



**BMD PLUG GAUGES
TECHNICAL
GUIDE 2007/2008**



47521



Contens



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Competence for precision and safety



Superior quality for reliable performance

High-volume engineering does not work without precision. To achieve highest possible safety in production, precision is necessary starting from design to final product.

Here the trademark DIATEST stands for quality. Gauges with repeatability to 0.001 mm/0.00005" guarantee exact results.

DIATEST bore gauges are manufactured according to DIN EN ISO 9001. Using state-of-the-art manufacturing engineering the highest quality standards are achieved. Our products withstand technological demands, no matter whether it is a question of standard products or special solutions made to customer's specifications.

This is the company's philosophy, carried out by an ex-

perienced staff: Highest quality at a fair cost effectiveness, combined with expert advice and absolute faithfulness to deadlines in dealing with all DIATEST customers. For us this is a service taken for granted which our DIATEST partners worldwide appreciate.

This is what partnership means to us.



Technical description

Plug gauges (BMD) are self-indicating, self-centering, high-precision measurement instruments. These easy-to-use gauges are suitable for both static and dynamic measurements. They can be used for manual detection of dimensional deviations and shape defects errors in bores in serial measurement at the machine but may also be installed in measuring equipment and automated systems.

A broad range of applications, ease of handling, superior precision and rugged construction are combined in a highly cost-effective system. A wide selection of basic types in the standard program, supplemented by useful accessories, ensures that nearly all bores encountered in actual practice can be measured precisely.

The range of display instruments includes mechanical indicators, digital displays and sensors connected to analytical equipment. Peripheral equipment provides for static data analysis, dimension-based tool control and many other useful options.

Special models

The BMD Plug Gauge Guide is intended to assist you in selecting the most suitable measurement equipment. For special measurement problems, we need a detailed description of the measurement task as well as a drawing or sample in order to prepare an offer. An optimum offer depends on precise, complete information.

Please note: Deviations regarding technical aspects of specially designed BMD gauges as opposed to standard gauges are possible!

Special markings SO-B (extra charge)

We can provide special markings, such as customer-specific ID numbers, tolerances, etc. Please keep in mind that the possibilities for adding special markings to small plug gauges are limited. The surcharge for SO-B is calculated for each increment of 10 characters or portion thereof (see price list).

Design and material characteristics:

Probe: spring steel, approx. 61 HRC

Needles: carbide, approx. 1650 HV

Guide cylinder: gauge steel, approx. 60 HRC

Hard chrome coating on guide cylinders, approx. 1000 HV (standard design)

Special cylinder designs: OCR = steel cylinders, hardened with gunmetal finish

Please note: OCR plug gauges are not suitable for rough measurement conditions..

ZHML = cylinder with carbide bars, page 13

ZKUL = cylinder with plastic bars, page 16

Technical data

All dimensions are quoted in mm unless otherwise specified.

We reserve the right to make technical modifications in order to improve performance. Minor deviations which do not impact significantly on measurement equipment performance may occur.

Information regarding technological advances and the most recent version of our documentation is also available on the Internet at www.diatest.com

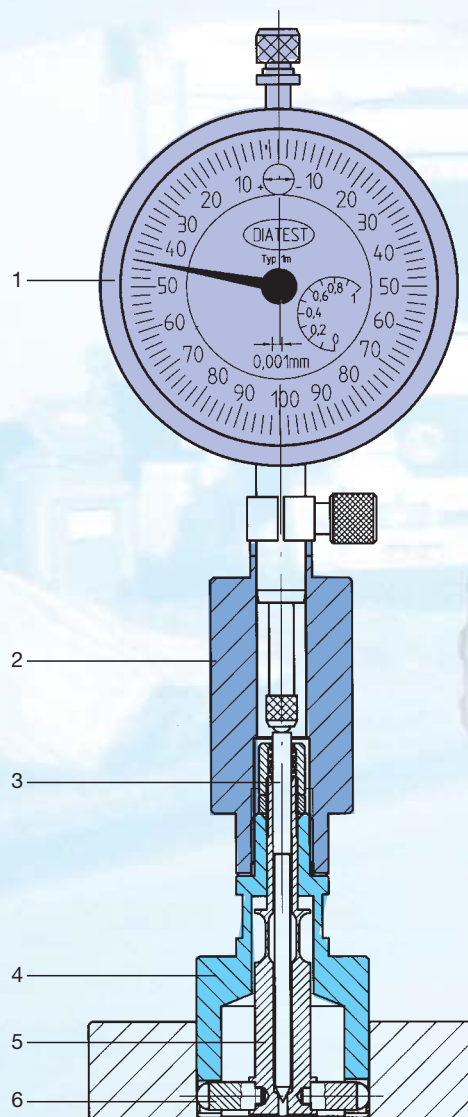
Zero setting

Zero setting should be performed with the aid of a setting ring that corresponds precisely to the minimum bore size. This ensures that the risk of radial and axial errors is largely eliminated during the calibration process.

The most suitable setting rings are those which comply with the specifications of DIN 2250-C. Setting rings with larger dimensions or for minimum, medium and maximum dimensions are generally not required.

Function

The guide cylinder (4) centers the probe gauging contacts (6) axially and radially in the bore. The lapped cone of the needle (3) translates the distance traveled by the gauge contacts 1:1 to the indicator clamped in the holder (2).



Technical description



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Delivery times

Delivery times are quoted ex factory. Express orders should allow for the weekday on which goods can be shipped.

Repairs

Please allow approx. 10 – 15 days for repairs or general reconditioning.

General reconditioning includes functional testing and replacement of damaged parts.

The hard chrome coating on plug gauge cylinders will be renewed as needed (this option is not automatically included in the general overhaul service).

A cost estimate will be provided on request.

Maintenance

No special maintenance is required. If cleaning is needed, remove the needle and clean the plug gauge and the needle carefully with compressed air and a cleaning solution.

Please note: The needle taper should be greased prior to installation (e.g. Vaseline). When installing needles for Series 6 and 10, please ensure that springs are remounted (no springs in Series 4).



Gauging accuracy

Maximum permissible deviations with new plug gauges:

Repetition accuracy

2-point design
fw = 0.001 mm

3-point design
fw = 0.002 mm

Gauging distance translation errors (Linearity)

2-point models
fe = 1% of gauging distance
min. 0.001

3-point models
fe = 3% of gauging distance
min. 0.002

FB design
fe = 2% of gauging distance
min. 0.001

Axial and radial centering errors

The plug gauge guide cylinder positions the gauging contacts in the bore and ensures high repetition accuracy. Short guide paths and/or excessive play between the bore and the guide cylinder result in lower repetition accuracy due to tipping and lateral shifting.

Nominal dimensions and standard measurement ranges

Plug gauge order dimension (nominal dimension = minimum bore dimension)

Example:
 $\varnothing 35 D7 = \varnothing 35 +0.08/+0.105$
 BMD nom. dimension = 35.08
 $\varnothing 35 H7 = \varnothing 35 +0/+0.025$
 BMD nom. dimension = 35.0

Measurement range extension MB-SO (extra charge)

The standard measurement range can be extended for applications requiring measurement of larger bore tolerances. Please note: Some plug gauges with MB-SO have smaller measurement radii. This poses the danger of axial and radial errors. Please enquire before using diamond measurement contacts.

A measurement range extension of e.g. MB-SO+0.4 indicates that the entire measurement range of the plug gauge is 0.4 mm, based on the nominal plug gauge dimension.

Standard delivery times	
Plug gauge type	Production days
S, D, PK, OR, 2R, S-FB up to nom. dim. 100 mm	10
S, D, PK, OR, 2R, S-FB above nom. dim. 100 mm	15
FB, 3P, L, PK-2Z, MZ, AT0	15
SO-TA, UM, PA, SO-GL, SO-W10, T-BMD	25
SO-KO, SO-ZL, SO-2Z, ZHML, SO-PA etc.	30

Saturdays, Sundays, public holidays and company holidays are not counted as production days and will extend delivery times accordingly.

Express delivery times (extra charge)	
Plug gauge type	Production days
S, D, PK, OR, 2R, S-FB up to nom. dim. 100 mm	5-8
S, D, PK, OR, 2R, S-FB above nom. dim. 100 mm	8-10
FB, 3P, L, PK-2Z, MZ, AT0	8-10
SO-TA, UM, PA, SO-GL, SO-W10, T-BMD	15
SO-KO, SO-ZL, SO-2Z, ZHML, SO-PA etc.	15

Delivery times for all other plug gauges, including multiplane gauges, etc, will be quoted on request.

Measurement range, based on nominal BMD dimension		
BMD series	Application range	Measurement range
4	$\varnothing 2.98 - 9.0$	+ 0.1 mm
6	$\varnothing 7.0 - 20.0$	+ 0.15 mm
10	$\varnothing 15.0 - 270.0$	+ 0.2 mm
FB6	$\varnothing 7.0 - 16.0$	+ 0.15 mm
FB10	$\varnothing 15.0 - 150.0$	+ 0.15 mm
3P (Series 6)	$\varnothing 8.0 - 20.0$	+ 0.15 mm
3P (Series 10)	$\varnothing 15.0 - 100.0$	+ 0.2 mm

Measurement range extension MB-SO	
BMD series	max. meas. range (order suffix)
Series 4	max. MB-SO+0.2
Series 6	max. MB-SO+0.4
Series 10 bis $\varnothing 120$ mm	max. MB-SO+0.8
Series 10 $\varnothing >120$ bis 180 mm	max. MB-SO+0.6
Series 10 $\varnothing >180$ bis 220 mm	max. MB-SO+0.4
Series 10 $\varnothing >220$ bis 270 mm	max. MB-SO+0.3
Series FB	max. MB-SO+0.3
BMD-3P (Series 6)	max. MB-SO+0.3
BMD-Series 10 3P	max. MB-SO+0.4

Technical description

Measurement range limitation MB-B

A reduction of the standard measurement range can be requested in orders for Series 6, Series 10 and Series FB. Order suffix: MB-B and max. desired measurement range.

Sample order for max. measurement range of +0.1 mm instead of 0.2 mm:

BMD-S10-CR-35.0-MB-B+0.1

Washers can also be used to reduce the measurement range. DIATEST offers a line of washers for this purpose:

BMD Series 6 US-6
BMD Series 10 US-10

Indicators, gauging pressure

Plug gauges can be used with nearly all mechanical and electronic indicator units with Ø 8h and 3/8" stem. Gauging pressure has a significant influence on the service life and accuracy of BMD.

Recommended gauging pressures for standard measurement ranges:

BMD Series 4 appr. 0.3 – 0.4 N
BMD Series 6 appr. 0.6 – 1.0 N
BMD Series 10 appr. 0.8 – 1.2 N

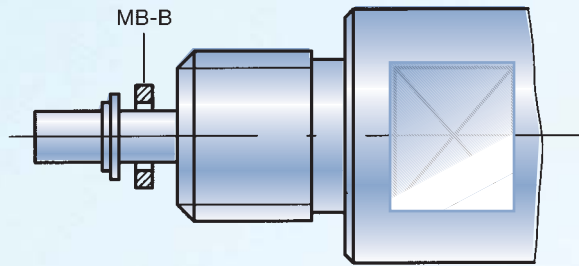
Please note:

It may be necessary to increase gauging pressure when using options MB-SO and PG.

Gauging pressure reduction

Only low gauging pressure is needed when using Series 4 BMD to measure thin-walled objects or to reduce wear on measurement contacts. It is often impossible to obtain a suitable reading. Special indicator holders or adapters can be used to reduce the gauging pressure of the indicator. In addition, Option PG provides for the possibility of lifting the gauging contacts from the bore surface.

Type PG Page 8
Holder MH-6-73-R Page 23
Holder MH-10-150-PG Page 32
Holder MH-10-150-R Page 25
Holder MH-10-150-F Page 31
Adapter A4-10-F Page 34
Adapter A6-6-F Page 35
MH-4-67-F Page 27
MH-6-65-F Page 27



Gauging contacts

Large gauge contact radii (see Table MGM) are important to ensure long service life and are required when measuring bores with rough surfaces. Our BMD gauging contacts meet these requirements.

The selection of gauging contact material depends on the composition of the workpiece and the conditions affecting wear. BMD gauging contacts are available in several different materials.. If you are not sure

which material is best suited for your workpiece, please get in touch with us.

Carbide bore (MHM) plug gauges are fitted with carbide gauging contacts (standard, no extra charge).

Carbide: approx. 1850 HV

Carbide should not be used for workpieces composed of non-ferrous metal, aluminum or alloys of either.

Hard chrome (MCR) gauging

contacts are suitable for use with non-ferrous metals, aluminum and alloys of both. These gauging contacts are made of carbide steel coated with a layer of hard chrome.

The hard coating is approx. 0.03 mm thick. The MCR option should not be selected for applications involving heavy wear conditions or very soft workpiece materials. In these cases, it is advisable to opt for diamond gauging contacts (MDI).

Gauge contact radii (see Table MHM)

Hardness: approx. 1000 HV
Order suffix: MCR

Available for nominal diameters of 3,95 and above.

Example:
BMD-S10-CR-35.0-MCR

Ceramic gauging contacts (MKE) (extra charge)

Like the MCR option, ceramic gauging contacts are suited for use with non-ferrous metals and aluminum.

When working with very soft aluminum materials, the ceramic material may discolor. This has no impact on performance or measurement accuracy, however.

Hardness: Knoop 100g
18000

Grain size: 0.5 µm

Gauge contact radii (see Table MHM)

Not available for Series 4 and FB

Order suffix: MKE

Example:
BMD-S10-CR-35.0-MKE

Gauging contacts, carbide (MHM)		
BMD series	Diameter range	gauging radius
Series 4	2.98 – 9.0	R = 0.5
Series 6	7.0 – 20.0	R = 2.0
Series 10	15.0 – 25.0	R = 2.5
	> 25.0 – 31.0	R = 4.5
	> 31.0 – 35.0	R = 6.5
	> 35.0 – 41.0	R = 8.5
	> 41.0 – 47.0	R = 10.5
	> 47.0 – 56.0	R = 13.0
	> 56.0 – 66.0	R = 16.0
	> 66.0 – 120.0	R = 20.0
	> 120.0 – 150.0	R = 25.0
	> 150.0 – 270.0	R = 30.0
Option MB-SO+0,4 to 0,5		R = 4.5
Option MB-SO+0,5 and above		R = 2.5
BMD-FB6	7.0 – 16.0	R = 2.0
BMD-FB10	15.0 – 18.0	R = 1.0
	> 18.0 – 150.0	R = 1.5
BMD-ME		R = 4.5
BMD-PK (Series 10)		R = 2.5
BMD-PK (Series 6)	7.9 – 20.0	R = 2.0
BMD-3P (Series 10)		R = 2.5
BMD-3P (Series 6)	8.0 – 20.0	R = 2.0



Technical description



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Ruby gauging contacts (MRU) (extra charge)

For non-ferrous metals, aluminum and alloys of both.

It may be necessary to opt for diamond contact when working with very soft aluminum materials, etc.

Gauging contact radii, see Table MHM

Hardness, ruby: approx. 2000 HV
Order suffix: MRU

Example:
BMD-S10-35.0-MRU

Not available for Series 4 and FB

Diamond gauging contacts (MDI) (extra charge)

Suitable for use with extremely soft aluminum materials, under heavy wear conditions (e.g. automatic measurement) and with highly polished surfaces, etc.

These gauging contacts are made of natural diamond.

Please note: The gauging contact may be damaged with working with sharp-edged workpieces. Please inquire before using the MB- SO extended range option.

Plastic gauging contacts (MKK) (extra charge)

These gauging contacts should be used only under certain specific conditions, e.g. for highly polished surfaces..

The gauging contacts consist of polyamide balls (Ø 4.0 mm). These elements can be replaced by the customer.

Available for nominal diameters of 25.0 mm and above. Type S or D only.

Maximum measurement range: MB-SO+0.3

Order suffix: MKK

Example:
BMD-S10-CR-35.0-MKK

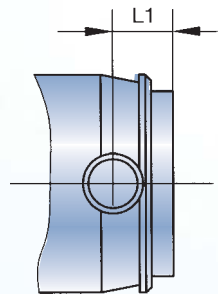
Service life

Service life depends upon such conditions as workpiece surface quality (roughness, coating), material, length of the measured bore, gauging pressure, etc. Up to 1,000,000 measurements are possible under optimum conditions.

The following options may be selected for applications involving heavy wear conditions:

- Air cleaning (L) Page 22
- PG Page 8
- MDI Page 7
- ZHML Page 13
- Gauging pressure reduction Page 6

Protective cover AD (extra charge)



Protective covers should be used with caution. Covers protect mechanical parts and reduce the risk of dirt accumulation. However, they make it difficult to remove chips, coolants and other deposits.

Standard protective covers are made of aluminum. Covers made of steel, carbide steel and other materials are available on request.

Depending on nominal diameter and design, protective covers are either glued or screwed in place.

Covers for Types S and S-FB

Covers for Type S are available for nominal diameters of 4.0 and above. Up to a nominal diameter of 28.0, the dimension L1 increases by 0.5 mm. For nominal diameters of 28.0 and above, dimension L1 increases by 2.0 mm.

Order suffix: AD-S

Example:
BMD-S10-CR-35.0-AD-S

Covers for Type D

Dimension L1 increases by 1 mm.

Order suffix: AD-D

Example:
BMD-D10-CR-35.0-AD-D

Covers for Type FB

BMD-FB6: Dimension L1 increases by 1 mm. For Series BMD-FB10, nominal diameters 15-28 mm, dimension L1 increases by 0.5 mm and for nominal diameters of 28 mm by 2 mm.

Order suffix: AD-FB

Example:
BMD-FB10-CR-35.0-AD-FB

Gauging contacts, diamond (MDI)

BMD series	Diameter range	Gauging radius
Series 4	3.95 – 9.0	R = 0.5
Series 6	7.0 – 16.0	R = 2.0
Series 10	15.0 – 270.0	R = 2.5
Order suffix	MDI	
Example	BMD-S10-CR-35.0-MDI	

Not available for FB



Technical description

Reduced cylinder diameter tolerance (MZ)

(extra charge)

The production tolerances for guide cylinders indicated for BMD Types S and D (Page 10, 11) are reduced to 0.01 mm (± 0.005). The purpose is to reduce axial and radial errors to a minimum. This option should be used only for very small bore tolerances (to approx. 0.01 mm).

Cylinder production tolerance (min. bore diameter -0.01) ± 0.005 mm

Order suffix: MZ

The MZ dimension is approx. 0.01 mm lower than the minimum bore diameter (= nominal BMD diameter).

Example:

Min. bore diameter = 35.0

MZ diameter = 34.99

BMD-S10-35.0-MZ-34.99

The guide cylinder is manufactured with a diameter of $\varnothing 34.99 \pm 0.005$ mm

Range of application

$\varnothing 4,0 - 100,0$ mm.

Other diameter dimensions on request.

Inspection plug gauge (BM)

(on request, extra charge)

The inspection plug gauge is a full-form GO gauge used to measure minimum bore diameter. If the inspection gauge can be inserted into the bore, the exact actual diameter as well as any shape defects are shown on the indicator.

Series 6 $\varnothing 8,0 - 20,0$

Series 10 $\varnothing >20 - 100,0$

Quality ISO6 or to customer specification

BMD without inherent gauging pressure (PG)

Without an indicator, BMDs have an inherent gauging pressure of approx. 0.2 – 1.7 N.

In Option PG – without inherent gauging pressure – the built-in gauge head is not pre-extended. The gauging contacts are retracted beneath the surface of the guide cylinder. This option should be selected e.g. for use with sensitive or rough workpiece surfaces.

Please note:

Indicator gauging pressures must be higher, as the gauge head exerts no pressure of its own.

Option PG should be used in conjunction with the following accessories:

Holders:

MH-6-73-R

MH-10-150-R

MH-10-150-PG

Order suffix: PG

Example:

BMD-S10-35.0-PG

Page 23

Page 25

Page 32

Toleranced connecting length (ATO) (extra charge)

Depending on how the gauging unit is installed, the needle may protrude at different lengths (differences of up to 1.0 mm). Especially when electrical gauges are used, the gauge must be readjusted in the holder when the plug gauge is changed (electrical zero point). In order to avoid this problem, the dimension from the stop rim to the needle is adjusted with a tolerance of ± 0.02 in the ATO option. The adjustment is made in the setting ring at the nominal dimension. This option requires that the setting ring be ordered with the component.

Please note:

If the plug gauge is used with such accessories as a depth extension, angle fittings, etc., option ATO must cover the entire unit (accessories are not interchangeable).

BMD series	ATO
Series 4	12.55 ± 0.02
Series 6	12.18 ± 0.02
Series 10	21.96 ± 0.02

Order suffix: ATO

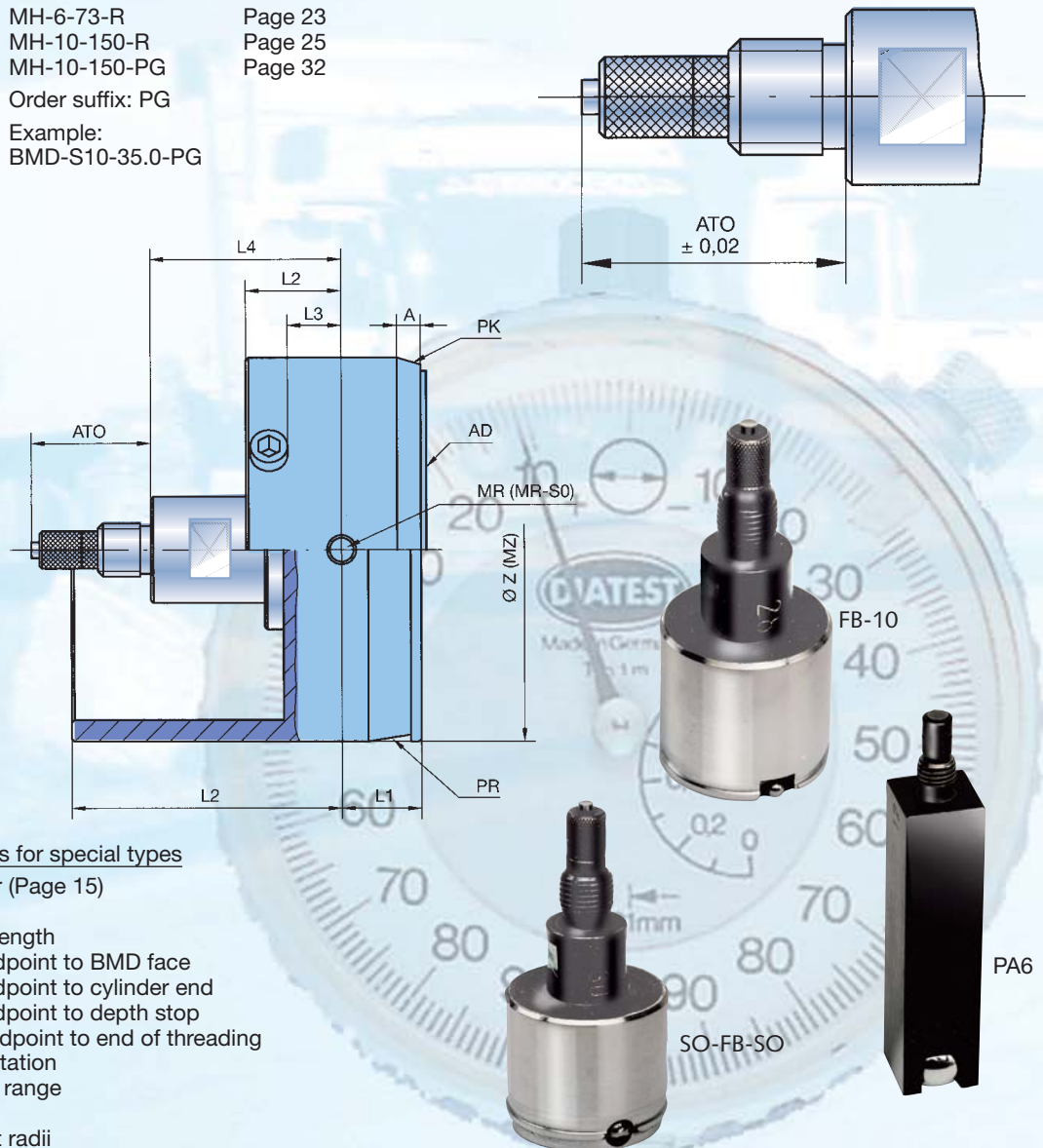
Example:

BMD-S10-35.0-ATO

BMD-S10-35.0+TV-15-64-ATO

Note:

Dimension ATO changes as a result of mechanical wear.



Important dimension-based codes for special types

A	Length of 30° pilot taper (Page 15)
AD	Cover AD-S, AD-D
ATO	Toleranced connecting length
L1	Length from contact midpoint to BMD face
L2	Length from contact midpoint to cylinder end
L3	Length from contact midpoint to depth stop
L4	Length from contact midpoint to end of threading
MB-B	Measurement range limitation
MB-SO	Extended measurement range
MZ	Limited Z dimension
MR-SO	Special gauging contact radii
$\varnothing Z$	Actual BMD cylinder diameter

Bore plug gauges – Basic types



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In diameters of up to 44.0 mm, the guide cylinder and the threaded connection fittings are produced as a single part. In plug gauges with nominal diameters larger than 44.0 mm, guide cylinders and the threaded connection fittings are manufactured as separate parts.

The basic plug gauge types are ordinarily used as manual measuring device and are thus produced with entry grooves which prevent the gauge from jamming as it enters the bore.

Series 4 BMD plug gauges have no entry grooves.

Our Basic plug gauge types are divided into three groups:

1. Basic plug gauge for general-purpose gauging

Due to its short L1 dimension, this type is not suitable for measurement from the lip of the bore.

2. Basic plug gauge for all through bores

This type of plug gauge should always be used for workpieces with through bores. Another advantage is that the enlarged L1 dimension allows for reliable measurement from the lip of the bore.

3. Basic plug gauge for blind bores

This type of BMD plug gauge should always be used when measurements are to be made near the bottom of the bore or when bores are very short. For very short bores, the entry groove should be reduced in size or eliminated entirely (Type OR).

The BMD-FB plug gauge is produced in versions FB-6 (connection threading M6 x 0.75) and FB-10 (connection threading M10 x 1) and is available in nominal diameters of 7.0 mm and above.

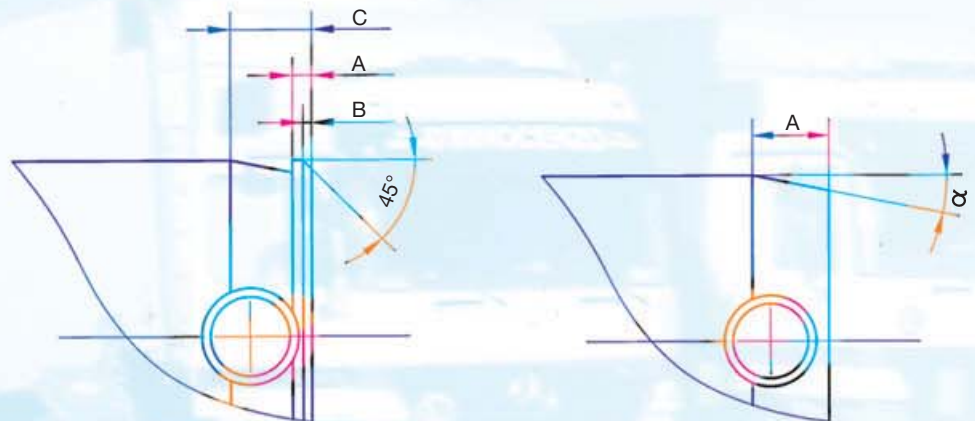
Smaller bore diameters require the use of Type BMD-S4-S-FB.

Insertion aids

In order to facilitate insertion of the plug gauge into the bore, Diatest offers optional entry grooves (PR) and pilot tapers (PK). An entry groove is the standard solution for preventing jamming during manual measurement.

For automatic measurement or use in measuring systems, the pilot taper is used in conjunction with a floating holder (see Page 46).

For very short bores (in which an entry groove cannot be used) the cylinder is beveled (Option OR, see Page 14).



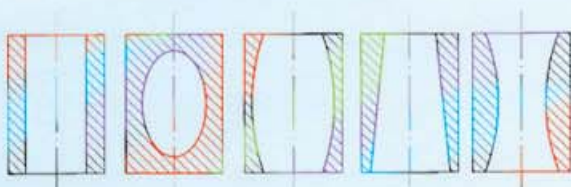
Entry groove dimensions

Series	Nom. diameter range	A	B	C
6	> 7.0 – 10.0	0.5	0.3	1.9
6	> 10.0 – 20.0	0.6	0.3	2.0
10	> 15.0 – 25.0	0.9	0.5	3.7
10	> 25.0 – 44.0	1.1	0.5	4.6
10	> 44.0 – 70.0	1.5	0.5	6.5
10	> 70.0 – 100.0	2.0	0.5	10.0
10	> 100.0 – 270.0	2.0	0.5	11.0

Pilot cone dimensions

Series	Nom. diameter range	Type D		Type S	
		A	α	A	α
4	> 3.95 – 6.0	2	8°	0.8	30°
4	> 6.0 – 9.0	3	8°	0.8	30°
6	> 7.0 – 9.0	3.5	8°	2.5	15°
6	> 9.0 – 20.0	3.5	15°	2.5	15°
10	> 15.0 – 70.0	4	15°	3	15°
10	> 70.0 – 270.0	4.5	15°	3.5	15°

Sample applications for 2-point and 3-point BMD plug gauges



2-point plug gauges for standard applications (bore diameter, shape deviations), special: oval



3-point plug gauges: for polygon only

S4

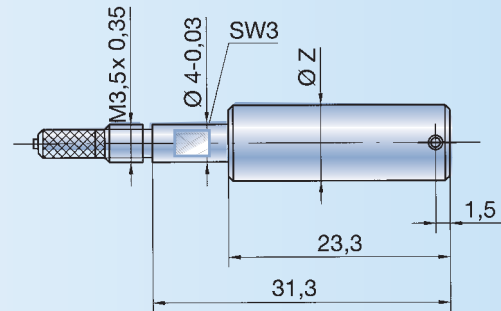
Nominal diameter range: Ø 2.98 – 9.0 mm

Ø Z = Nom. diameter - 0.02/- 0.04

Sample order:

Bore diameter	Order no.
7D6	BMD-S4-CR-7.04

Diameters less than 2.98 with T-BMD
(Page 16)



S6

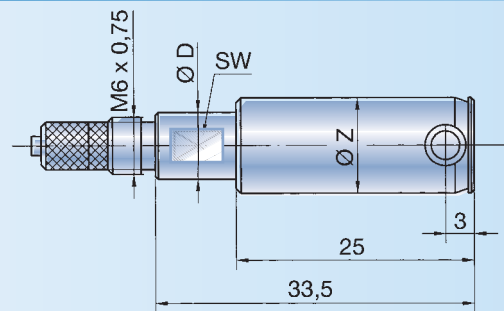
Nominal diameter range: 7.0 – 20.0

Ø Z = Nom. diameter - 0.02/- 0.04

Sample order:

Bore diameter	Order no.
10H6	BMD-S6-CR-10.0

Nom. diameter	7.0 – 8.0	> 8.0 – 20.0
Ø D	6.8	7.9
SW	6	7



S10

Ø 15 – 44 mm

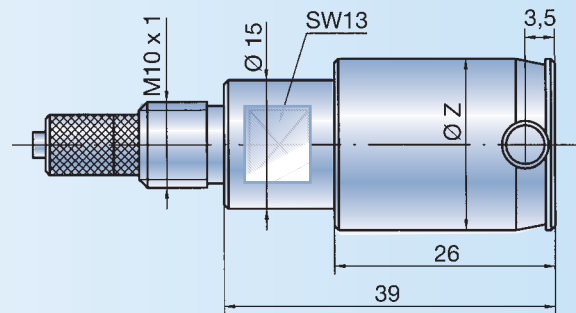
Nominal diameter range: above 15.0 – 44.0 mm

Nom. diameter Ø 15 – 32.0
Ø Z = Nom. diameter - 0.02/- 0.05

Nom. diameter Ø > 32.0 – 44.0
Ø Z = Nom. diameter - 0.03/- 0.06

Sample order:

Bore	Order no.
40 – 0.007/+0.025	BMD-S10-CR-39.993



S10

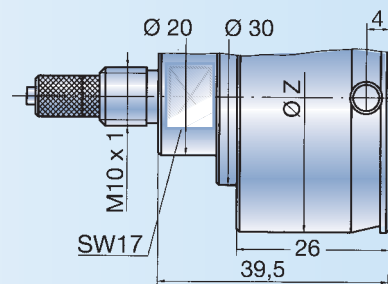
Ø > 44 – 70 mm

Nominal diameter range: above 44.0 – 70.0 mm

Ø Z = Nom. diameter - 0.03/- 0.06

Sample order:

Bore	Order no.
50 R7	BMD-S10-CR-49.95



S10

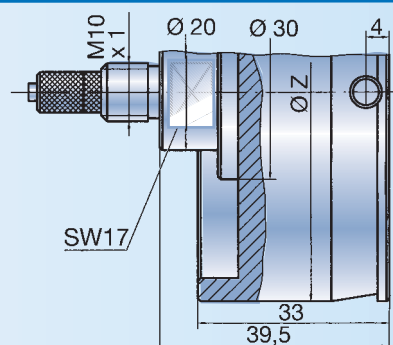
Ø > 70 – 270 mm

Nominal diameter range: above 70.0 – 270.0 mm

Ø Z = Nom. diameter - 0.04/- 0.07

Sample order:

Bore	Order no.
125 – 0.04	BMD-S10-CR-124.96



D4

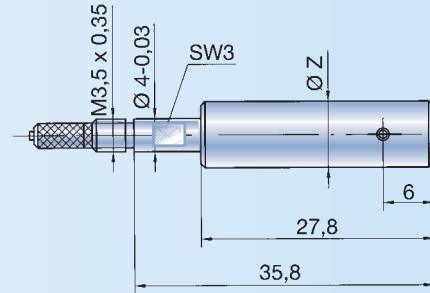
Nominal diameter range: Ø 2.98 – 9.0 mm

Ø Z = Nom. diameter -0.02/-0.04

Sample order:

Bore diameter	Order no.
5 N8	BMD-D4-CR-4.98

Diameters less than 2.98 with T-BMD (Page 16)



D6

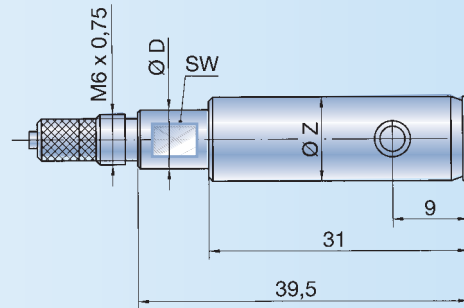
Nominal diameter range: 7.0 – 20.0 mm

Ø Z = Nom. diameter -0.02/-0.04

Sample order:

Bore diameter	Order no.
10 + 0.04	BMD-D6-CR-10.0

Nom. diameter	7.0 – 8.0	8.0 – 20.0
Ø D	6.8	7.9
SW	6	7



D10

Ø 15 – 44 mm

Nominal diameter range: above 15.0 – 44.0 mm

Nom. diameter Ø 15 – 32.0

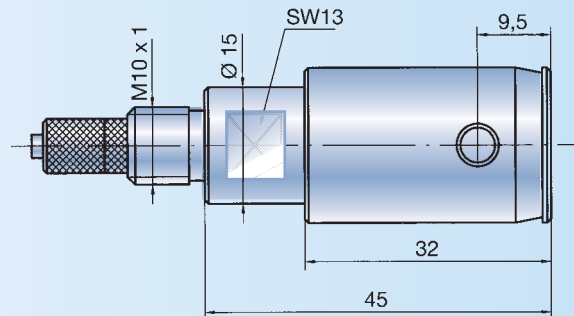
Ø Z = Nom. diameter -0.02/-0.05

Nom. diameter Ø > 32 – 44.0

Ø Z = Nom. diameter -0.03/-0.06

Sample order:

Bore	Order no.
42 K8	BMD-D10-CR-41.97



D10

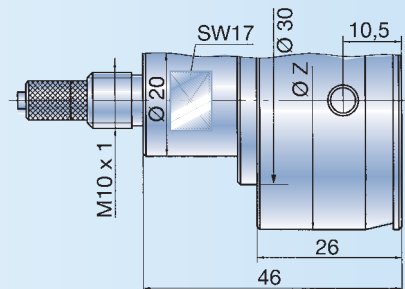
Ø > 44 – 70 mm

Nominal diameter range: above 44.0 – 70.0 mm

Ø Z = Nom. diameter -0.03/-0.06

Sample order:

Bore	Order no.
60 JS8	BMD-D10-CR-59.977



D10

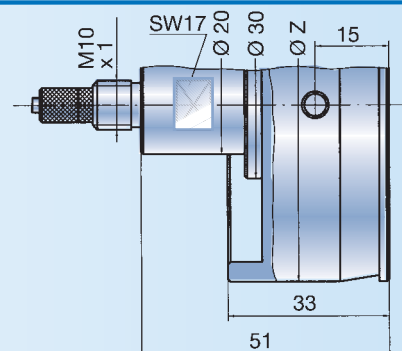
Ø > 70 – 270 mm

Nominal diameter range: above 70.0 – 270.0 mm

Ø Z = Nom. diameter -0.04/-0.07

Sample order:

Bore	Order no.
100 H7	BMD-D10-CR-100.00



FB 6 \varnothing 7.0 – 16.0 mm

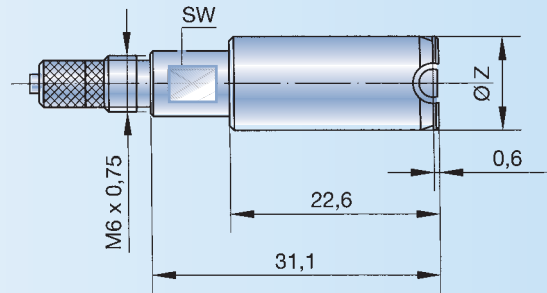
Nominal diameter range: above 7.0 – 16.0 mm

Nom. diameter \varnothing 7.0 – 16.0
 \varnothing Z = Nom. diameter - 0.02/- 0.04

Sample order:

Bore	Order no.
9 K8	BMD-FB6-CR-8.984

Gauging contacts available in MHM or MCR only



FB 10 \varnothing 15.0 – 44.0 mm

Nominal diameter range: above 15,0 – 44.0 mm

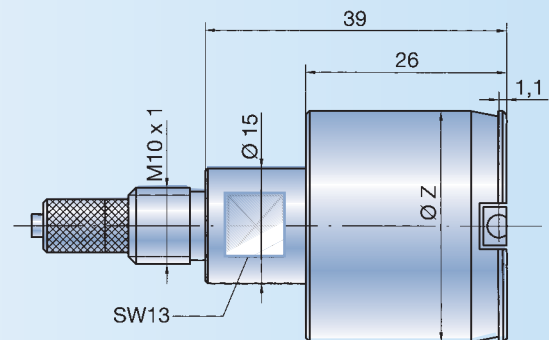
Nom. diameter \varnothing 15 – 32.0
 \varnothing Z = Nom. diameter - 0.02/- 0.05

Nom. diameter \varnothing > 32 – 44.0
 \varnothing Z = Nom. diameter - 0.03/- 0.06

Sample order:

Bore	Order no.
42 K8	BMD-FB10-CR-41.973

Gauging contacts available in MHM or MCR only



FB 10 > \varnothing 44.0 – 70.0 mm

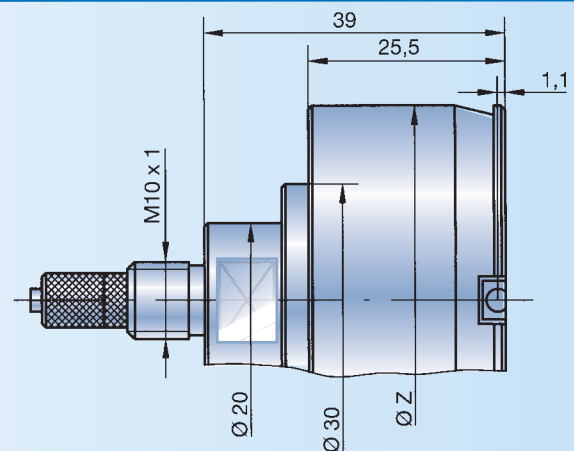
Nominal diameter range: above 44.0 – 70.0 mm

\varnothing Z = Nom. diameter - 0.03/- 0.06

Sample order:

Bore	Order no.
60 JS8	BMD-FB10-CR-59.977

Gauging contacts available in MHM or MCR only



FB 10 > \varnothing 70.0 – 150.0 mm

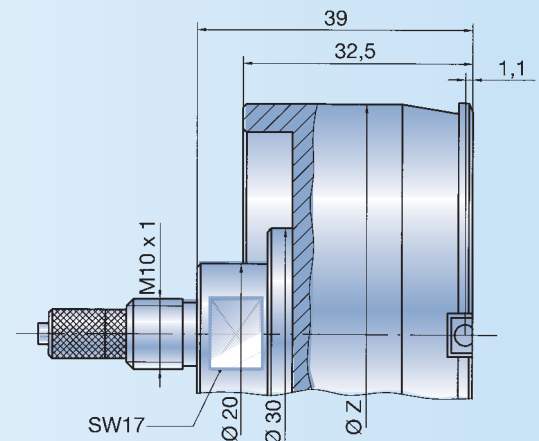
Nominal diameter range: above 70.0 – 150.0 mm

\varnothing Z = Nom. diameter - 0.04/- 0.07

Sample order:

Bore	Order no.
100 H7	BMD-FB10-CR-100.00

Gauging contacts available in MHM or MCR only



BMD plug gauges for automatic gauging - Type PK - are produced with a 30° or 16° pilot taper instead of an entry groove. With the aid of matching floating holders, these BMD plug gauges can be used in measuring systems, transfer lines, CNC

machines and automated testing units, etc.

Type D plug gauges should be used wherever possible:

- Longer pilot taper (= larger floating range)
- The gauging contacts are

positioned behind the pilot taper, which makes it easier to insert the contacts into the bore (especially for MB-SO), thus reducing wear. In type S gauges, the contacts are partially inside the taper.

Unless otherwise specified, dimensions correspond to those of the basic types. In the version with air ejection - L - dimension L1 is enlarged for the protective cover as indicated in the specification on Page 7.

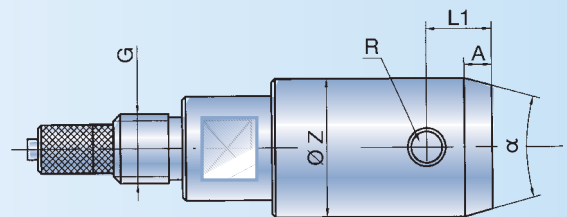
Series	Nom. diameter range	Type D			Type S			Ø Z Nom. diameter minus	Gauging radius R	Threading G
		A	B	α	A	B	α			
4	3.95 - 6.0	2	9	16°	0.8	8	60°	0.2	0.5	M 3.5 x 0.35
4	> 6.0 - 9.0	3	9	16°	0.8	8	60°	0.2	0.5	M 3.5 x 0.35
6	7.9 - 9.0	3.5	12	16°	2.5	11	30°	0.3	2	M 6 x 0.75
6	> 9.0 - 20.0	3.5	12	30°	2.5	11	30°	0.3	2	M 6 x 0.75
10	15.0 - 70.0	4	14	30°	3	13	30°	0.4	2.5	M 10 x 1
10	> 70.0 - 270.0	4.5	18	30°	3.5	17	30°	0.4	2.5	M 10 x 1

PK

BMD plug gauge with pilot taper

Standard type (no extra charge)

- Basic types: S, D, L
- Nom. diameter range: 3.95 - 270 mm
- Order suffix: PK
- Sample order: BMD-D10-CR-30.0-PK
- Ø Z as in basic types

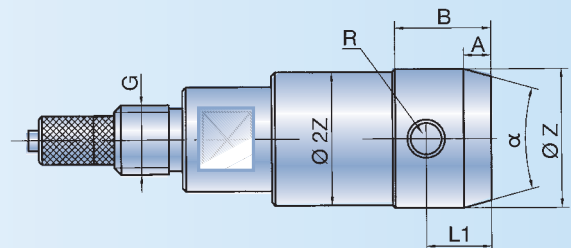


PK-2Z

BMD plug gauge with pilot taper and beveled cylinder (extra charge)

The beveled cylinder reduces the risk of jamming resulting from deviation of plug gauge angle to the bore axis.

- Basic types: S, D, L
- Nom. diameter range: 3.95 - 270 mm
- Order suffix: PK-2Z
- Sample order: BMD-D10-CR-30.0-PK-2Z-Ø Z = 30 - 0.4 mm
- Ø Z as in basic types

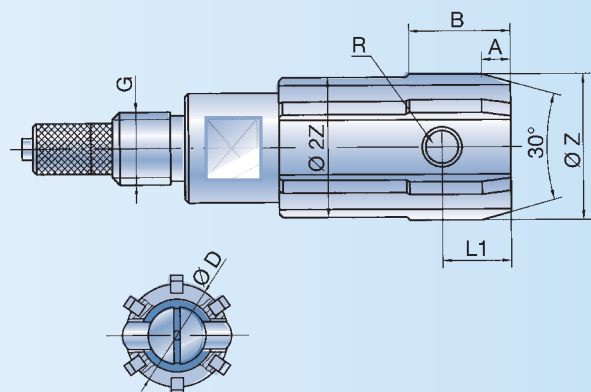


PK-ZHML

BMD-PK plug gauges with carbide bars (PK-ZHML) (extra charge)

Carbide bars reduce the risk of jamming in fouled bores (e.g. chips in bore).

- Basic types: S, D, L
- Nom. diameter ranges:
 - Series 6 Ø 11 - 20 mm
 - Series 10 Ø 18 - 270 mm
- Ø D
 - Series 6 Nom. diameter - 2 mm
 - Series 10 Nom. diameter - 3 mm
- Ø Z as in basic types
- BMD gauge cylinder in OCR
- Order suffix: PK-ZHML
- Sample order: BMD-D10-OCR-30.0-PK-ZHML



Special-purpose plug gauges are designed to meet specific customer needs. These include either customized products

(indicated by “on request”) or modifications of basic cylinder types (indicated by “extra charge”).

All special types must be specifically requested. Your request should include a precise description of the measurement

problem and a reliable drawing illustrating the measurement problem. A sample workpiece may be necessary in some cases.

S-FB

BMD plug gauges for blind bores (extra charge)

In order to measure closer to the bottom of the bore, the guide cylinder of Type S or FB is shortened. L1-dimensions that lie between the minimum length L1 and the standard must be indicated in the order.

Type S
Nom. diameter range: Ø 4.0 – 270.0 mm

Advantages of Type S-FB

The large gauging radii of Type S are used. This facilitates insertion of the plug gauge into the bore and helps reduce wear.

Ø Z = Nom. diameter as in Type S. L2 as in Type S

BMD gauge type	Min. length L1
Series 4	0.6 mm (Ø 4.0 and above)
Series 6	1.6 mm
Series 10	2.4 mm

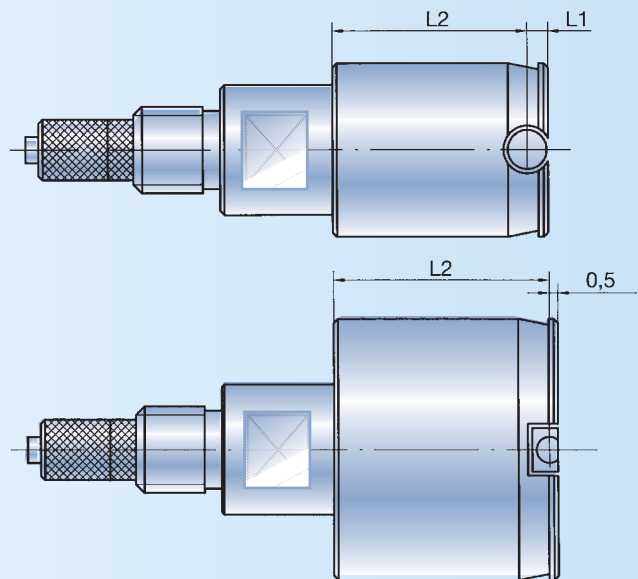
FB-S-FB
Nom. diameter range: 15.0 – 150.0 mm

Ø Z = Nom. diameter as in Type FB. Minimum length L1 = 0.5 mm. At L1 = 0.5 mm, the gauging contact has a sharp edge, which results in heavier wear. If the workpiece is also sharp-edged, Option PG should be used (Page 8). Available only in Type BMD-FB10.

Order suffix: S-FB

Sample order:

Bore	Order no.
28 H7	BMD-S10-CR-28.0-
requested L1 = 3.0	S-FB-L1 = 3.0



OR

BMD plug gauge without entry groove (no extra charge)

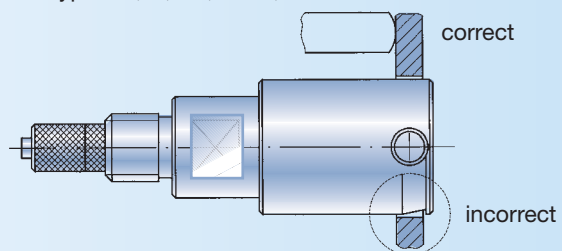
When used in very short bores, the entry groove cancels out most or all of the guide function.

Order suffix: OR

Sample order:

Bore	Order no.
30 H6	BMD-S10-CR-30.0-
	OR-Fase 0.5 x 45°

In this case, the plug gauge should not have a guide groove. The cylinder should be beveled in order to prevent jamming. Basic types: S, D, FB, S-FB, L



UM

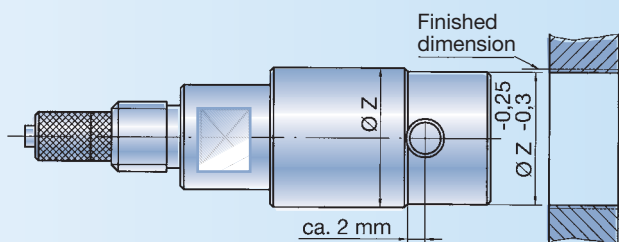
BMD plug gauge with reduced entry diameter (extra charge)

Nom. diameter range: 7.9 – 270 mm. The BMD plug gauge can be inserted to the end of the front cylinder before the finished dimension is reached, thus making it possible to gauge the machine stop point. The entire BMD plug gauge can be inserted into the bore beyond the finished dimension.

Basic types: S, D Order suffix: UM

Bestellbeispiel:

Bore	Order no.
30 H7	BMD-S10-CR-30.0-UM



2R

BMD plug gauge with 2 entry grooves

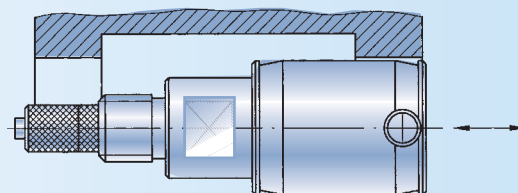
(extra charge)

This option prevents jamming when the BMD plug gauge is retracted from ribbed workpieces or interrupted bores.

Basic types: S, D, FB, S-FB, L
 Nom. diameter range: 7.0 – 270 mm
 Order suffix: 2R

Sample order:

Bore	Order no.
10 H6	BMD-S6-CR-10.0-2R



3P

3-point BMD plug gauge (extra charge)

3-point plug gauges are required in order to detect polygonal shape defects.

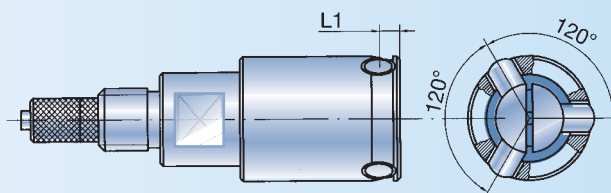
The gauging contacts are spaced at 3 x 120°. Different spacing available on request.

The inner probe is mounted on a pendulum bearing in order to allow the gauging unit to center itself in the bore.

Basic types: S, D, L Nom.
 Diameter range: 8.0 – 100 mm
 Sample order: BMD-S10-CR-35.0-3P

The dimensions of the BMD plug gauge correspond to those of the basic types in Series 6 and 10.

Due to its specific design, the gauging accuracy of the 3-point BMD plug gauge is slightly less than that of the 2-point gauge (see Page 5). Therefore, a 2-point plug gauge should be used wherever possible.



SO-TA

BMD plug gauge with depth stop

(extra charge)

3 carbide stop bolts set at 3 x 120° angles.

Basic types: S, D, S-FB, L-FB
 Order suffix: SO-TA-L3
 Sample order: BMD-D10-CR-28.0-SO-TA-L3 = 11
 Please indicate dimension L3 in your order.

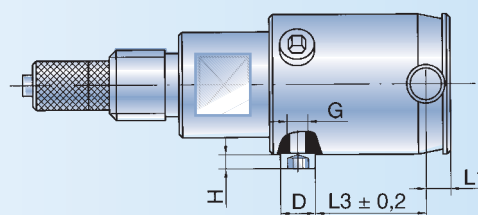


Table for SO-TA

Nom- Ø	Type	Max. L3	Type	Max. L3	D	H	G
12 – 20	S6	16	D6	16	5	2	M3
20 – 32	S10	16.5	D10	16.5	5	2	M3
> 32 – 44	S10	16.5	D10	16.5	7.5	3.5	M5
> 44 – 70	S10	14.5	D10	8	7.5	3.5	M5
> 70 – 270	S10	21.5	D10	10.5	7.5	3.5	M5

T-BMD

BMD plug gauges for small dimensions
(extra charge)

Types: standard, FB and PA

Nom. diameter ranges:

Standard, FB $\varnothing > 2.25 - 2.98$

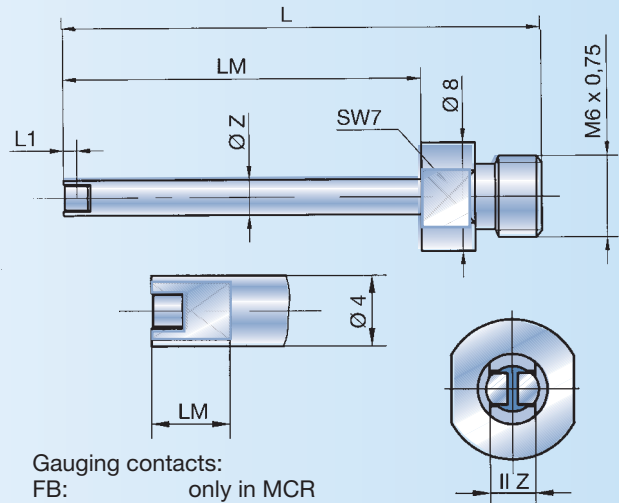
PA $\parallel 1.0 - 3.0$

Standard. FB

Nom. diameter	LM	L1	L1 (FB)	L
$\varnothing 2.25 - 2.50$	21.5	1.1	0.5	30.5
$\varnothing > 2.50 - 2.98$	27.0	1.4	0.5	35.8

PA

Nom. diameter	LM	L1	L
$\parallel 1.0 - 1.5$	4.5	0.8	24.7
$\parallel > 1.5 - 2.49$	4.5	1.1	30.5
$\parallel > 2.49 - 3.0$	4.5	1.4	35.8



Gauging contacts:

FB: only in MCR

Standard: MHM and MCR

PA: with MCR, from $\parallel 1.51$ also MHM

Sample order: T-BMD-2.55 · T-BMD-PA-2.38*

* All prices includes the needle

ZKUL

BMD plug gauges with plastic bars (extra charge)

Designed for use with very sensitive surfaces (e.g. polished hydraulic bores, etc). MDI or MKK gauging contacts may be required.

Bask types: S, D, L

Nom. diameter ranges:

Series 6 $\varnothing 11 - 20$ mm

Series 10 $\varnothing 18 - 270$ mm

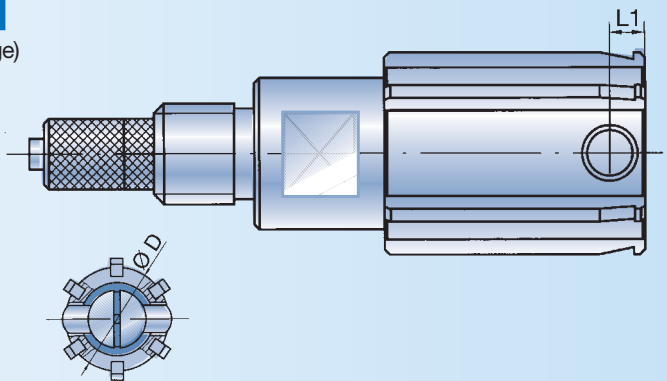
$\varnothing D$ Series 6 Nom. diameter - 2 mm

Series 10 Nom. diameter - 3 mm

$\varnothing Z$ as in basic types

Order suffix: PK-ZKUL

Sample order: BMD-D10-CR-30.0-ZKUL



SO-DZL

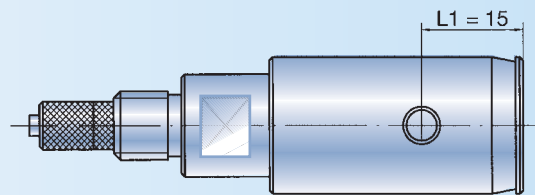
BMD plug gauge with long cylinder (extra charge)

In versions with air ejection - L - length L1 increases by 1 mm.

Basic types: D, L

Nom. diameter range: 3.95 - 44 mm

Sample order: BMD-S6-CR-10.0-SO-DZL



SO-ZL

BMD plug gauge with extended cylinder
(on request)

Basic types: S, D, L

Nom. diameter range: $\varnothing 3.95 - 270$ mm

Please indicate the following lengths in your request:

L1 max. 200 mm

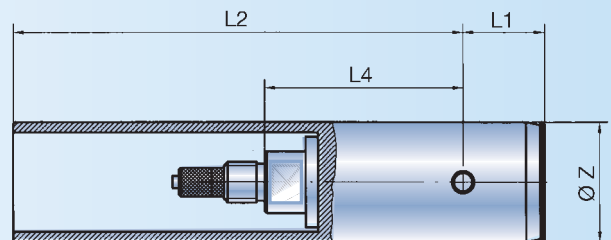
L2 up to nom. diameter 23.0 max. as in L4

Nom. diameter > 23.0 max. 200 mm

L4 **cannot be changed**

Sample order:

BMD-S10-CR-39.997-SO-ZL-L1 = 25-L2 = 50



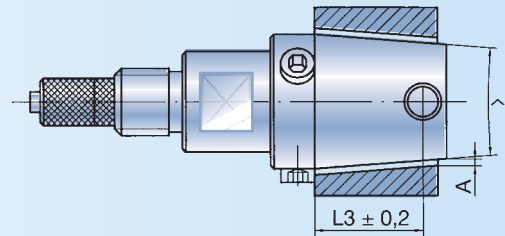
For large L2 lengths, a TV15 depth extension may be required.

SO-KO

BMD plug gauges for tapered bores
(on request)

All BMD-SO-KO plug gauges must be used with a depth stop (e.g. SO-TA, etc.). When ordering with an SO-TA, please indicate length L3.
The BMD plug gauge can only be produced on the basis of a tapered master ring or a good sample workpiece with corresponding minimum tolerance.
Clearance A is approx. 0.05 mm at minimum bore diameter.

Basic types: S, D, FB, S-FB, L
Nom. diameter range: 4 – 100 mm
Max. angle: \sphericalangle approx. 30°

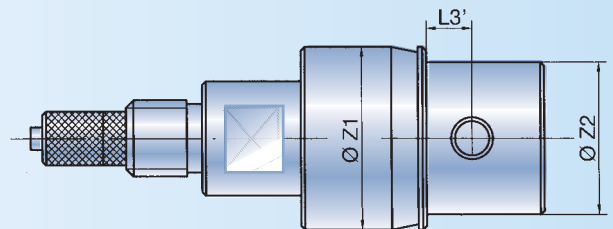


SO-2Z

BMD plug gauges with 2 guide cylinders
(on request)

Type SO-2Z is used to reduce centering errors when working with short bores by using a second bore for support.

Basic types: S, D, FB, S-FB, L
Nom. diameter range: 3.95 – 270 mm
Sample order:
BMD-S10-CR-49.95-SO-2Z-Ø Z1 = 55.0-L3' = 5
Please indicate the following in all orders:
Ø 1, Ø 2, L3'

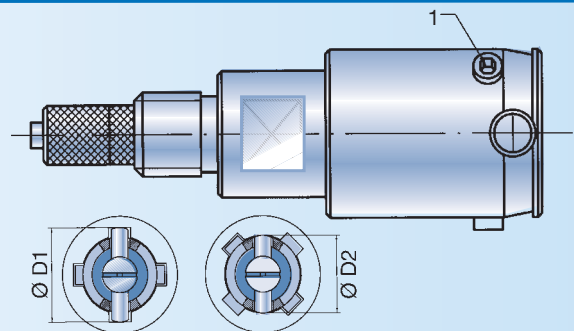


SO-GL

BMD plug gauges with axial grooves
(on request)

The guide pins (1) secure the radial position of the gauging contacts in the groove or the core bore.
Please order the data sheet for SO-GL before placing your request.

Basic types: S, D, FB, L
Nom. diameter range: 3,95 – 270 mm



SO-FB-SO

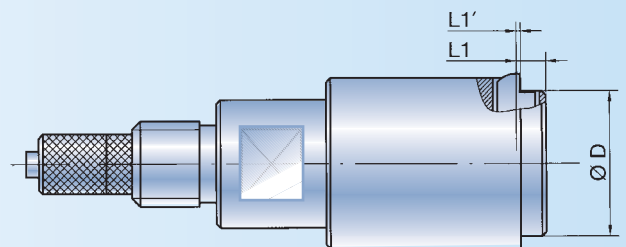
BMD-FB plug gauges for stepped bores
(on request)

This gauge type is ideally suited for measuring stepped bores close to the step. The large gauging radii (R = 2.5) are ideal for measuring bores with rough surfaces*.

Please indicate the following in your order:
L1' : Distance from gauging contact midpoint to step (min. 0.5 mm)
L1 : Standard as in Type S or D
ØD : Diameter of the staggered cylinder

Basic types: S, D
Nom. diameter range: 7 – 270 mm
Sample order:
BMD-S10-CR-35.0-SO-FB-SO-L1' = 0.5-ØD = 33.0

* Please use type PG (Page 8) if possible.



SO-KW

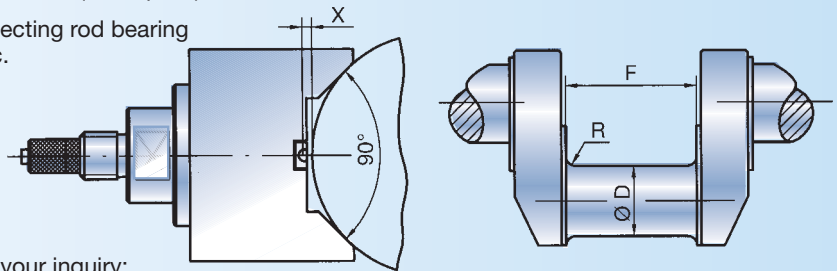
BMD plug gauges for crankshafts (on request)

For measuring face distance F of connecting rod bearing surface on crankshafts, camshafts, etc.

Nom. diameter range: 8 – 100 mm
 Types: Type S or FB
 Distance: shaft – measuring point X:
 Type FB: X min. 1.6 mm
 Type S: X min. 2.9 mm

Please indicate the following values in your inquiry:
 Dimension F (with tolerance), R, Ø D, X or request
 data sheet SO-KW.

Available in OCR only.

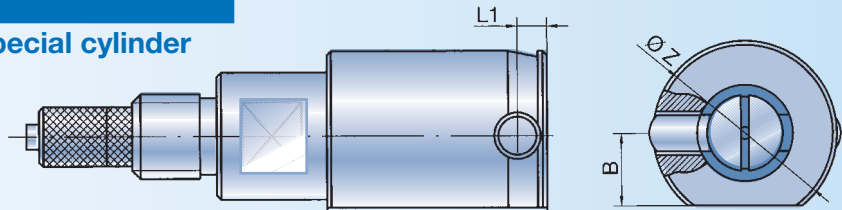


SO-SZ

BMD plug gauges with special cylinder shapes (on request)

Please enclose a detail from a drawing with all requests for gauges of this type.

Basic types: S, D, FB, L, S-FB

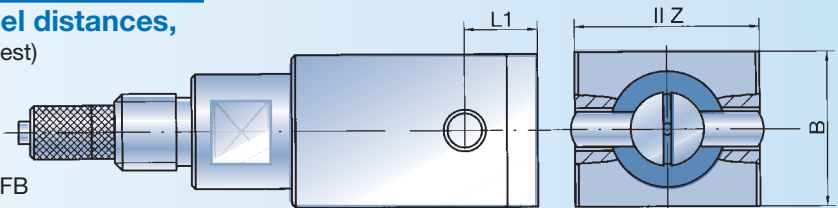


SO-PA

BMD plug gauges for parallel distances, customized versions (on request)

For distance measurement in workpieces for which the standard BMD PA cannot be used.

Basic types: S, D, FB, L, S-FB
 Nom. diameter range: 4 – 270 mm
 Type SO-PA in OCR only

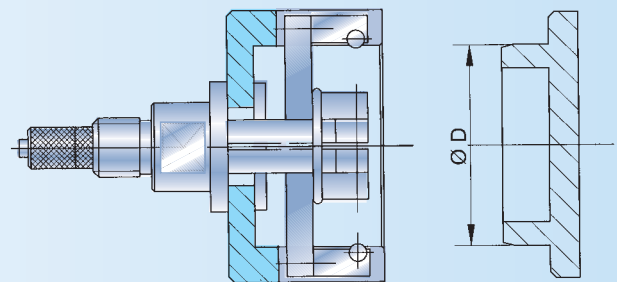


BMD-OD

BMD for measuring outside diameter (on request)

Plug gauge used to measure outside diameters of between 20 and 100 mm on shafts. Max. measuring depth approx. 12 mm.

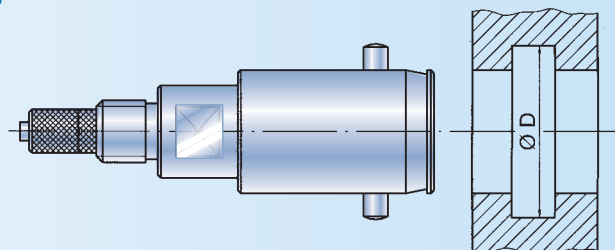
Please enclose a workpiece drawing with your enquiry. We would require a sample workpiece or a setting master for production.



EMD

BMD for recess gauging (on request)

Plug Gauge for gauging recesses in workpieces from 20 mm. Max measuring range up to 10 mm (depending on nominal size). Contact points available in carbide (MHM) and chrome (MCR). Please furnish workpiece drawing with inquiry. For production we need workpiece sample.



Type PA BMD plug gauges are hybrid constructions composed of a BMD plug gauge and a probe: Modified versions of probes from our probe program are mounted in a guide cylinder.

The carbide steel guide cylinder (approx. 62 HRC) is available only in OCR

Gauging contacts are supplied in MCR and – depending on size – in MHM.

When calculating prices, please note that the price of the needle is added to the price of the BMD plug gauge for Type PA units.

Required accessories:

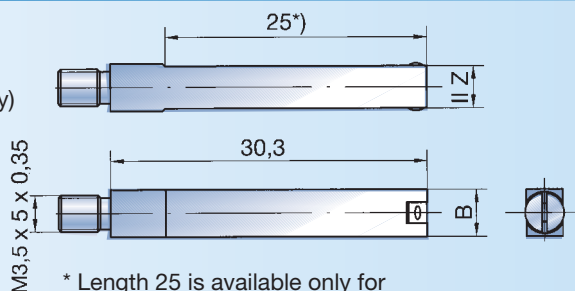
- BMD PA-4 Indicator holder MH6-51 (Page 23), Adapter A4-6 (Page 34) or depth extension TV4 (Page 37)
- BMD-PA-6 Adapter A6-10-L-PA, otherwise as for BMD Series 6

Nominal diameter	Gauging pressure
3.0 – 4.2	0.8 – 1.0 N
4.2 – 9.5	1.0 – 1.5 N
9.5 – 20.5	1.2 – 1.8 N
20.5 – 30.0	1.5 – 2.0 N

BMD-PA-4

Nom. diameter range: 3.0 – 4.9 mm

Gauging contacts: MCR, MHM (Type S to 4.0 only)
 Guide cylinder: in OCR only
 Types: S, FB
 L1: BMD-PA-4-S-MCR L1 = 1.4 mm
 BMD-PA-4-FB-MCR L1 = 0.5 mm
 Z = Nom. diameter -0.02/-0.04
 B = Nom. diameter + 1 mm
 Gauging range: 0.25 mm
 Sample order: BMD-PA-4-S-MCR-4.35

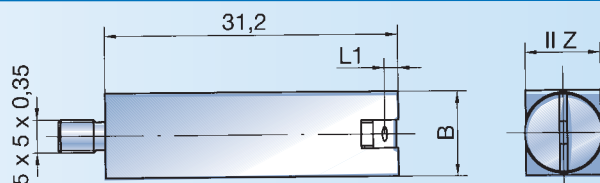


* Length 25 is available only for distances of less than 4 mm.

BMD-PA-4

Nom. diameter range: > 4.9 – 9.5 mm

Gauging contacts: MCR, MHM (Type S only)
 Guide cylinder: in OCR only
 Types: S, FB
 L1: BMD-PA-4-S-MCR L1 = 1.8 mm
 BMD-PA-4-S-MHM L1 = 1.8 mm
 BMD-PA-4-FB-MCR L1 = 0.8 mm

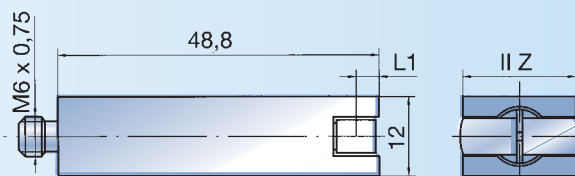


II Z = Nom. diameter -0.02/-0.04
 B = Nom. diameter + 1 mm, Gauging range: 0.25 mm
 Sample order: BMD-PA-4-S-MHM-6.3

BMD-PA-6

Nom. diameter range: > 9.5 – 30 mm

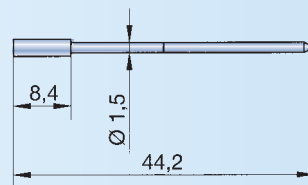
Gauging contacts: MCR, MHM
 Guide cylinder: in OCR only
 Types: S, FB
 L1: BMD-PA-6-S-MCR L1 = 3.5 mm
 BMD-PA-6-S-MHM L1 = 3.5 mm
 BMD-PA-6-FB-MCR L1 = 1.0 mm



II Z = Nom. diameter -0.02/-0.05
 B = 12.0 mm
 Gauging range: 0.3 mm

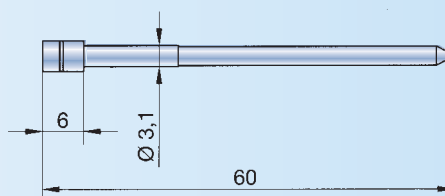
Pressure needle for BMD-PA-4

Carbide needle (without groove) for BMD-PA-4-S-MCR and BMD-PA-4-S-MHM = Order no. NT-HM-PA-1-150
 Carbide needle (with 2 grooves) for BMD-PA-4-FB-MCR = Order no. NT-FB-HM-PA-1-150



Pressure needle for BMD-PA-6

Carbide needle (with one groove) for BMD-PA-6-S-MCR and BMD-PA-6-MHM = Order no. NHM 3-310
 Carbide needle (with 2 grooves) for BMD-PA-6-FB-MCR and BMD-PA-6-MHM = Order no. NFB-HM 3-310



BMD-ME

Multiplane plug gauges

(on request only)

Multiplane plug gauges are capable of measuring up to 8 bore dimensions simultaneously. ME-BMD plug gauge types are available for use in manual gauging (with entry groove) or for automatic bore gauging (with pilot taper PK).

All multiplane plug gauges are special BMD gauges and are

configured for specific measurement applications. Therefore, your enquiry should include all workpiece data, such as:

- bore drawing or detail
- workpiece material
- position of measuring points

The most important currently available primary dimensions, distances

and gauging contact configurations are listed in the table below. Deviations are possible under certain conditions, however. Please ask!

Multiplane plug gauge characteristics:

- Gauging radius $R = 4.5 \text{ mm}$; with pilot taper (PK) $R = 2.5 \text{ mm}$

- Linearity and repeatable accuracy may deviate from the standard (due to the asymmetrical configuration of the mechanical gauging elements).
- Hard chrome coated cylinder
- Steel cover $L = 1.0 \text{ mm}$

BMD-ME

Primary dimensions

Specific dimensions, e.g. minimum length (6.5 mm) or minimum diameter, of the individual guide cylinders can be reduced under certain circumstances. The radial configuration of the gauging contacts is shown in the table below.

Different connection types are listed in the table below.

Enquiries

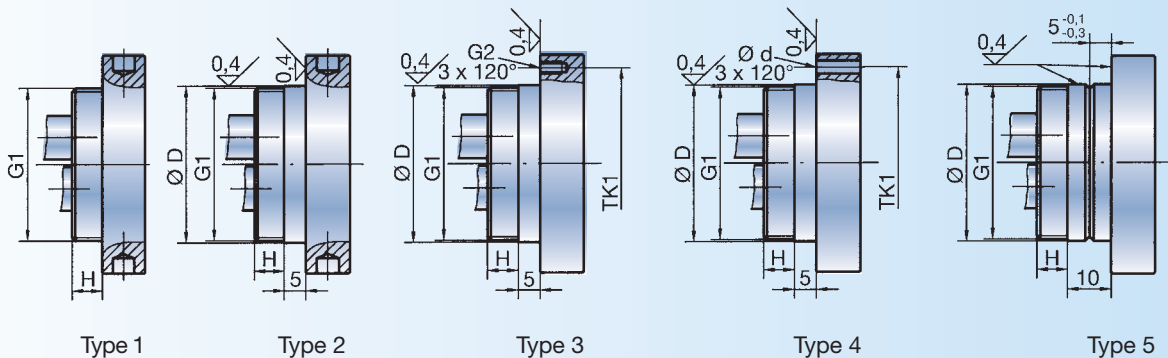
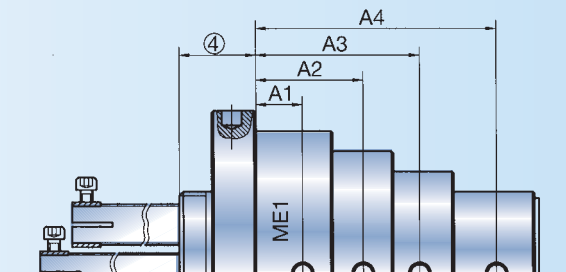
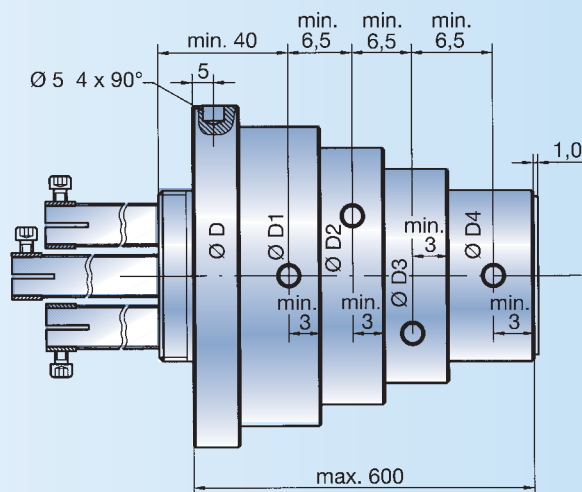
In order to prepare an offer, we require a workpiece drawing with the following information:

1. Distance from gauging planes to a workpiece reference edge
2. Radial/angular position of gauging contacts – see table
3. Bore diameter, tolerance and the desired measuring range
4. Type of connection

Types of connection

Depending on the specific application (manual gauging, installation in a gauging system, etc.), multiplane BMD plug gauges can be fitted with different types of connections.

Connection threadings will also differ depending upon the number of gauging planes (see Page 21). The most commonly used connections are listed below. Other connection dimensions and types are available on request. The type 5, size 2 connection is required for the BMD-ME plug gauge with floating holder for multiplane BMD gauges (SH-BMD-ME).



Connection dimensions for multiplane BMD plug gauges

Connection size	Thread (G1)	Thread height (H)	Ø D + 0/-0,03	Thread (G2)	Pitch diameter (TK1)
1	M35 x 1,5	7 mm	36 mm	M5	52 mm
2	M40 x 1,5	8 mm	41 mm	M5	57 mm
3	M52 x 1,5	10 mm	53 mm	M6	70 mm

The following table shows current available minimum guide cylinder diameters for the individual measurement planes. Deviations from these dimensions are possible in specific cases.

Minimum diameters for multiplane BMD plug gauges

Type	Min. possible cylinder Ø					Angular position of contacts in plug cylinder				Connection size
	Ø D	Ø D1	Ø D2	Ø D3	Ø D4	ME 1	ME 2	ME 3	ME 4	
BMD-1ME	37,5	15				0-180°				1
BMD-2ME-13-10	37,5	22	22			0-180°	0-180°			1
BMD-2ME-13-12	37,5	30	30			0-180°	0-180°			1
BMD-2ME-15-9	37,5	32	24			0-180°	0-180°			1
BMD-2ME-15-18	37,5	33	30			0-180°	90-270°			1
BMD-2ME-20-1	37,5	35	35			0-180°	90-270°			1
BMD-2ME-20-2	37,5	35				0-90-180-270°				1
BMD-3ME-13	37,5	21	21	21		0-180°	120-300°	60-240°		1
BMD-3ME-20	37,5	35	35	35		0-180°	120-300°	60-240°		1
BMD-3ME-0-24-1	46	46	39	8		0-180°	0-180°	0-180°		2
BMD-4ME-20-1	42,5	42	42	42	35	0-180°	0-180°	90-270°	90-270°	2
BMD-4ME-24-26-2	42,5	39	8			beliebig z.B. 0-180°	0-180°			2
BMD-4ME-24-26-3	42,5	41	41	41	41	0-180°	90-270°	45-225°	135-315°	2
BMD-4ME-24-26-4	42,5	39				0-90-180-270°				2
BMD-4ME-24-26-5	42,5	41	41			0-90-180-270°		45-135-225-315°		2
BMD-4ME-24-26-6	42,5	41	41	41		0-90-180-270°		45-225°	135-315°	2
BMD-8ME-20-38	60	60	60	60	60	0-180°	0-180°	90-270°	90-270°	3

Type	Min. possible cylinder Ø				Angular position of contacts in plug cylinder				Connection size
	Ø D5	Ø D6	Ø D7	Ø D8	ME 5	ME 6	ME 7	ME 8	
BMD-8ME-20-38	60	60	60	53	45-225°	45-225°	135-315°	135-315°	3

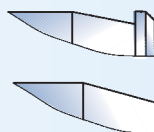
BMD-ME

Insertion aids

Depending on the specific application, multiplane BMD plug gauges are configured as follows with entry groove for manual gauging (see Page 9)

- with pilot taper (30°) for automatic gauging (see Page 9)

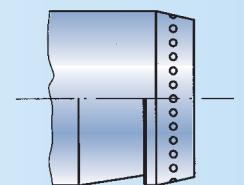
It is not necessary to affix the entry groove/pilot taper to the first cylinder.



Clean stream nozzle

With separate air-hose fitting for compressed air supply at up to 10 bar for removal of coarse dirt deposits. The blower nozzle is supplied from an air chamber that is separated from the measurement system. Please note:

The blower nozzle is not a substitute for a cleaning station. If the workpiece is heavily fouled, additional measures must be taken.



L Basic types with air supply

DIATEST produces bore plug gauges with mechanical measurement systems. Type L (air supply) gauges are designed to provide for workpiece cleaning at the contact points and to reduce contact bore fouling.

All gauges equipped with an air cleaning system are produced with covers. This increases dimension L1.

DIATEST supplies an aluminum cover as a standard component. All dimension not otherwise specified are the same as for basic types S and D. Required air pressure: 2-3 bar.

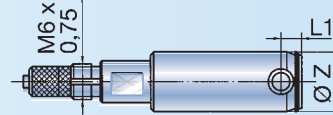
Accessories for BMD-L: Holders L-MH-150 (Page 31), L-EH (Page 29), Depth extensions L-TV-8, L-TV-15, L-TV-15-A (Pages 37/38), Right-angle attachments L-W10 (Page 36), Adapter A6-10-L (Page 35)

L-S6 Ø 7.9 – 20 mm

L-D6 Nom. diameter range: 7.9 – 20.0 mm

Covers for Series L-S6 are glued into place

Type S L1 = 3.5 mm
Type D L1 = 9.5 mm



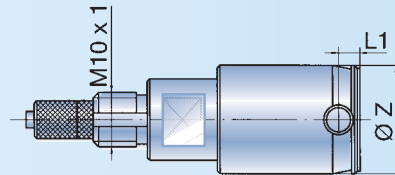
L-S10 Ø 15 – 44 mm

L-D10 Nom. diameter range: 15.0 – 44.0 mm

Covers for Series L-S10 up to nom. diameter of 28.0 mm are glued into place.

Type S10 > 28 mm and Type D are bolted in place

Type S Ø 15.0 – 28.0 mm L1 = 4.0 mm
Ø > 28.0 – 44.0 mm L1 = 5.5 mm
Type D L1 = 10.5 mm

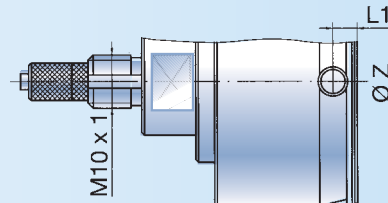


L-S10 > Ø 44 – 70 mm

L-D10 Nom. diameter range: 44.0 – 70.0 mm

Cover bolted

Type S L1 = 6.0 mm
Type D L1 = 11.5 mm

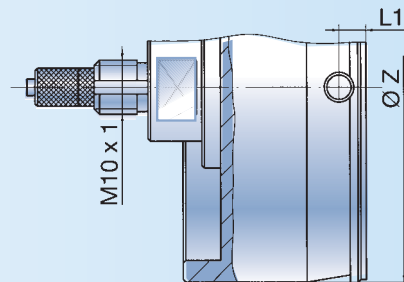


L-S10 Ø 70 – 270 mm

L-D10 Nom. diameter range: 70.0 – 270.0 mm

Cover bolted

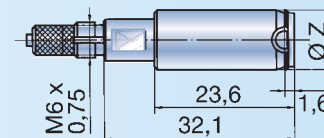
Type S L1 = 6.0 mm
Type D L1 = 16.0 mm



L-FB6 Ø 7 – 16 mm

Nom. diameter range: 7.0 – 16.0 mm

Cover glued

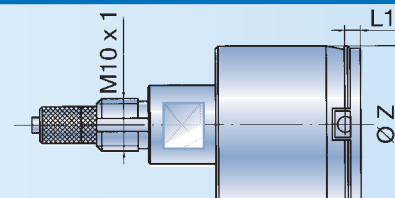


L-FB10 Ø 15 – 150 mm

Nom. diameter range: 15.0 – 150.0 mm

Covers glued up to nom. diameter 28.0 mm, bolted above 28.0 mm.

Ø 15 – 28 L1 = 1.6 mm
Ø > 28 – 150 L1 = 3.1 mm



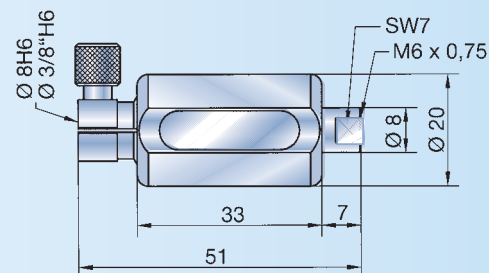
MH6 indicator holders are available in several different designs. They are used for Series 6 BMD plug gauges along with with adapters (Page 34) for Series 4 Series 4 plug gauges (threading M3.5 x 0.35)

MH6-51

Standard indicator holder for Series 6 BMD plug gauges, without pressure pin

With clamping fixture

Clamp bore	Order no.
8H6	MH6-51
3/8"H6	MH6-51-Z



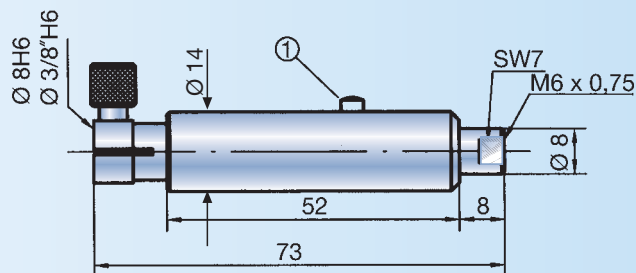
MH6-73-R

Indicator holder with pin retraction

When the button (1) is pressed, the indicator gauging pin is retracted from the BMD plug gauge pressure needle, removing gauging pressure from the gauge. See also Type "PG", Page 8

With clamping fixture

Clamp bore	Order no.
8H6	MH6-73-R
3/8"H6	MH6-73-R-Z



MH6-

Indicator holder for Series 6 BMD plug gauges, temperature stabilized

The holder is ordinarily equipped with two marking strips.

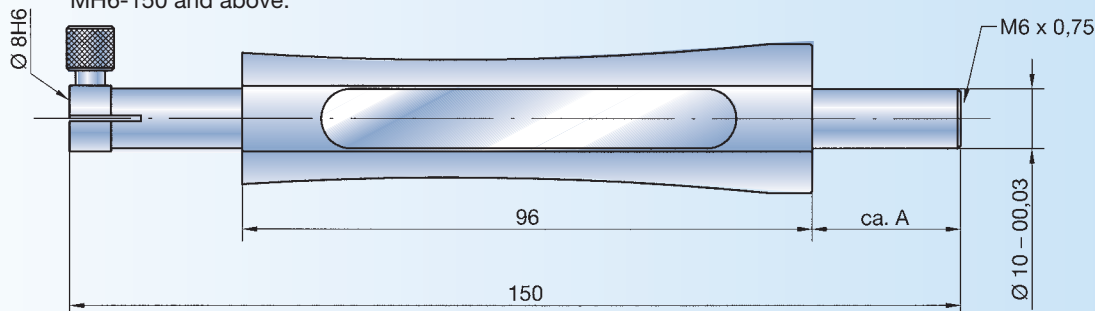
Type:

Order no.	Length L	Length A
MH6-100*	93 mm	12 mm
MH6-150	142 mm	18 mm
MH6-200	192 mm	68 mm
MH6-290	282 mm	158 mm

Please note:

Available with Ø 8H6 clamping unit only.

* The new handle shape is available only for MH6-150 and above.



MH10

Indicator holders, M10 x 1 threading

MH10 indicator holders are available in several different designs. They are used with Series 10 plug gauges.

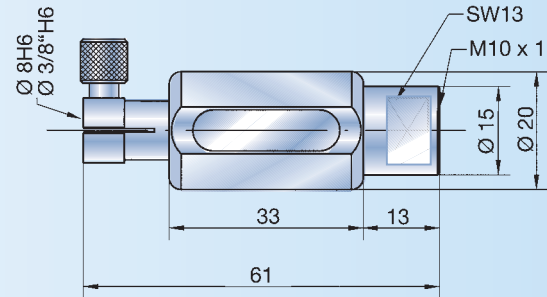
When fitted with an adaptor (see Pages 34, 35), the holders can also be used with Series 6 (M6 x 0.75 threading) and Series 4 (M3.5 x 0.35 threading) BMD plug gauges.

MH10-61

Standard indicator holder for Series 10 BMD plug gauges, without pressure pin

With clamping fixture:

Clamp bore	Order no.
8H6	MH10-61
3/8"H6	MH10-61-Z



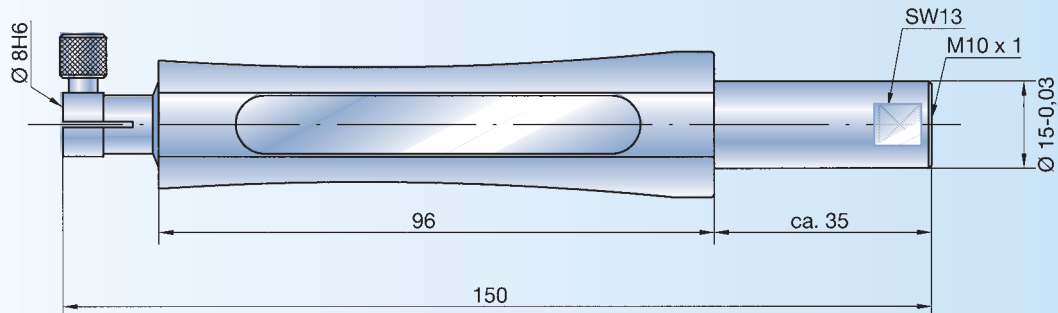
MH10-150

Indicator holder, temperature stabilized

With clamping fixture:

Clamp bore	Order no.
8H6	MH10-150
3/8"H6	MH10-150-Z

The new MH10-150 is supplied with 2 marking strips as standard (BL). The offset shield (see MH10-150-P, Page 25) can be attached easily: The clamping screw is replaced with an Allan screw. The impact shield is simply affixed and clamped with 2 screws. For further details see MH10-150-P, Page 25.



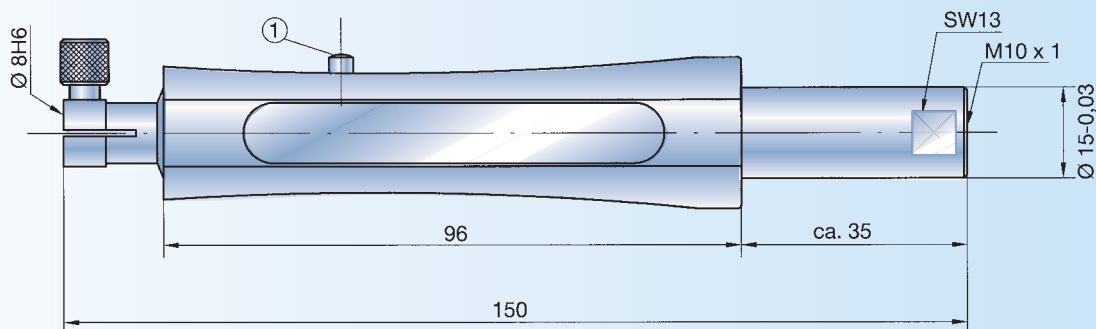
MH10-150-R

Indicator holder, temperature stabilized, with retraction

All dimensions as in MH10-150, with additional button. When the button (1) is pressed, the indicator measuring pin is retracted from the pressure needle of the BMD plug gauge, removing gauging pressure from the BMD plug gauge. See also Tape "PG", Page 8

With clamping fixture:

Clamp bore	Order no.
8H6	MH10-150-R
3/8"H6	MH10-150-R-Z

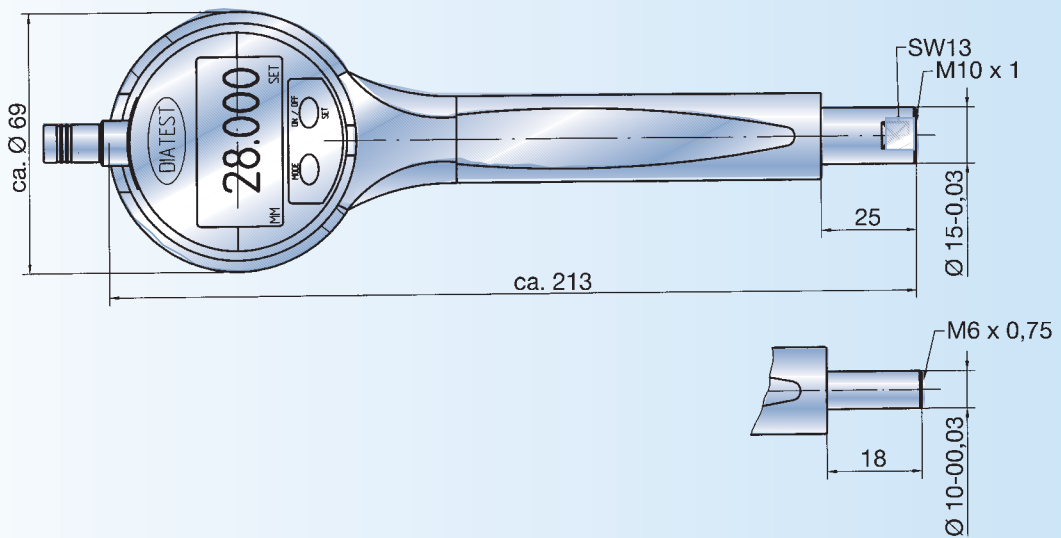


MH10-150-P

MH6-150-P Indicator holder with impact shroud protection

Temperature-stabilized holder for indicators MDU-125, MU-10 m, MU-1 m and F1000 (indicator not included in price).

The holders are supplied with 2 marking strips. The impact shield can be removed simply by loosening the two clamping screws (see also MH10-150, Page 24).



BL

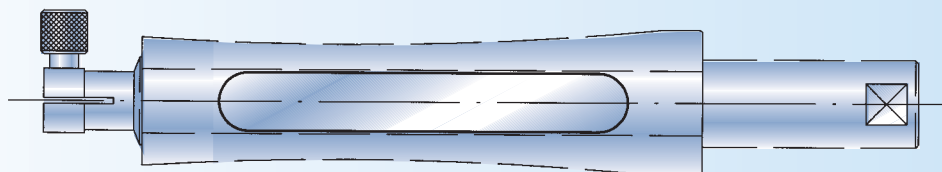
Marking strip BL (extra charge)

A large number of holders are equipped with marking strips as standard (see table). The dimensions indicated below apply to all marking strips except for holder MH10-150-F. A second marking strip can be affixed to several types of holders (e.g. EH, AH, EH-M). Holders which ordinarily do not have marking strips can be equipped with these, if requested. Please enquire.

Order suffix: 1st strip BL-1
2nd strip BL-2

Replacement marking strips for holders (except MH10-150-F)
Order no.: BLE

Holder	No. of BL	Page
MH6-51	1	23
MH10-61	1	24
MH6-... (ab L=150)	2	23
MH10-150 (-P)	2	24
L-MH10-150	2	24
MH10-150-R	2	25
EH(-V)	1	29
EH-M	1	30
MH10-150-F	1	31
MH10-150-P	2	31
MH10-170-D	2	32
MH10-150-PG	2	32
AH6/10-61	1	33
AH6/10-140	1	33



MH Indicator holders with adjustable spring pressure

Function and installation

The complete spring unit with M2.5 threading is installed in place of the indicator stem. The unit is regulated by adjusting the spring nut. The correct gauging pressure setting must be determined by trial and error.

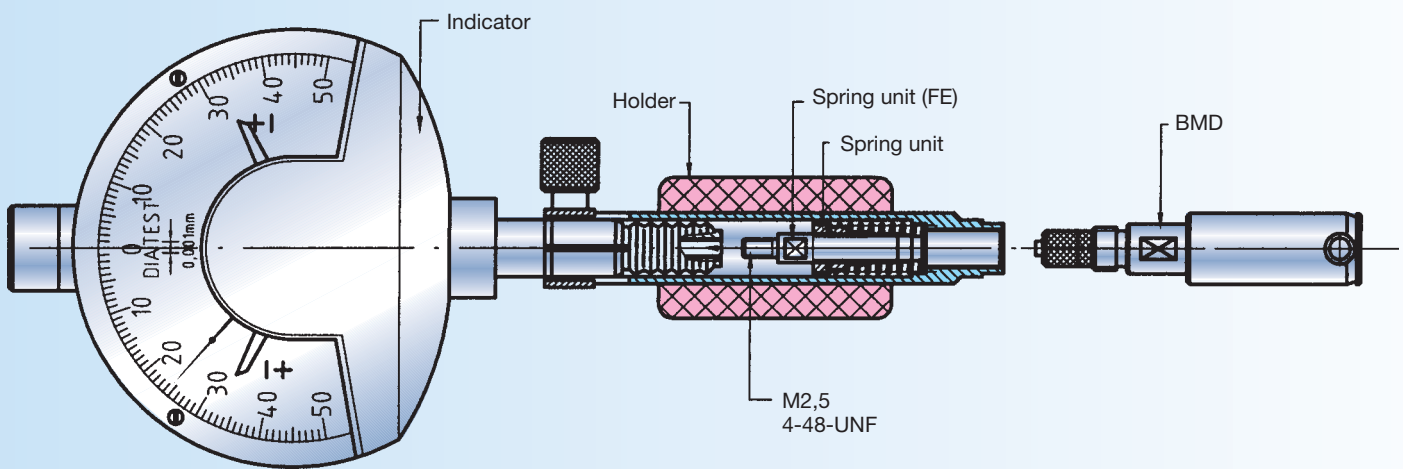
The basic approach is to determine the lowest gauging pressure

at which acceptable repetition accuracy is ensured.

Please note: The gauging pressure must be adjusted on the same plane on which the work-piece is to be measured (horizontal or vertical).

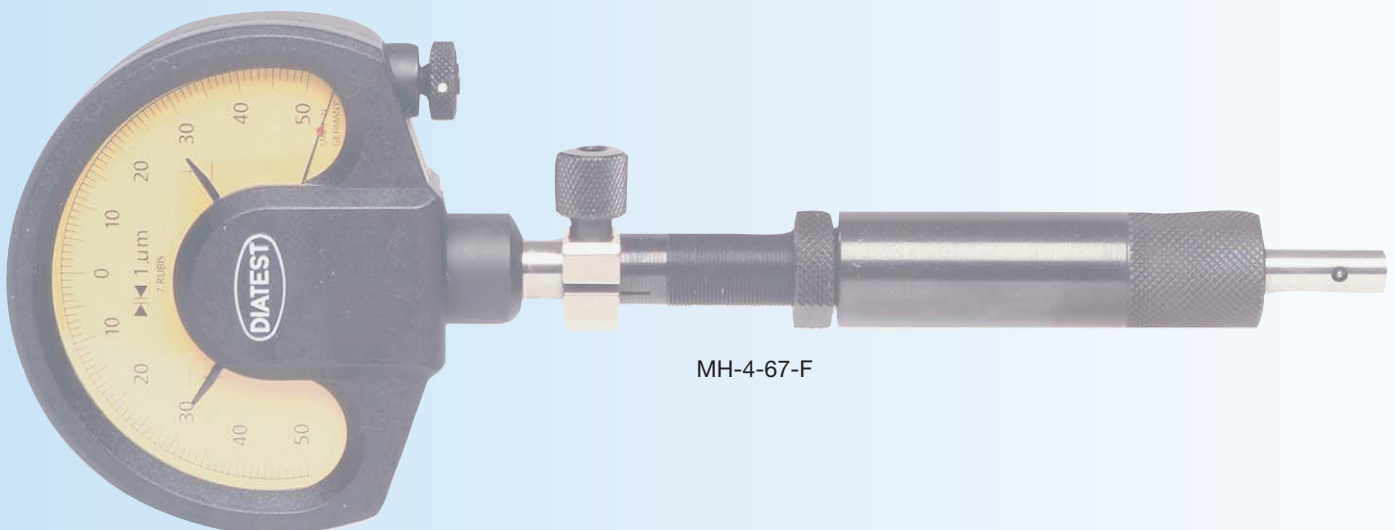
The knurled sleeve on holder MH4-67-F provides excellent

protection from breakage for Series 4 BMD plug gauges. It also serves as a continuously adjustable depth stop (0 – 20 mm). The holder can also be clamped directly into the clamping fixture, as the protective sleeve has a diameter of 15 – 0.03 mm.



Procedure

1. Replace the stem of the indicator with the complete spring unit.
2. Screw the BMD plug gauge into the holder and tighten.
3. Set the required counter-pressure (against the indicator) by adjusting the spring nut.
4. Clamp the indicator unit into the holder.
5. Test gauging pressure and repeat step 3 as needed.



MH-4-67-F

Holders with spring tension should be used whenever an indicator with the appropriate gauging pressure is not available (see Page 6) or when minimum

gauging pressure is required for technical reasons (e.g. very thin-walled workpiece).

MH4-67-F

Indicator holders with adjustable spring pressure for Series 4 BMD plug gauges

The knurled sleeve (1) shields the BMD plug gauge and can also be used as a depth stop.

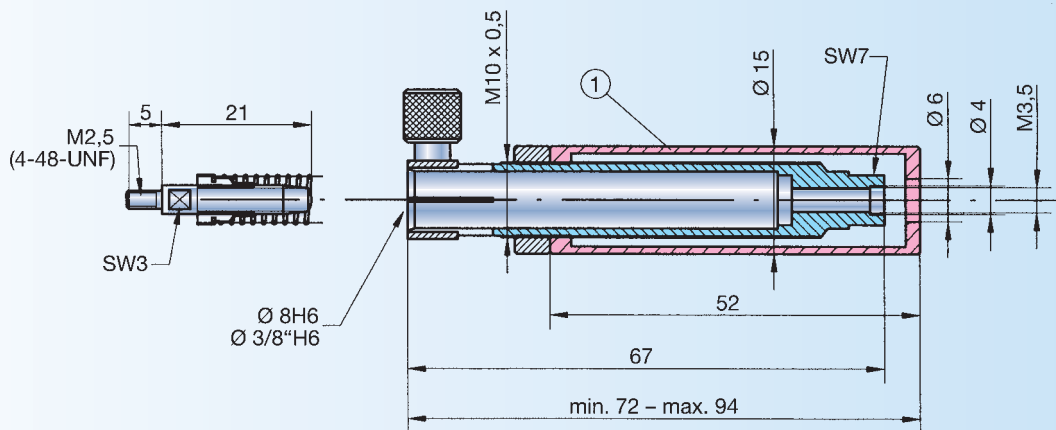
When ordering without BMD plug gauges please indicate Ø D!

With clamping fixture:

Clamping bore	Order no.
8H6	MH4-67-F
3/8"H6	MH4-67-F-Z

Separate knurled sleeve:

for	Order no.
MH4-67-F	MH4-67-F-RH
MH4-67-F-Z	MH4-67-F-RH-Z

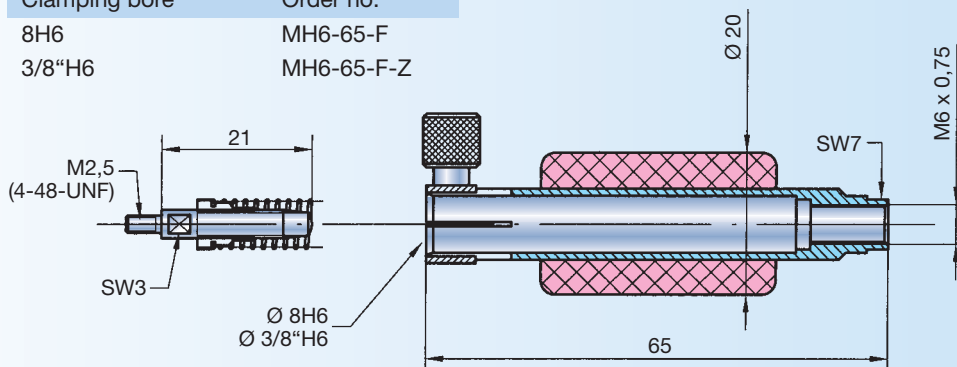


MH6-65-F

Indicator holder with adjustable spring pressure for Series 6 BMD plug gauges

With clamping fixture:

Clamping bore	Order no.
8H6	MH6-65-F
3/8"H6	MH6-65-F-Z



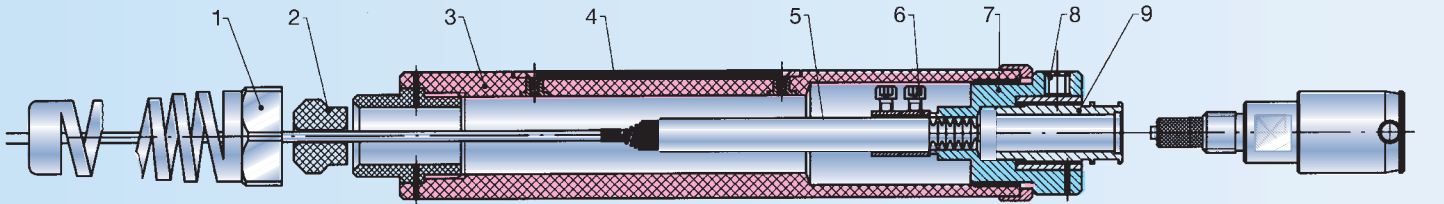
Holder configuration and installation

The probe clamping unit (6) is available in Ø 8H6 or in 3/8"H6. The probe (5), with maximum diameter Ø 12 mm and maximum length of 140 mm, is mounted in the holder and protected against shocks and splashing.

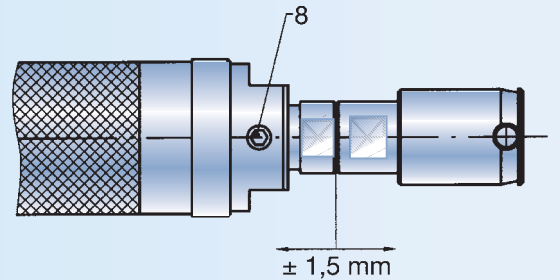
Once the probe is installed fixed between the two EH-KK clamping cones (2), the probe cable is protected against pulling strain. The bend protector (1) prevents excessive cable bending.

Model EH-V is recommended for use when BMD plug gauges or accessories are changed frequently. After loosening the clamping screw (8), fine adjustment can be performed to ensure that

the probe is positioned at the electrical zero point. These holders are equipped with 1 marking strip as standard.



1. Bend protector
2. Clamping cone:
EH-KK-N for cable-Ø 3-4 mm
EH-KK-5-N for cable -Ø 4-5 mm
3. Plastic grip sleeve
4. Marking strip BLE
(see Page 25)
5. Probe
6. Dual tangent clamp
7. Holder unit
8. Clamping screw
9. Fine adjustment

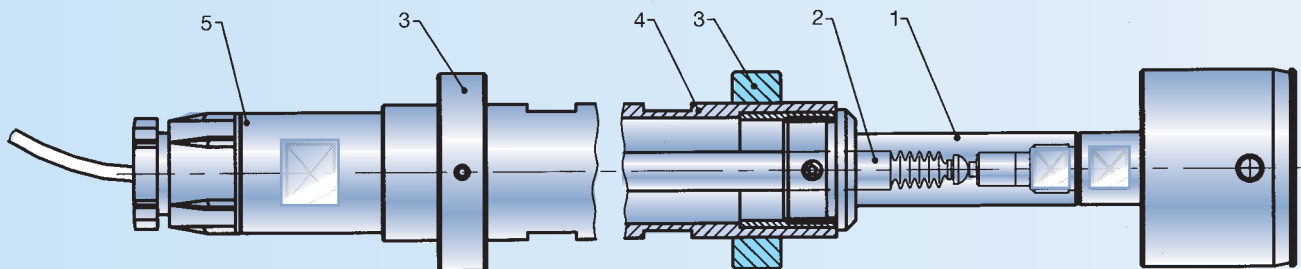


Extension and installation for deep bore measurement

The extension is ideal for applications requiring measurement of deep bores in combination with electrical probes. When using a TVT15, it is important to ensure sufficient probe cable length, as a combination with an extension cable inside the TVT15 is not possible.

The probe (2) is inserted through the TVT depth extension(s) (4) and clamped in the EH10-61 holder (1). A TVT-EHK cable clamp (5) can be used as a cap (does not apply when using an extension cord, as the probe plug cannot be drawn through the cap).

In order to prevent jamming of the BMD plug gauge in the bore, it is advisable to use clampable support rings (3) – available on request. For extensions and cable clamping fixtures see Page 39.



1. Holder EH10-61-T15
EH10-61-T28
2. Probe
3. Support rings
4. TVT (Page 39)
5. TVT-EHK (Page 39)

Electrical holders are used to mount probes which are connected to other units, e.g. Diatron 5000 plus, Diatron 2000 or a computer.

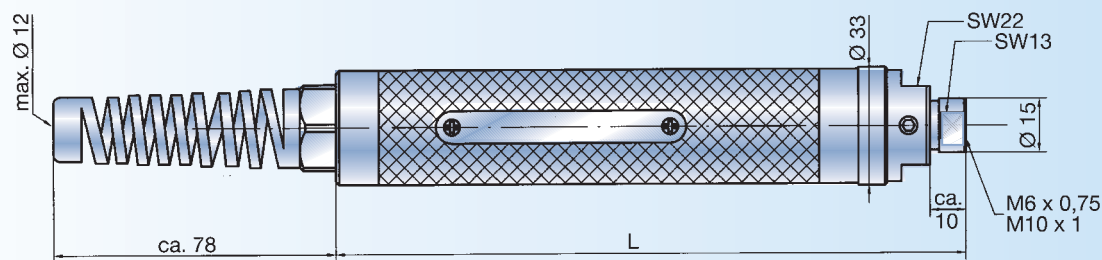
EH-V

Electrical holder with fine adjustment, M6 x 0.75 or M10 x 1 threading

Also available in Type "L" (Order no. L-EH-V) for plug gauges with air supply.

Please note: When using Type "L", the protective bellows must be removed from the probe.

Clamping bore	Length L (approx.)	Connection threading	Order no.
8H6	173 mm	M6 x 0.75	EH-V6
8H6	173 mm	M10 x 1	EH-V10
8H6	129 mm	M6 x 0.75	EH-V6-EK
8H6	129 mm	M10 x 1	EH-V10-EK
3/8"H6	173 mm	M6 x 0.75	EH-V6-Z
3/8"H6	173 mm	M10 x 1	EH-V10-Z
3/8"H6	129 mm	M6 x 0.75	EH-V6-Z-EK
3/8"H6	129 mm	M10 x 1	EH-V10-Z-EK



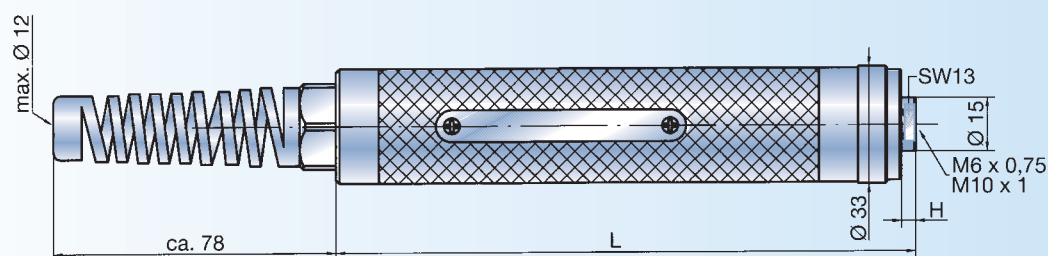
EH

Electrical holder with M6 x 0.75 or M10 x 1 threading

Also available in Type "L" (Order no. L-EH-10) for plug gauges with air supply.

Please note: When using Type "L", the protective bellows must be removed from the probe.

Clamping bore	Length L (approx.)	Connection threading	Order no.
8H6	159 mm	M6 x 0.75	EH6
8H6	159 mm	M10 x 1	EH10
8H6	115 mm	M6 x 0.75	EH6-EK
8H6	115 mm	M10 x 1	EH10-EK
3/8"H6	159 mm	M6 x 0.75	EH6-Z
3/8"H6	159 mm	M10 x 1	EH10-Z
3/8"H6	115 mm	M6 x 0.75	EH6-Z-EK
3/8"H6	115 mm	M10 x 1	EH10-Z-EK

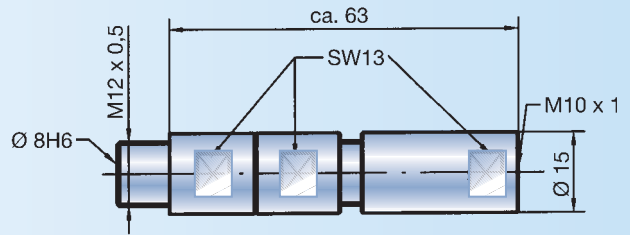


EH10-61-T15

Probe holder for TVT15

This holder is suitable only for electrical probes with \varnothing 8H6 clamping fixtures in combination with DIATEST depth extension TVT15. Characteristics as in EH10-61-T28.

However, no extension cables can be used inside the TVT15.



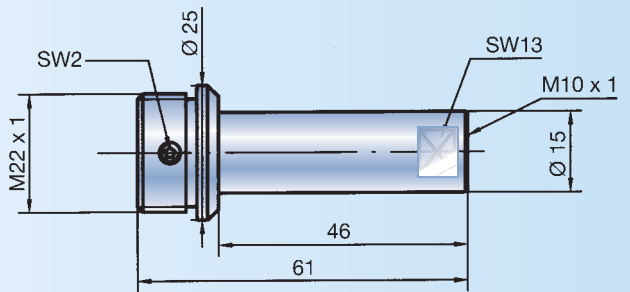
EH10-61-T28

Probe holder for TVT28

This holder is suitable only for electrical probes with \varnothing 8H6 clamping fixtures in combination with DIATEST depth extension TVT28.

Advantage: The measurement is made by the probe on the BMD plug gauge itself, without the influence of additional mechanical components between gauge and probe. This makes it possible to perform measurements at depths of several metres with maximum precision. The inside diameter of the TVT28 is large enough to allow for connection of a probe plug and an extension cable.

Minimum bore diameter: 28.5 mm.



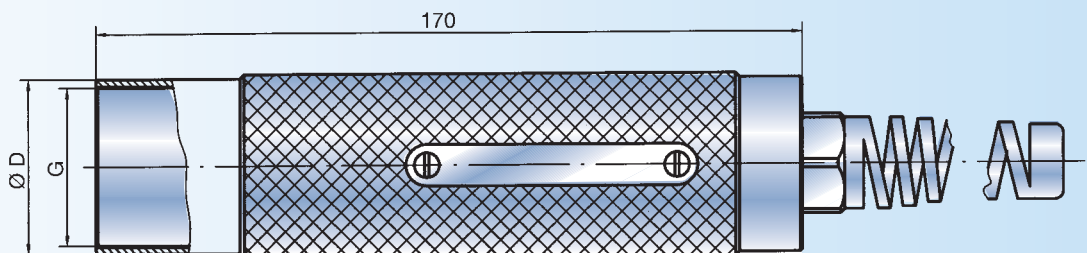
EH-M

Electrical holders for multiplane plug gauges

These holders are designed exclusively for use with multiplane BMD plug gauges (see Page 20). Consult the table on Page 21 for the appropriate model (connection threading).

These holders are ordinarily equipped with 1 marking strip.

Model	Connection size	Threading G	\varnothing D
EH-M35 x 1.5	1	M35 x 1.5	38 mm
EH-M40 x 1.5	2	M40 x 1.5	42.5 mm
EH-M52 x 1.5	3	M52 x 1.5	56 mm



MH10-150-F

Indicator holder with adjustable spring pressure

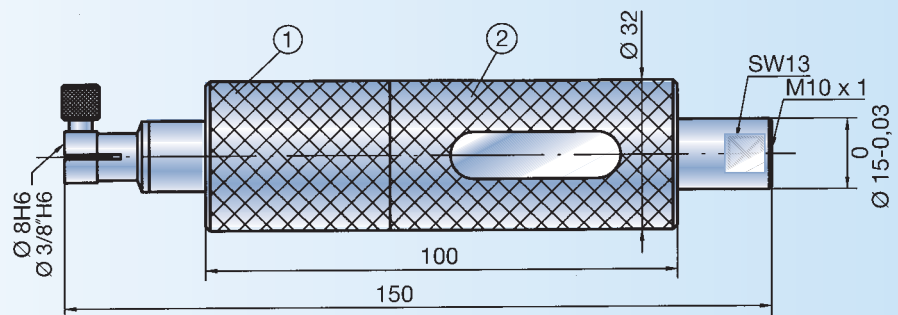
The gauging pressure of the indicator can be adjusted by approx. ± 1 N by adjusting and locking the two grip sleeves (1 and 2) on the holder.

This is especially important for measurement of thin-walled workpieces and in order to reduce wear on the BMD contact points.

The holder is ordinarily equipped with 1 marking strip.

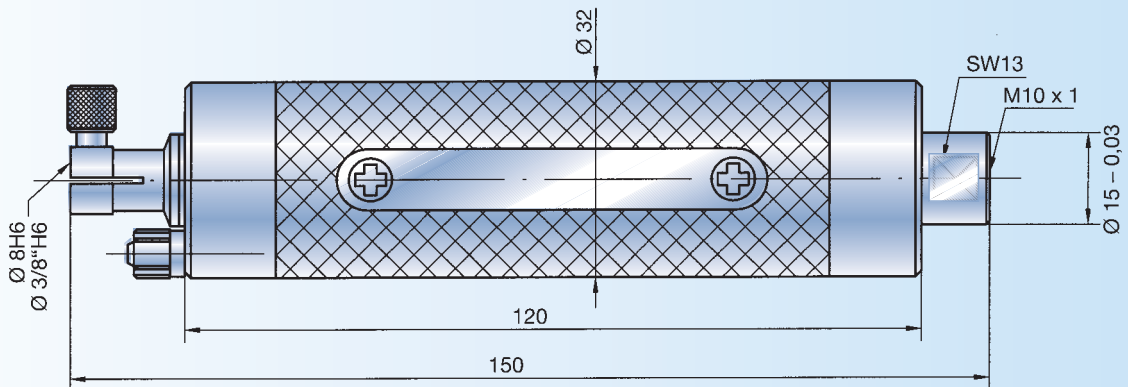
With clamping fixture:

Clamping bore	Order no.
8H6	MH10-150-F
3/8"H6	MH10-150-F-Z



L-MH10-150

Indicator holder, temperature stabilized, for BMD plug gauges with air supply



For air hoses with an inside diameter of 3.0 mm and an outside diameter of 4.3 mm. Required air pressure: 2-3 bar.

The holders are ordinarily equipped with 2 marking strips.

With clamping fixture:

Clamping bore	Order no.
8H6	L-MH10-150
3/8"H6	L-MH10-150-Z

MH10-170-D

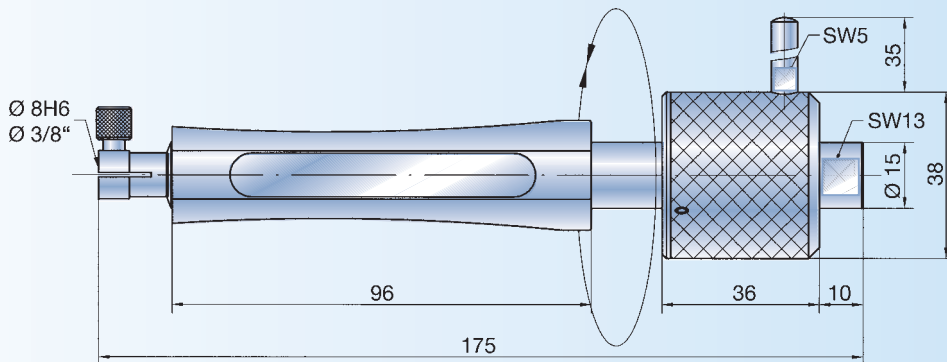
Indicator holder with rotating dial

This indicator holder allows 360° rotation of the BMD plug gauge in the workpiece. The measurement indicator remains stationary and easily readable. This holder is ideal for testing for oval or polygonal deformation.

The holder is supplied with 2 marking strips as standard.

With clamping fixture:

Clamping bore	Order no.
8H6	MH10-170-D
3/8"H6	MH10-170-D-Z



MH10-150-PG

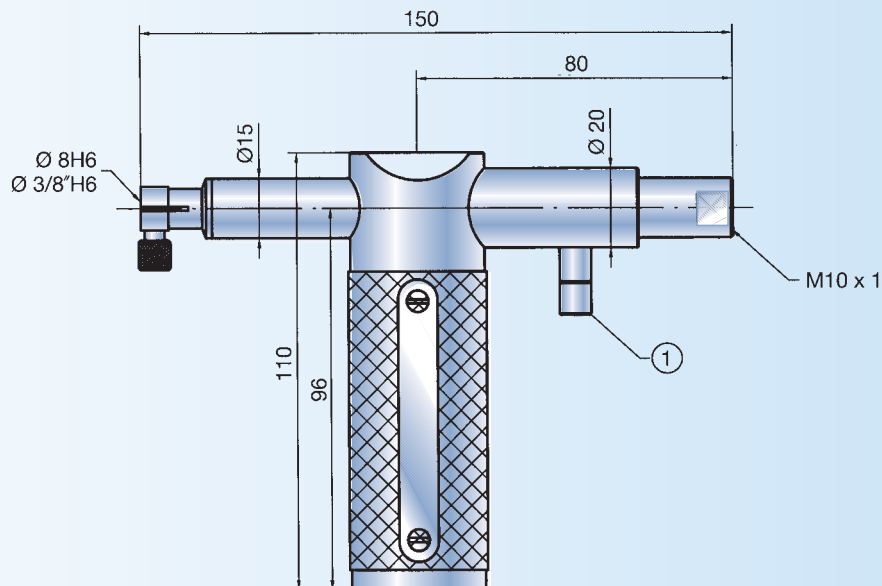
Indicator holder with gauging pressure retraction

Indicator gauging pressure is removed using a bolt (1). Type PG BMD plug gauges (see Page 8) can be inserted into the bore without contact pressure (helps reduce wear, advantageous when measuring workpieces with sensitive surfaces, etc.).

The holder is supplied with 2 marking strips as standard.

With clamping fixture:

Clamping bore	Order no.
8H6	MH10-150-PG
3/8"H6	MH10-150-PG-Z

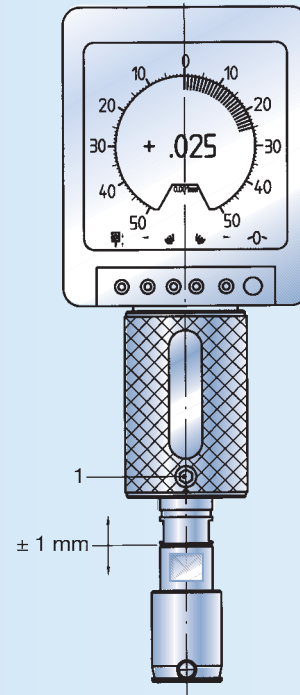
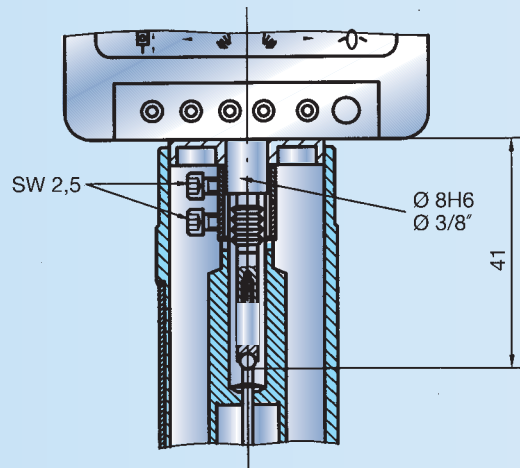


Special holders are available for ANA indicators (ANA1 and ANA-RS232). The indicator is fixed firmly in the holder by a dual-tangent clamp.

Shifts in the position of the indicator are virtually impossible, even

under heavy load conditions. If different measurement indicators are used, the dimension of 41 mm must be maintained.

The holders are supplied with 1 marking strip as standard.



Indicator maladjustment are practically impossible with Analog holders. Adjustments are performed using the fine adjustment device built into the holder.

Fine adjustment is secured by tightening the SW3 Allan screw (1). The adjustment range is approximately ± 1 mm.

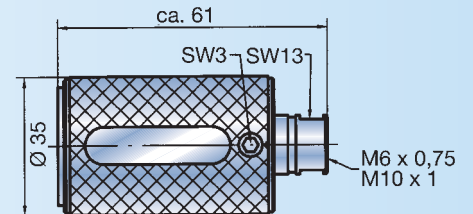
AH6-61

AH10-61

Short holder for the Analog indicator

Indicator holder without pressure pin

Model	Clamping bore	Connection thread
AH6-61	Ø 8H6	M6 x 0.75
AH6-61-Z	Ø 3/8"H6	M6 x 0.75
AH10-61	Ø 8H6	M10 x 1
AH10-61-Z	Ø 3/8"H6	M10 x 1



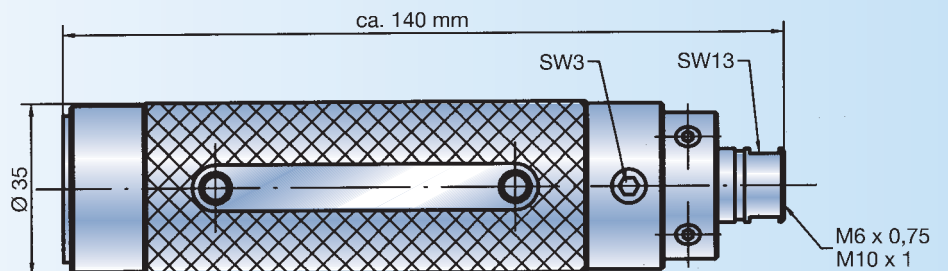
AH6-140

AH10-140

Holder for Analog indicator

Indicator with pressure pin

Model	Clamping bore	Connection thread
AH6-140	Ø 8H6	M6 x 0.75
AH6-140-Z	Ø 3/8"H6	M6 x 0.75
AH10-140	Ø 8H6	M10 x 1
AH10-140-Z	Ø 3/8"H6	M10 x 1



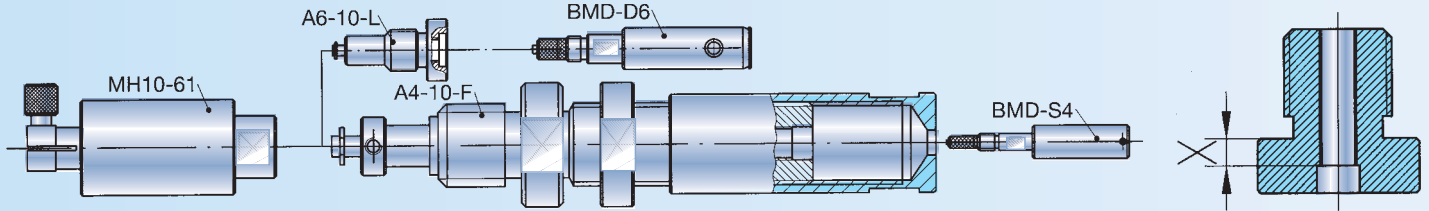
A Adapters

BMD plug gauge adapters are used to connect BMD gauges with smaller threads to BMD plug gauge accessories with larger threads.

Model SP: With protective bore (fracture protection for the plug gauge). Dimension X = distance between plane surface of plug thread and the adapter threads.

In addition to the adapters, depth extensions TV4 and TV3,8 (see Page 37) also function as adapters.

Please note: When using adapters, it is important to ensure sufficient indicator gauging pressure, especially with adapters for Series 4.



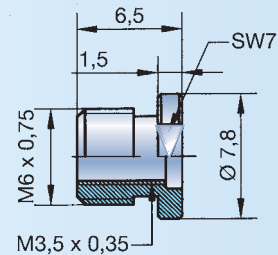
Adapters for Series 4 BMD plug gauges

A4-6

Series 4 to Series 6 adapter

The adapter is designed so that it can also be used for BMD-PA.

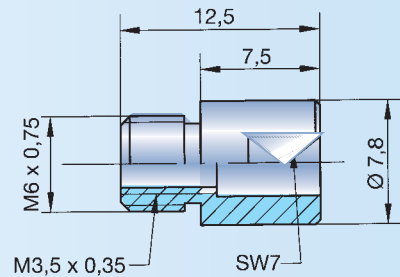
X = 1



A4-6-SP

Series 4 to Series 6 adapter with fracture protection

X = 1

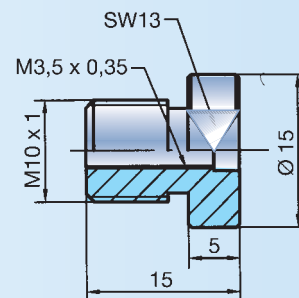


A4-10

Series 4 to Series 10 adapter

X = 3

Please note: This adapter is not suitable for use with Series 10 accessories with pressure pins (e.g. TV15 or MH10-150).

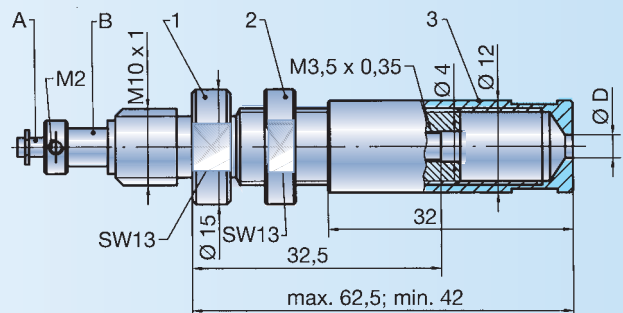


A4-10-F

Series 4 to Series 10 adapter with adjustable spring pressure

Series 4 BMD plug gauges require a gauging pressure of 0.3-0.4 N. A spring in the adapter (1) counteracts the indicator gauging pressure. Spring pressure can be flexibly adjusted by turning sleeve B toward threaded pin A. The sleeve (3) serves as fracture protection and as a depth stop. It can be adjusted continuously from 0 to 20.5 mm. The sleeve is secured with the lock nut (2). For instruction on correct adjustment of minimum gauging pressure see Page 26.

Please indicate dimension $\varnothing D$ in orders. Example: A4-10-F-D=7.2



Order no. for separate sleeve (3): A4-10-F-RH

Adapters for Series 6 BMD plug gauges

A6-10-L

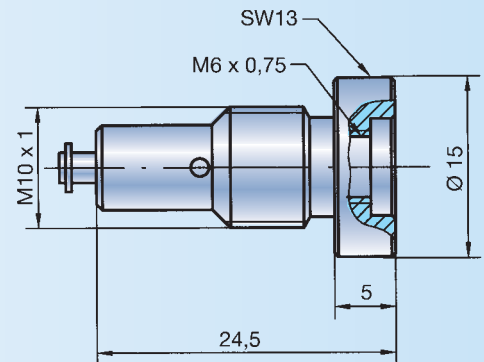
Series 6 to Series 10 adapter with pressure pin

This adapter is generally recommended for adapting from Series 6 to Series 10:

- The pressure pin permits the use of all Series 10 accessories.
- Series L BMD plug gauges

Select Model A6-10-L-PA for use with BMD-PA (not shown in illustration).

X = 3

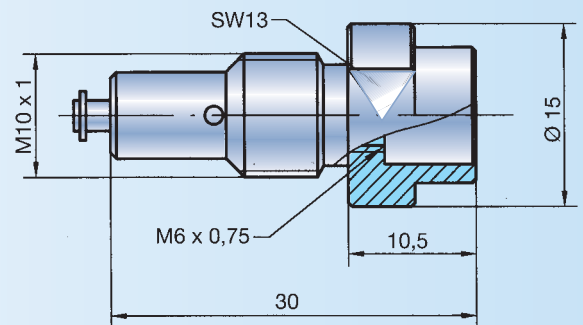


A6-10-L-SP

Series 6 to Series 10 adapter with protective bore and pressure pin

Characteristics in A6-10-L but with additional fracture protection.

X = 3

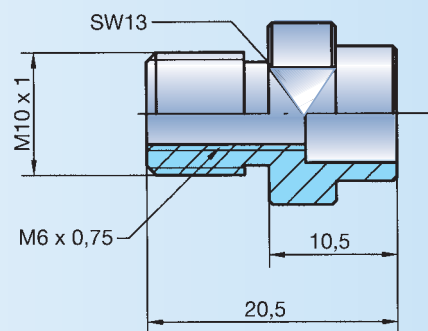


A6-10-0-SP

Series 6 to Series 10 adapter with fracture protection

Please note: This adapter is not suitable for use with Series 10 accessories with pressure pins (e.g. TV15 or MH10-150).

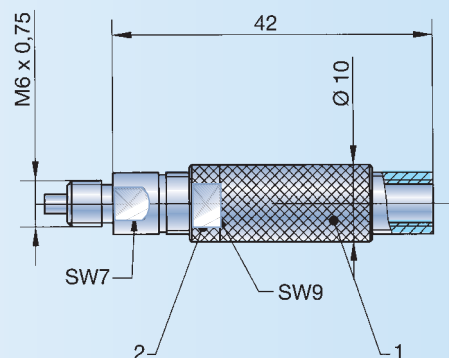
X = 3



A6-6-F

Adapter for Series 6 BMD plug gauges with adjustable spring pressure

The spring pressure can be adjusted flexibly by turning the sleeve (1). The sleeve is secured with the lock nut (2). For instruction on correct adjustment of minimum gauging pressure see Page 26.



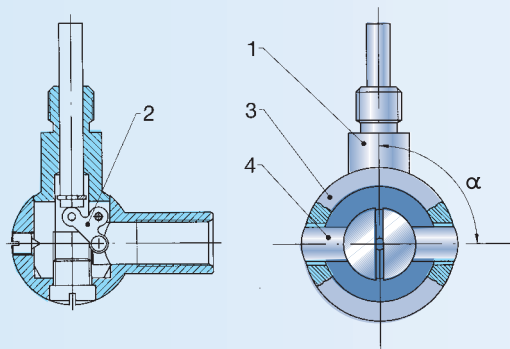
W Right-angle attachments

Right-angle attachments are used when working in confined spaces or for measuring lateral bores.

The 90° diversion is effected with the aid of a high-precision transfer lever (2). When screwing in the BMD plug gauge, it is important to ensure that the transfer lever is set in the lower position (see sketch).

The angular alignment of the plug gauge contacts (4) with the right-angle attachment (1) is not specified.

If a specific angle is preferred, please indicate the desired angle in your order.

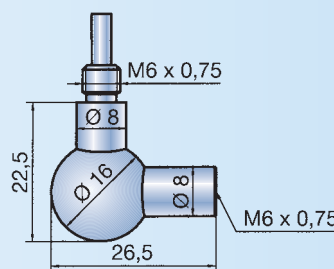


W6

Right-angle attachment for Series 6 BMD

An adapter is required for use with Series 4 BMD plug gauges.

Order no. W6



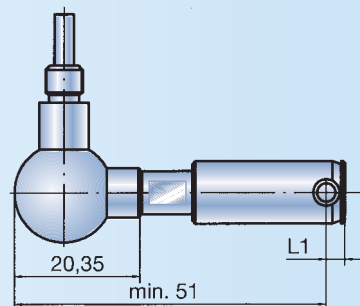
SO-W6

BMD plug gauge with special right-angle attachment for Series 6

If the dimensions of the BMD plug gauge with right-angle attachment are too long, Model SO-W6 can be used as an alternative. In this version, the right-angle attachment and the BMD plug gauge are shortened in the area of the thread connection. The BMD plug gauge and the right-angle attachment form a single unit and can be ordered as a complete set only.

Please note: Dimension L1 of the BMD plug gauge must be beaded to the length of 51 mm!

Sample order: BMD-S6-CR-10-SO-W6



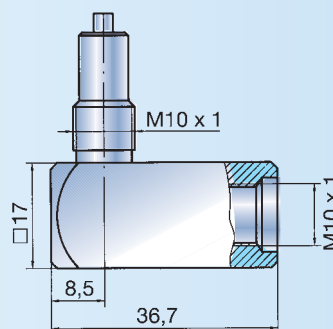
W10

Right-angle attachment for Series 10 BMD plug gauges

Right-angle attachment L-W10 must be used with plug gauges with an air supply.

Order no. W10 (BMD plug gauge without air supply)

L-W10 (BMD plug gauge with air supply)



SO-W10

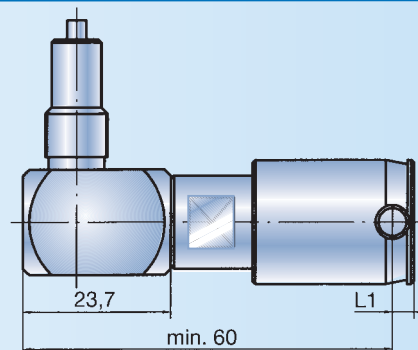
BMD plug gauge with special right-angle attachment for Series 10

Use as described for SO-W6. A shorter version than the minimum length of 60 mm can be achieved by using BMD Series 6 BMD plug gauges with SO-W6.

Please note: Dimension L1 of the BMD plug gauge must be beaded to the length of 60 mm!

Sample order: BMD-S10-CR-28-SO-W10

Also available in model L-SO-W10 (BMD plug gauge with air supply)



Two different types of depth extensions are available:

- Depth extension with pressure pin (TV)
- Depth extension without pressure pin (TVT)

TV depth extensions can be used for measuring depths of up to several meters, depending on the model.

Most of the depth extensions are temperature stabilized.

This means that temperature fluctuations, e.g. resulting from hand warmth, do not have an appreciable influence on measurements.

It is important to ensure that the depth extension does not bend during the measuring process, as this will result in measurement errors.

Only size TV8 (7, 8) and larger depth extensions used in combination.

The TV4 extension has 2 different connection threadings (adapter function).

Depth extensions TV4 through TV15 are also available with additional pressure springs. This feature may be useful where a BMD plug gauge with a longer extension is used in overhead work (the weight of the pressure pin counteracts the gauging pressure of the indicator) requiring increased total gauging pressure.

The spring can also be installed separately. Order suffix: F e.g. TV15-500-F

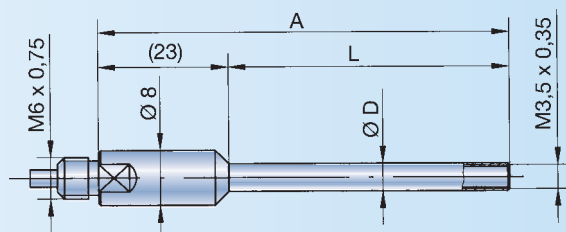
Type TVT depth extensions are suitable for use with probes only. The probe is clamped directly to the BMD plug gauge using EH10-61-T28 (15) holders. The power cable is fed through the extension (Page 39).

TV4 (3.8)

Series 4 depth extensions

TV4 depth extensions are designed for use with Series 4 BMD plug gauges. These depth extensions cannot be used in combination. They are equipped with two different threads and thus also function as adapters (Series 4 to Series 6).

All Series 4 depth extensions are temperature stabilized. The TV4 is suitable for automatic measurement only under certain conditions.



Ø D	L	A	Order no.
3.8	64	79	TV3.8-64
4.0	20	35	TV4-20
4.0	30	45	TV4-30
4.0	40	55	TV4-40
4.0	50	65	TV4-50
4.0	64	79	TV4-64

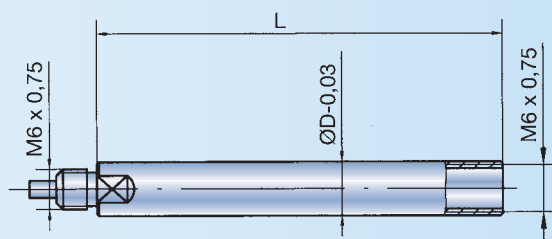
Ø D	L	A	Order no.
4.0	80	95	TV4-80
4.0	100	115	TV4-100
4.0	125	140	TV4-125
4.0	250	275	TV4-250
4.0	500	525	TV4-500
4.0	750	775	TV4-750
4.0	1000	1025	TV4-1000

TV8 (7.8)

Series 6 depth extensions

TV extensions with L = 80 and above temperature stabilized. Multiple extensions can be used in combination.

Select model L-TV8 for use with BMD plug gauges with air supply. The same dimensions apply: Example L-TV8-64



Ø D	L	Order no.
7.8	20	TV7.8-20
7.8	30	TV7.8-30
7.8	40	TV7.8-40
7.8	50	TV7.8-50
7.8	64	TV7.8-64

Ø D	L	Order no.
8.0	20	TV8-20
8.0	30	TV8-30
8.0	40	TV8-40
8.0	50	TV8-50
8.0	64	TV8-64
8.0	80	TV8-80

Ø D	L	Order no.
8.0	100	TV8-100
8.0	125	TV8-125
8.0	250	TV8-250
8.0	500	TV8-500
8.0	750	TV8-750
8.0	1000	TV8-1000

TV15

Series 10 depth extensions

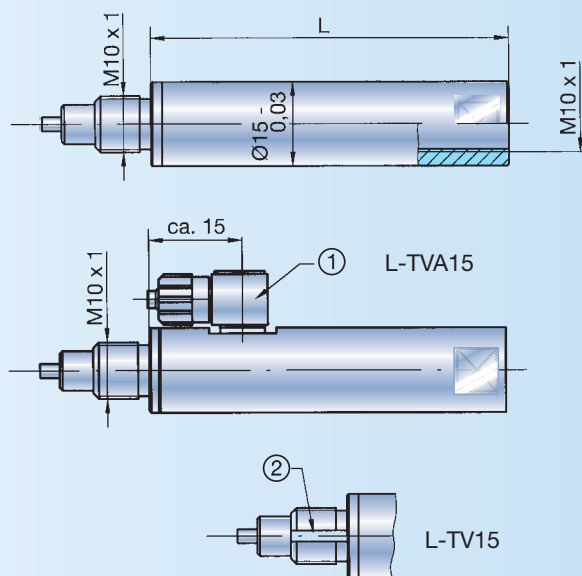
These depth extensions are temperature stabilized. Multiple extensions can be used in combination.

With air supply:

The TV15 for BMD plug gauges with air supply is available in 2 versions:

- ① With side air inlet
Order no. L-TVA15
- ② With air inlet in threading
Order no. L-TV15

L	Order no.	L	Order no.
45	TV15-45	125	TV15-125
64	TV15-64	250	TV15-250
80	TV15-80	500	TV15-500
100	TV15-100	750	TV15-750

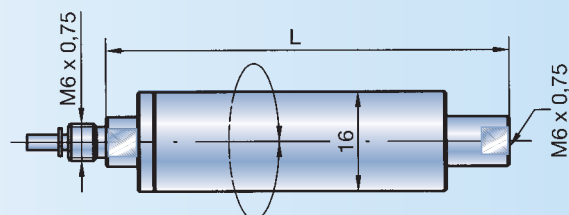


TV64-D

Rotating dial element for Series 6

The rotating dial element makes it possible to rotate the BMD plug gauge 360° in the bore. The measurement indicator remains fixed in place. Application: bore roundness testing.

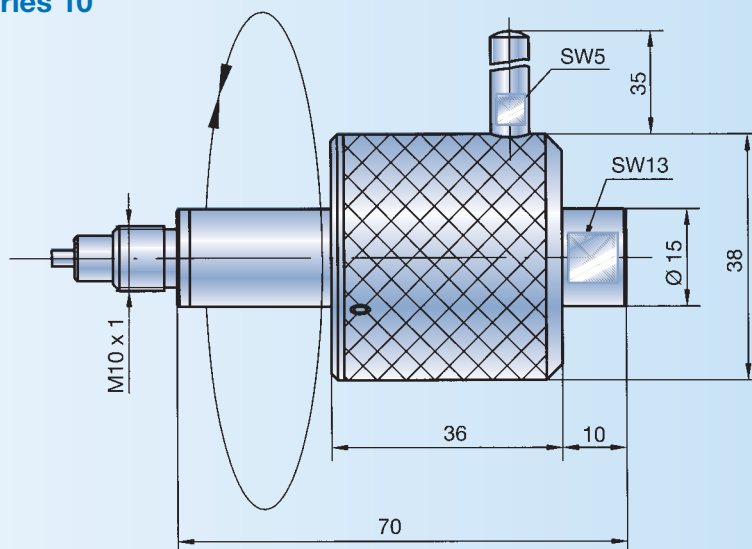
L	Order no.
36	TV36-D
64	TV64-D



TV15-70-D

Rotating dial element for Series 10

Principle identical to that of TV64-D. With M10 x 1 connection threading. Longer size on request. Order no. TV15-70-D



For measuring deep bores in combination with electronic probes (3) and correspondingly long cables or extensions.

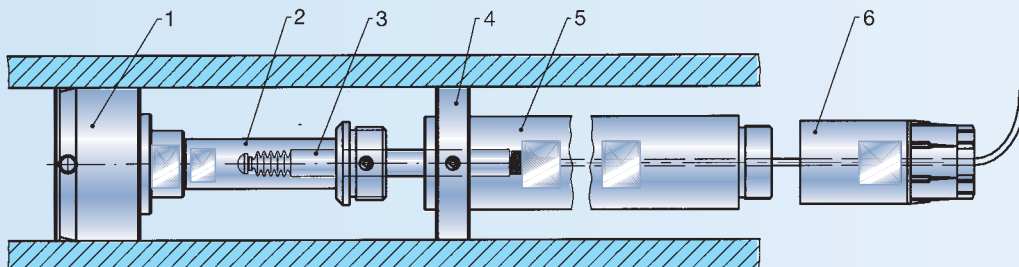
We recommend the use of support rings (4) to facilitate

insertion into the workpiece. These rings should be approx. 0.2 to 0.5 mm smaller than the workpiece bore.

The probe is clamped into the EH10-61T holder (2) (see Page

30). The probe cable runs through the depth extension (5) and is clamped in the TVT-EHK cable clamping fixture (6). The advantage offered by this system is that measurements can be read at the

BMD plug gauge (1). The risk of errors due to extension bending is eliminated.

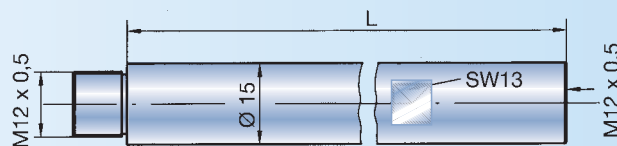


TVT15

Depth extension with 15 mm outside diameter

TVT15 depth extensions are used in combination with the EH10-61-T15 holder (Page 30). Please note that no probe extension can be used inside the TVT, as the outside diameter of the coupling is too large. A probe with a longer connection cable is required for measurement depths of more than 2 m.

L	Order no.	L	Order no.
125	TVT15-125	500	TVT15-500
250	TVT15-250	1000	TVT15-1000

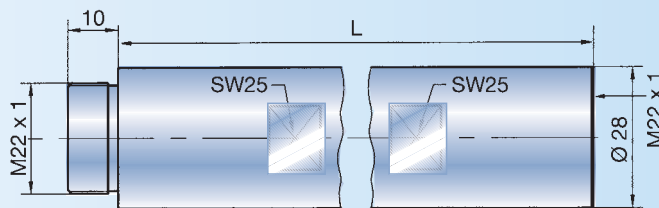


TVT28

Depth extension with 28 mm outside diameter

TVT28 depth extensions are used in combination with the EH10-61-T28 holder (Page 30). The inside diameter of the TVT28 is large enough to permit passage of a probe extension cable with coupling (outside diameter approx. 17.2 mm). The TVT28-EHK cable clamp fixture cannot be used with this option!

L	Order no.	L	Order no.
125	TVT28-125	500	TVT28-500
250	TVT28-250	1000	TVT28-1000

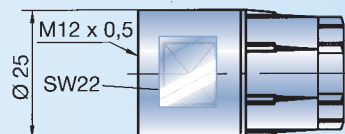


TVT-EHK

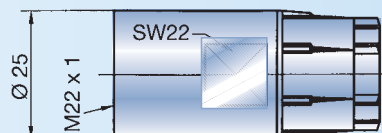
Cable clamping fixture for TVT15 and TVT28

The cable clamping fixture ensures safe withdrawal of the probe connection cable from the TVT.

Please note: The cable clamping fixture cannot be used in combination with a probe extension cable!



TVT15-EHK (for TVT15), Order no.: TVT15-EHK

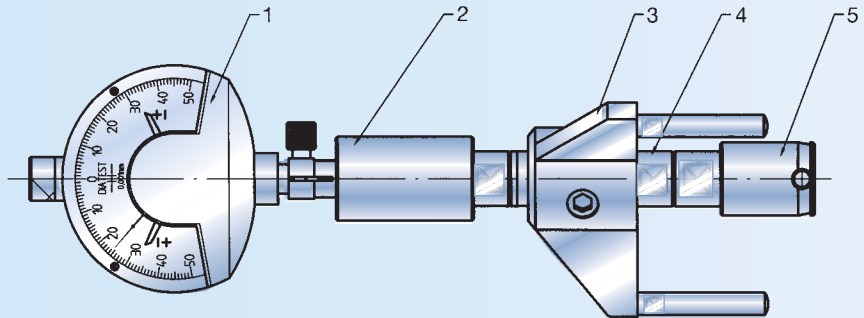


TVT28-EHK (for TVT28), Order no.: TVT28-EHK

TA Depth stops

Depth stops are used to limit measuring depths. They can be clamped to the corresponding depth extension or to the holder.

- Example: 1 = Indicator
 2 = Holder
 3 = Depth stop
 4 = Depth extension
 5 = BMD plug gauge

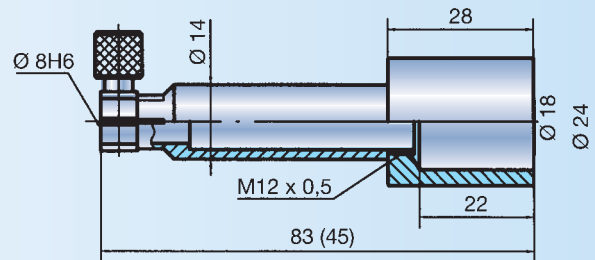


TA8 Depth stop for Series 6

Can be attached to TV8 or holder MH6

Sizes:

- TA8 total length 83 mm
 TA8-K total length 45 mm



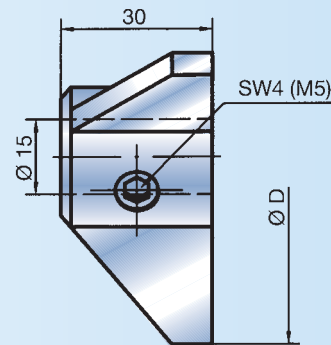
TA15 Depth stop for Series 10

Can be attached to TV15 or MH10-

Instead of the clamping fixture, the TA15 is also available with M24 x 1 threading (for screw connection to TA15-C or TA15-F, for example).

Order suffix: M24, example: TA15-45-M24

Ø D	Order no.	Ø D	Order no.
45	TA15-45	160	TV15-160
75	TA15-75	220	TV15-220
110	TA15-110		



TA15-A Depth stop for Series 10 with 3 stop pins

Can be attached to TV15 or MH10-

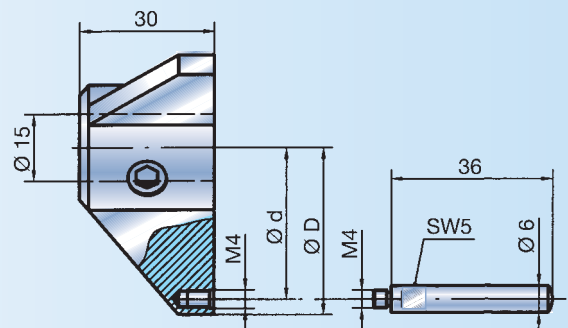
Special model: Ø d deviation from standard

Order suffix: SO-Ød, example: TA15-A-45-SO-Ø d=32

Instead of the clamping fixture, the TA15 is also available with M24 x 1 threading (for screw connection to TA15-C or TA15-F, for example).

Order suffix: M24

Example: TA15-A-45-SO-Ø d = 32-M24

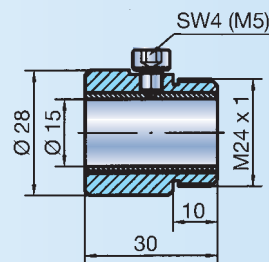


Ø D	Ø d	Order no.	Ø D	Ø d	Order no.
45	38	TA15-45	160	153	TA15-160
75	68	TA15-75	220	213	TA15-220
110	103	TA15-110			

TA15-C

Basic depth stop body

Can be attached to TV15 or MH10.
 To be screwed onto special stop rings or TA15/TA15-A with M24 x 1 threading.
 Special stop rings can be produced on request.
 Order no. TA15-C



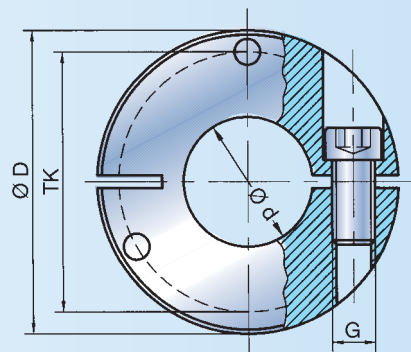
TA-KW

Depth stop designed for clamping to BMD plug gauge guide cylinders

Available models:
 – TA-KW depth stop, steel, non-hardened (standard)
 – TA-KH depth stop, steel with 3 carbide (HM) balls as contact points in pitch diameter TK
 – TA-KG depth stop, steel, hardened
 (Caution: Increased risk of BMD plug gauge cylinder

TA-KW depth stops cannot be produced in sizes larger than 100 mm!
 Sample order: TA-KW-15.75 (= Ø d)

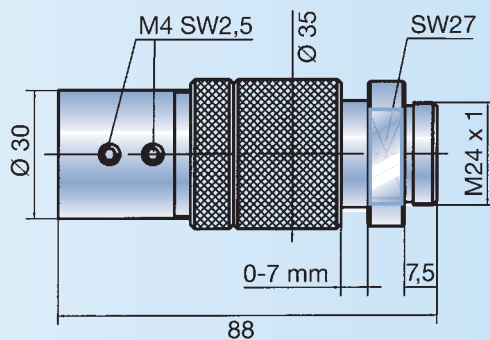
Ød	ØD	TK	h	G	Ød	ØD	TK	h	G
3-5	27	16	10	M4	35-40	65	53	12	M5
5-8	30	19	10	M4	40-45	70	58	12	M5
8-11	33	22	10	M4	45-50	75	63	12	M5
11-15	37	26	10	M4	50-60	85	73	12	M5
15-20	42	31	10	M4	60-70	95	83	12	M5
20-25	50	38	12	M5	70-80	105	93	12	M5
25-30	55	43	12	M5	80-90	115	103	12	M5
30-35	60	48	12	M5	90-100	125	113	12	M5



TA15-F

Spring-loaded depth stop

Can be attached to TV15 extensions. Spring stroke is continuously adjustable 0 to 7 mm.
 Can be combined with TA15/TA15-A special depth stops.
 Application: for measurement on 2 planes in short bores.
 Order no. TA15-F



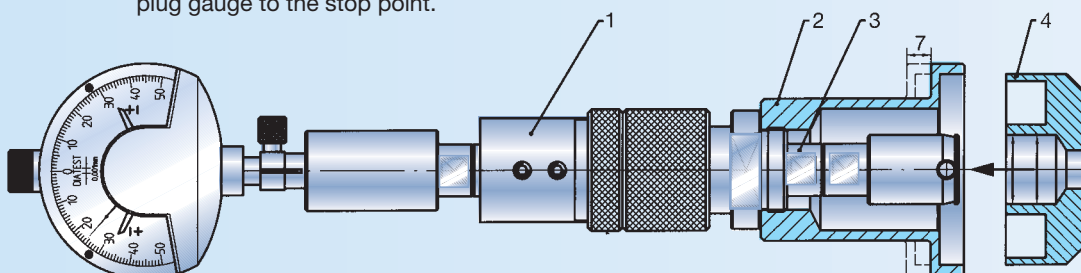
Sample application

For measuring short bores on 2 planes (taper, etc.).

The TA15-F (1) with the special depth stop ring (2) is attached to a depth extension (3). The workpiece (4) is pulled over the BMD plug gauge to the stop point.

After the first measurement, the workpiece is pressed to the end of the spring stroke, and the second measurement is taken.

The unit can also be configured as a measuring station (Page 42). Special depth stop rings available on request.



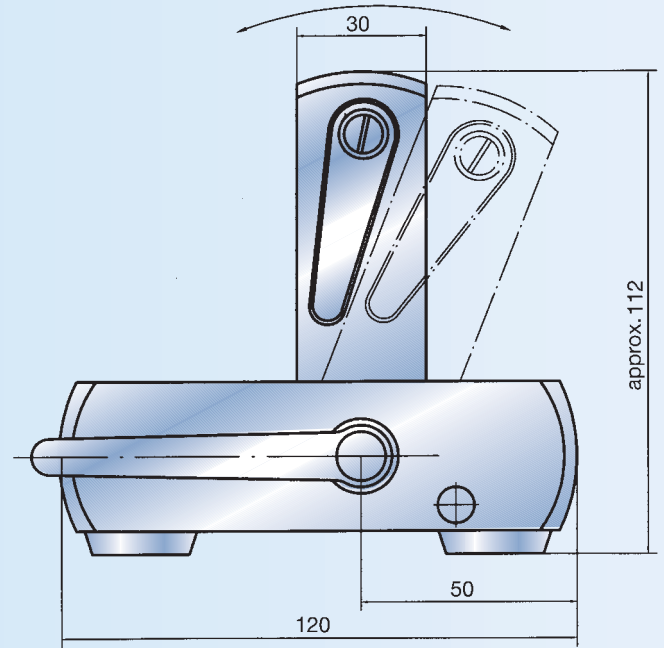
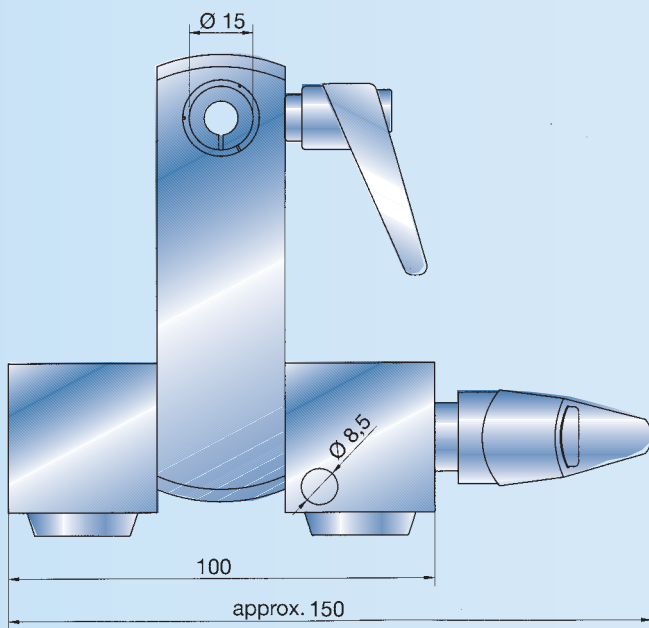
KM Small measurement fixtures

These fixtures are used for stationary measurements of smaller workpieces. One or more BMD plug gauge units can be installed.

Applications: direct measurement at production machines, honing machines, grinding machines, etc. Can be combined with standard components of BMD Series 6 and 10.

Series 4 BMD plug gauges must be adapted accordingly. A wide range of adjustment options ensures optimum handling. Special models with longer mid-sections (for large BMD plug

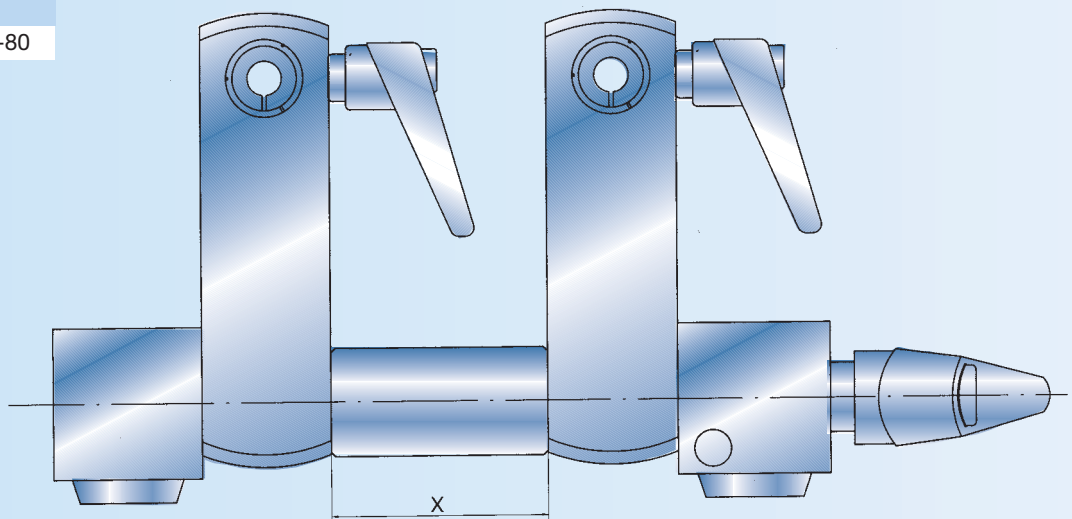
gauges) or longer side components are available on request. Clamping brackets used to mount the KM (e.g. on a workbench) are listed on Page 45 (KM-KB). Not included in the delivery package.



Several KM fixtures can be combined.

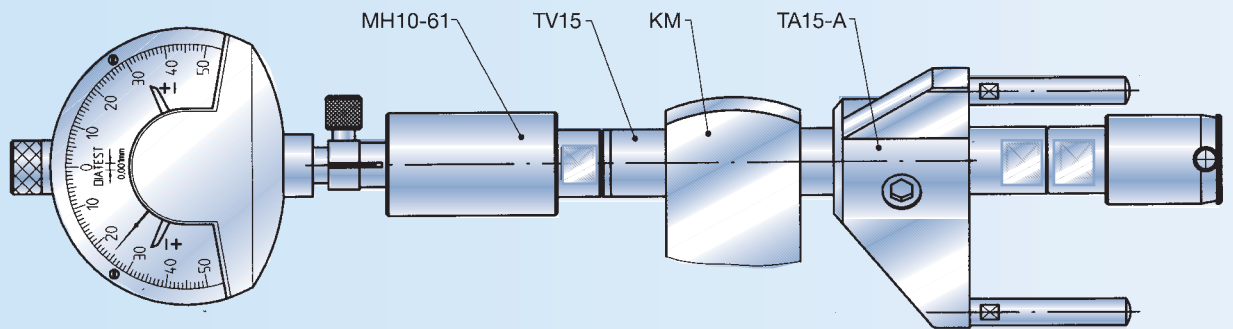
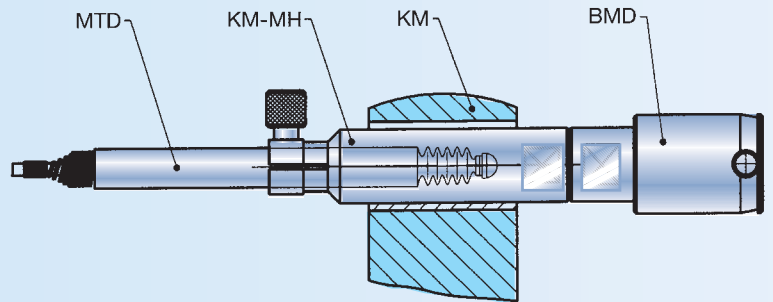
Order no.	X
KM1	0
KM2	80
KM3	80-80
KM4	80-80-80
KM5	80-80-80-80
KM6	80-80-80-80-80

Fixtures with different dimensions X (min. 30 mm) or more measurement points than the KM6 as well as individual components required to upgrade existing small measurement fixtures are available on request.

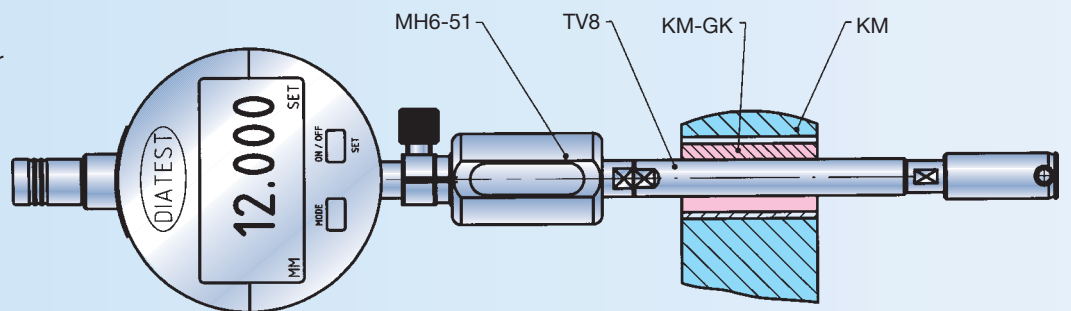


Sample applications

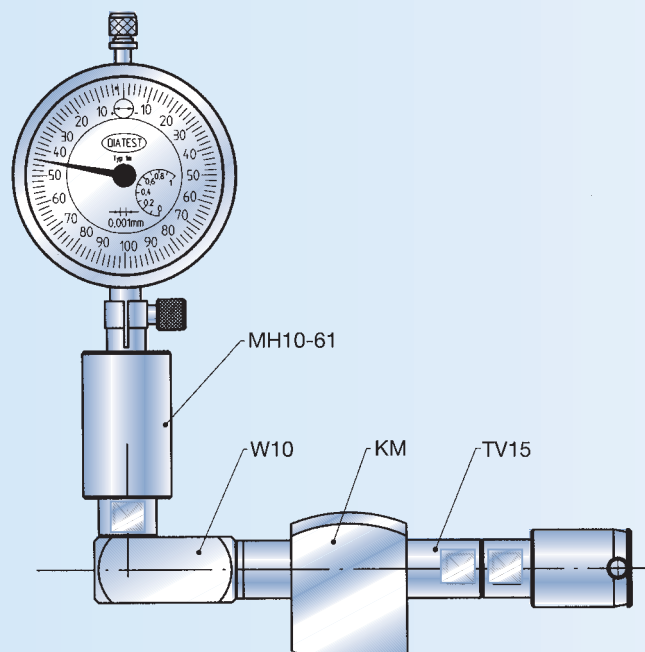
An EH can also be used instead of a KM-MH for an inductive probe (Page 29). In this case, an additional TV15 is required and clamped into the KM.



The KM-GK slotted clamping sleeve is always used as an adapter when clamping a TV8.



The W6 right-angle attachment and matching holder are required for use with a TV8.



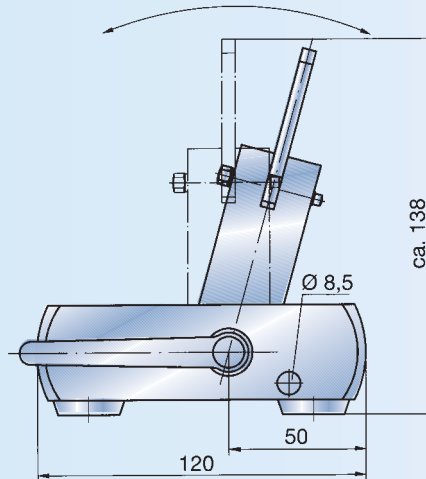
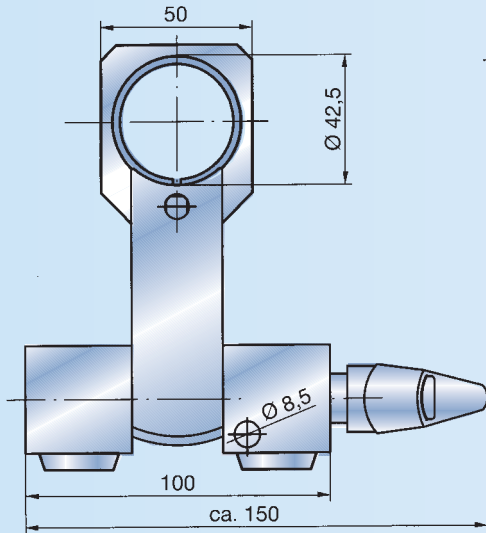
Small measurement fixtures for multiplane plug gauges

The holder for EH-M40 x 1.5 multiplane plug gauges can be clamped directly into the KM-ME.

The EH-M35 x 1.5 holder can only be clamped with the aid of a KM-ME35-40 clamping sleeve.

Special models with longer mid-sections (for large BMD diameters) or longer side elements are available on request.

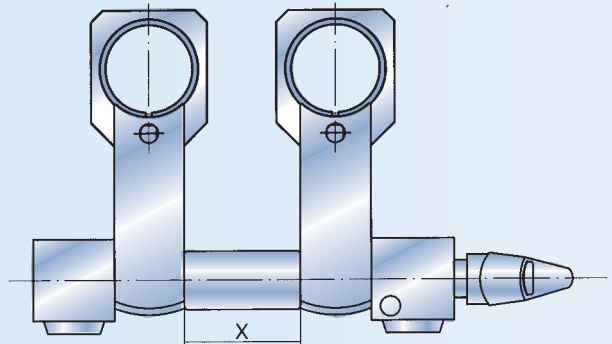
Clamping bracket for use in mounting the KM (e.g. to a workbench), see Page 45. Not included in the delivery package.



Several KM-ME fixtures can be combined.

Order no.	X
KM-ME1	0
KM-ME2	80
KM-ME3	80-80
KM-ME4	80-80-80
KM-ME5	80-80-80-80
KM-ME6	80-80-80-80-80

Fixtures with different dimensions X (min. 30 mm) or more measurement points than the KM6 as well as individual components required to upgrade existing small measurement fixtures are available on request.

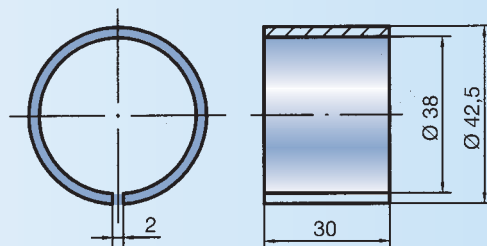


KM-ME35-40

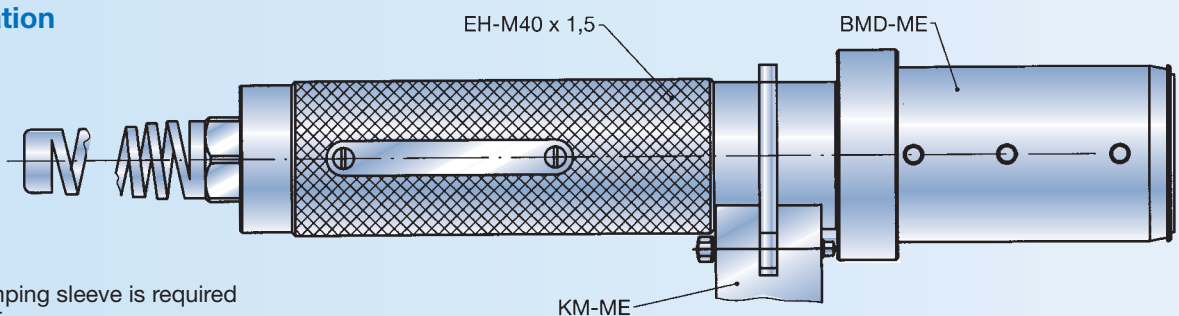
Slotted clamping sleeve

Required for clamping the EH-M35 x 1.5 holder into the KM-ME.

Order no. KM-ME35-40



Sample application

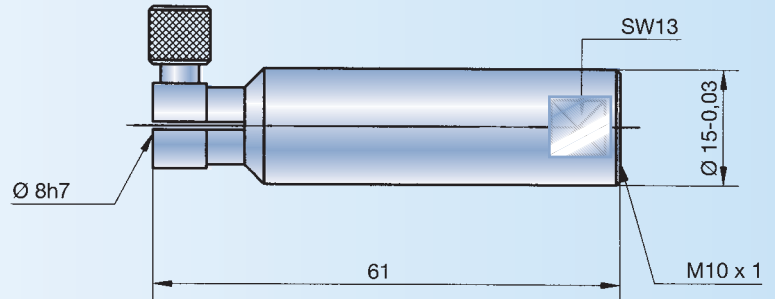


A KM-ME35-40 clamping sleeve is required for the EH-M35 x 1.5.

KM-MH

Indicator holder

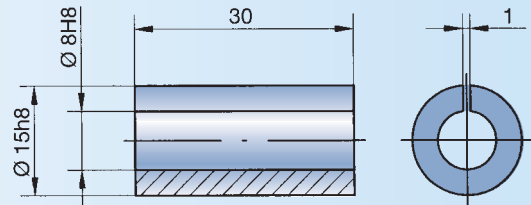
Can be clamped directly into the KM. Without plastic grip.
Order no. KM-MH



KM-GK

Slotted clamping sleeve

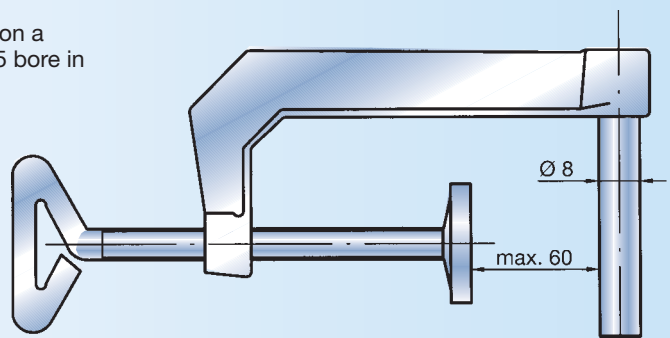
For clamping TV8 depth extensions into the KM.
Order no. KM-GK



KM-KB

Clamping bracket

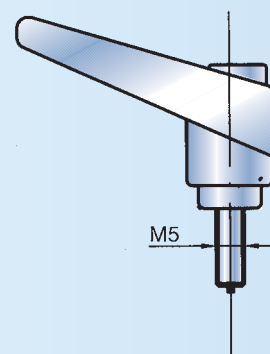
For mounting the small measurement fixture (e.g. on a workbench). The Ø 8 bolt is inserted into the Ø 8.5 bore in the KM.
Not included with the KM.
Order no. KM-KB



KM-VK

Adjustable clamping lever

For TA15 depth stops.
Facilitates rapid depth stop adjustment.
Order no. Nr. KM-VK



SH-BMD

Floating holders

Floating holders (2) are used in combination with Type PK BMD plug gauges (with pilot taper (3)) for measurements in fixtures. The purpose of the floating holder is to compensate for plug gauge positioning errors and to override

minor errors in the angle between the BMD plug gauge and the bore axis.

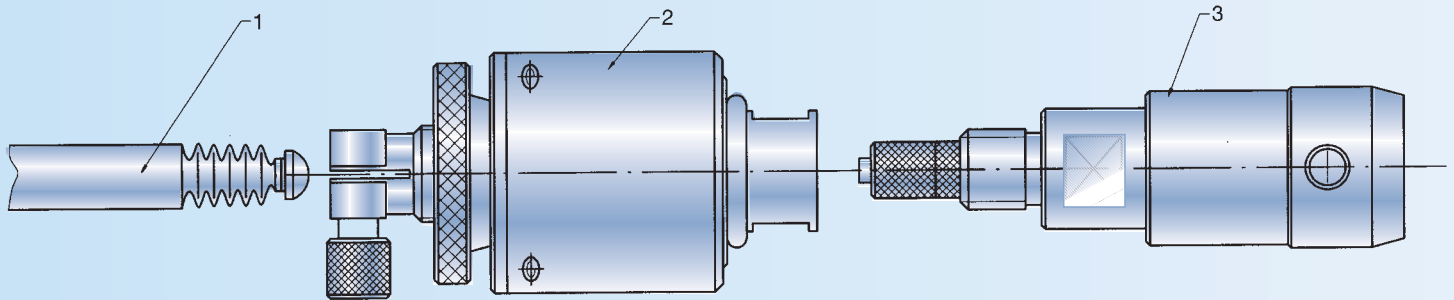
Floating holders are mounted in clamping sleeves with diameters of 20, 30 and 50 mm. They should not be clamped too tightly, in

order to avoid impairing the function of the SH-BMD.

Floating holders SH-BMD20 and SH-BMD30 do not have anti-twist protection. When using an inductive probe, a probe spacer ring is required (MUZ-10).

It may be necessary to remove the protective bellows in the inductive probe.

The AT0 option is recommended for applications involving frequent BMD plug gauge changes (see Page 8), especially with indicator units with inductive probes (1).

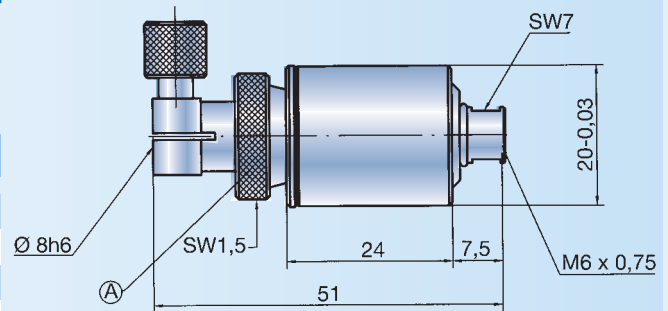


SH-BMD20

Floating holder with 20 mm outside diameter

Technical data

Adjusting nut (A)	Float range	Axial tilt angle<
0 revolutions	± 0 mm	0°
1 revolutions	± 0.13 mm	2° 40'
2 revolutions	± 0.26 mm	3°
3 revolutions	± 0.39 mm	3° 20'
4 revolutions	± 0.5 mm	3° 35'



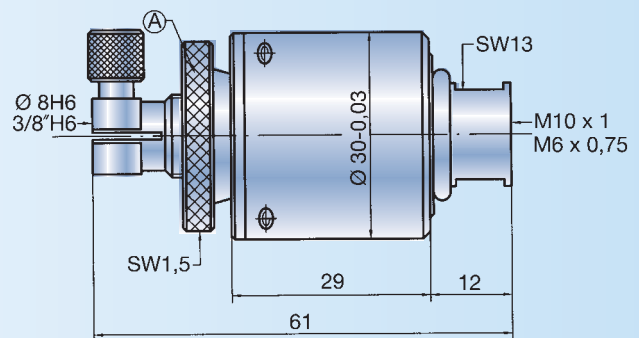
Order no. SH-BMD20-6

SH-BMD30

Floating holder with 30 mm outside diameter

Technical data

Adjusting nut (A)	Float range	Axial tilt angle<
0 revolutions	± 0 mm	0°
1 revolutions	± 0.125 mm	0° 30'
2 revolutions	± 0.25 mm	0° 50'
3 revolutions	± 0.375 mm	1°
4 revolutions	± 0.5 mm	1° 5'
5 revolutions	± 0.625 mm	1° 10'
6 revolutions	± 0.75 mm	1° 10'



Order no. SH-BMD30-6 (M6 x 0.75 connection threading)
SH-BMD30-10 (M10 x 1 connection threading)

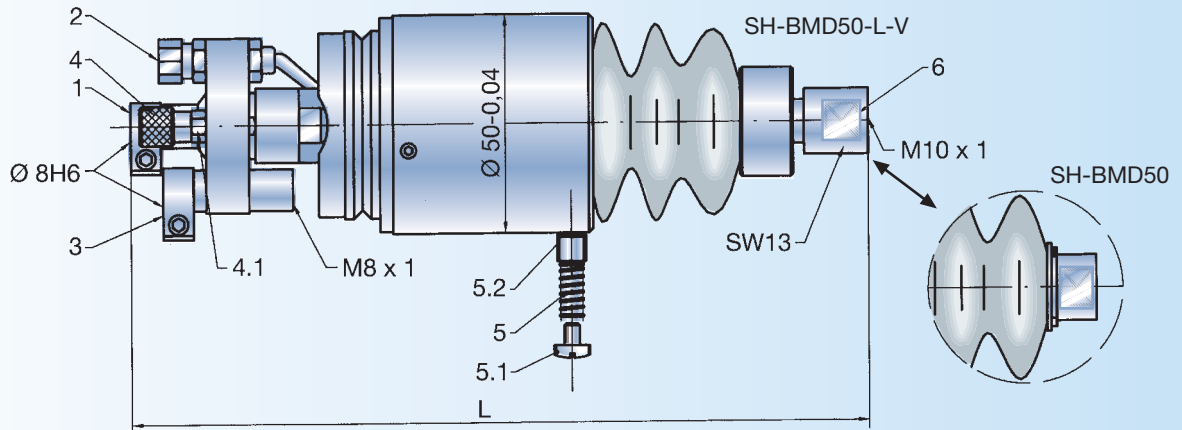
Setting the float range for SH-BMD20+30

Set the adjusting nut (A) to float range 0, but do not tighten, as otherwise the holder will be pulled backwards along with the BMD plug gauge and will no longer float parallel!

Then set the desired float range and tighten the adjusting nut with an Allan wrench. When using small-diameter BMD plug gauges, it is especially important to ensure that the float range is not set too high. An excessively large float range can cause collision of the front face of the BMD plug gauge.

SH-BMD50

Floating holders with anti-impact protection



Floating holders with anti-impact protection are ordinarily used only in fully automatic measuring systems. The floating holder is secured against twisting.

Models

SH-BMD50	Without air supply or fine adjustment L = 150
SH-BMD50-V	Without air supply, with fine adjustment L = 164±1.5
SH-BMD50-L-V	With air supply and fine adjustment L = 164±1.5

Applications

BMD plug gauges up to nom. diameter of 150 mm with horizontal installation, BMD plug gauges up to nom. diameter of 250 mm with vertical installation, BMD plug gauges with Option L (with air outlet at the gauging contacts)

Fine adjustment (Type V)

In applications involving frequent BMD plug gauge changes, the probe can be calibrated to the electronic zero point on the fine adjustment unit without shifting the position of the probe itself.

Anti-impact protection

with 22 mm recoil stroke

Sample applications:

- Bore missing, workpiece incorrectly positioned, etc. The SH-BMD with proximity switch stops the machine if recoil is too great.
- BMD moves to the bottom or step of a blind or stepped bore. The bore depth is measured additionally through the recoil stroke of the SH-BMD50 and a probe.
- BMD-SO-KO (see Page 16) is inserted into the bore to the depth stop point.

Technical description

- 1 Collet bore Ø 8H6 with tangential clamp for mounting the probe.
- 2 Compressed air fitting (approx. 3-4 bar) with Type L only

- 3 Collet bore Ø 8H6 for proximity switch with M8 x 1 threading in forward section
- 4 Set screw for float range. 1 revolution = ±0.25 mm float range
- 4.1 SW7 lock nut to secure set screw. For float range = 0: Tighten nut against the set screw, tighten adjusting screw completely.
- 5 Weight balance spring with variable spring pressure – 4-30 N
- 5.1 Set screw for weight balancing
- 5.2 Spring sleeve
- 6 Type V: The fine adjustment fixture can be adjusted by ±1.5 mm by loosening the clamping screw. This eliminates the need to move the probe for BMD plug gauge changes.

Setting the float range

Tighten nut 4.1 slightly against the head of set screw 4. Tighten screw 4 to the stop point (= float range 0). Turn screw 4 back (1 revolution = ±0.25 mm float range) until the desired float range is set. Tighten screw 4 against nut 4.1 to secure the screw against turning. The maximum float range is ±0.75 mm.

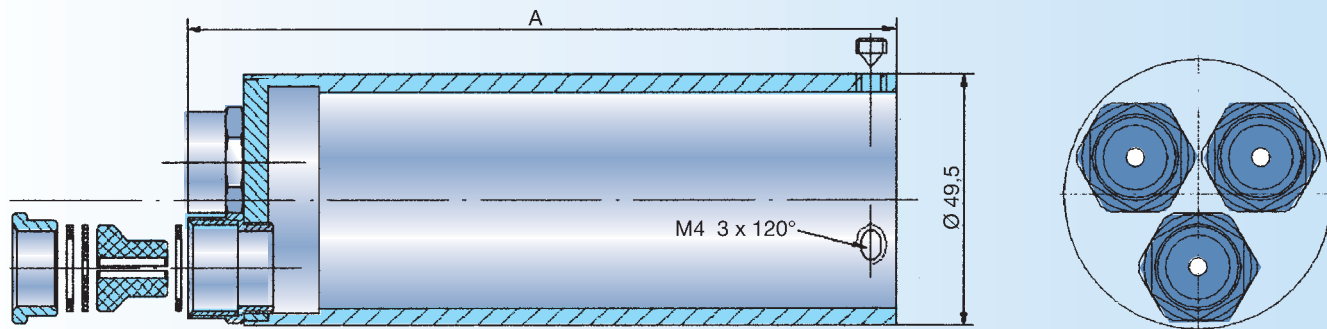
Weight compensation

In horizontal applications, the BMD plug gauge is balanced in the center position by adjusting set screw 5.1 or replacing spring 5. This prevents excessive wear on the pilot taper when the plug is inserted into the bore. The delivery package includes 2 springs with different strengths. Spring 5 must be removed in vertical configurations.

SH-BMD50-10

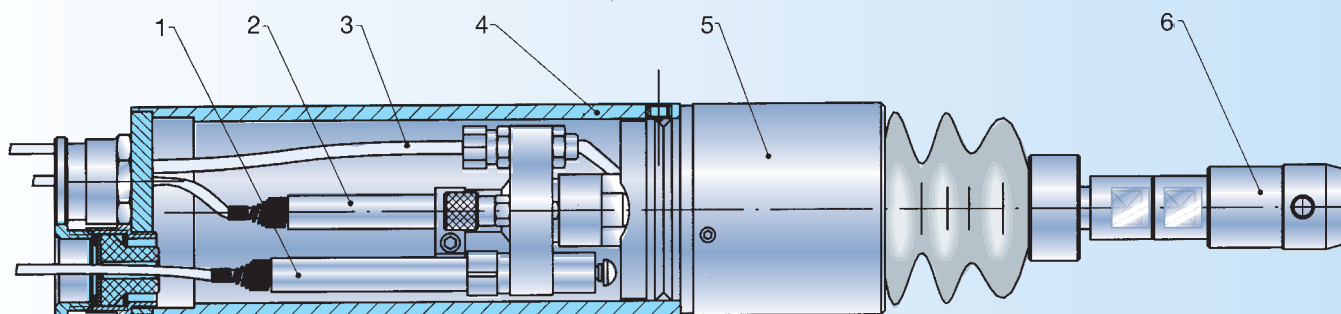
Protective sleeve for SH-BMD50

The protective sleeve safeguards the installed electronic probe and proximity switch. The cable and air hoses can be drawn out without risk contact with splash water through the 3 crimp connections.



Sizes

Length A	Order no.
152 mm	SH-BMD50-10
190 mm	SH-BMD50-10-190

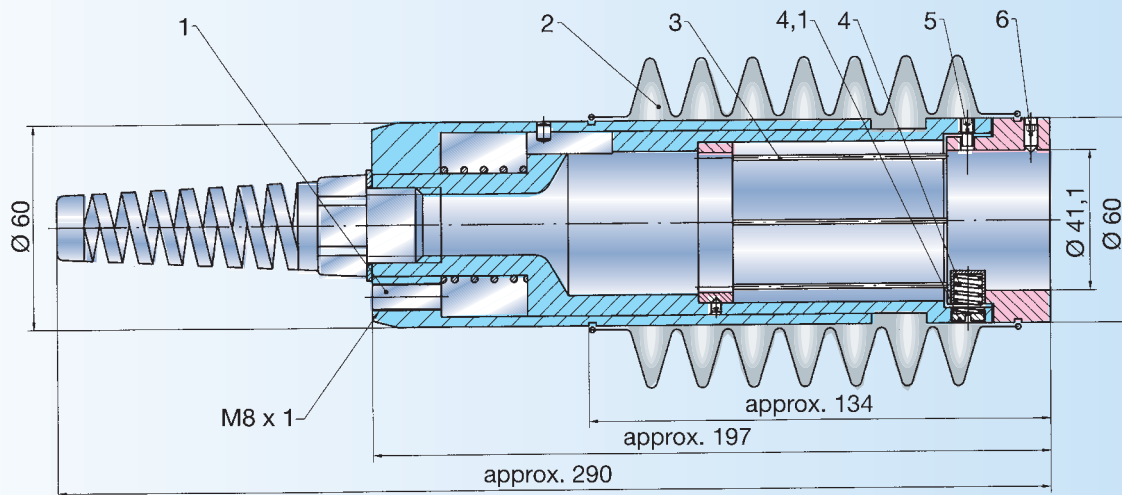


Example

- 1 Proximity switch or probe
- 2 Electr. probe
- 3 Air hose
- 4 Protective sleeve
- 5 Floating holder
- 6 BMD-PK

SH-BMD-ME

Floating holder for multiplane plug gauges



The floating holder for multiplane plug gauges with anti-impact protection is designed exclusively for use with Type ME-BMD plug gauges (Page 20).

Please note:

Connection type 5, size 2 (see page 20) is required for installation of a multiplane BMD plug gauge.

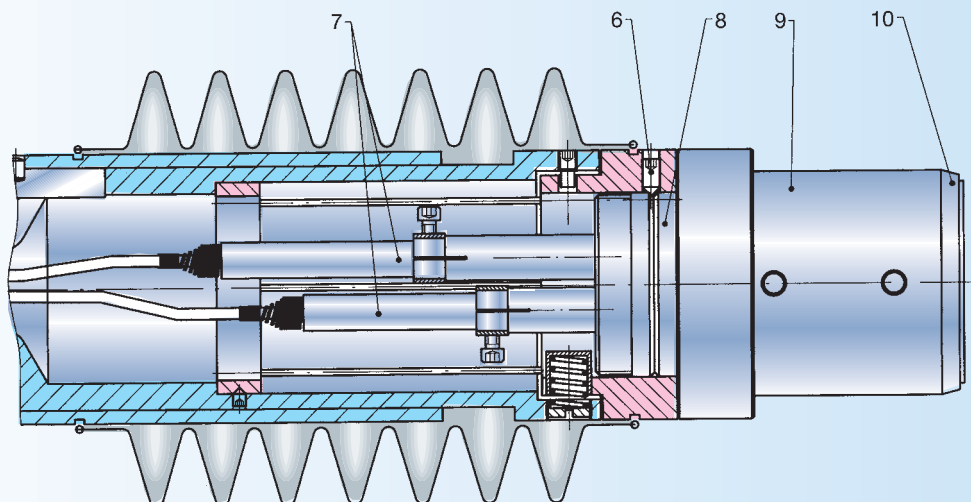
Weight compensation

In horizontal configurations, the BMD plug gauge is balanced in an approximate central position by adjusting the 2 set screws 4.1 or by replacing the 2 springs 4. The 2 set screws are positioned at an angle of 96° and must be aligned during installation in such a way that they point downward and at an angle of approx. 48° to the vertical axis.

Technical description

- 1 M8 x 1 threaded bore for proximity switch (anti-impact protection). Spring stroke approx. 20 mm
- 2 Protective bellows to protect against splashing

- 3 Spring rods provide for free floating. Float range approx. ±1 mm; non-adjustable.
- 4 Weight compensation spring for horizontal configurations. Total of 2 spring sets set at an angle of 96°. The springs must be positioned during installation in the machine or fixture in such a way that weight compensation can be achieved. The springs must be removed for vertical installation of the SH-BMD-ME.
- 5 Anti-twist protection. The floating holder is protected against twisting.
- 6 3 mounting screws for multiplane BMD plug gauges (3 x 120°). A Type 5 connection on the BMD plug gauge is required for plug gauge installation.
- 7 Probe with Ø 8h6 extension diameter (and air hose, if applicable). The cable and hose are drawn out of the floating holder through the anti-bend protector.
- 8 Type 5, size 2 connection (on BMD)
- 9 Multiplane BMD plug gauge
- 10 Pilot taper

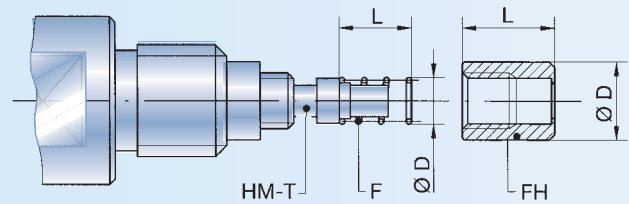


E Spare parts

Some BMD plug gauge components are replaceable. However, it is essential to ensure that the correct parts are used. Use of the wrong parts will result in incorrect measurements.

Part codes:

HM-T Carbide pressure needle
 F Spring (not for Series 4)
 FH Spring sleeve



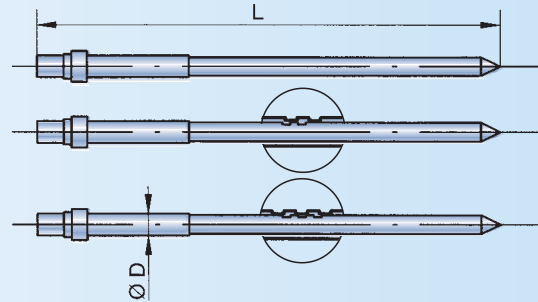
HM-T

Carbide pressure needles

Pressure needles can be replaced separately. It is important to ensure that the correct pressure needles are used.

Pressure needles are marked with notches.

no notch 2-point BMD plug gauge, BMD-FB6
 2 notches BMD-FB10
 3 notches 3-point BMD plug gauge
 more than 3 notches Special-purpose pressure needle



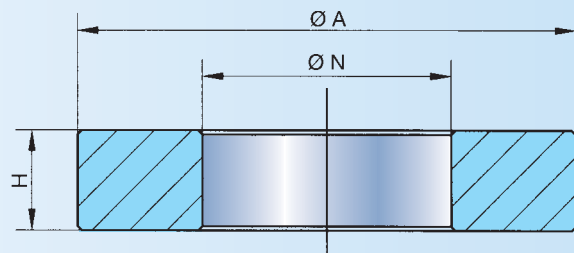
Description HM-T	Series 4 (M3,5 x 0,35)				Series 6 (M6 x 0,75)				Series 10 (M10 x 1)			
	Ø D	L	Notches	Order no.	Ø D	L	Notches	Order no.	Ø D	L	Notches	Order no.
2-point	1.5	42.8	0	HM-T4	1.5	42.8	0	HM-T6	2.7	59.5	0	HM-T10
FB					1.5	42.8	0	HM-T6	2.7	59.5	2	HM-T10-FB
3-point					1.5	42.5	3	HM-T6-3P	2.7	58.5	3	HM-T10-3P
spring					2.5	4		F6	3.7	10		F10
sleeve	2.8	6		FH4	4.5	5		FH6	7	8.5		FH10

ZU Accessories

Setting rings

Setting rings are used to calibrate the measuring device. Setting rings which conform to DIN 2250-C are best suited for this purpose. They are available from DIATEST in all size increments from Ø 1 to 300 mm.

Setting rings which conform to DIATEST company standards may also be used. However, these rings are available from DIATEST only in fixed diameters.



Nom. diameter Ø N mm	Grading mm	Outside Ø A mm	Height H mm
2.250 – 3.750	0.25	20.0	4.5
4.000 – 9.500	0.5	20.0	4.5
10.000 – 20.000	0.5	36.0	7.5
20.500 – 29.500	0.5	45.0	10.0
30.000 – 40.000	1.0	60.0	12.0

Order no. = R-nom. diameter · Sample order: R-25.500

Accuracy of DIATEST setting rings (company standard):

Max. deviation from nom. diameter 0.0009 mm
 Max. concentricity error 0.0003 mm
 Max. rough depth 0.00002 mm
 Hardness 62-64 HRC



Superior quality for reliable performance

General and technical abbreviations

	Page		Page		Page
A		MR		SO-KW	
Adapter	34-35	Gauging radius	6	BMD plug gauge for crankshaft bearing width	18
AD		MRU		SO-PA	
Cover	7	Ruby gauging contacts	7	BMD plug gauge for parallel wall measurement	18
AH		M24		SO-SZ	
Holder for Analog indicator	33	Depth stop with M24 threading	40, 41	BMD plug gauge with special cylinder	18
BL		NHM		SO-ZL	
Holder with marking strip	25	Pressure needle for BMD-PA-6	19	BMD with extended L1 and/or L2	16
BLE		NFB		SO-TA	
Replacement marking strip	25	Pressure needle for BMD-PA-6-FB	19	BMD Plug gauge with built-in depth stop	15
BM		NT-HM		SO-W	
Bore gauge	8	Pressure needle for BMD-PA-4	19	Right-angle attachment and BMD plug gauge; short form	36
BMD		NT-FB		SO-ZZ	
Bore plug gauge	10-22	Pressure needle for BMD-PA-4-FB	19	BMD plug gauge with 2 guide cylinders	17
D		OCR		TA	
Basic BMD type for through bores	11	BMD plug gauge with steel cylinder (not chrome coated)	4	Depth stops	40, 41
D		OD		T-BMD	
Order suffix for rotating dial segment/holder	32, 38	BMD plug gauge for outside diameter	18	BMD plug gauge for small diameters	16
EH, EHT		OR		TV	
Holder for electronic probes	28-30	BMD plug gauge without pilot tape	14	Depth extension with pressure pin	37, 38
F		PA		TVT	
Order suffix for depth extension with spring	37, 50	BMD gauge for parallel wall gauging	18, 19	Depth extension without pressure pin	37, 39
FB		PG		UM	
Basic type for blind bores	12	BMD plug gauge without inherent measurement pressure	8	BMD plug gauge with reduced entry diameter	14
GK		PK		V	
Slotted clamping sleeve	45	BMD plug gauge with pilot tape	9, 13	Holder or floating holder with fine adjustment	28, 29, 33, 47
HM		R		VK	
Carbide	6	Gauging radius (dimension)	6	Adjustable clamping lever	45
HM-T		Setting ring	50	W	
Carbide pressure needle	50	S		Right-angle attachment	36
KB		Stand basic BMD plug gauge type	10	Z	
Clamping bracket	45	S-FB		Order code for 3/8" special bore	23-33
KM		BMD plug gauge, Type S with shortened L1	14	ZHML	
Small measurement fixtures	42-44	SH-BMD		BMD plug gauge with carbide bars	13
L		Floating holder for BMD PK	46-49	ZKUL	
BMD plug gauge without accessories, with air supply	22, 29, 31, 35-38	SO		BMD plug gauge with plastic bars	16
MCR		Special-purpose design	14-18	2R	
Hard chrome gauging contacts	6	SO-B		BMD plug gauge with 2 guide grooves	15
MDI		Special marking	4	2Z	
Diamond gauging contact	7	SO-DZL		BMD plug gauge with 2 cylinders	17
ME		BMD plug gauge with extended L1	16	3P	
Multiplane plug gauges	20, 21	SO-FB-SO		BMD plug gauge in 3-point configuration	15
MH		BMD plug gauge for stepped bores	17		
Indicator holders	23-27, 45	SO-GL			
MHM		BMD plug gauge for longitudinal groove measurement	17		
Carbide gauging contacts	6	SO-KO			
MKE		BMD plug gauge for tapered inside diameters	17		
Ceramic gauging contacts	6				
MKK					
Plastic gauging contacts	7				

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