

Instructions for checking caliper gauges of the series Int/Odi and ID/OD - absolute measurement



1 Generalities

This instruction follows the checking instructions for caliper gauges according to VDI/VDE/DGQ 2618, page 12.1 and 13.1. The gauges are referred to as gauges with absolute measurement and adjustable zero point.

2 Terms

Terms of length testing techniques see DIN 2257, part 1 and 2 (see also fig. 1) and International Vocabulary of Basic and General Terms in Metrology.

2.1 Range of application A_{wb}

The range of application is the sum of regulating and measuring range (e.g. ID 10M..)

2.2 Range of indication A_{zb}

The range of indication is the range between the highest and the lowest indication.

2.3 Measuring range M_{eb}

The measuring range is defined as the range of values of the measurable variable, in which given or stipulated margins of error will not be exceeded.

2.4 Total motion G_h

The total motion of the movable caliper arm consists of the range of indication and the free motion.

2.5 Scale interval (Graduation) S_{kw}

The scale interval represents the modification of the value of the measurable variable which causes the indication to change by one scale part. The scale interval is indicated in the unit of the measurable variable. The scale interval was also called graduation.

2.6 Deviation in the measuring range f_M

The deviation in the measuring range (range of deviation) f_M represents the distance of ordinates between the highest and the lowest position in the deviation diagram, when the movable caliper arm closes. The tolerance field G_M for f_M is symmetrically positioned to the zero line.

2.7 Deviation in the partial measuring range f_t

The deviation in the partial measuring range f_t represents the distance of ordinates between the highest and the lowest position in the deviation diagram, measured for a partial measuring range of a half turn of the pointer when the movable caliper arm closes. The tolerance field G_T for f_t is symmetrically positioned to the zero line.

2.8 Repeat precision f_w

The repeat precision f_w is a characteristic value for deviations of the measured quantity within the measuring range in the same motion direction of the movable caliper arm (usually n is 5). This margin of error is designated as repeat limit r .

2.9 Measuring force F_{min} , F_{max}

When the caliper arm closes, the measuring force F_{min}/F_{max} is determined at the top of the movable caliper arm. The gauge must be held in vertical position ≥ 200 mm (see also fig. 2).

2.10 Torsional force of the bezel

The torsional bezel should neither exceed nor fall below a certain defined range of torsional force. The torsional force is measured in Ncm.

3 Characteristics for checking

The values of table 1 and 2 must not be exceeded within the measuring range. These values are valid for the vertical measuring position of the instruments for internal measurement (Intertest, ID) and for the instruments for external measurement (Oditest, OD).

Attention:

The above mentioned error parameters imply the correct handling of the gauge. Errors, which are due to incorrect handling such as extreme motion of the caliper arms, application in temperatures below 10°C and above 30°C are excluded.

Gauges used out of the reference temperature the zero point has to be adjusted. Extremely loadings are fast and jerky actuating of the arms, as well as tight hitting against the limit stop in the case

3.1 Reading

Division scales (scale ring, scale)

The division scale is to be arranged by lines with marginal sharpness. These lines should clearly contrast with the ground. All lines should be straight, directed to the rotation of the pointer axis and arranged centrally. Accentuated lines should be longer than the others.

The distance of the centers of adjacent lines (scale spacing) should not be smaller than 0.75 mm, measured from a circle described by the tip of the pointer.

The width of the lines should be 20 % of the scale spacing width. The deviation of the medium width of one line within one scale must not exceed ± 0.03 scale spacing. The scale interval has to be indicated with value and unity in mm using the following symbol: $\Rightarrow 1 \Leftarrow 0.01$ mm.

The dial gauge should have a turnable (adjustable) scale for the zero positioning. The eccentricity of the scale ring to the pointer axis has to be ≤ 0.25 mm.

Cleanness and quality of the scale print, bezel

The field of the scale lines applies as a operating field. Visible breaks of the lines, colour specks or dust particles more than 0,1mm are not admissible. The breaks must not exceed 2/3 of the line diameter.

The rest of the scale and bezel applies as a design field. Max. 2 visible colour specks not more than 0,2mm are admissible. The colour specks on the bezel or glass must not exceed 0,1mm.

If colour specks and dust particles in the operation field, design field and on the bezel are in tolerance are only allowed one time per gauge in the different fields and not together (plural pieces are not allowed).

Range of indication

Against the figures indicated in the table 1 and 2, the gauges are allowed to deviate from the following values :

Gauge	Max-value(mm)	Min-value (mm)
ID	+0,3	+0,1/-0,3
OD	+0,3/-0,1	look 3.2

For inch gauges the conversion table should be used.

Torsional force of the bezel

The torsional force has to be checked with a torsional force checking caliper with a special cap.

Before checking the bezel must be turned and the measurement can be done.

The measuring results have to be read while turning the bezel.

Permissible values:

ID / OD 03.. and ID / OD 07.. à 10 – 20 Ncm

ID / OD 10.. and ID / OD 20.. à 10 – 30 Ncm

Tolerance marks

While turning the bezel the tolerance marks of the series ID/OD 03.. and ID/OD 07.. are not allowed to slide at the case.

The automativ interlock of the tolerance marks has to be strong enough so that a moving of the tolerance marks are not possible during the measurement or by modification of the bezel.

Distance and height of the pointer

The small pointer has to be adjusted that a sliding at the scale or the big pointer is not possible. The distance between both elements is min. 0,2mm.

The big pointer has to be adjusted that a sliding at the scale or at the bezel or at the small pointer is not possible. The distance between these elements is min. 0,2mm.

The min. distances are to be guaranteed for the complete rotation.

The big pointer must not be out of true.

3.2 Movement, adjustment and measuring force

Movement

The movement should be free of visible dirt and chips particles.

Insignificant friction variation of the movement because of the process tolerance are permissible, as long as they are within the limiting value.

Noises caused by the rack gear have no affect on the accuracy of the caliper gauge. This is no reason for a complaint.

A quality statement is the deviation diagramm supplied with each gauge.

Identification

Similarly to the standard for dial gauges VDI/VDE/DGQ 2618 page 12.1 and 13.1 the checking is done in steps which correspond to the decuple of the scale interval (up to 200 times). Block gauges and ring gauges are used to determine f_M , f_t (will be handed out on customers request), and f_W . A fully automatically checking device is also used to determine these values.

Its calibration is annually revised. Being checked through the DKD (German calibration service), all gauges and devices correspond to the national length standard.

The repeatability f_W is checked by means of 5 measurements of the same measure in the first third of the measuring range.

Attention: Usually all gauges are electronically adjusted with error limits. For manual calibration the tolerance limits of the certificate are valid. Variations due to the operator are considered. In case of failure of the electronic adjustment a B1 certificate based on manual inspection is provided. The following test points are considered for B1 certificates:

Measuring range ≤ 20 mm	5 test points (mm-scale)
Measuring range = 25 mm	6 test points (inch-scale)
Measuring range ≥ 50 mm	11 test points (mm- and inch-scale)

Pointer position at the beginning of the measuring range

A deviation of the big pointer at the beginning of the measuring range or „0“ is admissible.

Because of different transmissions and kinematics the following max. deviations must not be exceeded:

ID / OD 03.. und ID / OD 07.. = +/- 2 scale lines

ID / OD 10.. = +/- 3 scale lines

ID / OD 20.. = +/- 2 scale lines

A deviation of the small pointer of ± 1 pointer width at the beginning of the measuring range or „0“ is admissible.

Measuring force

The measuring force for the series ID/OD10.. and ID/OD20.. is made by means of a torsion spring.

The spring is greased between the winding. The given measuring force is made by prestressing the spring.

Slight noises can be caused by the spring when using the gauges. They have no affect on the accuracy of the caliper gauges.

The measuring force for the series ID/OD03.. und ID/OD07.. is made by means of a flat spiral tension spring.

The force is defined by the spring inset point and the spring. The measuring force can be determined by a force-sending device.

Reference temperature

The reference temperature is 20 ± 3 °C.

3.3 Measuring arms and contacts

Measuring arms

Measuring arms made of stainless steel are usually not coated.

Measuring arms made of quality flat steel are coated for surface protection.

Concerning surface irregularities a visual check is made.

Measuring contacts

All ball measuring contacts made of stainless steel are provided with a carbide ball which are fixed by inductive soldering.

The quality is visual checked..

All chisel measuring contacts are made of stainless steel and are tempered.

Flat measuring contacts made of stainless steel or aluminium are coated with hart-coat.

Interchangeability

If there is a possibility the gauges have interchangeable measuring contacts.

When changing the measuring contacts insignificant deviations in the display are possible because of the process tolerance and will be compensated by turning the scale ring.

Positions tolerance of the measuring contacts

The gauges with ball contacts or chisel contacts have an admissible position tolerance deviation of max. $\pm 0,2$ mm due to the axle.

A parallelism deviation of max. 0,01mm for chisel contact is admissible.

The check is made with a test piece 1-2mm. The test piece is touched with both outer chisel points. The deviation must be max. 0,01mm.

Documentation

The checking values can be memorized in a diagram or a computer (table). After the final test and acceptance, the gauges must be correctly marked with the identification number of the testing record.

It may be given to the customer as:

- manufacturer certificate M according to DIN 55350 (Typ A) or as
- manufacturer certificate M according to DIN 55350 (Typ B1 and C).

3.2 Table 1: Admissible deviations **gauges with mm- scaling**

No.	Type	Instrument range [mm]	Range of application [mm]	Total motion [mm]	Scale interval [mm]	G _{M zul} [mm]	G _{t zul} [mm]	r [mm]	F _{min} ±15%[N]	F _{max} ±15%[N]	Measuring uncertainty ± [mm] B1	Measuring uncertainty ± [mm] C	Certificate	Annotation
													Typ	
1	ID 0302	2.5 - 7.5	2.3 - 7.8	2.3 - 7.8	0.005	0.015	0.012	0.005	1.2	1.7	0.003	0.002	C (B1)	
2	ID 0305	5 - 10	4.7 - 10.3	4.7 - 10.3	0.005	0.015	0.012	0.005	1.2	1.7	0.003	0.002	C (B1)	
3	ID 0705	5 - 15	4.7 - 15.5	4.7 - 15.5	0.01	0.02	0.015	0.005	1.1	1.7	0.004	0.002	C (B1)	
4	ID 0710	10 - 20	9.5 - 20.5	9.5 - 20.5	0.01	0.02	0.015	0.005	1.1	1.7	0.004	0.002	C (B1)	
5	ID 0720	20 - 30	19.2 - 30.5	14.7 - 30.5	0.01	0.02	0.015	0.005	1.1	1.7	0.004	0.002	C (B1)	
6	ID 0730	30 - 40	29.2 - 40.5	24.7 - 40.5	0.01	0.02	0.015	0.005	1.1	1.7	0.004	0.002	C (B1)	
7	ID 0740	40 - 50	39.2 - 50.5	34.7 - 50.5	0.01	0.02	0.015	0.005	1.1	1.7	0.004	0.002	C (B1)	
8	ID 1010	10 - 30			0.01	0.03	0.025	0.01	0.9	1.5	0.005	0.002	C (B1)	
9	ID 1020	20 - 40			0.01	0.03	0.02	0.01	0.9	1.5	0.004	0.002	C (B1)	
10	ID 1030	30 - 50			0.01	0.03	0.02	0.01	0.9	1.5	0.004	0.002	C (B1)	
11	ID 1040	40 - 60			0.01	0.03	0.02	0.01	0.9	1.5	0.004	0.002	C (B1)	
12	ID 1050	50 - 70			0.01	0.03	0.02	0.01	0.9	1.5	0.004	0.002	C (B1)	
13	ID 1060	60 - 80			0.01	0.03	0.02	0.01	0.9	1.5	0.004	0.002	C (B1)	
14	ID 1070	70 - 90			0.01	0.03	0.02	0.01	0.9	1.5	0.004	0.002	C (B1)	
15	ID 1080	80 - 100			0.01	0.03	0.02	0.01	0.9	1.5	0.004	0.002	C (B1)	
16	ID 10M60	60 - 130*			0.01	0.03	0.025	0.015	0.9	1.5	0.005	0.002	6x C (B1)	* Awb
17	ID 10M120	120 - 190*			0.01	0.04	0.03	0.02	0.9	1.5	0.005	0.002	6x C (B1)	* Awb
18	ID 2015	15 - 65			0.05	0.05	0.04	0.025	1.2	2.0	0.005	0.002	C (B1)	
19	ID 2040	40 - 90			0.05	0.05	0.04	0.025	1.2	2.0	0.005	0.002	C (B1)	
20	ID 2040K1	40 - 90			0.05	0.05	0.04	0.025	1.2	2.0	0.005	0.002	C (B1)	
21	ID 2070	70 - 120			0.05	0.05	0.04	0.025	1.2	2.0	0.005	0.002	C (B1)	
22	ID 2070K1	70 - 120			0.05	0.05	0.04	0.025	1.2	2.0	0.005	0.002	C (B1)	
23	ID 20100	100 - 150			0.05	0.05	0.04	0.025	1.2	2.0	0.01	0.002	C (B1)	
24	ID 20100K1	100 - 150			0.05	0.05	0.04	0.025	1.2	2.0	0.01	0.002	C (B1)	
25	ID 20130	130 - 180			0.05	0.05	0.04	0.025	1.2	2.0	0.01	0.002	C (B1)	
26	ID 20130K1	130 - 180			0.05	0.05	0.04	0.025	1.2	2.0	0.01	0.002	C (B1)	

- B1 Certificate: based upon manual inspection, PC print, inspection uncertainty for k=2
- C Certificate: based upon machine inspection, PC print, inspection uncertainty for k=2
- * Awb Range of application indicated, not measuring range
- MU Dial indicator, used according to DIN 878
- M2 Basis Modul 2

Continue Table 1: gauges with mm- scaling

No.	Type	Instrument range [mm]	Range of application [mm]	Total motion [mm]	Scale interval [mm]	G _{M zul} [mm]	G _{t zul} [mm]	r [mm]	F _{min} ±15%[N]	F _{max} ±15%[N]	Measuring uncertainty ± [mm] B1	Measuring uncertainty ± [mm] C	Certificate Typ	Annotation
27	ID 20150	150 - 200			0.05	0.05	0.04	0.025	1.2	2.0	0.01	-	B1	
28	ID 20180	180 - 230			0.05	0.075	0.05	0.025	1.2	2.0	0.01	-	B1	
29	ID 20200	200 - 250			0.05	0.1	0.05	0.05	1.2	2.0	0.01	-	B1	
30	ID 20250	250 - 300			0.05	0.15	0.1	0.05	1.2	2.0	0.01	-	B1	
31	ID 20300	300 - 350			0.05	0.15	0.1	0.05	1.2	2.0	0.01	-	B1	
32	ID 20350	350 - 400			0.05	0.2	0.15	0.05	1.2	2.0	0.02	-	B1	
33	ID 20400	400 - 450			0.05	0.2	0.15	0.075	1.2	2.0	0.02	-	B1	
34	ID 20450	450 - 500			0.05	0.25	0.2	0.075	1.2	2.0	0.025	-	B1	
35	ID 20500	500 - 550			0.05	0.25	0.2	0.075	1.2	2.0	0.025	-	B1	
36	ID 20M180	180 - 310*			0.05	0.075	-	0.05	1.2	2.0	0.01	-	3x B1	* Awb
37	ID 20M300	300 - 430*			0.05	0.15	-	0.05	1.2	2.0	0.01	-	3x B1	* Awb
38	ID 20M420	420 - 550*			0.05	0.25	-	0.05	1.2	2.0	0.01	-	3x B1	* Awb
39	ID 4040	40 - 140			0.1	0.15	-	0.075	1.5	2.5	0.02	-	B1	
40	ID 4060	60 - 160			0.1	0.15	-	0.075	1.5	2.5	0.02	-	B1	
41	ID 40100	100 - 200			0.1	0.15	-	0.075	1.5	2.5	0.02	-	B1	MU M2
42	ID 40200	200 - 300			0.1	0.15	-	0.075	1.5	2.5	0.02	-	B1	MU M2
43	ID 40300	300 - 400			0.1	0.2	-	0.1	1.5	2.5	0.02	-	B1	MU M2
44	ID 40400	400 - 500			0.1	0.2	-	0.15	1.5	2.5	0.03	-	B1	MU M2
45	ID 40500	500 - 600			0.1	0.25	-	0.15	1.5	2.5	0.03	-	B1	MU M2
46	ID 40600	600 - 700			0.1	0.3	-	0.2	1.5	2.5	0.04	-	B1	MU M2
47	ID 40700	700 - 800			0.1	0.35	-	0.2	1.5	2.5	0.05	-	B1	MU M2
48	ID 40800	800 - 900			0.1	0.4	-	0.3	1.5	2.5	0.05	-	B1	MU M2
49	ID 40900	900 - 1000			0.1	0.45	-	0.3	1.5	2.5	0.05	-	B1	MU M2
50	ID 6080	80 - 180			0.1	0.25	-	0.1	1.5	2.5	0.05	-	B1	MU M2
51	ID 60150	150 - 250			0.1	0.3	-	0.1	1.5	2.5	0.05	-	B1	MU M2
52	ID 60220	220 - 320			0.1	0.3	-	0.1	1.5	2.5	0.05	-	B1	MU M2
53	ID 80100	100 - 300			0.2	0.4	-	0.2	1.0	2.0	0.1	-	B1	MU M2

B1 Certificate: based upon manual inspection, PC print, inspection uncertainty for k=2
 C Certificate: based upon machine inspection, PC print, inspection uncertainty for k=2
 * Awb Range of application indicated, not measuring range
 MU Dial indicator, used according to DIN 878

Continue Table 1:

gauges with mm- scaling

No.	Type	Instrument range [mm]	Range of application [mm]	Total motion [mm]	Scale interval [mm]	$G_{M\ zul}$ [mm]	$G_{t\ zul}$ [mm]	r [mm]	F_{min} $\pm 15\%[N]$	F_{max} $\pm 15\%[N]$	Measuring uncertainty \pm [mm] B1	Measuring uncertainty \pm [mm] C	Certificate Typ	Annotation
54	ID 80200	200 - 400			0.2	0.4	-	0.2	1.0	2.0	0.1	-	B1	MU M2
55	ID 80400	400 - 600			0.2	0.6	-	0.2	1.0	2.0	0.1	-	B1	MU M2
56	ID 80600	600 - 800			0.2	0.8	-	0.3	1.0	2.0	0.1	-	B1	MU M2
57	ID 80800	800 - 1000			0.2	0.8	-	0.3	1.0	2.0	0.1	-	B1	MU M2
58	ID 120200	200 - 400			0.2	1.0	-	0.6	1.5	2.5	0.2	-	B1	MU M2
59	INT 00	2.5 - 12.5			0.01	0.03	0.02	0.01	1.2	1.8	0.005	-	B1	
60	INT 01	5 - 15			0.01	0.02	0.015	0.005	1.2	1.8	0.003	-	B1	
61	INT 20	5 - 25			0.01	0.025	0.02	0.01	0.6	1.0	0.003	-	B1	
62	INT 21	10 - 30			0.01	0.025	0.02	0.01	1.5	2.7	0.004	0.002	C (B1)	
63	INT 22	20 - 40			0.01	0.025	0.02	0.01	1.5	2.7	0.004	0.002	C (B1)	
64	INT 23	30 - 50			0.01	0.025	0.02	0.01	1.5	2.7	0.004	0.002	C (B1)	
65	OD 0305	0 - 5	0 - 5.4	0 - 7.8	0.005	0.015	0.01	0.005	0.8	1.7	0.003	0.002	C (B1)	
66	OD 0305T	0 - 5	0 - 5.4	0 - 7.8	0.005	0.02	0.01	0.005	0.8	1.7	0.003	-	B1	
67	OD 0305D	0 - 5	0 - 5.4	0 - 7.8	0.005	0.015	0.01	0.01	0.8	1.7	0.003	-	B1	
68	OD 0305W	0 - 5	0 - 5.4	0 - 7.8	0.005	0.015	0.01	0.01	0.4	-	0.003	-	B1	
69	OD 0710	0 - 10	0 - 10.8	0 - 15.5	0.01	0.02	0.015	0.005	0.8	1.3	0.003	0.002	C (B1)	
70	OD 0710R	0 - 10	0 - 10.8	0 - 15.5	0.01	0.02	0.015	0.005	0.8	1.3	0.003	0.002	C (B1)	
71	OD 0710RS	0 - 10	0 - 10.8	0 - 15.5	0.01	0.02	0.015	0.005	0.8	1.3	0.003	0.002	C (B1)	
72	OD 0710S	0 - 10	0 - 10.8	0 - 15.5	0.01	0.02	0.02	0.01	0.8	1.3	0.003	0.002	C (B1)	
73	OD 1020	0 - 20			0.01	0.03	0.025	0.01	0.9	1.5	0.004	0.002	C (B1)	
74	OD 1020R	0 - 20			0.01	0.03	0.025	0.01	0.9	1.5	0.004	0.002	C (B1)	
75	OD 1020RS	0 - 20			0.01	0.03	0.025	0.01	0.9	1.5	0.004	0.002	C (B1)	
76	OD 1020S	0 - 20			0.01	0.03	0.025	0.01	0.9	1.5	0.004	0.002	C (B1)	
77	OD 1020T10	0 - 20			0.01	0.05	-	0.015	0.9	1.5	0.004	-	B1	
78	OD 2050	0 - 50			0.05	0.05	0.04	0.025	1.2	1.8	0.01	0.002	C (B1)	
79	OD 2050B	0 - 50			0.05	0.075	0.05	0.025	1.2	1.8	0.01	-	B1	
80	OD 2050BF80	0 - 50			0.05	0.075	-	0.05	1.2	1.8	0.01	-	B1	

B1 Certificate: based upon manual inspection, PC print, inspection uncertainty for $k=2$

C Certificate: based upon machine inspection, PC print, inspection uncertainty for $k=2$

* Awb Range of application indicated, not measuring range

MU Dial indicator, used according to DIN 878

M2 Basic modul 2

Continue Table 1: gauges with mm- scaling

No.	Type	Instrument range [mm]	Range of application [mm]	Total motion [mm]	Scale interval [mm]	$G_{M\ zul}$ [mm]	$G_{t\ zul}$ [mm]	r [mm]	F_{min} $\pm 15\%[N]$	F_{max} $\pm 15\%[N]$	Measuring uncertainty \pm [mm] B1	Measuring uncertainty \pm [mm]		Certificate Typ	Annotation
												B	C		
81	OD 2050BF80T	0 - 50			0.05	0.1	0.075	0.05	1.2	1.8	0.02	-	B1		
82	OD 2050BF130	0 - 50			0.05	0.075	0.05	0.05	1.2	1.8	0.01	-	B1		
83	OD 2050BF130T	0 - 50			0.05	0.1	0.075	0.05	1.2	1.8	0.02	-	B1		
84	OD 2050BR	0 - 50			0.05	0.075	0.05	0.025	1.2	1.8	0.01	-	B1		
85	OD 2050BT	0 - 50			0.05	0.1	0.075	0.025	1.2	1.8	0.02	-	B1		
86	OD 2050F80	0 - 50			0.05	0.075	0.05	0.025	1.2	1.8	0.01	-	B1		
87	OD 2050F80T	0 - 50			0.05	0.1	0.075	0.05	1.2	1.8	0.02	-	B1		
88	OD 2050F130	0 - 50			0.05	0.075	0.05	0.05	1.2	1.8	0.01	-	B1		
89	OD 2050F130T	0 - 50			0.05	0.1	0.075	0.05	1.2	1.8	0.02	-	B1		
90	OD 2050R	0 - 50			0.05	0.05	0.04	0.025	1.2	1.8	0.01	0.002	C (B1)		
91	OD 2050RS	0 - 50			0.05	0.05	0.04	0.025	1.2	1.8	0.01	0.002	C (B1)		
92	OD 2050S	0 - 50			0.05	0.05	0.04	0.025	1.2	1.8	0.01	0.002	C (B1)		
93	OD 2050T	0 - 50			0.05	0.1	0.075	0.025	1.2	1.8	0.02	-	B1		
94	OD 2050T10	0 - 50			0.05	0.1	0.075	0.025	1.2	1.8	0.02	-	B1		
95	OD 20100	50 - 100			0.05	0.075	0.05	0.025	1.2	1.8	0.01	-	B1		
96	OD 20100B	50 - 100			0.05	0.075	0.05	0.05	1.2	1.8	0.01	-	B1		
97	OD 20100BF80	50 - 100			0.05	0.075	0.05	0.05	1.2	1.8	0.01	-	B1		
98	OD 20100BF80T	50 - 100			0.05	0.1	0.075	0.05	1.2	1.8	0.02	-	B1		
99	OD 20100BT	50 - 100			0.05	0.1	0.075	0.05	1.2	1.8	0.02	-	B1		
100	OD 20100F80	50 - 100			0.05	0.075	0.05	0.05	1.2	1.8	0.01	-	B1		
101	OD 20100F80T	50 - 100			0.05	0.1	0.075	0.05	1.2	1.8	0.02	-	B1		
102	OD 20100S	50 - 100			0.05	0.075	-	0.025	1.2	1.8	0.01	-	B1		
103	OD 20100T	50 - 100			0.05	0.1	0.075	0.05	1.2	1.8	0.02	-	B1		
104	OD 20100T10	50 - 100			0.05	0.1	0.075	0.05	1.2	1.8	0.02	-	B1		
105	OD 20150	100 - 150			0.05	0.075	0.05	0.05	1.2	1.8	0.02	-	B1		
106	OD 20150B	100 - 150			0.05	0.075	0.05	0.05	1.2	1.8	0.02	-	B1		
107	OD 20150BT	100 - 150			0.05	0.1	0.075	0.05	1.2	1.8	0.02	-	B1		

B1 Certificate: based upon manual inspection, PC print, inspection uncertainty for $k=2$
 C Certificate: based upon machine inspection, PC print, inspection uncertainty for $k=2$
 * Awb Range of application indicated, not measuring range
 MU Dial indicator, used according to DIN 878
 M2 Basic modul 2

Continue Table 1:

gauges with mm- scaling

No.	Type	Instrument range [mm]	Range of application [mm]	Total motion [mm]	Scale interval [mm]	$G_{M\ zul}$ [mm]	$G_{t\ zul}$ [mm]	r [mm]	F_{min} $\pm 15\%[N]$	F_{max} $\pm 15\%[N]$	Measuring uncertainty \pm [mm] B1	Measuring uncertainty \pm [mm] C	Certificate	
													Typ	Annotation
108	OD 20150T	100 - 150			0.05	0.1	0.075	0.05	1.2	1.8	0.02	-	B1	
109	OD 20150T10	100 - 150			0.05	0.1	0.075	0.05	1.2	1.8	0.02	-	B1	
110	OD 20200	150 - 200			0.05	0.1	0.05	0.05	1.2	1.8	0.02	-	B1	
111	OD 20200B	150 - 200			0.05	0.1	0.05	0.05	1.2	1.8	0.02	-	B1	
112	OD 20200BT	150 - 200			0.05	0.1	0.05	0.05	1.2	1.8	0.02	-	B1	
113	OD 20250	200 - 250			0.05	0.15	0.1	0.05	1.2	1.8	0.02	-	B1	
114	OD 20300	250 - 300			0.05	0.15	0.1	0.05	1.2	1.8	0.02	-	B1	
115	OD 20350	300 - 350			0.05	0.15	0.15	0.05	1.2	1.8	0.02	-	B1	
116	OD 20400	350 - 400			0.05	0.2	0.15	0.075	1.2	1.8	0.02	-	B1	
117	OD 20450	400 - 450			0.05	0.25	0.15	0.075	1.2	1.8	0.025	-	B1	
118	OD 20500	450 - 500			0.05	0.25	0.15	0.075	1.2	1.8	0.025	-	B1	
119	OD 3030W	0 - 30			0.1	0.15	-	0.075	1.5	2.5	0.025	-	B1	MU M2
120	OD 3050	0 - 50			0.1	0.15	-	0.075	1.5	2.5	0.025	-	B1	MU M2
121	OD 3050T	0 - 50			0.1	0.2	-	0.1	1.5	2.5	0.025	-	B1	MU M2
122	OD 3070W	30 - 70			0.1	0.15	-	0.075	1.5	2.5	0.025	-	B1	MU M2
123	OD 40100	0 - 100			0.1	0.15	0.1	0.075	1.5	2.5	0.02	-	B1	
124	OD 40100B1	0 - 100			0.1	0.2	0.15	0.1	1.5	2.5	0.025	-	B1	MU M2
125	OD 40100B1F1	0 - 100			0.1	0.2	0.15	0.1	1.5	2.5	0.025	-	B1	MU M2
126	OD 40100B1F2	0 - 100			0.1	0.2	0.15	0.1	1.5	2.5	0.025	-	B1	MU M2
127	OD 40100B1R	0 - 100			0.1	0.2	0.15	0.075	1.5	2.5	0.025	-	B1	MU M2
128	OD 40100B2	0 - 100			0.1	0.2	0.15	0.075	1.5	2.5	0.025	-	B1	MU M2
129	OD 40100B2F1	0 - 100			0.1	0.2	0.15	0.075	1.5	2.5	0.025	-	B1	MU M2
130	OD 40100B2F2	0 - 100			0.1	0.2	0.15	0.075	1.5	2.5	0.025	-	B1	MU M2
131	OD 40100B2R	0 - 100			0.1	0.2	0.15	0.075	1.5	2.5	0.025	-	B1	MU M2
132	OD 40100F1	0 - 100			0.1	0.2	0.15	0.1	1.5	2.5	0.025	-	B1	MU M2
133	OD 40100F2	0 - 100			0.1	0.2	0.15	0.075	1.5	2.5	0.025	-	B1	MU M2
134	OD 40100R	0 - 100			0.1	0.15	0.1	0.075	1.5	2.5	0.02	-	B1	

B1 Certificate: based upon manual inspection, PC print, inspection uncertainty for $k=2$

C Certificate: based upon machine inspection, PC print, inspection uncertainty for $k=2$

* Awb Range of application indicated, not measuring range

MU Dial indicator, used according to DIN 878

M2 Basic modul 2

Continue Table 1:

gauges with mm- scaling

No.	Type	Instrument range [mm]	Range of application [mm]	Total motion [mm]	Scale interval [mm]	$G_{M\ zul}$ [mm]	$G_{t\ zul}$ [mm]	r [mm]	F_{min} $\pm 15\%[N]$	F_{max} $\pm 15\%[N]$	Measuring uncertainty \pm [mm] B1	Measuring uncertainty \pm [mm]		Certificate Typ	Annotation
												B1	C		
135	OD 40100T	0 - 100			0.1	0.15	0.1	0.075	1.5	2.5	0.03	-	B1		
136	OD 40100T10	0 - 100			0.1	0.15	0.1	0.075	1.5	2.5	0.03	-	B1		
137	OD 40200F1	100 - 200			0.1	0.2	0.15	0.075	1.5	2.5	0.04	-	B1	MU M2	
138	OD 40200F2	100 - 200			0.1	0.2	0.15	0.075	1.5	2.5	0.04	-	B1	MU M2	
139	OD 60100	0 - 100			0.1	0.3	-	0.15	1.5	2.5	0.04	-	B1	MU M2	
140	OD 60100BJ	0 - 100			0.1	0.3	-	0.15	1.5	2.5	0.05	-	B1	MU M2	
141	OD 60100T	0 - 100			0.1	0.4	-	0.15	1.5	2.5	0.05	-	B1	MU M2	
142	OD 60100T10	0 - 100			0.1	0.4	-	0.15	1.5	2.5	0.05	-	B1	MU M2	
143	OD 80200	0 - 200			0.2	0.4	-	0.2	1.0	2.0	0.1	-	B1	MU M2	
144	OD 120200	0 - 200			0.2	1.0	-	0.6	1.0	2.0	0.2	-	B1	MU M2	
145	ODI 00D	0 - 2			0.01	0.01	-	0.005	0.8	1.6	-	-	A		
146	ODI 00K	0 - 10			0.01	0.015	0.01	0.005	0.8	1.6	0.003	-	B1		
147	ODI 00T	0 - 10			0.01	0.05	0.015	0.01	0.8	1.6	0.003	-	B1		
148	ODI 00W	0 - 2			0.01	0.02	-	0.01	0.2	0.6	-	-	A		
149	ODI 20	0 - 20			0.01	0.025	0.02	0.01	1.0	2.2	0.003	0.002	C (B1)		
150	ODI 20K/K	0 - 20			0.01	0.025	0.02	0.01	1.0	2.2	0.003	0.002	C (B1)		
151	ODI 20R	0 - 20			0.01	0.025	0.02	0.01	1.0	2.2	0.003	0.002	C (B1)		
152	ODI 20RK/K	0 - 20			0.01	0.025	0.02	0.01	1.0	2.2	0.003	0.002	C (B1)		

- B1 Certificate: based upon manual inspection, PC print, inspection uncertainty for $k=2$
C Certificate: based upon machine inspection, PC print, inspection uncertainty for $k=2$
* Awb Range of application indicated, not measuring range
MU Dial indicator, used according to DIN 878
M2 Basic modul 2

Table 2: Admissible deviations gauges with inch- scaling

1	IDZ 0302	.1 - .3	.09-.31	.09 -.31	.0002	.0008	.0005	.0002	1.2	1.7	.0003	.00008	C (B1)	
2	IDZ 0305	.2 - .4	.19-.41	.19 -.41	.0002	.0008	.0005	.0002	1.2	1.7	.0003	.00008	C (B1)	
3	IDZ 0705	.2 - .6	.19 - .61	.19 - .61	.0005	.001	.0008	.0003	1.1	1.7	.0003	.00008	C (B1)	
4	IDZ 0710	.4 - .8	.38 - .81	.38 - .81	.0005	.001	.0008	.0003	1.1	1.7	.0003	.00008	C (B1)	
5	IDZ 0720	.8 - 1.2	.768 -1.21	.57 -1.21	.0005	.001	.0008	.0003	1.1	1.7	.0003	.00008	C (B1)	
6	IDZ 0730	1.2 - 1.6	1.168 -1.61	.97 -1.61	.0005	.001	.0008	.0003	1.1	1.7	.0003	.00008	C (B1)	
7	IDZ 0740	1.6 - 2.0	1.568 - 2.01	1.37 - 2.01	.0005	.001	.0008	.0003	1.1	1.7	.0003	.00008	C (B1)	
8	IDZ 1010	.4 - 1.4			.0005	.0015	.001	.0005	0.9	1.6	.0002	.00008	C (B1)	
9	IDZ 1025	1.0 - 2.0			.0005	.0015	.001	.0005	0.9	1.6	.0002	.00008	C (B1)	
10	IDZ 1040	1.6 - 2.6			.0005	.0015	.001	.0005	0.9	1.6	.0002	.00008	C (B1)	
11	IDZ 1055	2.2 - 3.2			.0005	.0015	.001	.0005	0.9	1.6	.0002	.00008	C (B1)	
12	IDZ 1070	2.8 - 3.8			.0005	.0015	.001	.0005	0.9	1.6	.0002	.00008	C (B1)	
13	IDZ 1080	3.2 - 4.2			.0005	.0015	.001	.0005	0.9	1.6	.0002	.00008	C (B1)	
14	IDZ 10M60	2.4 - 5.4*			.0005	.0015	.0015	.001	0.9	1.6	.0002	.00008	5x C (B1)	* Awb
15	IDZ 10M120	4.7 - 7.7*			.0005	.0015	.0015	.001	0.9	1.6	.0002	.00008	5x C (B1)	* Awb
16	IDZ 20M180	7.1 - 12.1*			.001	.006	.003	.002	1.2	2.0	.0005	-	3x B1	* Awb
17	IDZ 20M300	11.8 -16.8*			.001	.006	.003	.002	1.2	2.0	.0005	-	3x B1	* Awb
18	IDZ 20M420	16.5 -21.5*			.001	.008	.004	.002	1.2	2.0	.0005	-	3x B1	* Awb
19	IDZ 2015	.6 - 2.6			.001	.002	.0015	.001	1.2	2.0	.0004	.00008	C (B1)	
20	IDZ 2040	1.6 - 3.6			.001	.002	.0015	.001	1.2	2.0	.0004	.00008	C (B1)	
21	IDZ 2040K1	1.6 - 3.6			.001	.002	.0015	.001	1.2	2.0	.0004	.00008	C (B1)	
22	IDZ 2070	2.8 - 4.8			.001	.002	.0015	.001	1.2	2.0	.0004	.00008	C (B1)	
23	IDZ 2070K1	2.8 - 4.8			.001	.002	.0015	.001	1.2	2.0	.0004	.00008	C (B1)	
24	IDZ 20100	4.0 - 6.0			.001	.003	.002	.001	1.2	2.0	.0004	.00008	C (B1)	
25	IDZ 20100K1	4.0 - 6.0			.001	.003	.002	.001	1.2	2.0	.0004	.00008	C (B1)	
26	IDZ 20130	5.2 - 7.2			.001	.003	.002	.001	1.2	2.0	.0004	.00008	C (B1)	

B1 Certificate: based upon manual inspection, PC print, inspection uncertainty for $k=2$
C Certificate: based upon machine inspection, PC print, inspection uncertainty for $k=2$
** Awb* Range of application indicated, not measuring range
MU Dial indicator, used according to DIN 878
M2 Basic modul 2

Continue Table 2: gauges with inch- scaling

No.	Type	Instrument range [inch]	Range of application [inch]	Total motion [inch]	Scale interval [inch]	G _{M zul} [inch]	G _{t zul} [inch]	r [inch]	F _{min} ±15%[N]	F _{max} ±15%[N]	Measuring uncertainty ± [inch] B1	Measuring uncertainty ± [inch] C	Certificate	
													Typ	Annotation
27	IDZ 20130K1	5.2 - 7.2			.001	.003	.002	.001	1.2	2.0	.0004	.00008	C (B1)	
28	IDZ 20150	5.9 - 7.9			.001	.003	.002	.001	1.2	2.0	.0004	-	B1	
29	IDZ 20180	7.1 - 9.1			.001	.003	.002	.001	1.2	2.0	.0004	-	B1	
30	IDZ 20200	7.9 - 9.9			.001	.004	.002	.002	1.2	2.0	.0005	-	B1	
31	IDZ 20250	9.8 - 11.8			.001	.006	.004	.002	1.2	2.0	.001	-	B1	
32	IDZ 20300	11.8 - 13.8			.001	.006	.004	.002	1.2	2.0	.001	-	B1	
33	IDZ 20350	13.8 - 15.8			.001	.008	.006	.002	1.2	2.0	.0015	-	B1	
34	IDZ 20400	15.7 - 17.7			.001	.008	.006	.003	1.2	2.0	.0015	-	B1	
35	IDZ 20450	17.7 - 19.7			.001	.01	.006	.003	1.2	2.0	.0015	-	B1	
36	IDZ 20500	19.7 - 21.7			.001	.01	.006	.003	1.2	2.0	.0015	-	B1	
37	IDZ 4040	1.6 - 5.6			.004	.006	.004	.003	1.5	2.5	.001	-	B1	
38	IDZ 4060	2.4 - 6.4			.004	.006	.004	.003	1.5	2.5	.001	-	B1	
39	IDZ 6080	3.0 - 7.0			.005	.01	.008	.005	1.5	2.5	.0025	-	B1	MU M2
40	IDZ 60150	6.0 - 10.0			.005	.0125	.008	.005	1.5	2.5	.0025	-	B1	MU M2
41	IDZ 60220	8.6 - 12.6			.005	.0125	.008	.0075	1.5	2.5	.0025	-	B1	MU M2
42	IDZ 80220	8.0 - 16.0			.01	.0175	-	.0125	1.0	2.0	.0025	-	B1	MU M2
43	INT 50	.1 - .5			.0005	.001	.0005	.00025	1.2	1.8	.0002	-	B1	
44	INT 51	.2 - .6			.0005	.001	.0005	.0005	1.2	1.8	.0025	-	B1	
45	INT 70	.2 - 1.0			.0005	.0015	.00075	.0005	0.6	1.0	.0025	-	B1	
46	INT 71	.4 - 1.2			.0005	.0015	.001	.0005	1.5	2.7	.0025	.00008	C (B1)	
47	INT 72	.8 - 1.6			.0005	.0015	.001	.0005	1.5	2.7	.0025	.00008	C (B1)	
48	INT 73	1.2 - 2.0			.0005	.0015	.001	.0005	1.5	2.7	.0025	.00008	C (B1)	
49	ODZ 0305	0 - .2	0 - .216	0 - .307	.0002	.0008	.0005	.0003	0.8	1.7	.0003	.00008	C (B1)	
50	ODZ 0305T	0 - .2	0 - .216	0 - .307	.0002	.001	.0008	.0003	0.8	1.7	.0003	-	B1	
51	ODZ 0305D	0 - .2	0 - .216	0 - .307	.0002	.0008	.0005	.0004	0.8	1.7	.0003	-	B1	
52	ODZ 0305W	0 - .2	0 - .216	0 - .307	.0002	.0008	.0005	.0004	0.4	-	.0003	-	B1	
53	ODZ 0710	0 - .4	0 - .432	0 - .61	.0005	.0008	.0008	.0003	0.8	1.3	.0003	.00008	C (B1)	

B1 Certificate: based upon manual inspection, PC print, inspection uncertainty for k=2
 C Certificate: based upon machine inspection, PC print, inspection uncertainty for k=2
 * Awb Range of application indicated, not measuring range
 MU Dial indicator, used according to DIN 878
 M2 Basic modul 2

Continue Table 2:

gauges with inch- scaling

No.	Type	Instrument range [inch]	Range of application [inch]	Total motion [inch]	Scale interval [inch]	G _{M zul} [inch]	G _{t zul} [inch]	r [inch]	F _{min} ±15%[N]	F _{max} ±15%[N]	Measuring uncertainty ± [inch] B1	Measuring uncertainty ± [inch] C	Certificate Typ	Annotation
54	ODZ 0710R	0 - .4	0 - .432	0 - .61	.0005	.0008	.0008	.0003	0.8	1.3	.0003	.00008	C (B1)	
55	ODZ 0710RS	0 - .4	0 - .432	0 - .61	.0005	.0008	.0008	.0003	0.8	1.3	.0003	.00008	C (B1)	
56	ODZ 0710S	0 - .4	0 - .432	0 - .61	.0005	.001	.001	.0005	0.8	1.3	.0003	.00008	C (B1)	
57	ODZ 1020	0 - 1.0			.0005	.0015	.001	.0005	0.9	1.6	.0003	.00008	C (B1)	
58	ODZ 1020R	0 - 1.0			.0005	.0015	.001	.0005	0.9	1.6	.0003	.00008	C (B1)	
59	ODZ 1020RS	0 - 1.0			.0005	.0015	.001	.0005	0.9	1.6	.0003	.00008	C (B1)	
60	ODZ 1020S	0 - 1.0			.0005	.0015	.001	.0005	0.9	1.6	.0003	.00008	C (B1)	
61	ODZ 1020T10	0 - 1.0			.0005	.002	.0015	.001	0.9	1.6	.0003	-	B1	
62	ODZ 2050	0 - 2.0			.001	.002	.0015	.001	1.2	1.8	.0005	.00008	C (B1)	
63	ODZ 2050B	0 - 2.0			.001	.002	.0015	.001	1.2	1.8	.0005	-	B1	
64	ODZ 2050BF80	0 - 2.0			.001	.003	.002	.001	1.2	1.8	.0005	-	B1	
65	ODZ 2050BF80T	0 - 2.0			.001	.004	.003	.0015	1.2	1.8	.0005	-	B1	
66	ODZ 2050BF130	0 - 2.0			.001	.003	.002	.001	1.2	1.8	.0005	-	B1	
67	ODZ 2050BF130T	0 - 2.0			.001	.004	.003	.0015	1.2	1.8	.0006	-	B1	
68	ODZ 2050BR	0 - 2.0			.001	.002	.0015	.001	1.2	1.8	.0005	-	B1	
69	ODZ 2050BT	0 - 2.0			.001	.004	.003	.0015	1.2	1.8	.0006	-	B1	
70	ODZ 2050F80	0 - 2.0			.001	.003	.002	.001	1.2	1.8	.0005	-	B1	
71	ODZ 2050F80T	0 - 2.0			.001	.004	.003	.0015	1.2	1.8	.0006	-	B1	
72	ODZ 2050F130	0 - 2.0			.001	.003	.002	.001	1.2	1.8	.0005	-	B1	
73	ODZ 2050F130T	0 - 2.0			.001	.004	.003	.0015	1.2	1.8	.0006	-	B1	
74	ODZ 2050R	0 - 2.0			.001	.002	.0015	.001	1.2	1.8	.0005	.00008	C (B1)	
75	ODZ 2050RS	0 - 2.0			.001	.002	.0015	.001	1.2	1.8	.0005	.00008	C (B1)	
76	ODZ 2050S	0 - 2.0			.001	.002	.0015	.001	1.2	1.8	.0005	.00008	C (B1)	
77	ODZ 2050T	0 - 2.0			.001	.004	.003	.0015	1.2	1.8	.0006	-	B1	
78	ODZ 2050T10	0 - 2.0			.001	.004	.003	.0015	1.2	1.8	.0006	-	B1	
79	ODZ 20100	2.0 - 4.0			.001	.003	.002	.001	1.2	1.8	.0005	-	B1	
80	ODZ 20100S	2.0 - 4.0			.001	.003	-	.001	1.2	1.8	.0005	-	B1	

B1 Certificate: based upon manual inspection, PC print, inspection uncertainty for $k=2$

C Certificate: based upon machine inspection, PC print, inspection uncertainty for $k=2$

* Awb Range of application indicated, not measuring range

MU Dial indicator, used according to DIN 878

M2 Basic modul 2

Continue Table 2:

gauges with inch- scaling

No.	Type	Instrument range [inch]	Range of application [inch]	Total motion [inch]	Scale interval [inch]	G _{M zul} [inch]	G _{t zul} [inch]	r [inch]	F _{min} ±15%[N]	F _{max} ±15%[N]	Measuring uncertainty ± [inch] B1	Measuring uncertainty ± [inch] C	Certificate	
													Typ	Annotation
81	ODZ 20100B	2.0 - 4.0			.001	.003	.002	.001	1.2	1.8	.0005	-	B1	
82	ODZ 20100BF80	2.0 - 4.0			.001	.003	.002	.001	1.2	1.8	.0005	-	B1	
83	ODZ 20100BF80T	2.0 - 4.0			.001	.004	.003	.0015	1.2	1.8	.0006	-	B1	
84	ODZ 20100BT	2.0 - 4.0			.001	.004	.003	.0015	1.2	1.8	.0006	-	B1	
85	ODZ 20100F80	2.0 - 4.0			.001	.003	.002	.001	1.2	1.8	.0005	-	B1	
86	ODZ 20100F80T	2.0 - 4.0			.001	.004	.003	.0015	1.2	1.8	.0006	-	B1	
87	ODZ 20100T	2.0 - 4.0			.001	.004	.003	.0015	1.2	1.8	.0006	-	B1	
88	ODZ 20150	4.0 - 6.0			.001	.003	.002	.001	1.2	1.8	.0008	-	B1	
89	ODZ 20150B	4.0 - 6.0			.001	.003	.002	.001	1.2	1.8	.0008	-	B1	
90	ODZ 20150BT	4.0 - 6.0			.001	.004	.003	.0015	1.2	1.8	.0006	-	B1	
91	ODZ 20150T	4.0 - 6.0			.001	.004	.003	.0015	1.2	1.8	.0006	-	B1	
92	ODZ 20200	6.0 - 8.0			.001	.003	.002	.002	1.2	1.8	.0002	-	B1	
93	ODZ 20200B	6.0 - 8.0			.001	.003	.002	.002	1.2	1.8	.0002	-	B1	
94	ODZ 3050	0 - 2.0			.005	.01	.006	.005	1.5	2.5	.0015	-	B1	MU M2
95	ODZ 40100	0 - 4.0			.004	.006	.004	.004	1.5	2.5	.001	-	B1	
96	ODZ 40100B1	0 - 4.0			.005	.0075	-	.005	1.5	2.5	.001	-	B1	MU M2
97	ODZ 40100B1F1	0 - 4.0			.005	.0075	-	.005	1.5	2.5	.001	-	B1	MU M2
98	ODZ 40100B1F2	0 - 4.0			.005	.0075	-	.005	1.5	2.5	.001	-	B1	MU M2
99	ODZ 40100F1	0 - 4.0			.005	.0075	-	.005	1.5	2.5	.001	-	B1	MU M2
100	ODZ 40100R	0 - 4.0			.004	.006	.004	.004	1.5	2.5	.001	-	B1	
101	ODZ 40100T	0 - 4.0			.004	.008	.006	.004	1.5	2.5	.0015	-	B1	
102	ODZ 60100	0 - 4.0			.005	.0125	.008	.0075	1.5	2.5	.0002	-	B1	MU M2
103	ODZ 60100T	0 - 4.0			.005	.015	.008	.0075	1.5	2.5	.0002	-	B1	MU M2
104	ODZ 60100BJ	0 - 4.0			.005	.015	.008	.0075	1.5	2.5	.0002	-	B1	MU M2
105	ODZ 80200	0 - 7.9			.01	.02	-	.01	1.0	2.0	.0002	-	B1	MU M2

B1 Certificate: based upon manual inspection, PC print, inspection uncertainty for $k=2$
C Certificate: based upon machine inspection, PC print, inspection uncertainty for $k=2$
** Awb* Range of application indicated, not measuring range
MU Dial indicator, used according to DIN 878
M2 Basic modul 2

Continue Table 2:

gauges with inch- scaling

No.	Type	Instrument range [inch]	Range of application [inch]	Total motion [inch]	Scale interval [inch]	G _{M zul} [inch]	G _{t zul} [inch]	r [inch]	F _{min} ±15%[N]	F _{max} ±15%[N]	Measuring uncertainty ± [inch] B1	Measuring uncertainty ± [inch] C	Certificate Typ	Annotation
106	ODI 50K	0 - .4			.0005	.00075	.0005	.00025	0.8	1.6	.0002	-	B1	
107	ODI 50T	0 - .4			.0005	.0015	.001	.0005	0.8	1.6	.0002	-	B1	
108	ODI 70	0 - .8			.0005	.0015	.001	.0005	1.0	2.2	.0003	.00008	C (B1)	
109	ODI 70K/K	0 - .8			.0005	.0015	.001	.0005	1.0	2.2	.0003	.00008	C (B1)	
110	ODI 70R	0 - .8			.0005	.0015	.001	.0005	1.0	2.2	.0003	.00008	C (B1)	
111	ODI 70RK/K	0 - .8			.0005	.0015	.001	.0005	1.0	2.2	.0003	.00008	C (B1)	

- B1 Certificate: based upon manual inspection, PC print, inspection uncertainty for $k=2$
C Certificate: based upon machine inspection, PC print, inspection uncertainty for $k=2$
* Awb Range of application indicated, not measuring range
MU Dial indicator, used according to DIN 878
M2 Basic modul 2

Conversion „inch“ - „mm“ (rounded values)

inch	0.0001	0.0002	0.00025	0.0003	0.0004	0.0005	0.00075	0.001	0.0015	0.002	0.0025	0.003	0.0035	0.004
mm	0.0025	0.005	0.0063	0.0075	0.010	0.013	0.019	0.026	0.039	0.052	0.064	0.076	0.089	0.102

inch	0.005	0.006	0.008	0.010	0.0125	0.015	0.020	0.025	0.030	0.035	0.040	0.045	0.050
mm	0.127	0.152	0.203	0.254	0.317	0.381	0.508	0.635	0.762	0.889	1.016	1.143	1.270

Bild 1: Error curve for internal and external gauges, caliper arm closes

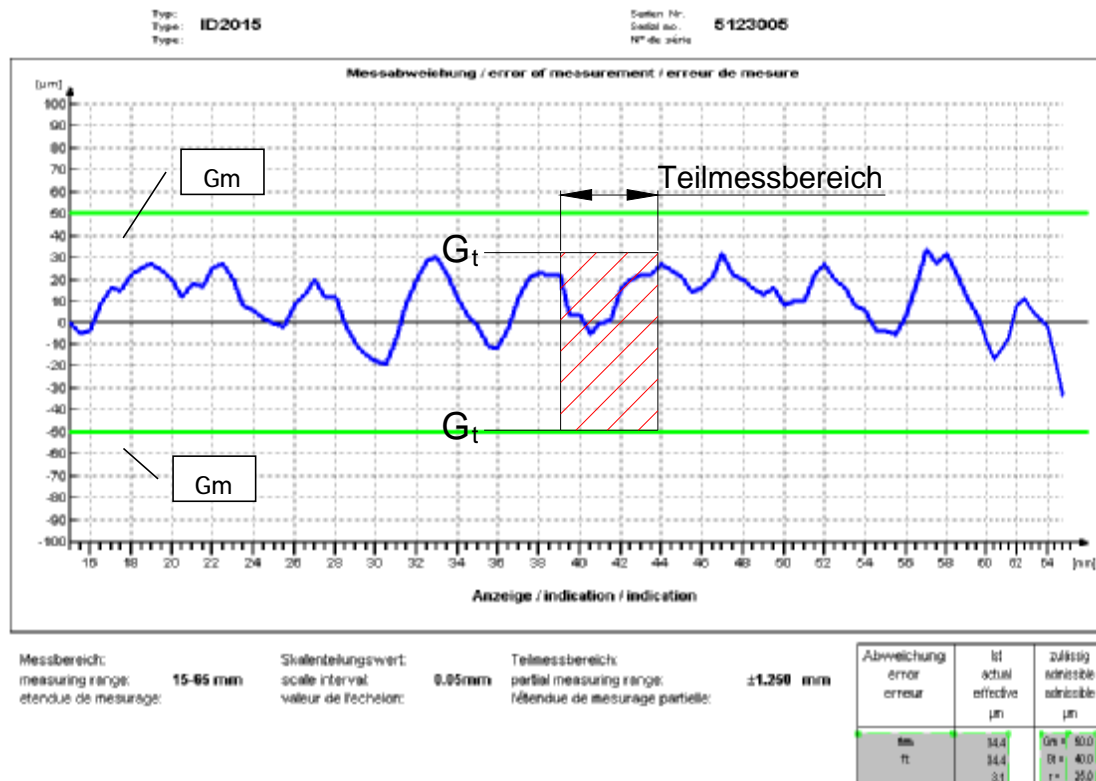
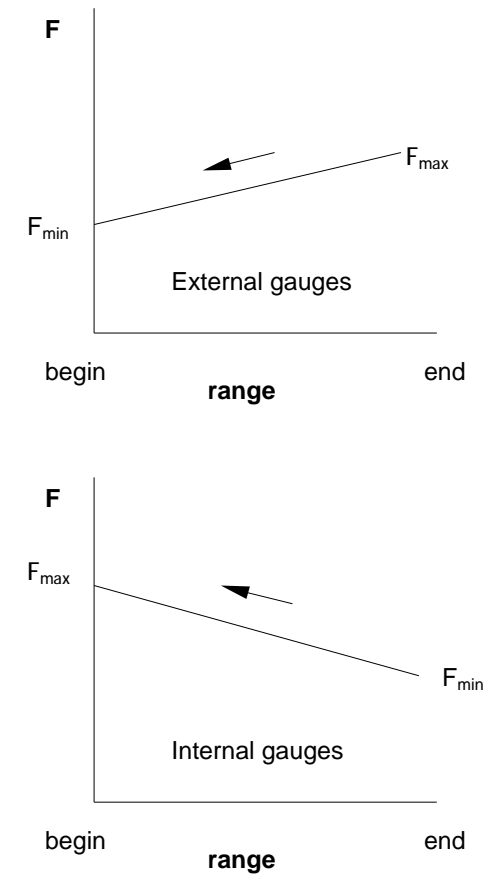


Bild 2: Curve for the measuring force F when the caliper arm closes



The partial measuring range corresponds to ± 0.5 turns of the pointer. During evaluation it is moved as a „window“ over the measuring range.

Definations:

- G_M maximum admissible deviation in the measuring range
- G_t maximum admissible deviation in the partial measuring range

QM-instruction elaborate		Controle QM		State of modification: 08	
Name: J.Ciszewski	Date: 18.06.2003	Name: J.Ciszewski	Date: 18.06.2003	Name: J.Ciszewski	Date: 18.06.2003

