger (UK)	**EBY-1020**	P2104 F	P2104 M
Battery	**EBY-1021**	EHE-2XXX	1301, 1303,
Battery Eliminator Kit for 110V Models	**EKT-1237-W1**	EGH-Levels	1304, 1318
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

Technical Data

Power	832 F Mahr Federal probe type Order no.	832 M Mahr probe type Order no.
120VAC adapter	**2004005**	**2004000**
US battery/120VAC charger	**2004007**	**2004002**
EU/UK 220/240VAC adapter	**2004006**	**2004001**
EU battery/220VAC charger	**2004008**	**2004003**
UK battery/240VAC charger	**2004009**	**2004004**

Accessories

	Order no.
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 /10 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 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 230 V Euro / 120 V US	**4102040**
RS-232 Cable: Amplifier to Printer, 3 m / 10 ft	**7024634**
Paper rolls for MSP-2 Line Printer	**4102041**

For appropriate inductive probes please refer to pages 7-6 to 7-18

Millimar C 1208 Compact amplifier with background lit display

Features

- 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, 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, . . .

- Supplied with:
  Operating instructions and a mains power supply plug

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 ***±.0001; .0003; .001; .003; .01; .03; .1; .3 inch; or tolerance related***
Meas. range inductive probe	4000 (±2000) µm, resolution 0.1 µm ***±.08", resolution .000005"***
Response time	
- Meas. value memory	0.010s
- Digital display	0.100s
- Analog display	0.100s
- Outputs	0.020s

Error limit	
- 10 x analog display	2.5%
- Digital display	0.3% (min. 0.2 µm)
Temperature coefficient	0.005%/°C
Operating temperature	0°C . . . 45°C / 32°F . . . 113°F
Interfaces	
Computer, printer	RS232, 9 pin interface (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 . . . 240V, 47Hz . . . 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 F	Mahr-Federal compatible	**5312082**

For appropriate Inductive probes please refer to pages 7-6 to 7-18

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	**5318430**
Foot switch for for Input 1	**5330955**
for Input 2	**5330956**
for Input 3	**5330957**
Adapter non wired for I/O port	**7032401**
Keypad dust cover	**3025712**

Millimar C 1216 Compact amplifier with background lit display

Features

- 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 at measuring ranges ± .008 inch

Connections
- 2 inputs for inductive probes (also compatible with probes from Mahr, 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)

- Supplied with:
  Operating instructions and a mains power supply plug

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 ***±.0001; .0003; .001; .003; .01; .03; .1; .3 inch; or tolerance related***
Meas. range inductive probe	4000 (±2000) µm, resolution 0.1µm ***±.08", resolution .000005"*** 400 (±200) µm, resolution 0.01µm ***±.008", resolution .000001"***
Response time	
- Meas. value memory	0.010s
- Digital display	0.100s
- Analog display	0.100s
- Outputs	0.020s

Error limit	
- 10 x analog display	2.5%
- Digital display	0.3% (min. 0.2 µm)
Temperature coefficient	0.005%/°C
Operating temperature	0°C . . . 45°C / 32°F . . . 113°F
Interfaces	
Computer, printer	RS232, 9 pin interface (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 . . . 240V, 47Hz . . . 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 F	Mahr-Federal compatible	**5312082**
C 1216 M	Mahr compatible	**5312160**
C 1216 F	Mahr-Federal compatible	**5312162**

For appropriate Inductive probes please refer to pages 7-6 to 7-18

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		**5318430**
Foot switch for	for Input 1	**5330955**
	for Input 2	**5330956**
	for Input 3	**5330957**
Adapter non wired for I/O port		**7032401**
Keypad dust cover		**3025712**

Millimar C 1245 Compact amplifier

Features

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

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

Connections
- 2 input modules can be inserted into base unit
- Following modules are available:
  - 4 inputs for Inductive Probes (Mahr, Mahr-Federal, Tesa compatiblity)
- 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
- Supplied with:
  Operating instructions and a mains power supply plug

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 ***± .0003; .001; .003; .01; .03; .1; .3 inch***
Measuring range inductive probe	4000 (±2000) µm, resolution 0.1 µm (measured value display ***± .08", resolution .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°. . . 50°C
Interfaces	
Computer, printer	RS232, 9 pin interface (PC-compatible layout)
- Control outputs	6 Optocoupler-outputs, 24V, 100mA
- Control inputs	3 Optocoupler-inputs, 24V, 10mA
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 6.103"***
Weight	ca. 2 kg / 4.40 lbs

Order no.

		Order no.
C 1245 M	Mahr compatible for 4 inductive probes	**5331250**
C 1245 M	Mahr compatible for 8 inductive probes	**5331291**
C 1245 T	Tesa compatible for 4 inductive probes	**5331251**
C 1245 F	Mahr-Federal compatible for 4 inductive probes	**5331253**

For appropriate Inductive probes please refer to pages 7-6 to 7-18

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		**5318430**
Foot switch for Millimar	for Input 1	**5330955**
	for Input 2	**5330956**
	for Input 3	**5330957**
Adapter non wired for I/O port		**7032401**
Keypad dust cover		**3025712**

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
- Tolerance monitoring (with adjustable hysteresis)
- Tolerance field can be set along the total width
- Universal classification possibilities
- Extreme value memories of long stability
- 2 inputs for Mahr compatible inductive probes for single, sum or difference measurements
- Use the RS232C interface to connect a printer / computer / data logger
- Connect a recorder with analog output
- Use the RS232C interface to remotely control all functions
- Supplied with: Operating instructions and a mains power supply plug

Technical Data

Display	analog/digital

Analog display: Measuring range/resolution

± 1 µm/0.02 µm ***(± .00003"/.000001")***
± 3 µm/0.1 µm ***(± .0001"/.000002")***
± 10 µm/0.2 µm ***(± .0003"/.00001")***
± 30 µm/1 µm ***(± .001"/.00002")***
± 100 µm/2 µm ***(± .003"/.00001")***
± 300 µm/10 µm ***(± .01"/.0002")***
± 1000 µm/20 µm ***(± .03"/.01")***
± 3000 µm/100 µm ***(± .1"/.002")***
± 10000 µm/200 µm ***(± .3"/.01")***

Digital display: Measuring range/resolution

± 200 µm/0.01 µm ***(± .008"/.000001")***
± 2000 µm/0.1 µm ***(± .08"/.00001")***

Single meas./ 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 4.724***
Weight	2.3 kg / 5.07 lbs

Order no.

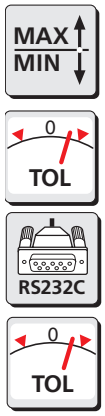
Version		Order no.
1240	Front Panel English	**5312401**

For appropriate Inductive probes please refer to pages 7-6 to 7-14
Recommended **Probe 1340** see page 7-14

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**
Control Unit 1240/SG with 3 push buttons and 5 relay outputs	**5312439**
Classifying Instrument 1240/KG with 20 opto-coupler outputs	**5312438**
Data Cable to any. PC (9 pin D-jack)/MSP2	**7024634**
Statistics Printer MSP2, 230V / 110V	**4102040**

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)
- 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
- Programable analog output voltage ± 5 V
- Supplied with: Operating instructions and a mains power supply plug

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***
Meas. range inductive probe	4000 (±2000) µm, resolution 0.1 µm ***±.08", resolution .000005"*** 400 (±200) µm, resolution 0.01 µm ***±.008", resolution .000001"***
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, 100 mA
- Control inputs	3 Optocoupler Inputs, 24 V, 10 mA
Analog output	Voltage ±5 V programable
Power supply	90 . . . 264 V, 47 . . . 63 Hz
Power consumption	12 VA
Protection class	IP53 IP43 with conductive dust
Dimensions (H x W x D)	ca. 487 x 47 x 144 mm ***ca. 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	**5318400**
S 1840 F	Mahr-Federal compatible	**5318402**

For appropriate Inductive probes please refer to pages 7-6 to 7-18

Accessories

		Order no.
Base Plate, for up to 3 columns		**5330901**
Wall Mounting		**5330902**
Connection Cable (9 pin D-Sub-jack to D-Sub-jack), length 3 m / 10 ft		**7024634**
Control Unit with 3 push buttons		**5318430**
Foot Switch for Millimar	Input 1	**5330955**
	Input 2	**5330956**
	Input 3	**5330957**
Adapter non wired for I/O port		**7032401**

Millimar X 1715 Intelligent measurement interface system

Features

Millimar X 1715 is a smart and universal measurement interface system for complex measuring tasks on the production floor. It is ideal as a signal transformer between sensors and the electronic measured data processsing.

Functions
- Static and dynamic measurements
- Equation editor
- Definition of 16 features are 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

- Supplied with: Operating instructions, connection cable and a mains power supply plug

Technical Data

Measuring range inductive probe	4000 (± 2000) µm, ***± .08"*** Resolution 0,1 µm, ***.000005"***
Response time	
- Meas. value memory	0.005s
- Outputs	0.020s
Error limits	
- 0.3% (min. 0.2 µm)	
Temperature coefficient	± 0,005%/°C
Oper. temperature range	0°. . . 50°C / 32° F . . . 122° F
Interfaces	
Computer, printer	RS232, 9 pin interface (PC-compatible layout)
- Control outputs	6 Optocoupler-outputs, 24V, 100mA
- Control inputs	3 Optocoupler-inputs, 24V, 10mA

Analog output voltage	programmable
Power supply	90 V . . . 264 V, 47Hz . . . 63Hz
Power consumption	11 VA
Protection class	IP53 IP43 with conductive dust
Dimensions (H x B x T)	ca. 160 mm x 205 mm x 165 mm ***ca. 6.30" x 8.07" x 6.49"***
Weight	ca. 2 kg / 4.40 lbs

Order no.

		Order no.
X 1715	Mahr compatible for 2 Inductive probes	**5331064**
X 1715	Mahr compatible for 4 Inductive probes	**5331063**
X 1715	Mahr compatible for 8 Inductive probes	**5331061**
X 1715	Tesa compatible for 8 Inductive probes	**5331062**

For appropriate Inductive probes please refer to pages 7-6 to 7-14

Accessories

		Order no.
Connection Cable (9 pin D-Sub-jack to D-Sub-jack), length 3 m / 10 ft		**7024634***
Control Unit with 3 push buttons		**5318430**
Foot Switch for Millimar	for input 1	**5330955**
	for input 2	**5330956**
	for input 3	**5330957**
Adapter non wired for I/O port		**7032401**

** Included in the scope of supply*

Millimar X 1741 Intelligent measurement interface system

Features

Millimar X 1741. is a smart and universal measurement interface system for complex measuring tasks on the production floor. It is ideal as a signal transformer between sensors and the electronic measured data processsing.

Functions
- Static and dynamic measurements
- Equation editor
- Definition of 16 features are possible
- 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

- Supplied with: Operating instructions, connection cable and a mains power supply plug

Technical Data

Measuring range inductive probe	4000 (± 2000) µm, ***± .08"*** Resolution 0.1 µm, ***.000005"***
Response time	
- Meas. value memory	0.005s
- Outputs	0.020s
Error limits	
- 0.3% (min. 0.2 µm)	
Temperature coefficient	± 0.005%/°C
Oper. temperature range	0°. . . 50°C / 32° F . . . 122° F
Interfaces	
Computer, printer	RS232, 9 pin interface (PC-compatible layout)
- Control outputs	12 Optocoupler-outputs, 24V, 100mA
- Control inputs	6 Optocoupler-inputs, 24V, 10mA

Analog output voltage	programmable (2 outputs)
Power supply	90 V . . . 264 V, 47Hz . . . 63Hz
Power consumption	11 VA
Protection class	IP53 IP43 with conductive dust
Dimensions (H x W x D)	ca. 235 mm x 180 mm x 160 mm ***(9.25" x 7.08" x 6.29")***
Weight	ca. 2 kg / 4.40 lbs

Order no.

		Order no.
X 1741	Mahr compatible for 2 Inductive probes	**9037840**
X 1741	Mahr compatible for 4 Inductive probes	**9038383**
X 1741	Mahr compatible for 12 Inductive probes	**5331057**
X 1741	Mahr compatible for 16 Inductive probes	**5331096**

For appropriate Inductive probes please refer to pages 7-6 to 7-14

Accessories

		Order no.
Connection Cable (9 pin D-Sub-jack to D-Sub-jack), length 3 m / 10 ft		**7024634***
Control Unit with 3 push buttons		**5318430**
Foot Switch for Millimar	Input 1	**5330955**
	Input 2	**5330956**
	Input 3	**5330957**
Adapter non wired for I/O port		**7032401**

** Included in the scope of supply*

Millimar Measuring Amplifier 1901 TA with analog output

IP54

Features

- The measuring amplifier 1901 TA is to be used in connection with an inductive probe for measurement control processes
- Provides the inductive probe with an AC voltage and converts the carrier fequency signal into output voltage
- Output voltage: ± 10 V (Option: ± 5 V / 0 V to 10 V) at the end of the measuring range
- Simultaneously the output signal current of ± 5 mA at the end of the measuring range is available
- Supply voltage 24 V=
- The housing of the 1901 TA is designed for use in the machine room
- Connections : 1 output for one Mahr compatible inductive probe
- Supplied with: 3 pin socket plug for analog output, 3 pin coupling bushing for power supply and operating instructions

Technical Data

Measuring ranges (adjustable through bridges)	± 125 µm ***(± .00492")*** ± 250 µm ***(± .00984")*** ± 500 µm ***(± .01968")*** ± 1000 µm ***(± .03937")*** ± 2000 µm ***(± .07874")***
Output voltage at end of measuring range	± 10 V
Option:	± 5 V / 0–5 V / 0–10 V
Current output at end of measuring range	± 5 mA
Linearity	± 0.3%
Supply voltage	24 V =

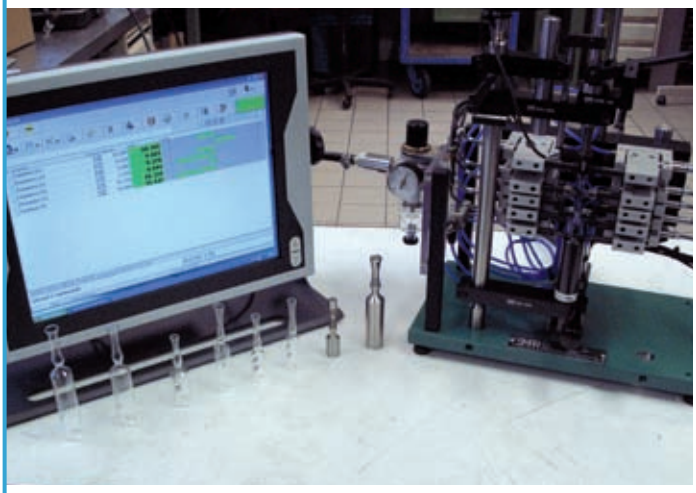
Connections	
Input	5 pin socket
Output	3 pin socket
Supply	3 pin plug
Response time	5-10 ms
Cut-off frequency	90 Hz
Protection class	IP 54
Dimensions: (L x D x H)	43 x 100 x 170 mm ***(1.69" x 3.93" x 6.69")***

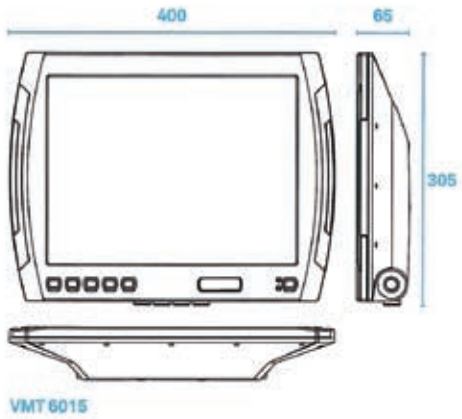
Order no.

		Order no.
1901 TA	Mahr compatible for 1 Inductive probe	**5319011**
1901 TA/So	Mahr compatible for 1 Inductive probe 0- 10 V	**9023856**

For appropriate Inductive probes please refer to pages 7-6 to 7-14

Millimar G1275





Description

With the measuring computer **Millimar G1275,** measuring results from multi-gaging units can easily be recorded and statistically evaluated.

The industrial housing makes the measuring computer suitable for use in the rough production area.

The compact dimensions of the housing allow for use of the computer in areas with little space.

The measuring results are clearly shown on the 15" TFT monitor, which avoids reading errors and misinterpretations.

Using the touchscreen, the measuring computer can be realiably operated in the production environment.

To record the measuring signals from the most different sensors, a broad spectrum of measuring interfaces can be connected to the measuring computer Milimar G1275.

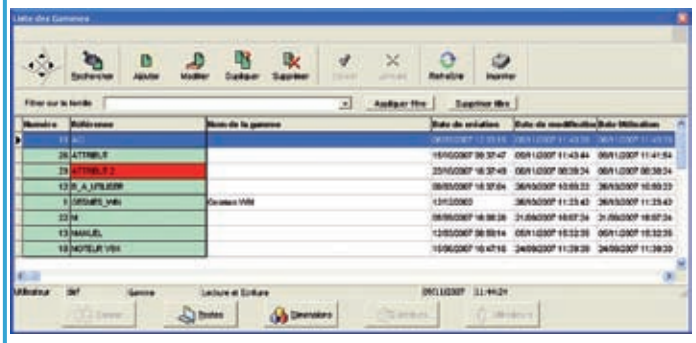
Technical Data

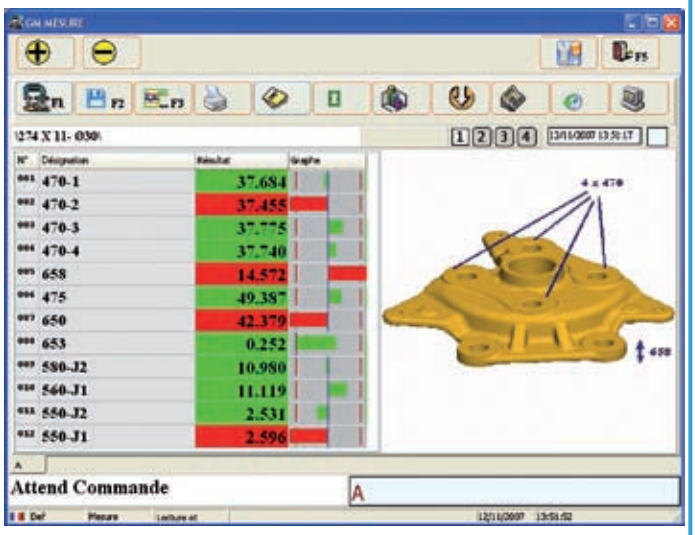
Dimensions (L x D x H)	305 x 400 x 65 mm
Weight	4,3 kg
Material	Aluminum pressure die-cast powder-coated
Operating temperature	0 °C . . . 55 °C
Relative humidity	10 % to 85 % non-condensing
Protection class	IP65
TFT color monitor	15" 1024 x 768 pixel
Touch	Resistive industry touchscreen
Power supply	230 V ± 10 % AC / 24V DC (via external mains unit)

Interfaces

Inputs/Outputs	1 RS232 (COM1) 1 input for keyboard/mouse 2 Ethernet connection (RJ45) 2 USB on the back side 1 USB in the front panel

Software Millimar D1200X

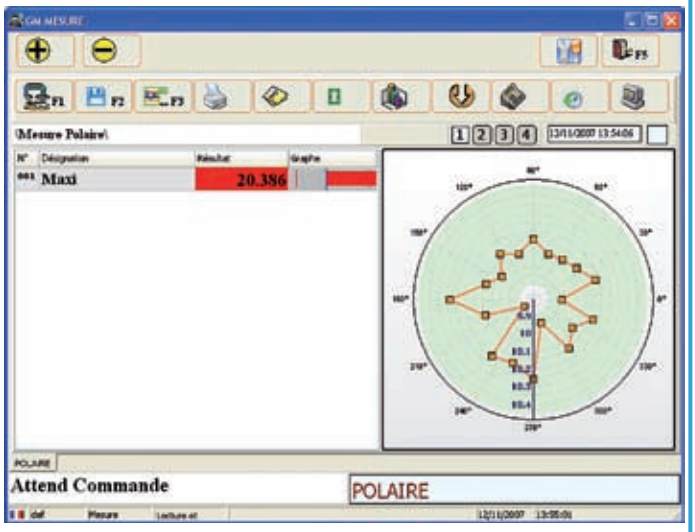




Description

- Windows-based software
- ACCESS data bank
- Password protected menus and access authorization
- Free form editor
- Easy programming of the inspection plan by filling out masks
- Freely programmable calculation format

- Fast selection to display the measurements conducted
- Aid monitor for easy adjustment of sensors
- Calibration history is saved
- Measuring value display (numerical and as a bar graph)
- Measurement is saved (manually or automatically)
- Monitoring of the working range of the sensors and alarm
- Statistical evaluation of a measuring result
- Depiction as a histogramm and SPC control card.
- Automatic calibration demand after hours and n measurements
- Inaccurate measuring values can be commented on with the reasons
- Statistiscal analysis
- Test of normal distribution
- Measurement systems analysis (R&R) and gage capability integrated
- Module to export in numerous data formats
- Interfaces to e.g. QDAS, SUMEQ, SESAME, QUASAR
- I/O interface for automatic control (option)
- Operation in automatic production lines with dialog control



Minimum Requirements

- Pentium IV or similar processor with at least 1.5 GHz
- Windows 2000 or Windows XP
- 20 GB free memory on the hard drive
- 512 MB RAM
- Monitor 1024 x 768
- Free USB interface
- CD drive
- 1 to 4 RS232 interfaces, depending upon the number of peripheral units

Millimar. Electronic Levels

OVERVIEW

Electronic Levels Applications F

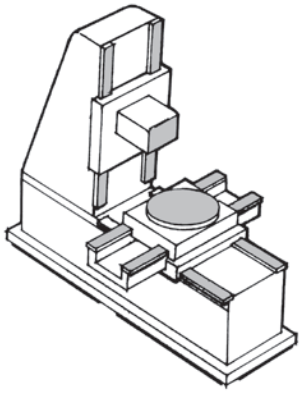
Measuring with a Mahr Federal Electronic Level is a relatively simple procedure. In a typical profile application, for example, measurements are made by moving the sensing heads in convenient increments along a straight path on the surface being checked. Comparative readings are taken at each increment.

Computer assisted models allow economical, fast, and error-free calculations to be made automatically. As prompted by the computer, the operator simply enters the value at each measurement point by pressing a hand-held switch. Depressing a computer key activates automatic analysis. Within moments, the results are displayed and printed, if desired, for permanent record.

Surface Deviation (Machine Tools)

The accuracy of machine tools begins with proper levelness plus the relationship between the ways and the table. These relationships are critical during the manufacturing process.

Once the level is zeroed, the instrument functions as a spirit level, and will check the overall levelness of the machine components to a very high degree of accuracy.



Shown here are just a few of the many surfaces that can be checked on a machine tool using the Electronic Level.

Differential Sensing

To aid in differential profiling applications, two level sensing heads, operating simultaneously with a single amplifier, are used. When the sensing heads are arranged for opposite response to a common motion (such as vibration or a shift in attitude of the object whose surfaces are being compared), they will ignore the common motion and respond only to changes which affect the two heads differentially. A deviation of flatness, squareness, parallelism or alignment, therefore, can be accurately determined even though the object (such as a surface plate or a machine way) does not maintain constant orientation.

Surface Plate Flatness

The next progression in data collection is to combine and print a number of surface straightness checks onto a single chart. This is useful for checking the surface flatness of machine beds and surface plates.

Although the Moody Method for checking surface plates has been traditionally used to check flatness, the computer assisted digital Electronic Level System is ideally suited for highly precise profiling of surface plates and large machined surfaces while eliminating tedious and time-consuming data recording and calculations required by manual systems.

Determining surface flatness is accomplished by using a straight edge as a guide and moving the level along the edge.

Readings are recorded at convenient locations, and entered into the computer via handswitch to produce the surface profile.

Machine Tool Evaluation

ANSI Standard B5.54, for machining center evaluation, refers to levels as an important part of machine evaluation, calling out angular deviation as a major contributor to machine tool errors.

Electronic Levels are ideal for monitoring such deviations as pitch, yaw and roll.

When used with the Spindle Mount Attachment (EAT-1062), levels become an essential tool towards total Machine Tool Evaluation.

Electronic Levels F

Offer fast response, fine resolution and excellent repeatability

Features

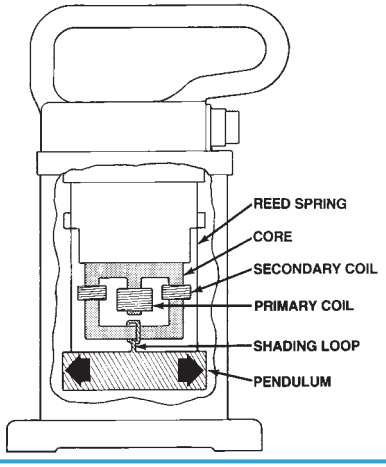
- Used to determine any deviation in the right angle relationship between a horizontal surface and the earth's gravitational force (usually expressed as an angular or linear deviation from absolute level).
- Show any change in this relationship over time.
- Compare the orientation attitude of separate or adjacent horizontal surfaces.
- Show any change in this comparison over time.
- Level systems are angular-linear compatible.
- Sensing heads are interchangeable with Mahr Federal's gage heads to accommodate linear measurements.
- Fast Response: quick response to slight angular changes permit taking fast and accurate measurements at various sensing head positions or taking dynamic position readings.
- Resolution/Repeatability: Mahr Federal's Electronic Levels far exceed the sensitivity and accuracy of precision spirit levels with a resolution to 6 µin per foot (.1 arc second), compared to the spirit level's resolution of .0001" per foot. With repeatability at ±.1 arc second, Electronic Levels are ideal for ultra-high resolution profiling.
- Direct Dimensional Readout: multiplier feature permits operator to view displacement caused by the angular measurement of the level head; this is displayed as an inches per foot readout rather than arc seconds: eliminates readout confusion when switching from spirit levels to electronic levels.
- Angular-Linear Compatible: sensing heads are easily interchangeable with Federal gage heads to accommodate linear measurements.
- Operator Friendly: Level systems are often compared to the autocollimator or laser calibration systems. In each case, the measurement technique is basically the same. Electronic Levels, however, are much easier to set up and operate. Results are obtained cost-effectively without requiring time consuming sight path alignments. There are no optical surfaces to keep clean, and the Level does not need a turbulence-free environment to achieve accurate readings.

How they work

As shown in the figure, our Sensing Head operates on the pendulum principle, with a pendulum supported by two reed springs attached to an extension block at the top of the Sensing Head housing.

Tilting the head causes a change in the position of the pendulum's shading loop in relation to the center leg of the core. This produces an electrical imbalance in the amount of flux passing through the two secondary coils, delivering a signal proportional to the displacement of the pendulum.

This is displayed on a Mahr Federal amplifier meter which is graduated in seconds of arc.



Electronic Levels Ordering Information

Differential Level System

The Differential Level System operates simultaneously with a single amplifier, permitting an immediate comparison between two surfaces.

Adjustable bases permit setup on surfaces that are out-of-level or square by as much as ±1.5°.

Each system includes:
- 832 F Amplifier with power module and storage case
- 2 EGH-2013-W2 Electronic Level Heads with 6m / 20ft cables
- 2 EAT-1029 Adjustable Bases
- ECB-1871 Remote data enter handswitch with 6m / 20ft cable

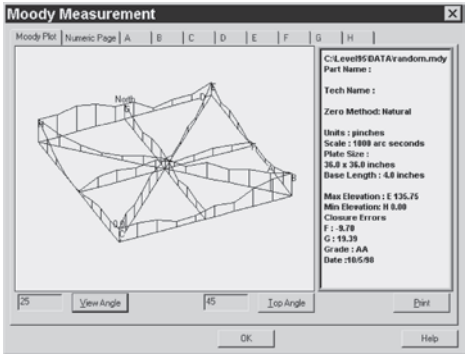
Ordering no.

Type	Order no.
Differential Level System described above with 120 VAC 50/60 Hz power module	**EMD-832P-48-W1**
Differential Level System described above with 220 VAC 50/60 Hz power module (EU)	**EMD-832P-48-W2**

Automatic Profiling System

Ideally suited for highly precise profiles of surface plate and large machine surfaces, eliminating tedious and time-consuming data recording and calculating required by manual systems.

Each system includes:
- 832 F Amplifier with power module and storage case
- 2 EGH-2013-W2 Electronic Level Heads with 6m/20ft cables
- 2 EAT-1029 Adjustable Bases
- ECB-1871 Remote data enter handswitch with 6m/20ft cable
- ECB-1872 RS-232 0.6 m/4 ft interconnect cable, 9 pin-9 pin
- Notebook computer (EAS-2836) with notebook printer (ERO-1063) and cable (ECB-1775)
- Mahr Federal Profiling Software (EDD-1035) for single line profile measurements and Moody Method surface plate profiling. Includes 3 data outputs (printout of data point readings, numeric and isometric plots of surface plate readings)



Surface Plate Certification Software

- Moody and Profile Analysis
- Isometric or numeric plots
- Automatic grading according to industry standards
- On-line help
- Flexible path sequence and orientation
- Multiple run averaging
- Difference of Data Files

Ordering no.

Type	Order no.
Automatic Profiling System described above with 120 VAC 50/60 Hz power module	**EMD-832P-50-W1**
Automatic Profiling System described above with 220 VAC 50/60 Hz power module (EU)	**EMD-832P-50-W2**
Surface Plate Certification Software	**EDD-1035**

Electronic Levels Ordering Information

Accessories

Type	Order no.
Electronic Level Gage Head, with 2.5m / 8 ft cable, 210 mm / 8.2" x 114 mm / 4.5" x 50.8 mm / 2" 3.5 kg / 7.75 lbs.	**EGH-2013-W1**
Electronic Level Gage Head, same as above except with 6 m / 20 ft cable	**EGH-2013-W2**
Adapter Cable, to connect EGH-13 Electronic Level Gage Heads or EHE-1xxx Gage Heads to a Series 832 & 830 Gaging Amplifier, 1.8 m / 6 ft long	**ECB-1853**

EAT-1029
(Adjustable Leveling Foot)

The adjustable level foot mounts to the base of the level head. Typically used to assist in leveling the head to its true zero position.

EAT-1054
(Magnetic Base)

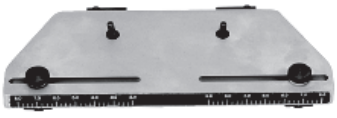
Incorporates a magnet to fix it in position, providing stability when mounted on a moving carriage.

EAT-1055
(Vee Base)

Has a 120° Vee precision ground into the 102 mm / 4" base for measuring the straightness or alignment of cylindrical surfaces.

EAT-1056
(Right Angle Attachment)

Has two 152 mm/ 6" surfaces, accurately ground to 90°, to simplify measuring flatness on horizontal or vertical and cylindrical surfaces. Each adjacent pair of faces is square to within 0.5 µm / 25 µin. Attachment includes 120° Vee face, which is parallel to its base to the same limit.

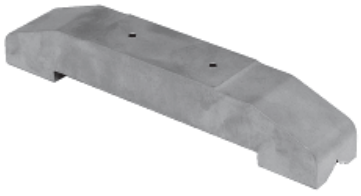


EAT-1057
(Adjustable Base)

A three-pad base lets you adjust the distance between the pads from 50mm/2in to 203mm/8 in when using the "Grid" or "Union Jack" measuring methods. Can also be used for straightness movement checks.

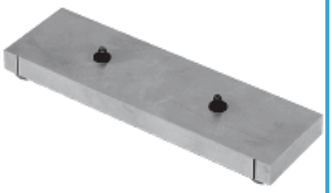
EAT-1062
(Spindle Block)

A special spindle mounting block to hold the level head in a horizontal or vertical spindle. Utilizes a 19mm/.750 in bar for mounting and allowing checking angular motion on a machine tool per B5.54 Calibration Standard.



EAT-1061
(29.5mm/11.625in Base)

Has a 29.5mm/12.625in ground, flat surface for leveling machine beds and ways. It also has a 120° Vee ground into the base, permitting the base to be positioned on a cylindrical surface. When coupled with an 832 or 830 Electronic Amplifier while in the inch mode, it can display inches/feet as a direct reading.



EAT-1058 (50 mm / 2")
EAT-1059 (102 mm / 4")
EAT-1060 (152 mm / 6")

A three-pad base which provides the flexibility to maximize data accumulation for surface plate calibration. Available in three pad spacing sizes.

Millimar. Air Gage Metrology

PRECISION BEGINS AT THE START OF THE MEASURING PROCESS

►| High pressure air gages measure dimension deviations quickly and precisely. For years, they have proven themselves as high quality pneumatic length measuring units in industrial production and measuring rooms. Air measuring value recorders such as jet air probes, jet air plug gages, jet air ring gages, air caliper gages, angularity plug gages, angularity measuring rings and measuring units for mating parts determine the measuring value without contact. The measuring values of one or several air measuring value recorders are displayed by the Millimar evaluation units according to the principle of determination of changes in air pressure. |◄

Millimar. Air Gage Metrology

Metrological features

Millimar evaluation units work according to the principle of determination of changes in air pressure; the pressure differential between two chambers is measured. While one of the two chambers provides a constant reference pressure, the pressure of the other chamber (measuring chamber) is determined by the distance of the measuring jet of an air measuring value recorder to the test specimen.
Millimar evaluation units have two connection points that are each directly connected to one of the two pressure chambers. Thus the measuring value is measured directly without any conversion via a Piezo pressure sensor and is then digitalized.

Magnifications from 2500:1 to 10000:1 are realized with exchangeable instrument jets.

Millimar measuring units must be supplied with constant air pressure through a pressure reducing valve. Measuring units with pressure reducing valves can be connected to all compressed air lines from 3.5 bar to 10 bar overpressure, whereby an air filter should be interconnected.

The air must be dry and oil-free.

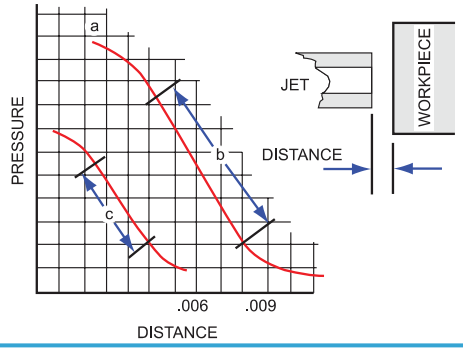
Metrological features

- Universal, relilable, proven, especially high-performing
- All measuring methods, individual, total and differential measurements
- High accuracy, long-term stability, insensitive to environmental influences
- Up to 10000x magnification of the measuring values, large meas-uring ranges
- High measuring accuracy and reproducibility for the measuring results: depnding upon the magnification 0.5 µm to 20 µm
- Contact-free measurements with measuring jets, no damage to the workpieces
- Reliable measurements of even uncleaned, oiled, lubricated workpieces, or workpieces with lapping paste. Measuring points are cleaned by the measuring air
- Linear display of the measuring values on a clear, large or long scale, easy and error-free reading of measuring results
- Measurement of diameters, distance between holes, tapers, excentricities, alignment of bores, mating measurements etc.
- Various measuring possibilities due to the corresponding adaption to existing measuring problems
- Airgage display unit for all applications
- Requires little room, handy, easy to use, all measuring methods
- Fully automatically working electrical units for measuring, control and sorting processes
- Measurement control unit for production machines
- **Millimar** single and multi-column units to set-up complete testing control units
- Multi-column units according to the modular construction system due to close arrangement of the measuring colums and long scales
- Versatile measuring elements: jet air probes, jet air plugs gage, jet air ring gages, air caliper gages, angularity plug gages, angularity measuring rings, taper jet plug gages, taper jet ring gages and measuring units for mating parts for contact-free measurement
- Unusually long life-time of the air measuring elements
- Robust model for the shop floor. Models for all applications.
- Special models for special tasks

General Technical Data of Air Gages

Air gaging is a measuring system that uses air pressure to deter-mine 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.



Millimar. Air Evaluation Units

OVERVIEW

	Analog DA	Universal DA	µDimensionAir	832 DDA	C1208 PE
Catalog page	7 - 45	7 - 46	7 - 47	7 - 49	7 - 51
Display	Large analog scale with 2 tolerance markers	Large analog scale with 2 tolerance markers	Analog display with 1 digital line display	LCD with an analog display	Analog scale with a two line backlighted digital display
Measuring channels	Single channel	Single Channel	Single Channel	Single or Dual Channel	Single Channel
Compatible air tooling	Mahr Federal	Mahr Federal Universal	Mahr Federal Universal	Mahr Federal	Mahr Federal Universal
Max. Resolution	0.1 µm / ***.000005"***	0.1 µm / ***.000005"***	0.01 µm / ***.00002"***	0.1 µm / 0.01 µm* ***.000005"/.00001"***	0.1 µm / ***.000005"***
Input Combinations				+A, - A, +B , -B , A + B , A - B , A +B , -A - B	Formula editor for 80 characters Functions: + / - / * / ÷/ () / Factor
Features / Programs	1	1	1	1	16 / 6
Test steps	1	1	1	1	6
Dynamic measurements	–	–	MAX, MIN, MAX-MIN	MAX, MIN, MAX-MIN, (MAX+MIN)/2, mean	MAX, MIN, MAX-MIN, (MAX+MIN)/2, mean
Mastering Mode:	Nominal Master	Max/Min Master/ Nominal	Nominal or Max/Min	Nominal or Max/Min	Nominal or Max/Min
Classification	–	–	3 class	5 class LED and I/O	max. 998, max. 62 on I/O, 5 LED
Control inputs and outputs / SPS connections	–	–	–	5 Opto-coupler outputs	3 Opto-coupler inputs, 6 Opto-coupler outputs
Analog output	–	–	–	1	1
Data interfaces / ports	–	–	USB, ASCII/Digimatic	RS232, 9 pin, plug	RS232, 9 pin, plug
Configuration	Turn switch	Turn switch	Keypad	Keypad	Keypad
Battery operated	–	–	Yes	No, AC powered	No, AC powered
Dimensions in mm (H x W x D)	137 x 157 x 80	165 x 190 x 148	254 x 168 x 143	205 x 160 x 165	210 x 160 x 155

	C 1245	1840PE
	7 - 52	7 - 53
	Analog scale with a two line digital display	Column analog scale, 2 line digital display
	Single/Dual	Single
	Mahr Federal Universal	Mahr Federal Universal
	0.1 µm / ***.000005"***	0.1 µm / ***.000005"***
	Formula editor for 80 characters Functions: + / - / * / ÷/ () / Factor	+A, - A, +B , -B , A + B , A - B , B - A , -A - B
	16 / 6	2 / 2
	6	1
	MAX, MIN, MAX-MIN, (MAX+MIN)/2, mean	MAX, MIN, MAX-MIN, (MAX+MIN)/2, mean
	Nominal or Max/Min	Nominal or Max/Min
	max. 998, max. 62 on I/O	Nominal or Max/Min
	3 Opto-coupler inputs, 6 Opto-coupler outputs	3 Opto-coupler inputs, 6 Opto-coupler outputs
	1	1
	RS232, 9 pin, plug	RS232, 9 pin, plug
	Keypad	Keypad
	No, AC powered	No, AC powered
	137 x 157 x 80	165 x 190 x 148

Other display options available upon request

832 Differential

832 performs match gage operation

1841

1841 configured for multiple diameters:
- Taper angle
- Taper difference

Mar-Chek

Gaging computer for signal combination, statistics, operator sequence, etc.

Millimar. Air Evaluation Units

MEASURING COMPLEX TASKS TO THE POINT

►| 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. |◄

Dimensionair® Air Gages (single master system) F

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) µin / µm 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 7-57, 7-58 and 7-59*

Dimensionair® Air Gages (single or dual master system) F

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	**2242662**
	.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***

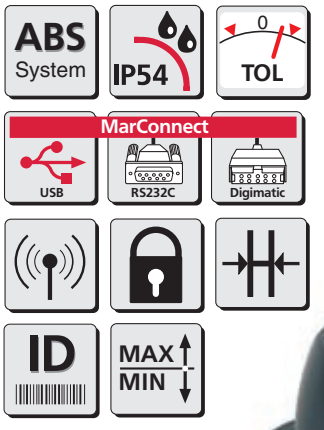
Tooling Adaptors

Adaptors are available for many standard-tooling configurations:

Thread/Adaptor style	Plug Type / Measured size	Order No.	
10-32	2.7686 mm / ***.109"*** to 12.547 mm /***.494"***	**AAD-194****	**AAD-313**
1/4-28	12.547 mm / ***.494"*** to 23.876 mm / ***.940"***	**AAD-193****	**AAD-312**
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	**AAD-165**	

**Requires AD-165 adaptor, ** Includes bleed to simulate MFI jetting.*

µ*Dimensionair*® Air Gages (single or dual master system) F



The µDimensionair is the ultimate of portability and versatility — in your hand or at the workbench or machine tool. Shown with optional 2239307 Bench Kit

All parts of the µ*Dimensionair* are completely interchangeable and included with the gaging system — versatility is built-in.

All µ*Dimensionair* gages are supplied with output capability.

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. µ*Dimensionair* 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.

µ*Dimensionair II* offers:

- Single and Min/Max mastering selectable
- All other features of the µ*Max*µ*m II* Digital Indicator:
  - Dynamic Mode operation: Min, Max, TIR
  - Multiplier factor and hold function
  - Data output with selectable serial number
  - MarConnect data output: USB OPTO RS232C Digimatic

Versatility

The ultimate in configuration — interchangeable handle allows for pistol grip or normal end-mount for easy application of the plug to the part. For large, heavy plugs, mount the handle between the tooling and the display — assures a well-balanced, ergonomic measuring system. Can also be mounted to a bench stand when parts are brought to the gage.

Accessories

Bench stand provides safe and secure µ*Dimensionair* storage between measurements.

Order no. 2241109

Slide valve controls air to tooling — saves cost of wasted air, reduces air noise.

Order no. 2240993

Swivel coupling allows for rotating tooling to fully explore bore.

Order no. 2240594

For applications where the local elevation is greater than 305m / 1000 feet, special calibration is required.

µ*Dimensionair*® Air Gages (single or dual master system) F

Technical Data

		µ*Dimensionair II*	
		Resolution	**Tooling I.D. Numbers**
Measuring range	± 0.080mm **± *0.003"*** ± 0.040mm **± *0.0015"*** ± 0.020mm **± *0.00075"***	0.002mm, 0.001mm ***0.0001", 0.00005"*** 0.001mm, 0.0005mm ***0.00002", 0.00005"*** 0.001mm, 0.0005mm ***0.00002", 0.00005"***	60 50 20
Data Output		USB / ASCII / Digimatic	
Battery Life		6,000 hours	
Operating Temperature		5 - 35° C / ***41 - 95° F***	
Storage Temperature		0 - 60° C / ***32 - 140° F***	
Repeatability		± 1 Last Significant Digit (LSD)	
Calibration Accuracy		± 1 Last Significant Digit (LSD)	
Linear Error		± 1% full scale (LSD)	
Response Time		Approximately 1 second	
Thermal Stability		0.1% of full scale/F	
Tolerance Indicators		Two – over / under (3 Class)	
Weight		25 kg / ***5.5 lbs***	
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	
Air Supply		2.10 ± .01 bar / 30.4 ± .15 psi	
Display		Rotates through 270 degrees	
Order no.		**2103200***	

** Complete with handle, adaptor and hose*

Accessories

	µ*Dimensionair II* **Order no.**
Pressure Regulator with filter	**2238020***
Pressure Meter	**2095924**
Bench Kit with adaptor	**2239307**
Battery 3V type CR-2450	**EBY-1018** or **4102520**
Insulated Handle	**2237666**
Shut off slide valve	**2240993**
Rest Stand	**2241109**
Swivel coupling adaptor	**2240594**
Air Regulator Trap	**AFL-24**
20' Long Hose	**2237713**
Supply Hose to Regulator/Filter	**AHO-2**
Data interface:	
USB Cable (MarCom or PC, 2m)	**4346023**
RS232 Cable (OPTO- 2m)	**4346020**
Digimatic Cable (10 pin plug 2m)	**4346021**

Optional Factory
Configured Features for
µ*Dimensionair II*:

- Locked multiplier factor
- Disabled sleep mode
- Locked inch/mm button
- Locked setup mode with password
- Power up in inch/mm unit on battery change
- Calibration lockout with password

832 Dimensionair® Air Gaging (Zero master system) F

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"***	0.0002 mm /***10µ"***	0.004 mm /***150µ"***	60
	±0.040 mm /***±.0015"***		0.002 mm /***75µ"***	50
	±0.020 mm /***±.00075"***		0.001 mm /***38µ"***	20
High Magnification Single or Dual Input	±0.008 mm /***±.0003"***	0.0001 mm /***5µ"***	0.0004 mm /***15µ"***	10
	±0.004 mm /***±.00015"***		0.0002 mm /***8µ"***	5

Operating Temperature	5~35° C / ***41~95° F***
Storage Temperature	0~60° C / ***32~140° F***
Repeatability	±1 digit or ±1% of range, whichever is greater
Calibration Accuracy	±1 digit*
Linear Error	±1 digit
Response Time (Electronics)	43 msec.
Response Time (Air)	approx. 1 sec. (dependent on hose length of air tooling)
Thermal Stability	0.1% of full scale/°F
Digital I/O	five TTL opto-isolated outputs
Data Output	RS-232, transmits Channels A, B, (or both – dual input models only)
Analog Output	±5 VDC full scale for displayed value signal ±A, ±B
Measuring Modes	Actual, Minimum, Maximum, T.I.R., Nominal
Tolerance Indicators	five LED
Weight (approx.)	5 kg / ***11 lbs.***
Dimensions H x W x D	254 x 197 x 216 mm / ***10" x 7.752 x 10.25"***
Display Modes	A, (or B or both – dual input models only)
Auto Power Off	after 30 minutes of non-use (selectable)
Power Requirements	100 Vac to 240 Vac, 50-60Hz with power module (Furnished)

Note: All models listed may be ordered for: 1-Jet, 2-Jet, 3-Jet, 4-Jet, or 6-Jet applications. At time of ordering, PLEASE designate the number of jets to be used on the system.

** For applications where the local elevation is greater than 305M/1000 feet, special calibration is required.*

832 Dimensionair® Air Gaging (Zero master system) F

Technical Data

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**

Accessories

Order no.	Description
7024634	RS-232 Cable, Amplifier to MSP-2 Printer or computer, 2m / 6ft cable
ECV-1276	Oil/Splash Cover (opaque)–provides protection for the 832 Digital Dimensionair® when used in harsh environments
ECV-1285	Oil/Splash Cover (clear)–provides protection for the 832 Digital Dimensionair when used in harsh environments
ECB-1857	Footswitch for HOLD/RESUME, 3m / 10ft cable
ECB-1858	Footswitch for DYNAMIC RESET, 3 m / 10ft cable
ECB-1859	Footswitch for SEND DATA, 3m / 10ft cable
ECB-1855	Pushbutton for DYNAMIC RESET, 1.5m / 5ft cable
ECB-1860	Pushbutton for SEND DATA, 1.5m / 5ft cable
ECB-1861	Pushbutton for HOLD/RESUME, 1.5m / 5ft cable
ECB-1868	Pushbutton for HOLD/RESUME and SEND DATA, 3m / 10ft cable
EKT-1236-W3	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 5.08" x 5.32" with ECB-1886-W2*, 6.1 mm / 24" interconnect cable amplifier/relay box
EKT-1236-W4	Same as W3, except with 220 Vac Power Supply
EKT-1236-W5	Same as W3, except with 240 Vac Power Supply
2010000	Power Supply, U.S. Adaptors (120V)
2010001	Power Supply, International Adaptor (120/240V)
Mating Connectors	
ECN-1695-W2	Digital I/O (15 pin male)
ECN-1693	Reset Data (3/32 microphone plug)
ECN-1695-W1	RS-232 Digital Output (9 pin female)

** Order ECB-1886-W1 for 305 mm / 12" interconnect cable, or, ECB-1886-W3 for 914 mm / 36" cable.*

Millimar C 1208 PE Compact, user-friendly length measuring unit

Model types and Accessories

			Order no.
C1208 PE	10000 F	Mahr Federal compatible	**5312093**
C1208 PE	2500 F/ 5000 F	Mahr Federal compatible	**5312095**

Accessories

Connection cable (9 pin D-Sub jack to D-Sub jack), length 3 m	**7024634**
Control unit with 3 push buttons	**5318430**
Footswitch for Millimar for	
Input 1	**5330955**
Input 2	**5330956**
Input 3	**5330957**

Features

Functions
- Favorites, using the SELECT button, frequently required settings can be directly called up
- Static measurements ± A, ± B and all combinations
- Dynamic measurements: Max, Min, Max-Min, Max+Min, mean value
- Auto-detect mode. Two measuring devices can be connected (probe, plug gage. . .) - the measuring device used is automatically shown on the display
- 1 point or 2 point master measurements
- Programmable via built-in keypad or RS232 interface via MS-Windows configuration software D1000S

Display
- Backlit LCD display with scale display and two-line digital display
- 5 three-colored status lamps for warning and tolerance limits
- Up to 2 features can be displayed at the same time

Connections
- One input for pneumatic measuring devices (optionally compatible to PE systems from Mahr or Mahr Federal)
- RS232 interface
- Three digital inputs for measuring start, master measurements, sending measuring value, . . .
- Three digital outputs for GO, NO-GO, rework, measuring time, . . .

Technical Data

Display	Backlit LCD display 115 mm x 70 mm
Analog scale	Indicator, 61 graduation
Range and text display	Characters LCD, 5 x 7, Dot matrix, alpha numerical
Measured value display	7 digit LCD, 7 segments
Tolerance display	5 LEDs, 3 colors
Display 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

Measuring range / resolution (tooling dependant)

2500:1	100 (±50) µm / 0.1 µm
5000:1	50 (±25) µm / 0.1 µm
10000:1	25 (±12.5) µm / 0.1 µm

Error limits

10 x analog display	2 % (51 pixel)
Digital display	0.05 %
Temperature coefficient	± 0.005 %/°C
Operating temp. range	0 °C to 45 °C

Interfaces

Computer, printer	RS232, 9 pin, male (PC compatible configuration)
Control inputs	3 opto-coupler outputs, 24 V, 10 mA 24 V, 100 mA
Control outputs	3 opto-coupler inputs, 24 V, 100 mA 24V, 10 mA
Current supply	100 V to 240 V,
Mains unit	47 Hz to 63 Hz
Power consumption	10 VA
Protection class	IP53 with conductive dust IP43
Housing dimensions (H x W x D)	ca. 205 x 160 x 165 mm
Weight	ca. 2.1 kg

Millimar C 1245 PE Flexible length measuring unit for versatile tasks (single or dual master system)

Features

Display
- Analog indicator instrument for measuring value display
- Two-line LCD display to display the measuring value and help texts
- 5-color status lamps for warning and tolerance limits
- Up to 3 features can be shown simultaneously

Functions
- 16 characters can be defined
- With 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 values
- Statistical functions: n, x-bar S, Xmax, Xmin, R
- Measuring value memory for 5000 measuring values
- Measuring Start / Stop via keyboard, digital input, RS232

Connections
- 2 input modules can be used in the basis unit
- RS232 interface
- 1 analog output
- 3 digital inputs for measuring start, master measurement / zeroing, sending data
- 6 digital outputs for GO, NO-GO, rework, collective goods, measuring time, 4 classes, BCD interface

Model types

			Order no.
C1245 PE/F	2500	with regulator	**5331271**
C1245 PE/F	5000	with regulator	**5331271**
C1245 PE/F	10000	with regulator	**5331273**
For 2 pneumatic probes			
C1245 PE/F 2	2500	with regulator	**5331275**
C1245 PE/F 2	5000	with regulator	**5331275**
C1245 PE/F 2	10000	with regulator	**5331277**
Accessories	Air Supply Adaptor Kit		**2121236**

Technical Data

Display	analog indicator instrument, LCD 53 mm x 40 mm
Analog scale	145 mm x 80 mm
Range and text display	7 characters LCD, 5x7 dot matrix, alphanumerical
Measured value display	7 characters LCD, 7 segment
Tolerance display	5 LEDs, 3-colored
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 / resolution (tooling dependant)

2500:1	100 (±50) µm / 0.1 µm
5000:1	50 (±25) µm / 0.1 µm
10000:1	25 (±12.5) µm / 0.1 µm

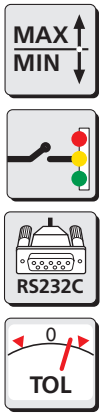
Error limits

10 x analog display	2 % (51 pixel)
Digital display	0.05 %
Temperature coefficient	± 0.005 %/°C
Operating temp. range	0 °C to 45 °C

Interfaces

Computer, printer	RS232, 9 pin, male (PC compatible configuration)
Control inputs	6 opto-coupler outputs, 24 V, 10 mA, 10 mA 24 V, 100 mA
Control outputs	3 opto-coupler inputs, 24 V, 100 mA
Current supply	90 V to 264 V,
Mains unit	47 Hz to 63 Hz
Power consumption	11 VA
Protection class	IP53 with conductive dust IP43
Housing dimensions (H x W x D)	ca. 205 x 160 x 165 mm
Weight	ca. 2.2 kg

Millimar S 1840 PE Length measuring instrument with three-color illuminated bar graph (single or dual master system)



Features

Assess and judge measuring results at a glance – nothing is easier than that with the Millimar S 1840 column amplifier. For measurements with air measuring devices

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
- Easy to read 3-color illuminated bar graph with analog warning and tolerance limit display
- Backlit, two-line LCD for the display of measuring values, help tests and units of measurement
- 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.

- Supplied with:
  Mains power supply plug

Configuration Software

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.

Millimar S 1840 PE Length measuring instrument with three-color illuminated bar graph (single or dual master system)

Technical Data

Analog display	101 LED elements, 3-color
Range and text display	7 character LCD, 14 segment, alphanumerical
Measured value display	7-stellig LCD, 7 Segment
Tolerance display	via color range of the anlog display
Display ranges	± 1, 10, 30, 100, 300, 1000, 3000, 10000 µm ± .0001; .0003; .001; .003; .01; .03; .1; .3 inch or tolerance related
Error limits	
10 x analog display	1 % (101 LEDs)
Digital display	± 1 digit
Temperature coefficient	± 0.005 %/°C
Operating temp. range	0 °C to 45 °C
Interfaces	
Computer, printer	RS232, 9 pin, male (PC compatible configuration)
Control inputs	3 opto-coupler outputs, 24 V, 10 mA
Control outputs	3 opto-coupler inputs, 24 V, 100 mA
Analog output voltage	1 V/mm
Power supply	90 V bis 264 V, 47 Hz to 63 Hz
Power consumption	20 VA
Protection class	IP53 with conductive dust IP43
Housing dimensions (H x W x D)	ca. 487 x 47 x 144 mm ***ca. 19.17" x 1.85" x 5.67"***
Weight	ca. 1.6 kg

Air/electronic converter for Millimar S 1840 PE

Measuring principle	differential pressure		
Measuring value acquisition	piezo		
Magnification	2500:1	5000:1	10000:1
Air 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 regulator)	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 ***(1.308-2.616 cu.yd.)***		

Order no.

Millimar S 1840 PE to connect air measuring devices

		Tooling I.D.	Order no.
S 1840 PE/F	Low magnification for 1 air gage 2500:1 / 5000:1 without regulator	50/20	**5318455***
S 1840 PE/F	High magnification for 1 air gage10000:1 without regulator	10,5	**5318457***

** Base with Regulator required and sold separately, Air Supply Kit recommended*

Accessories

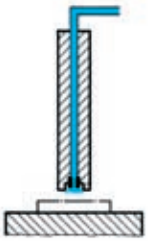
	Order no.
Base foot With 1 Regulator for 1 1840PE Column Unit	**5330910**
Base foot With 2 Regulators for 2 1840PE Column Units	**5330911**
Base foot With 3 Regulators for 3 1840PE Column Units	**5330912**
Connection cable (9 pin D-Sub jack to D-Sub jack), length 3 m	**7024634**
Control unit with 3 push buttons	**5318430**
Foot switch for Millimar	**5330955**
Configuration software D1000 S	**7090375**
Air Supply Adaptor Kit Includes AFL-24 Filter and AHO-2 Hose	**2121236**

Millimar. Air Gages

PRECISION BEGINS AT THE START OF THE MEASURING PROCESS

►I Air gages use the measuring effect of the change in pressure when a workpiece approaches a measuring jet. As the distance between jets and work surface decreases, the pressure increases while the velocity of flow and the respective volume flow decrease. The air measuring procedure has a realtively short but very linear measuring range. I◄

1.



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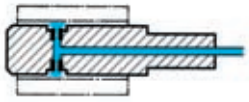

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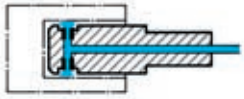

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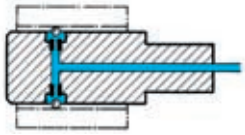

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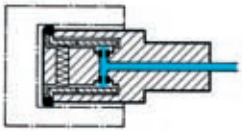

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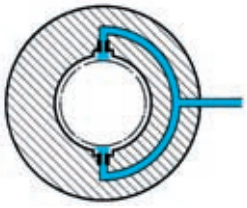

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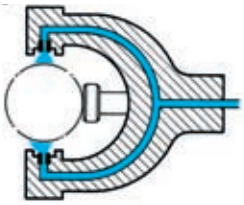

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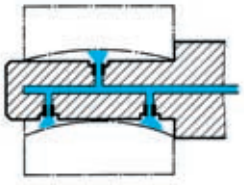

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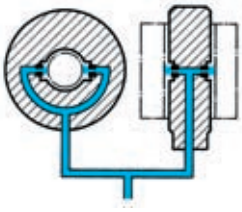

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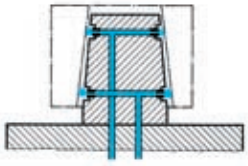

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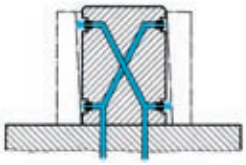

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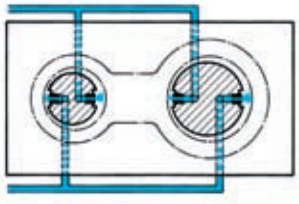

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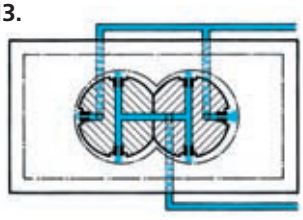

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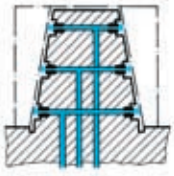

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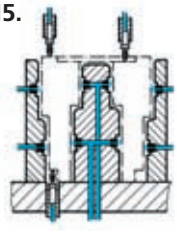


1. Thickness or wall thickness measurements with jet air gage **2.** Diameter measurement of cylindrical through bores with jet air plug gage. **3.** Diameter measurement of cylindrical blind bores with jet air plug gage. **4**. Diameter measurement of cylindrical through bores with ball contact plug gage **5.** Diameter measurement of cylindrical blind bores with lever contact plug gage **6.** Diameter of thickness measurement with adjustable jet air caliper gage **8**. Straightness measurement of a cylindrical bore with special jet air plug gage **9.** Mating measurement between bore and shaft with jet air plug gage and jet air ring gage. **10.** Taper-pitch measurement of an inside taper with taper jet air plug gage measurement as per the differential measuring method **11.** Measurement of a perpendicular position of a cylindrical bore to the front face with a special jet air plug gage measurement as per the differential measuring method **12.** Measurement of hole distances of separated cylindrical bores with jet air plug gage measurement as per the differential measuring method **13**. Measurement of hole distances of truncated cylindrical bores with jet air plug gages measurement as per the differential measuring method **14**. Taper-pitch measurement as well as form and diameter measurement of an inside taper with taper jet air plug gage. **15.** Multiple inside and outisde measurements with measuring jet air gages and contact probes in connection with a seven-column unit.

Dimensionair® Air Gages – 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 hard chrome (optional) body extends useful life of the Air Plug.
- Deep, recessed jets - Air jets are recessed into the plug body which protects them from damage.
- Large jet size eliminates clogging from dirt 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 25mm/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.

Identification	Nominal Size from		To & include		Clearance from Nominal Size	
	mm	*inch*	mm	*inch*	mm	*inch*
DP100*, DP60	3	***.123"***	3.5	***.140"***	0.030	***.0012"***
	3.5	***.140"***	4.7	***.185"***	0.045	***.0018"***
	4.7	***.185"***	6.3	***.248"***	0.061	***.0024"***
	6.3	***.248"***	76.3	***3.004"***	0.081	***.0032"***
	76.3	***3.004"***	127	***5.000"***	0.089	***.0035"***
	above 127	***5.000"***			0.107	***.0042"***
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"***	76.3	***3.004"***	0.045	***.0018"***
	76.3	***3.004"***	127	***5.000"***	0.071	***.0028"***
	Above 127	***5.000"***			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"***	76.3	***3.004"***	0.023	***.0009"***
	76.3	***3.004"***	127	***5.000"***	0.071	***.0028"***
	Above 127	***5.000"***			0.081	***.0032"***
DP10	1.57	***.062"***	44.5	***1.750"***	0.009	***.00035"***
	44.5	***1.750" up***			0.014	***.00055"***
DP5	1.57	***.062"***	25.40	***1.000"***	0.004	***.000175"***
	25.40	***1.000"***	44.45	***1.750"***	0.005	***.0002"***
	44.45	***1.750" up***			0.007	***.0003"***

** DP-100 not available below 9.525 mm / .375"*

Ordering Information

When ordering Air Plugs please specify:

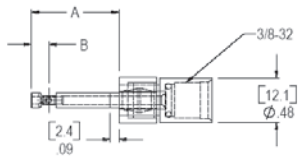
1. Nominal I.D. Size and Tolerance.
2. Dimensionair Model to be used.
3. Air Plug style (Through Hole, Blind Hole, or Counterbore).
4. Air Plug finish (Chrome-plated or Hardened Steel).
5. Order Master Setting Ring at same time.

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

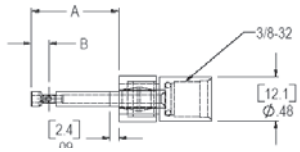
Through Hole Plugs (DP50 - DP20 & 60)

3-4.7mm/ .123-.185"



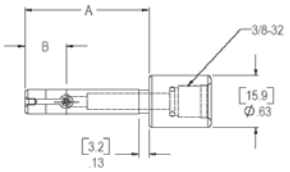
Minimum recommended hole length: 4.8 mm / ***.187***"

4.7-6.3mm/ .185-.248"



Minimum recommended hole length: 4.8 mm / ***.187***"

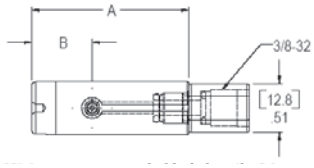
6.3-9.5mm/ .248-.3735"



Minimum recommended hole length: 6.35 mm / ***.250***"

With guide sleeve or stop collar: 1.8 mm / ***.070***"

9.5-14.9mm/ .3735-.588"

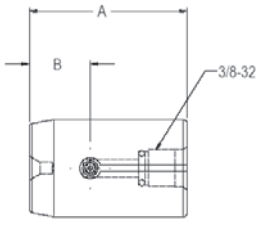


Minimum recommended hole length: 6.35 mm / ***.250***"

With guide sleeve or stop collar: 1.77 mm/ ***.070***"

May be used with AEX-1 or -2 Extensions for deep holes.

14.9-37.7mm/ .588-1.484"

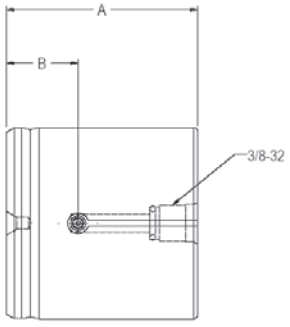


Minimum recommended hole length: 6.35 mm / ***.250***"

With guide sleeve or stop collar: 1.77 mm / ***.070***"

May be used with AHA-4 or -5 Extensions for deep holes.

37.7-76.3mm/ 1.484-3.004"

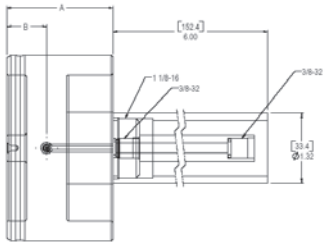


Minimum recommended hole length: 6.35 mm / ***.250***"

With guide sleeve or stop collar: 1.77 mm / ***.070***"

May be used with AHA-4 or -5 Extensions for deep holes.

76.3-114.3mm/ 3.004-4.50"



Minimum recommended hole length: 6.35 mm / ***.250***"

With guide sleeve or stop collar: 1.8 mm/ ***.070***"

Technical Data

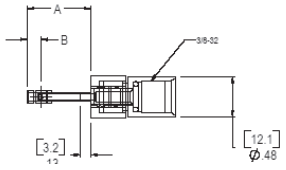
Through Hole Plugs
Measured Size mm/inch

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*		DP60 mm/*inch*	
3	***.123"***	3.5	***.140"***	23.8	***.9375"***	4.8	***.1875"***	4.7	***.187"***	0.025	***.001"***	0.013	***.0005"***	.051	***.002"***
3.5	***.140"***	4.7	***.185"***	23.8	***.9375"***	4.8	***.1875"***	4.7	***.187"***	0.038	***.0015"***	0.020	***.00075"***	.076	***.003"***
4.7	***.185"***	6.3	***.248"***	38	***1.5"***	12.7	***.500"***	4.7	***.187"***	0.051	***.002"***	0.025	***.001"***	.102	***.004"***
6.3	***.248"***	9.5	***.3735"***	38	***1.5"***	12.7	***.500"***	6.4	***.250"***	0.076	***.003"***	0.038	***.0015"***	.152	***.006"***
9.5	***.3735"***	14.9	***.588"***	38	***1.5"***	12.7	***.500"***	6.4	***.250"***	0.076	***.003"***	0.038	***.0015"***	.152	***.006"***
14.9	***.588"***	37.7	***1.490"***	41.3	***1.625"***	15.9	***.625"***	6.4	***.250"***	0.076	***.003"***	0.038	***.0015"***	.152	***.006"***
37.7	***1.490"***	76.3	***3.004"***	50	***2"***	19	***.750"***	6.4	***.250"***	0.076	***.003"***	0.038	***.0015"***	.152	***.006"***
76.3	***3.004"***	114.3	***4.5"***	50	***2"****	19	***.750"***	6.4	***.250"***	0.076	***.003"***	0.038	***.0015"***	.152	***.006"***

** 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 76.5 mm / 3.010".*

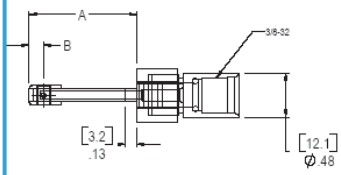
Blind Hole/Counterbore Plugs (DP50 - DP20 & 60)

3.9-4.7 mm / .155-.185“



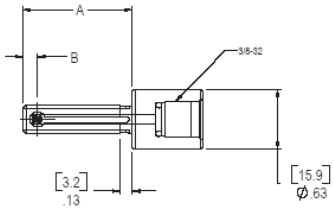
Minimum recommended hole length: 6.35 mm / ***.250***".
Note: Masters must simulate workpiece for holes of this size.

4.7-6.3 mm / .185-.248“



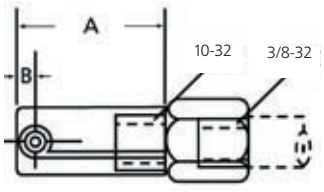
Minimum recommended hole length: 6.35 mm / ***.250***"

6.3-9.47 mm / .248-.373“



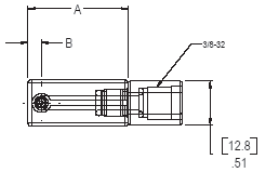
Minimum recommended hole length: 6.35 mm / ***.250***"
Shorter bores can be checked. Consult Mahr Federal Customer Resource Center.

9.47-11.8 mm / .373-.467“



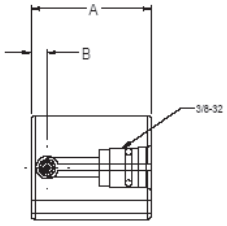
Minimum recommended hole length: 6.35 mm / ***.250***".
Shorter bores can be checked. Consult Mahr Federal Customer Resource Center. May be used with Extension AHA-28 for deep holes.

11.8-14.93 mm / .467-.588“



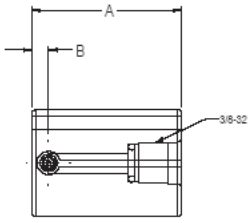
Minimum recommended hole length: 6.35 mm / ***.250***"
Shorter bores can be checked. Consult Mahr Federal Customer Resource Center. May be used with Extensions AEX-1 or -2 for deep holes.

14.93-37.7 mm / .588-1.484“



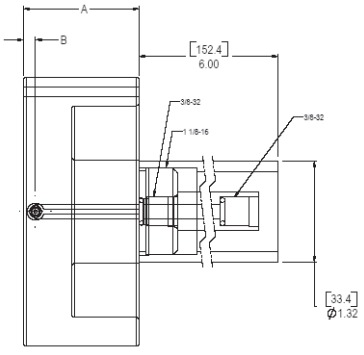
Minimum recommended hole length: 6.35 mm / ***.250***".
Shorter bores can be checked. Consult Mahr Federal Customer Resource Center. May be used with AHA-4 or -5 Extensions for deep holes.

37.7-76.30 mm / 1.484-3.004“



Minimum recommended hole length: 6.35 mm / ***.250***".
Shorter bores can be checked. Consult Mahr Federal Customer Resource Center. May be used with AHA-4 or -5 Extensions for deep holes.

76.3-114.3 mm / 3.004-4.50“



Minimum recommended hole length: 6.35 mm / ***.250***".

Super Blind Plugs

Blind Hole Air Plugs can be furnished to check shorter holes than listed above, and can be furnished to check closer to the bottom of a hole. Holes must be at least 2.79 mm / ***.110“*** long, and the distance from the end of the plug to the center-line of the jets can be as short as 2.16 mm / ***.085“*** for plugs below 6.3 mm / ***.248“*** or 1.90 mm / ***.075“*** for plugs above 6.3 mm / ***.248“*** .

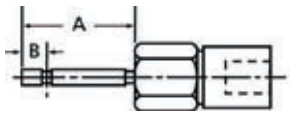
Blind Hole/Counterbore Plugs

Above		To & Include		"A"		"B"		Minimum Hole Length*		Measuring Range DP50		DP20		DP60	
mm	*inch*	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“***	.076	***.003“***
4.7	***.185“***	6.3	***.248“***	29.4	***1.156“***	4	***.156“***	6.4	***.250“***	0.051	***.002“***	0.025	***.001“***	.102	***.004“***
6.3	***.248“***	11.8	***.467“***	29.4	***1.156“***	4	***.156“***	6.4	***.250“***	0.076	***.003“***	0.038	***.0015“***	.152	***.006“***
11.8	***.467“***	14.9	***.588“***	29.4	***1.156“***	4	***.156“***	6.4	***.250“***	0.076	***.003“***	0.038	***.0015“***	.152	***.006“***
14.9	***.588“***	37.7	***1.484“***	29.4	***1.156“***	4	***.156“***	6.4	***.250“***	0.076	***.003“***	0.038	***.0015“***	.152	***.006“***
37.7	***1.484“***	76.3	***3.004“***	35.7	***1.406“***	4	***.156“***	6.4	***.250“***	0.076	***.003“***	0.038	***.0015“***	.152	***.006“***
76.3	***3.004“***	114.3	***4.5“***	38	***1.5“*/****	4	***.156“***	6.4	***.250“***	0.076	***.003“***	0.038	***.0015“***	.152	***.006“***

** 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 152mm/6in long and 33.3mm/1.31in diameter is supplied with plugs over 76.5 mm / 3.010“.*

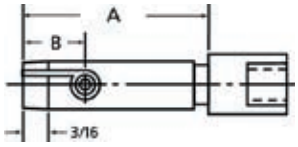
Through Hole Plug (DP10 – DP5)

1.6-6.4 mm/ .062-.250"



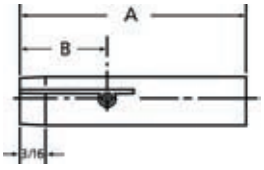
Minimum recommended hole length: 3.18 mm / ***.125"***.

6.4-9.5 mm/ .250-.3735"



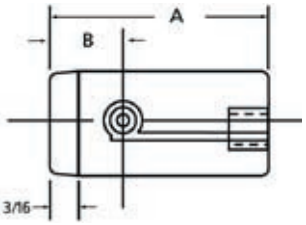
Minimum recommended hole length: 3.18 mm / ***.125"***.
With guide sleeve or stop collar: 1.14 mm/ .045".

9.5-11.1 mm/ .3735-.437"



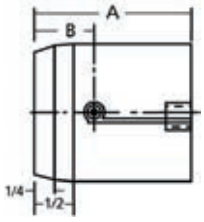
Minimum recommended hole length: 3.18 mm / ***.125"***.
With guide sleeve or stop collar: 1.14 mm / ***.045"***. May be used with AHA-23 or -24 Extensions for deep holes.

11.1-44.5 mm/ .437-1.750"



Minimum recommended hole length: 3.18 mm / ***.125"*** with proper support min. is 1.14 mm/ ***.045"***. May be used with AHA-23 or -24 Extensions for deep holes.

44.5 mm & Up/ 1.750" & Up



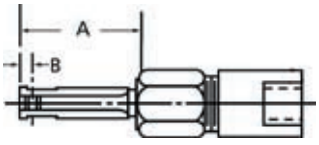
Minimum recommended hole length: 3.18 mm / ***.125"***.
With guide sleeve or stop collar: 1.14 mm / ***.04"***. May be used with AHA-23 or -24 Extensions for deep holes.

Through Hole Plugs

Above		To & include		"A"		"B"		Minimum Hole Length*		Measuring Range DP10		DP5	
mm	***inch***	mm	***inch***	mm	***inch***	mm	***inch***	mm	***inch***	mm	***inch***	mm	***inch***
1.6	***.062"***	6.4	***.250"***	23.8	***.9375"***	4.8	***.1875"***	3.2	***.125"***	0.015	***.0006"***	0.008	***.0003"***
6.4	***.250"***	9.5	***.3735"***	38	***1.5"***	12.7	***.500"***	3.2	***.125"***	0.015	***.0006"***	0.008	***.0003"***
9.5	***.3735"***	11.1	***.437"***	41.3	***1.625"***	15.9	***.625"***	3.2	***.125"***	0.015	***.0006"***	0.008	***.0003"***
11.1	***.437"***	44.5	***1.750"***	41.3	***1.625"***	15.9	***.625"***	3.2	***.125"***	0.015	***.0006"***	0.008	***.0003"***
44.5	***1.75"***	76.5	***3.010"***	50	***/2"***	19	***.625"***	3.2	***.125"***	0.015	***.0006"***	0.008	***.0003"***

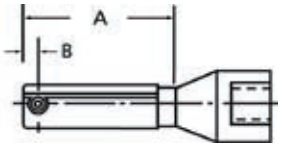
Blind Hole Plug (DP10 – DP5)

3.2-6.4mm/ .125-.250"



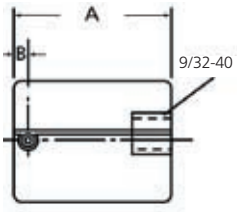
Minimum recommended hole length: 3.96 mm / ***.156"***.

6.4-11.1mm/ .250-.437"



Minimum recommended hole length: 3.18 mm / ***.125"***.

11.1mm & Up/ .437" & Up



Minimum recommended hole length: 3.18 mm / ***.125"***.
Use AHA-23 or -24 Extensions for deep hole applications.

Blind Hole/Counterbore Plugs

Above		To & include		"A"		"B"		Minimum Hole Length*		Measuring Range DP10		DP5	
mm	***inch***	mm	***inch***	mm	***inch***	mm	***inch***	mm	***inch***	mm	***inch***	mm	***inch***
3.2	***.125"***	6.4	***.250"***	21.4	***.844"***	2.4	***.094"***	3.9	***.156"***	0.015	***.0006"***	0.008	***.0003"***
6.4	***.250"***	11.1	***.437"***	27.8	***1.094"***	2.4	***.094"***	3	***.120"***	0.015	***.0006"***	0.008	***.0003"***
11.1	***.437"***	76.5	***3.010"***	27.8	***1.094"***	2.4	***.094"***	3	***.120"***	0.015	***.0006"***	0.008	***.0003"***

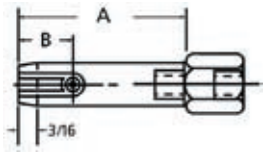
** If a guide sleeve or stop collar is used, minimum hole length can be as small as 1.1 mm/ .045" for holes larger than 6.4 mm/.250".*

Super Blind Plugs

Blind Hole Air Plugs can be furnished to check shorter holes than listed above, and can be furnished to check closer to the bottom of a hole. Holes must be at least 1.9mm/.075" long, and the distance from the end of the plug to the center-line of the jets can be as short as 1.4mm/.055" for plugs below 6.4mm/.250" or 1.1mm/.045" for plugs above 6.4mm/.250".

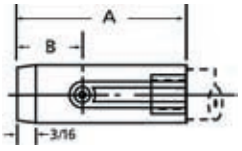
Through Hole Plug (DP100)

9.525-12.7mm/ .375-.500"



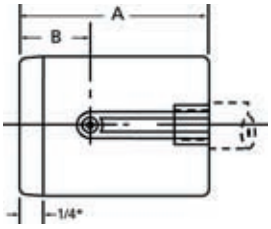
Minimum recommended hole length: 6.35 mm / ***.250"***, with proper support min. is 3.18 mm / ***.125"***. May be used with AEX-1 or -2 Extensions for deep holes.

12.7-37.8mm/ .500-1.490"



Minimum recommended hole length: 6.35 mm / ***.250"***, with proper support min. is 1.14 mm/ ***.125"***. May be used with AHA-4 or -5 Extensions for deep holes.

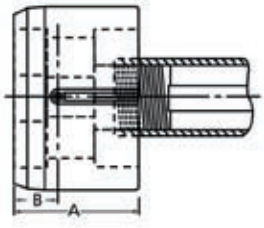
37.7-76.3mm/ 1.490-3.004"



Minimum recommended hole length: 6.35 mm / ***.250"***.

May be used with AHA-4 or -5 Extensions for deep holes.

76.3mm & Up/ 3.004" & Up



Minimum recommended hole length: 6.35 mm / ***.250"***.

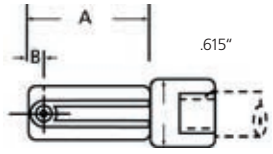
Through Hole Plugs

Measured Size mm/inch

Above		To & include		"A"		"B"		Minimum Hole Length*		Measuring Range DP10		DP5	
mm	***inch***	mm	***inch***	mm	***inch***	mm	***inch***	mm	***inch***	mm	***inch***	mm	***inch***
9.525	***.375"***	12.7	***.500"***	38	***1.5"***	12.7	***.500"***	12.7	***.500"***	6.4	***.250"***	0.152	***.006"***
12.7	***.500"***	37.7	***1.490"***	41.3	***1.625"***	15.9	***.625"***	15.9	***.625"***	6.4	***.250"***	0.152	***.006"***
37.7	***1.490"***	76.3	***3.004"***	50	***2"***	15.9	***.625"***	19	***.750"***	6.4	***.250"***	0.152	***.006"***
76.3	***3.004"***	114	***4.5"***	50	***2"***	19	***.625"***	19	***.750"***	6.4	***.250"***	0.152	***.006"***

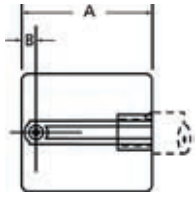
Blind Hole/Counterbore Plugs

9.525-14.25 mm/ .375-.561"



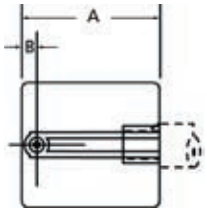
Minimum recommended hole length: 7.9 mm / ***.312"***.

14.25-37.8 mm/ .561-1.490"



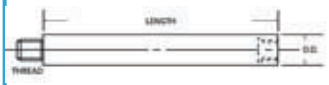
Minimum recommended hole length: 7.9 mm / ***.312"***. Use with AHA-4 or -5 handles for deep hole applications.

37.8-76.3 mm/ 1.490-3.004"



Minimum recommended hole length: 7.9 mm / ***.312"***. Use with AHA-4 or -5 handles for deep hole applications.

76.3-108.2 mm/ 3.004-4.500"



Notes:

* *If a guide sleeve or stop collar is used, minimum hole length can be as small as 3.18 mm/.125"*

** *A handle 152 mm/6" long and 33.3 mm/1.31" diameter is supplied with plugs over 76.3 mm /3.004". For smaller or larger plugs than those shown above, or for any modification to the specifications shown, contact Mahr Federal Customer Resource Center.*

Super Blind Plugs

Blind Hole Air Plugs can be furnished to check shorter holes than listed above, and can be furnished to check closer to the bottom of a hole. Holes must be at least 4.45 mm / ***.175"*** long, and the distance from the end of the plug to the center-line of the jets can be as short as 2.5 mm / ***.100"***.

Blind Hole Plugs

Measured Size mm/inch

Above		To & include		"A"		"B"		Minimum Hole Length*		Measuring Range	
mm	***inch***	mm	***inch***	mm	***inch***	mm	***inch***	mm	***inch***	mm	***inch***
9.525	***.375"***	14.1	***.556"***	30	***1.187"***	4.7	***.187"***	12.7	***.500"***	0.152	***.006"***
14.1	***.556"***	37.7	***1.490"***	30	***1.187"***	4.7	***.187"***	15.9	***.625"***	0.152	***.006"***
37.7	***1.490"***	76.3	***3.004"***	36.5	***1.438"***	4.7	***.187"***	19	***.750"***	0.152	***.006"***
76.3	***3.004"***	114	***4.5"***	36.5	***1.438"***	4.7	***.187"***	19	***.750"***	0.152	***.006"***

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 µDimensionair and air snaps.

AHA-66 and **2236070** – light weight aluminum handles without or with air shutoff valve.

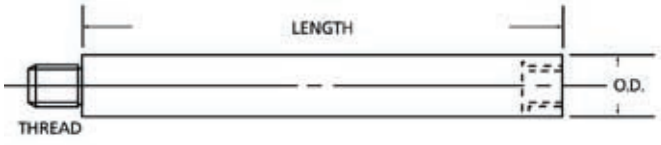
AHA-15 Handle – Used and furnished with 1250:1 thru 8000:1 through or blind hole plugs over 76.3 mm / ***3.004"***.

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 9.47 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 9.47 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.

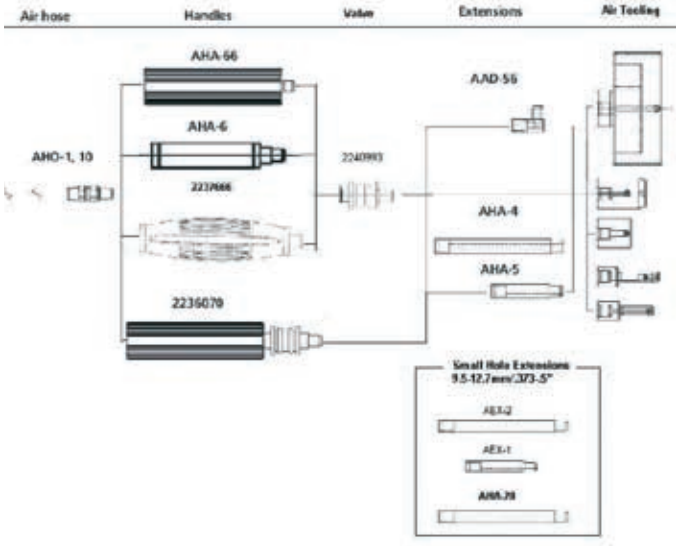
2201975 – extension used with BA-100 adjustable base. Provides easily configured base for bench-mounted air tooling fixturing. See Dimentron Plugs (Chapter 9. MaraMeter).



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"***	133.3/ ***5.25"***
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*

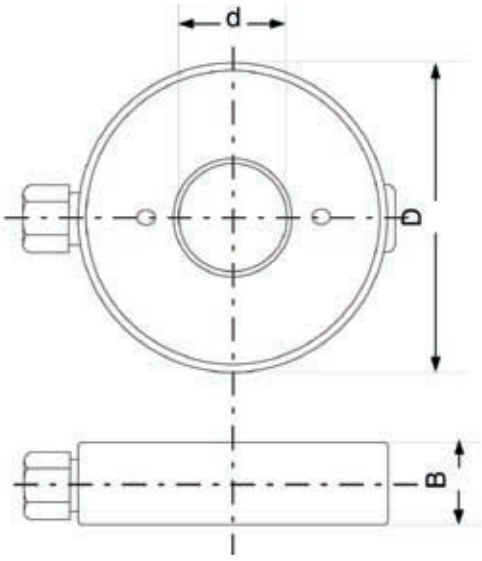
Accessory Configuration for DP60/DP50/DP20 Systems – Low Magnification



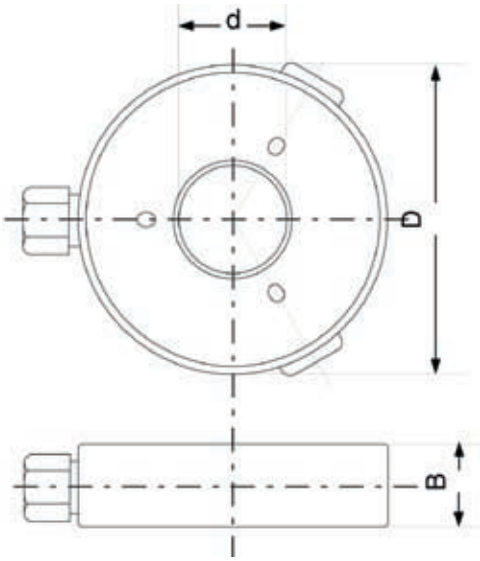
Accessories for High Magnification Systems – DP10/DP5

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.

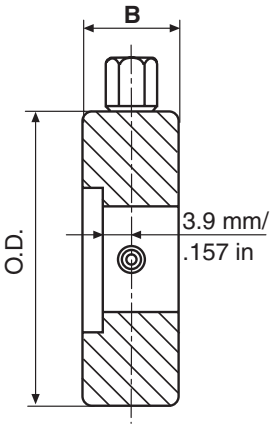


Jet air ring gage with 2 measuring jets

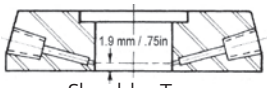


Jet air ring gage with 3 measuring jets

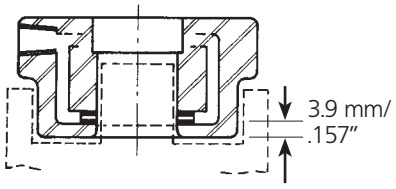
For applications where O.D.'s need to be checked near a shoulder, or where part length is restricted, contact Mahr Federal for technical assistance about shoulder and Snout Type Air Rings.



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".

Dimensionair® Air Rings

Options for Air Rings

Carbide Wear strips

Air plugs are normally furnished chromed for long life. Other materials can be provided to improve the life of the ring when high volume or grinding grit may still remain on the part. Materials such as Ferrotic and addition of carbide strips can be provided.

Bases for air rings

Depending on the application there are many ways to hold an air ring. They may be hand held and placed over the part if the part is still on the machine. They may be front mounted, horizontally or vertically on the Dimensionair or for larger parts the can be mounted to a base and held vertically or horizontally.

Special bases are available the mount the ring horizontally and incorporate a part lifting mechanism to aid in part removal.

Guide chutes

Guide chutes and vees are available in a host of options to improve the inspection process. Vee type guide chutes can be furnished on one or both sides of an air ring from 6.3 mm / ***.248***" through 44.5 mm / ***1.75***". Other options include tube type guide chutes for sizes 6.3 mm / ***.248***" through 63.5 mm / **2.5**".
Standard length of the guide chutes are 63.5 mm / **2.5**" and affix to the side of the air ring. Normal length of the chute is 63.5 mm / **2.5**". Other options including heavy duty out riggers and universal vee stands can be provided.

Options for Air Snaps

Since side clearances can present gaging problems with crankshaft diameters or similar applications, Mahr Federal designed a new line of air snaps that make the tough measurements easier and affordable.

We based our new air snap design on our own proven air tooling techniques, known for providing long life and high-resolution in tough shop environments. Now you can measure fixed sizes from 12.5 mm / ***.49***" through 184 mm / ***7.25***" using D-2500 and D-5000 systems. Widths are typically 19 mm / ***.75***" but can be customized to reach diameters having tight clearances.

Jet locations can be located central in the snap or positioned close to either side for exploring close to a shoulder.

Multiple circuit air snaps are available for speeding the process while checking the journal for size variation, taper, barrel or hourglass shape.

Dimensionair® Air Gages

AirProbes and JetProbes

- AirProbes and JetProbes provide modular, convenient gage heads for use in hand-held gages and for designing into fixture gages.
- 9.5 mm / ***.375***" bodies provide standardized mounting configurations.
- Compact size allows easy access to hard-to-reach dimensions.
- AirProbes and JetProbes are calibrated for instant use with Dimensionair® systems - just set zero and measure!
- Available in single-probe and matched-probe configurations.

AA-1-3 AirProbe and AAT-19 JetProbe Assembly

AirProbes

For use where contact-type measurement is required with 2500:1 Dimensionair Systems. AirProbes are available in Regular Action (counter-clockwise meter movement when spindle is depressed) or Reverse Action (clockwise meter movement when spindle is depressed) and in various ranges. When used with Model 2500:1 Dimensionair, the Meter Dial must be specified to match the AirProbe range (see table below). AirProbe and Dial are color coded - just match the color band on the AirProbe to the colored dot on the Dial to be sure that the AirProbe range matches the readout on the Dimensionair. AirProbes are provided with AAD-55 Straight Adaptor for attaching to Air Hoses.

Order No.	Range		Style / Color Code***	Matching Dial Model		Graduations	
	mm	***inch***		inch	metric	µm	***inch***
AA-1-3*	0.076	***.003"***	Regular / Red	**ADL-28****	**ADL-95****	1	***.00005"***
AA-2-3*	0.076	***.003"***	Reverse / Red	**ADL-28****	**ADL-95****	1	***.00005"***
AA-1-6	0.152	***.006"***	Regular / Green	**ADL-16**	**ADL-96**	2	***.0001"***
AA-2-6	0.152	***.006"***	Reverse / Green	**ADL-16**	**ADL-96**	2	***.0001"***
AA-1-15	0.301	***.015"***	Regular / Yellow	**ADL-20**	**ADL-97**	5	***.0002"***
AA-2-15	0.301	***.015"***	Reverse / Yellow	**ADL-20**	**ADL-97**	5	***.0002"***
AA-1-30	0.762	***.030"***	Regular / Blue	**ADL-24**	**ADL-98**	10	***.0005"***
AA-2-30	0.762	***.030"***	Reverse / Blue	**ADL-24**	**ADL-98**	10	***.0005"***

** .003" Range AirProbes can also be used with 5000:1 Dimensionairs, but the working range is reduced to .0015".*
*** These dials are the same as normally supplied on 2500:1 Dimensionairs, except for the color code.*
**** Regular AirProbes have single color band; reverse AirProbes have double color band.*

AirProbes can be supplied in matched pairs, either two Regular Action AirProbes or one Regular and one Reverse Action AirProbe. Contact Mahr Federal Customer Resource Center to specify.

AirProbes JetProbes

JetProbes are similar to AirProbes, except they have an open jet at the end, instead of a contacting spindle. JetProbes are ideal for measuring flatness of surfaces which cannot be touched, or for building into fixture designs where air gaging is called for. JetProbes can be used with 2500:1, 5000:1 Dimensionairs, and are supplied singly or in matched pairs. **Order No. AAT-19** for single JetProbe or **AAT-20** for a matched pair. JetProbes are supplied with AHO-1 Air Hose, a zero setting valve, and hardware for mounting to the Dimensionair.

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
2248282	2-way Manifold
2248283	3-way Manifold
2248284	4-way Manifold
2248285	5-way Manifold

Manifold 2248282

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.

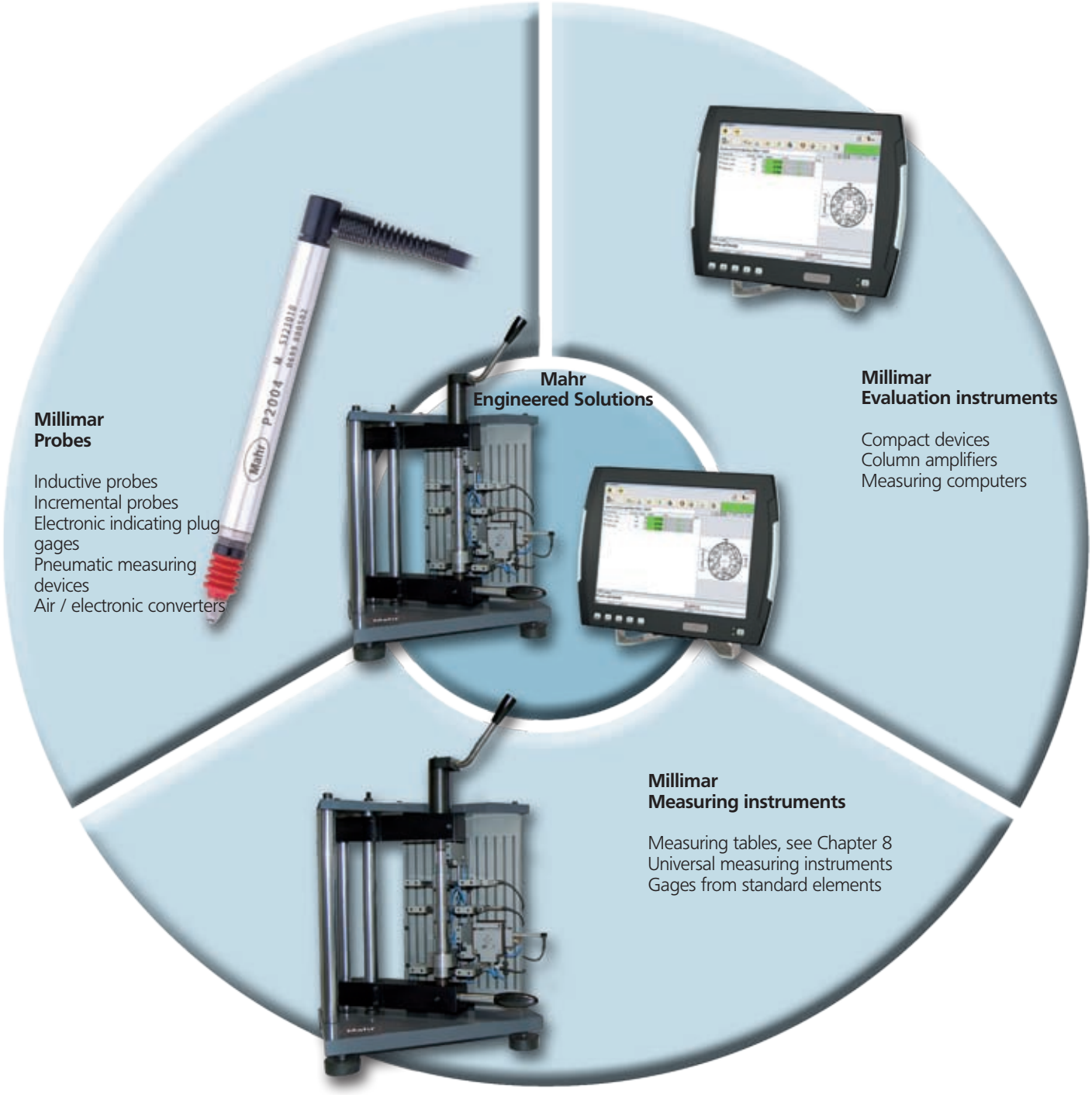
Order No.	Description
AFL-10	Particle Filter (normally furnished on all Dimensionair Models). Filter size: 5 microns; Maximum pressure: 250 p.s.i.; maximum working temperature: 175°F.
AFL-24	Oil and Water Separator Trap, includes mounting hardware. Filtering capacity: 99.7% removal of oil and water; 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

Millimar. Engineered Solutions

MEASURING INSTRUMENTS FOR DIMENSIONAL METROLOGY

►| 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. |◄



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 representing 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.

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).

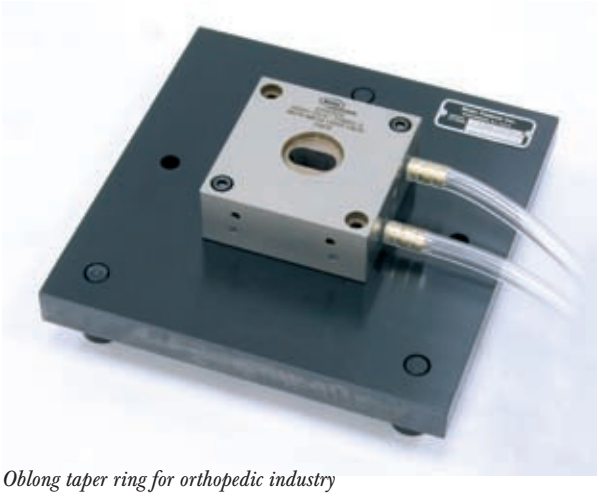
Electronic multi-gage measuring device to test 6x ø and perpendicularity

Air tooling for diameter and center distance

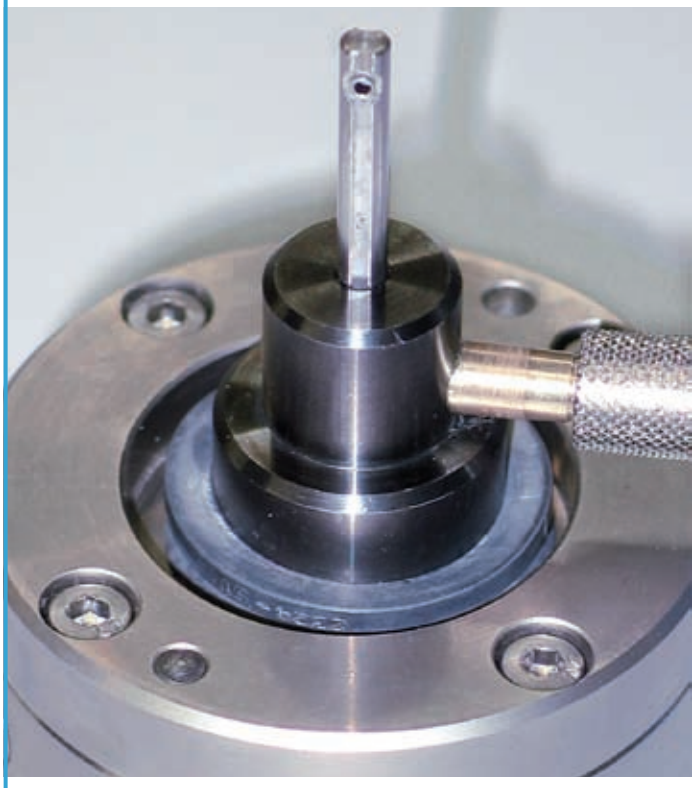
Jet air plug gage mounted on a floating bearing with position query to diameter and determination of position

Pneumatic Measuring Devices for Inside and Outside Diameter Measurement

Valve seat plug



Oblong taper ring for orthopedic industry



Jet air plug gage with floating bearing

Pneumatic measurements with jet air gages is a non-contact measurement with high resolution and low workspace requirement. An extremely small distance between different measurement planes can be selected.

The corresponding arrangement of jet air gages enables not only diameter to be measured, but also form tolerances such as cylinder form, taper angle, straightness etc.

Due to the smallest size possible, they are suitable for small inside and outside diameters (valve guide bores) and do not require a great amount of maintenance.

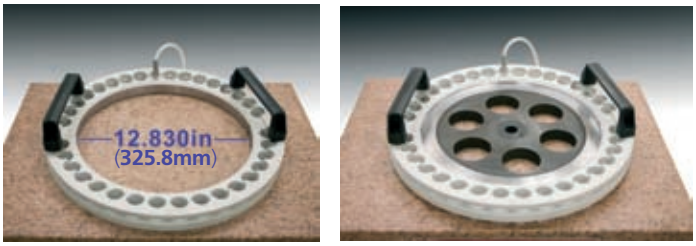
They can be used for low workpiece tolerances (mainly used for ground workpieces or workpieces with precision bores Rz<=6.3). For large roughness depths, a contact measurement must be used.

The jet air gages do not touch the workpiece. Also for minimum size workpieces there is always a minimum gab. The measuring forces are insignificantly small. The opposing surface which the jeta air gage blows upon must be at least as wide as the outside diameter of the gage.

Jet air plug gages and rings are very robust and insensitve to filth (self-cleaning effect). Filth generally directly influences every measurement, however, pneumatic metrology offers a considerable advantage over normal tactile measurement. Residue from coolants or bore emulsions and small dirt particles are removed by the exiting air thus assuring a correct measurement, even without exaggerated cleanliness.

The design of the jet air gage form as well as their arrangement to the measuring organs makes it possible to measure the narrowest bars, polygonal parts, spherical parts as well as very thin-walled parts.

Air Ring



Air ring measuring 325.8mm / 12.83in

Air ring and plug gages are adjusted to fit the customer's specific measuring task, just like the tactile versions are.
This makes all plug gages, but also ring gages, purely special models.

Product range:

- Plug gages for through bores
- Blind bore plug gages
- Special multi-gaging plugs gages
- Ring / plug gages with 2 or more jet air nozzles on the periphery
- Ring / plug gages with several measuring planes
- Ring / plug gages in incremental models
- Special measuring devices
- Straightness plugs
- Mating measuring devices
- Taper plug (SK, HSK, MK among others) and ring gages

Three-step air plug gage with floating small diameter

Measuring devices for taper measurement

Millipneu taper jet air plug gages and taper jet air ring gages as well as tactile taper plug gages are used for the rational testing of morse, steep, metrical and special tapers.
With taper plug gages, inside tapers are measured and outside tapers with taper ring gages.

The taper measuring devices with 2 measuring planes can determine the characteristics diameter and taper pitch/taper angle.

Taper measuring devices with 3 or more measuring planes enable the evaluation of the features diameter, taper angle/taper pitch and a statement as to the convexity.

By additionally attaching an inductive probe to taper measuring devices, the insertion depth can be determined.

Taper air plug gage with taper attachment

Air tooling with for 5 point diamter at 3 levels

Tapered air plug for the orthopedic industry

Dimensional Gaging: Dynamically measures cylinder bore ID and cylinder flange

The Cylinder Liner Gage stand-alone automatic gage to measure the Bore ID and Flange Thickness of a Diesel Cylinder Liner. It is situated to be fed by conveyors that bring and take away cylinder Liners from the gage. The gage is designed as a Pass Through Gage with about a 2 Second cycle time.

The gage comprises a three stage stations:

- The first station is the load station where one part stops and a temperature measurement is made.
- In Station Two, the Air Plug's home position is in the Zero Master assembly. This allows for zero mastering at a specified frequency. It also allows the Air Plug to stay on scale, minimizing stabilization time as the Air Plug enters the Liner's bore.
- In Station Three, the Flange Thickness assembly is introduced to the flange. The measuring contacts are retracted while the assembly is in motion and engage the part only after the assembly reaches the gaging position.

Dimensional Gaging: Dynamically measures cylinder bore ID and cylinder flange

Model 2152447 is an automatic, free standing gage to measure the "crush" dimension of Half Bearings and consists of two operating modes - Fully automatic and Manual.

The operation cycle involves two strokes of a ram press:

- First is a selectable preload from 200 – 7,000lbs to seat the part in its nest.
- Second is the measuring load selectable from 200– 7000lbs and comprises three speeds:

1st - Positioning, brings the ram close to the part to be measured.
2nd - Approach, slows when ram is close to desired load.
3rd - Measure, the ram slows to the measuring speed

After measuring the half bearing, an extraction mechanism pushes the part up from the nest for removal.

The entire process is computer driven with seletable parameters, capable of data collection, generating printable reports and database building.

OD Surface waviness

Mahr Federal will take standard Surface/Contour and Form system components and employ them in unique measurement solutions.

Using standard drive systems and displays roughness and waviness parameters can be measured easily and reliably on the shop floor.

With this large outside diameter surface/waviness fixture which is designed to measure cylinders from 120 through 400 mm – or even beyond. The fixture maintains alignment of the drive unit to the axis of the part with no crowning error. It provides a stable base the will not allow the part to fall of the part, provides automatic protection of the measurement probe and is easy for the operator to place on the part.

ID/OD Gage

For large bearings surface/contour and roundness are just as critical as the small one. Using standard surface and form components parts can be placed on the machine for reliable measurements.

These are possible by building robust and stable surfaces into the gaging stations.

This bearing counter system allows for measuring the contours of races on bearings up to 1828 mm in diameter

ID/OD Gage

Large roundness systems con be supplied to measure:
- Roundness
- Concentricity and Circular Runout
- Circular flatness and perpendicularity
- Plane runout and circular parallelism

The Large air bearing with tilt and centering has a capacity of 900 to 1828 mm.

Millimar. Standard Elements

Modular

The use of Millimar standard elements allows multi-gage measuring devices to be designed and implemented for the widest possible range of workpieces, e.g. rotationally symmetrical and non-rotationally symmetrical parts.

Rotationally symmetrical workpieces can be mounted between centers or on prismatic supports, whereas non-rotationally symmetrical workpieces often require a special holder.

Versatile

The versatility of the Millimar standard elements means that the right solution can be provided, whatever the measurement task at hand.

Whether it's a question of external, internal or length measurements, the Millimar standard elements will be able to meet your requirements, even in the case of complex workpiece geometries.

Thanks to the space-saving design of the styli, a high number of measuring points can be inspected within a small area of the testpiece.

The pneumatic lifting mechanisms integrated into the measuring elements simplify the job of moving the testpiece into the measuring position and reduce the amount of wear on the styli.

Flexible

The modular concept using Millimar standard elements is continued throughout the construction of the whole system. A generous amount of travel in the styli (up to 20 mm / 0.79") allows a high degree of flexibility in terms of the variety of testpieces that can be accommodated.

Precise

The Millimar standard elements are specially designed for use in the workshop and are manufactured using a rigorous process. This guarantees that the measuring devices give stable and reliable measurements.

For example, using styli fitted with two ball-bearing guides for supporting the moving part, it is possible to achieve measurement accuracy at the µm scale, if this is required due to the tolerances of the feature being measured.

Reliable

All components are long-lasting and low-maintenance thanks o the use of rust-proof materials, the selection of appropriate heat treatments, and the use of a lifting mechanism to minimize the effects of friction acting on the styli when the workpiece is inserted.

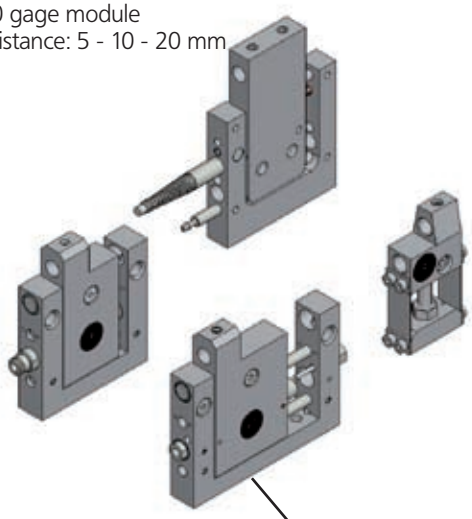
Economical

Our systems can either be constructed by the customer from standard elements obtained from the catalogue, or alternatively we can provide ready-built devices as turn-key solutions. Whichever option you choose, you can be sure that you are purchasing a system that is tailored to your specific requirements on the most favorable of terms.

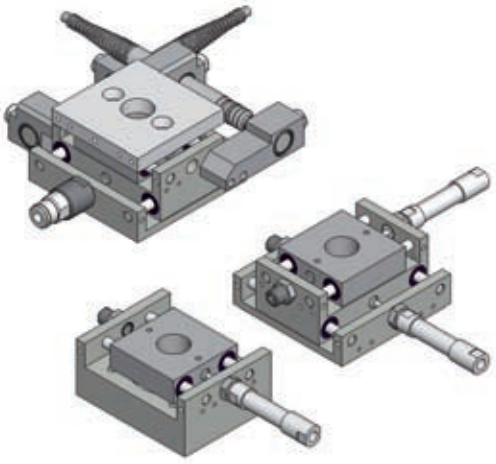
Below are just a few examples of the many factors that contribute to the cost effectiveness of the Millimar standard elements:

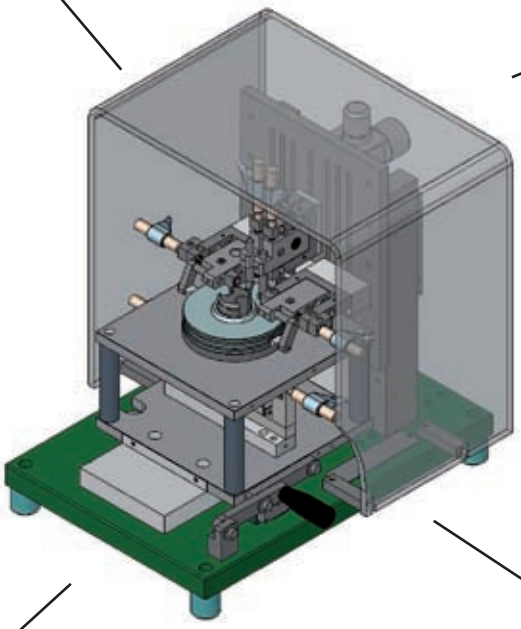
- Reusability of standard elements: Once manufacture of a particular type of workpiece has ceased, all standard elements used in the test equipment can be reused for a different type of workpiece.
- A choice of different mechanisms for guiding the moving part of the stylus, according to the accuracy requirements of the measuring task (optimal price-performance ratio).
- Reduction in development and implementation time.
- Availability of the equipment: Our standard elements are manufactured under standard production conditions and are always available off the shelf and ready to use.

FP 1500 gage module
Travel distance: 5 - 10 - 20 mm

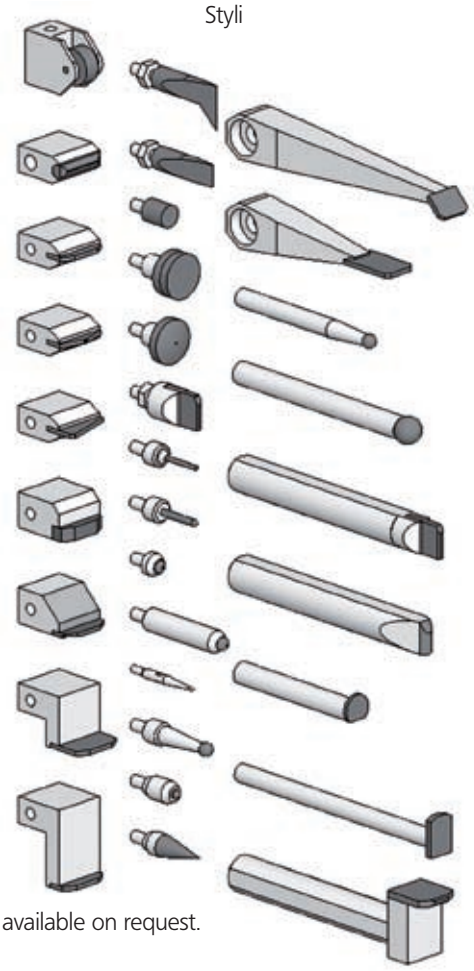


XY tables
Travel distance: 2.5 - 5 - 7 mm

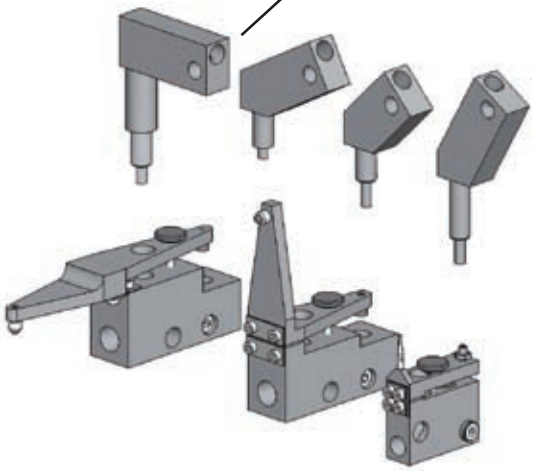




Styli

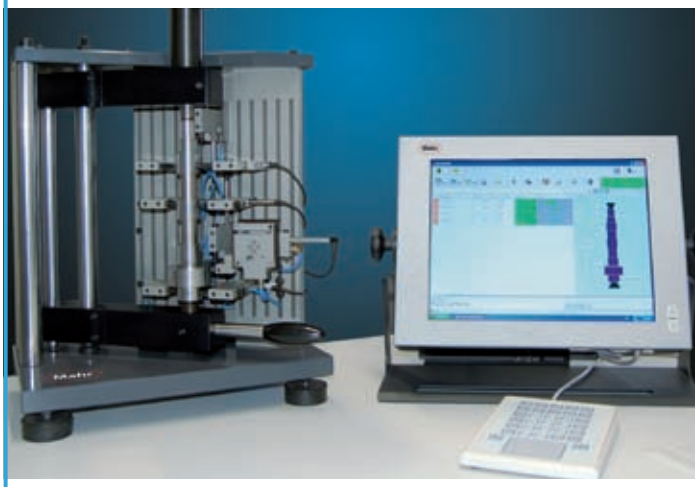


Angular adjustment
0 - 30 - 45 - 60 - 90°



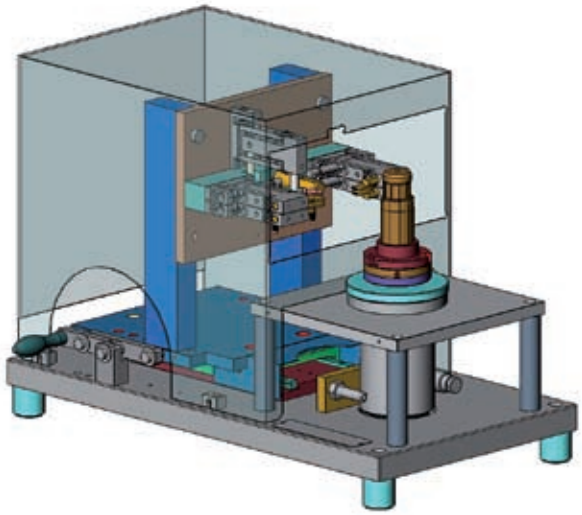
Specialized catalog available on request.

Standardized Measuring Devices



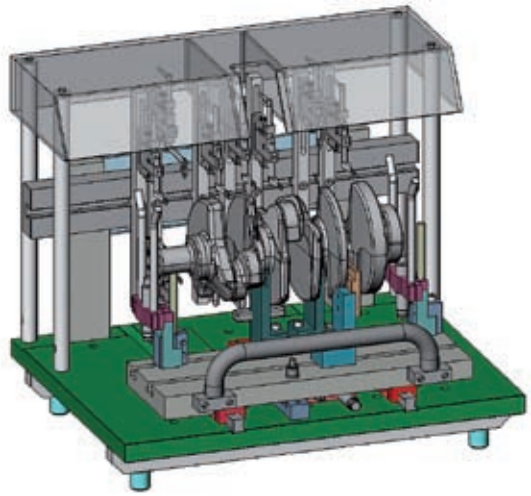
Vertical measuring device with pivoting clamping of workpiece between centers

These measuring devices allow inspection of diameter, length, and radial and axial run-out for rotationally symmetrical parts.



Measuring device with rotary table

Measuring devices with rotary table allow combined external and internal measurements and automatic radial and axial run-out testing.



Horizontal measuring device with clamping of workpiece on prisms or between centers, including workpiece loading table

The horizontal measuring device allows workpieces to be held on prismatic supports or between centers. This system is particularly suitable for heavy workpieces.

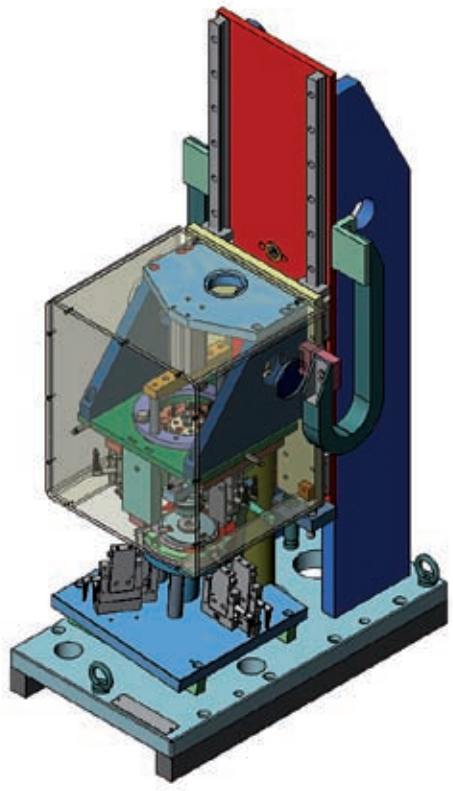
The workpiece can be loaded into the workpiece holder away from the actual measuring station.

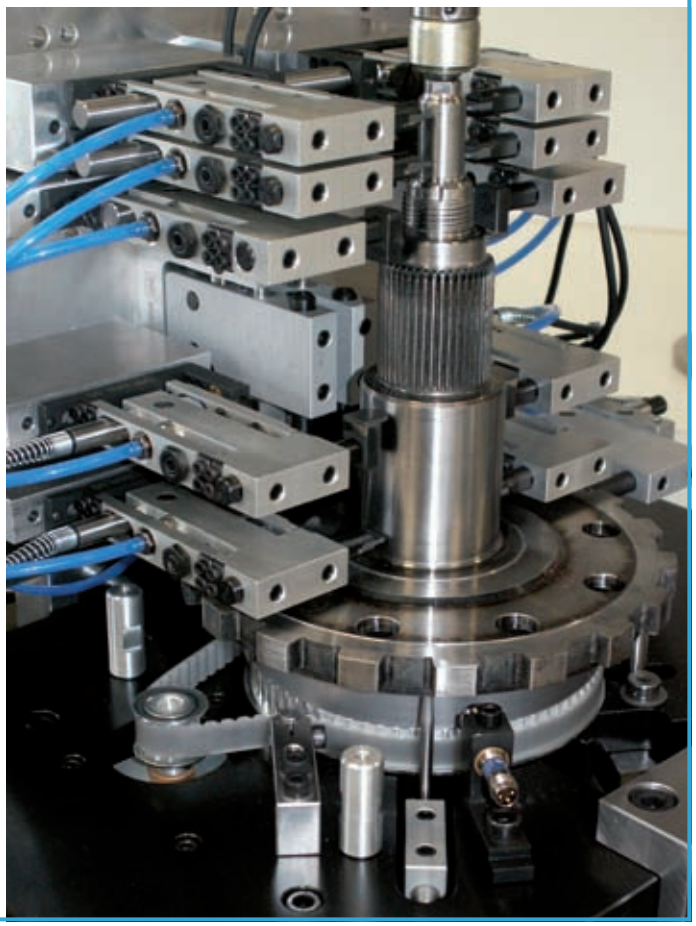
Customized Measuring Devices

Customized measuring devices

Complete design and build service for automatic machines for integration into production lines.

Measurement results can be evaluated online to allow tool adjustments, statistical analysis, etc.





Automated measuring machines

Workpieces can be placed by robots, for example.

Loading and lifting is then carried out automatically.

The various gage modules are connected to our industrial meas-uring computer.

The **Millimar** D1200X software provides display and analysis of static and dynamic measurements and form deviations.

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 Stands

MarStand 815 GN 8- 2
With Cast Iron Base
MarStand 2400 8- 2
For Electronic Measurements
MarStand 815 MA / 815 MB / 815 MG / 815 P 8- 3
With Magnetic Base

Post & Support Arm Assemblies

MarStand 815 XN / 815 XMA / 815 XMB / 815 XMS / 815 XMG / 815 XP 8- 5
With Mounting Thread and / or T-slot

Magnetic Bases

MarStand 815 Y / 815 YP 8- 5

Center Bench

MarStand 818 8- 6
With moveable Tail Stocks and Support Arms

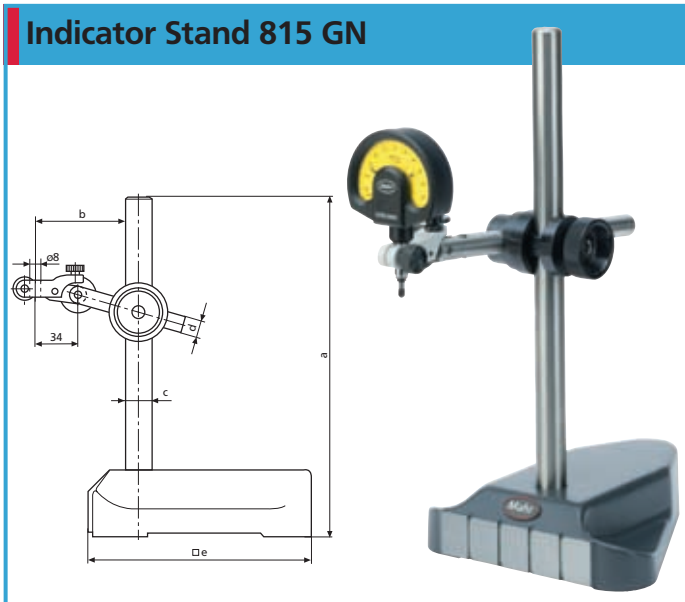
Comparator Stands

MarStand 820 N / 820 NC / 820 FC / 820 NG / 820 FG 35 B / NB-60 8- 8
Small Version
MarStand 821 NG / 821 FG 8-12
Large Version
MarStand 824 NT / 824 FT / 824 GT 8-13
Heavy Version

Modular Units

MarStand 827 b 8-14

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 finely adjusted
- Post and support arm are made from stainless steel
- Indicator can be rotated through ± 90°

Technical Data

Total height with base a		Max. projection of support arm b	Post dia. c	Post dia. d	Base surface e	Fine adjustment range	Weight	Order no.* Mount dia. 8H7	Order no.* Mount dia. 3/8"
mm	*inch*	mm	mm	mm	mm	mm	kg		
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

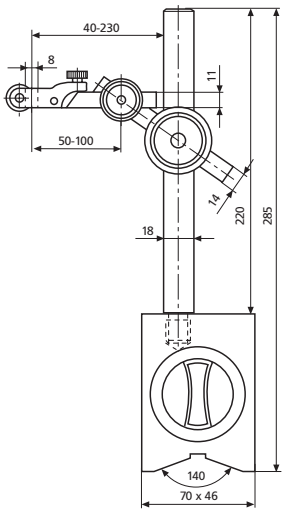
- A stable Height Stand for electronic measurement,
- Fine adjustment in the base allows easy operator set-up, even at high magnification. Up to 3.8 mm / .150" adjustment when arms fully extended
- Collar has Teflon bearings and metal-to-metal clamping.
- Post is thermally isolated from heat transfer 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.*
457 / ***18"***	254 / ***10"***	31.8 / ***1.25"***	161.7 x 94 / ***6.2 x 3.7"***	3.8 / ***0.150"***	**2400**

* *excludes indicating instrument*

Indicator Stand 815 MA with magnetic base



Features

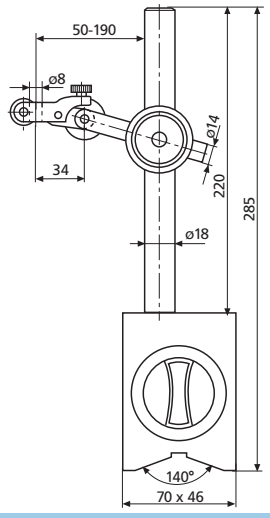
- Support arm with two joints
- Base has a powerful ON/OFF permanent magnet
- Magnetic force is active across the surfaces and the V-shaped bottom plus the front of the base
- Post and support arm are made from stainless steel
- Support arm can be finely adjusted

Technical Data

Total height with base		V-way for shaft dia.	Magnetic force	Fine adjustment range	Weight	Order no.* Mount dia.	Order no.* Mount dia.	Order no. wooden case
mm	***inch***	mm	N	mm	kg	8H7	3/8"	
285	***11.2"***	20 - 100	450	2	2.5	**4416000**	**4416050**	**4416001**

* *excludes indicating instrument*

Indicator Stand 815 MB with magnetic base



Features

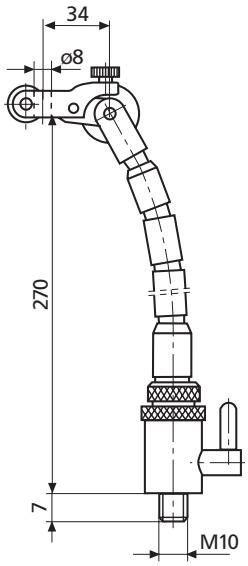
- Support arm with one joint
- Base has a powerful ON/OFF permanent magnet
- Magnetic force is active across the surfaces and the V-shaped bottom plus the front of the base
- Post and support arm are made from stainless steel
- Support arm can be finely adjusted
- Indicating instrument can be rotated through ± 90°

Technical Data

Total height with base		V-way for shaft dia.	Magnetic force	Fine adjustment range	Weight	Order no.* Mount dia.	Order no.* Mount dia.	Order no. wooden case.
mm	***inch***	mm	N	mm	kg	8H7	3/8"	
285	***11.2"***	20 - 100	450	2	2.2	**4417000**	**4417050**	**4416001**

* *excludes indicating instrument*

Indicator Stand 815 MG with flexible stem



Features

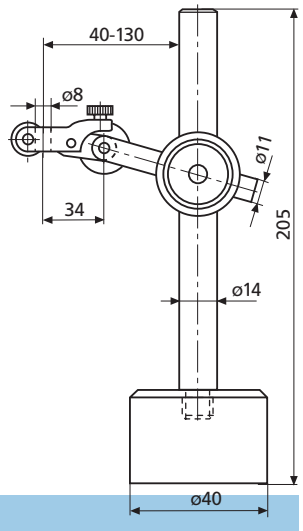
- Flexible in any direction, arm can be locked in position
- The sleeves and grounded steel balls of the stem are compressed with a strong steel cable
- Clamping force is adjustable
- Base has a powerful ON/OFF permanent magnet
- Magnetic force is active across the surfaces and the V-shaped bottom plus the front of the base
- Support arm can be finely adjusted
- Indicating instrument can be rotated through ± 90°

Technical Data

Total height with base		V-way for shaft dia.	Magnetic force	Fine adjustment range	Weight	Order no.* Mount dia.	Order no.* Mount dia.	Order no. wooden case
mm	***inch***	mm	N	mm	kg	8H7	3/8"	
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 finely adjusted
- Indicating instrument can be rotated through ± 90°

Technical Data

Total height with base		Magnetic force	Fine adjustment range	Weight	Order no.* Mount dia.	Order no.* Mount dia.
mm	***inch***	N	mm	kg	8H7	3/8"
205	***8"***	250	1.5	0.7	**4422000**	**4422050**

* *excludes indicating instrument*

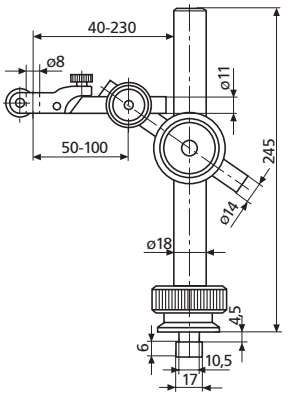
Post and Support Assemblies 815 X

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

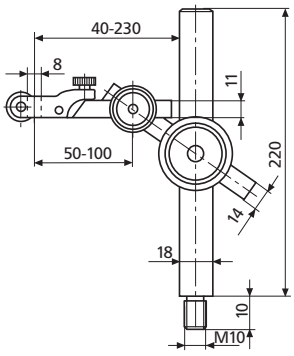
Order no. **4424000**



815 XMA
with mounting thread

- Two joints
- Post and support arm are made from stainless steel
- With fine adjustment

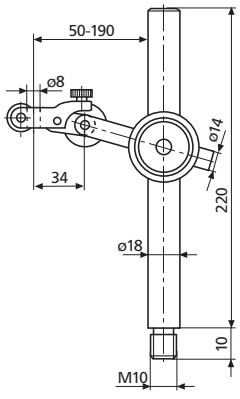
Order no. **4424005**



815 XMB
with mounting thread

- One joint
- Post and support arm are made from stainless steel
- With fine adjustment

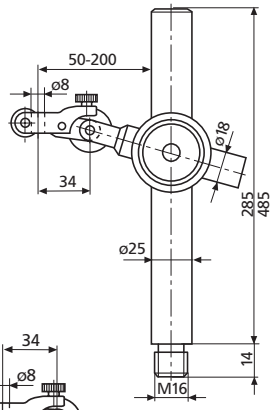
Order no. **4424006**



815 XMS
especially stable version with mounting thread

- One joint
- Post and support arm are made from stainless steel
- With fine adjustment

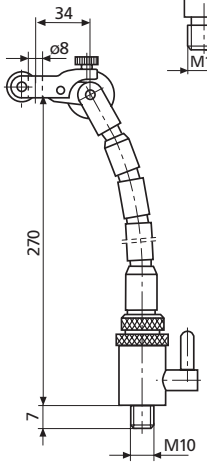
Post height	**Order no.**
285 mm	**4435011**
485 mm	**4435015**



815 XMG
with mounting thread

- Flexible in any direction, arm can be locked in position
- With fine adjustment

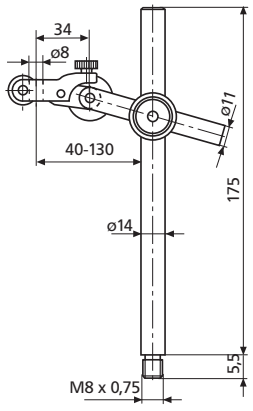
Order no. **4424010**



815 XP
with mounting thread

- One joint
- Post and support arm are made from stainless steel
- With fine adjustment

Order no. **4424015**



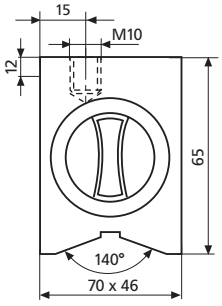
Magnetic Bases 815 Y

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

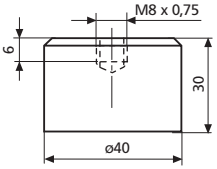
Order no. **4425000**



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 (.79")

Support Arm 818 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. (excludes indicating instrument)
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. (excludes indicating instrument)
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**

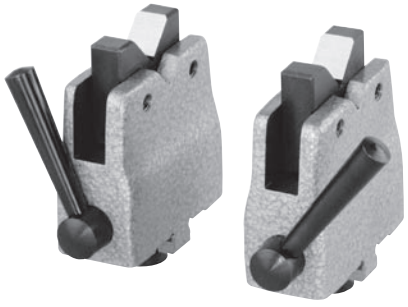
Support arm 818 XNB

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



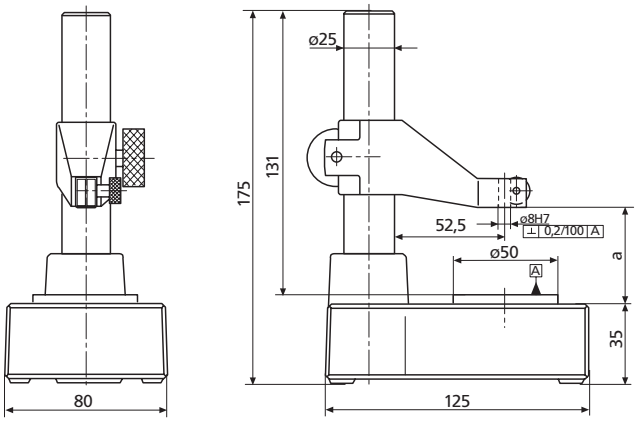
Small Comparator Stands 820

820 N

Indicating instruments are sold seperately

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 for 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

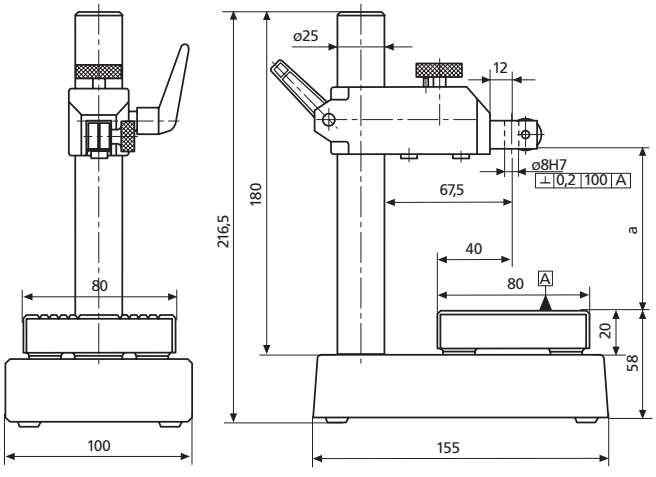
* *excludes indicating instrument*

Small Comparator Stands 820

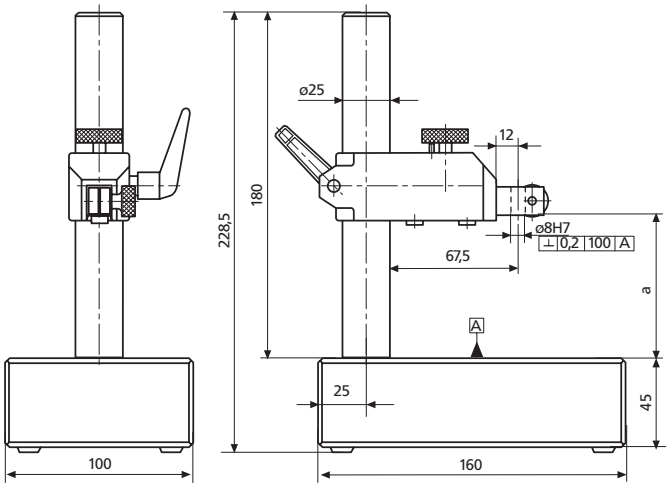
820 FC

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 12-9)

		Order no.
107 V	(Single)	**4229000**
	(Pair)	**4229001**

Comparator Stands 35 B

Excludes indicating instrument. Only indicating instruments that have a horiziontal 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**

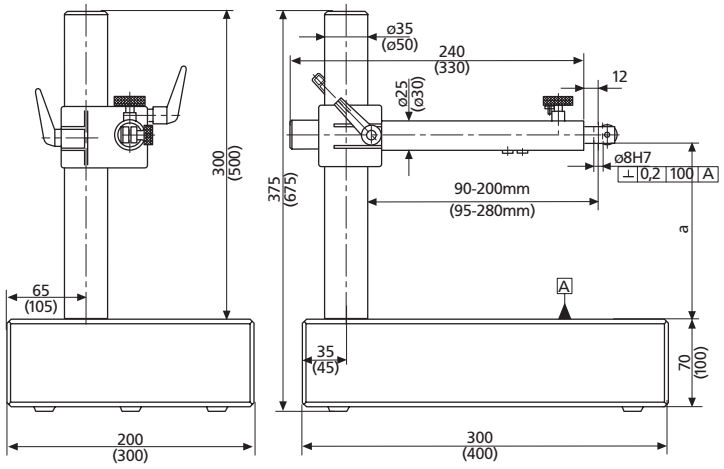
Readout Specification: Because of the versatility of the Series 35B and NB-60 Stands, almost any type of readout can be used.

- 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 12-9)

		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

tolerance	Plate size hole mm	Flatness µm	Mounting 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 12-9)

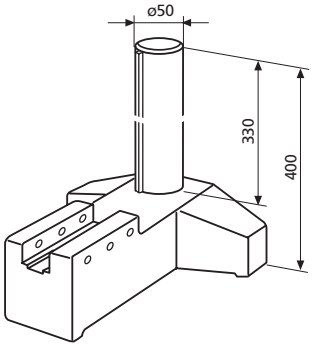
		Order no.
107 V	(Single)	**4229000**
	(Pair)	**4229001**

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

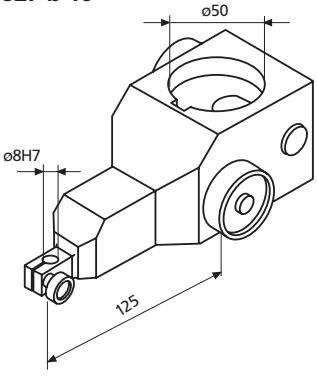


- T-shaped base which is made from a special cast iron
- Post has a chrome finish

Order no. **4082705**

Support Arms

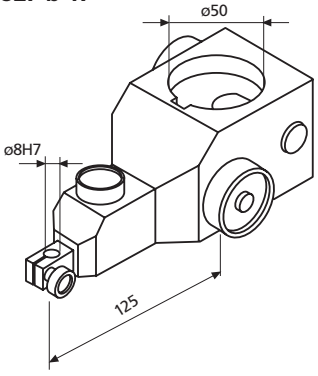
827 b 16



- Mounting hole 8 mm
- Without fine adjustment

Order no. **4082716**

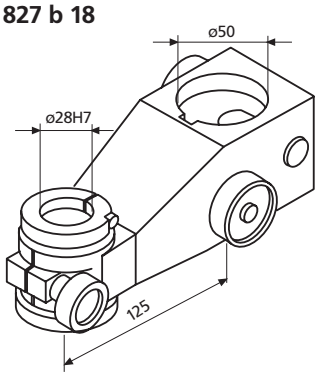
827 b 17



- Mounting hole 8 mm
- Fine adjustment, consisting of a strong, rigid parallel spring assembly

Order no. **4082717**

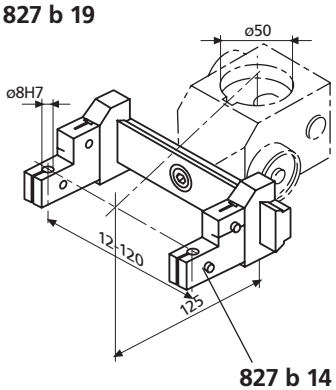
827 b 18



- 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**

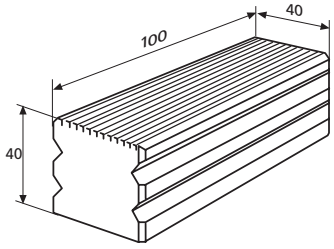
827 b 14
- With probe holder, mounting hole 8 mm

Order no. **4082714**

Modular Units 827 for individual comparator stands

Plates

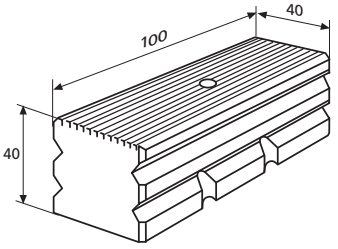
827 b 31



- For single measurement
- Hardened and lapped
- Reversible
- Measuring surface has longitudinal grooves
- Flatness deviation 1 µm

Order no. **4082731**

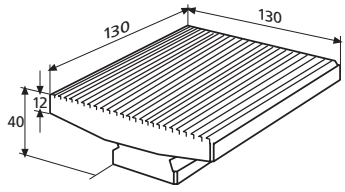
827 b 32



- 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. **4082732**

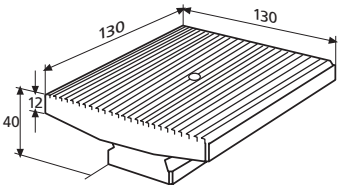
827 b 33



- For single measurement
- Large measuring surfaces which has longitudinal grooves, hardened and lapped
- Flatness deviation 1 µm

Order no. **4082733**

827 b 34

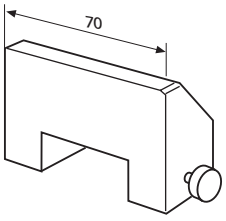


- For sum measurement
- Large measuring surfaces which have longitudinal grooves, hardened and lapped
- With mounting hole 8H7 mm/ .375" and a clamp for inductive probes
- Flatness deviation 1 µm

Order no. **4082734**

Adjustable Stop

827 b 35

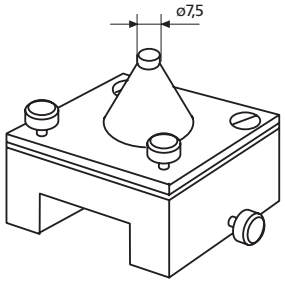


- Ensures that a work piece is correctly positioned
- To be attached to plates 827 b 31 and 827 b 32

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 individual 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

Indicating Measuring Instruments for Outside Dimensions, Indicating Snap Gages

MaraMeter 1000 P / 300 P / 840 F / 840 FC / 840 FH / 840 FG / 840 FM / 840 FS 9- 2
With fixed or interchangeable measuring faces

MaraMeter 840 E 9-18
For extremely high precision

MaraMeter 852 / 852 TS / 853 9-19
For threads, pitches, roots, serrations

Portable Thickness Gages

MaraMeter 22 P / 26 P / 838 A / 838 B / 838 AB / 57 B 9-26
With digital and/or analog display

Caliper Gages

MaraMeter 49 P / 838 TA / 838 EA / 838 TI / 838 EI 9-33
With digital and/or analog display

Depth Gages

MaraMeter 837 / 65 P-40 / 75 P-30 / 75 P-30 / 75 B-1 9-41

Indicating Measuring Instruments for Inside Dimensions,

Dimentron® Plug Inside Diameter Gages 9-46
Designed for high production I.D. gaging

MaraMeter 844 D 9-51
Indicating Plug Gage for rapid testing of serial components

MaraMeter 844 K 9-58
Self-centering Dial Bore Gage

Marameter 1280 P Adjustable Bore Gages 9-63
Superior accuracy for production and inspection

MaraMeter 844 N 9-66
Self-centering Dial Bore Gage

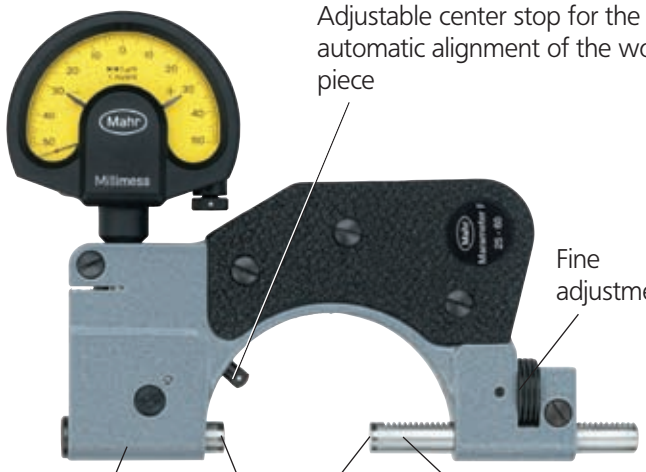
MaraMeter 844 Z 9-70
Dial Bore Gage for internal serrations

MaraMeter. Indicating Snap Gages

OVERVIEW

►| The Indicating Snap Gages **MaraMeter** 840 F / 300 P-1 are ideal for highly accurate and reliable results on cylindrical work pieces with a narrow tolerance. |◄

MaraMeter 840 F

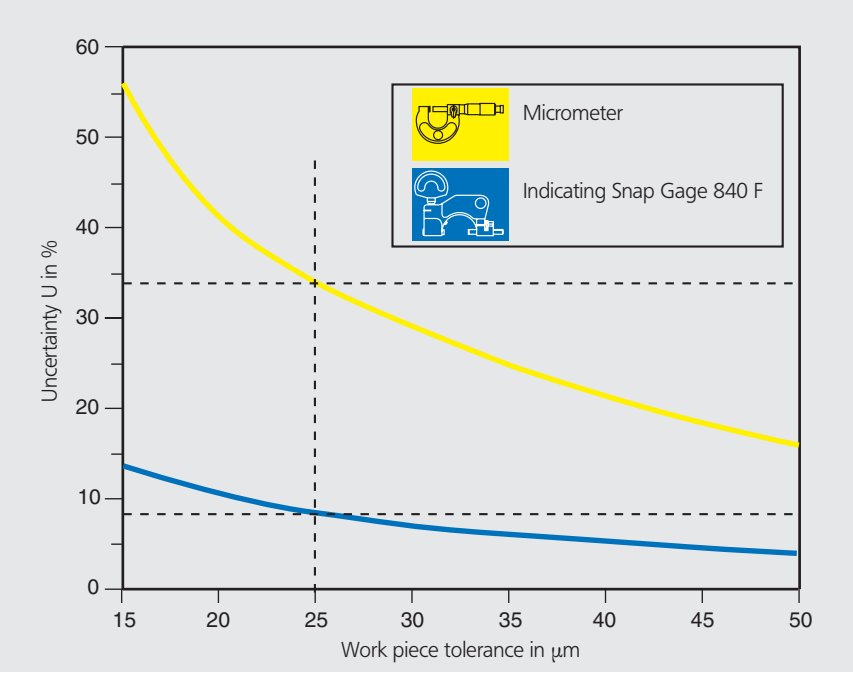


MaraMeter 300 P-1

Advantages of the Snap Gage 840 F compared to a Micrometer

- **Reduced Measuring Uncertainity**

The MaraMeter Indicating Snap Gages have a notably reduced measuring uncertainty in comparison to to a Micrometer.



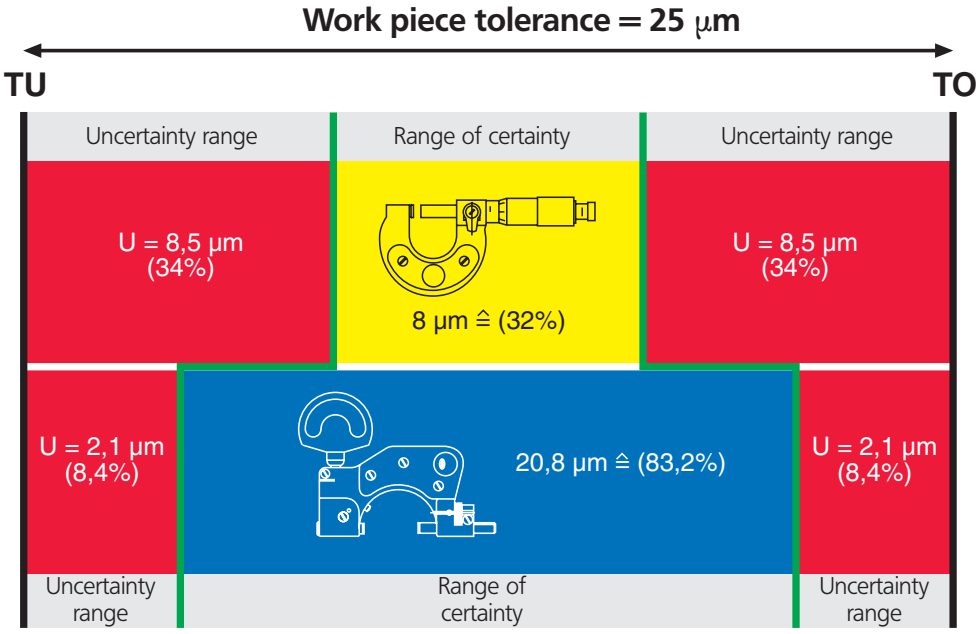
Measuring Uncertainty U is dependent upon the tolerance of the work piece

- **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 840 F, 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

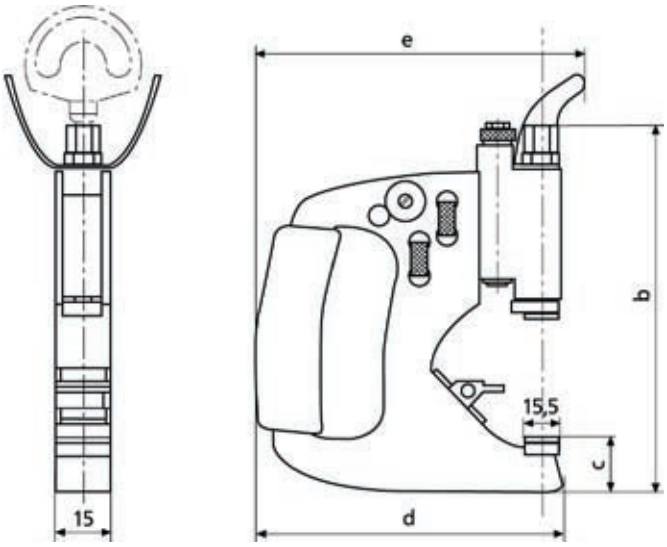
Style	Normally Furnished Indicating Instruments Readings	Snap Style	Separately, Order no.
12I/22I	***.0001"***	Flat Anvil	**IDT-102/IDT-106**
O1I/P1I	0.002 mm	Flat Anvil	**IDS-206/IDS-208**
Maxμm®/// (1)	selectable (3)	Flat Anvil	**2033109**
Maxμm®/// (2)	selectable (3)	Flat Anvil	**2033119**
2034201	0.0005 mm / ***.00002"***	Flat Anvil	**2034201**
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 - 25.4 /***0-1"***	150/ **6"**	29/ ***1.16"***	145/ ***5.8"***	158/ ***6.3"***
25.4 - 50.8 /***1-2"***	175/ **7"**	29/ ***1.16"***	141/ ***5.6"***	154/ ***6.16"***
50.8 - 76.2 /***2-3"***	200/ **8"**	29/ ***1.16"***	155/ ***6.2"***	167/ ***6.7"***
76.2 - 101.6 /***3-4"***	226/ ***9"***	29/ ***1.16"***	167/ ***6.7"***	180/ ***7.2"***
101.6 - 127 /***4-5"***	251/ ***10"***	29/ ***1.16"***	180/ ***7.2"***	193/ ***7.7"***
127 - 152.4 /***5-6"***	278/ ***11"***	30/ ***1.2"***	203/ ***8"***	215/ ***8.6"***
152.4 - 177.8 /***6-7"***	303/ ***12"***	30/ ***1.2"***	213/ ***8.5"***	226/ ***9"***
177.8 - 203.2 /***7-8"***	329/ ***13"***	30/ ***1.2"***	231/ ***9.2"***	244/ ***9.7"***
203.2 - 228.6 /***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®/// indicator	With μMaxμm®// indicator	With AirProbe®	No Indicator with 8 mm adaptor & lift lever	With Dial Indicator No lift lever	With Dial Indicator With lift lever
0 - 25.4 /***0-1"***	**OMI-300P-1**	**2003100**	**EMD-300P-1**	**EDI-300P-1**	**A300P-1**	**2003110**	**300P-1**	**301P-1**
25.4 - 50.8 /***1-2"***	**OMI-300P-2**	**2003101**	**EMD-300P-2**	**EDI-300P-2**	**A300P-2**	**2003111**	**300P-2**	**301P-2**
50.8 - 76.2 /***2-3"***	**OMI-300P-3**	**2003102**	**EMD-300P-3**	**EDI-300P-3**	**A300P-3**	**2003112**	**300P-3**	**301P-3**
76.2 - 101.6 /***3-4"***	**OMI-300P-4**	**2003103**	**EMD-300P-4**	**EDI-300P-4**	**A300P-4**	**2003113**	**300P-4**	**301P-4**
101.6 - 127 /***4-5"***	**OMI-300P-5**	**2003104**	**EMD-300P-5**	**EDI-300P-5**	**A300P-5**	**2003114**	**300P-5**	**301P-5**
127 - 152.4 /***5-6"***	**OMI-300P-6**	**2003105**	**EMD-300P-6**	**EDI-300P-6**	**A300P-6**	**2003115**	**300P-6**	**301P-6**
152.4 - 177.8 /***6-7"***	**OMI-300P-7**	**2003106**	**EMD-300P-7**	**EDI-300P-7**	**A300P-7**	**2003116**	**300P-7**	**301P-7**
177.8 - 203.2 /***7-8"***	**OMI-300P-8**	**2003107**	**EMD-300P-8**	**EDI-300P-8**	**A300P-8**	**2003117**	**300P-8**	**301P-8**
203.2 - 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 - 25.4 /***0-1"***	**OMI-300P-31**	**EMD-300P-31**	**EDI-300P-31**	**A300P-31**		**300P-31**	**301P-31**
25.4 - 50.8 /***1-2"***	**OMI-300P-32**	**EMD-300P-32**	**EDI-300P-32**	**A300P-32**		**300P-32**	**301P-32**
50.8 - 76.2 /***2-3"***	**OMI-300P-33**	**EMD-300P-33**	**EDI-300P-33**	**A300P-33**		**300P-33**	**301P-33**
76.2 - 101.6 /***3-4"***	**OMI-300P-34**	**EMD-300P-34**	**EDI-300P-34**	**A300P-34**		**300P-34**	**301P-34**
101.6 - 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/// Indicator with Digital Output

Snap Gages for Outside Diameters 300P

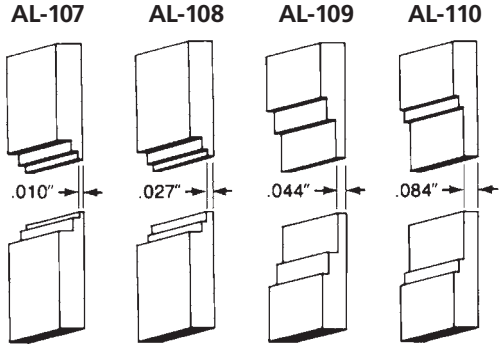
Accessories

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.

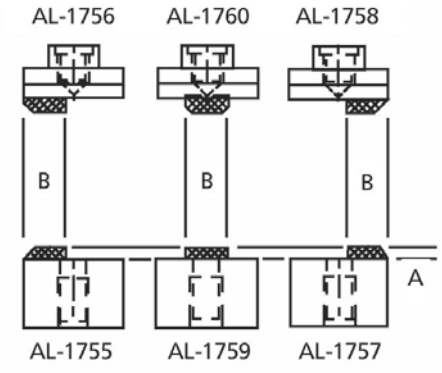
		Order no.
Bench Stand for Gages Clamps 300P and 1000P Series Gages firmly. A 6.4 mm / .25" mounting hole allows permanent fastening to bench surface.		**BA-26**
Bench Stand for Disc Masters Holds any AGD style 3 Disc up to 127 mm / 5" diameter and 27 mm / 1.12" wide. Two 6.4 mm / 0.25" mounting holes 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**

Anvil Inserts – For all Series 300P-30 and 301P-30 groove gages (2 required per gage).



Anvil Inserts

Plain Anvil Options
Front View



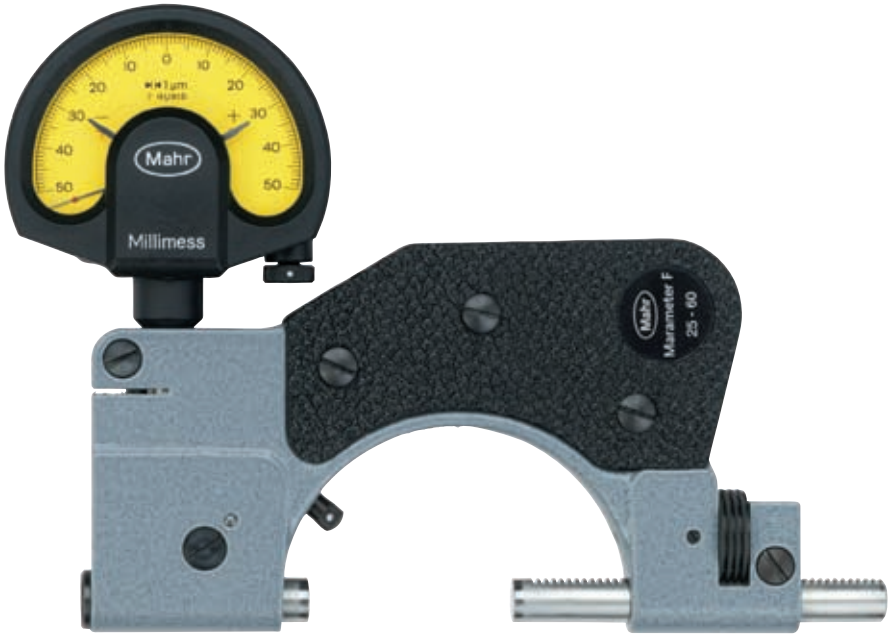
A = 2mm/.080in
B = 6.35mm/.250in

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
- Supplied with: Wooden case, steel flat contact points 903

Technical Data

	Measuring range				Repeatability f_w	Distance of moveable anvil	Measuring force**	Measuring face		Order no.*
	mm			*(inch)*	µm	mm	N	Flatness µm	Parallelism µm	
840 F	0	-	25	***(0 - 1")***	≤ 0.5	2	7.5	≤ 0.2	≤ 1	**4450000**
	25	-	60	***(1 -2.36")***	≤ 0.5	2	7.5	≤ 0.2	≤ 2	**4450001**
	50	-	100	***(2 -4")***	≤ 1	2.5	7.5	≤ 0.2	≤ 2	**4450002**
	100	-	150	***(4 -6")***	≤ 1	2.5	7.5	≤ 0.2	≤ 2	**4450003**
	150	-	200	***(1 -2.36")***	≤ 1	2.5	7.5	≤ 0.2	≤ 2	**4450004**
840 FC	0	-	25	***(0 -1")***	≤ 1	2	7.5	≤ 0.2	≤ 1	**4450100**
	25	-	60	***(1 -2.36")***	≤ 1	2	7.5	≤ 0.2	≤ 2	**4450101**

* *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:

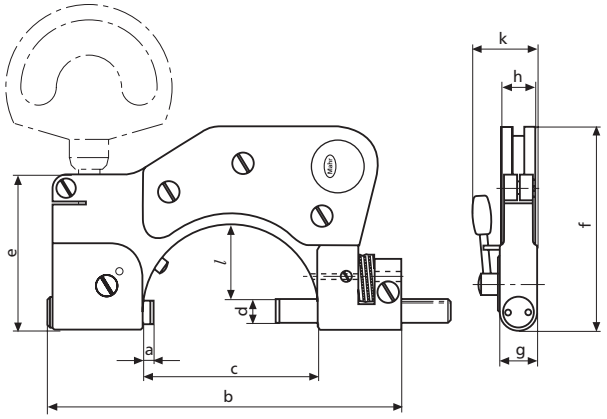
Dial Comparator		Readings mm / *inch*	Order no. mm / *inch*
Compramess	**1004 / *1004 Z***	5 µm / ***.0001"***	**4333000 / *4333900***
Millimess	**1003 / *1003 Z***	1 µm / ***.00005"***	**4334000 / *4334900***
Millimess	**1003 XL**	2 µm	**4334001**
Supramess	**1002 / *1002 Z***	0.5 µm / ***.00002"***	**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 II		0.0005 mm / ***.00002"***	**2034207****

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*

2000

1003



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*

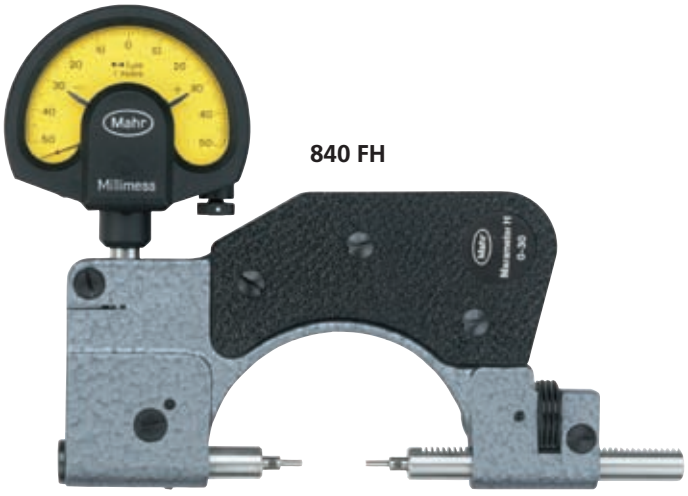
Accessories

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



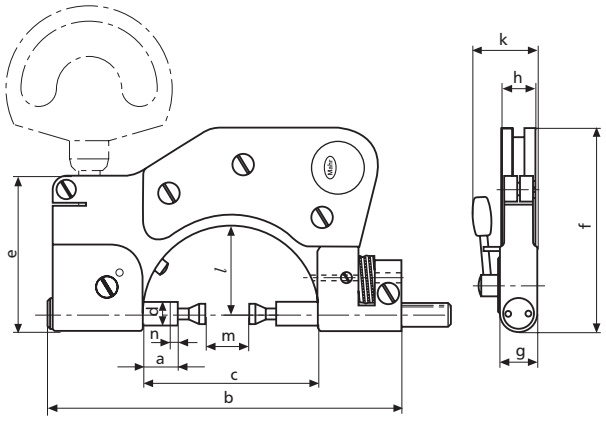
Features

- 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
- Supplied with: Wooden case, steel flat contact points 903, spanner DIN 902-3.5

Technical Data

	Measuring range*				Repeatability	Distance of moveable anvil	Measuring force	Order no.**
	mm			*(inch)*	f_w µm	mm	N	
840 FH	0	-	30	***(0 - 1.18")***	≤ 1	2	7.5	**4451000**
	30	-	80	***(1.18 -3")***	≤ 1	2.5	7.5	**4451005**

* *Measuring is dependent upon the length of the anvils being used*
** *Excludes indicating instrument (and anvils)*



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*

Indicating Snap Gage 840 FH with interchangeable anvils

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 II		.0005 mm/	***.00002"***	**2034207****

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*

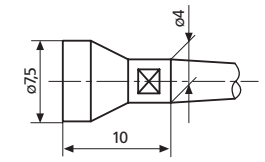
Accessories

Spanner (Included in scope of supply)
for **840 FH**, to loosen anvils
Order no. **4880210**

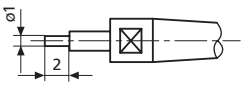
Reference Discs 390 see Chapter 13

Gage Blocks see Chapter 13

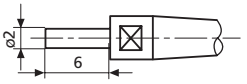
Holder 840 Fk and **Stand 840 Ff** see Page 9-15



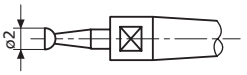
40 He 0H



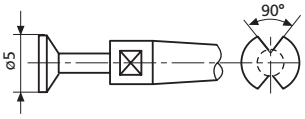
40 He 1



40 He 2



40 He 3



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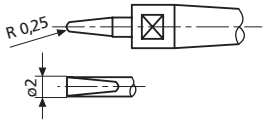

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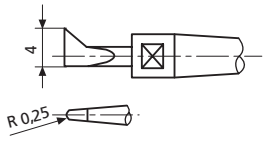

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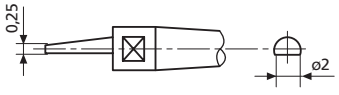
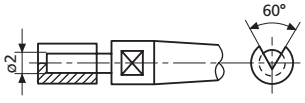


40 He 7



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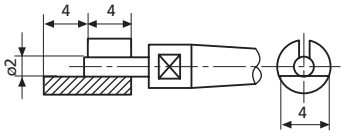

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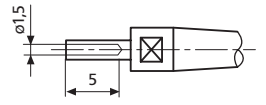

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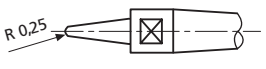


40 He 11

Indicating Snap Gages 840 FG with interchangeable anvils

840 FG

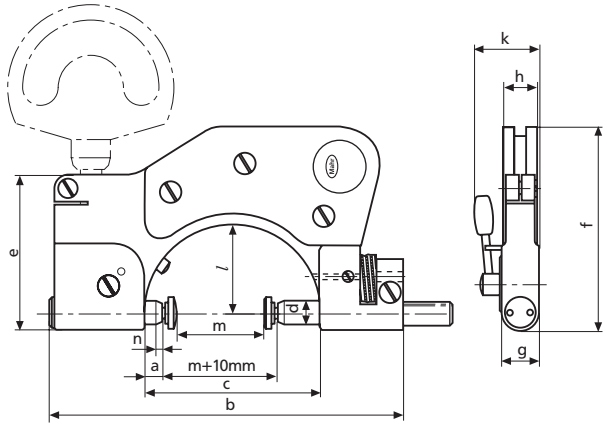
Features

- 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
- Supplied with: Wooden case, steel flat contact points 903

Technical Data

	Measuring range*				Repeatability	Distance of moveable anvil	Measuring force	Order no.**
	mm			*(inch)*	f_w µm	mm	N	
840 FG	0	-	50	***(0 - 2")***	≤ 0.5	2	7.5	**4454000**
	40	-	90	***(1.57 - 3.57")***	≤ 0.5	2.5	7.5	**4454001**

* *Measuring is dependent upon the length of the anvils being used*
** *Excludes indicating instrument (and anvils)*



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**			

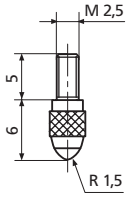
Indicating Instruments

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 II		.0005 mm/ ***.00002"***	**2034207****

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



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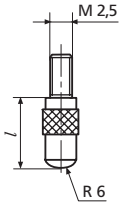

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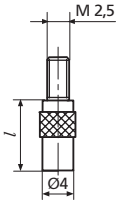

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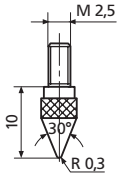

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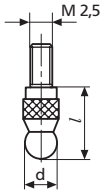

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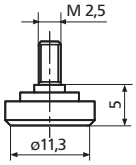

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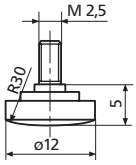

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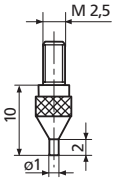


Catalog no.	Features	Order no.
907	Flat contact plates* steel, dia. 11.3 mm, A = 1 cm²	**4360200**
907 H	Flat contact plates*, carbide tipped, dia. 7 mm	**4360201**
908	Spherical contact plates, steel	**4360210**
908 H	Spherical contact plates, carbide tipped	**4360211**
911 H	Pin contact point, carbide tipped, dia. 1 mm, plan	**4360240**

** When using a flat contact plate the opposite facing anvil must be a spherical contact plate.*

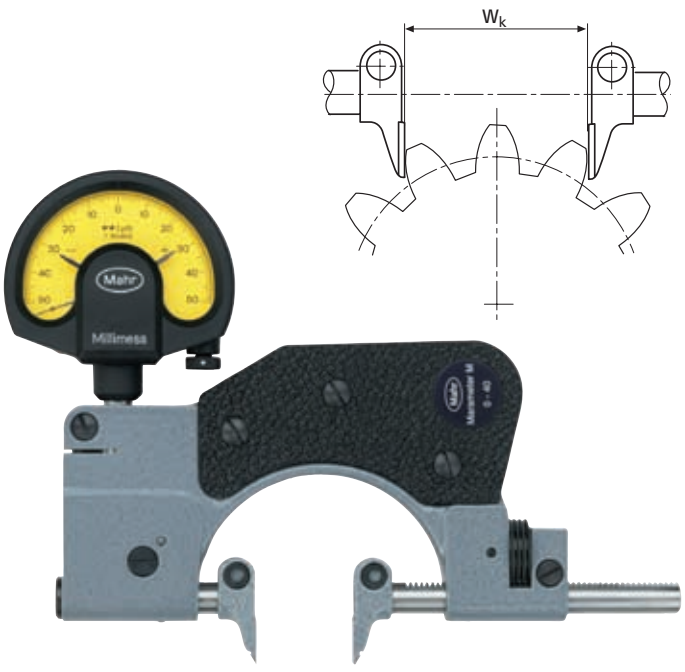
Accessories

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



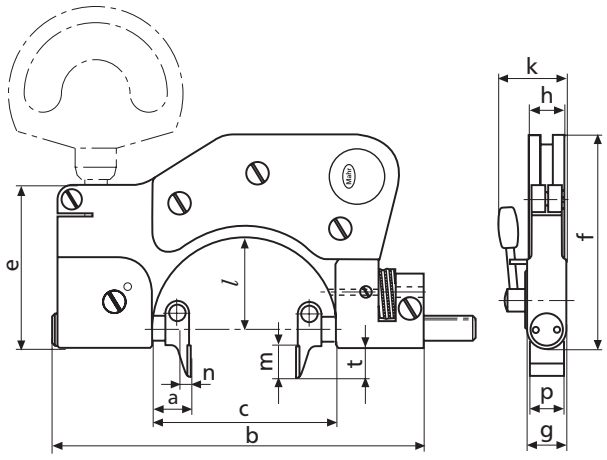
Features

- 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
- Supplied with: Wooden case, steel flat contact points 903

Technical Data

	Measuring range mm			(inch)	Repeatability f_w µm	Measuring force N	Measuring face Area mm	Flatness µm	Parallelism µm	Tooth span measurements as per module m	Order no.*
840 FM	0	-	40	***(0 - 1.57")***	1	7.5	12 x 12	≤ 0.5	≤ 2	0.5	**4452000**
	40	-	80	***(1.57 - 3")***	1	7.5	12 x 12	≤ 0.5	≤ 3	0.5	**4452001**
	80	-	130	***(3 - 5")***	1	9	15 x 17	≤ 0.5	≤ 3	1.0	**4452002**
	130	-	180	***(5 - 7")***	1	9	15 x 17	≤ 0.5	≤ 3	1.0	**4452003**

** 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 user's 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 user influence

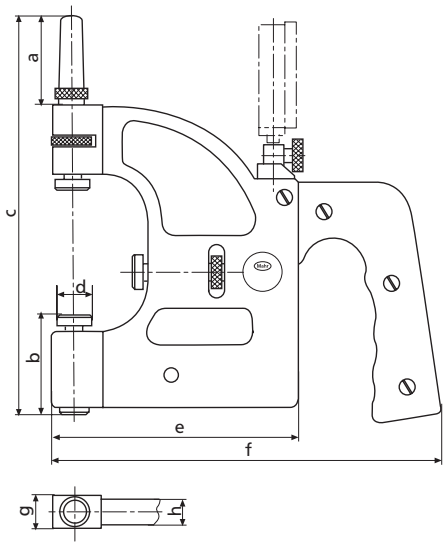
- Supplied with:
  Wooden case, allen key

Technical Data

	Measuring range				Repeatability f_w	Measuring force	Distance of moveable anvil	Measuring faces Flatness	Measuring faces Parallelism	Weight	Order no.*
	mm			*(inch)*	µm	N	mm	µm	µm	kg	
840 FS	10	-	30	***(.39 - 1.18")***	1	13.5	0.7	≤ 0.5	≤ 3	0.6	**4455000**
840 FS	30	-	60	***(1.18 - 2.36")***	1	13.5	0.7	≤ 0.5	≤ 3	0.9	**4455001**
840 FS	60	-	100	***(2.36 - 4")***	1	13.5	0.7	≤ 0.5	≤ 3	1.3	**4455002**
840 FS	100	-	150	***(4 - 6")***	1	15	0.7	≤ 0.5	≤ 3	1.7	**4455003**
840 FS	150	-	200	***(6 - 8")***	1	15	0.7	≤ 0.5	≤ 3	2.0	**4455004**
840 FS	200	-	250	***(8 - 10")***	1	15	0.7	≤ 0.5	≤ 3	2.2	**4455005**
840 FS	250	-	300	***(10 - 12")***	1	15	0.7	≤ 0.5	≤ 3	2.5	**4455006**
840 FS	300	-	350	***(12 - 14")***	1	15	0.7	≤ 0.5	≤ 4	3.3	**4455007**
840 FS	350	-	400	***(14 - 16")***	1	15	0.7	≤ 0.5	≤ 4	3.3	**4455008**
840 FS	400	-	450	***(16 - 18")***	1	15	0.7	≤ 0.5	≤ 4	4.3	**4455009**
840 FS	450	-	500	***(18 - 20")***	1	15	0.7	≤ 0.5	≤ 4	4.7	**4455010**

** Excludes indicating instrument*

Technical Data



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

Accessories

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 II		.0005 mm/	***.00002"***	**2034207****

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

- Supplied with:
  Wooden case

Technical Data

	Measuring range mm	Readings / Resolution adjustable to* µm	Measuring force N	Measuring faces dia. mm	Repeatability f_w µm	Measuring faces Parallelism µm	Order no.**
840 E	0 - 25	0.01	4.5	7.5	≤ 0.1	≤ 0.3	**4453000**

* *Depending upon which indicating instrument is being used*
** *Excludes indicating instrument*

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 C1216M, C1208M and 1240; please refer to Chapter 7

C 1208M

1240

Indicating Bench Snap Gage 852 TS

Applications

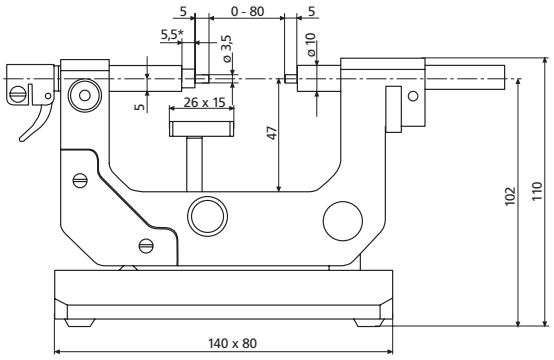
- For rapid measurements of diameters of cylindrical parts (shafts, bolts and shanks)
- For measuring pitch, root and outside diameters of all kinds of external threads as well as serrations
- For thickness and length measurement
- Particularly suited for batch produced parts

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** mm	(inch)	Repeatability f_w µm	Retraction mm	Measuring force N	Measuring face Parallelism µm	Mounting dia.	Order no.
0 - 80	***(0 - 4")***	1	1.2	6.5	≤ 2	8 mm 8 mm .375"	**4510030***** **4510031 +** **4510035 +**

* *In initial position* ** *Depending upon which anvils are being used* *** *Delivery with a different indicating instrument is available upon request*
\+ *Excludes indicating instrument, order indicating instrument seperately.*

Accessories

	Order no.
Standard TC-tipped anvils, Pair dia. D= 3.5 mm	**4510840**

Interchangeable Anvils please refer to Pages 9-23 to 9-25
Thread Setting Plug Gages see Page 13-20

Indicating Thread Snap Gage 852

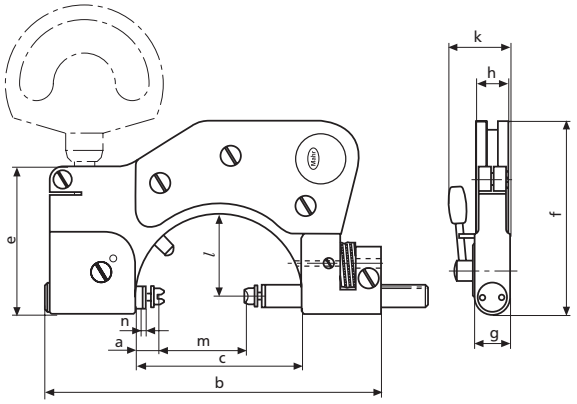
Features

- 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
- Supplied with: Wooden case, steel flat contact points 903

Technical Data

	Measuring range* mm			(inch)	Repeatability f_w µm	Measuring force N	Order no.**
852	0	-	45	***(0 - 1.77")***	1	7.5	**4510000**
852	45	-	85	***(1.77 - 3.34")***	1	7.5	**4510001**
852	85	-	140	***(3.34 - 5.51")***	1	9	**4510002**
852	140	-	190	**(5.51 - 7.48")**	1	9	**4510003**

* *Depending upon which anvils are being used, purchase seperately*
** *Excludes indicating instrument and anvils*



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*

Technical Data

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 II		.0005 mm/	***.00002“***	**2034207****

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*

2000

1003

Accessories

Interchangeable Anvils please refer to Pages 9-19
Thread Setting Plug Gages see Page 13-14
Holder 840 Fk and **Stand 840 Ff** (for 0-45 mm) see Page 9-15

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 9-20
- Supplied with: Wooden case, steel flat contact points 903

Technical Data

	Measuring range mm			(inch)	Repeatability f_w µm	Measuring force N	Order no.*
853	1.2	-	35	***(.04 - 1.37")***	2	7.5	**4511000**
853	35	-	75	***(1.37 - 3")***	2	7.5	**4511001**

** Excludes indicating instrument and the support yokes 853 q*

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 table below:

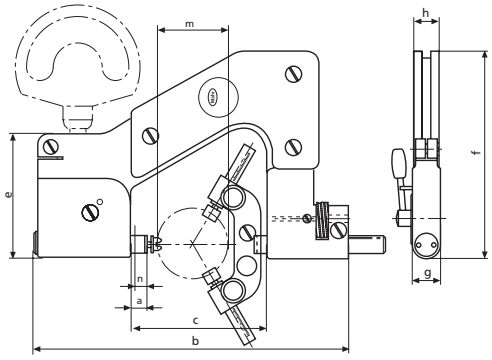
Cat. no.	No. of flutes of taps	For meas. range mm	Compens. factor**	Order no.
853 qk 3	3	1.2 - 35	x 1	**4511024**
853 qk 5	5	1.2 - 35	x 1.34	**4511026**
853 qk 7	7	1.2 - 35	x 1.42	**4511028**
853 qg 3	3	35 - 75	x 1	**4511025**
853 qg 5	5	35 - 75	x 1.34	**4511027**
853 qg 7	7	35 - 75	x 1.42	**4511029**

*** 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	**810 S**	0.001 mm	**4311000**
Compramess	**1004/*1004 Z***	5 µm/ ***.0001"***	**4333000/*4333900***
Zentimess	**1010/*1010 Z***	0.01 mm/***.0005"***	**4332000/*4332900***
MarCator	**1087R/*1087 ZR***	1 µm / ***.00005"***	**4337160/*4337170***



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

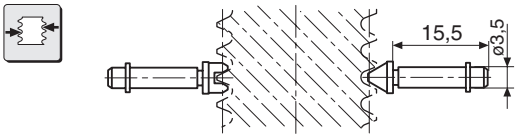
a = In initial position*

Accessories

Interchangeable Anvils see from Pages 9-23 to 9-24
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

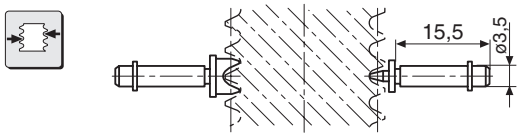
1.25 - 2	**4511105**	**4511104**
2 - 3.5	**4511108**	**4511107**
3.5 - 5	**4511140**	**4511139**
5 - 7	**4511142**	**4511141**

** 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

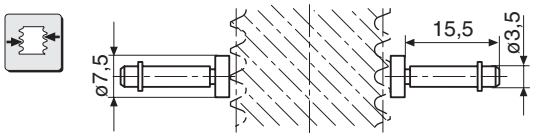
Metric thread (60°)			Whitworth thread (55°)			American UST-thread (60°)
Pitch	V-anvil	Blade	Pitch range	V-anvil	Blade	The same anvils are to be used as with the Whitworth-thread (55°).
mm	**Order no.**	**Order no.**	tpi	**Order no.**	**Order no.**	
0.5	**4173213**		40	**4173331**		
0.6	**4173214**		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

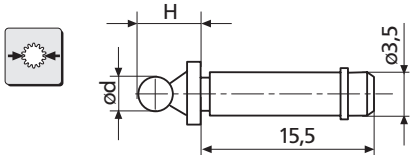
Hardened steel **Order no.** **4173210**
Carbide tipped **Order no.** **4511190**



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

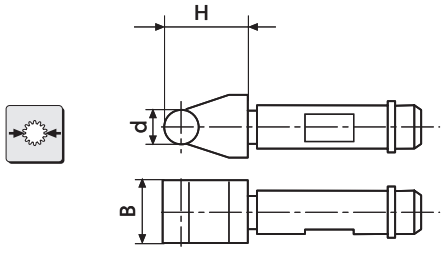
dia. **d** mm	**H** mm	**Order no.**	dia. **d** mm	**H** mm	**Order no.**	dia. **d** mm	**H** mm	**Order no.**
0.5	5.0	**4179150**	1.65	6.2	**4179168**	3.048	7.5	**4179182**
0.551	5.1	**4179151**	1.7	6.2	**4179169**	3.2	7.7	**4170570**
0.62	5.1	**4179152**	1.75	6.3	**4170553**	3.25	7.8	**4170566**
0.623	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** dia. 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 **2034212** µMaxµm®// XL Digital Indicator (front mounted) and BA-26 Stand (Stand not included)

XLI-22P-20 with **2034212** 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 spherical measuring faces
- For measuring hard materials for example; sheet metal, hardboard, wooden panels and panes of glass

Technical Data

	Throat depth mm	Throat depth *(inch)*	Measuring range mm	Measuring range *(inch)*	Measuring face dia. mm	Measuring face radius mm	Order no. with Indicator **810** 0.01 mm Res	Order no. with Indicator **1075 R** 0.005mm/.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 and hardboard

Technical Data

	Throat depth mm	Throat depth *(inch)*	Measuring range mm	Measuring range *(inch)*	Measuring face dia. mm lower	Measuring face radius mm upper	Order no. with Indicator **810** 0.01 mm Res	Order no. with Indicator **1075 R** 0.005mm/.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**

	Throat depth mm	Throat depth *(inch)*	Measuring range mm	Measuring range *(inch)*	Measuring face dia. mm lower	Measuring face radius mm upper	Order no. with Indicator **1075 R** 0.005mm/.0001" 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 2.5 mm / .10" sensitive range and .002 mm / .0001" grads.
57B-15M	**57B-15**	0 - 25 / ***0 - 1"***	Dial Indicator readout with 25 mm / 1" sensitive range and .01 mm / .001"grads.
XLI-57B-15			µMaxµm®// XL Digital Indicator with 25 mm / 1" range and .001 mm / .00005" resolution.

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 contact is a flat 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. An auxiliary weight on the Indicator provides a total dead-load weight of 25 grams. (Replacement lower rod: PS-43)

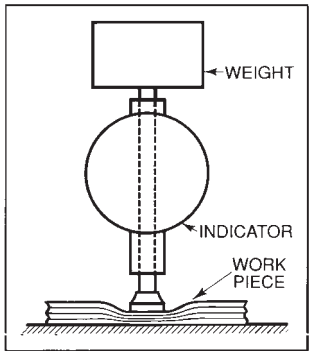
Technical Data

Order no. Metric	Inch	Capacity mm / *inch*	Description
57B-13M	**57B-13**	7.62 / ***0 - .30"***	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.
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.
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, .0005 mm / .00002" resolution.
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.

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.

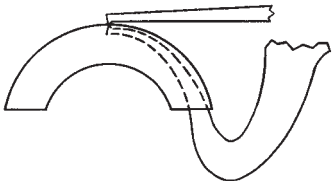
Technical Data

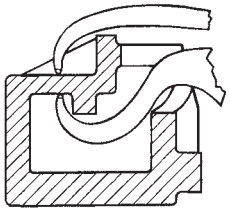
Order no. Metric	Inch	Capacity* mm / *inch*	Gaging Depth mm / *inch*	Minimum Graduation mm / *inch*	A	B
49P-17M	**49P-17**	0 - 50 / ***0 - 2"***	100 / ***4"***	0.02 / ***.001"*** grads.	1-1/4	1-1/4
49P-19M	**49P-19**	0 - 50 / ***0 - 2"***	200 / ***8"***	0.02 / ***.001"*** grads.	2-9/16	2
49P-1M	**49P-1**	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 (Metric) for External Measurement 838 TA to measure thickness and wall thicknesses

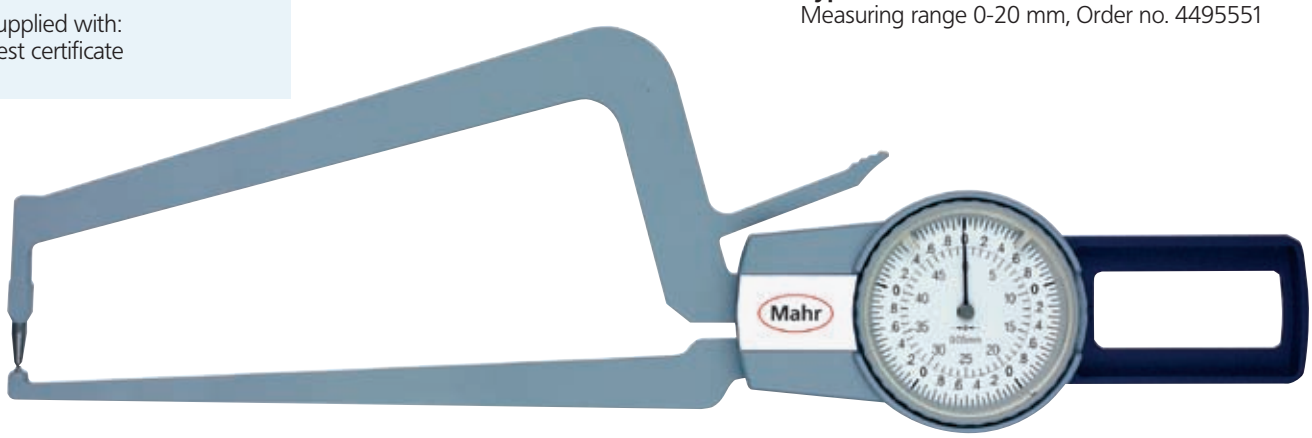
Features

- For measuring thicknesses and wall thicknesses
- Easy to operate, very habile and portable
- Easy to read tolerance markers
- Dust and splash waterproof
- Contact points are made from carbide
- Absolute measuring instrument

- Supplied with:
  Test certificate

IP65

Type A
Measuring range 0-20 mm, Order no. 4495551



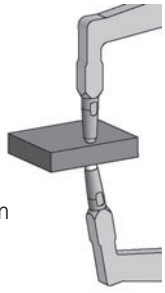
Type B with handle
Measuring range 0-50 mm, Order no. 4495554

Technical Data and Dimensions

			Type A			Type B	
Measuring range	Meb	mm	0 - 10	0 - 20	0 - 20	0 - 50	0 - 50
Readings	Skw	mm	0.005	0.01	0.01	0.05	0.05
Error limit	G	mm	0.015	0.03	0.03	0.05	0.05
Repeatability limit	r	mm	0.005	0.01	0.01	0.025	0.025
Measuring depth	L	mm	35	85	85	170	170
Contact point - length (move.)	Hb	mm	19.1	24.6	24.6	32	32
Contact point - length (fixed)	Hf	mm	18.6	24.6	2.5	32	1
Contact point - ball dia.	D	mm	1.5 [1]	1.5 [1]	1.5 [2]	2 [1]	2 [2]
Measuring force	F	N	0.8 - 1.2	1.1 - 1.6	1.1 - 1.6	1.2 - 1.8	1.2 - 1.8
Protection class			IP65	IP65	IP65	-	-
Order no.			**4495550**	**4495551**	**4495552**	**4495553**	**4495554**

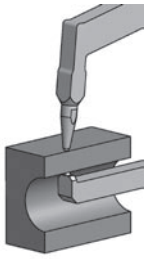
Applications

1)

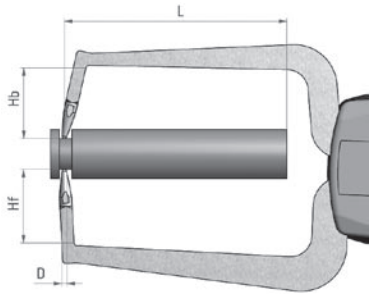


Ball dia. 1.5 mm
Ball dia. 2 mm
Ball dia. 3 mm

2)



Ball dia. 1.5 mm
Ball dia. 2 mm
Ball dia. 3 mm



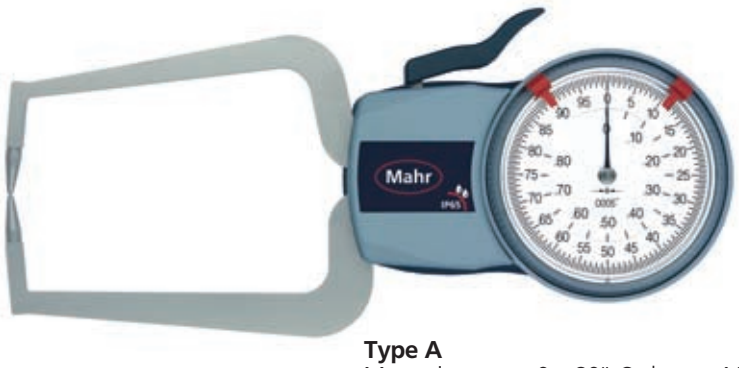
Gages (Inch) for External Measurement 838 TA to measure thickness and wall thicknesses

Features

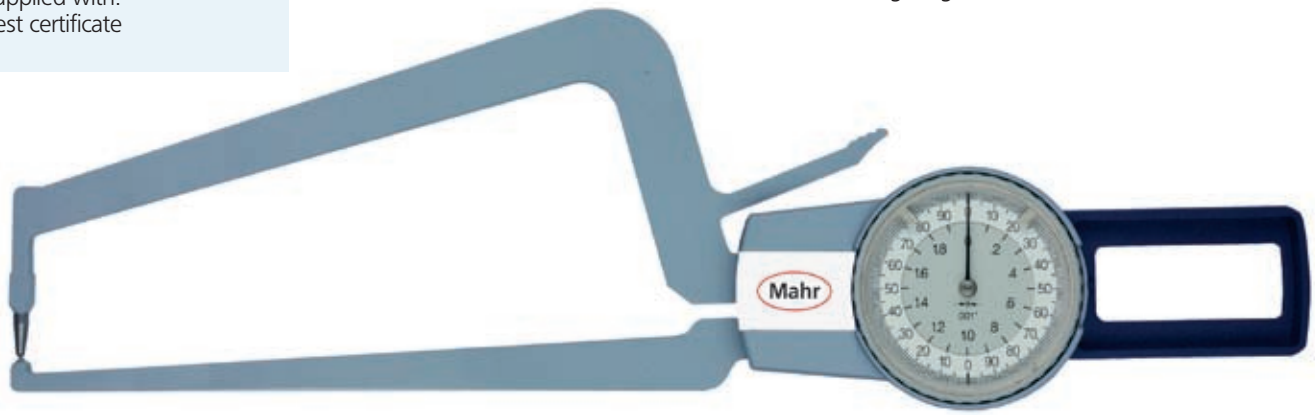
- For measuring thicknesses and wall thicknesses
- Easy to operate, very habile and portable
- Easy to read tolerance markers
- Dust and splash waterproof
- Contact points are made from carbide
- Absolute measuring instrument

- Supplied with: Test certificate

IP65



Type A
Measuring range 0 - .80", Order no. 4495951



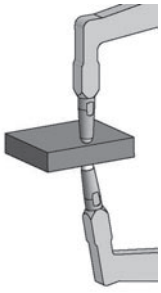
Type B with handle
Measuring range 0 - 2.0", Order no. 4495954

Technical Data and Dimensions

			Type A			Type B	
Measuring range	Meb	inch	0 - .40	0 - .80	0 - .80	0 - 2.0	0 - 2.0
Readings	Skw	inch	.0002	.0005	.0005	.001	.001
Error limit	G	inch	.0008	.0015	.0015	.002	.002
Repeatability limit	r	inch	.0002	.0005	.0005	.001	.001
Measuring depth	L	inch	1.37	3.2	3.2	6.8	6.8
Contact point - length (move.)	Hb	inch	.75	.97	.97	1.26	1.26
Contact point - length (fixed)	Hf	inch	.75	.97	.097	1.26	.04
Contact point - ball dia.	D	inch	.06 1)	.06 1)	.06 2)	.08 1)	.08 2)
Measuring force	F	N	0.8 - 1.2	1.1 - 1.6	1.1 - 1.6	1.2 - 1.8	1.2 - 1.8
Protection class			IP65	IP65	IP65	-	-
Order no.			**4495950**	**4495951**	**4495952**	**4495953**	**4495954**

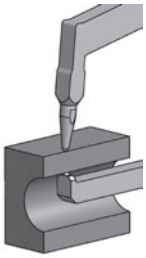
Applications

1)

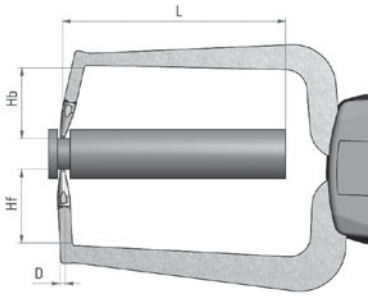


Ball dia. .06"
Ball dia. .08"

2)



Ball dia. .06"
Ball dia. .08"

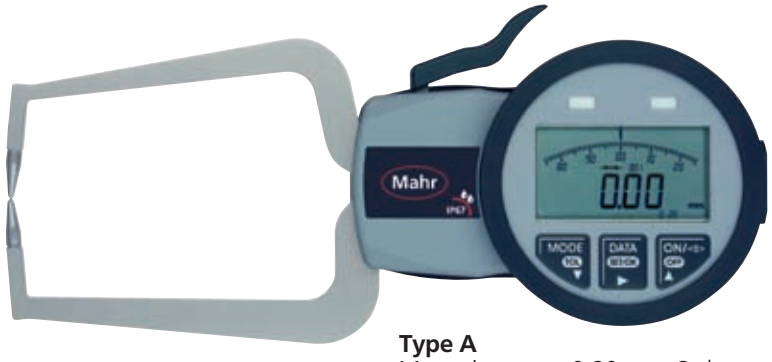


Electronic Gages for External Measurement 838 EA to measure thickness and wall thicknesses

Features

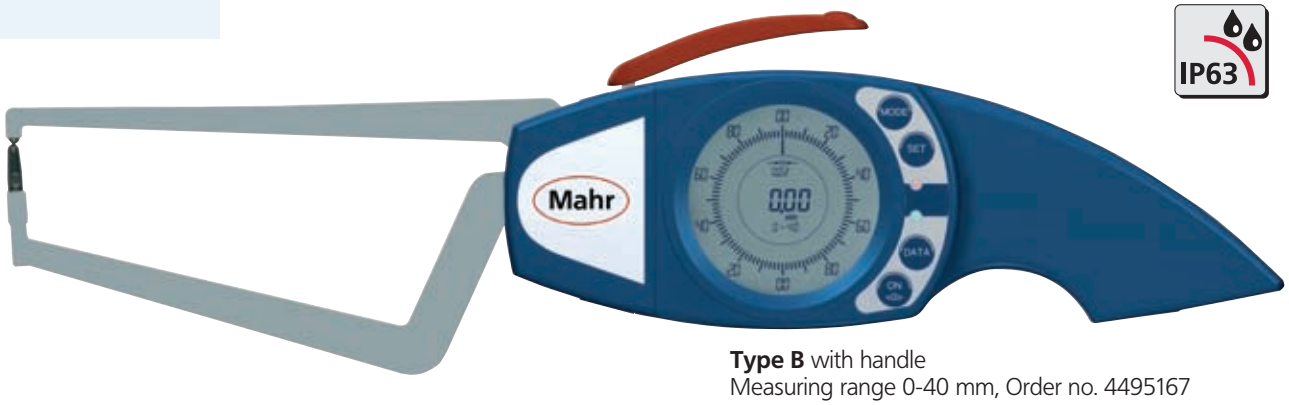
- High contrast analog and digital LCD
- Specified measuring programs according to application
- Absolute/Relative measuring program
- Tolerance is displayed with 2 LEDs
- mm/inch switchable
- Protection class IP67 or IP63 according to EN 60529

- Supplied with:
  Test certificate
  Battery



IP67

Type A
Measuring range 0-20 mm, Order no. 4495561



IP63

Type B with handle
Measuring range 0-40 mm, Order no. 4495167

Technical Data and Dimensions

			Type A			Type B	
Measuring range	Meb	mm	0 - 10	0 - 20	0 - 20	0 - 40	0 - 40
Resolution	Skw	mm	0.005	0.01	0.01	0.02	0.02
Error limit	G	mm	0.015	0.03	0.03	0.04	0.04
Repeatability limit	r	mm	0.005	0.01	0.01	0.02	0.02
Measuring depth	L	mm	35	85	85	115	115
Contact point - length (move.)	Hb	mm	19.1	24.6	24.6	25	25
Contact point - length (fixed)	Hf	mm	18.6	24.6	2.5	25	1
Contact point - ball dia.	D	mm	1.5 [1]	1.5 [1]	1.5 [2]	3 [1]	3 [2]
Measuring force	F	N	0.8 - 1.2	1.1 - 1.6	1.1 - 1.6	1 - 1.5	1 - 1.5
Protection class			IP67	IP67	IP67	IP63	IP63
Order no.			**4495560**	**4495561**	**4495562**	**4495059**	**4495167**

Accessories

		Order no.
Digimatic interface incl. data connection cable for Type A	**838 di**	**4495083**
Digimatic interface incl. data connection cable for Type B	**838 di**	**4495084**
USB data cable incl. Software for Type A	**838 usb**	**4495079**
Battery Alkaline AAA 1.5 V for Type A*		**4243073**
Battery Alkaline AA 1.5 V for Type B		**4243072**

Contact point information see page 9-34

** 2 batteries are required*

Electronic Gages for Internal Measurement 838 EI for measuring bores and internal grooves

Features

- High contrast analog and digital LCD
- Specified measuring programs according to application
- Absolute/Relative measuring program
- Tolerance is displayed with 2 LEDs
- mm/inch switchable
- Protection class IP67 or IP63 according to EN 60529
- Supplied with:
  Test certificate
  Battery

IP67

Type A
Measuring range 10-30 mm, Order no. 4495591

IP63

Type B with handle
Measuring range 15-55 mm, Order no. 4495596

Technical Data and Dimensions

			Type A						Type B	
Measuring range	Meb	mm	5 - 15	10 - 30	20 - 40	30 - 50	40 - 60	50 - 70	15 - 55	35 - 75
Resolution	Skw	mm	0.005	0.01	0.01	0.01	0.01	0.01	0.02	0.02
Error limit	G	mm	0.015	0.03	0.03	0.03	0.03	0.03	0.04	0.04
Repeatability limit	r	mm	0.005	0.01	0.01	0.01	0.01	0.01	0.02	0.02
Measuring depth	L	mm	35	85	85	85	85	85	114	114
Groove depth	A	mm	2.3	5.2	7.0	7.0	8.3	8.3	4.5	8
Groove width	B	mm	0.8	1.2	1.2	1.2	1.2	1.2	2.5	3
Contact point - length (move.)	Hb	mm	2.5	5.4	7.3	7.3	12.2	12.2	6	8.5
Contact point - length (fixed)	Hf	mm	2.5	5.4	7.3	7.3	12.2	12.2	6	8.5
Contact point - ball dia.	D	mm	0.6	1	1	1	1	1	1.5	2
Measuring force	F	N	0.8 - 1.2	1.1 - 1.6	1.1 - 1.6	1.1 - 1.6	1.1 - 1.6	1.1 - 1.6	1.2 - 1.7	1.3 - 1.8
Protection class			IP67	IP67	IP67	IP67	IP67	IP67	IP63	IP63
Order no.			**4495590**	**4495591**	**4495592**	**4495593**	**4495594**	**4495595**	**4495596**	**4495597**

Accessories

		Order no.
Digimatic interface incl. data connection cable for Type A	**838 di**	**4495083**
Digimatic interface incl. data connection cable for Type B	**838 di**	**4495084**
USB data cable incl. Software for Type A	**838 usb**	**4495079**

	Order no.
Battery Alkaline AAA 1.5 V for Type A*	**4243073**
Battery Alkaline AA 1.5 V for Type B	**4243072**

** 2 batteries are required*

Gages (Metric) for Internal Measurement 838 TI for measuring bores and internal grooves

Features

- For measuring bores and internal grooves
- Easy to operate, very habile and portable
- Easy to read tolerance markers
- Dust and splash waterproof
- Contact points are made from carbide
- Absolute measuring instrument

- Supplied with: Test certificate

IP65

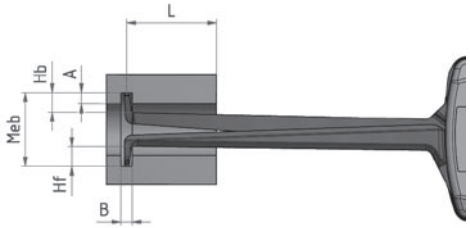
Type A
Measuring range 10-30 mm, Order no. 4495581

Type B with handle
Measuring range 15-65 mm, Order no. 4495076

Technical Data and Dimensions

			Type A						Type B	
Measuring range	Meb	mm	5 - 15	10 - 30	20 - 40	30 - 50	40 - 60	50 - 70	15 - 65	40 - 90
Readings	Skw	mm	0.005	0.01	0.01	0.01	0.01	0.01	0.05	0.05
Error limit	G	mm	0.015	0.03	0.03	0.03	0.03	0.03	0.05	0.05
Repeatability limit	r	mm	0.005	0.01	0.01	0.01	0.01	0.01	0.025	0.025
Measuring depth	L	mm	35	85	85	85	85	85	175	175
Groove depth	A	mm	2.3	5.2	7.0	7.0	8.3	8.3	4.5	8
Groove width	B	mm	0.8	1.2	1.2	1.2	1.2	1.2	2.5	2.5
Contact point - length (move.)	Hb	mm	2.5	5.4	7.3	7.3	12.2	12.2	5.3	8.5
Contact point - length (fixed)	Hf	mm	2.5	5.4	7.3	7.3	12.2	12.2	5.3	8.5
Contact point - ball dia.	D	mm	0.6	1	1	1	1	1	1.5	2
Measuring force	F	N	0.8 - 1.2	1.1 - 1.6	1.1 - 1.6	1.1 - 1.6	1.1 - 1.6	1.1 - 1.6	1.2 - 2	1.2 - 2
Protection class			IP65	IP65	IP65	IP65	IP65	IP65	-	-
Order no.			**4495580**	**4495581**	**4495582**	**4495583**	**4495584**	**4495585**	**4495076**	**4495077**

Application



Gages (Inch) for Internal Measurement 838 TI for measuring bores and internal grooves

Features

- For measuring bores and internal grooves
- Easy to operate, very habile and portable
- Easy to read tolerance markers
- Dust and splash waterproof
- Contact points are made from carbide
- Absolute measuring instrument

- Supplied with: Test certificate

IP65

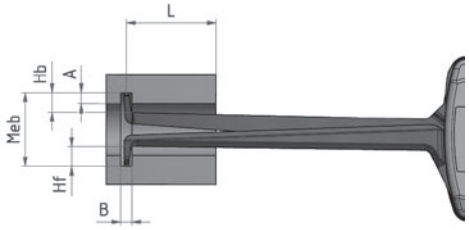
Type A
Measuring range .40 - 1.20", Order no. 4495981

Type B with handle
Measuring range .60 - 2.60", Order no. 4495476

Technical Data and Dimensions

			Type A						Type B	
Measuring range	Meb	inch	.20 - .60	.40 - 1.20	.80 - 1.60	1.20 - 2.00	1.60 - 2.40	2.00 - 2.80	.60 - 2.60	1.60 - 3.60
Readings	Skw	inch	.0002	.0005	.0005	.0005	.0005	.0005	.001	.001
Error limit	G	inch	.0008	.0015	.0015	.0015	.0015	.0015	.002	.002
Repeatability limit	r	inch	.0002	.0005	.0005	.0005	.0005	.0005	.001	.001
Measuring depth	L	inch	1.37	3.2	3.2	3.2	3.2	3.2	6.9	6.9
Groove depth	A	inch	.09	.19	.26	.31	.31	.31	.19	.31
Groove width	B	inch	.032	.06	.08	.08	.08	.08	.09	.10
Contact point - length (move.)	Hb	inch	.097	.21	.29	.29	.33	.33	.21	.33
Contact point - length (fixed)	Hf	inch	.097	.21	.29	.29	.33	.33	.21	.33
Contact point - ball dia.	D	inch	.024	.04	.04	.04	.04	.04	.06	.08
Measuring force	F	N	0.8 - 1.2	1.1 - 1.6	1.1 - 1.6	1.1 - 1.6	1.1 - 1.6	1.1 - 1.6	1.2 - 2	1.2 - 2
Protection class			IP65	IP65	IP65	IP65	IP65	IP65	-	-
Order no.			**4495980**	**4495981**	**4495982**	**4495983**	**4495984**	**4495985**	**4495476**	**4495477**

Application



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 sheet 12.1 and 13.1. 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 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 $\pm f_{Mzul.}$.

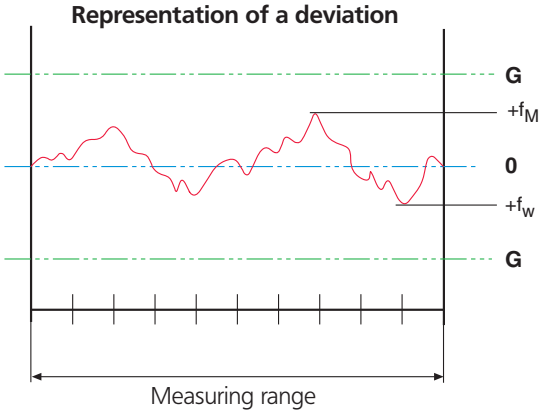
The deviation in the partial measuring range f_t can only be determined by using electronic testing methods during the preparation of certificates of quality.

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).

The limits of error f_w are refered to with **repeatability limit r.**

Representation of a deviation



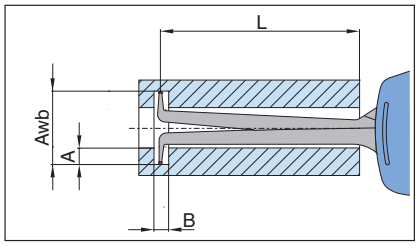
Measuring Capacity of Internal Measuring Instruments

Data listed in the table referring to groove depth A, groove width B and measuring depth L 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.

Application range Awb (mm)

Groove depth A (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 B = 1.4
A = 0.5 L = 56

Indicating Depth Gage 837

Features

- Cross beam is hard chrome plated and hardened
- Measuring faces are finely lapped
- Supplied with: Cross beam, Anvil 902 12 mm

Technical Data

Length of cross beam mm	Width of cross beam mm	Flatness of the cross beam der	Mounting hole mm	Order no.*
80	16	DIN 876/0	8H7	**4494010**
100	16	DIN 876/0	8H7	**4494011**
120	20	DIN 876/0	8H7	**4494012**

** Excludes indicating instrument*

Accessories

Spherical Contact Points 902

Depth measuring range* mm			L mm	Order no.
10	-	20	25	**4360015**
20	-	30	35	**4360017**
30	-	40	45	**4360026**
40	-	50	55	**4360031**
50	-	60	65	**4360035**
60	-	70	75	**4360020**
70	-	80	85	**4360036**
80	-	90	95	**4360029**

* for Indicators with a 10 mm measuring range

Indicating Instruments

Recommended are:

Indicator	Readings / Resolution mm	Measrung range mm	Order no.
810 AT	0.01	10	**4311060**
1075 R	0.01	12.5	**4336010**
1086 R	0.01	25	**4337130**
1086 R	0.01	50	**4337131**

Indicating Depth Gage 65P-40, 75P-30

75P-35

75P-30

65P-40

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

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"***

* *Indicator not included.*

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 2034212 (.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.

Depth Gages 75P-50

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*	µMaxµm
0.00 - 1.60 / ***0 - .063"***	PT-201	PT-564
1.60 - 4.80 / ***.063 - .188"***	PT-232	PT-14
4.80 - 8 / ***.188 - .313"***	PT-305	PT-564
8 - 11 / ***.313 - .438"***	PT-565	PT-31
11 - 14 / ***.438 - .563"***	PT-239	PT-201
14 - 17.50 / ***.563 - .688"***	PT-50	PT-232
17.50 - 21 / ***.688 - .813"***	PT-235	PT-305
21 - 24 / ***.813 - .938"***	PT-241	PT-565
24 - 27 / ***.938 - 1.063"***	PT-100	PT-239
27 - 30 / ***1.063 - 1.188"***	PT-51	PT-50
30 - 33.40 / ***1.188 - 1.313"***	PT-243	PT-235
33.4 - 37 / ***1.313 - 1.438"***	PT-696	PT-241
37 - 40 / ***1.438 - 1.563"***	PT-101	PT-100
40 - 43 / ***1.563 - 1.688"***	PT-245	PT-51
43 - 46 / ***1.688 - 1.813"***	PT-102	PT-243
46 - 49 / ***1.813 - 1.938"***	PT-566	PT-696
49 - 52.4 / ***1.938 - 2.063"***	PT-247	PT-101

** For "C" size dial indicators, "EDI-" and "XLI-" µMaxµm Digital Indicators.*

Semi-finished Model

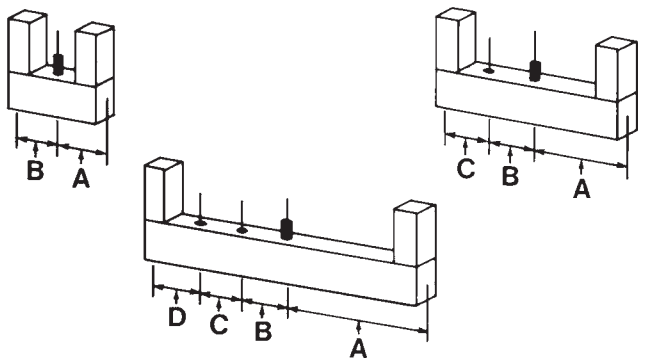
0-25 mm/ **0-1"**	25-50 mm/ **1-2"**	Gaging Positions	Used with Model	"A"	"B"	"C"	"D"
MR-501	**MR-502**	One	75P-50, 75P-30/35	25 mm/ ***1"***	25 mm/ ***1"***	–	–
MR-511	**MR-512**	One	75P-51	38 mm/ ***1.5"***	38 mm/ ***1.5"***	–	–
MR-521	**MR-522**	Two	75P-52	50 mm/ ***2"***	25 mm/ ***1"***	25 mm/ ***1"***	–
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	Order no. 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 Gages

The Dimentron System - Built for Performance

Dimentron Plug Assembly – shown with *Maxμm®III* Indicator, Housing and Handle

Special depth gaging applications

Shown with bench stand 2239307

The Dimentron plug gage, which is formed by the plug body, the panto-assembly with contacts and the transfer rod, is the measuring system comprising the Dimentron plug. It can be interchanged by simply unscrewing it from the display assembly.

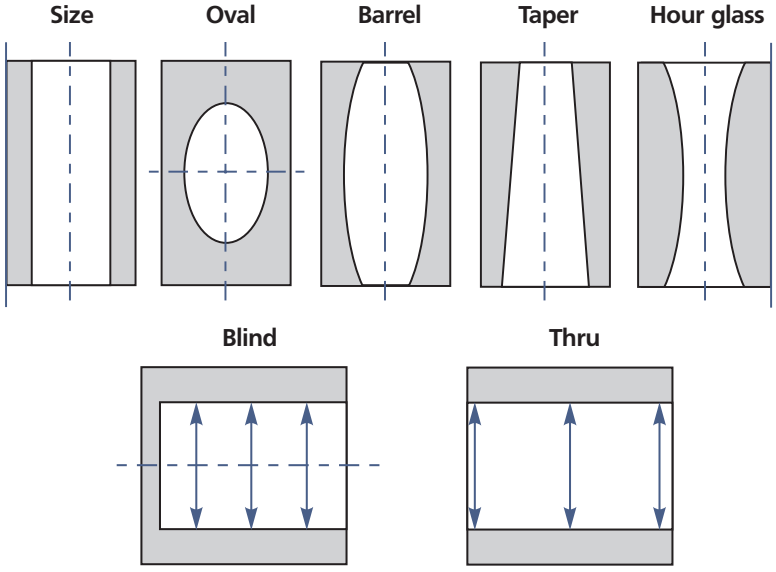
The **plug body** is made from through hardened 440 stainless steel, tempered and ground, with hardness 52-56 HRC, guides the plug gage; its easy entry guide facilitate introduction into the bore.

Standard **contacts** are made of tungsten carbide and based on the bore diameter range, come in two possible radii. Other contact materials are available based on the part being measured. Diamond, Ruby or hard-chrome-covered contacts are also available. Diamond or ruby contacts are suggested for soft aluminum or highly wearing applications; hard chromed ones (1000 HV) for aluminum and relevant alloys. Also based n the thickness of the surface available options cylindrical contacts may be ordered.

Either 2 or 4 steel spring assemblies **form panto-spring assemblies**. The design of the transfer assembly is determined by the diameter of the plug. This panto-design produces true straight-line transfer to the Vee-rod.

A **transfer rod**, with spherical tungsten carbide tip, slides on a tempered steel V-shaped guide and inclined plane, transferring the measurement to the display device. This unique floating system has been designed and tested to resist for over 10,000,000 measuring cycles.

Though designed for the toughest shop conditions, wear items do occasionally need replacement. Because of the individual components **service is fast and easy**. All parts are available separately from Mahr Federal and with standard tools, can be replaced in minutes to help maintain up time on the floor.



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.

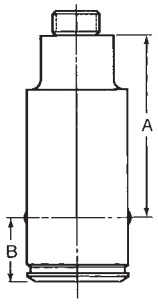
Technical Data

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.
For "0" at 6 o'clock position, specify **2033201**.

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 1.5 m / 5 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-50102*)	***.00005"***/.001 mm
	EDI-550P-20	(with 2034201)	***.00002"***/.0005 mm

** no output*

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.

Dimentron Plug Gage	Adaptors	Handles	Readout	Housing Housings	Handle
Dimentron Plug					
Stop Collar					
Extension	**EKT-1120-WX**		**2014802**		
			2034201		
			2033111	**B-12668**	
				EHG-1198	**AT-124** **HA-88**
			2033101	**EHG-1172**	**AT-124** **HA-88**
			2033001 - no Data Output **2033011** - with Data Output **(6 pin)**		
		HA-141	**2033091** - canister style* **2033099** - pencil style* * ± 1 mm/ ±.040" Range Digital Transducer.		
			550P-10/20	**Dial Indicator**	
		EHA-1146 **EHA-1145**	**832 AMP**		
		BA-100			
		AAT-192 **AAT-193** **AAT-194**	**D-2500: 1 - 4000:1**		
		EDI-550P-10 **EDI-550P-20**	**µMaxµm//**		

Change-WX suffix as required:
For adaptor selection see page 9-46

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 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:

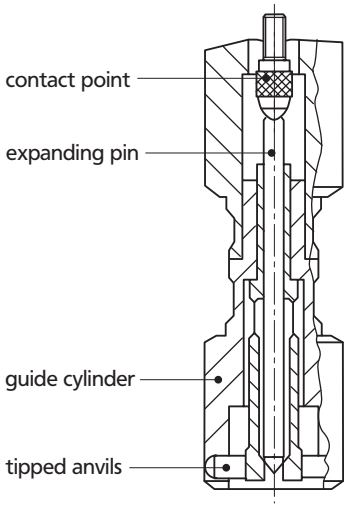
Bore diameter	Tolerance	
35 D7	+ 80	+105 µm
35 H7	+ 0	+25 µm
35 R7	- 50	-25 µm

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

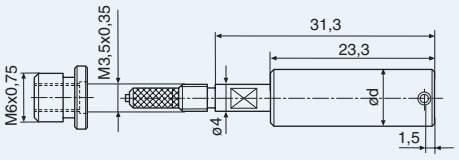
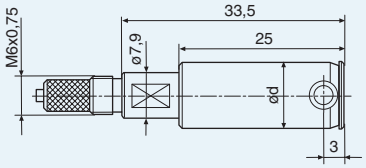
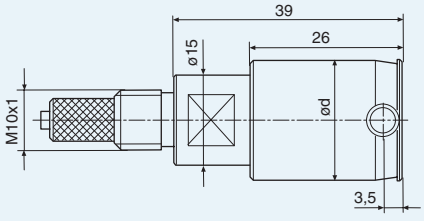
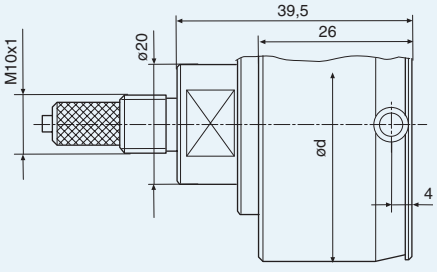
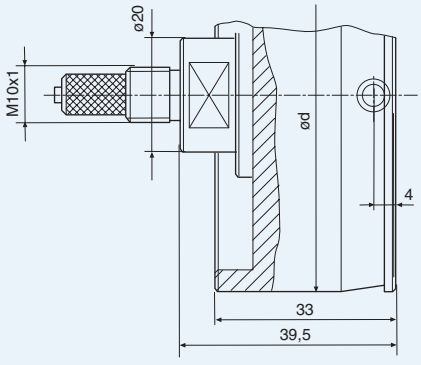
Accuracy

Hystersis	f_u	≤ 0.4 µm
Repeatability	f_w	≤ 1 µm
Linearity		≤ 1 %
Linearity 844 Dks >16 mm		≤ 2 %



Plug Gages

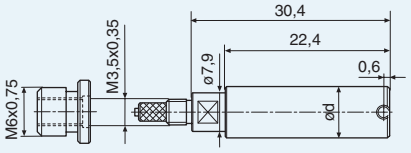
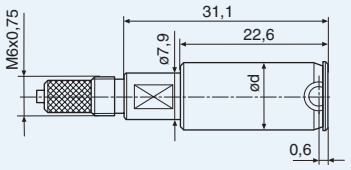
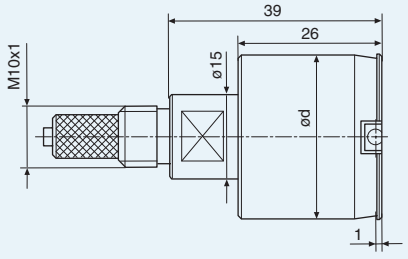
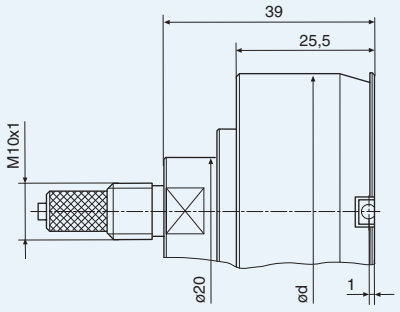
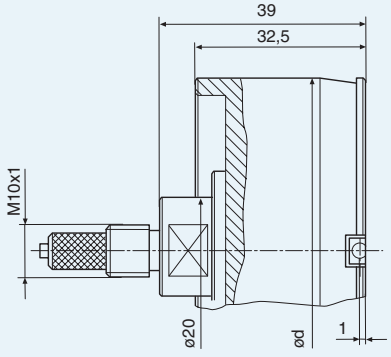
Measuring Head 844 Dk, Standard version

	Nominal① diameter mm		Manufacturing② tolerance mm	Meas. range③ dia. **d**	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

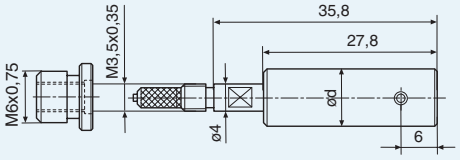
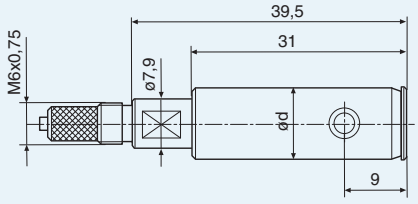
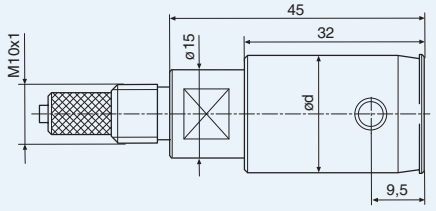
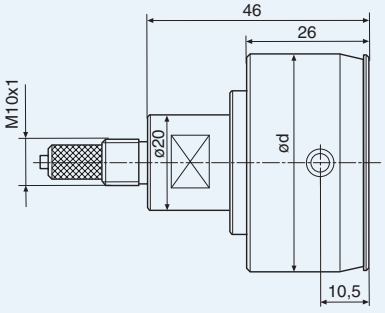
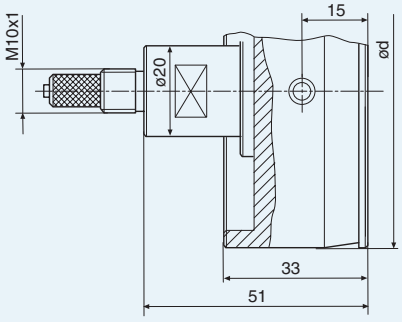
Measuring Head 844 Dks, for blind holes, to measure almost to the base of a bore

	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	16 - 25	-0.02/-0.05	0.15	**4478230**	
over	25 - 32	-0.02/-0.05	0.15	**4478232**	
over	32 - 44	-0.02/-0.06	0.15	**4478233**	
over	44 - 50	-0.03/-0.06	0.15	**4478234**	
over	50 - 60	-0.03/-0.06	0.15	**4478235**	
over	60 - 70	-0.03/-0.06	0.15	**4478236**	
over	70 - 80	-0.04/-0.07	0.15	**4478237**	
over	80 - 90	-0.04/-0.07	0.15	**4478238**	
over	90 -100	-0.04/-0.07	0.15	**4478239**	
over	100 -110	-0.04/-0.07	0.15	**4478240**	
over	110 -120	-0.04/-0.07	0.15	**4478241**	
over	120 -130	-0.04/-0.07	0.15	**4478242**	
over	130 -140	-0.04/-0.07	0.15	**4478243**	
over	140 -150	-0.04/-0.07	0.15	**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 from 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*

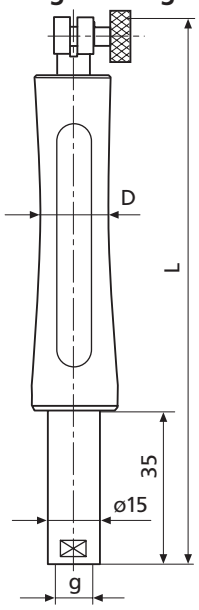
Modular Unit System 844 D

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	Handle dia. D mm	Order no.
844 Kg	M6 x 0.75	50	14	**4470851**
844 Dg	M10 x 1	150	26	**4478851**

844 Kg / 844 Dg

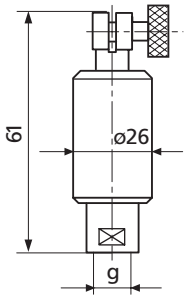


Short Holder 844 Dgk - Short version

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	Handle dia. D mm	Order no.
844 Dgk	M10 x 1	61	26	**4478050**

844 Dgk

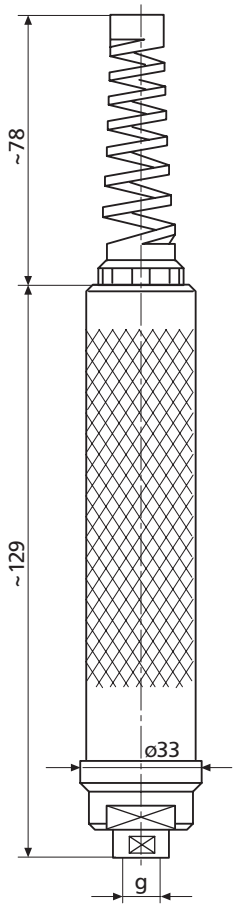


Holder 844 Dge for Inductive Measuring Probes

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	Handle dia. D mm	Order no.
844 Dge	M6 x 0.75 M10 x 1	195 195	33 33	**4478020** **4478021**

844 Dge

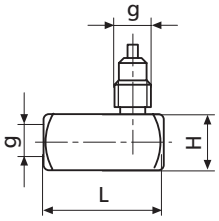


Right Angle (Elbow) Attachment

For measuring diffcult to reach bores, e.g. in tight spaces, on a machine tool or when work piece bores are inconveniently located. For screwing in between holder and measuring head.

Cat. no.	Connecting thread g mm	Elbow Length L mm	Elbow Height H mm	Order no.
844 Kw	M6 x 0.75	26.5	22.5	**4470110**
844 Dw	M10 x 1	36.7	17	**4478110**

844 Kw / 844 Dw



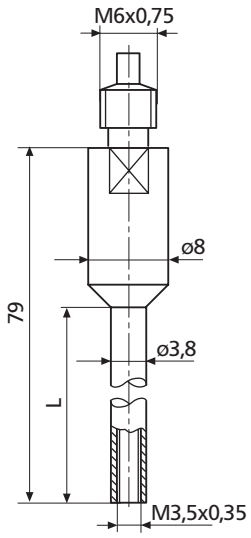
Modular Unit System 844 D

Extensions

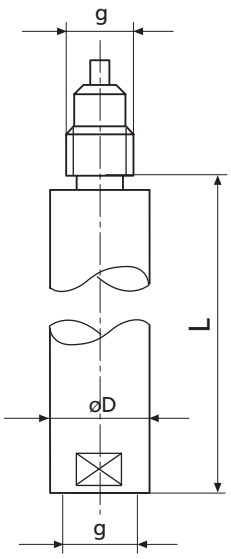
For extra-deep bores. Screws in between holder and measuring heads. Several extensions can be screwed together as of 8 mm. Models 844 Dv and 844 Dvk made of **Invar steel**.

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 Dvk



844 Kv / 844 Dv

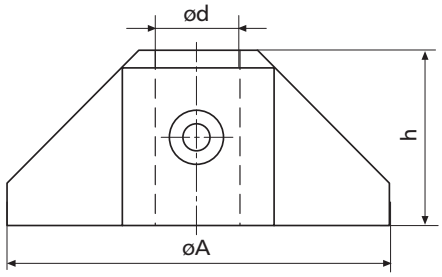


Depth Stops

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*	Height h mm/*inch*	Order no.
844 Kt	8 / ***.32"***	24 / ***1"***	60 / **2.36**	**4470115**
844 Dt	15 / ***.6"***	45 / ***1.8"***	30 / **1.18**	**4478115**
844 Dt	15 / ***.6"***	75 / ***3"***	30 / **1.18**	**4478116**
844 Dt	15 / ***.6"***	110 / ***4.3"***	30 / **1.18**	**4478117**
844 Dt	15 / ***.6"***	160 / ***6.3"***	30 / **1.18**	**4478118**
844 Dt	15 / ***.6"***	220 / ***8.6"***	30 / **1.18**	**4478119**

844 Kt / 844 Dt

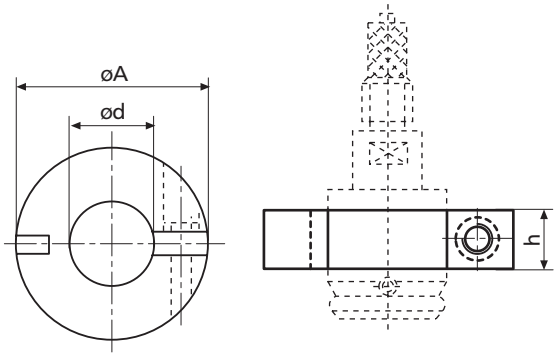


Depth Stop Rings

For limiting depth of insertion of measuring head in bore. Clamped onto the measuring head.

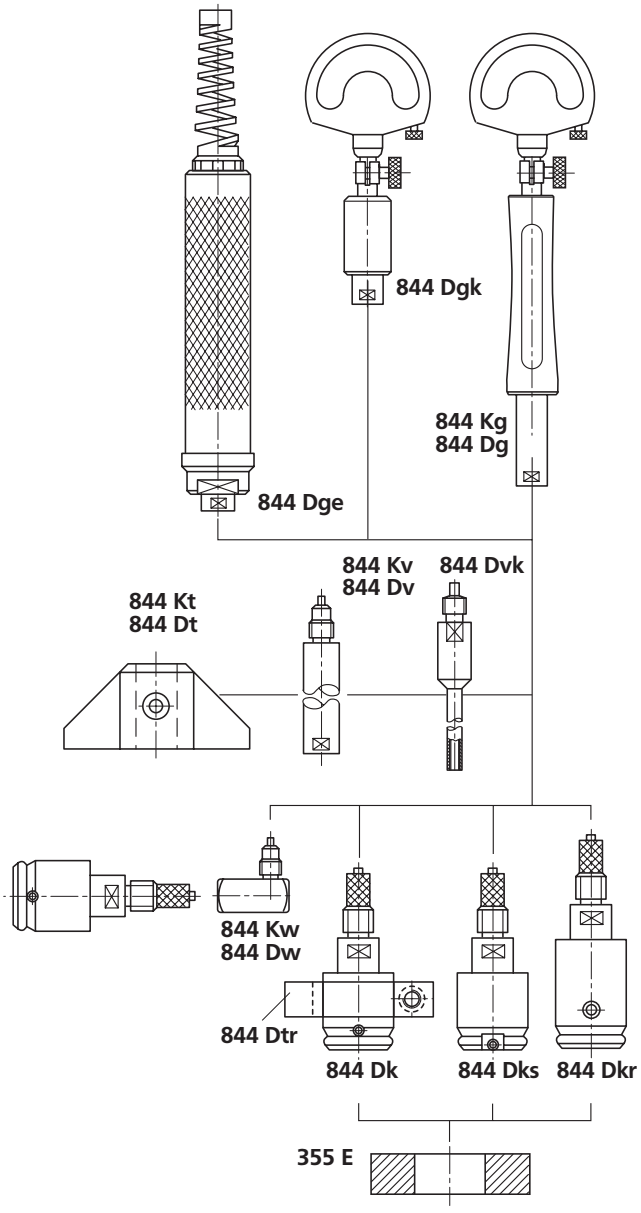
Cat. no.	Mounting hole dia. d mm	Stop surface dia. A mm/*inch*	Height h mm/*inch*	Order no.
844 Dtr	3 - 5	27 / ***1.1"***	10 / ***.4"***	**4478130**
	> 5 - 8	30 / ***1.2"***	10 / ***.4"***	**4478130**
	> 8 - 11	33 / ***1.3"***	10 / ***.4"***	**4478130**
	> 11 - 15	37 / ***1.5"***	10 / ***.4"***	**4478130**
	> 15 - 20	42 / ***1.7"***	10 / ***.4"***	**4478130**
	> 20 - 25	50 / ***1.9"***	12 / ***.5"***	**4478131**
	> 25 - 30	55 / ***2.1"***	12 / ***.5"***	**4478131**
	> 30 - 35	60 / ***2.3"***	12 / ***.5"***	**4478131**
	> 35 - 40	65 / ***2.5"***	12 / ***.5"***	**4478131**
	> 40 - 45	70 / ***2.8"***	12 / ***.5"***	**4478131**
	> 45 - 50	75 / ***3.0"***	12 / ***.5"***	**4478132**
	> 50 - 60	85 / ***3.3"***	12 / ***.5"***	**4478132**
	> 60 - 70	95 / ***3.7"***	12 / ***.5"***	**4478132**
	> 70 - 80	105 / ***4.1"***	12 / ***.5"***	**4478132**
	> 80 - 90	115 / ***4.5"***	12 / ***.5"***	**4478133**
	> 90 - 100	125 / ***4.9"***	12 / ***.5"***	**4478133**

844 Dtr



Modular units	Diameter of Measuring Heads 2.98 - 8 mm	8 - 16 mm	over 16 mm
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 9-44		

Modular unit	Diameter of Measuring Heads 2.98 - 20 mm	20 - 44 mm	44 - 80 mm	80 - 100 mm
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 P 2004 M		**5323010**
Millimar S 1840	±10, 30, 100, 300, 1000 µm 3000 µm, 10000 µm	**5318400**
Millimar P 2004 M		**5323010**

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:	see page 13-19

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
- Supplied with: Holder, probe, expanding pin and a wooden case, excludes an indicating instrument

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****

** Excludes an 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:

Indicators		Readings	Order no.
Compramess	**1004**	5 µm	**4333000**
Millimess	**1003**	1 µm	**4334000**
Millimess	**1003 XL**	2 µm	**4334001**
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**
MarCator	**1087 BR**	1 µm, 2 µm, 4 µm, 10 µm	**4337162**

Digital Indicators see Chapter 5
Electrical Indicating Instruments see Chapter 7

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.

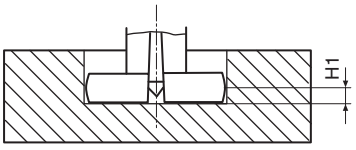
Measuring Probe 844 Kk, Expander Pin, individual Ring Gage for 844 Ke

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
7.00	6.70 - 7.30	38	4470613	4470806	4471613	4471200	4482326
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

for further technical data (e.g. nominal dimensions up to 40 mm) see **WebCode 11070**

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



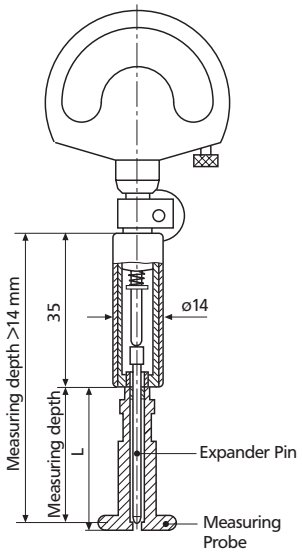
Modular Unit System for 844 KS Blind Hole Measuring Probes

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

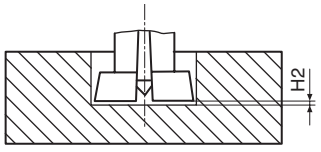
Nominal dimension mm	Measuring range mm	Measuring depth mm	Blind hole measuring probe hard chrome plated	Blind hole expander pin steel
1.75	1.50 - 1.90	16	**4482228**	**4482176**
2.00	1.80 - 2.20	16	**4482229**	
2.25	2.05 - 2.45	16	**4482230**	
2.50	2.30 - 2.70	21	**4470301**	**4482177**
2.75	2.55 - 2.95	21	**4482227**	
3.00	2.80 - 3.20	21	**4482178**	
3.25	3.05 - 3.45	21	**4482179**	
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**	**4482028**
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**	
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**	**4482192**
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**	
16.00	15.40 - 16.60	80	**4482021**	
17.00	16.40 - 17.60	80	**4482203**	
18.00	17.40 - 18.60	80	**4482113**	

for further technical data (e.g. nominal dimensions up to 40 mm) see **WebCode 11070**



844 Kk

Minimum measurement height



Nominal dimension mm			L mm	H 2 mm
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, ø 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

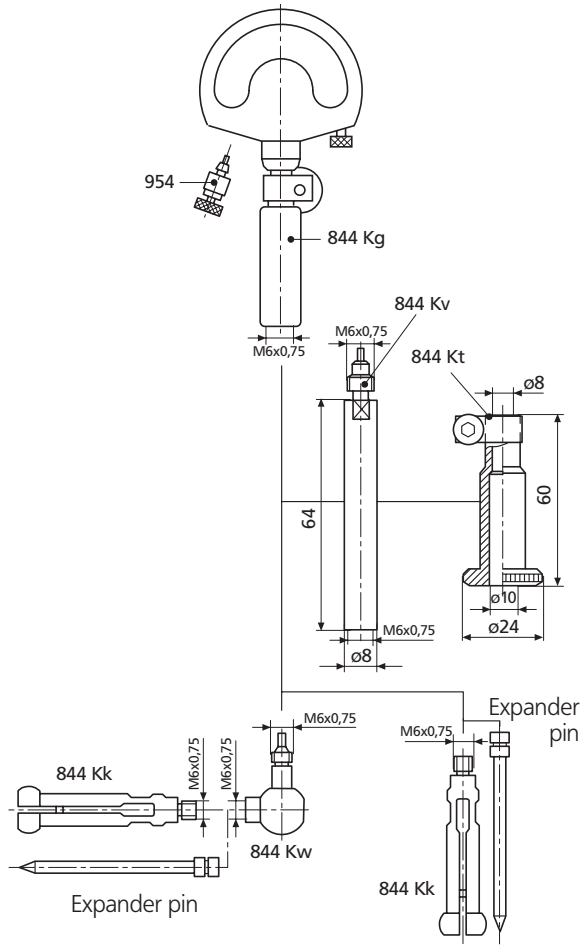
Order no. **4470110**

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.

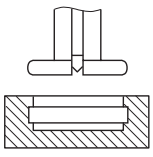
Order no. **4470115**



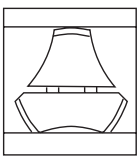
Measuring Probes for Special Applications

For measurement of blind holes, diameters of recesses, distances between plane-parallel surfaces, etc. special models of measuring probes are available on request.

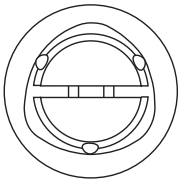
1. Measurement of the diameter of recesses



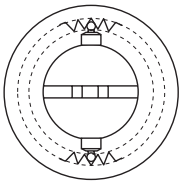
2. Measurement of plane-parallel surfaces



3. Measurement of polygon bores



4. Measurement of inside serrations, see 844 Z Page 9-70



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 position. 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 the determination of the reversal point is inappropriate.

Table dia.	58 mm
Throat depth of arm	45 mm
Table stroke	30 mm
Max. work piece height	ca. 100 mm

Order no. **4470100**

Floating Holder 844 Ksts

Features

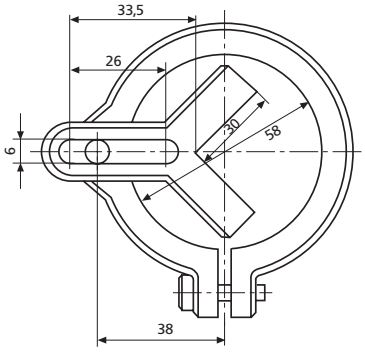
For use in conjunction with Stand 844 Kst. Enables measuring probe to find common axis of bore and measuring instrument quickly and easily on insertion into hole, thus providing optimum measuring speed and high accuracy. Particularly suitable for small diameters, as measuring confidence is considerably 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®*III* 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*III* 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

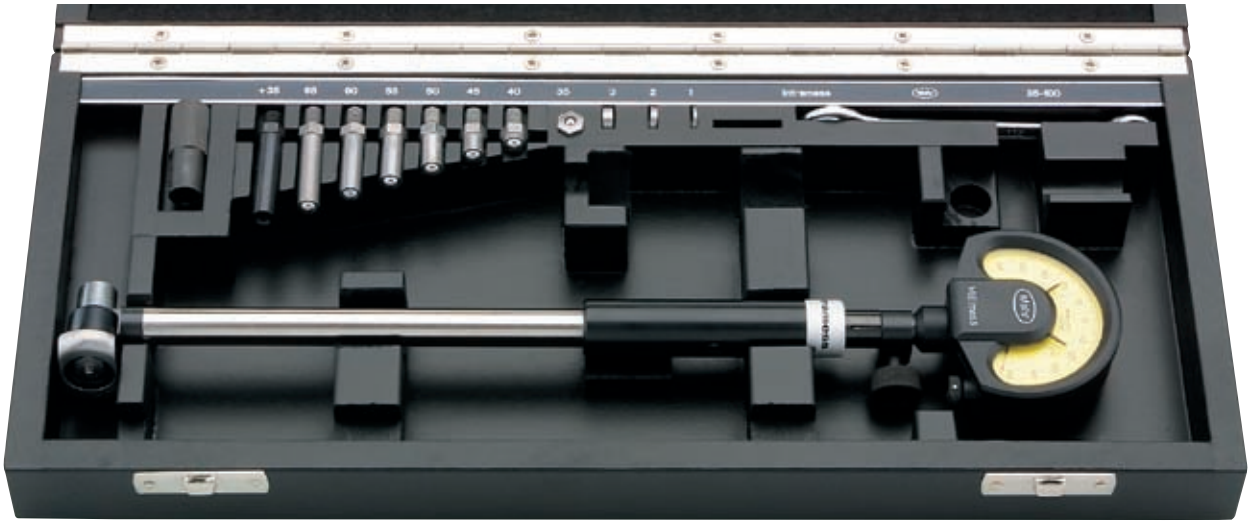
Diameter to be measured mm/*inch*	Extension Required Carbide	Steel	Used on Gage Model Numbers
12 - 16 / ***.50 - .625"***	**PT-562**	**PT-558**	1280P-1xxx
16 - 19 / ***.625 - .75"***	**PT-567**	**PT-559**	
19 - 22 / ***.75 - .875"***	**PT-568**	**PT-560**	1282P-1xxx
22 - 25 / ***.875 - 1"***	**PT-557**	**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 / 844 NH Intramess



Features

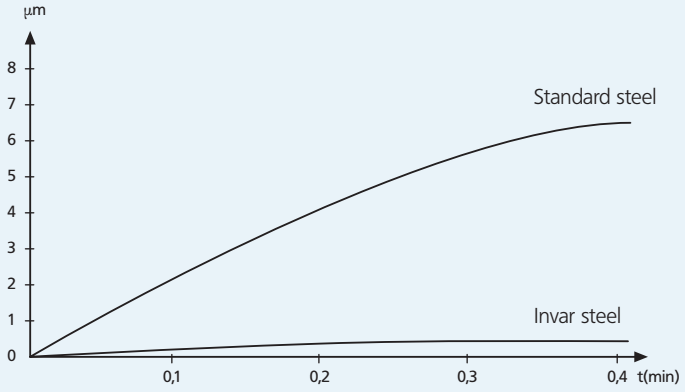
- Measuring the diameter, roundness and conical form of a bore as well as the distances of plane-parallel surfaces
- Measuring head consists of a carbide-tipped moving anvil and an interchangeable stationary anvil which has a hardened steel ball; alternatively a carbide ball is available
- Transmission 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
- Supplied with: Holder, measuring head, stationary anvil, wooden case, excludes an indicating instrument

The comparision between Invar and Standard steel

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

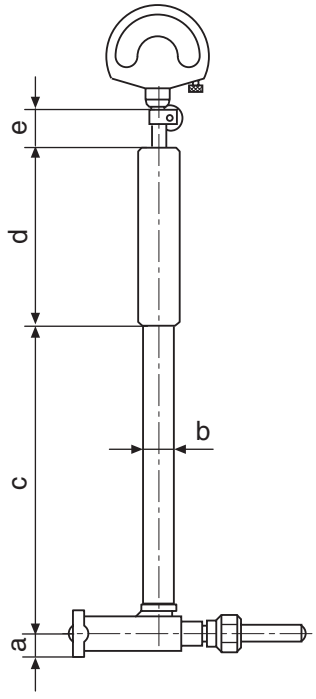
Measuring range mm	Measuring range *(inch)*	Error limit G_e µm	Repeatability f_w µm	Hysteresis f_u µm	Order no* 844 N	Order no* 844 NH
18 - 50	*(.7 - 2")*	2	0.5	2.5	**4474000**	**4475000**
35 - 100	*(1.4 - 4")*	2	0.5	2.5	**4474001**	**4475001**
100 - 250	*(4 - 10")*	2	0.5	2.5	**4474002**	**4475002**
250 - 400	*(10 - 16")*	3	1.5	3.5	**4474003**	**4475003**
400 - 800	*(16 - 32")*	3	1.5	3.5	**4474004**	**4475004**
250 - 800	*(10 - 32")*	3	1.5	3.5	**4474005**	**4475005**

* *Excludes indicating instrument*

Complete Instrument

844 N Carbide-tipped moving anvil; stationary anvil with steel ball

844 NH Moving anvil **and** stationary anvil are carbide-tipped



Measuring range mm	Measuring range *(inch)*	a	b	c	d	e
18 - 50	*(.7 - 2")*	5.35	8	115	63	22
35 - 100	*(1.4 - 4")*	8.5	12	148	80	22
100 - 250	*(4 - 10")*	11.5	18	230	100	25
250 - 400	*(10 - 16")*	16	24	366	110	28
400 - 800	*(16 - 32")*	17.5	24	366	110	28

Indicating Instruments

All indicating instruments that has a 8 mm mounting shank may be used. Recommended are:

Indicator		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 II		.0005 mm/	***.00002"***	**2034207****
		.001mm/	***.00005"***	
MarCator	**1087 BR**	.002mm/	***.0001"***	**4337162**
		.004mm,/	***.0005"***	
		.010mm/	**.001"**	

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. Setting Device

Uses standard gage blocks for setting any bore diameter and any tolerance. Replaces ring gages and is universally applicable.

2. 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:	see page 13-19

355 E

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**

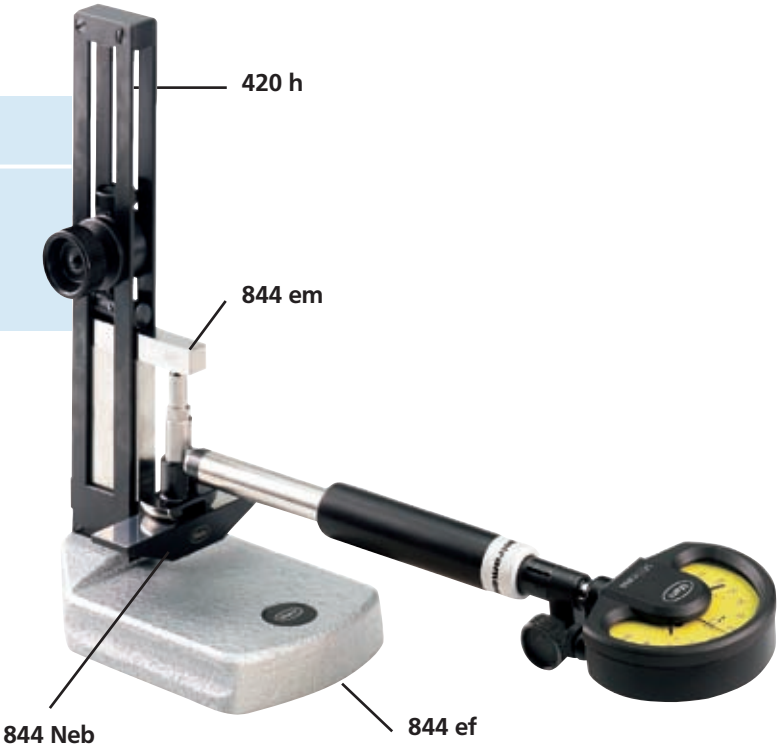
Gage Block Holder 420 h

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.

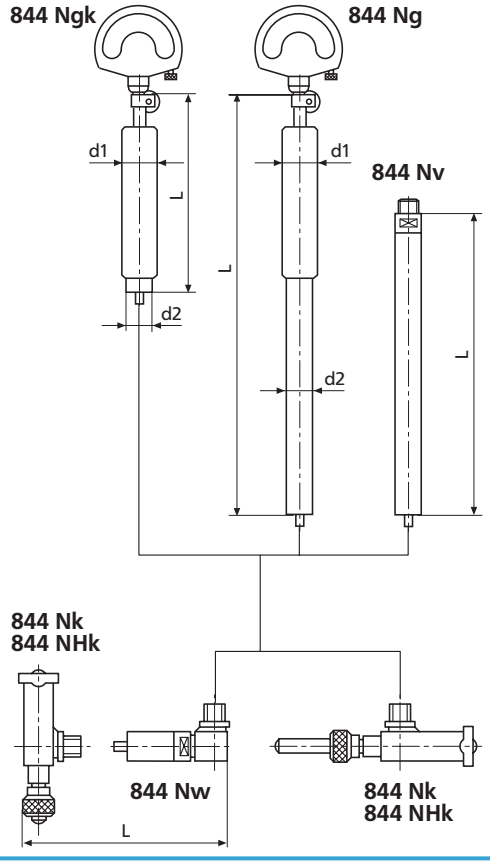
For meas. ranges mm	*(inch)*	Length* L mm/*inch*	Bore depth mm/*inch*	Order no.
18 -50	***(.7 - 2")***	66/***2.6"***	45/***1.8"***	**4474070**
35 -100	***(1.37 - 4")***	80/***3.1"***	55/***2.2"***	**4474071**
100 -250	***(4 - 10")***	105/***4.1"***	70/***2.8"***	**4474072**

** 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 "Mdk" from **3.5 - 333 mm**

Modular Unit Parts 844 Kk
"Mdk" from **3.5 - 26.1 mm**
(see table below)

Modular Unit Parts 844 Z
"MdK" **26 - 333 mm** (see table on opposite page)

Features

- For diametrical two ball measurement MdK, 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 anvils 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:

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**		**4470806**
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**		
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**	**4470808**
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**	
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**	

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

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**

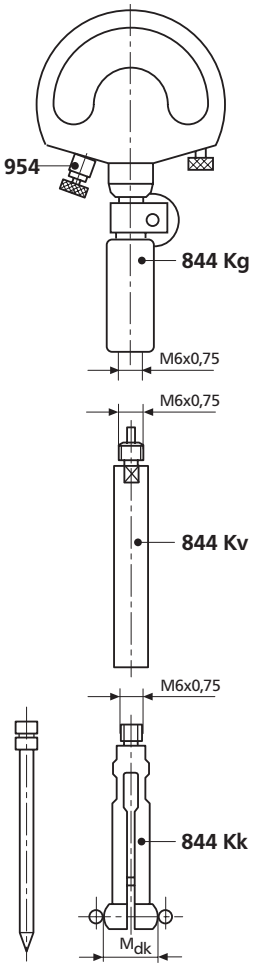
Extension 844 Kv

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

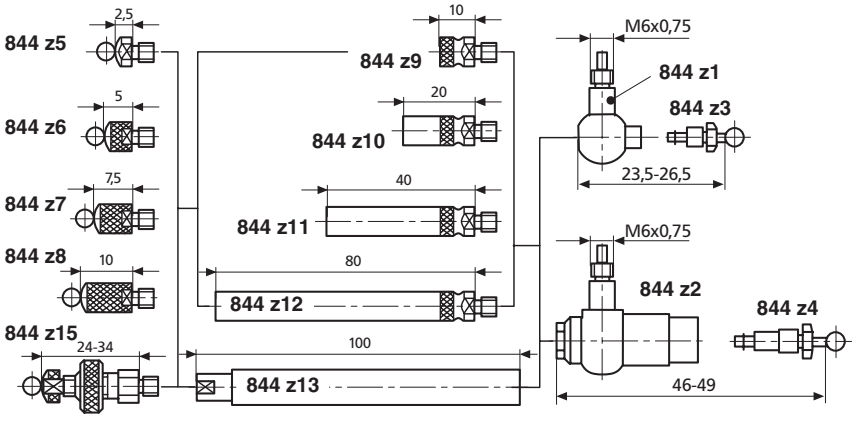


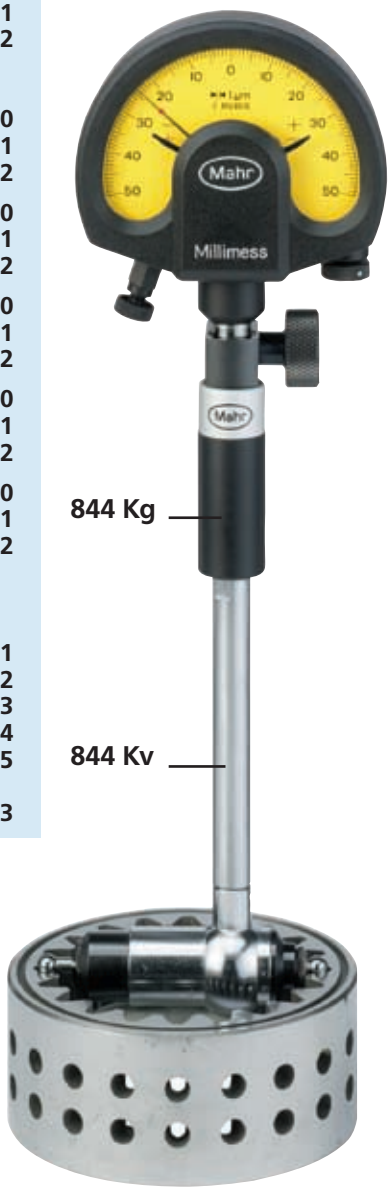
Modular Unit Parts

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:

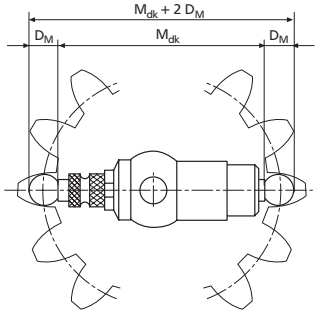
Diametrical two ball meas. M_{dK}	73.0	mm
Ball dia.	5.486	mm

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 specifed 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 9-67.

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. | ◄

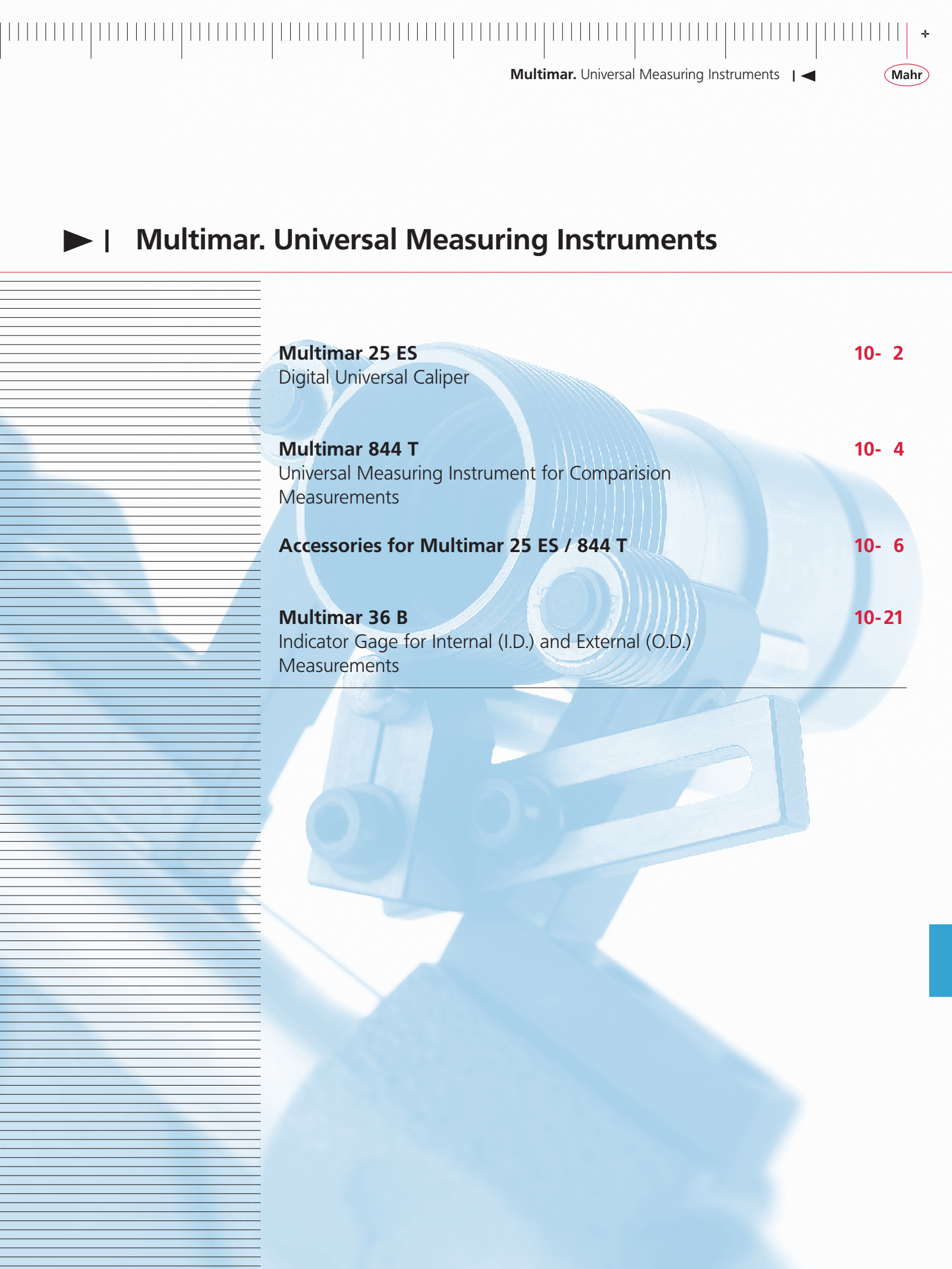
► | Multimar. Universal Measuring Instruments

Multimar 25 ES 10- 2
Digital Universal Caliper

Multimar 844 T 10- 4
Universal Measuring Instrument for Comparision Measurements

Accessories for Multimar 25 ES / 844 T 10- 6

Multimar 36 B 10-21
Indicator Gage for Internal (I.D.) and External (O.D.) Measurements



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**

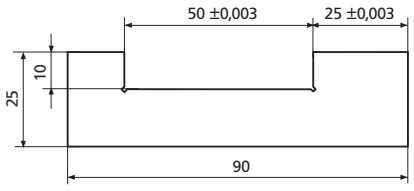
* *Dependent upon which accessories are being used the measuring range can be extended by a further 75 mm (2.95") by reversing the measuring arms 844 Te/Tx*
** *Without fine adjustment*

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

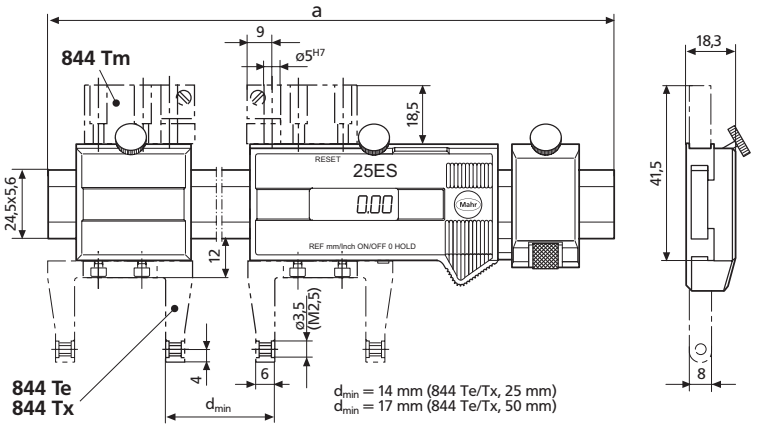
25 EeI

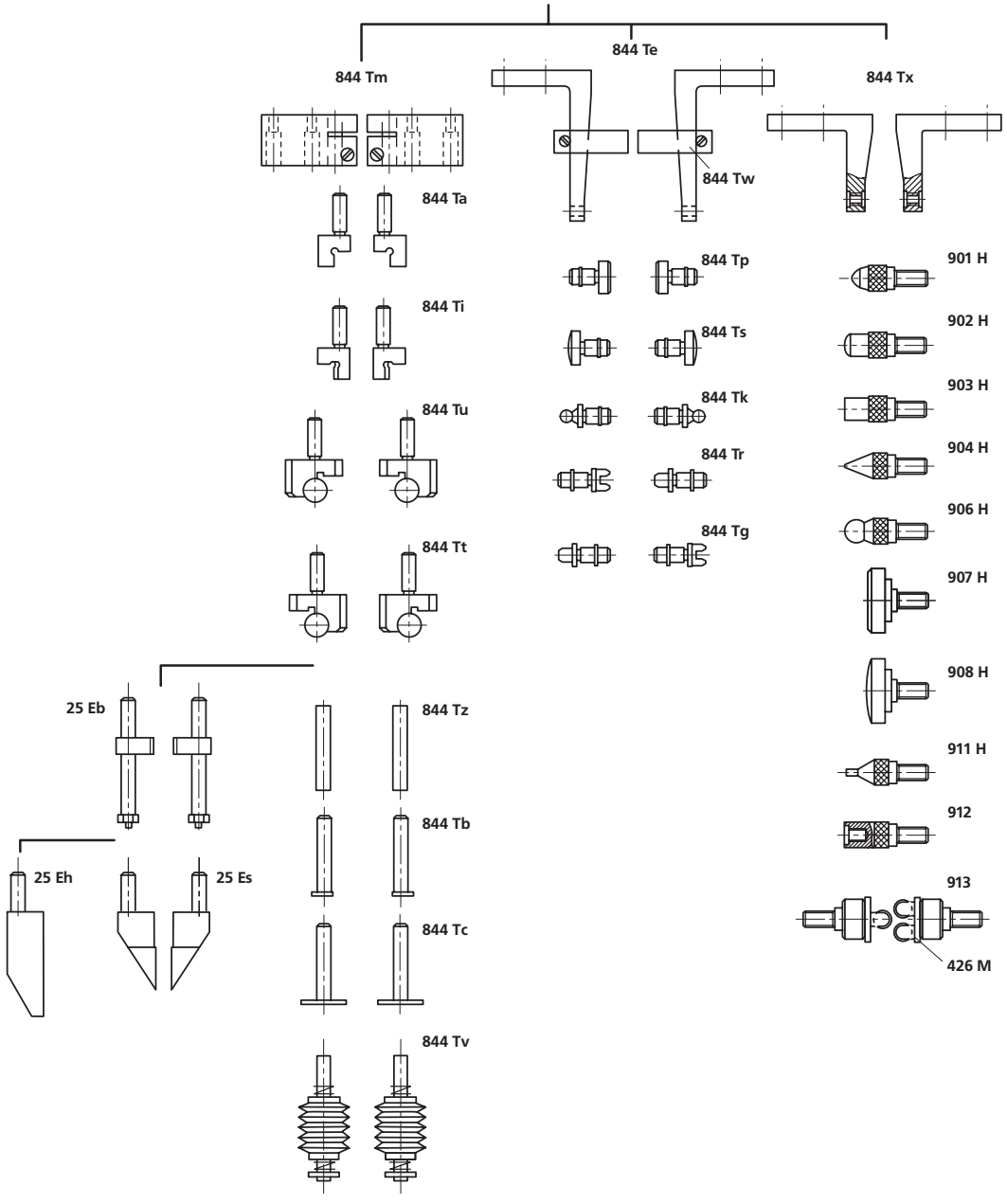


Digital Universal Caliper 25 ES Measuring Arms, Mounting Attachments and Anvils

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

OVERVIEW

► | 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

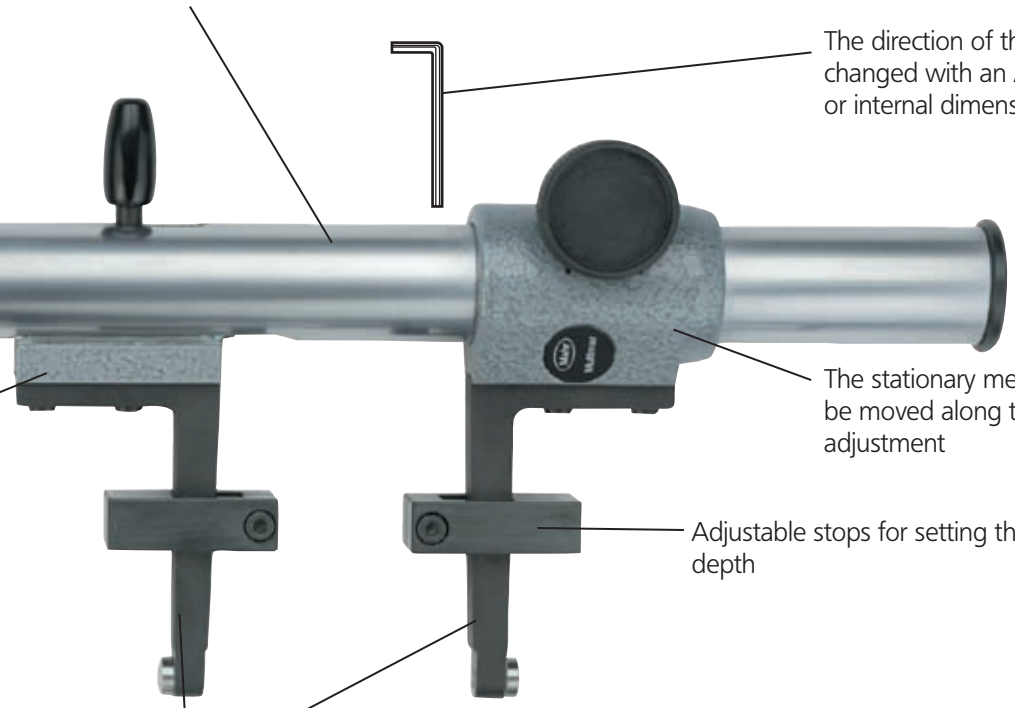
Application range* mm	Application range* *(inch)*	Extended range of application mm/*inch*	Distance of movable anvil mm/*inch*	Weight g/lbs	Order no.**	Order no. Wooden case
25 - 110	***(1 - 4.33")***	25 - 185 / ***1 - 7.28"***	10/ ***.4"***	775 / 1.71	**4500001*** **	**4500010**
100 - 260	***(4 - 10.24")***	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*

*** *Supplied with a wooden 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:

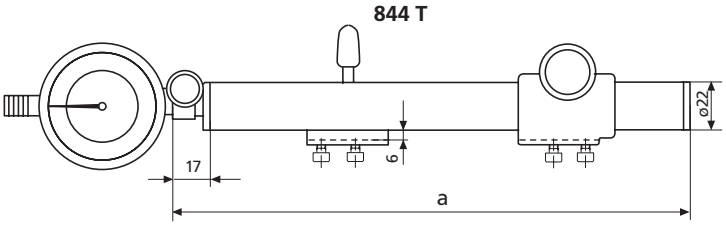
Indicating Instrument	**Readings** mm/***inch***	**Order no.** mm/***inch***
MarCator 810 S	0.01 mm	**4311000**
Zentimess 1010 / ***1010 Z***	0.01 mm / ***.0005"***	**4332000/** ***4332900***
Compramess 1004 / ***1004 Z***	5 µm / ***.0001"***	**4333000/** ***4333900***
Digital Indicator MarCator 1087 BR	0.001 mm* / ***.00005"***	**4337162**
µMaxµm® II XL	1 µm / ***.00005"****	**2034249**

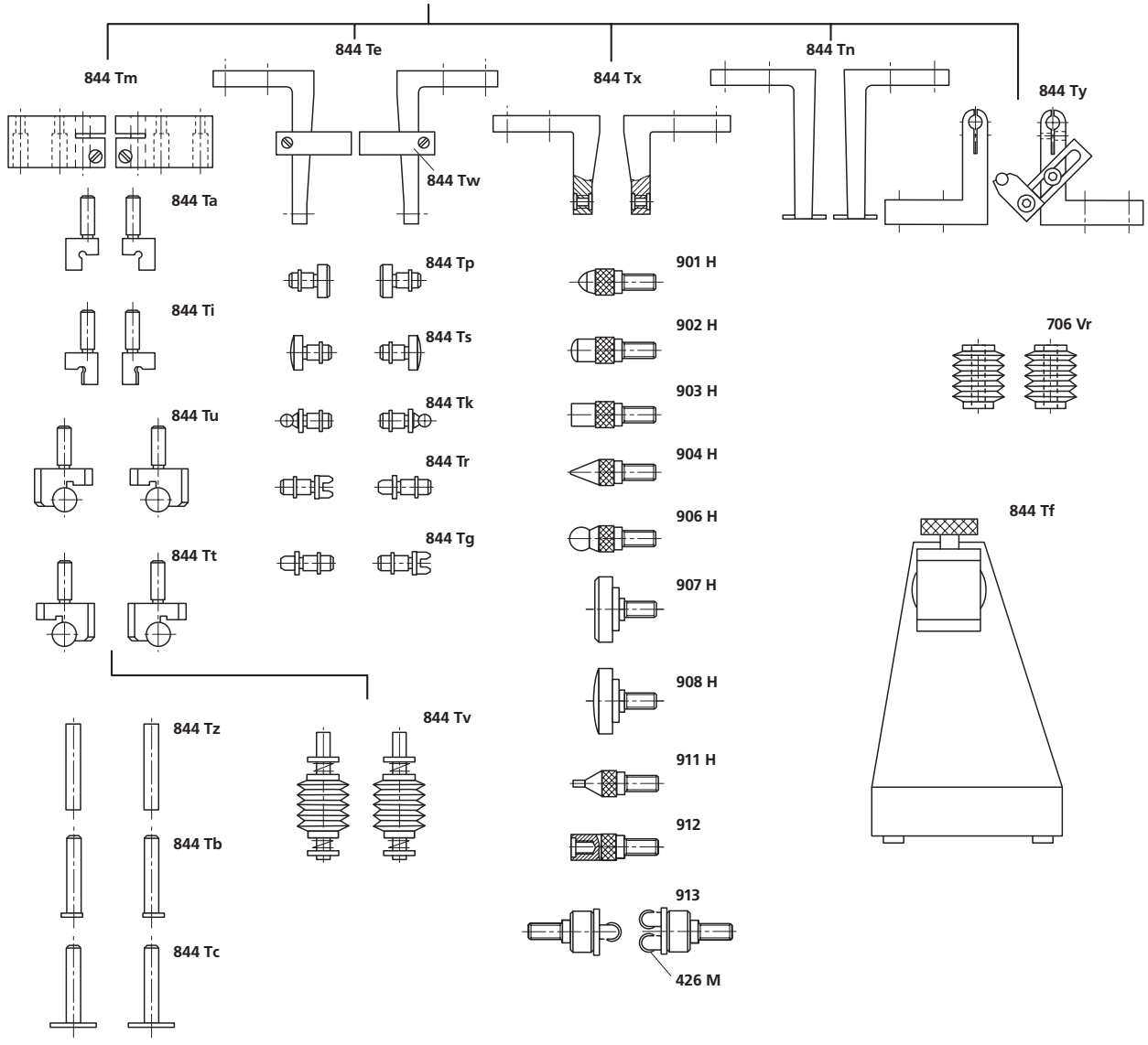
* Resolution
For further digital indicators please refer to Chapter 5

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"*



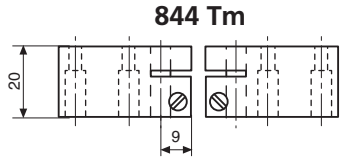


Overview. Measuring Arms, Stops and Mounting Attachments

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**

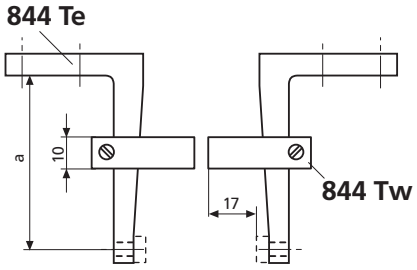


Measuring Arms 844 Te

- 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

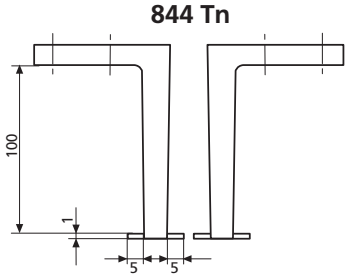
Order no. **4500109**

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***

** Not suitable for Digital Caliper 25 ES*

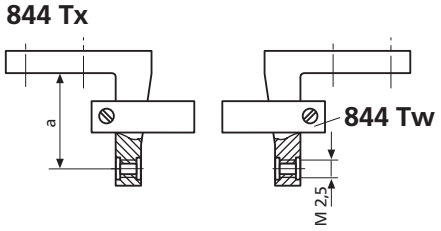


Measuring Arms 844 Tx

- 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***

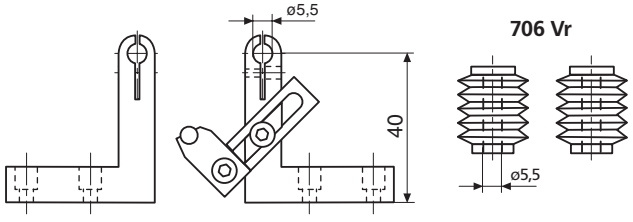
** Not suitable for Digital Caliper 25 ES*



Holder for Measuring Rollers 844 Ty

- With location bolts for the Measuring Rollers 706 Vr, plus a stop and stop pin

Order no. **4502463**



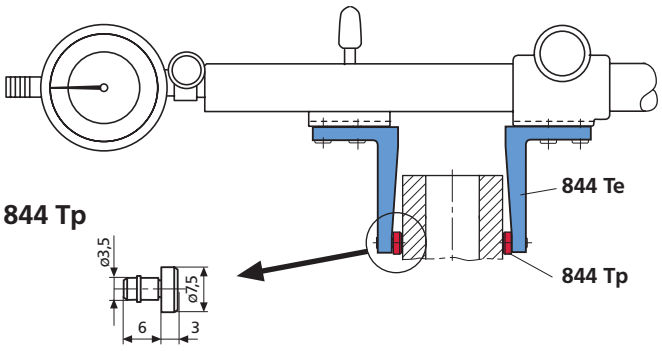
Measuring external and internal dimensions

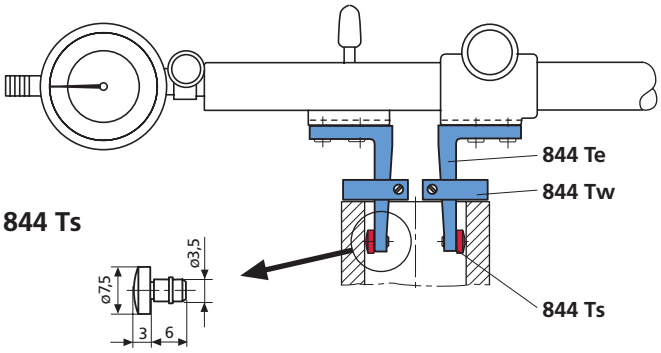
Anvils for Measuring Arms 844 Te

- 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*

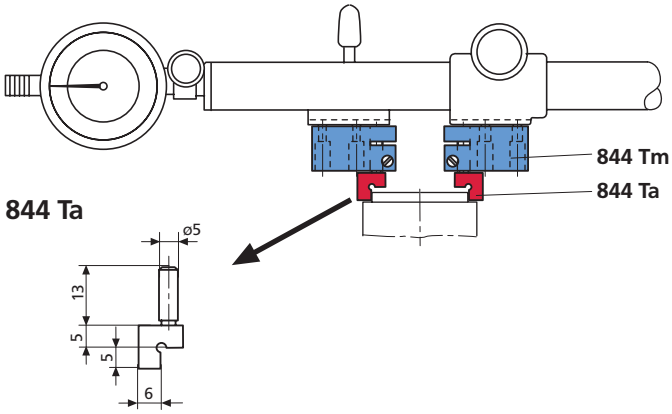


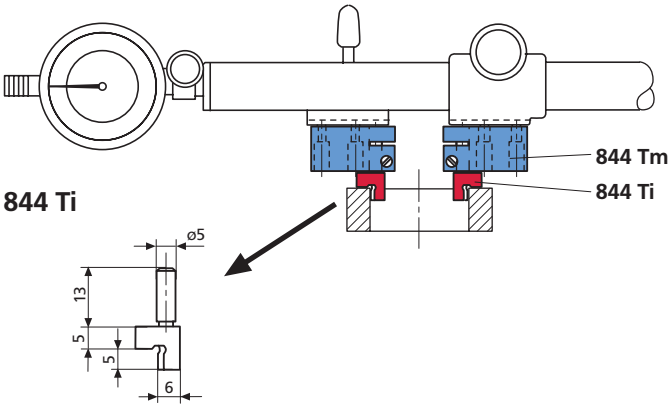


Shoulder anvils for mounting attachments 844 Tm

- 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**



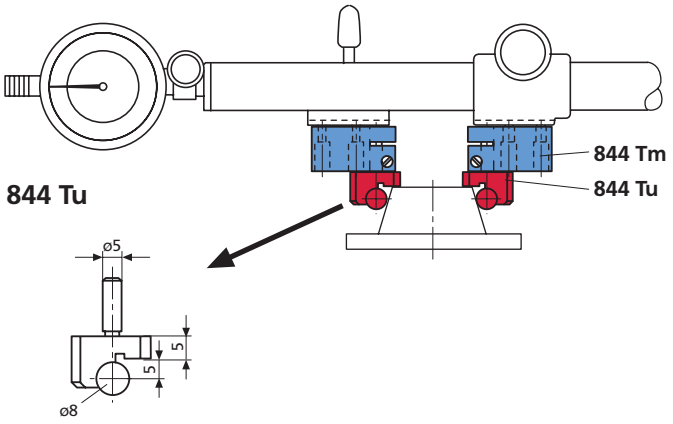


Measuring tapers and distances

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**

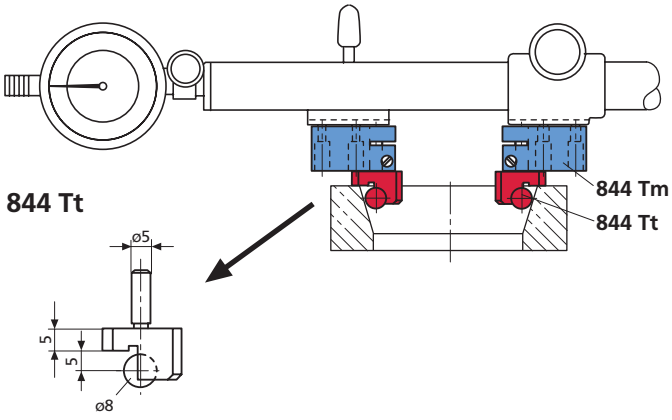


Ball Anvils 844 Tt*
for Mounting Attachments 844 Tm

- 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

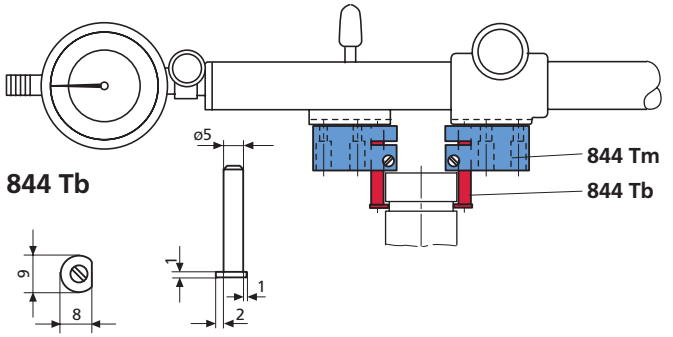
- For measuring centering shoulders and recesses on internal and external diameters; consists of a pin type holder, which is be moved to set the measuring depth in Mounting Attachment 844 Tm and a mounted measuring blade
- The face of the Mounting Attachment 844 Tm serves as stop

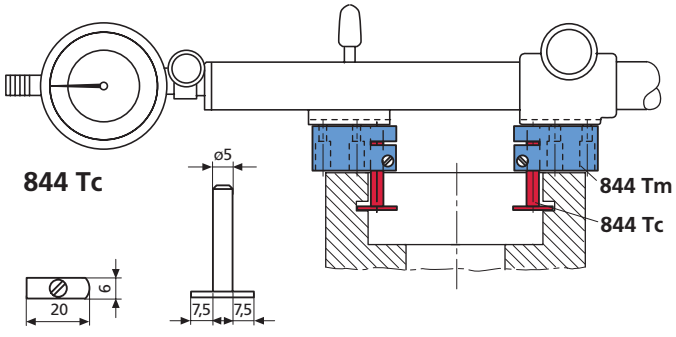
844 Tb
- With round measuring blades
- Ideal for workpieces that have a recess up to 2 mm in depth

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

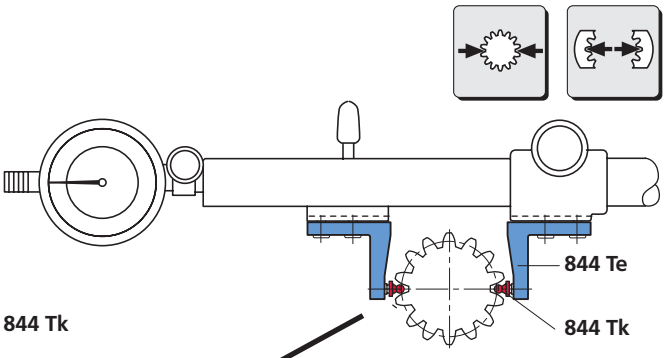
Ball Anvils 844 Tk

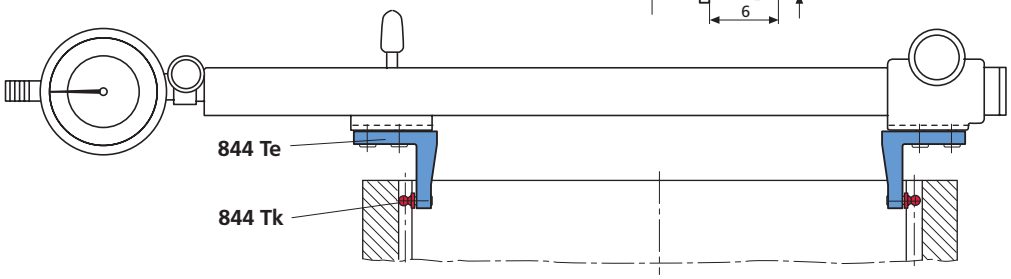
Use in conjunction with Measuring Arms 844 Te

- 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)

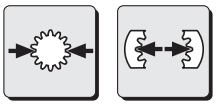
Measuring external and internal tooth profiles

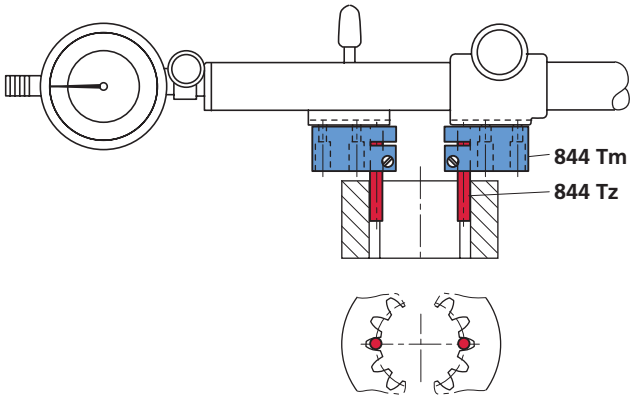
Cylindrical Measuring Pins 844 Tz

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

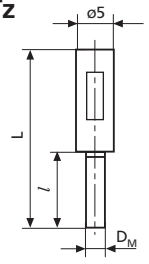




dia. D_M mm	Length l mm	Length L mm	Order no.
1	6	19.5	**4500500**
1.25	6	19.5	**4500501**
1.5	6	19.5	**4500502**
1.75	10	23.5	**4500503**
2	10	23.5	**4500504**
2.5	10	23.5	**4500506**
3	15	28.5	**4500507**
3.5	15	28.5	**4500508**
4	15	28.5	**4500509**
4.5	20	33.5	**4500510**
5	20	33.5	**4500511**
5.5	20	33.5	**4500512**
6	20	33.5	**4500513**

Further sizes are available upon request (material: Steel)

844 Tz



Measuring external threads

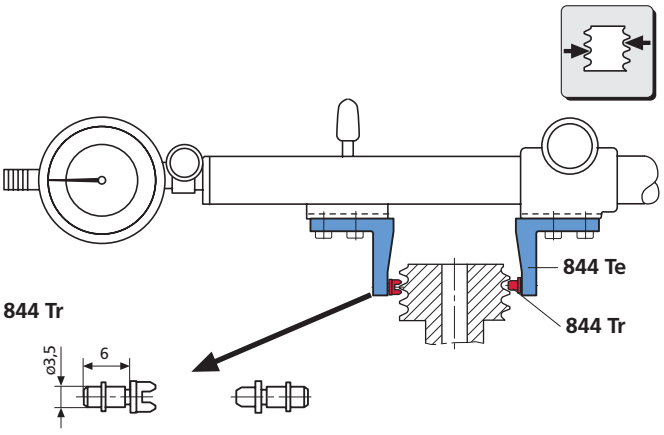
Interchangeable Anvils 844 Tr

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 acc. to DIN 103

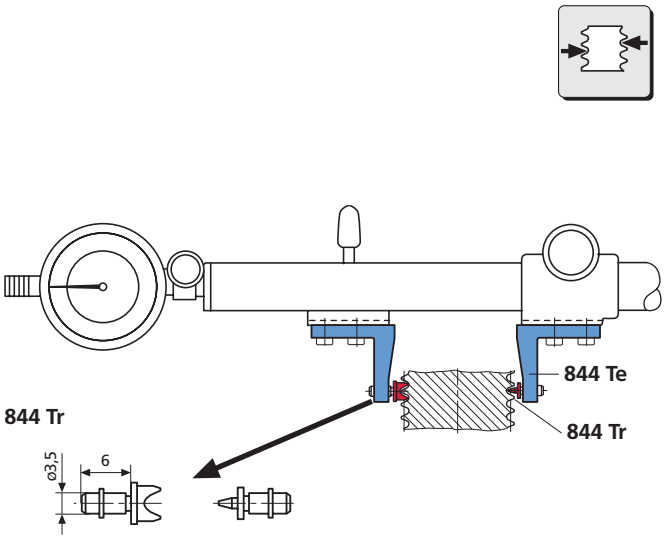
Pitch mm	V-anvil Order no.	Blade Order no.
1	**4501150**	**4501350**
1.5	**4501151**	**4501351**
2	**4501152**	**4501352**
3	**4501153**	**4501353**
4	**4501154**	**4501354**
5	**4501155**	**4501355**
6	**4501156**	**4501356**
7	**4501157**	**4501357**
8	**4501158**	**4501358**
9	**4501159**	**4501359**
10	**4501160**	**4501360**
12	**4501161**	**4501361**
14	**4501162**	**4501362**
16	**4501163**	**4501363**
18	**4501164**	**4501364**
20	**4501165**	**4501365**

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

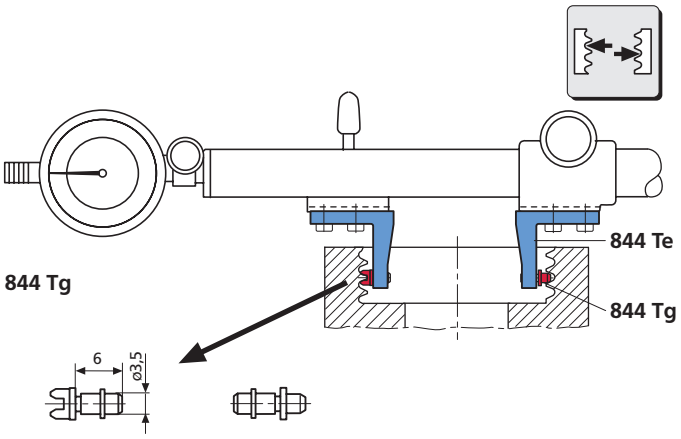
Interchangeable Anvils 844 Tg

Used in conjunction with Measuring Arms 844 Te

• Pair consists of V-anvil and tapered anvil.

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 external thread acc. to DIN 103

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**
12	**4174961**	**4174981**
14	**4174962**	**4174982**
16	**4174963**	**4174983**
18	**4174964**	**4174984**
20	**4174965**	**4174985**

Measuring internal threads

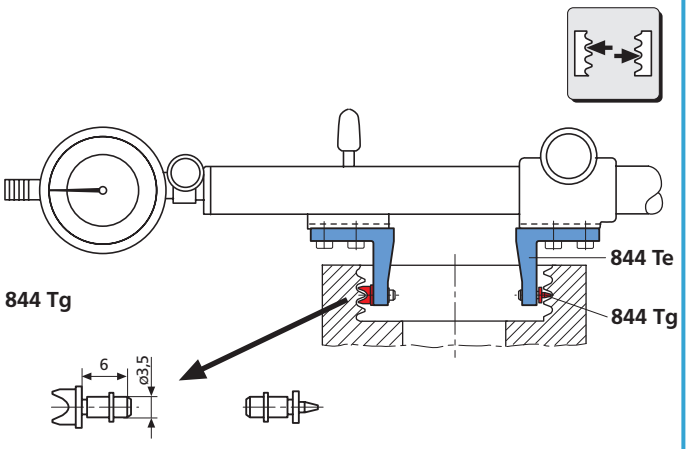
Interchangeable Anvils 844 Tg

Used in conjunction with Measuring Arms 844 Te

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

For external 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**	

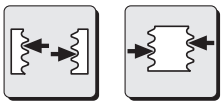
Whitworth internal thread (55°)
American UST internal thread (60°)

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

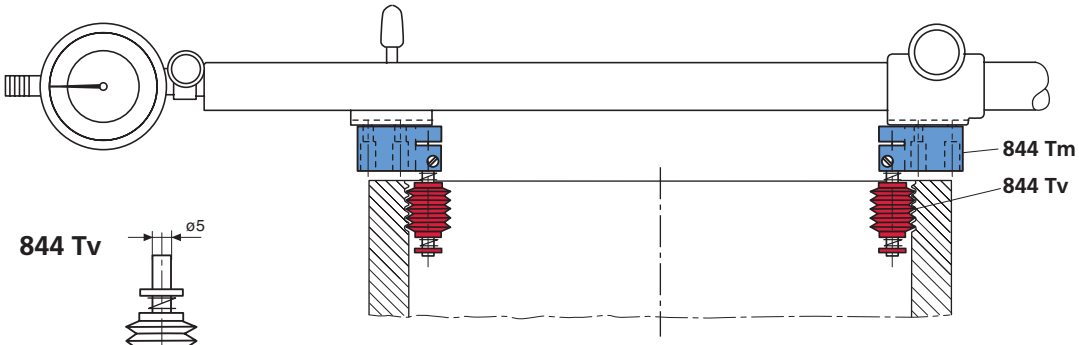
Interchangeable Measuring Rollers 844 Tv

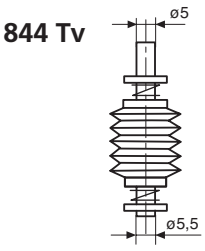
Used in conjunction with Mounting Attachment 844 Tm



- 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°) Pitch mm	Order no.	Whitworth Thread (55°) Range tpi	Order no.	American UST Thread (60°) 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**

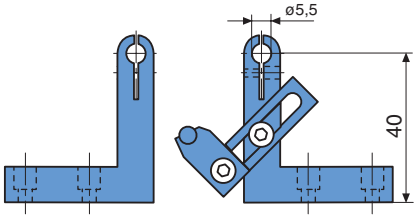
Special Threads. Interchangeable Measuring Rollers for special threads are also available on request.

Measuring external threads

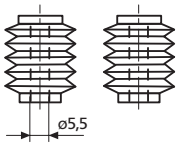
Measuring Roller Holder 844 Ty

- With location bolts for the Measuring Rollers 706 Vr
- With stop and stop pin

Order no. **4502463**



706 Vr



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**

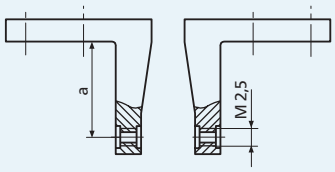
Special Threads. Interchangeable Measuring Rollers for special threads are also available on request.

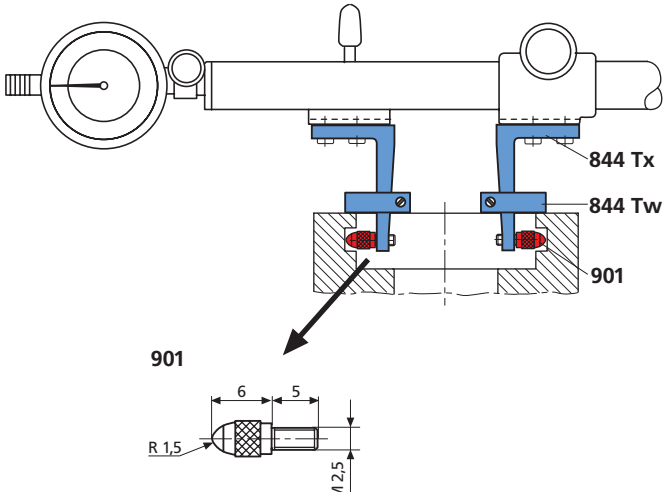
Measuring external and internal dimensions

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***

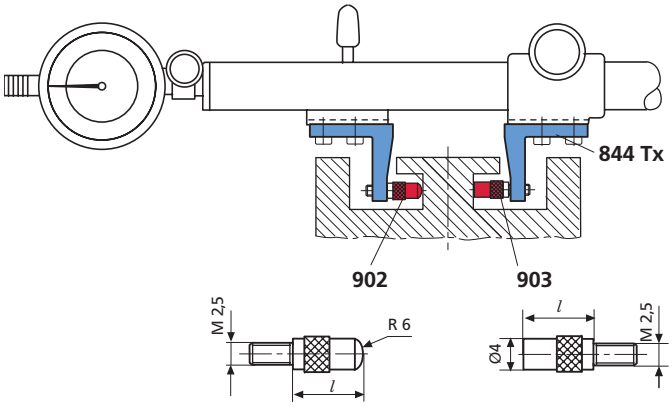
** Not suitable for Digital Caliper 25 ES*

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

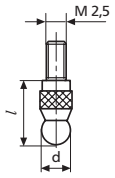
Measuring Arms 844 Tx and associated Anvils

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**			

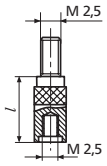
906 H



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



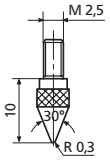
Special Contact Points / Anvils

		Order no.
Conical Contact Points, carbide tipped	**904 H**	**4360131**
Flat Contact Points*, steel, A = 1 cm² carbide tipped, dia. 7 mm	**907** **907 H**	**4360200** **4360201**
Spherical Contact Points, steel carbide tipped	**908** **908 H**	**4360210** **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**

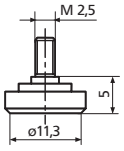
** When using an anvil with a flat contact face the opposite anvil must have an spherical contact face.*

Note:
The Order no's on pages 10-18 and 10-19 only related to one piece.

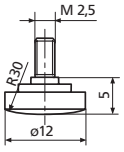
904 H



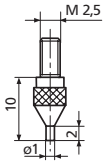
907



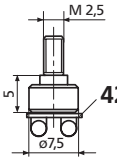
908 H



911 H



913



426 M

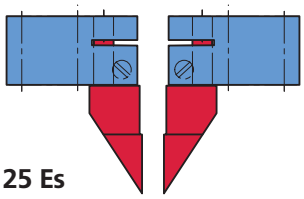
Scribing with Digital Universal Caliper 25 ES

Scriber Point 25 Es
- For straight lines and circles
- Made of hardened steel

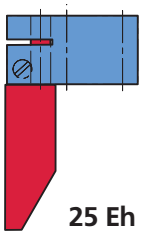
Order no. **4118530**

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**



25 Es



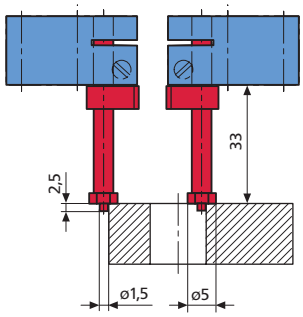
25 Eh

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**

25 Eb



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**

844 Tf

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	.5 µm	**EDI-20302**

Technical Data

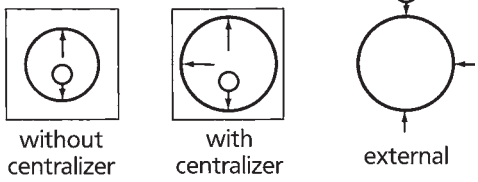
Style	Capacity I.D.	Capacity O.D.	Order no. With 0.0001" Dial Indicator	Order no. With 0.002 mm Dial Indicator	Order no.* With Maxµm®///	Order no.* With Maxµm®/// & Output	Order no.* With µMaxµm & Output	Order no. w/o Indicator, metric 8 mm mount shank
"T" Plate	*.75 - 5.5"* 19 - 139 mm	*.25 - 5"* 6 - 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*

	Order no.
36B-10 with **1087B** and **Y & T Plate Sets**	**2061657**
36B-20 with **1087B** and **Y & T Plate Sets**	**2061658**

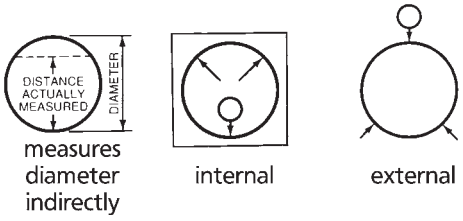
I.D./O.D. Indicator Gage 36 B for Internal and External Dimensions

"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

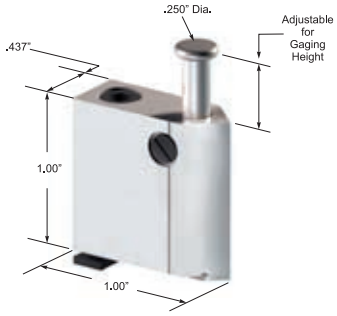


"V"-plates are self-centralizing. Three jaws are used and the measurement is of the distance between the sensitive contact and the chord formed by the two reference contacts. This measurement bears a direct relationship to the diameter and compensation is made by a special ratio indicator so diameter 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)

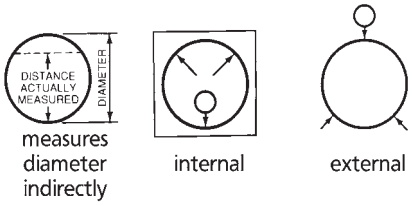
Order no. (3 jaw set)	Adjustment Height	Material: Contact and Rest Surface	Replacement Contact Pins (3 required)
JW-9	0.79-19 mm / ***.031-.75"***	Steel	**PS-55**
JW-58	0.79-18 mm / ***.031-.72"***	Carbide	**PS-226**
2220461*	0.79-18 mm	Carbide	**2225694**

* *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

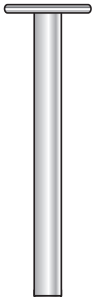
Special steel ball contacts can be made in a variety of different diameters for your measurement applications.

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.

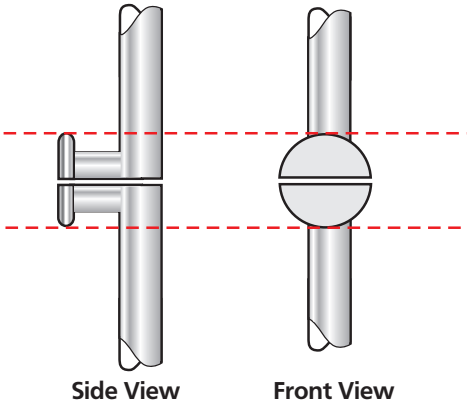


Special Contacts: TC Ball

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.



JW-58 w/TC Wear Pads

Specially designed jaws supplied with Tungsten Carbide wear surfaces provide extra long jaw life.

Additional Contacts

844T Contact Points for use with 36B Gage
We have added to the list of standard contacts by modifying the JW-9 jaws to accept some of the Universal Gage 844T contacts. This modification was done by reaming out the jaws from .186" to .196" diameters so that they will accept the contacts that are used with the 844TM holders.
With the added addition of the anvils below we have more measurement possibilities with the 36B gage such as Pitch Diameters of gears, Threads (Metric, Whitworth and American UST), Taper diameters and recesses.
For Threads and Cylindrical pins please see catalog pages 10-11 Cylindrical pins and 10-16 for threads.

		Order no.
Flat shoulder anvils	Sold as a pair	**4500050**
Inside taper anvils	Sold as a pair	**4500046**
Measuring blades	Sold as a pair	**4500114**
Cylindrical Pins	Sold as a pair	**See page 10-11**
Semi-cylindrical anvils	Sold as a pair	**4500055**
Outside taper anvils	Sold as a pair	**4500047**
Measuring blades	Sold as each	**4500015**
External/ internal threads	Sold as a pair	**See page 10-16**

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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

Overview
MarConnect USB Ready 11- 2
Simple data transmission to a PC as well as enables quick and universal assembly of a multiple measuring station.

MarCom Software 11- 3
Clear and flexible data acquisition

Statistics Printer

MarConnect MSP2 11- 4
Statistics printer with integrated Data Logger

Interfaces

MarConnect T-Box 11- 5
Interface to connect to a PC keyboard input

Radio Transmission

MarConnect Radio System FM 1 11- 6
Secure and wireless data transmission

MarConnect Radio System FM 2 11- 7
Secure and wireless data transmission

Overview
MarConnect Data Connection Cables 11- 8
To connect Measuring Instruments to Data Printers & External Devices

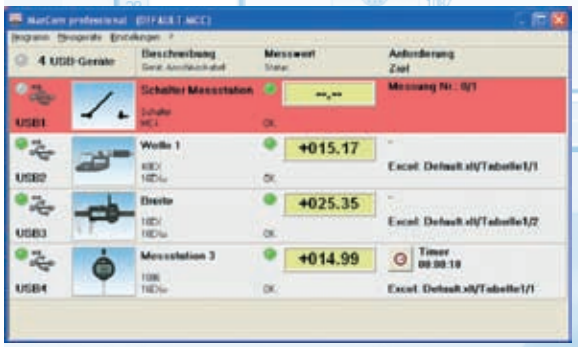
MarConnect. USB ready

►| 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. |◄

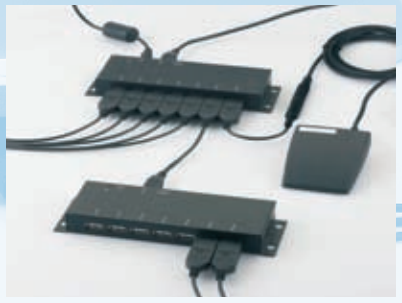
- **Choose alternative methods of data transmission** either with a foot switch or a PC keyboard, direct on the measuring instrument or with the Timer function

- **Compatible** with all **MarConnect USB** ready measuring instruments

- **Clear and flexible data acquisition** with the easy to use **MarCom** Professional Software

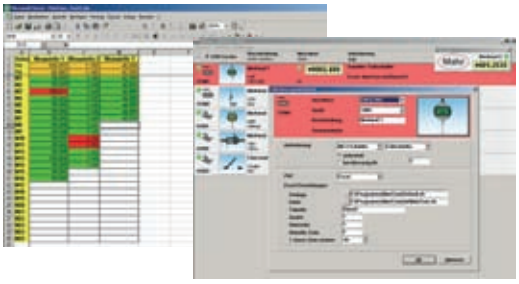


- **Multiple measuring station** is easily set up with a USB hub, up to 100 measuring devices can be simultaneously connected



- **Easily extendable** with additional USB hubs

MarCom Software



System Requirements

IBM AT compatible PC
USB interface, higher than 1.1
MS Windows® 2000, XP, Vista, 7
CD / DVD drive
Recommended: MS Excel from Version 97 onwards

	Order no.
Software MarCom Professional	**4102552**
Software MarCom Standard	**4102551**

Features

Software MarCom Professional

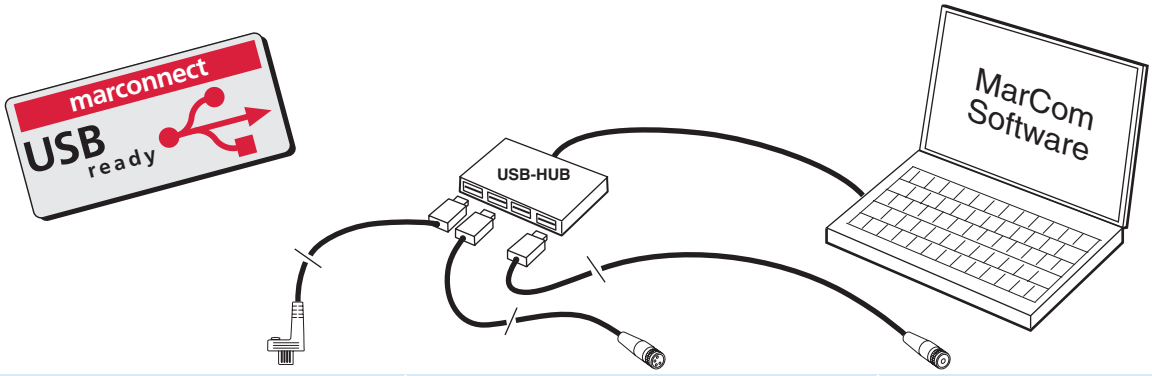
- Directly transfer meas. values into MS Excel*, a text file or key code
- Measured values from each device can be sent to a different column, table or folder in Excel
- Data transmission is possible via. USB and 2 serial COM interfaces
- USB hub is also suitable as a measuring instrument interface
- Up to 100 meas. devices can be connected with USB data cable
- Clear portrayal of selected meas. devices with the aid of icons
- Several foot switches can be connected via USB. meas. devices and be freely assigned
- Freely definable / configurable measurement cycles
- Data transmission via "Data" button on meas. devices or on the data cable; via a PC, timer, keyboard; or a foot switch connected to a USB interface

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

USB ready measuring instruments



Data Connection Cable **16 EXu**
Order no. 4102357
incl. MarCom Standard

for **MarCal.** Calipers
16 ER / 16 EWR
16 EWV
18 EWR
30 ER / 30 EWR
/ 30 EWN

for **Digimar.** Height Gages
814 SR

for **Micromar.** Micrometers
40 EWR, 40 EWS, 40 EWV,
46 EWR, 44 EWR

for **MarCator.** Digital Indicators
1075 R, 1086 R,
1087 R

for **MarSurf.** PS1

Data Connection Cable **2000 usb**
Order no. 4346023
incl. MarCom Standard

for **MarCator.** Digital Indicators
1088

for **Millimess.** Digital Comparators
2000
2001
2100
µMaxµm II

for **Digimar.** 816 CL

Data Connection Cable **MC-I**
Order no. 4102782
incl. MarCom Standard

for **Foot switch**
Order no. 4102058

USB-HUB 7-fold industrial model incl. USB cable for connection to a PC and power adapter

220 V	**Order no. 4102553**
110 V (US type)	**Order no. 2245786**

Statistics Printer MSP 2 with integrated Data Logger

marconnect
RS232C Digimatic

Above shows the Statistics Printer MSP2 being used in conjunction with 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 keyboard interface to connect to measuring instruments to USB interface

T-Box 205 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 (Windows, Linux, DOS)
- 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 port is individually adjustable via the interface
- Termination character (e.g. Enter) and language can be selected via the intercae
- The power is supplied by the USB interface
- Supplied with: USB cable

Technical Data

	Inputs	Dimensions mm (L x W x H)	Order no.	Remarks
T-Box 205 USB	2 x Multi-RS232C inputs 3 x Digimatic inputs	175 x 125 x 55	**4102579**	When connecting Digimatic measuring instruments the standard cable of the manufacturer can be used

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

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
- The measured values can be directly triggered on the measuring instrument, timer funktion or with the optional foot switch
- Supplied with: USB-Interface

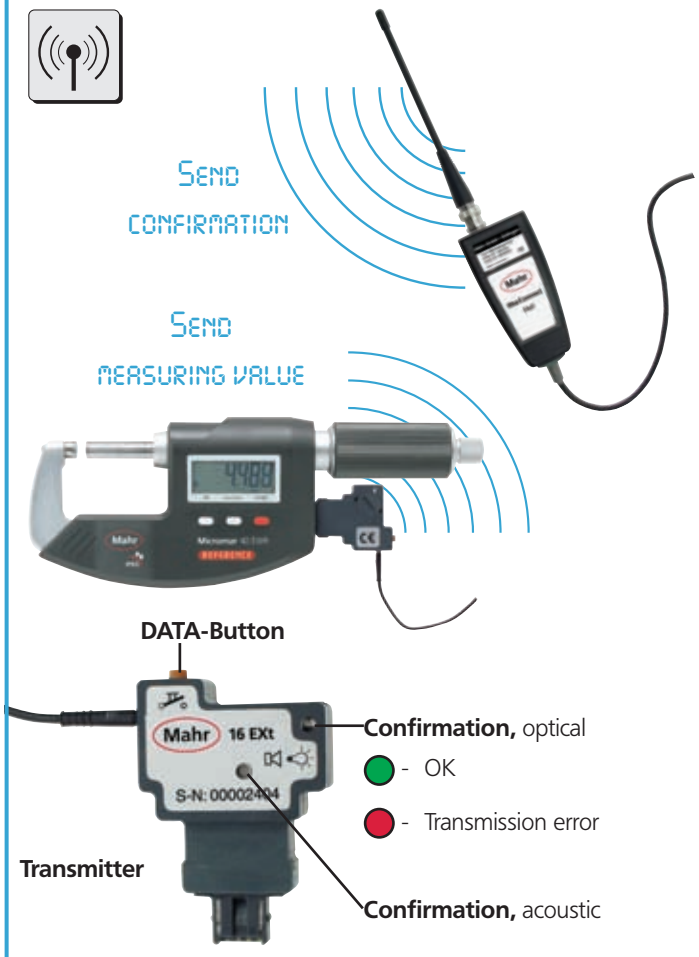
Technical Data

Input	Dimensions mm (L x W x H)	Order no.
1 x Digimatic - measuring instrument - input	20 x 57 x 33	**4102523**

Accessories

	Order no.
Foot Switch	**4102058**

Radio Transmission radio system FM 1*



* *Only available in North America, Canada and Mexico*

Note:
FM 1 and FM 2 are not compatible with one another.

Transmitter

For Measuring Instruments			Order no.
MarCal **Digimar** **Micromar** **MarCator**	16 ER, 16 EWR, 16 EWV, 18 EWR, 30 EWR, 30 EWN 814 SR, 816 CL 40 EWR, 44 EX, 46 EX, 40 EWS, 40 EWV 1075 R, 1086 R, 1087 R	**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 CX2, 817 CLM	**RS232t**	**2121317**
Millimess **MarCator**	2000, 2001, 2010, *µMaxµmII* 1088, *µMaxµmII XL*	**Mahrt**	**2121369**

Contact Mahr Federal for transmitters to be used with: *µMaxµmIII*, Digimatic devices, Digimatic data cables

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

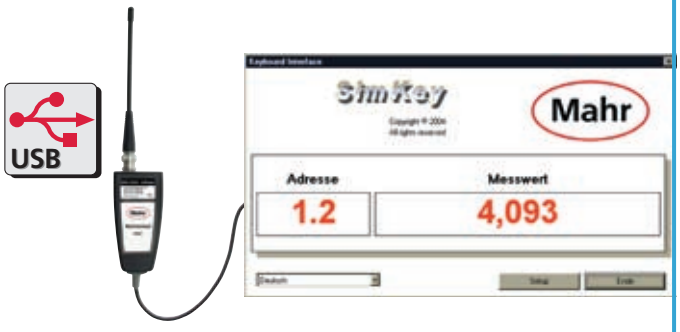
		Order no.
Receiver For USB interface includes, driver and basic Sim Key software to store measured values in an MS-Excel file.	**FM 1**	**4102320**

Sim Key software keeps track of every transmitters specific RF signature and assigns a frequency so incoming data transmissions are not lost.

Also supplied with MAHR_EXDLL Software (REQUIRES DONGLE ACCESS KEY) sold separately*

MAHR_EXDLL software offers more sorting options for incoming data transmissions.

***Dongle access key**	**2121335**



Radio transmission radio system FM 2

FM 2

2000 f

16 EXf

FM 2 is not available in North America, Canada and Mexico

Note:
FM 1 and FM 2 are not compatible with one another.

Features

- Wireless data transmission from a measuring instrument to a PC
- Secure data transmission due to the acknowledgement dialog of the received data from the PC to the measuring instrument
- Optical confirmation of received data on the transmitter
- TWIN receiver for USB and RS232 interfaces
- Compact transmitter without an external antenna
- Theoretically unlimited amount of measuring instruments can be connected to a receiver
- Distance of radio wave up to 100 m (depending on the working environment)
- Radio frequency is 433 MHz*
- Up to 69 channels are available per receiver, several receivers can be used at any one time
- Bi-directional radio link (remote control from measuring instruments)
- Triggering data via a hand switch is possible

** Further frequencies are available upon request*

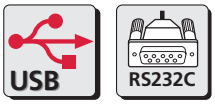
Transmitter

For Measuring Instruments			Order no.
MarCal **Digimar** **Micromar** **MarCator**	16 ER, 16 EWR, 16 EWV, 18 EWR, 30 ER, 30 EWN, 30 EWR 814 SR 40 EW, 44 EX, 46 EX, 40 EWS, 40 EWV 1075, 1080, 1081, 1086, 1087	**16 EXf**	**4102306**
MarCal **Digimar** **MarTool**	25 ES, 30 EWD, 31 ES, 32 ES 27 ES, M 814 106 ES	**1082 f**	**4102307**
Millimess **MarCator** **Digimar**	2000, 2001, 2100 1088 816 CL	**2000 f**	**4102309**
Digimar	817 CLM	**817 f**	**4102310**
Millimar	C1208, C1216, C1245, S1840	**RS232 f**	**4102311**

Further transmitters are available, see page 11-9

Receiver

		Order no.
TWIN Receiver for USB and RS232 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 2**	**4102305**



Accessories

		Order no.
Hand switch for remote control*	**HTF 1**	**4102314**

** only in conjunction with Software Pack Plus*

Software

	Order no.
Software Pack Plus to store measured data from several transmitters in separate MS-Excel® columns. Remote control with the hand switch.	**4102315**

MarConnect. Interfaces

OVERVIEW

Connect to . . . / Instrument	PC			
	direct via USB and MarCom Software	direct via RS232C and MarCom Software	via Digi-USB 1	via T-Box
Foot Switch	4102058+4102782 ③	4102058+4102782 ②③	4102058	4102556
16 ER / EWR 16 EWV 18 EWR 30 ER / EWR / EWN 40 EW, 40 EWS, 40 EWV, 46 EX, 44 EX 1075 R, 1086 R, 1087 R 814 SR, PS1, M300	4102357	4102410	4102411	4102411
2000, 2001, 2100, 1088, 816 CL, *µMaxµmII*	4346023	4346020	4346021	4346021
838 EA, 838 EI (Model A) 838 EA, 838 EI (Model B)	4495079 --------	-------- --------	4495083 4495084 ⑥	4495083 4495084 ⑥
Max*µmIII*	--------	--------	2239037 2239036	2239037 --------
31 EW, 800 EW, 800 EWL	4305121	4305122	--------	--------
25 ES 106 ES M 814	4102510+4102330	4102510	--------	4102510
MSP 2	4102711+4102334 ④	4102711 ④	--------	--------
1240, S1840, C1245, C1208, C1216, X1715, X1741	7024634+4102331 ⑤	7024634 ⑤	--------	4102715
Digimar 817 CLM	7024634+4102333 ④	7024634 ④	--------	--------

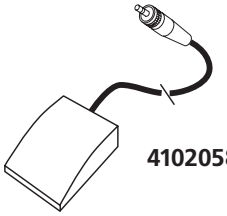
① Only available in North America, Canada and Mexico
② Foot switch; only with an additional USB Port
③ Cable length 18 cm / 7”
④ Data transmission only with the “Data” key or “automatic transmisison” on the measuring instrument
⑤ Foot switch to transfer data on the measuring instrument
Millimar - Order no. 5330956 / Millimar 1240 - Order no. 5312431

►I **MarConnect.** Regardless of which interface standard you use, whether; USB, Opto RS232 oder Digimatic, MarConnect always provides you with the optimum connection. I◄

Transmitter ① FM 1 via USB	Transmitter FM 2 via USB or RS232	Data printer MSP 2
--------	4102314 ⑦	4102058
4102321	4102306	4102411
2121369	4102309	4346021
Contact Mahr Federal Contact Mahr Federal	-------- 4102313+4495084	4495083 4495084 ⑥
-------- 2121368	--------	2239037 --------
--------	--------	--------
4102322	4102307	4102510
--------	--------	--------
2121317 ⑧	4102311 ⑧	7024634
2121317	4102310	7024634

⑥ Data cable is included in the handle of the measuring instrument, cable length 1.5 m / 5 ft
⑦ Hand switch only in conjunction with Software pack Plus
⑧ Not available for Millimar 1240

Standard cable length 2 m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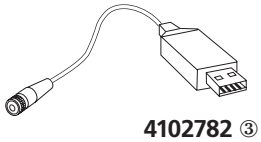
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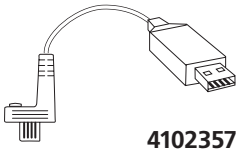
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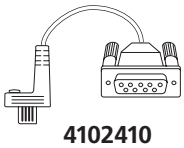
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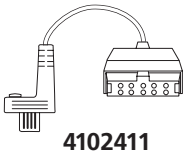
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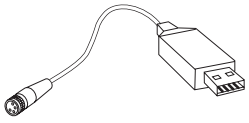
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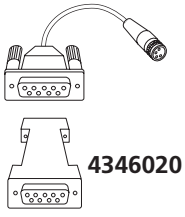
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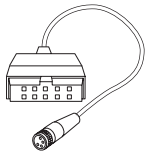
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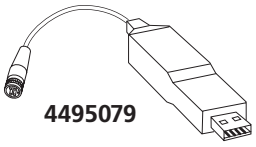
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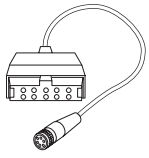
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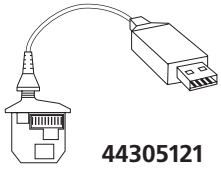
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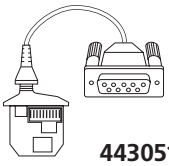
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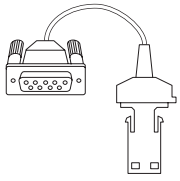
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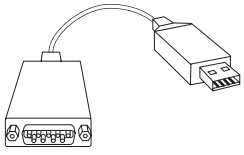
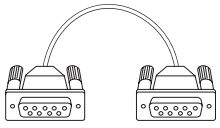
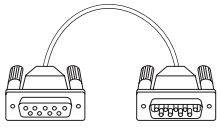

4102330 bis 4102334
Cable length 1 m


4102715 / 7024634


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

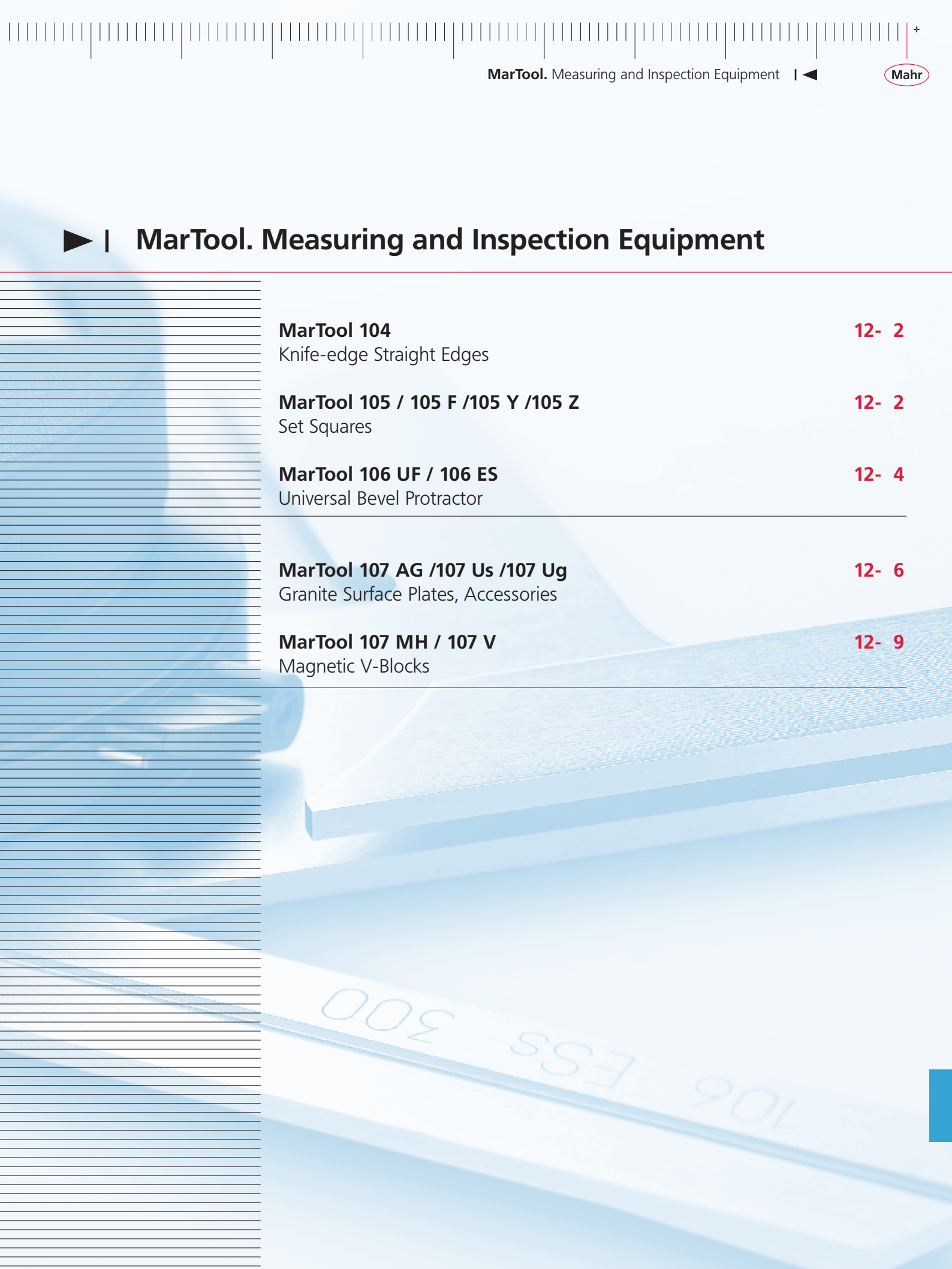
MarTool 104 12- 2
Knife-edge Straight Edges

MarTool 105 / 105 F /105 Y /105 Z 12- 2
Set Squares

MarTool 106 UF / 106 ES 12- 4
Universal Bevel Protractor

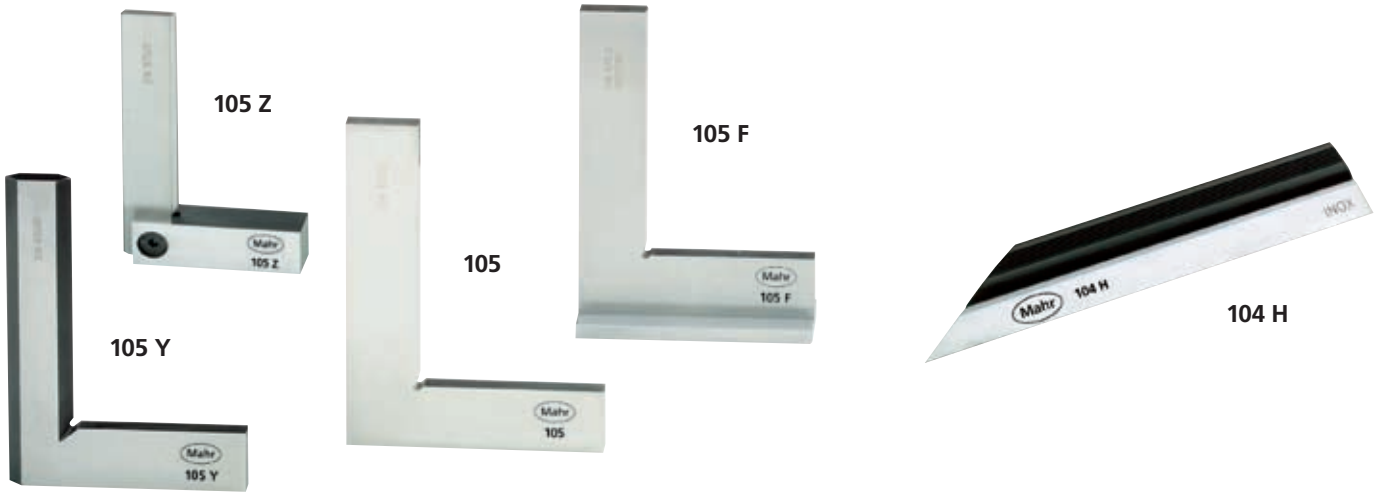
MarTool 107 AG /107 Us /107 Ug 12- 6
Granite Surface Plates, Accessories

MarTool 107 MH / 107 V 12- 9
Magnetic V-Blocks



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: Carton

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: Carton

Accuracy

Grade **0 DIN 875**

Technical Data

Length 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: Carton

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 and a wide beam
- Without a knife edge
- Supplied with: Carton

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

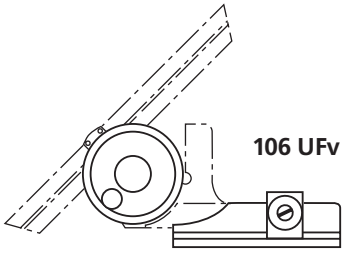
- With fine adjustment
- Stainless steel
- Vernier scale and main scale both have a satin chrome finish to prevent glare and to enable parallax free reading on the same plane
- Knurled screw for clamping the interchangeable beam into position
- Supplied with: Magnifying reading lens, interchangeable beam and case

Technical Data

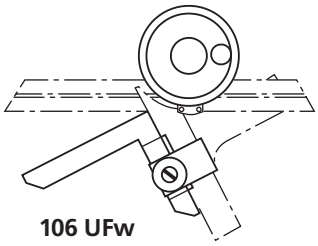
Blade length mm	Range degrees	Readings minutes	Deviation minutes	Order no.
150	360°	5′	5′	**4214050**
200	360°	5′	5′	**4214051**
300	360°	5′	5′	**4214052**

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

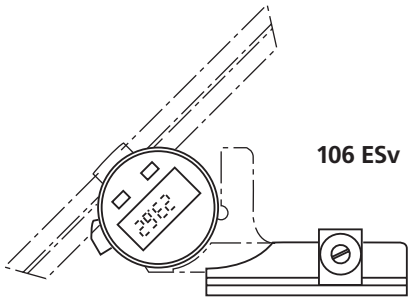
- Easy to read high contrast 8,5 mm high LCD
- Displays the angular degrees and angular minutes or decimal degrees
- Zero setting at any position of the measuring range
- Beam can be clamped with a push button
- Fine adjustment for easy setting of a desired angle
- Locking lever to prevent accidental 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**



106 ESv

Surface Plate 107 G made from granite

Technical Data

- 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

Technische Daten

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:

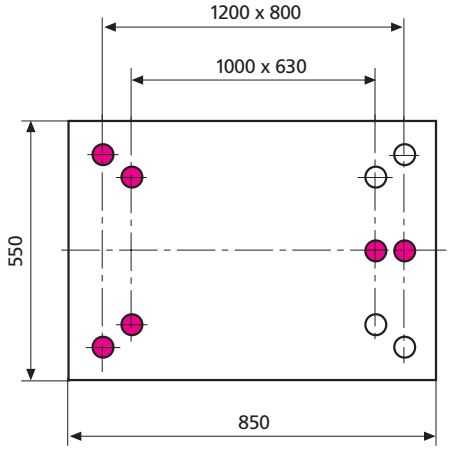
Grade acc to DIN 876	**Flatness tolerance** in µm
00	$t_1 = 2\,(1 + l/1000)$
0	$t_1 = 4\,(1 + l/1000)$
1	$t_1 = 10\,(1 + l/1000)$

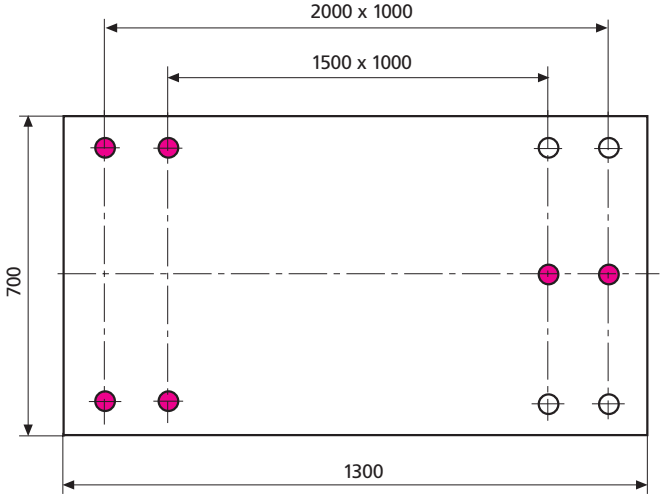
Length l in mm

Surface plates are available in other dimensions upon request
** Excludes stand with cabinet*

Mounting of Surface Plates 107 G up to 2000 x 1000 mm

Distortion of the surface plates is minimized if supported at the support points A.
For plates with edge lengths over 1000 mm it is advised to provide anti-tilt elements at the B support points.
Support points A (Bessel points, 0.22 x l or w from the edge of the plate). Support points B are for the anti-tilt elements.





● Support point A

○ Support point B

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 piece**	**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 respectively the 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**

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

Rectangular Gage Blocks 13- 2
according to DIN EN ISO 3650

MarGage 402 / 404 / 406 / 408 / 409 13- 4
Rectangular Gage Blocks made of steel

MarGage 411 / 415 13- 4
Test Sets for Calipers

MarGage 417 13- 5
Individual Rectangular Gage Blocks made of steel

MarGage 402 C / 404 C / 406 C / 408 C / 409 C 13- 6
Rectangular Gage Blocks made of ceramic

MarGage 417 C 13- 8
Individual Rectangular Gage Blocks made of ceramic

MarGage 418 C 13- 9
Protective Rectangular Gage Blocks made of ceramic

MarGage 419 C 13- 9
Test Sets for Micrometers

Accessories for Rectangular Gage Blocks 13-10

Inch Gage Blocks 13-12
according to ANSI

Pin Gages / Plug Gages 13-14

MarGage 426 / 426 G / 426 S 13-14
Pin Gages made of steel

MarGage 426 D / 426 DS 13-16
Plug Gages made of steel

MarGage 426 A / 426 M 13-17
Thread Pin Gages

Settings Standards / Thread Gages 13-18

AGD Masters 13-18
Master Rings / Master Discs / Master Plugs

MarGage 355 E / 390 / 708 E / 715 E 13-19
Setting Standards

MarGage 705 / 708 G / 708 N 13-20
Thread Gages

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 ZrO_2 (Circonimar).

Heat Expansion Coefficient

Steel	$11.5 \times 10^{-6}\ K^{-1}$
Circonimar	$9.5 \times 10^{-6}\ K^{-1}$

Calibration Certificate

Gage blocks in sets are supplied with a Mahr calibration certificate stating deviations from the nominal size, this confirms the traceability 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 gage block sets 404 or 404 C are very convenient, each set contains 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**	5	30 / 41.3 / 131.4 / 243.5 / 281.2
411/2	2	**4800344**	5	30 / 41.3 / 131.4 / 243.5 / 281.2
415/1	1	**4800339**	6	30 / 41.3 / 131.4 / 243.5 / 281.2 / 481.1
415/2	2	**4800340**	6	30 / 41.3 / 131.4 / 243.5 / 281.2 / 481.1

Individual Rectangular Gage Blocks 417

- Tolerance classes K, 0, 1, 2
- Nominal sizes greater than 125 mm, the gage blocks are supplied in a wooden case
- Special sizes are available on request

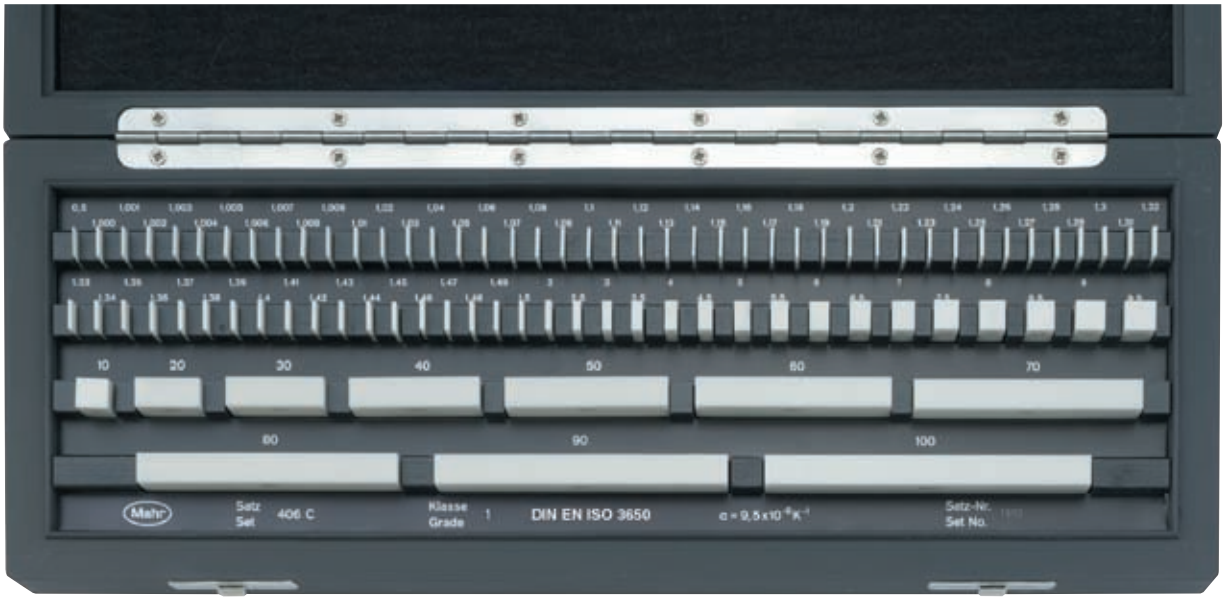
Tolerance Class K	XX=34
Tolerance Class 0	XX=10
Tolerance Class 1	XX=12
Tolerance Class 2	XX=14

Nominal sizes	Order no.	Nominal sizes	Order no.
0.50	**480XX09**	1.31	**480XX59**
1	**480XX19**	1.32	**480XX60**
1.001	**480XX20**	1.33	**480XX61**
1.002	**480XX21**	1.34	**480XX62**
1.003	**480XX22**	1.35	**480XX63**
1.004	**480XX23**	1.36	**480XX64**
1.005	**480XX24**	1.37	**480XX65**
1.006	**480XX25**	1.38	**480XX66**
1.007	**480XX26**	1.39	**480XX67**
1.008	**480XX27**	1.40	**480XX68**
1.009	**480XX28**	1.41	**480XX69**
1.01	**480XX29**	1.42	**480XX70**
1.02	**480XX30**	1.43	**480XX71**
1.03	**480XX31**	1.44	**480XX72**
1.04	**480XX32**	1.45	**480XX73**
1.05	**480XX33**	1.46	**480XX74**
1.06	**480XX34**	1.47	**480XX75**
1.07	**480XX35**	1.48	**480XX76**
1.08	**480XX36**	1.49	**480XX77**
1.09	**480XX37**	1.5	**480XX78**
1.10	**480XX38**	1.6	**480XX79**
1.11	**480XX39**	1.7	**480XX80**
1.12	**480XX40**	1.8	**480XX81**
1.13	**480XX41**	1.9	**480XX82**
1.14	**480XX42**	2	**480XX83**
1.15	**480XX43**	2.5	**480XX84**
1.16	**480XX44**	3	**480XX85**
1.17	**480XX45**	3.5	**480XX86**
1.18	**480XX46**	4	**480XX87**
1.19	**480XX47**	4.5	**480XX88**
1.20	**480XX48**	5	**480XX89**
1.21	**480XX49**	5.5	**480XX90**
1.22	**480XX50**	6	**480XX91**
1.23	**480XX51**	6.5	**480XX92**
1.24	**480XX52**	7	**480XX93**
1.25	**480XX53**	7.5	**480XX94**
1.26	**480XX54**	8	**480XX95**
1.27	**480XX55**	8.5	**480XX96**
1.28	**480XX56**	9	**480XX97**
1.29	**480XX57**	9.5	**480XX98**
1.30	**480XX58**	10	**480XX99**

Tolerance Class K	XX=35
Tolerance Class 0	XX=11
Tolerance Class 1	XX=13
Tolerance Class 2	XX=15

Nominal sizes	Order no.	Nominal sizes	Order no.
10.5	**480XX00**	175	**480XX41**
11	**480XX01**	200	**480XX42**
11.5	**480XX02**	250	**480XX43**
12	**480XX03**	300	**480XX44**
12.5	**480XX04**	400	**480XX46**
13	**480XX05**	500	**480XX48**
13.5	**480XX06**	600	**480XX49**
14	**480XX07**	700	**480XX50**
14.5	**480XX08**	800	**480XX51**
15	**480XX09**	900	**480XX52**
15.5	**480XX10**	1000	**480XX53**
16	**480XX11**		
16.5	**480XX12**		
17	**480XX13**		
17.5	**480XX14**		
18	**480XX15**		
18.5	**480XX16**		
19	**480XX17**		
19.5	**480XX18**		
20	**480XX19**		
20.5	**480XX20**		
21	**480XX21**		
21.5	**480XX22**		
22	**480XX23**		
22.5	**480XX24**		
23	**480XX25**		
23.5	**480XX26**		
24	**480XX27**		
24.5	**480XX28**		
25	**480XX29**		
30	**480XX30**		
40	**480XX31**		
50	**480XX32**		
60	**480XX33**		
70	**480XX34**		
75	**480XX35**		
80	**480XX36**		
90	**480XX37**		
100	**480XX38**		
125	**480XX39**		
150	**480XX40**		

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
- The 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 handle than Circonimar; Circomimar has excellent wringing properties, no corrosion, no need for lubrication, low weight and scratch resistant

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		

Individual Rectangular Gage Blocks 417 C

- Tolerance classes K, 0, 1, 2
- Special sizes are available on request

	Tolerance Class K	XX=46			
	Tolerance Class 0	XX=40			
	Tolerance Class 1	XX=42			
	Tolerance Class 2	XX=44			
Nominal sizes	**Order no.**	**Nominal sizes**	**Order no.**	**Nominal sizes**	**Order no.**
0.50	**480XX00**	1.21	**480XX40**	1.7	**480XX71**
1	**480XX10**	1.22	**480XX41**	1.8	**480XX72**
1.001	**480XX11**	1.23	**480XX42**	1.9	**480XX73**
1.002	**480XX12**	1.24	**480XX43**	2	**480XX74**
1.003	**480XX13**	1.25	**480XX44**	2.5	**480XX75**
1.004	**480XX14**	1.26	**480XX45**	3	**480XX76**
1.005	**480XX15**	1.27	**480XX46**	3.5	**480XX77**
1.006	**480XX16**	1.28	**480XX47**	4	**480XX78**
1.007	**480XX17**	1.29	**480XX48**	4.5	**480XX79**
1.008	**480XX18**	1.30	**480XX49**	5	**480XX80**
1.009	**480XX19**	1.31	**480XX50**	5.5	**480XX81**
1.01	**480XX20**	1.32	**480XX51**	6	**480XX82**
1.02	**480XX21**	1.33	**480XX52**	6.5	**480XX83**
1.03	**480XX22**	1.34	**480XX53**	7	**480XX84**
1.04	**480XX23**	1.35	**480XX54**	7.5	**480XX85**
1.05	**480XX24**	1.36	**480XX55**	8	**480XX86**
1.06	**480XX25**	1.37	**480XX56**	8.5	**480XX87**
1.07	**480XX26**	1.38	**480XX57**	9	**480XX88**
1.08	**480XX27**	1.39	**480XX58**	9.5	**480XX89**
1.09	**480XX28**	1.40	**480XX59**	10	**480XX90**
1.10	**480XX29**	1.41	**480XX60**	10.5	**480XX91**
1.11	**480XX30**	1.42	**480XX61**	11	**480XX92**
1.12	**480XX31**	1.43	**480XX62**	11.5	**480XX93**
1.13	**480XX32**	1.44	**480XX63**	12	**480XX94**
1.14	**480XX33**	1.45	**480XX64**	12.5	**480XX95**
1.15	**480XX34**	1.46	**480XX65**	13	**480XX96**
1.16	**480XX35**	1.47	**480XX66**	13.5	**480XX97**
1.17	**480XX36**	1.48	**480XX67**	14	**480XX98**
1.18	**480XX37**	1.49	**480XX68**	14.5	**480XX99**
1.19	**480XX38**	1.5	**480XX69**		
1.20	**480XX39**	1.6	**480XX70**		

Tol. Class K	XX=47		
Tol. Class 0	XX=41		
Tol. Class 1	XX=43		
Tol. Class 2	XX=45		
Nominal sizes	**Order no.**		
15	**480XX00**		
15.5	**480XX01**		
16	**480XX02**		
16.5	**480XX03**		
17	**480XX04**		
17.5	**480XX05**		
18	**480XX06**		
18.5	**480XX07**		
19	**480XX08**		
19.5	**480XX09**		
20	**480XX10**		
20.5	**480XX11**		
21	**480XX12**		
21.5	**480XX13**		
22	**480XX14**		
22.5	**480XX15**		
23	**480XX16**		
23.5	**480XX17**		
24	**480XX18**		
24.5	**480XX19**		
25	**480XX20**		
30	**480XX21**		
40	**480XX22**		
50	**480XX23**		
60	**480XX24**		
70	**480XX25**		
75	**480XX26**		
80	**480XX27**		
90	**480XX28**		
100	**480XX29**		

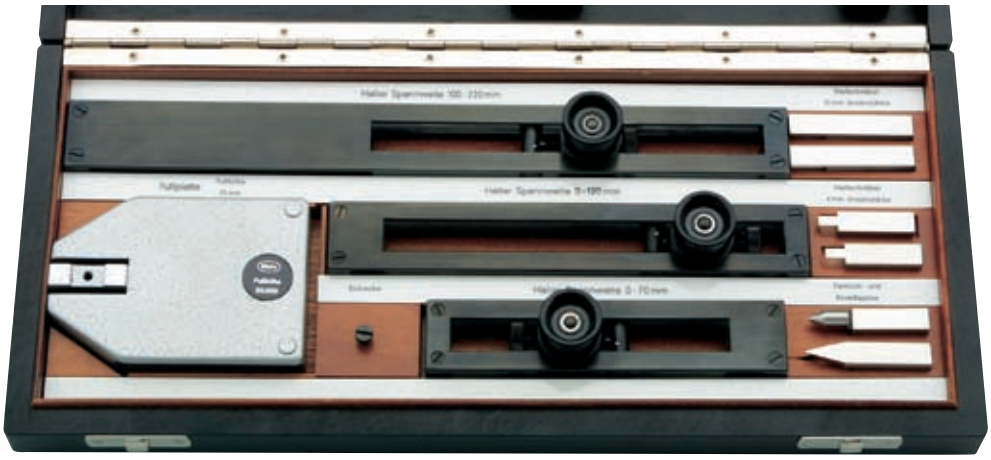
Pair of Protective Rectangular Gage Blocks 418 C

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

- To be used 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
- Supplied with:
  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

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 with:
  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
- Supplied with:
  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
- Supplied with: 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

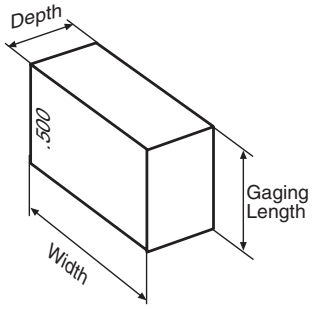
- Long used as the practical standards of dimensional measurement in precision manufacturing. With accuracies, materials and manufacturing methods greatly refined, gage blocks are now of highest quality and precision.
  - As comparison reference and utilization standards in the field of length measurement.
  - 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 Rectangular

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**

Inch Gage Blocks set with 81 blocks

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. Can also be used 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 **426/0**			Wear-resistant gage steel, hardened multi-aged, ground and **lapped** **Grade 1, DIN 2269** Manufacturing tolerance ± 1.0 µm **426/1**			Wear-resistant gage steel, hardened multi-aged and precision ground **Better than Grade 2, DIN 2269** Manufacturing tolerance ± 1.5 µm **426/2**	
	Length	**Increments**		**Length**	**Increments**		**Length**	**Increments**
		Order no.	**Order no.**		**Order no.**	**Order no.**		**Order no.**
	mm	0.01 mm	0.001 mm	mm	0.01 mm	0.001 mm	mm	0.01 mm
0.30 - 0.49	30	**4828103**	**4828303**	40	**4828113**	**4828313**	40	**4828133**
0.50 - 0.99	30	**4828104**	**4828304**	40	**4828114**	**4828314**	40	**4828134**
1.00 - 2.99	60	**4828105**	**4828305**	70	**4828115**	**4828315**	70	**4828135**
3.00 - 5.99	60	**4828106**	**4828306**	70	**4828116**	**4828316**	70	**4828136**
6.00 - 9.99	60	**4828107***	**4828307**	70	**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**

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 **426 G/0**			Wear-resistant gage steel, hardened, multi-aged, ground and **lapped** **Grade 1, DIN 2269** Manufacturing tolerance ± 1.0 µm **426 G/1**			Wear-resistant gage steel, hardened multi-aged and precision ground **Better than Grade 2, DIN 2269** Manufacturing tolerance ± 1.5 µm **426 G/2**	
	Effective Length	**Increments**		**Effective Length**	**Increments**		**Effective Length**	**Increments**
		Order no.	**Order no.**		**Order no.**	**Order no.**		**Order no.**
	mm	0.01 mm	0.001 mm	mm	0.01 mm	0.001 mm	mm	0.01 mm
0.10 - 0.19	28	**4828151**	**4828351**	33	**4828161**	**4828361**	33	**4828171**
0.20 - 0.29	28	**4828152**	**4828352**	33	**4828162**	**4828362**	33	**4828172**
0.30 - 0.49	28	**4828153**	**4828353**	33	**4828163**	**4828363**	33	**4828173**
0.50 - 0.99	28	**4828154**	**4828354**	33	**4828164**	**4828364**	33	**4828174**
1.00 - 2.99	57	**4828155**	**4828355**	62	**4828165**	**4828365**	62	**4828175**
3.00 - 5.99	57	**4828156**	**4828356**	62	**4828166**	**4828366**	62	**4828176**
6.00 - 10.00	57	**4828157**	**4828357**	62	**4828167**	**4828367**	62	**4828177**

Length of handle see Page 13-16 (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

dia. 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**	**Order no.**	**Increments**	**Anzahl**	**Order no.**	**Increments**	**Quantity**	**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

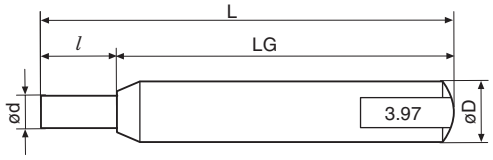
Individual Plug Gages 426 D made from steel, with a handle

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

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

Supplied with: Wooden case with plastic inlay

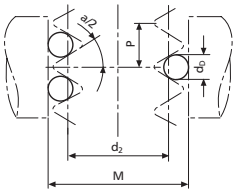
dia. mm	Increment	Quantity	Length	Order no.	dia. mm	Increment	Quantity	Length	Order no.
0.06 - 0.50	0.01	45	2*	**4825000**	5.01 - 5.50	0.01	50	10	**4825010**
0.51 - 1.00	0.01	50	5	**4825001**	5.51 - 6.00	0.01	50	10	**4825011**
1.01 - 1.50	0.01	50	5	**4825002**	6.01 - 6.50	0.01	50	14	**4825703**
1.51 - 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 0.17 - 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

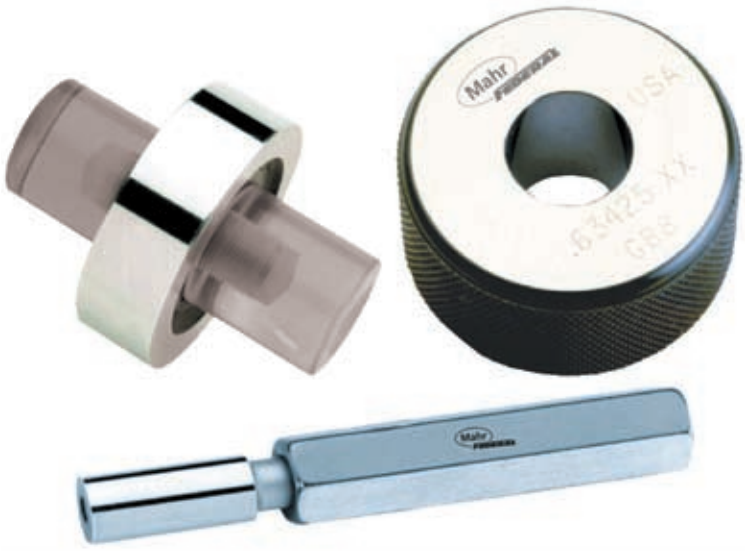
Pin Gage	Order no.			for thread pitch												
				Metric				Whitworth range tpi			American UST range tpi			Trapezoid		
dia. mm	426 M Pair dia. 7.5 mm	426 M Pair dia. 6.5 mm	426 A Set	mm										mm		
0.17	**4820010**	**4820132**	**4821000**	0.25		0.3										
0.195	**4820011**	**4820149**	**4821001**								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 Grade 1
Nominal size 3 mm **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

Ring Gages 355 E

Features

- 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	1 - 200 mm

Diameter increments 1mm

ø mm	Order no.	ø mm	Order no.	ø mm	Order no.	ø mm	Order no.	ø mm	Order no.	ø mm	Order no.*
1	**4710006**	21	**4710041**	41	**4710061**	61	**4710081**	81	**4710101**	>100-105	**4714201***
2	**4710010**	22	**4710042**	42	**4710062**	62	**4710082**	82	**4710102**	>105-110	**4714202***
3	**4710014**	23	**4710043**	43	**4710063**	63	**4710083**	83	**4710103**	>110-115	**4714203***
4	**4710018**	24	**4710044**	44	**4710064**	64	**4710084**	84	**4710104**	>115-120	**4714204***
5	**4710020**	25	**4710045**	45	**4710065**	65	**4710085**	85	**4710105**	>120-125	**4714205***
6	**4710022**	26	**4710046**	46	**4710066**	66	**4710086**	86	**4710106**	>125-130	**4714206***
7	**4710024**	27	**4710047**	47	**4710067**	67	**4710087**	87	**4710107**	>130-135	**4714207***
8	**4710026**	28	**4710048**	48	**4710068**	68	**4710088**	88	**4710108**	>135-140	**4714208***
9	**4710028**	29	**4710049**	49	**4710069**	69	**4710089**	89	**4710109**	>140-145	**4714209***
10	**4710030**	30	**4710050**	50	**4710070**	70	**4710090**	90	**4710110**	>145-150	**4714210***
11	**4710031**	31	**4710051**	51	**4710071**	71	**4710091**	91	**4710111**	>150-155	**4714211***
12	**4710032**	32	**4710052**	52	**4710072**	72	**4710092**	92	**4710112**	>155-160	**4714212***
13	**4710033**	33	**4710053**	53	**4710073**	73	**4710093**	93	**4710113**	>160-165	**4714213***
14	**4710034**	34	**4710054**	54	**4710074**	74	**4710094**	94	**4710114**	>165-170	**4714214***
15	**4710035**	35	**4710055**	55	**4710075**	75	**4710095**	95	**4710115**	>170-175	**4714215***
16	**4710036**	36	**4710056**	56	**4710076**	76	**4710096**	96	**4710116**	>175-180	**4714216***
17	**4710037**	37	**4710057**	57	**4710077**	77	**4710097**	97	**4710117**	>180-185	**4714217***
18	**4710038**	38	**4710058**	58	**4710078**	78	**4710098**	98	**4710118**	>185-190	**4714218***
19	**4710039**	39	**4710059**	59	**4710079**	79	**4710099**	99	**4710119**	>190-195	**4714219***
20	**4710040**	40	**4710060**	60	**4710080**	80	**4710100**	100	**4710120**	>195-200	**4714220***

* When placing an order please inform us of the diameter

Diameter increments 0,001 mm

ø mm	Order no.*	ø mm	Order no.*	ø mm	Order no.*	ø mm	Order no.*	ø mm	Order no.*
1-1,8	**4732600**	>35-40	**4732607**	>80-85	**4732616**	>125-130	**4732638**	>170-175	**4732629**
>1,8-3	**4732641**	>40-45	**4732608**	>85-90	**4732617**	>130-135	**4732623**	>175-180	**4732630**
>3-5	**4732642**	>45-50	**4732609**	>90-95	**4732618**	>135-140	**4732639**	>180-185	**4732631**
>5-10	**4732635**	>50-55	**4732610**	>95-100	**4732619**	>140-145	**4732624**	>185-190	**4732632**
>10-15	**4732602**	>55-60	**4732611**	>100-105	**4732620**	>145-150	**4732640**	>190-195	**4732633**
>15-20	**4732603**	>60-65	**4732612**	>105-110	**4732636**	>150-155	**4732625**	>195-200	**4732634**
>20-25	**4732604**	>65-70	**4732613**	>110-115	**4732621**	>155-160	**4732626**		
>25-32	**4732605**	>70-75	**4732614**	>115-120	**4732637**	>160-165	**4732627**		
>32-35	**4732606**	>75-80	**4732615**	>120-125	**4732622**	>165-170	**4732628**		

* When placing an order please inform us of the diameter

Setting Standards for indicating measuring instruments

Reference Discs 390

Features

- 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

Features

- 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

Features

- 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

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

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-9001:2008 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

Certificate of Registration

nqa global assurance

This is to certify that the Quality Management System of:

Mahr Federal Inc.
1139 Eddy Street
Providence, RI 02905

applicable to:

Design, manufacture and servicing of dimensional gages and gaging systems and dimensional calibration services including field service for masters, standards and gages

has been assessed and approved by
National Quality Assurance, U.S.A., against the provisions of:

ISO 9001:2008

For and on behalf of NQA, USA, Acton, MA 01720

Certificate Number: 10057
EAC Code: 19, 35
First Issued: October 6, 1995
Valid Until: September 2, 2013
Reissued: September 8, 2010

ANAB

This approval is subject to the company maintaining its system to the required standard, which will be monitored by NQA, USA, an accredited organization under the ANSI-ASQ National Accreditation Board.

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 January 2009).

2011-04-01 through 2012-03-31
Effective dates

For the National Institute of Standards and Technology

NVLAP-01C (REV. 2009-01-28)