THE BENCHMARK OF INDICATING MEASURING INSTRUMENTS. **MARAMETER.**

►| Marameter is the ideal measuring instrument for highly precise measurements of internal and external diameters on either an indvidual part or on serial components. Our indicating measuring instruments obtain the best results due to their constant measuring force, their exact transmission lever system as well as their high parallelism on the measuring faces. For special measuring tasks such as threads, teeth, grooves or precision mechanical parts Marameter offers the right solution. |◄

► | MaraMeter. Indicating Measuring Instruments

1000P Snap Gages for Outside Diameters

The economical way to check outside diameters on the shop floor.

1000P-3
0.01 mm or .0005" Dial
Indicator normally furnished

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.

Technical Data

Order no. Metric	Order no. Inch	Capacity mm / *inch*	Reference Anvil Diameter mm / *inch*
1000P-1M*	**1000P-1***	0 - 25 / ***0 - 1"***	13 / ***.50"***
1000P-2M*	**1000P-2***	19 - 50 / ***.75 - 2"***	13 / ***.50"***
1000P-3M	**1000P-3**	44 - 82 / ***1.75 - 3.25"***	13 / ***.50"***
1000P-4M	**1000P-4**	76 - 114 / ***3 - 4.5"***	16 / ***.625"***
1000P-5M	**1000P-5**	102 - 152 / ***4 - 6"***	16 / ***.625"***
1000P-6M	**1000P-6**	152 - 203 / ***6 - 8"***	19 / ***.75"***
1000P-7M	**1000P-7**	203 - 254 / ***8- 10"***	19 / ***.75"***

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.*

300P Snap Gages for Outside Diameters

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).

Superior precision for O.D. checks

EDI-301P-2
BA-26 Bench Stand
(not included)

Technical Data

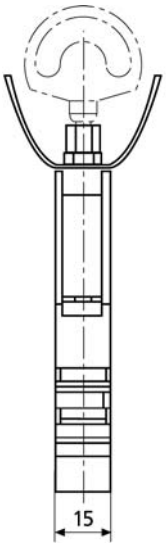
	Normally Furnished Indicating Instruments		
Style	**Readings**	**Snap Style**	**Separately, Order no.**
12I/22I	.0001"	Flat Anvil	**IDT-102/IDT-106**
O1I/P1I	0.002 mm	Flat Anvil	**IDS-206/IDS-208**
Maxμm®/// (1)	selectable (3)	Flat Anvil	**2033109**
Maxμm®/// (2)	selectable (3)	Flat Anvil	**2033119**
EDI-10102	0.001 mm/.00005"	Flat Anvil	**EDI-10102**
B5M/C5M	.0005"	Groove Anvil	**IDS-101/IDS-105**
O6I/P6I	0.010 mm	Groove Anvil	**IDS-207/IDS-209**
Maxμm®/// (1)	selectable (3)	Groove Anvil	**2033109**
Maxμm®/// (2)	selectable (4)	Groove Anvil	**2033119**
with Air Probe for 2500:1		All	**
with Electronic Gage Heads		All	**

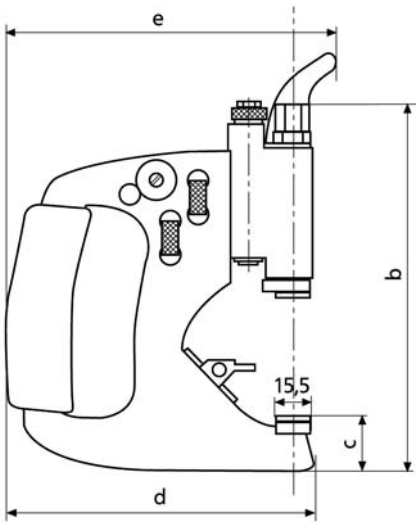
A300P-2

** *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"

300P Snap Gages for Outside Diameters

Technical Data





Dimensions

Measuring Range mm/inch	b	c	d	e
0-25/ ***0-1"***	150/ **6"**	29/ ***1.16"***	145/ ***5.8"***	158/ ***6.3"***
25-50/ ***1-2"***	175/ **7"**	29/ ***1.16"***	141/ ***5.6"***	154/ ***6.16"***
50-76/ ***2-3"***	200/ **8"**	29/ ***1.16"***	155/ ***6.2"***	167/ ***6.7"***
76-100/ **3-4"**	226/ ***9"***	29/ ***1.16"***	167/ ***6.7"***	180/ **7.2"**
100-127/ **4-5"**	251/ ***10"***	29/ ***1.16"***	180/ ***7.2"***	193/ ***7.7"***
127-152/ **5-6"**	278/ ***11"***	30/ ***1.2"***	203/ ***8"***	215/ ***8.6"***
152-178/ ***6-7"***	303/ ***12"***	30/ ***1.2"***	213/ ***8.5"***	226/ ***9"***
178-203/ ***7-8"***	329/ ***13"***	30/ ***1.2"***	231/ ***9.2"***	244/ ***9.7"***
203-229/ **8-9"**	335/ ***13.5"***	30/ ***1.2"***	248/ ***9.9"***	261/ ***10.4"***

Ordering Information

Plain Anvils (Anvils included in price – choose from list below)

No Indicator	No Indicator 8 mm Adaptor	With Maxμm®/// Indicator	With Maxμm Indicator	With AirProbe®	No Indicator with 8 mm Adaptor & Lift Lever	With Dial Indicator No Lift Lever	With Dial Indicator With Lift Lever	Capacity
OMI-300P-1	**2003100**	**EMD-300P-1**	**EDI-300P-1**	**A300P-1**	**2003110**	**300P-1**	**301P-1**	0-25 mm/ ***0-1"***
OMI-300P-2	**2003101**	**EMD-300P-2**	**EDI-300P-2**	**A300P-2**	**2003111**	**300P-2**	**301P-2**	25-50 mm/ ***1-2"***
OMI-300P-3	**2003102**	**EMD-300P-3**	**EDI-300P-3**	**A300P-3**	**2003112**	**300P-3**	**301P-3**	50-76 mm/ ***2-3"***
OMI-300P-4	**2003103**	**EMD-300P-4**	**EDI-300P-4**	**A300P-4**	**2003113**	**300P-4**	**301P-4**	76-100 mm/ ***3-4"***
OMI-300P-5	**2003104**	**EMD-300P-5**	**EDI-300P-5**	**A300P-5**	**2003114**	**300P-5**	**301P-5**	100-127 mm/ ***4-5"***
OMI-300P-6	**2003105**	**EMD-300P-6**	**EDI-300P-6**	**A300P-6**	**2003115**	**300P-6**	**301P-6**	127-152 mm/ ***5-6"***
OMI-300P-7	**2003106**	**EMD-300P-7**	**EDI-300P-7**	**A300P-7**	**2003116**	**300P-7**	**301P-7**	152-178 mm/ ***6-7"***
OMI-300P-8	**2003107**	**EMD-300P-8**	**EDI-300P-8**	**A300P-8**	**2003117**	**300P-8**	**301P-8**	178-203 mm/ ***7-8"***
OMI-300P-9	**2003108**	**EMD-300P-9**	**EDI-300P-9**	**A300P-9**	**2003118**	**300P-9**	**301P-9**	203-229 mm/ ***8-9"***

Blade Anvils (Anvils included in price – choose from list below)

OMI-300P-31		**EMD-300P-31**	**EDI-300P-31**	**A300P-31**		**300P-31**	**301P-31**	0-25 mm/ ***0-1"***
OMI-300P-32		**EMD-300P-32**	**EDI-300P-32**	**A300P-32**		**300P-32**	**301P-32**	25-50 mm/ ***1-2"***
OMI-300P-33		**EMD-300P-33**	**EDI-300P-33**	**A300P-33**		**300P-33**	**301P-33**	50-76 mm/ ***2-3"***
OMI-300P-34		**EMD-300P-34**	**EDI-300P-34**	**A300P-34**		**300P-34**	**301P-34**	76-100 mm/ ***3-4"***
OMI-300P-35		**EMD-300P-35**	**EDI-300P-35**	**A300P-35**		**300P-35**	**301P-35**	100-127 mm/ ***4-5"***

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) MaxμmIII Indicator with Digital Output

300P Indicating Snap Gage for Outside Diameters

Accessories

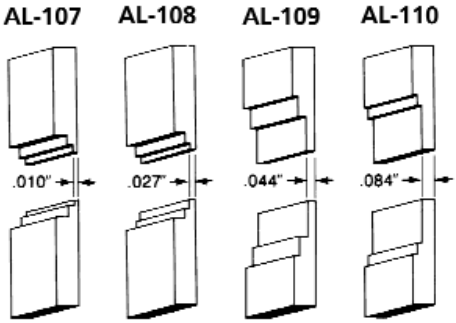
BA-71 Bench Stand for Disc Masters

AL-110

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.

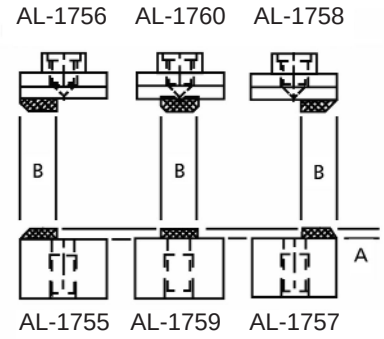
		Order no.
Bench Stand for Gages Clamps 300P and 1000P Series Gages firmly. A 6.4 mm/0.25 in mounting hole allows permanent fastening to bench surface.		**BA-26**
Bench Stand for Disc Masters Holds any AGD type Disc up to 127 mm/5 in diameter and 27 mm/1.12 in wide. Two 6.4 mm/0.25 in mounting holes allow permanent fastening to bench surface		**BA-71**
Gaging pressure options	Lighter Heavier	**SP-192** **SP-118**
EDI-30xP only pressure options	Lighter Heavier	**2243295** **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 = 5.08mm/.250in

Blade Anvils

Width mm / inch	Depth mm / inch	Order no. Steel	T.C.
0.25 mm/ ***.010"***	0.76 mm/ ***.030"***	**AL-107**	**AL-1741**
0.69 mm/ ***.027"***	1.02 mm/ ***.040"***	**AL-108**	**AL-1742**
1.12 mm/ ***.044"***	4.83 mm/ ***.19"***	**AL-109**	**AL-1743**
2.13 mm/ ***.084"***	6.35 mm/ ***.25"***	**AL-110***	**AL-1744**

** normally provided*

Indicating Snap Gages 840 F / 840 FC MaraMeter F

Features

- For cylindrical parts such as shafts, bolts and spindles, for thickness and length measurements
- Rugged, forged steel frame with heat insulators
- Measuring spindle is mounted in long guide way with lever-controlled retraction
- Anvil spindle can easily be fine adjusted
- Measuring spindle and anvil spindle are both made of hardened stainless steel, carbide-tipped or ceramic (840 FC) measuring faces
- Adjustable center stop for automatic alignment
- Maximum wear resistance due to non-contact positioning in conjunction with carbide-tipped measuring faces
- Constant measuring force as a result of built-in spring, thus eliminating user influence
- Universally applicable and extremely versatile. Each instrument spans a broad measuring range, within this range any dimension and fit can be very quickly and easily adjusted

Technical Data

	Measuring range mm	*(inch)*	Measuring** force N	Distance of moveable anvil mm	Measuring face Flatness µm	Parallelism µm	Order no.*	Order no. Wooden case
840 F	0 - 25	***(0 - 1")***	7.5	2	≤ 0.2	≤ 1	**4450000**	**4450010**
	25 - 60	***(1 - 2.36")***	7.5	2	≤ 0.2	≤ 2	**4450001**	**4450011**
	50 - 100	***(2 - 4")***	7.5	2.5	≤ 0.2	≤ 2	**4450002**	**4450012**
	100 - 150	***(4 - 6")***	7.5	2.5	≤ 0.2	≤ 2	**4450003**	**4450013**
	150 - 200	***(6 - 8")***	7.5	2.5	≤ 0.2	≤ 2	**4450004**	**4450014**
840 FC	0 - 25	***(0 - 1")***	7.5	2	≤ 0.2	≤ 1	**4450100**	**4450010**
	25 - 60	***(1 - 2.36")***	7.5	2	≤ 0.2	≤ 2	**4450101**	**4450011**

** Excludes indicating instrument ** Further measuring forces are available on request*

Indicating Instruments

All indicating instruments that has a 8 mm mounting shank may be used.
Recommended are:

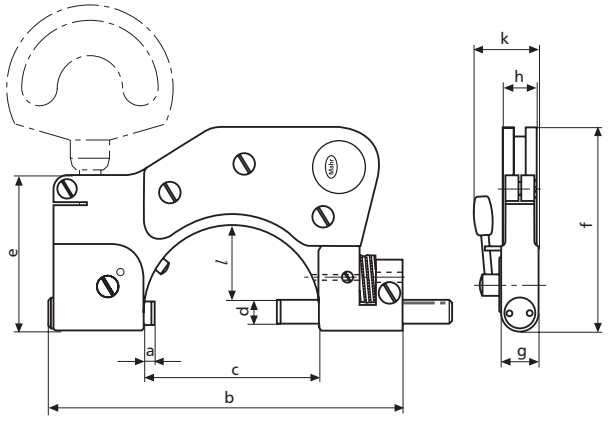
Dial Comparator		Readings mm / *inch*	Order no. mm / *inch*
Compramess	**1004 / *1004 Z***	5 µm / ***.0001"***	**4333000 / *4333900***
Millimess	**1003 / *1003 Z***	1 µm / ***.00005"***	**4334000 / *4334900***
Millimess	**1003 XL**	2 µm	**4334001**
Supramess	**1002 / *1002 Z***	0.5 µm / ***.00002"***	**4335000 / *4335900***
Extramess	**2000**	0.2 µm / ***.00001"*** 0.5 µm / ***.00002"*** 1 µm / ***.00005"***	**4346000***
Extramess	**2001**	0.2 µm / ***.00001"*** 0.5 µm / ***.00002"*** 1 µm / ***.00005"***	**4346100***
µMaxµm		.001 mm/ ***.00005"***	**EDI-10302****

Digital Indicators see Chapter 5
Electrical Indicating Instruments see Chapter 7

** 230 V, for 115 V please refer to page 6-5*
***requires contact 4360107*

2000

1003



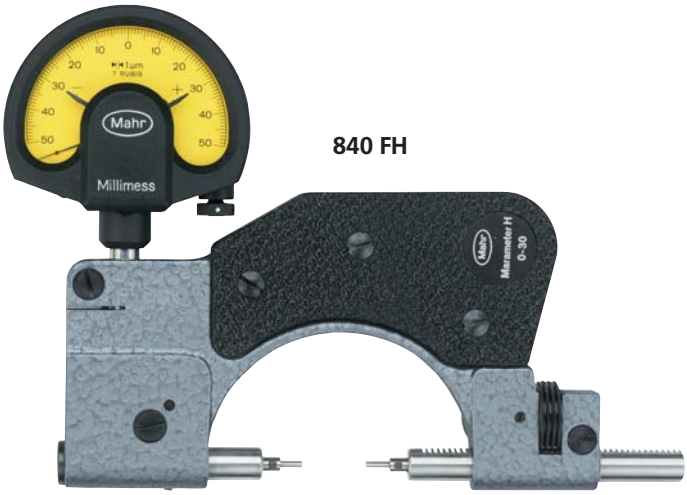
Meas. range mm	0-25	25-60	50-100	100-150	150-200
a*	5	5	6.5	6.5	6.5
b	97	140	193	258	316
c	34	68	110	162	212
d	8	9	10	12	12
e	54	60	60	70	75
f	65	77	103	141	171
g	12	13	14	16	16
h	13	13	13	12	12
k	23	25	28	31	31
l	14	30	54	81	106

** In initial position*

Accessories

Reference Discs 390 see Chapter 13
Gage Blocks see Chapter 13
Holder 840 Fk and **Stand 840 Ff** see Page 9-13

Indicating Snap Gage 840 FH with interchangeable anvils



840 FH

Features

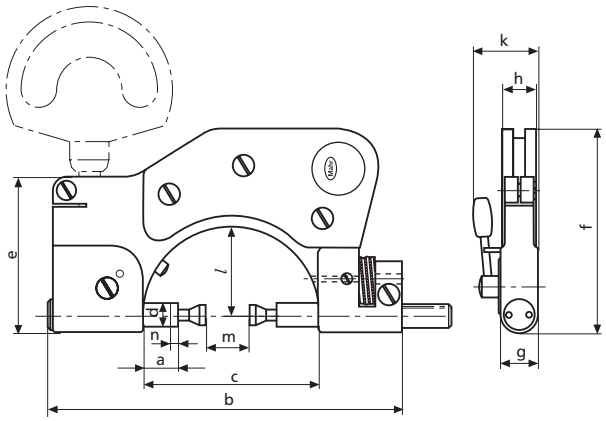
- Measuring spindle and anvil spindle have precision tapered bores for mounting interchangeable anvils 40 He
- For cylindrical parts such as shafts, bolts and spindles
- Rugged, forged steel frame with heat insulators
- Measuring spindle is mounted in long guide way with lever-controlled retraction
- Anvil spindle can easily be fine adjusted
- Measuring spindle and anvil spindle and both made from hardened stainless steel
- Maximum wear resistance due to non-contact positioning
- Constant measuring force as a result of built-in spring, thus eliminating user influence
- Universally applicable
- All kinds of measurement problems can be solved with the broad range of interchangeable anvils

Technical Data

	Measuring range* mm	(inch)	Distance of moveable anvil mm	Meas. force N	Order no.**	Order no. Wooden case
840 FH	0 - 30	*(0 - 1.18")*	2	7.5	**4451000**	**4510010**
	30 - 80	*(1.18 - 3")*	2.5	7.5	**4451005**	**4510011**

* *Measuring is dependent upon the length of the anvils being used*

** *Excludes indicating instrument*



Meas. range m (mm)	840 FH 0-30	30-80
a*	12.5	7.5
b	140	193
c	68	110
d	9	10
e	60	60
f	77	103
g	13	13
h	13	13
k	25	28
l	34	59
n**	2	2.5

* *In initial position*

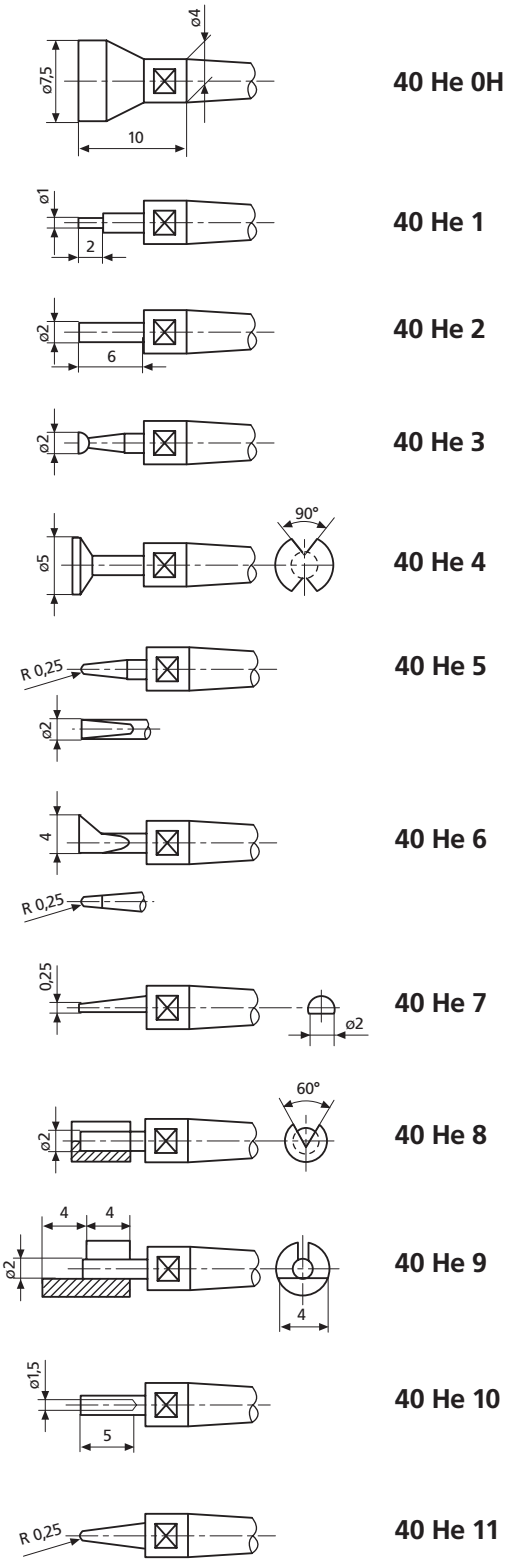
** *Distance of moveable anvil*

Interchangeable Anvils 40 He for Indicating Snap Gage 840 FH

with tapered shank

Catalog no.	Features	Order no.
40 He 0H*	Flat faces	**4152036**
40 He 1	Stepped flat faces	**4152011**
40 He 1H*	Stepped flat faces	**4152033**
40 He 2	Stepped flat faces	**4152012**
40 He 2H*	Stepped flat faces	**4152032**
40 He 3	Discs	**4152013**
40 He 4	Discs with V-groove	**4152014**
40 He 5	Blades	**4152015**
40 He 6	Offset blades	**4152016**
40 He 7	Recessed blades	**4152017**
40 He 8	Recessed flat faces with V-grooves on sleeve	**4152018**
40 He 9	Recessed flat faces with slip on support	**4152019**
40 He 10	With clearance bores	**4152020**
40 He 11	Point	**4152021**

** Carbide version*



Indicating Instruments

All indicating instruments that has a 8 mm mounting shank may be used. Recommended are:

Dial Comparator		Readings mm / *inch*	Order no. mm / *inch*
Compramess	**1004 / *1004 Z***	5 µm/ ***.0001"***	**4333000/*4333900***
Millimess	**1003 / *1003 Z***	1 µm/ ***.00005"***	**4334000/*4334900***
Millimess	**1003 XL**	2 µm	**4334001**
Supramess	**1002 / *1002 Z***	0.5 µm/ ***.00002"***	**4335000/*4335900***
Extramess	**2000**	0.2 µm/ ***.00001"***	
		0.5 µm/ ***.00002"***	**4346000***
		1 µm/ ***.00005"***	
Extramess	**2001**	0.2 µm/ ***.00001"***	
		0.5 µm/ ***.00002"***	**4346100***
		1 µm/ ***.00005"***	
µMaxµm		.001mm/***.00005"***	**EDI-10302****

Digital Indicators see Chapter 5
Electrical Indicating Instruments see Chapter 7
** 230 V, for 115 V please refer to page 6-5 ** requires contact 4360107*

Accessories

Spanner (Included in scope of supply)
for **840 FH**, to loosen anvils
Order no. **4880210**

Reference Discs 390 see Chapter 13
Gage Blocks see Chapter 13
Holder 840 Fk and **Stand 840 Ff** see Page 9-13

Indicating Snap Gages 840 FG with interchangeable anvils

840 FG

Features

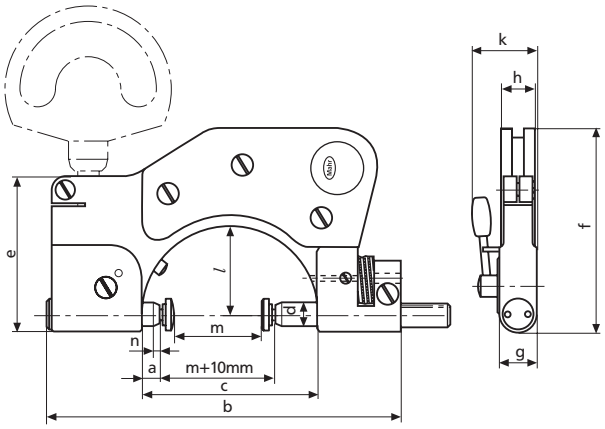
- Measuring spindle and anvil spindle have a M 2,5 connection thread, thus enabling the use of interchangeable anvils that are also used in dial indicators and dial comparators
- For cylindrical parts such as shafts, bolts and spindles
- Rugged, forged steel frame with heat insulators
- Measuring spindle is mounted in long guide way with lever-controlled retraction
- Anvil spindle can easily be fine adjusted
- Measuring spindle and anvil spindle and both made from hardened stainless steel
- Maximum wear resistance due to non-contact positioning
- Constant measuring force as a result of built-in spring, thus eliminating user influence
- Universally applicable
- All kinds of measurement problems can be solved with the broad range of interchangeable anvils

Technical Data

	Measuring range* mm	(inch)	Distance of moveable anvil mm	Meas. force N	Order no.**	Order no. Wooden case
840 FH	0 - 50	*(0 - 2")*	2	7.5	**4454000**	**4450011**
	30 - 90	*(1.57 - 3.57")*	2.5	7.5	**4454001**	**4450012**

* *Measuring is dependent upon the length of the anvils being used*

** *Excludes indicating instrument*



Meas. range m (mm)	840 FG 0-50	40-90
a*	5	6.5
b	140	193
c	68	110
d	9	10
e	60	60
f	77	103
g	13	14
h	13	13
k	25	28
l	34	59
n**	2	2.5

* *In initial position*

** *Distance of moveable anvil*

Interchangeable Anvils for Indicating Snap Gage 840 FG

Catalog no.	Features	Order no.
901 H	Standard contact point with carbide ball, ball dia.3 mm	**4360002**
902 H	Spherical contact point with carbide face R = 6 mm	
	Length *l* in mm	
	10	**4360041**
	15	**4360043**
	20	**4360044**
903 H*	Flat contact point, carbide tipped	
	Length *l* in mm	
	6	**4360101**
	10	**4360103**
	15	**4360105**
	20	**4360106**
904 H	Conical contact point, carbide tipped	**4360131**

906 H **Ball Contact Points**

with carbide ball,
manufacuring tolerance ball dia. 0/-6 µm

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

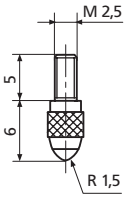
Indicating Instruments

All indicating instruments that has a 8 mm mounting shank may be used. Recommended are:

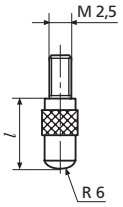
Dial Comparator		Readings mm / *inch*	Order no. mm / *inch*
Compramess	**1004 / *1004 Z***	5 µm/ ***.0001"***	**4333000/*4333900***
Millimess	**1003 / *1003 Z***	1 µm/ ***.00005"***	**4334000/*4334900***
Millimess	**1003 XL**	2 µm	**4334001**
Supramess	**1002 / *1002 Z***	0.5 µm/ ***.00002"***	**4335000/*4335900***
Extramess	**2000**	0.2 µm/ ***.00001"***	
		0.5 µm/ ***.00002"***	**4346000***
		1 µm/ ***.00005"***	
Extramess	**2001**	0.2 µm/ ***.00001"***	
		0.5 µm/ ***.00002"***	**4346100***
		1 µm/ ***.00005"***	
µMaxµm		.001mm/***.00005"***	**EDI-10302****

Digital Indicators see Chapter 5
Electrical Indicating Instruments see Chapter 7
** 230 V, for 115 V please refer to page 6-5 ** requires contact 4360107*

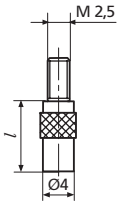
901 H



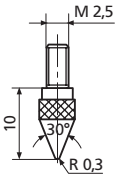
902 H



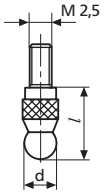
903 H



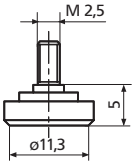
904 H



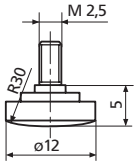
906 H



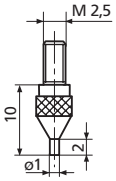
907



908 H



911 H



Catalog no.	Features	Order no.
907	Flat contact plates* steel, dia. 11.3 mm, A = 1 cm^2	**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.*

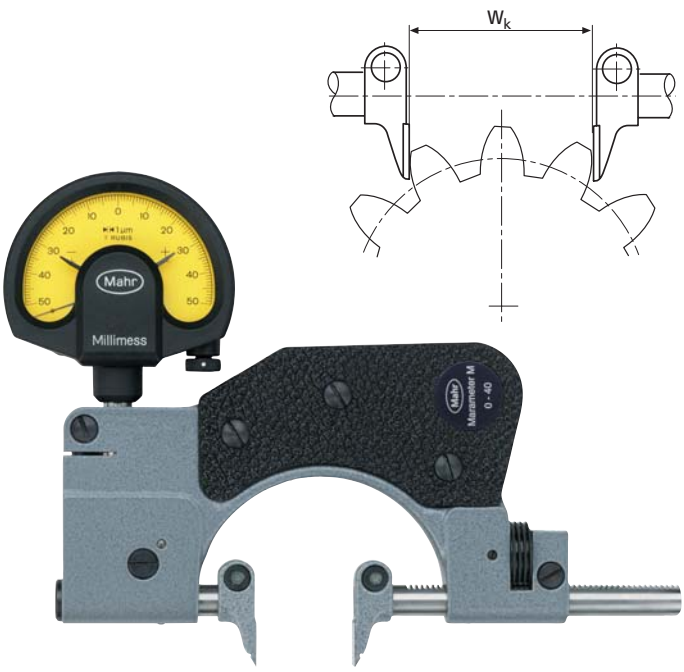
Accessories

Reference Discs 390 see Chapter 13

Gage Blocks see Chapter 13

Holder 840 Fk and **Stand 840 Ff** see Page 9-13

Indicating Snap Gages 840 FM MaraMeter M with measuring jaws



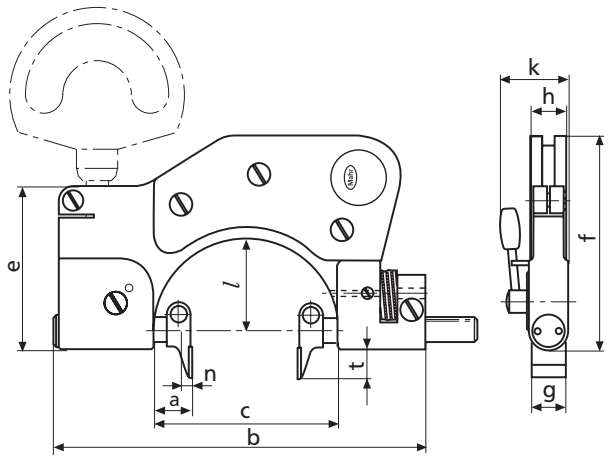
Features

- For diameters of small hubs, registers, shoulders on shafts and groove widths as well as for tooth span W_k as indirect, reference-free determination of tooth thickness on spur gears with straight and helical teeth
- Rugged, forged steel frame with heat insulators
- Measuring spindle is mounted in long guide way with lever-controlled retraction
- Anvil spindle can easily be fine adjusted
- Maximum wear resistance due to non-contact positioning in conjunction with carbide-tipped measuring faces
- Measuring spindle and anvil spindle made of hardened stainless steel; with extending carbide-tipped measuring jaws
- Constant measuring force as a result of built-in spring, thus eliminating user influence
- Universally applicable and extremely versatile, each instrument spans a broad measuring range, within this range any dimension and fit can be very quickly and easily adjusted

Technical Data

Measuring range mm	*(inch)*	Measuring force N	Measuring face area mm	flatness µm	parallelism µm	Tooth span measurements as per module m	Order no.*	Order no. Wooden case
0 - 40	*(0 - 1.57")*	7.5	12 x 12	≤ 0.5	≤ 2	0.5	**4452000**	**4450011**
40 - 80	*(1.57 - 3")*	7.5	12 x 12	≤ 0.5	≤ 3	0.5	**4452001**	**4450012**
80 - 130	*(3 - 5")*	9	15 x 17	≤ 0.5	≤ 3	1.0	**4452002**	**4450013**
130 - 180	*(5 - 7")*	9	15 x 17	≤ 0.5	≤ 3	1.0	**4452003**	**4450014**

* *Excludes indicating instrument*



Dimensions

Meas. range (mm)	0-40	40-80	80-130	130-180
Dist mov. anvil n (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
t	11	11	17	17

* *In initial position*

Accessories

Indicating instruments, see Page 9-7
Reference Discs 390 see Chapter 13
Gage Blocks see Chapter 13
Holder 840 Fk and **Stand 840 Ff** see Page 9-13

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

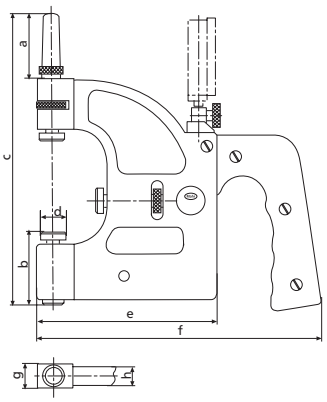
- For stationary application in conjunction with the following measuring instruments **840 F/FC, 840 FH, 840 FG, 840 FM, 840 E** and **852**
- User has both hands free for insertion of work piece and retraction of moving spindle
- Indicating instrument is always in operator's field of vision
- Rugged, 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



Dimensions

Meas. range mm	dia. d	a	b	c	e	f	g	h
10 - 30	18	37	46	154	87	161	17	15
30 - 60	18	45	51	199	122	196	17	15
60 - 100	22	56	62	260	154	228	20	18
100 - 150	22	71	62	335	189	263	20	18
150 - 200	22	71	62	385	214	288	20	18
200 - 250	22	71	62	436	248	322	20	18
250 - 300	22	71	62	487	280	354	20	18
300 - 350	22	71	62	537	310	384	20	18
350 - 400	22	71	62	587	350	424	20	18
400 - 450	22	71	62	637	380	454	20	18
450 - 500	22	71	62	687	410	484	20	18

Technical Data

Measuring range mm	Measuring range *(inch)*	Measuring force N	Distance of moveable anvil mm	Meas. faces flatness µm	Meas. faces Parallelism µm	Weight kg	Order no.*	Order no. Wooden case
10 - 30	*(.39 - 1.18")*	13.5	0.7	≤ 0.5	≤ 3	0.6	**4455000**	**4455020**
30 - 60	*(1.18 - 2.36")*	13.5	0.7	≤ 0.5	≤ 3	0.9	**4455001**	**4455021**
60 - 100	*(2.36 - 4")*	13.5	0.7	≤ 0.5	≤ 3	1.3	**4455002**	**4455022**
100 - 150	*(4 - 6")*	15	0.7	≤ 0.5	≤ 3	1.7	**4455003**	**4455023**
150 - 200	*(6 - 8")*	15	0.7	≤ 0.5	≤ 3	2.0	**4455004**	**4455024**
200 - 250	*(8 - 10")*	15	0.7	≤ 0.5	≤ 3	2.2	**4455005**	**4455025**
250 - 300	*(10 - 12")*	15	0.7	≤ 0.5	≤ 3	2.5	**4455006**	**4455026**
300 - 350	*(12 - 14")*	15	0.7	≤ 0.5	≤ 4	3.3	**4455007**	**4455027**
350 - 400	*(14 - 16")*	15	0.7	≤ 0.5	≤ 4	3.3	**4455008**	**4455028**
400 - 450	*(16 - 18")*	15	0.7	≤ 0.5	≤ 4	4.3	**4455009**	**4455029**
450 - 500	*(18 - 20")*	15	0.7	≤ 0.5	≤ 4	4.7	**4455010**	**4455030**

** Excludes indicating instrument*

Accessories for Indicating Snap Gages 840 FS MaraMeter S

Indicating Instruments

All indicating instruments that has a 8 mm mounting shank may be used. Recommended are:

Dial Comparator		Readings mm / *inch*		Order no. mm / *inch*
Compramess	**1004 / *1004 Z***	5 µm/	***.0001"***	**4333000/*4333900***
Millimess	**1003 / *1003 Z***	1 µm/	***.00005"***	**4334000/*4334900***
Millimess	**1003 XL**	2 µm		**4334001**
Supramess	**1002 / *1002 Z***	0.5 µm/	***.00002"***	**4335000/*4335900***
Extramess	**2000**	0.2 µm/	***.00001"***	
		0.5 µm/	***.00002"***	**4346000***
		1 µm/	***.00005"***	
Extramess	**2001**	0.2 µm/	***.00001"***	
		0.5 µm/	***.00002"***	**4346100***
		1 µm/	***.00005"***	
µMaxµm		.001mm/	***.00005"***	**EDI-10302****

Digital Indicators see Chapter 5
Electrical Indicating Instruments see Chapter 7
** 230 V, for 115 V please refer to page 6-5 ** requires contact 4360107*

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

Technical Data

Measuring range	0-25 mm
Readings/ Resolution adjustable to*	0.01 µm
Measuring force	4.5 N
Measuring face dia.	7.5 mm
Repeatability	≤ 0.1 µm
Parallelism of measuring surfaces	≤ 0.3 µm
Order no. (without indicating instruments)	**4453000**
Order no. Wooden case	**4453010**

** Depending upon which indicating instrument is being used*

Accessories

Reference Discs 390 see Chapter 13
Gage Blocks see Chapter 13
Stand 840 Ff see Page 9-13

Recommended indicating instruments:
Electrical indicating instruments; ideal are C 1210 M and 1240 see Chapter 7

Indicating Thread Snap Gage 852

Features

- For measuring pitch, root and outside diameters of all kinds of external threads as well as serrations
- Rugged, forged steel frame with heat insulators
- Measuring spindle is mounted in long guide way with lever-controlled retraction
- Anvil spindle can easily be fine adjusted
- Measuring spindle and anvil spindle are both made of hardened stainless steel, with mounting bore for insertion of interchangeable anvils
- Adjustable center stop for automatic alignment
- Maximum wear resistance due to non-contact positioning
- Constant measuring force as a result of built-in spring, thus eliminating user influence
- Universally applicable and extremely versatile. each instrument spans a broad measuring range

Technical Data

Measuring range* mm	*(inch)*	Meas.force N	Order no.**	Order no. wooden case
0 - 45	*(0 - 1.77")*	7.5	**4510000**	**4510010**
45 - 85	*(1.77 - 3.34")*	7.5	**4510001**	**4510011**
85 -140	*(3.34 - 5.51")*	9	**4510002**	**4510012**
140 -190	**(5.51 - 7.48")**	9	**4510003**	**4510013**

* *Depending upon which anvils are being used*
** *Excludes indicating instrument*

Indicating Instruments

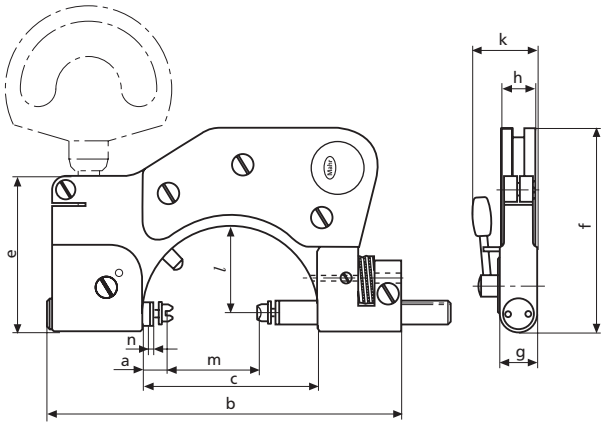
All indicating instruments that has a 8 mm mounting shank may be used. Recommended are:

Dial Comparator		Readings mm / *inch*		Order no. mm / *inch*
Compramess	**1004 / *1004 Z***	5 µm/	***.0001"***	**4333000/*4333900***
Millimess	**1003 / *1003 Z***	1 µm/	***.00005"***	**4334000/*4334900***
Millimess	**1003 XL**	2 µm		**4334001**
Supramess	**1002 / *1002 Z***	0.5 µm/	***.00002"***	**4335000/*4335900***
Extramess	**2000**	0.2 µm/	***.00001"***	
		0.5 µm/	***.00002"***	**4346000***
		1 µm/	***.00005"***	
Extramess	**2001**	0.2 µm/	***.00001"***	
		0.5 µm/	***.00002"***	**4346100***
		1 µm/	***.00005"***	
µMaxµm		.001mm/	***.00005"***	**EDI-10302****

Digital Indicators see Chapter 5
Electrical Indicating Instruments see Chapter 7
** 230 V, for 115 V please refer to page 6-5 ** requires contact 4360107*

Accessories

Interchangeable Anvils please refer to Pages 9-19 to 9-21
Thread Setting Plug Gages see Page 13-20
Holder 840 Fk and **Stand 840 Ff** (for 0-45 mm) see Page 9-13



Meas. range m (mm)	0-45	45-85	85-140	140-190
Dist mov. anvil n (mm)	2	2.5	2.5	2.5
a*	13	8	10	6
b	140	193	258	316
c	68	110	162	212
e	60	60	70	75
f	77	103	141	171
g	13	14	16	16
h	13	13	12	12
k	25	28	31	31
l	34	59	87	112

a = in initial position*

Indicating Bench Snap Gage 852 TS

Application

- For rapid measurements of diameters of cylindrical parts (shafts, bolts and shanks)
- For measuring pitch, root and outside diameters of all kinds of external threads as well as serrations
- For thickness and length measurement
- Particularly suited for batch produced parts

Features

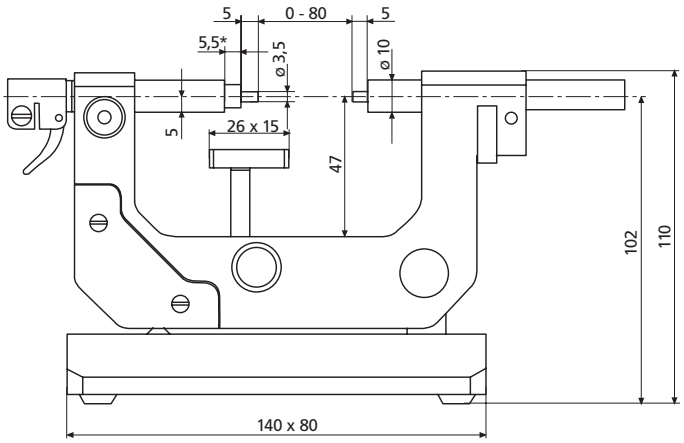
- Rugged steel frame, can be inclined up to 45° from the sturdy base
- Measuring spindle and anvil spindle are both made of hardened stainless steel, with mounting bore for insertion of interchangeable anvils
- Anvil spindle can easily be fine adjusted
- Height adjustable stop
- Constant measuring force as a result of built-in spring, thus eliminating user influence
- Universally applicable and extremely versatile, each instrument spans a broad measuring range

- Scope of supply:
  TC tipped-anvils
  dia. D= 3,5 mm,
  Dial Comparator 1003

Technical Data

Measuring range [1] mm	*(inch)*	Retraction mm	Measuring force N	Measuring face Parallelism µm	Stem dia.	Order no.
0 - 80	*(0 - 4")*	1.2	6.5	≤ 2	8 mm	**4510030**
					8 mm	**4510031** [2]
					.375"	**4510035** [2]

1 *Depending upon which anvils are being used*
2 *Excludes indicating instrument*
Delivery with a different indicating instrument is available upon request
* *In initial position*



Accessories

Interchangeable Anvils please refer to Pages 9-19 to 9-21
Thread Setting Plug Gages see Page 13-20

Indicating Thread Snap Gage 853 for taps

Features

- For pitch, root and outside diameters on taps in conjunction with interchangeable anvils
- Measuring spindle mounted in long guideway, lever-controlled retraction with mounting bore for interchangeable anvils
- Anvil spindle adjustable with thumbscrew via worm and rack, for mounting interchangeable 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 9-16

Technical Data

Meas. range mm	*(inch)*	Meas. force N	Order no.*	Order no. Wooden case
1.2 - 35	*(.04 - 1.37")*	7.5	**4511000**	**4511020**
35 - 75	*(1.37 - 3")*	7.5	**4511001**	**4511021**

** Excludes indicating instrument*

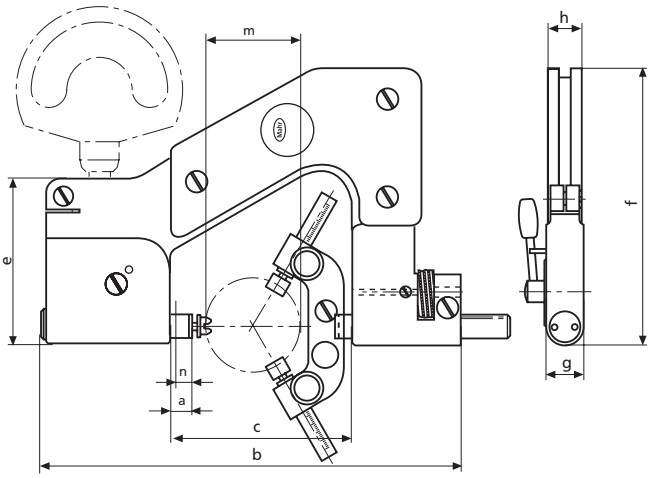
Interchangeable Support Yokes 853 q

Depending upon the number of flutes, allowance has to be made for a compensation factor when reading the result. See the following table:

Cat. no.	No. of flutes of taps	For meas. range mm	Compens. factor**	Order no.
853 qk 3	3	1.2 - 35	x 1	**4511024**
853 qk 5	5	1.2 - 35	x 1.34	**4511026**
853 qk 7	7	1.2 - 35	x 1.42	**4511028**
853 qg 3	3	35 - 75	x 1	**4511025**
853 qg 5	5	35 - 75	x 1.34	**4511027**
853 qg 7	7	35 - 75	x 1.42	**4511029**

*** Allowance is to be made for other compensation methods when using the Holder 840 Fk*

Electrical indicating instruments see Chapter 7.
The compensation factor can be entered into the Millitron 1240



Meas. range m (mm)	1.2-35	35-75
Dist mov. anvil n (mm)	8	8
a*	12	11.5
b	152	192
c	66	110
e	60	65
f	98	125
g	14	14
h	11.5	14

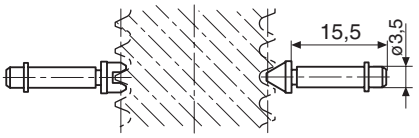
a = in initial position*

Accessories

Dial Comparators see Page 9-16
Recommendations: 810 S (see Page 5-32), 1010, 1004
Interchangeable Anvils see from Pages 9-19 to 9-21
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 mm	V-anvil Order no.	Blade Order no.	Pitch range tpi	V-anvil Order no.	Blade Order no.	Pitch range tpi	V-anvil Order no.	Blade 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 mm	V-anvil Order no.	Blade Order no.	Pitch range tpi	V-anvil Order no.	Blade Order no.	Pitch range tpi	V-anvil Order no.	Blade Order no.
0.2	**4173051**	**4174007**	40 - 32	**4173043**	**4176043**	60 - 48	**4173124**	**4176113**
0.25	**4173052**	**4174008**	32 - 24	**4173044**	**4176044**	48 - 40	**4173125**	**4176114**
0.3	**4173053**	**4174009**	24 - 18	**4173045**	**4176045**	40 - 32	**4173115**	**4176115**
0.35	**4173054**	**4174010**	18 - 14	**4173046**	**4176046**	32 - 24	**4173116**	**4176116**
0.4	**4173055**	**4174011**	14 - 10	**4173047**	**4176047**	24 - 18	**4173117**	**4176117**
0.45	**4173056**	**4174012**	10 - 7	**4173048**	**4176048**	18 - 14	**4173118**	**4176118**
0.5 - 0.7	**4173000**	**4174000**	7 - 4.5	**4173049**	**4176049**	14 - 10	**4173119**	**4176119**
0.7 - 1	**4173001**	**4174001**	4.5 - 3	**4173050**	**4176050**	10 - 7	**4173120**	**4176120**
1.25- 2	**4173002**	**4174002**	3 - 2.5	**4179408**	**4179411**	7 - 4.5	**4173121**	**4176121**
2 - 3.5	**4173003**	**4174003**				4.5 - 3	**4173122**	**4176122**
3.5 - 5	**4173004**	**4174004**						
5 - 7	**4173005**	**4174005**						
7 - 9	**4173006**	**4174006**						

Carbide anvils for 852, 852TS and 853

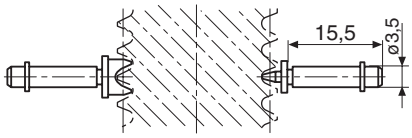
1.25- 2	**4511105**	**4511104**
2 - 3.5	**4511108**	**4511107**
3.5 - 5	**4511140**	**4511139**
5 - 7	**4511142**	**4511141**

** V-anvil covers 3 pitches*

Interchangeable Anvils for 852, 852 TS and 853

For root diameters

Each pitch requires a separate V-anvil.
Blade can be used for several pitches.



Anvils for root diameters

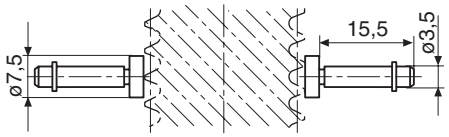
Metric thread (60°)			Whitworth thread (55°)			American UST-thread (60°)
Pitch	V-anvil	Blade	Pitch range	V-anvil	Blade	The same anvils are to be used as with the Whitworth-thread (55°).
mm	Order no.	Order no.	tpi	Order no.	Order no.	
0.5	4173213		40	4173331		
0.6	4173214		36	4173321	4173833	
0.7	4173215		32	4173332		
0.75	4173216	4173719	28	4173333		
0.8	4173217		26	4173335		
0.9	4173218		24	4173336		
1	4173219		22	4173337	4173840	
1.25	4173221		20	4173338		
1.5	4173222	4173723	19	4173339		
1.75	4173223		18	4173340		
2	4173225		16	4173342	4173843	
2.5	4173226	4173727	14	4173343		
3	4173227		12	4173345	4173847	
3.5	4173229		11	4173346		
4	4173230	4173731	10	4173347		
4.5	4173231		9	4173349	4173851	
5	4173233		8	4173350		
5.5	4173234	4173735	7	4173451		
6	4173235		6	4173453		
7	4173237		5	4173454	4173855	
8	4173238	4173739	4.5	4173455		
9	4173239		4	4173457		
			3.5	4173458	4173860	
			3.25	4173459		
			3	4173460		

For outside diameters

Anvil 40 Za, flat

Measuring face dia. 7.5 mm
with 853 smallest
measurable O.D. dia. 5 mm

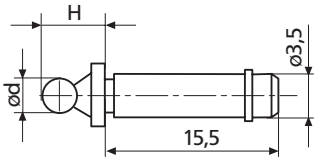
Hardened steel **Order no.** **4173210**
Carbide tipped **Order no.** **4511190**



Interchangeable Anvils for 852 and 852 TS

Ball anvils

For measuring gears and for special applications. Carbide ball.
With cylindrical mounting shank and retainer ring.
For mounting into mounting bores of thread micrometers 40 Z and 852.



Shank dia.	3.5 mm
Shank length	15.5 mm
Manufacturing tolerance Ball dia.	± 2 µm

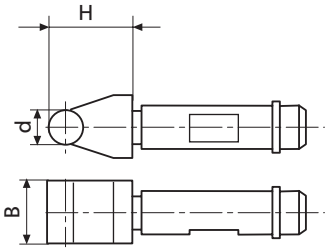
dia. **d** mm	**H** mm	**Order no.**	dia. **d** mm	**H** mm	**Order no.**	dia. **d** mm	**H** mm	**Order no.**
0.5	5.0	**4179150**	1.65	6.2	**4179168**	3.048	7.5	**4179182**
0.551	5.1	**4179151**	1.7	6.2	**4179169**	3.2	7.7	**4170570**
0.62	5.1	**4179152**	1.75	6.3	**4170553**	3.25	7.8	**4170566**
0.623	5.1	**4179153**	1.782	6.3	**4179170**	3.4	7.9	**4179183**
0.63	5.1	**4179154**	1.8	6.3	**4179171**	3.5	8.0	**4170558**
0.722	5.2	**4179155**	1.829	6.3	**4179172**	3.658	8.2	**4179184**
0.862	5.4	**4179156**	1.9	6.4	**4179173**	3.7	8.2	**4170571**
0.895	5.4	**4179157**	2	6.5	**4170554**	4	8.5	**4170559**
0.965	5.5	**4179158**	2.032	6.5	**4170568**	4.5	9.0	**4170560**
1	5.5	**4170550**	2.2	6.7	**4170569**	4.835	9.3	**4179185**
1.1	5.6	**4179159**	2.25	6.8	**4170564**	5	9.5	**4170561**
1.118	5.6	**4179160**	2.284	6.8	**4179174**	5.25	9.8	**4179186**
1.125	5.6	**4179161**	2.386	6.9	**4179175**	5.486	10.0	**4179187**
1.25	5.8	**4170551**	2.438	6.9	**4179176**	5.5	10.0	**4170562**
1.35	5.9	**4179162**	2.5	7.0	**4170556**	6	10.5	**4170563**
1.372	5.9	**4179163**	2.667	7.2	**4179177**	6.096	10.6	**4179188**
1.385	5.9	**4179164**	2.704	7.2	**4179178**	6.35	10.9	**4179189**
1.5	6.0	**4170552**	2.713	7.2	**4179179**	6.5	11.0	**4170567**
1.524	6.0	**4179165**	2.721	7.2	**4179180**	7	11.5	**4170572**
1.54	6.0	**4179166**	2.743	7.2	**4179181**	8	12.5	**4170573**
1.6	6.1	**4179167**	2.75	7.3	**4170565**	9	13.5	**4170574**
			3	7.5	**4170557**	10	14.5	**4170575**

Further sizes are available upon request (material: steel)

Roller Blades

For measuring gears and for special applications. The measuring roller is made of carbide.
To be mounted in the mounting bores of the 40 Z and 852.

Shank dia.	3.5 mm
Shank length	15.5 mm
Manufacturing tolerance Ball dia.	± 2 µm



dia. **d** mm	**Dimension H** mm	**Dimension B** ø mm	**Order no.**
1	5.5	5	**4510200**
1.25	5.8	5	**4510201**
1.5	6.0	5	**4510202**
1.75	6.3	5	**4510203**
2	6.5	5.5	**4510204**
2.5	7.0	5.5	**4510206**
3	7.5	5.5	**4510207**
3.5	8.0	5.5	**4510208**
4	8.5	5.5	**4510209**
4.5	9.0	5.5	**4510210**
5	9.5	6	**4510211**
5.5	10.0	6	**4510212**
6	10.5	6	**4510213**

Further sizes are available upon request (material: steel)

22 P Portable Thickness Gages

Portable measurement of sheet materials and small parts

22P-15

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.

XLI-22P-20 with **XLI-20000** µMaxµm XL Digital Indicator (front mounted) and BA-26 Stand (Stand not included)

XLI-22P-20 with **XLI-20000** µMaxµm XL Digital Indicator

Technical Data

Metric	Inch	Capacity	Throat Depth	Graduation
22P-10M	**22P-11**	0-2.54 mm/ ***0-.10"***	28.6 mm/ ***1.13"***	.002 mm/ ***.0001"***
22P-15M	**22P-15**	0-12.70 mm/ ***0-.50"***	50 mm/ ***2"***	.01 mm/ ***.001"***
22P-20M	**22P-20**	0-25 mm/ ***0-1"***	50 mm/ ***2"***	.01 mm/ ***.001"***
XLI-22P-20		25 mm/ ***0-1"***	50 mm/ ***2"***	.001mm/ ***.00005"*** (Resolution)

26 P Portable Thickness Gages

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	Throat Depth	Graduation
26P-7M	**26P-7**	0-7.6 mm/ ***0-.30"***	16 mm/ ***.63"***	.01 mm/ ***.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

Catalog-no.	Throat depth mm *(inch)*	Measuring range mm *(inch)*	Measuring face dia. mm	Measuring face radius mm	Order no. with Indicator **810** 0.01 mm Res	Order no. with Indicator **1080** 0.005/ .0001" Res	Order no. Wooden case
838 A	50 *(2")*	0 - 20 *(0 - .750")*	11.3 = 1 cm²	-	**4495000**	**4495120**	**4495050**
	100 *(4")*	0 - 20 *(0 - .750")*	11.3 = 1 cm²	-	**4495001**	**4495121**	**4495051**
	200 *(8")*	0 - 20 *(0 - .750")*	11.3 = 1 cm²	-	**4495002**	**4495122**	**4495052**
	50 *(2")*	0 - 20 *(0 - .750")*	20 = 3.14 cm²	-	**4495103**	**4495125**	**4495050**
	100 *(4")*	0 - 20 *(0 - .750")*	20 = 3.14 cm²	-	**4495104**	**4495126**	**4495051**
	200 *(8")*	0 - 20 *(0 - .750")*	20 = 3.14 cm²	-	**4495105**	**4495127**	**4495052**
	50 *(2")*	0 - 20 *(0 - .750")*	30 = 7.06 cm²	-	**4495109**	**4495130**	**4495050**
	100 *(4")*	0 - 20 *(0 - .750")*	30 = 7.06 cm²	-	**4495110**	**4495131**	**4495051**
	200 *(8")*	0 - 20 *(0 - .750")*	30 = 7.06 cm²	-	**4495111**	**4495132**	**4495052**
838 B	50 *(2")*	0 - 20 *(0 - .750")*	12	30	**4495010**	**4495135**	**4495050**
	100 *(4")*	0 - 20 *(0 - .750")*	12	30	**4495011**	**4495136**	**4495051**
	200 *(8")*	0 - 20 *(0 - .750")*	12	30	**4495012**	**4495137**	**4495052**

838 AB

Features

- Rugged sturdy frame made from hard aluminum
- Built-in Digital or Dial Indicator or Dial Comparator
- With a lifting lever for the moveable upper measuring spindle
- Convenient heat insulated handle, open at one end

Thickness Gage 838 AB

- Lower measuring face is flat
- Upper measuring face is spherical
- For measuring hard materials for example; sheet metal, hardboard

Technical Data

Catalog no.	Throat depth mm *(inch)*	Measuring range mm *(inch)*	Measuring face dia. mm lower	Measuring face radius mm upper	Order no. with Indicator **810** 0.01 mm Res	Order no. with Indicator **1080** 0.005/ .0001" Res	Order no. Wooden case
838 AB flat/ spherical	50 *(2")* 100 *(4")*	0 -20 *(0 - .750")* 0 -20 *(0 - .750")*	11.3 = 1 cm² 11.3 = 1 cm²	30 30	**4495504**	**4495140** **4495141**	**4495050** **4495051**

Catalog no.	Throat depth mm *(inch)*	Measuring range mm *(inch)*	Measuring faces dia. mm lower	Measuring faces radius mm upper	Order no. with Indicator **1082** 0.001 mm/ .0005" Res	Order no. with Comparator **1003** 1 µm Res	Order no. Wooden case
838 AB flat/ spherical	50 *(2")* 100 *(4")*	0 -20 *(0 - .750")* 0 -20 *(0 - .750")*	11.3 = 1 cm² 11.3 = 1 cm²	30 30	**4495145** **4495146**	**4495519** **4495517**	**4495050** **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	Description
57B-14M	**57B-14**	0-2.5mm/ 0-.10"	Dial Indicator readout with 2.5mm/ .10"sensitive range and .002mm/ .0001" grads.
57B-15M	**57B-15**	0-25mm/ 0-1"	Dial Indicator readout with 25mm/ 1" sensitive range and .01mm/.001"grads.
XLI-57B-15			μMaxμm® XL Digital Indicator with 25mm/ 1" range and .001mm/ .00005" resolution (Model XLI-50002).

Alternate Indicators and contact points available upon request.
Contact Mahr Federal.

Wire Insulation Thickness Gages 57B

For checking wall thickness of wire insulation and other small-diameter tubular parts

B-13

Features

- Using the basic design of the Model 57B-13 (Model 57B-13M – Metric) Gage, the lower contact is PT-103, 1.10mm/ .0432 diameter rod, mounted horizontally. The upper radiused contact is a chisel contact, in line with the rod. By slipping tubular parts onto the lower contact, the gage can measure the thickness of the wall of the tube. A 10 gram auxiliary weight (WT-3) on the Indicator provides a total dead-load weight of 25 grams. (Replacement lower rod: PS-43)

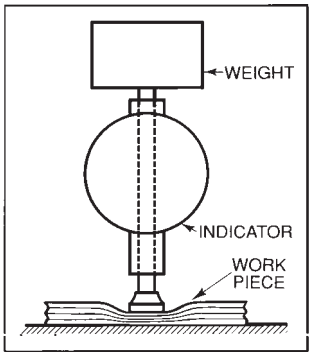
Technical Data

Order no. Metric	Inch	Capacity	Description
57B-13M	**57B-13**	0-2.5mm/ 0-.10"	Dial Indicator readout with7.6mm/ .30" sensitive range and 0.01mm/ .0005" grads.
XLI-57B-13			µMaxµm® XL Digital Indicator with 25mm/ 1" range and 0.001mm/ .00005" resolution (Model XLI-50002).
Options			
PT-2245			0.050mm/.02" diameter Pin, Lower Contact Assembly
PS-225			Replacement Lower Rod only

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	Description
57B-11M	**57B-11**	0-25 mm/ 0-1"	Dial Indicator readout with 25 mm/ 1" sensitive range and .01mm/.001"grads.
XLI-57B-11			µMaxµm® XL Digital Indicator with 25 mm/ 1" range and .001mm/ .00005" resolution (Model XLI-50002).
EMD-57B-11		0-21.5 mm/ ***0-.85"***	Maxµm/// Digital Indicator with selectable range and resolution, 2033101.
EDI-57B-11			µMaxµm Digital Indicator with 2 mm/ .08" sensitive range, .001 mm/ .00005" resolution (Model EDI-10101).
57B-12M	**57B-12**	0-12.5mm/ ***0-.5"***	Dial Indicator readout with 12.50 mm/ .50" sensitive range and .01 mm/ .0005" grads.
XLI-57B-12			µMaxµm® XL Digital Indicator with 12.50 mm/ .50" range and .001 mm/ .00005" resolution (Model XLI-10002).

Alternate Indicators and contact points available upon request. Contact Mahr Federal.

49P Caliper Gages

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.
- .02mm or .1mm/ .01", .001", or 1/64" grads. available.
- Continuous reading dials with revolution counters normally provided.
- Cylindrical radius steel contact tips normally furnished.

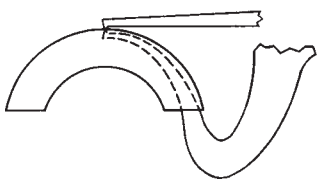
Technical Data

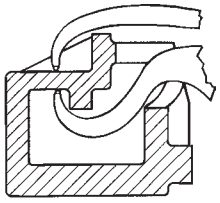
Order no. Metric	Order no. Inch	Capacity*	Gaging Depth	Minimum Graduation	A	B
49P-17M	**49P-17**	0 - 50 mm/ ***0 - 2"***	100 mm/ ***4"***	0.02 mm/ ***.001"*** grads.	1-1/4	1-1/4
49P-19M	**49P-19**	0 - 50 mm/ ***0 - 2"***	200 mm/ ***8"***	0.02 mm/ ***.001"*** grads.	2-9/16	2
49P-1M	**49P-1**	0 - 75 mm/ ***0 - 3"***	100 mm/ ***4"***	0.1 mm/ ***.01"*** grads.	1-1/4	1-1/4
49P-2M	**49P-2**	0 -75 mm/ ***0 - 3"***	200 mm/ ***8"***	0.1 mm/ ***.01"*** grads.	2-9/16	2

* *Ordinarily this gage is used as a comparator. The actual measuring range of the instrument is 38mm/1.50". If the gage is used for direct linear measurement, chordal errors may need to be corrected. Contact Mahr Federal Technical Assistance for details.*

Special Applications

Series 49P and 149P Caliper Gages have many design possibilities. Specially shaped arms of various lengths can be designed to reach inaccessible spots or get around obstructions to make measurements possible which might otherwise go unchecked. For alternate contact shapes or materials, alternate capacities and gaging depths, and special designs to meet your application contact Mahr Federal Technical Assistance.



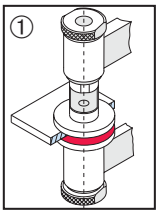


Gages for External Measurement 838 TA

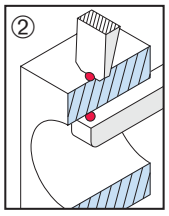
Features

- For measuring thicknesses and wall thicknesses
- Precision rack and pinion mechanism ensures reliable reproducibility
- Easy to operate, very habile and portable
- Resolution from 0.005 mm
- Tolerance markers are easy to read
- Dust and splash waterproof
- Contact points are made from carbide
- Absolute meas. instrument

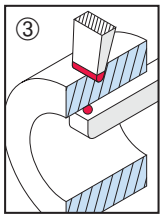
Applications



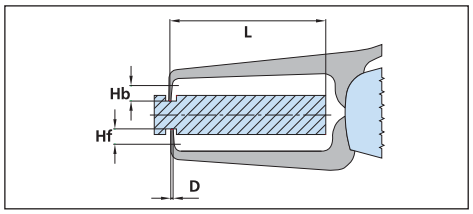
T dia. 10 mm



TC-ball dia. 1.5 mm



TC-ball dia. 1.5 mm SR 0.4



Technical Data and Dimensions

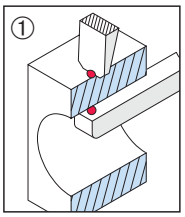
Application range	Awb	[mm / ***inch***]	0 - 5 / ***0 - .2"***	0 - 10 / ***0 - .4"***	0 - 10 / ***0 - .4"***
Measuring range	Meb	[mm / ***inch***]	5 / ***.2"***	10 / ***.4"***	10 / ***.4"***
Readings	Skw	[mm / ***inch***]	0.005 / ***.0002"***	0.01 / ***.0005"***	0.01 / ***.0005"***
Deviation within the meas. range	f_M	[mm / ***inch***]	± 0.02 / ***± .001"***	± 0.02 / ***± .001"***	± 0.02 / ***± .001"***
Repeatability	f_w	[mm / ***inch***]	0.005 / ***.0002"***	0.005 / ***.0002"***	0.005 / ***.0002"***
Measuring depth	L	[mm / ***inch***]	28 / ***1.1"***	59 / ***2.3"***	59 / ***2.3"***
Contact point - type	D	[mm]	T dia. 10 ①	K dia. 1.5 ②	K dia. 1.5/SR 0.4 ③
		[***inch***]	T dia. ***.4"***	K dia. ***.06"***	K dia. ***.06"/SR .015"***
Contact point - length (moveable)	Hb	[mm / ***inch***]	16.5 / ***.65"***	8 / ***.314"***	8 / ***.314"***
Contact point - length (fixed)	Hf	[mm / ***inch***]	8.5 / ***.332"***	0.9 / ***.035"***	0.9 / ***.035"***
Minimum meas. force	Fmin.	N	1.20	0.80	0.80
Maximum meas. force	Fmax.	N	1.70	1.30	1.30
Order no. Metric graduation			**4495070**	**4495071**	**4495072**
Order no. Inch graduation			**4495970**	**4495971**	**4495972**

Electronic Gages for External Measurement 838 EA

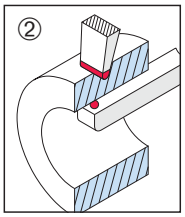
Features

- For measuring thicknesses and wall thicknesses
- Fast and reliable meas. results
- Absolute / Relative measuring program [0-Preset]
- Cable independent operation (battery operated with a 3V Lithium battery)
- Data output RS 232 and Digimatic
- mm/inch switchable
- Large display, 7 mm high digits
- Suitable for the workshop

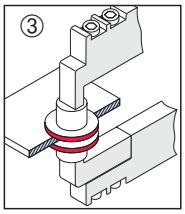
Applications



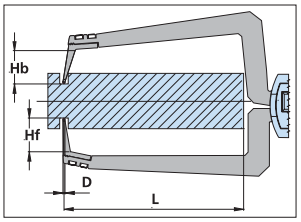
TC-ball dia. 1.5 mm



TC-ball dia. 1.5 mm SR 0.4



T dia. 10 mm



Technical Data and Dimensions

Application range	Awb	[mm / ***inch***]	0.2 - 12.5 / ***.008 - .5"***	0.2 - 12.5 / ***.008 - .5"***	0.3 - 25 / ***.012 - 1"***
Measuring range	Meb	[mm / ***inch***]	12.3 / ***.484"***	12.3 / ***.484"***	24.7 / ***.972"***
Resolution	Zw	[mm / ***inch***]	0.005 / ***.0002"***	0.005 / ***.0002"***	0.01 / ***.0005"***
Deviation within the meas. range	f_M	[mm / ***inch***]	± 0.015 / ***± .0006"***	± 0.015 / ***± .0006"***	±0.03 / ***± .0015"***
Repeatability	f_w	[mm / ***inch***]	0.02 / ***.001"***	0.02 / ***.001"***	0.02 / ***.001"***
Measuring depth	L	[mm / ***inch***]	25 / ***1"***	25 / ***1"***	80 / ***3.15"***
Contact point - type	D	[mm] [***inch***]	K dia. 1.5 ① K dia. ***.06"***	K dia. 1.5/SR 0.4 ② K dia. ***.06"/SR .15"***	T dia. 10 ③ T dia. ***.4"***
Contact point - length (moveable)	Hb	[mm / ***inch***]	22 / ***.86"***	22 / ***.86"***	22 / ***.86"***
Contact point - length (fixed)	Hf	[mm / ***inch***]	1/ ***.04"***	1/***.04"***	15/ ***.6"***
Minimum meas. force	Fmin.	N	0.9	0.9	0.9
Maximum meas. force	Fmax.	N	1.5	1.5	1.5
Order no.			**4495090**	**4495091**	**4495092**

Accessories

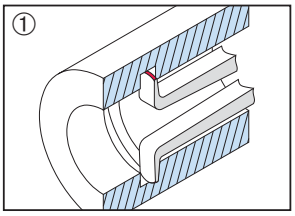
	Order no.
Mains Adapter **838 n**	
for battery independent operation	**4495087**
Battery CR 123A	**4495096**
Accessories for Data Processing see Chapter 11	

Gages for Internal Measurement 838 TI

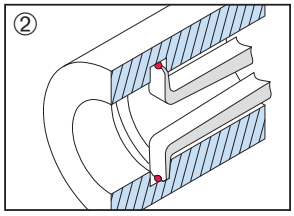
Features

- For measuring bores and internal grooves
- Precision rack and pinion mechanism ensures reliable reproducibility
- Easy to operate, very habile and portable
- Resolution from 0.005 mm
- Tolerance markers are easy to read
- Dust and splash waterproof
- Contact points are made from carbide
- Absolute meas. instrument

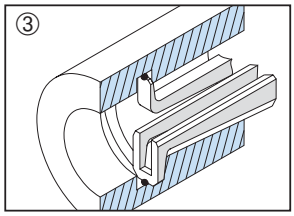
Applications



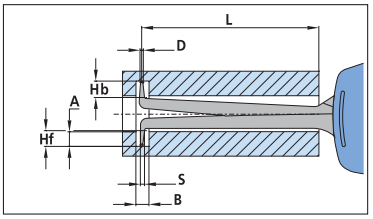
Blade R 0.1 mm



TC-ball dia. 1 mm
TC-ball dia. 0.6 mm



TC-ball dia. 1 mm



Technical Data and Dimensions

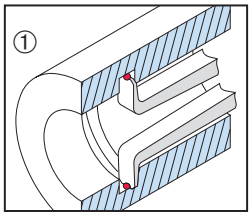
Application range	Awb	[mm]	2.5 - 7.5	5 - 10	5 - 15	10 - 20	20 - 30	30 - 40	40 - 50
		[*inch*]	***.1 - .3"***	***.2 - .4"***	***.2 - .6"***	***.4 - .8"***	***.8 - 1.2"***	***1.2 - 1.6"***	***1.6 - 2.0"***
Measuring range	Meb	[mm]	5	5	10	10	10	10	10
		[*inch*]	***.2"***	***.2"***	***.4"***	***.4"***	***.4"***	***.4"***	***.4"***
Readings	Skw	[mm]	0.005	0.005	0.01	0.01	0.01	0.01	0.01
		[*inch*]	***.0002"***	***.0002"***	***.0005"***	***.0005"***	***.0005"***	***.0005"***	***.0005"***
Deviation within the meas. range	f_M	[mm]	±0.01	±0.01	±0.02	±0.02	±0.02	±0.02	±0.02
		[*inch*]	***±.0005"***	***±.0005"***	***±.001"***	***±.001"***	***±.001"***	***±.001"***	***±.001"***
Repeatability	f_w	[mm]	0.0025	0.0025	0.005	0.005	0.005	0.005	0.005
		[*inch*]	***.0001"***	***.0001"***	***.0002"***	***.0002"***	***.0002"***	***.0002"***	***.0002"***
Measuring depth	L	[mm/*inch*]	10/***.4"***	22/***.86"***	30/***1.2"***	50/***2.0"***	52/***2.05"***	57/***2.25"***	57/***2.25"***
Groove depth	A	[mm/*inch*]	0.7/***.03"***	2.2/***.08"***	1.7/***.06"***	4/***.16"***	4/***.16"***	4.5/***.17"***	4.5/***.17"***
Groove width	B	[mm/*inch*]	0.6/***.024"***	1.4/***.05"***	1.1/***.04"***	2/***.08"***	2/***.08"***	2/***.08"***	2/***.08"***
Contact point - type	D	[mm]	SR 0.1 ①	K dia. 0.6 ②	K dia. 0.6 ②	K dia. 1 ③	K dia. 1 ③	K dia. 1 ②	K dia. 1 ②
		[*inch*]	***.004"***	***.02"***	***.02"***	***.04"***	***.04"***	***.04"***	***.04"***
Contact point - length (mov.)	Hb	[mm/*inch*]	0.7/***.03"***	2.3/***.09"***	2.3/***.09"***	5/***.2"***	5/***.2"***	5/***.2"***	5/***.2"***
Contact point - length (fixed)	Hf	[mm/*inch*]	0.7/***.03"***	2.3/***.09"***	2.3/***.09"***	5/***.2"***	5/***.2"***	5/***.2"***	5/***.2"***
Contact point - thickness	S	[mm/*inch*]	0.5/***.02"***	1.2/***.05"***	1.2/***.05"***	1.7/***.06"***	1.7/***.06"***	1.7/***.06"***	1.7/***.06"***
Minimum meas. force	Fmin.	N	1.20	1.20	0.80	0.80	0.80	0.80	0.80
Maximum meas. force	Fmax.	N	1.70	1.70	1.30	1.30	1.30	1.30	1.30
Order no.	**Metric**		**4495060**	**4495061**	**4495062**	**4495063**	**4495064**	**4495065**	**4495066**
Order no.	**Inch**		**4495960**	**4495961**	**4495962**	**4495963**	**4495964**	**4495965**	**4495966**

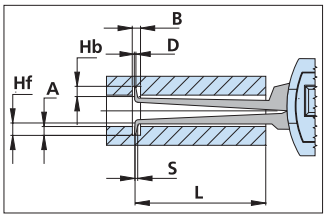
Electronic Gages for Internal Measurement 838 EI

Features

- For measuring bores and internal grooves
- Fast and reliable meas. results
- Absolute / Relative measuring program [0-Preset]
- Cable independent operation (battery operated with a 3V Lithium battery)
- Data output RS 232 and Digimatic
- mm/inch switchable
- Large display, 7 mm high digits
- Suitable for the workshop

Applications





Accessories

		Order no.
Mains Adapter	**838 n**	
for battery independent operation		**4495087**
Battery CR 123A		**4495096**
Accessories for Data Processing see Chapter 11		

Technical Data and Dimensions

Application range	Awb	[mm / ***inch***]	5 - 17.5/***.197 - .67"***	10 - 35/***.4 - 1.4"***	30 - 55/***1.2 - 2.16"***
Measuring range	Meb	[mm / ***inch***]	12.5/ ***.5"***	25/ ***1"***	25/ ***1"***
Resolution	Zw	[mm / ***inch***]	0.005 / ***.0002"***	0.005 / ***.0002"***	0.005 / ***.0002"***
Deviation within the meas. range	f_M	[mm / ***inch***]	±0.02 /± ***.001"***	±0.03 /± ***.0015"***	±0.03 /± ***.0015"***
Repeatability	f_w	[mm / ***inch***]	0.015 / ***.0006"***	0.03 / ***.0015"***	0.03 / ***.0015"***
Measuring depth	L	[mm / ***inch***]	20 / ***.787"***	80 / ***3.15"***	80 / ***3.15"***
Groove depth	A	[mm / ***inch***]	1.5 / ***.059"***	4.5 / ***.177"***	6 / ***.236"***
Groove width	B	[mm / ***inch***]	1.3 / ***.051"***	1.7 / ***.067"***	2.5 / ***.098"***
Contact point - type	D	[mm]	K dia. 0.8 ①	K dia. 1 ①	K dia. 1 ①
		[***inch***]	**K dia. 0.032"**	**K dia. .04"**	**K dia. .04"**
Contact point - length (moveable)	Hb	[mm / ***inch***]	2.5/ ***.1"***	5/ ***.19"***	7/ ***.027"***
Contact point - length (fixed)	Hf	[mm / ***inch***]	2.5/ ***.1"***	5/ ***.19"***	7/ ***.027"***
Contact point - thickness	S	[mm / ***inch***]	1.2/ ***.047"***	1.2/ ***.047"***	1.9/ ***.07"***
Minimum meas. force	Fmin.	N	0.9	0.9	0.9
Maximum meas. force	Fmax.	N	1.5	1.5	1.5
Order no.			**4495080**	**4495081**	**4495082**

Definition of Terms Specifications for inspection and test acceptance procedure of mechanical and electronic caliper gages

1. Basics

The inspection only follows conditionally the testing methods and procedures of the German standard DIN 878 for dial gages and the testing statements for caliper gages according to VDI/VDE/DGQ 2618 page 13. The gages are referred to without special reference as gages for 'absolute' measurements and adjustable zero point.

2. Definitions

Definitions of length checking techniques see DIN 2257 part 1 and part 2 (see also Ill. 1).

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 scale is the change of the value of a measured variable which causes the change of the indication by one interval. The reading corresponds to the scale interval on a line scale and is indicated by the unit 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 2 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 tolerance field for f_M is symmetrically positioned to the zero line and is indicated as $\pm f_{Mzul.}$.

2.6 Deviation in the partial measuring range f_t

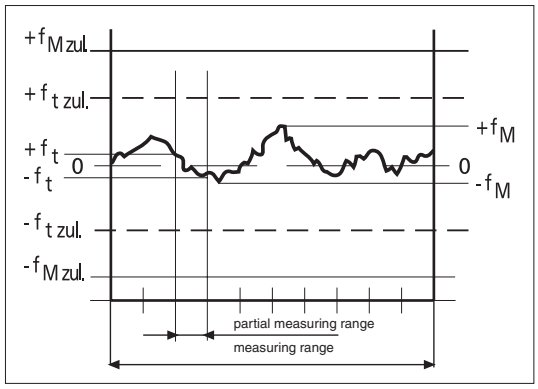
The deviation in the partial measuring range f_t is the distance of ordinates between the highest and the lowest position in the deviation diagram, measured for a partial measuring range when the moveable arm closes. The tolerance field for f_t is symmetrically positioned to the zero line and is indicated as $\pm f_{tzul.}$.

The deviation in the partial measuring range f_t can only be determined by using electronic checking methods for issuing test certificates.

2.7 Repeatability f_w

Repeatability f_w is a characteristic value for deviations of the measured variable within the measuring range in the same direction of movement of the movable caliper arm (usually for n=5).

Ill.1

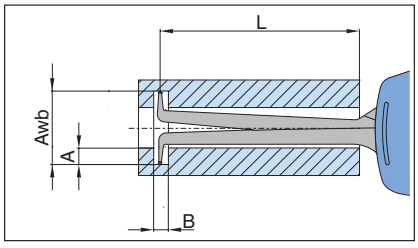


Measuring Capacity of Inside Measuring Instruments

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.

Groove depth A (mm)	Application range Awb (mm)										
	10	11	12	13	14	15	16	17	18	19	20
0	0/55	0/55	0/56	0/56	0/57	0/57	0/57	0/57	0/57	0/57	0/58
0,5		1,4/55	1,4/56	1,4/56	1,4/56	1,4/56	1,4/56	1,4/56	1,4/57	1,4/57	1,4/57
1			1,4/56	1,4/56	1,4/56	1,4/56	1,4/56	1,4/56	1,4/56	1,4/56	1,4/57
1,5				1,4/55	1,4/55	1,4/55	1,4/55	1,4/56	1,4/56	1,4/56	1,4/56
2					1,4/55	1,4/55	1,4/55	1,5/55	1,5/55	1,5/56	1,5/56
2,5						1,4/55	1,5/55	1,5/55	1,6/55	1,6/55	1,6/55
3							1,5/54	1,6/54	1,6/55	1,6/55	1,6/55
3,5								1,6/54	1,6/54	1,6/54	1,6/55
4									1,7/54	1,7/54	1,7/54
4,5										1,7/53	1,8/54

Relationship B/L



B = Min. groove depth (mm)
L = Max. usable caliper arm length (mm)

Example: Awb = 12 B = 1,4
A = 0,5 L = 56

65P-40, 75P-30 and 837 Depth Gages

75P-30 and 75P-35

65P-40

837*

Features

- **65P-40** has a "V" shaped base and a needle contact. Movement is "Push-Down" style. Ideal for measuring etch depth, pits, or small, shallow recesses.
- **75P-30** Depth Gages have rectangular, flat base and a radiused contact point. 75P-30 is supplied with contact point, for measuring depths from the base as a reference. Contact points for other depths are available upon request.
- **75P-35** Depth Gages have three interchangeable contact points, allowing inspection of depths to 76 mm/ 3". Check depths against a setting master.
- **837** has a large cross beam with hardened and ground contact surface as well as mounting clamp for dial indicator.

Technical Data

Order no. Metric	Order no. Inch	Capacity	Range of Sensitive	Graduation Contact	Base Dimensions	Contact Style/ Length
65P-40M	**65P-40**	0-2 mm/ ***0-.075"***	0-2 mm/ ***0-.075"***	0.01 mm/ ***.0005"***	64 mm/ ***2.50"***	Needle
75P-30M	**75P-30**	0-4 mm/ ***0-.15"***	0-4 mm/ ***0-.15"***	0.01 mm/ ***.0005"***	64x14 mm/ ***2.5x.56"***	radiused: 3 mm/ ***.13"***
75P-35M	**75P-35**	0-75 mm/ ***0-3"***	0-75 mm/ ***0-3"***	0.01 mm/ ***.001"***	64x14 mm/ ***2.5x.56"***	(3) radiused: 3 mm/ ***.13"*** 28 mm/ ***1.13"*** 54 mm/ ***2.13"***

Model	Range	Range with Anvils (837v)	Beam length	Beam width	Mounting hole dia.	Order no.
837	0-10 mm	0-100 mm	60 mm	12 mm	8 mm	**4494000***

Accessories

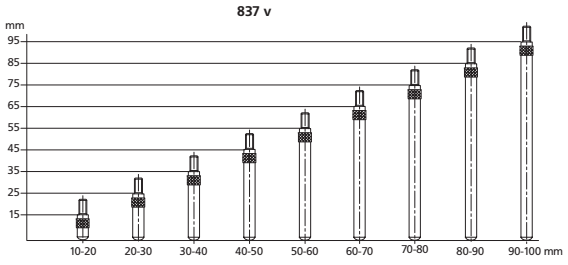
Indicating Instrument

Any dial indicator featuring an 8mm stem may be used. Dial Indicator 810 S is recommended because of its long measuring range.

Readings	0.01 mm
Range	10 mm
Order no.	4311210

Other options include Digital Indicators 1075, 1082, 1083 or 1085. Also, indicators in "Inch" versions.

* *Indicator not included.*



Contacts 837 v
Set of 9 anvils shown above in increments of 10 mm. Spherical measuring faces. Thread size M2.5
Order no. 4494009

Wooden case
For accommodating gage, dial indicator and anvils.
Order no. 4494001

75P-50 Depth Gages

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 (±.0025 mm/±.0001 in accuracy).

75P-52 with Setting Master

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, balanced dial.

  Inch: Furnished with .0005 in 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 in grads./ 1" range, continuous dial with revolution counter).

  Digital: Model XLI-20000 (.001 mm/.00005" resolution, 25 mm /1" range)

- For long range models contact Mahr Federal.

Base Dimensions (all bases are 15 mm/ ***.59"*** high x 19 mm/ ***.75"*** wide)

Order no. Metric	Order no. Inch	Length	Width	Diameter	Measuring Positions	Base only Model*
75P-50	**75P-50M**	50 mm/ ***2"***	19 mm/ ***.75"***	–	One	BA-42
75P-51	**75P-51M**	76 mm/ ***3"***	19 mm/ ***.75"***	–	One	BA-43
75P-52	**75P-52M**	102 mm/ 4"	19 mm/ ***.75"***	–	Two	BA-44
75P-53	**75P-53M**	152 mm/ ***6"***	19 mm/ ***.75"***	–	Three	BA-45
75P-54	**75P-54M**	203 mm/ ***8"***	19 mm/ ***.75"***	–	Three	BA-46
75P-55	**75P-55M**	–	–	19 mm/ ***.75"***	One	BA-47
75P-56	**75P-56M**	–	–	32 mm/ ***1.25"***	One	BA-76

* If base only is specified, it is supplied without the indicator holding collet, model AD-87.□ Order collet seperately if required.

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.

75P-50 Depth Gages

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	Contact Point model*	Maxμm/// & Maxμm Plus
0-1.60 mm/ ***0-.063"***	PT-201	PT-564
1.60-4.80 mm/ ***.063-.188"***	PT-232	PT-31
4.80-8 mm/ ***.188-.313"***	PT-305	PT-201
8-11 mm/ ***.313-.438"***	PT-565	PT-232
11-14 mm/ ***.438-.563"***	PT-239	PT-305
14-17.50 mm/ ***.563-.688"***	PT-50	PT-565
17.50-21 mm/ ***.688-.813"***	PT-235	PT-239
21-24 mm/ ***.813-.938"***	PT-241	PT-50
24-27 mm/ ***.938-1.063"***	PT-100	PT-235
27-30 mm/ ***1.063-1.188"***	PT-51	PT-241
30-33.40 mm/ ***1.188-1.313"***	PT-243	PT-100
33.4-37 mm/ ***1.313-1.438"***	PT-696	PT-51
37-40 mm/ ***1.438-1.563"***	PT-101	PT-243
40-43 mm/ ***1.563-1.688"***	PT-245	PT-696
43-46 mm/ ***1.688-1.813"***	PT-102	PT-101
46-49 mm/ ***1.813-1.938"***	PT-566	PT-245
49-52.4 mm/ ***1.938-2.063"***	PT-247	PT-102

** For "C" size dial indicators, "EDI-" and "XLI-" μMaxμm Digital Indicators.*

Semi-finished Model

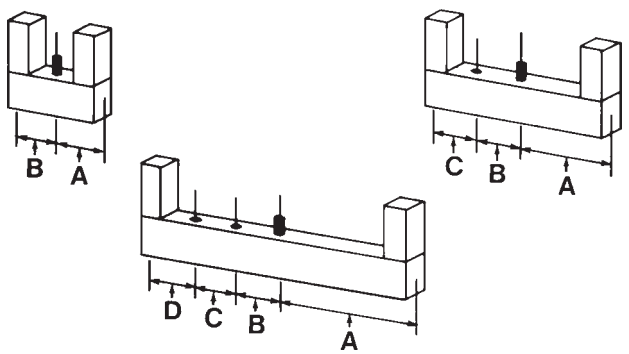
0-25 mm/ 0-1"	25-50 mm/ 1-2"	Gaging Positions	Used with Model	"A"	"B"	"C"	"D"
MR-501	**MR-502**	One	75P-50, 75P-30/35	25 mm/ ***1"***	25 mm/ ***1"***	–	–
MR-511	**MR-512**	One	75P-51	38 mm/ ***1.5"***	38 mm/ ***1.5"***	–	–
MR-521	**MR-522**	Two	75P-52	50 mm/ ***2"***	25 mm/ ***1"***	25 mm/ ***1"***	–
MR-531	**MR-532**	Three	75P-53	75 mm/ ***3"***	25 mm/ ***1"***	25 mm/ ***1"***	25 mm/ ***1"***
MR-541	**MR-542**	Three	75P-54	102 mm/ ***4"***	25 mm/ ***1"***	25 mm/ ***1"***	25 mm/ ***1"***
MR-551	**MR-552**	One	75P-55, 75P-56	17 mm/ ***.68"***	17 mm/ ***.68"***	–	–

Six different setting masters are available for Series 75P Models. Setting masters are available in two styles: Finished (ground to final size) and Semi-finished (assembled but not ground to final size). Finished depths available from 0-50 mm/ 0-2". Unground Anvil can be purchased separately. Specify **Model AL-89**.

For multi-position masters, please specify the anvil location.
Protective Housings for the Dial Indicator are available, see page 5-23.

For Series 75P-50 style depth gages with alternate Indicators, greater gaging depth, alternate contact configurations or other modifications, contact Mahr Federal Technical Assistance.

For master finished to size, specify size and add suffix "F". Example: MR-502F, size 1.265" (Master for 75P-50 set to 1.2652).



75B-1 Bench Depth Gages

For inspecting small parts

Features

- Available with Dial Indicator (75B-1 Models) or Maxμm®*III* & μMaxμm Digital Electronic Indicators (EMD-75B & 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.

75B-1

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*III* Digital Indicator with selectable range and resolution, 2033201.
XLI-75B-1		μMaxμm XL Digital Indicator, 2 mm/ ***1"*** range, .001 mm/ ***.00005"*** resolution
XLI-75B-2		μMaxμm XL Digital Indicator, 12 mm/ ***.50"*** range, .001 mm/ ***.00005"*** resolution

To specify Digital Output on EMD-75B Models, add suffix "D". Example = EMD-75B-1D.
Output is standard with XLI and EDI models.

Dimentron® Plug Inside Diameter Gages

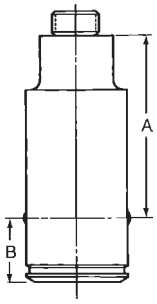
Thru-hole and Blind Hole Dimentron Plugs

Features

- Designed for high production I.D. gaging.
- High chrome content; hardened stainless steel bodies ground precisely for specified size measurement.
- Plug tooling interchangeable for quick changeover.
- Measuring is easy – just insert plug into diameter and read. No rocking needed.
- Set to nominal dimension with a single master ring.
- Long life: Tungsten carbide contacts and vee rod ensure durable motion transfer.
- Three styles of plugs available – Thru-hole, Blind Hole and Super-blind.
- Open design rinses clean easily.
- Explore bores for taper, barrel shape, bell-mouth and 2-point out-of-round.
- Stop Collars available for all standard sizes.
- Captive vee rod design.

Technical Data

Dimentron Plug Dimensions



Blind Hole Plugs

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" not available with this model.)

Thru-hole Plugs

Sizes above	To and include	A	B	Group*
3.2 mm/ ***.125"***	5.5 mm/ ***.217"***	30.4 mm/ ***1.2"***	6.4 mm/ ***.25"***	no group**
5.5 mm/ ***.217"***	8.2 mm/ ***.322"***	34.8 mm/ ***1.37"***	6.5 mm/ .256"	5
8.2 mm/ ***.322"***	9.5 mm/ ***.375"***	34.8 mm/ ***1.37"***	6.5 mm/ ***.256"***	6
9.5 mm/ ***.375"***	12.7 mm/ ***.50"***	35.4 mm/ ***1.39"***	13 mm/ ***.512"***	8
12.7 mm/ ***.50"***	19.05 mm/ ***.75"***	35.4 mm/ ***1.39"***	13 mm/ ***.512"***	8
19.05 mm/ ***.75"***	25 mm/ ***1"***	48.3 mm/ ***1.90"***	16 mm/ ***.63"***	12
25 mm/ ***1"***	38 mm/ ***1.50"***	48.3 mm/ ***1.90"***	16 mm/ ***.63"***	12
38 mm/ ***1.50"***	63 mm/ ***2.50"***	46.7 mm/ ***1.84"***	19 mm/ ***.748"***	12
63 mm/ ***2.50"***	114.3 mm/ ***4.5"***	46.7 mm/ ***1.84"***	19 mm/ ***.748"***	12
114.3 mm/ ***4.50"***	228.6 mm/ ***9.0"***	46.7 mm/ ***1.84"***	9.5 mm/ ***.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

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.

Dimentron Plug Assembly shown with Maxμm®/// Indicator, Housing and Handle

Technical Data

Sizes above	To and include	Maximum Part Tolerance Metric M01 Inch 050	M02 100	M05 200	M08 400
3.18 mm/ ***.1250"***	3.62 mm/ ***.145"***	±0.025 mm/ ***±0010"***	±0.038 mm/ ***±0015"***		
3.62 mm/ ***.1426"***	5.52 mm/ ***.217"***	±0.025 mm/ ***±0010"***	±0.046 mm/ ***±0018"***	±0.076 mm/ ***±0030"***	
5.50 mm/ ***.2171"***	7.94 mm/ ***.312"***	±.0.025 mm/ ***±0010"***	±0.046 mm/ ***±0018"***	±0.069 mm/ ***±0027"***	±0.102 mm/ ***±0040"***
7.94 mm/ ***.3125"***	9.5 mm/ ***.375"***	±.0.030 mm/ ***±0012"***	±0.051 mm/ ***±0020"***	±0.069 mm/ ***±0027"***	±0.127 mm/ ***±0050"***
9.50 mm/ ***.3750"***	12.7 mm/ ***.50"***	±0.038 mm/ ***±0015"***	±0.058 mm/ ***±0023"***	±0.086 mm/ ***±0034"***	±0.137 mm/ ***±0054"***
12.7 mm/ ***.5000"***	19.05 mm/ ***.75"***	±0.030 mm/ ***±0015"***	±0.069 mm/ ***±0027"***	±0.102 mm/ ***±0040"***	±0.165 mm/ ***±0065"***
19.05 mm/ ***.750"***	25.4 mm/ ***1.00"***	±0.030 mm/ ***±0015"***	±0.076 mm/ ***±0030"***	±0.127 mm/ ***±0050"***	±0.180 mm/ ***±0071"***
25.4 mm/ ***1.000"***	38 mm/ ***1.50"***	±0.030 mm/ ***±0015"***	±0.076 mm/ ***±0030"***	±0.152 mm/ ***±0060"***	±0.221 mm/ ***±0087"***
38 mm/ ***1.500"***	114.3 mm/ ***4.5"***	±0.030 mm/ ***±0015"***	±0.076 mm/ ***±0030"***	±0.152 mm/ ***±0060"***	±0.254 mm/ ***±0100"***
114.3 mm/ ***4.5"***	229 mm/ ***9.00"***	±0.030 mm/ ***±0015"***	±0.076 mm/ ***±0030"***	±0.152 mm/ ***±0060"***	±0.254 mm/ ***±0100"***

Order Maxμm Indicator and Accessories separately.

Maxμm/// Indicator
Inch: Specify **2033101 (2033111** if Digital Output is required) for .00005" resolution, .0001" grad., and "0" on the Indicator in the 12 o'clock position. For "0" at 6 o'clock position, specify **2033201**.

Metric: Specify **2033101 (2033111** if Digital Output is required) for 0.001 mm resolution, 0.001 mm grad., and "0" at 12 o'clock. Specify DEI-24121 for "0" at 6 o'clock.

EKT-1120-W1 is required to mount the Maxμm/// Indicator to Dimentron Plugs. (Specify **EKT-1120-W2** for Maxμm/// Indicators with 8 mm stems). This adaptor kit includes mounting adaptor, hex wrench, and flat-end, carbide faced contact point for the Indicator.
Other models include:
EKT-1120-W3 – EDI/Dial .375 in stem – 4-48 thread
EKT-1120-W4 – EDI/Dial 8 mm stem – 2.5 thread
EKT-1120-W6 – 1002 - 1010 8mm 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 MaxμmIII 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 9-3 and 9-5)

Dimentron® Plug Inside Diameter Gages

With Electonic Gage Heads

Gage heads are mounted to Dimentron Plugs using HA-88 and AD-140 Adaptor. Electronic Gage Heads can be ordered separately. The following Handle Assemblies include Adaptor, Wrenches and Gage Head:

Handle Assemblies

Order no.	Description
EHA-1146	Flat Contact 3 m / 11 ft. coiled cable
EHA-1145	Flat Contact 3 m / 11 ft. staright cable

Consists of 1280P Indicator and Handle Assembly with stocked adaptor:

	Order No.	Minimum graduation	
Inch	**550P-10**	**.00005"**	**EDI-550P-10** (with EDI-10102)
Metric	**550P-20**	***.00002"***	**EDI-550P-20** (with EDI-20102)

EDI-550P-10

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.

Remote MaxμmTransducer or Maxμm/// Digital Transducer Dimentron Plug Handle/ Adaptor: **HA-141**

Right Angle Adaptor AT-155

BA-100 (Dimentron Plug not included)

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"**

Dimentron® Plug Inside Diameter Gages

Dimentron Plug Gage	Adaptors	Handles	Readout	Housings	Housing Handle
Dimentron Plug					
Stop Collar					
Extension	EKT-1120-WX		2014802		
			EDI-10102		
			2033111	B-12668	
				EHG-1198	AT-124 HA-88
			2033101	EHG-1172	
	Change-WX suffix as required: *For adaptor selection see page 9-40*				
			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		

This table depicts available readouts for Dimentron Plug Inside Diameter Gages. After making a Plug selection, follow the chart for all the components needed to make up a gaging system suited to your application.

Indicating Plug Gages 844 D

Features

- For the rapid testing of diameter, roundness and conicity of bores
- Especially suitable for testing batches with tight tolerances
- No rocking in the bore is required to determine the reversal point
- Therefore ideal for use in conjunction with a digital indicating instrument and for subsequent processing of measured values
- Measuring head has a hardened, hard chromium-plated guide cylinder and carbide-tipped anvils
- The carbide expanding pin transfers radial movement to indicating instrument
- Constant measuring force as a result of built-in spring, thus eliminating user influence
- Measuring head, holder, depth extension, right angle attachments and depth stops are part of an extensive modular system

Technical Data of the Measuring Heads

Nominal diameter of the bore	Measuring range starting from the minimum bore dimension to be measured	
	844 Dk/844Dkr	844 Dks (from 4 mm)
2,98 - 8 mm	= - 0,02 + 0,1 mm	= - 0,02 + 0,1 mm
over 8 - 16 mm	= - 0,02 + 0,15 mm	= - 0,02 + 0,15 mm
over 16 - 32 mm	= - 0,02 + 0,2 mm	= - 0,02 + 0,15 mm
over 32 - 70 mm	= - 0,03 + 0,2 mm	= - 0,03 + 0,15 mm
over 70 - 200 mm	= - 0,04 + 0,2 mm	= - 0,04 + 0,15 mm

When placing an order please quote the nominal diameter and tolerances, for example:

Bore diameter	Tolerance	
35 D7	+ 80	+105 µm
35 H7	+ 0	+25 µm
35 R7	- 50	-25 µm

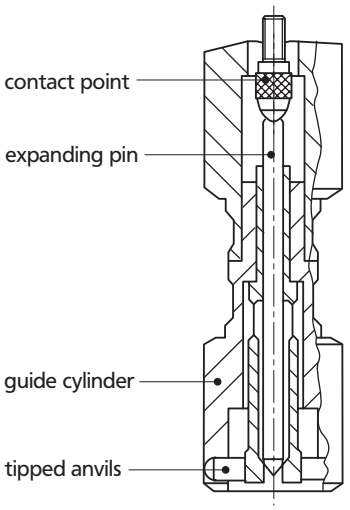
The diameter of the guide cylinder is produced between 0.02 and 0.07 mm smaller than the minimum dimension of the bore to be checked.

Example:

Plug Gage 844 Dk for bore	35 D7
Nominal diameter:	35 mm
Minimum dimension:	35.080 mm
Maximum dimension:	35.105 mm
Meas. range:	35.050 - 35.280 mm

Accuracy

Hystersis	≤ 0.4 µm
Repeatability	≤ 1 µm
Linearity	≤ 1 %
Linearity 844 Dks >16 mm	≤ 2 %



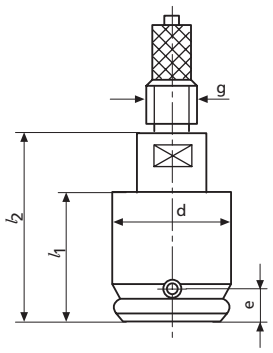
Plug Gages

Measuring Head 844 Dk

Standard version

	Diameter d mm		inch		l_1	Dimensions l_2 mm	e	Connection thread g
	2.98	8	*.12*	*.3"*	23	31	1.5	M6 x 0.75*
over	8	16	*.3*	*.6"*	25	33.5	3	M6 x 0.75
over	16	32	*.6*	*1.26"*	26	39	3.5	M10 x 1
over	32	44	*1.26*	*1.73"*	26	39	3.5	M10 x 1
over	44	70	*1.73*	*2.75"*	26	39	4	M10 x 1
over	70	200	*2.75*	*8"*	33	39	4	M10 x 1

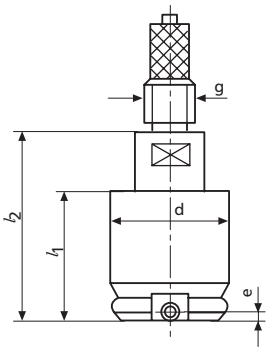
** With an Adapter for connection to the Holder*



Measuring Head 844 Dks

For the measurement of blind holes.

	Diameter d mm		inch		l_1	Dimensions l_2 mm	e	Connection thread g
	4	8	*.16*	*.3"*	23	31	0.6	M6 x 0.75*
over	8	16	*.3*	*.6"*	25	33.5	0.6	M6 x 0.75
over	16	32	*.6*	*1.26"*	26	39	1	M10 x 1
over	32	44	*1.26*	*1.73"*	26	39	1	M10 x 1
over	44	70	*1.73*	*2.75"*	26	39	1	M10 x 1
over	70	150	*2.75*	*6"*	33	39	1	M10 x 1

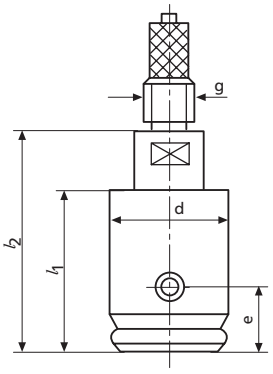


Measuring Head 844 Dkr

With an extended guide cylinder for the measurement of through holes from the edge of the bore. These are particularly suitable for narrow parts.

	Diameter d mm		inch		l_1	Dimensions l_2 mm	e	Connection thread g
	2.98	8	*.12*	*.3"*	28	36	6	M6 x 0.75*
over	8	16	*.3*	*.6"*	31	40	9	M6 x 0.75
over	16	32	*.6*	*1.26"*	32	45	9.5	M10 x 1
over	32	44	*1.26*	*1.73"*	32	45	9.5	M10 x 1
over	44	70	*1.73*	*2.75"*	26	46.5	10.5	M10 x 1
over	70	200	*2.75*	*8"*	33	51	15	M10 x 1

** With an Adapter for connection to the Holder*



Measuring Heads for Special Applications

Available for example with 3 anvils for concentricity and polygon tests, with flat anvils for plane-parallel surfaces, with anvils made of plastic, ruby, ceramic or diamond for particular material characteristics.

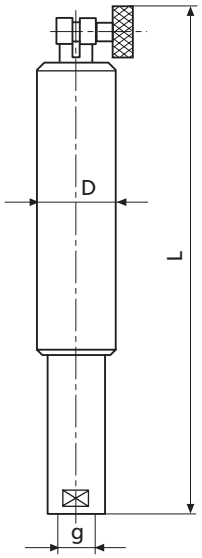
Modular Unit System 844 D

Standard Holder 844 Kg/844 Dg

With locking clamp for an indicating instrument and a connecting thread for a measuring head. Heat insulated handle. The model 844 Dg is made from **Invar steel.**

Cat. no.	Connecting thread g	Length L mm/*inch*	Handle dia. D mm/*inch*	Order no.
844 Kg	M6 x 0.75	50/ ***1.98"***	14/ ***.55"***	**4470851**
844 Dg	M10 x 1	150/ ***6"***	26/ ***1"***	**4478851**

844 Kg / 844 Dg

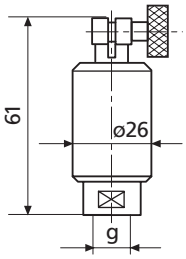


Short Holder 844 Dgk

With locking clamp for an indicating instrument and a connecting thread for a measuring head. Heat insulated handle.

Cat. no.	Connecting thread g	Length L mm/*inch*	Handle dia. D mm/*inch*	Order no.
844 Dgk	M10 x 1	61/ ***2.4"***	26/ ***1"***	**4478050**

844 Dgk

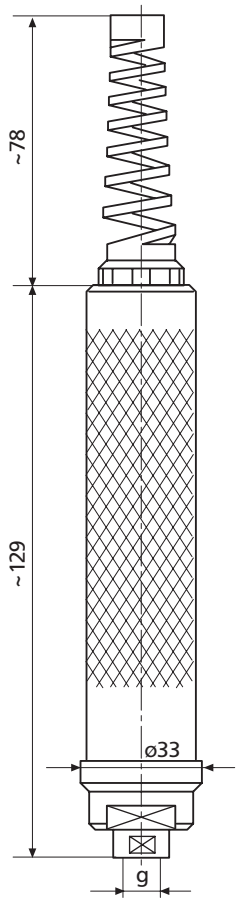


Holder 844 Dge for Inductive Measuring Probes

With long sleeve for shock and waterproof mounting of inductive measuring probes. Strain relief clamp for probe cable. Threaded connection for measuring heads. Heat insulated handle.

Cat. no.	Connecting thread g	Length L mm/*inch*	Handle dia. D mm/*inch*	Order no.
844 Dge	M6 x 0.75 M10 x 1	195/ ***7.7"*** 195/ ***7.7"***	33/ ***1.3"*** 33/ ***1.3"***	**4478020** **4478021**

844 Dge

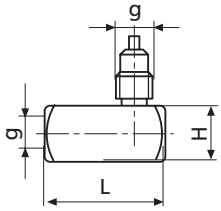


Right Angle (Elbow) Attachment

For measuring difficult to reach bores, e.g. in tight spaces, on a machine tool or when work piece bores are inconveniently located. For screwing in between holder and measuring head.

Cat. no.	Connecting thread g mm	Elbow Length L mm/*inch*	Elbow Height H mm/*inch*	Order no.
844 Kw **844 Dw**	M6 x 0.75 M10 x 1	26.5/ ***1.04"*** 36.7/ ***1.44"***	22.5/ ***.89"*** 17/ ***.67"***	**4470110** **4478110**

844 Kw / 844 Dw



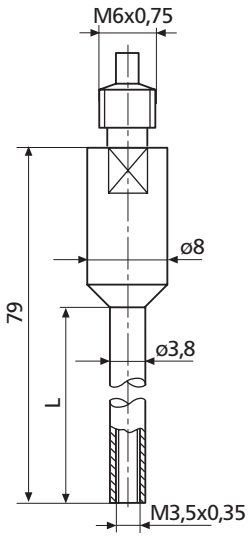
Modular Unit System 844 D

Extensions

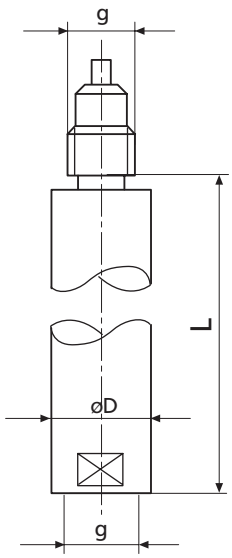
For extra-deep bores. Screws in between holder and measuring heads. Several extensions can be screwed together as of 8 mm. Models 844 Dv and 844 Dvk made of **Invar steel.**

Cat. no.	Connecting thread g	Length L mm/*inch*	dia. D mm/*inch*	Order no.
844 Dvk	M6x0.75/M3.5x0.35	64/***2.5"***	3.8/***.15"***	**4478080**
844 Kv	M6 x 0.75	64/***2.5"***	8/***.32"***	**4470070**
844 Dv	M10 x 1	64/***2.5"***	15/***.6"***	**4478070**
844 Dv	M10 x 1	80/***3"***	15/***.6"***	**4478071**
844 Dv	M10 x 1	100/***4"***	15/***.6"***	**4478072**
844 Dv	M10 x 1	125/***5"***	15/***.6"***	**4478073**
844 Dv	M10 x 1	250/***10"***	15/***.6"***	**4478074**
844 Dv	M10 x 1	500/***20"***	15/***.6"***	**4478075**
844 Dv	M10 x 1	750/***30"***	15/***.6"***	**4478076**

844 Dvk



844 Kv / 844 Dv

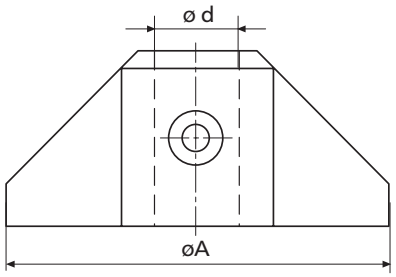


Depth Stops

For limiting depth of insertion of measuring head in bore. Can be attached to Extensions 844 Kv or 844 Dv. With clamping screw.

Cat. no.	Mounting hole dia. d mm/*inch*	Stop surface dia. A mm/*inch*	Order no.
844 Kt	8/ ***.32"***	25/ ***1"***	**4470115**
844 Dt	15/ ***.6"***	45/ ***1.8"***	**4478115**
844 Dt	15/ ***.6"***	75/ ***3"***	**4478116**
844 Dt	15/ ***.6"***	110/ ***4.3"***	**4478117**
844 Dt	15/ ***.6"***	160/ ***6.3"***	**4478118**
844 Dt	15/ ***.6"***	220/ ***8.6"***	**4478119**

844 Kt / 844 Dt

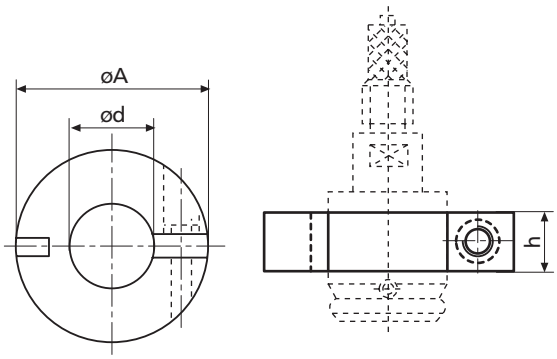


Depth Stop Rings

For limiting depth of insertion of measuring head in bore. Clamped onto the measuring head.

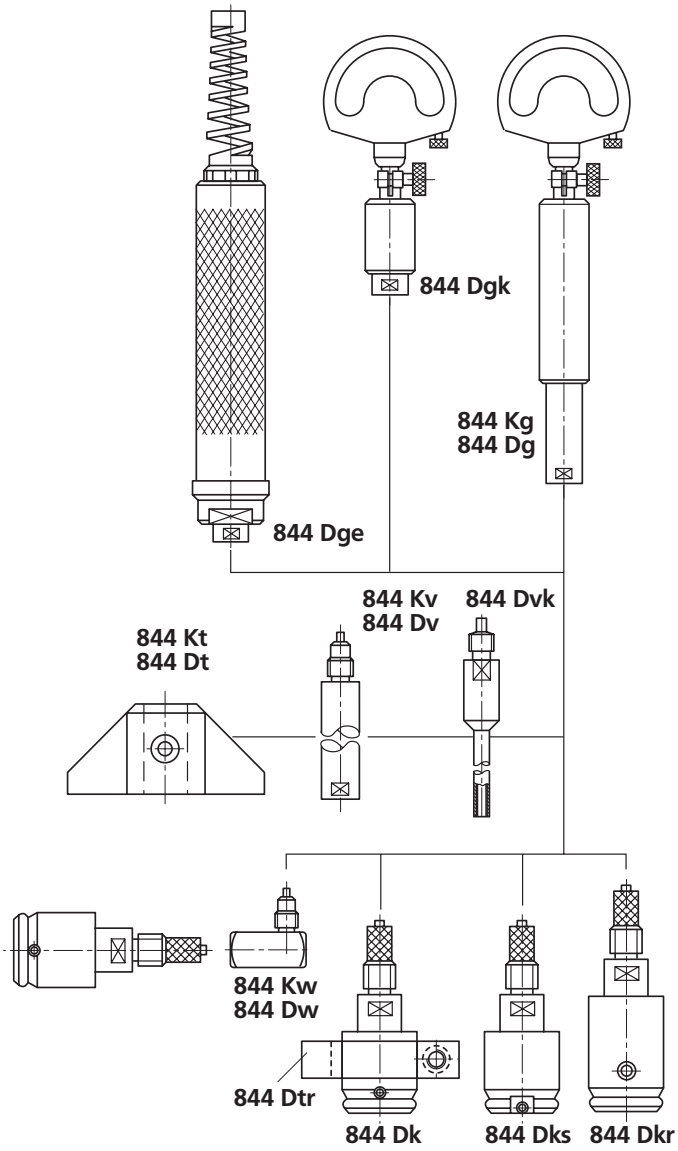
Cat. no.	Mounting hole dia. d mm	Stop surface dia. A mm/*inch*	Height h mm/*inch*	Order no.
844 Dtr	3 - 5	27/ ***1.1"***	10/ ***.4"***	**4478130**
	5 - 8	30/ ***1.2"***	10/ ***.4"***	**4478130**
	8 - 11	33/ ***1.3"***	10/ ***.4"***	**4478130**
	11 - 15	37/ ***1.5"***	10/ ***.4"***	**4478130**
	15 - 20	42/ ***1.7"***	10/ ***.4"***	**4478130**
	20 - 25	51/ ***2.0"***	12/ ***.5"***	**4478131**
	25 - 30	56/ ***2.2"***	12/ ***.5"***	**4478131**
	30 - 35	61/ ***2.4"***	12/ ***.5"***	**4478131**
	35 - 40	66/ ***2.6"***	12/ ***.5"***	**4478131**
	40 - 44	71/ ***2.8"***	12/ ***.5"***	**4478131**
	44 - 50	76/ ***2.9"***	12/ ***.5"***	**4478132**
	50 - 60	86/ ***3.4"***	12/ ***.5"***	**4478132**
	60 - 70	96/ ***3.8"***	12/ ***.5"***	**4478132**
	70 - 80	106/ ***4.1"***	12/ ***.5"***	**4478132**
	80 - 90	116/ ***4.6"***	12/ ***.5"***	**4478133**
	90 - 100	126/ ***4.9"***	12/ ***.5"***	**4478133**

844 Dtr



Modular Units	Diameter of Measuring Heads 2.98 - 8 mm *(.16 - .3")*	8 - 16 mm *(.3" - .6")*	over 16 mm *(over .6")*
844 Kg	4470851		
844 Dg			4478851
844 Dgk			4478050
844 Dge	4478020		4478021
844 Dvk 844 Kv 844 Dv	4478080	4470070	4478070 to 4478076
844 Kt 844 Dt		4470115	4478115 to 4478119
844 Kw 844 Dw	4470110		4478110
844 Dk 844 Dks 844 Dkr	• •	• •	• • •

Modular Unit	Diameter of Measuring Heads 2,98 - 20 *(.16-.787")*	20 - 44 *(.787-1.72")*	44 - 80 *(1.72-3.15")*	80 - 100 *(3.15-3.94")*
844 Dtr	4478130	4478131	4478132	4478133



Indicating Instruments

All indicating instruments that has a 8 mm mounting shank may be used. Recommended are:

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*
Supramess	1002 / *1002 Z*	0.5 µm/	*.00002"*	4335000/*4335900*
Extramess	2000	0.2 µm/	*.00001"*	
		0.5 µm/	*.00002"*	4346000*
		1 µm/	*.00005"*	
Extramess	2001	0.2 µm/	*.00001"*	
		0.5 µm/	*.00002"*	4346100*
		1 µm/	*.00005"*	
µMaxµm		.001mm/	*.00005"*	EDI-10302**

Digital Indicators see Chapter 5
Electrical Indicating Instruments see Chapter 7
** 230 V, for 115 V please refer to page 6-5 ** requires contact 4360107*

Adjustment of Plug Gages 844 D

Ring Gage 355 E:

Special wear-resistant gage steel. Hardened and lapped. With actual deviation engraved.

Dimensions:	DIN 2250, type C
Manufacturing tolerance:	DIN 2250
Available diameters:	0.5-200 mm

Self-Centering Dial Bore Gages 844 K Intramess

Features

- Measuring the diameter, roundness and conicity of bores
- Spring-loaded halves of measuring probe are split via expanding pin with precision-lapped taper. This movement is transferred to indicating instrument
- Maximum wear-resistance due to hard chrome plating. From 4 mm alternatively with carbide tipped available on request
- Constant measuring force as a result of built-in spring thus eliminating user influence
- Highly versatile, each gage covers a large range. Within the respective limits, quickly and easily adjustable to any size and any type of measuring application
- Measuring probe, holder, depth extensions, right-angle attachments and depth stops are part of an extensive modular system

Technical Data

Complete Instrument

844 K Measuring heads hard chrome plated, expanding pin made of stainless steel

844 KH Measuring heads carbide tipped on both sides, carbide expanding pin

844 KS Blind hole measuring heads hard chrome plated, expanding pin made of stainless steel

Catalog no.	Measuring range mm	Measuring range *(inch)*	Number of meas. probes	Order no.*
844 K	0.47 - 0.97	*(.018 - .038")*	6	**4470000**
	0.95 - 1.55	*(.037 - .060")*	5	**4470001**
	1.5 - 4.2	*(.060 - .160")*	10	**4470002**
	3.7 - 7.3	*(.145 - .29")*	7	**4470003****
	6.7 - 10.3	*(.26 - .40")*	7	**4470004****
	9.4 - 18.6	*(.37 - .73")*	9	**4470005****
844 KH	1.5 - 4.2	*(.060 - .160")*	10	**4471002**
	3.7 - 7.3	*(.145 - .29")*	7	**4471003****
	6.7 - 10.3	*(.26 - .40")*	7	**4471004****
	9.4 - 18.6	*(.37 - .73")*	9	**4471005****
844 KS	1.5 - 4.2	*(.060 - .160")*	10	**4482163**
	3.7 - 7.3	*(.145 - .29")*	7	**4482164****
	6.7 - 10.3	*(.26 - .40")*	7	**4482165****
	9.4 - 18.6	*(.37 - .73")*	9	**4482166****

* *Includes holder, measuring probe, expanding pin and wooden case, but not indicating instrument*

** *Additionally includes measuring force spring 4470828 and disk 4470821*

Accuracy

Deviation of linearity

≤ 2 % measuring ranges 0.47-1.55 mm
≤ 1 % measuring ranges 1.5-18.6 mm

Repeatability

1 µm manual measurement
≤ 0.5 µm measurement with Stand 844 Kst and Floating Holder 844 Ksts

Indicating Instruments

All indicating instruments that has a 8 mm mounting shank may be used. Recommended are:

Dial Comparator		Readings mm / *inch*		Order no. mm / *inch*
Compramess	**1004 / *1004 Z***	5 µm/	***.0001"***	**4333000/*4333900***
Millimess	**1003 / *1003 Z***	1 µm/	***.00005"***	**4334000/*4334900***
Millimess	**1003 XL**	2 µm		**4334001**
Supramess	**1002 / *1002 Z***	0.5 µm/	***.00002"***	**4335000/*4335900***
Extramess	**2000**	0.2 µm/	***.00001"***	
		0.5 µm/	***.00002"***	**4346000***
		1 µm/	***.00005"***	
Extramess	**2001**	0.2 µm/	***.00001"***	
		0.5 µm/	***.00002"***	**4346100***
		1 µm/	***.00005"***	
µMaxµm		.001mm/	***.00005"***	**EDI-10302****

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*

Modular Unit System for 844 K Standard Measuring Probes

In addition to complete Dial Bore Gages 844 K, modular units can also be compiled as required to suit a individual measuring task and or application.

Measuring Probe 844 Kk, Expander Pin, individual Ring Gage for 844 Ke

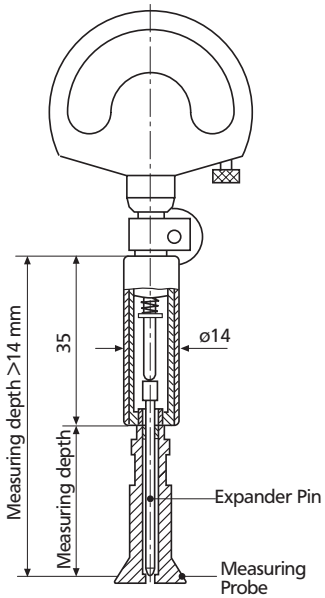
Nominal dimension mm	Measuring range mm	Measuring depth mm	Measuring probe hard chrome plated	Expanding pin steel	Measuring probe carbide tipped	Expander pin carbide	Ring gage
0.50	0.47 - 0.53	1.25	4470586	4470801			4482300
0.55	0.52 - 0.58	1.5	4470587				4482301
0.60	0.57 - 0.67	1.7	4470588				4482302
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

Modular Unit System for 844 K Blind Hole Measuring Probes

In addition to complete Dial Bore Gages 844 KS, modular units are available for assembly as required to suit a individual measuring task and or application.

Blind Hole Measuring Probe 844 Kk, Blind Hole Expander Pin

Nominal dimension mm	Measuring range mm	Measuring depth mm	Blind hole measuring probe hard chrome plated	Blind hole expander pin steel
1.75	1.50 - 1.90	16	**4482228**	
2.00	1.80 - 2.20	16	**4482229**	**4482176**
2.25	2.05 - 2.45	16	**4482230**	
2.50	2.30 - 2.70	21	**4480301**	
2.75	2.55 - 2.95	21	**4482227**	
3.00	2.80 - 3.20	21	**4482178**	
3.25	3.05 - 3.45	21	**4482179**	**4482177**
3.50	3.30 - 3.70	21	**4470300**	
3.75	3.55 - 3.95	21	**4482188**	
4.00	3.80 - 4.20	21	**4482180**	
4.00	3.70 - 4.30	38	**4482057**	
4.50	4.20 - 4.80	38	**4482162**	
5.00	4.70 - 5.30	38	**4482056**	
5.50	5.20 - 5.80	38	**4470953**	
6.00	5.70 - 6.30	38	**4482140**	
6.50	6.20 - 6.80	38	**4482055**	
7.00	6.70 - 7.30	38	**4482108**	**4482028**
7.50	7.20 - 7.80	38	**4482204**	
8.00	7.70 - 8.30	38	**4482054**	
8.50	8.20 - 8.80	45	**4482206**	
9.00	8.70 - 9.30	45	**4482170**	
9.50	9.20 - 9.80	45	**4482182**	
10.00	9.70 - 10.30	45	**4470375**	
10.00	9.40 - 10.60	45	**4482205**	
11.00	10.40 - 11.60	45	**4482042**	
12.00	11.40 - 12.60	45	**4482112**	
13.00	12.40 - 13.60	45	**4482102**	
14.00	13.40 - 14.60	45	**4482181**	**4482192**
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**	



844 Kk

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 wooden case of bore gages.

Diameter tolerance ± 1 µm

Ring Gages 844 Ke are only available with the diameters given in the table on the right.
For all other dimensions use must be made of Ring Gages 355 E with dimensions as per DIN 2250 and with actual deviation engraved.

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 64mm, 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

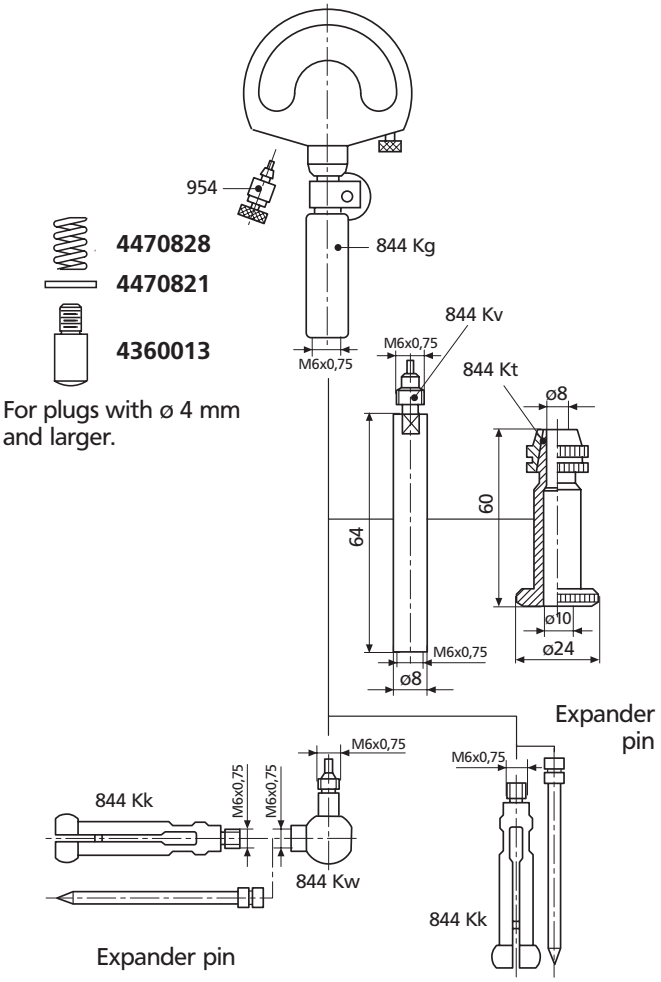
Order no. **4470110**

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.

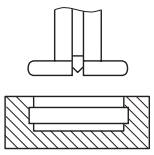
Order no. **4470115**



Measuring Probes for Special Applications

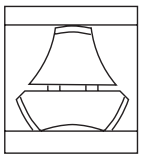
For measurement of blind holes, diameters of recesses, distances between plane-parallel surfaces, etc. special models of measuring probes are available on request.

1. Measurement of the diameter of recesses*

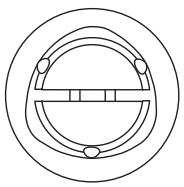


* *Requires holder 4471196*

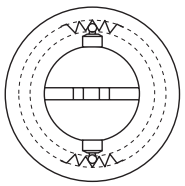
2. Measurement of plane-parallel surfaces



3. Measurement of polygon bores



4. Measurement of inside serrations, see 844 Z Page 9-60



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 determination of reversal point is inappropriate.

Table dia.	58 mm /***2.28"***
Throat depth of arm	45 mm / ***1.77"***
Table stroke	30 mm / ***1.18"***
Max. work piece height	approx. 100 mm / ***4"***

Order no. **4470100**

Angle Stop 844 Ka

Facilitates positioning of cylindrical work pieces under measuring instrument. For clamping to Stand 844 Kst.

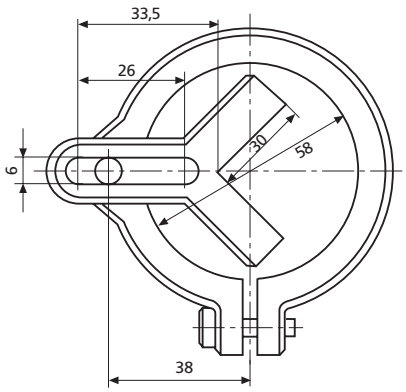
Order no. **4470120**

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**



1280 P Adjustable Bore Gages

Superior Accuracy for Production and Inspection.

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.

1282P-3W2 and 1280P-1W1

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	Gaging Depth	End of Head to Contact
1280P-1W1	**1282P-1W1**	12-25 mm/ ***.50-1"***	76 mm/ ***3"***	2.77 mm/ ***.11"***
1280P-2W2	**1282P-2W2**	25-50 mm/ ***1-2"***	152 mm/ ***6"***	4.37 mm/ ***.17"***
1280P-3W2	**1282P-3W2**	50-203 mm/ ***2-8"***	152 mm/ ***6"***	7.92 mm/ ***.31"***
1280P-1W2	**1282P-1W2**	12-25 mm/ ***.50-1"***	152 mm/ ***6"***	2.77 mm/ ***.11"***
1280P-2W3	**1282P-2W3**	25-50 mm/ **1-2"**	305 mm/ ***12"***	4.37 mm/ ***.17"***
1280P-3W3	**1282P-3W3**	50-203 mm/ ***2-8"***	305 mm/ ***12"***	7.92 mm/ ***.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).

1280 P Adjustable Bore Gages

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**.

1280 P Adjustable Bore Gages

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 in 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

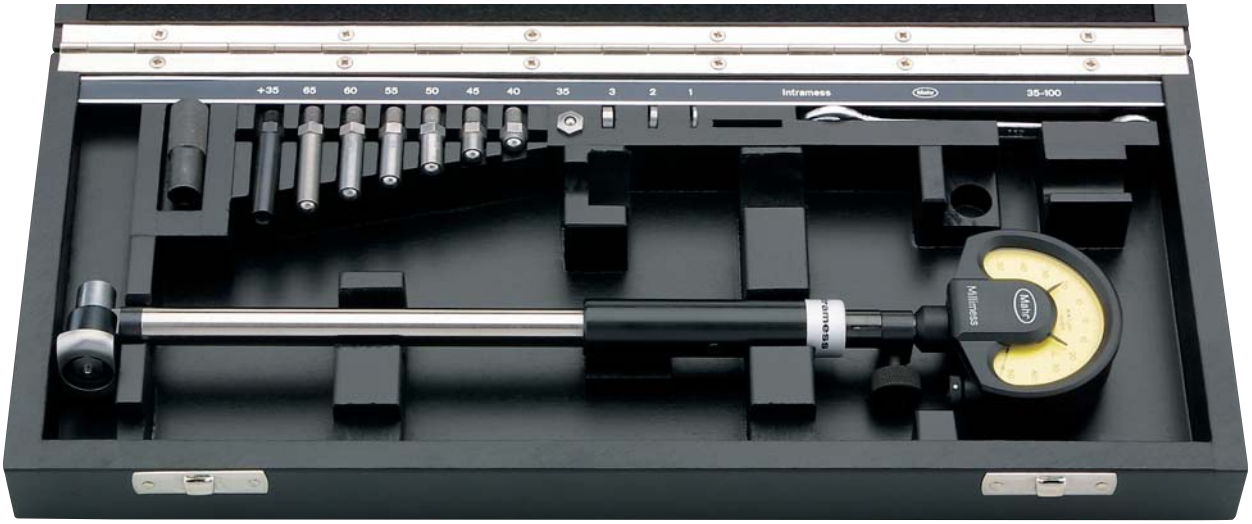
Diameter to be Measured	Extension Required Carbide	Extension Required Steel	Used on Gage Model Numbers
12 - 16 mm/ ***.50 - .625"***	**PT-562**	**PT-558**	1280P-1xxx
16 - 19 mm/ ***.625 - .75"***	**PT-567**	**PT-559**	
19 - 22 mm/ ***.75 - .875"***	**PT-568**	**PT-560**	1282P-1xxx
22 - 25 mm/ ***.875 - 1"***	**PT-557**	**PT-561**	
25 - 32 mm/ ***1 - 1.25"***	**PT-554**	**PT-555**	1280P-2xxx
32 - 38 mm/ ***1.25 - 1.50"***	**PT-553**	**PT-556**	
38 - 45 mm/ ***1.50 - 1.75"***	**PT-552**	**PT-569**	1282P-2xxx
45 - 50 mm/ ***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	Extension Sets	Used on Gage Models
50 - 64 mm/ ***2 - 2.5"***	**EX-222**	
64 - 76 mm/ ***2.5 - 3"***	**EX-223**	
76 - 89 mm/ ***3 - 3.5"***	**EX-224**	1280P-3XXX
89 - 100 mm/ ***3.5 - 4"***	**EX-225**	
100 - 127 mm/ ***4 - 5"***	**EX-223 with EX-226**	1282P-3XXX
127 - 152 mm/ ***5 - 6"***	**EX-225 with EX-226**	
152 - 178 mm/ ***6 - 7"***	**EX-223 with EX-228**	
178 - 203 mm/ ***7 - 8"***	**EX-225 with EX-228**	

Self-Centering Dial Bore Gages 844 N Intramess



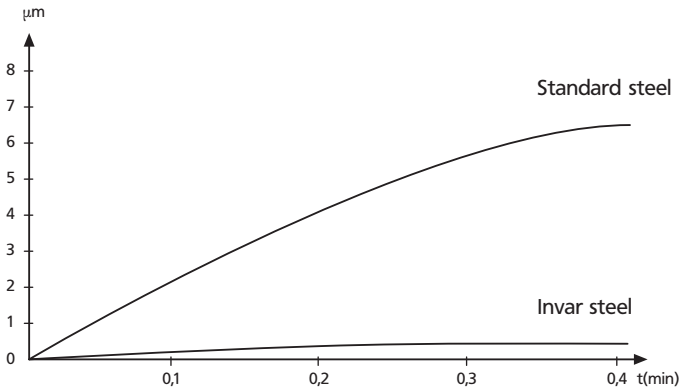
Features

- Measuring the diameter, roundness and conical form of a bore as well as the distances of plane-parallel surfaces
- Measuring head consists of a carbide-tipped moving anvil and an interchangeable stationary anvil which has a hardened steel ball; alternatively a carbide ball is available
- Transmission lever system transfers movement of the movable anvil to indicating instrument
- The broad centering bridge ensures automatic centering in the bore
- Insensitive to temperature due to both the shank and transfer rod being made from heat resistant **Invar steel**
- Highly resistant to wear and tear due to the carbide-tipped moving anvil
- Constant measuring force due to built-in spring thus eliminating user influence
- Universally applicable and extremely versatile as every instrument spans a broad measuring range, within this range it is quick and easy to adjust to any size
- Measuring head, holder, extensions, right-angle attachments and depth stops are all part of this extensive modular system

Invar steel has a particularly low expansion coefficient and thus makes the instrument totally insensitive to any kind of heat. Body heat from the user, increases in ambient temperature have no influence on the measuring results.

The graph on the right compares the Invar steel version to a standard type. Both gages were hand-held and thus influenced by body heat. The deviation when using Invar steel is negligible.

Change in length due to heat



Technical Data

Complete Instrument

844 N Carbide-tipped moving anvil; stationary anvil with steel ball

844 NH Moving anvil and stationary anvil are carbide-tipped

Accuracy

Accuracy of transmission	≤ 2 µm
Repeatability	≤ 0,5 µm

844 N

Measuring range mm	*(inch)*	for meas. depth** to mm/*inch*	Order no.*
18 - 50	*(.7 - 2")*	200/*8"*	**4474000**
35 - 100	*(1.4 - 4")*	250/*10"*	**4474001**
100 - 250	*(4 - 10")*	350/*14"*	**4474002**
250 - 400	*(10 - 16")*	500/*20"*	**4474003**
400 - 800	*(16 - 32")*	500/*20"*	**4474004**
250 - 800	*(10 - 32")*	500/*20"*	**4474005**

844 NH

Measuring range mm	*(inch)*	for meas. depth** to mm/*inch*	Order no.*
18 - 50	*(.7 - 2")*	200/*8"*	**4475000**
35 - 100	*(1.4 - 4")*	250/*10"*	**4475001**
100 - 250	*(4 - 10")*	350/*14"*	**4475002**
250 - 400	*(10 - 16")*	500/*20"*	**4475003**
400 - 800	*(16 - 32")*	500/*20"*	**4475004**
250 - 800	*(10 - 32")*	500/*20"*	**4475005**

* *Includes holder, measuring head, stationary anvil, wooden case (excludes indicating instrument)*

** *Excludes extension*

Indicating Instruments

All indicating instruments that has a 8 mm mounting shank may be used. Recommended are:

Dial Comparator		Readings mm / *inch*		Order no. mm / *inch*
Compramess	**1004 / *1004 Z***	5 µm/	***.0001"***	**4333000/*4333900***
Millimess	**1003 / *1003 Z***	1 µm/	***.00005"***	**4334000/*4334900***
Supramess	**1002 / *1002 Z***	0.5 µm/	***.00002"***	**4335000/*4335900***
Extramess	**2000**	0.2 µm/	***.00001"***	
		0.5 µm/	***.00002"***	**4346000***
		1 µm/	***.00005"***	
µMaxµm		.001mm/	***.00005"***	**EDI-10302****

Digital Indicators see Chapter 5
Electrical Indicating Instruments see Chapter 7

* *230 V, for 115 V please refer to page 6-5*

** *requires contact 4360107*

2001

1003

Accessories to adjust Dial Bore Gages

1. Ring Gage 355 E

Special wear-resistant gage steel. Hardened and lapped.
With actual deviation engraved

Dimensions:	DIN 2250, type C
Manufacturing tolerance:	DIN 2250
Available diameters:	0,5 - 200 mm

355 E

2. Setting Device

Uses standard gage blocks for setting any bore diameter and any tolerance. Replaces ring gages and is universally applicable

Components

Measuring Jaw 844 em

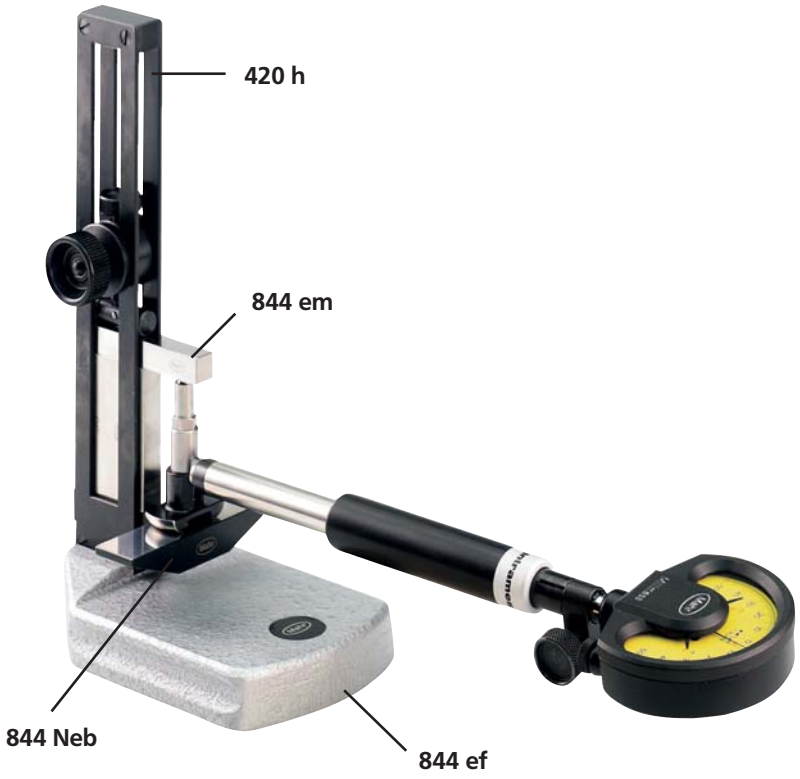
Measuring range mm	*(inch)*	Dimensions mm/*inch*	Order no.
18 - 800	***(.7 - 32")***	60 x 9.5 x 9 /***2.36 x .37 x .35"***	**4470095**

Setting Bridge 844 Neb

Measuring range mm	*(inch)*	Width mm/*inch*	Height mm/*inch*	Order no.
18 - 250	***(.7 - 10")***	70/***2.75"***	12/***.47"***	**4474080**
18 - 400	***(.7 - 16")***	165/***6.49"***	17/***.67"***	**4474081**
18 - 800	***(.7 - 32")***	320/***12.59"***	20/***.78"***	**4474082**

Gage Block Holder 420 h

Clamping range mm	*(inch)*	Order no.
0 - 70	***(0 - 2.75")***	**4800120**
0 - 120	***(0 - 4.72")***	**4800121**
100 - 220	***(4 - 8.66")***	**4800122**
100 - 420	***(4 - 16.53")***	**4800123**
400 - 820	***(16 - 32")***	**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/*in*)	d1 (mm/*in*)	d2 (mm/*in*)	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 indicator.

For meas. range mm/inch	L (mm/*in*)	d1 (mm/*in*)	d2 (mm/*in*)	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.

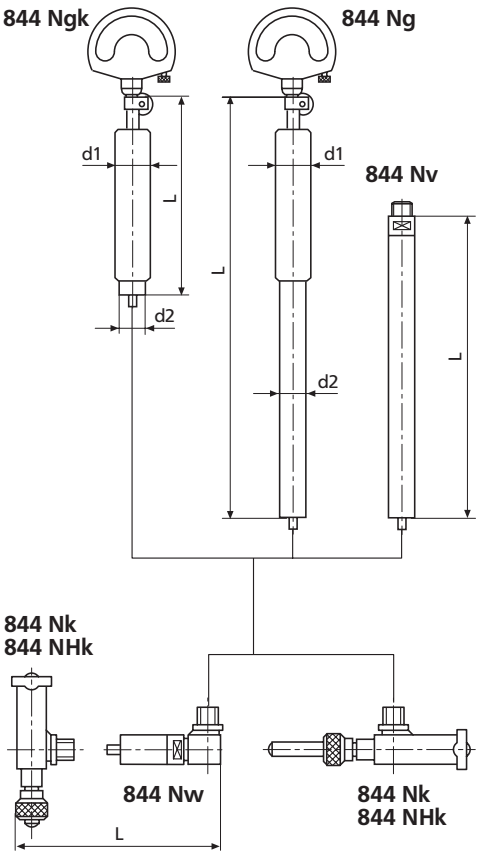
For meas. ranges mm *(inch)*	Length* L mm/*in*	Bore depth mm/*in*	Order no.
18 - 50 *(.7 - 2")*	66/*2.6"*	45/*1.8"*	4474070
35 - 100 *(1.37 - 4")*	80/*3.1"*	55/*2.2"*	4474071
100 - 250 *(4 - 10")*	105/*4.1"*	70/*2.8"*	4474072

* *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

Features

- For diametrical two ball measurement M_{dK}, to obtain the pitch diameter and conical form of internal gears in any position and at any depth
- For ball dimensions from 3,5 to 26,1 mm use the 844 Kk with carbide ball anvil s and in conjunction with an expander pin
- For ball dimensions >26 mm the measuring heads 844 z1 or 844 z2 with the appropriate modular units are to be employed
- Maximum wear resistance due to carbide ball anvils
- Constant measuring force due to built-in spring thus eliminating user influence
- Anvils, measuring heads, holder, spacer (immediate 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**		
4,0 - 4,6	**4482451**	**4482551**		
4,5 - 5,1	**4482452**	**4482552**		
5,0 - 5,6	**4482453**	**4482553**		
5,5 - 6,1	**4482454**	**4482554**		
6,0 - 6,6	**4482455**	**4482555**		
6,5 - 7,1	**4482456**	**4482556**		**4470806**
7,0 - 7,6	**4482457**	**4482557**		
7,5 - 8,1	**4482458**	**4482558**		
8,0 - 8,6	**4482459**	**4482559**		
8,5 - 9,1	**4482460**	**4482560**		
9,0 - 9,6	**4482461**	**4482561**		
9,3 -10,6	**4482462**	**4482562**	**4482662**	
10,3-11,6	**4482463**	**4482563**	**4482663**	
11,3-12,6	**4482464**	**4482564**	**4482664**	
12,3-13,6	**4482465**	**4482565**	**4482665**	
13,3-14,6	**4482466**	**4482566**	**4482666**	
14,5-16,1	**4482467**	**4482567**	**4482667**	
15,5-17,1	**4482468**	**4482568**	**4482668**	
16,5-18,1	**4482469**	**4482569**	**4482669**	
17,5-19,1	**4482470**	**4482570**	**4482670**	**4470808**
18,5-20,1	**4482471**	**4482571**	**4482671**	
19,5-21,1	**4482472**	**4482572**	**4482672**	
20,5-22,1	**4482473**	**4482573**	**4482673**	
21,5-23,1	**4482474**	**4482574**	**4482674**	
22,5-24,1	**4482475**	**4482575**	**4482675**	
23,5-25,1	**4482476**	**4482576**	**4482676**	
24,5-26,1	**4482477**	**4482577**	**4482677**	

Lifting Knob 954

enables the dial bore gage to gently guided into the serration. The measuring spindle of the indicating instrument can also be lifted.
Order no. **4372030**

Holder 844 Kg

with a clamping device for the indicating instrument. The mounting bore diameter 8 mm
Order no. **4470851**

Extension 844 Kv

for measuring in depth bores; length 64 mm
Order no. **4470070**

844 Kk Anvil

for internal serrations.
ball dimension „M_{dk}“ from

3,5 - 26,1 mm

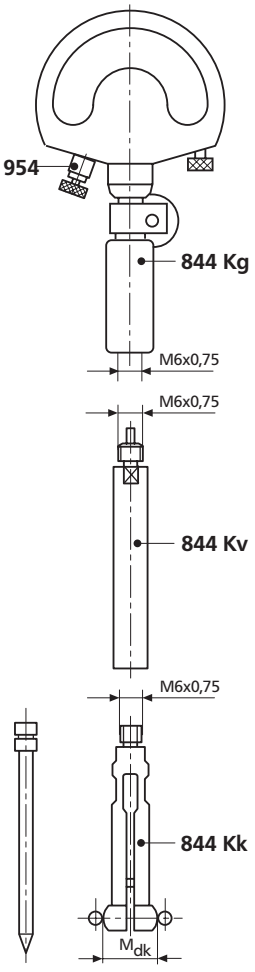


Table (Sizes in mm)

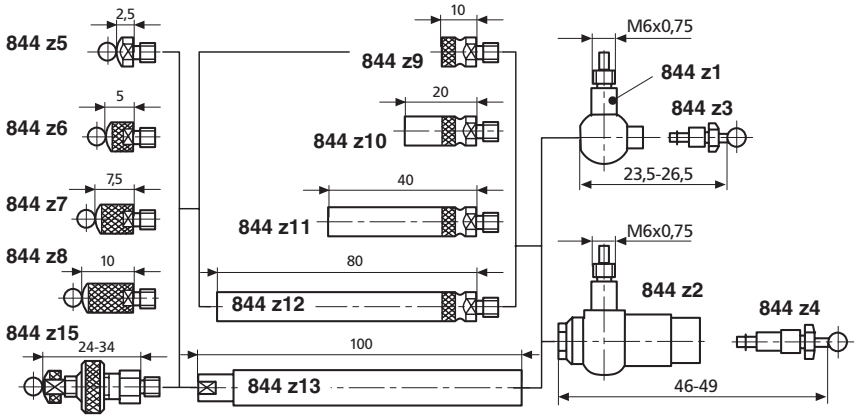
0,500 - 0,551 - 0,620 - 0,623 - 0,630 - 0,722 - 0,862 - 0,895 - 0,965 - 1,100 - 1,118 - 1,125 - 1,250
1,350 - 1,372 - 1,385 - 1,524 - 1,540 - 1,600 - 1,650 - 1,700 - 1,750 - 1,782 - 1,800 - 1,829 - 1,900
2,032 - 2,250 - 2,284 - 2,386 - 2,438 - 2,667 - 2,704 - 2,713 - 2,721 - 2,743 - 2,750 - 3,048 - 3,250
3,400 - 3,658 - 4,835 - 5,250 - 5,486 - 5,500 - 6,000 - 6,096 - 6,350 - 6,500 - 7,000

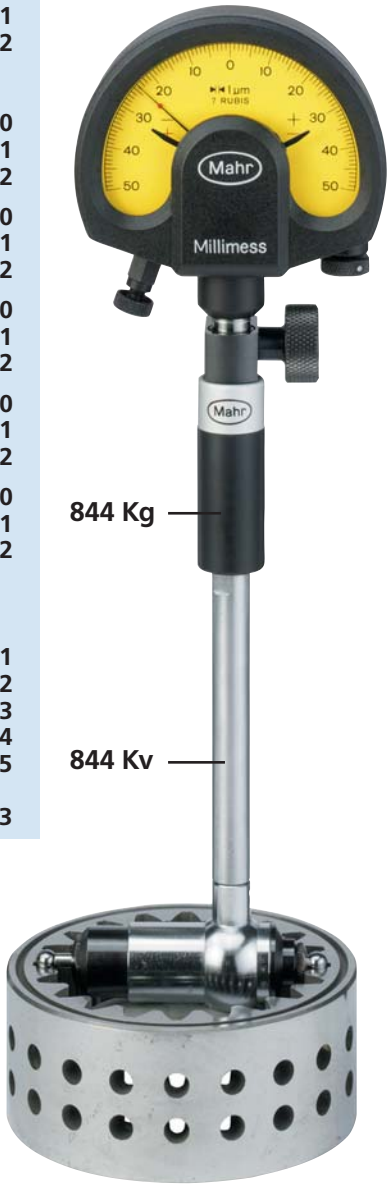
Modular Unit Parts

Diametrical two ball measurement from M_{dK} **26-333 mm**

Measuring Heads			**Order no.**
844 z1, for M_{dK} 26 - 130,5 mm			**4485000**
844 z2 for M_{dK} 48,5 - 333 mm			**4485001**
Floating Ball Anvils with carbide ball			
	Grad. (mm)	**Ball** dia. mm	
844 z3 Meas. range 3 mm, for Meas. Head 844 z1	0,5	1,0 - 5,0	**4488300**
		acc. to table	**4488301**
	0,5	7,5 - 10	**4488302**
844 z4 Meas. range 3 mm, for Meas. Head 844 z2	0,5	1,0 - 5,0	**4488310**
		acc. to table	**4488311**
	0,5	7,5 - 10	**4488312**
Ball Anvils with carbide ball			
844 z5, Length 2,5 mm	0,5	1,0 - 5,0	**4488320**
		acc. to table	**4488321**
	0,5	7,5 - 10	**4488322**
844 z6, Length 5,0 mm	0,5	1,0 - 5,0	**4488330**
		acc. to table	**4488331**
	0,5	7,5 - 10	**4488332**
844 z7, Length 7,5 mm	0,5	1,0 - 5,0	**4488340**
		acc. to table	**4488341**
	0,5	7,5 - 10	**4488342**
844 z8, Length 10,0 mm	0,5	1,0 - 5,0	**4488350**
		acc. to table	**4488351**
	0,5	7,5 - 10	**4488352**
844 z15, Length adjustable from 24-34 mm	0,5	1,0 - 5,0	**4488360**
		acc. to table	**4488361**
	0,5	7,5 - 10	**4488362**
Spacer (intermediate piece)			
	Length (mm)		
844 z9	10		**4486501**
844 z10	20		**4486502**
844 z11	40		**4486503**
844 z12	80		**4486504**
844 z13	100 *		**4486505**
Wooden case			**4485013**

** Only for 844 z2*





Dial Bore Gage for Internal Serrations 844 Z

Selecting Modular Unit Parts Measuring Head 844 z1 and Floating Ball Anvil 844 z3

M_{dk} in mm	844 z5	844 z6	844 z7	844 z8	844 z15	844 z9	844 z10	844 z11	844 z12	844 z13
26,0 - 29,0	x									
28,5 - 31,5		x								
31,0 - 34,0			x							
33,5 - 36,5				x						
36,0 - 39,0	x					x				
38,5 - 41,5		x				x				
41,0 - 44,0			x			x				
43,5 - 46,5				x		x				
46,0 - 49,0	x						x			
47,5 - 60,5					x					
48,5 - 51,5		x					x			
51,0 - 54,0			x				x			
53,5 - 56,5				x			x			
56,0 - 59,0	x					x	x			
57,5 - 70,5					x	x				
58,5 - 61,5		x				x	x			
61,0 - 64,0			x			x	x			
63,5 - 66,5				x		x	x			
66,0 - 69,0	x							x		
67,5 - 80,5					x		x			
68,5 - 71,5		x						x		
71,0 - 74,0			x					x		
73,5 - 76,5				x				x		
76,0 - 79,0	x					x		x		
77,5 - 90,5					x	x	x			
78,5 - 81,5		x				x		x		
81,0 - 84,0			x			x		x		
83,5 - 86,5				x		x		x		
86,0 - 89,0	x						x	x		
87,5 - 100,5					x			x		
88,5 - 91,5		x					x	x		
91,0 - 94,0			x				x	x		
93,5 - 96,5				x			x	x		
96,0 - 99,0	x					x	x	x		
97,5 - 110,5					x	x		x		
98,5 - 101,5		x				x	x	x		
101,0 - 104,0			x			x	x	x		
103,5 - 106,5				x		x	x	x		
107,5 - 120,5					x		x	x		
117,5 - 130,5					x	x	x	x		

Example:

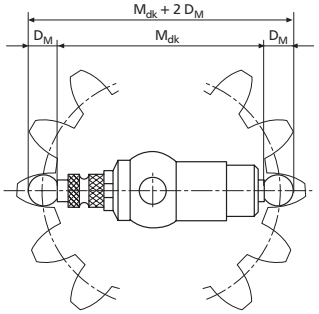
Diametrical two ball meas. M_{dK}	73,0	mm
Ball dia.	5,486	mm

When placing an order please quote the ball diameter of the modular unit system for 844 z3 - 844 z8, as well as 844 z15. On the basis of the above specified example above result several combinations that are possible to choice from is dependent upon the work piece. For further details please refer to the illustration on Page 9-61.

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