

MAG-FLUX® A

Magnetic-inductive sensor for flow measurement



ADVANTAGES

- » Minimal maintenance requirements
- » Flexible installation position provided the measuring tube is completely filled
- » Fully welded steel reinforcement
- » Reliability (long-term stability, service life)
- » Compact or separate construction possible

Our magnetically inductive sensor (MID) mag-flux® A is a precision instrument for the linear flow measurement of almost all electrically conductive liquids, as well as sludges, pulps and pastes.

Due to the nature of the magnetic field, these devices can be used for flow velocities up to 10 m/s (32.8 ft/s) and a minimum conductivity of 20 µS/cm.

The flowmeter consists of a sensor and a corresponding transmitter. These are available in both separate and compact designs. The fully welded steel fitting is robust and reliable and is available for various nominal sizes from ½"/DN 15 ... 32"/DN 800 (larger nominal sizes on request).

In combination with various measuring tube linings and process connections, you can customise the mag-flux® A specifically for your application.



TECHNICAL DATA

System

Measuring principle	Magnetic inductive flowmeter, pulsed constant field (DC)
Measuring accuracy	± 0.5 % from the measured value of 1 m/s ... 10 m/s ± 0.4 % from the measured value 1 mm/s of < 1 m/s
Repeatability	± 0.15 % from the measured value of 0.5 m/s ... 10 m/s

Input

Nominal diameter	DN 15 - DN 800 ANSI ½" - 32"
Process connections	EN 1092-1 ANSI B 16.5 Special connections

Operational conditions

Medium	Liquids
Minimum conductivity	> 20 µS/cm
Max. medium temperature	With rubber lining: 90 °C (194 °F) optional: 100 °C (212 °F) With PTFE lining: 130 °C (266 °F) at 25 bar (363 psi) 100 °C (212 °F) at 40 bar (580 psi)
Flow velocity limits	0.25 m/s ... 10 m/s
Pressure limits	With rubber lining: Max. 250 bar (3 626 psi) With PTFE lining: Depending on ambient temperature
Straight pipe lengths	Inlet path ≥ 5 x DN Outflow zone ≥ 2 x DN properly centred and grounded

Constructive design

Version	Fully welded steel reinforcement
Protection class	IP67 (compact version) IP68 (optional only for separate version)
Corrosion protection class	C2 (slightly polluted atmosphere, dry climate)
Wiring	2 x M16 x 1.5 (compact: 20 x 1.5) 2 x ½" NPT

Materials

Measuring tube	Stainless steel
Solenoid chamber	Steel, optional: Stainless steel
Lining of measuring tube	Hard / soft rubber, PTFE
Electrodes	Stainless steel, Hastelloy, Titanium, Tantalum, Platinum

The maximum allowable pressure decreases for pressure ratings PN 10 and PN 16 above DN 300 at media temperatures of:

Medium temperature	PN 10	PN 16
< 100 °C (< 212 °F)	10.0 bar (145 psi)	16.0 bar (232 psi)
100 °C (212 °F)	9.3 bar (135 psi)	14.9 bar (216 psi)
130 °C (266 °F)	9.0 bar (131 psi)	14.3 bar (207 psi)

NOMINAL DIAMETER SELECTION

The flow rate depends on the flow velocity and the nominal diameter (DN) of the flowmeter.

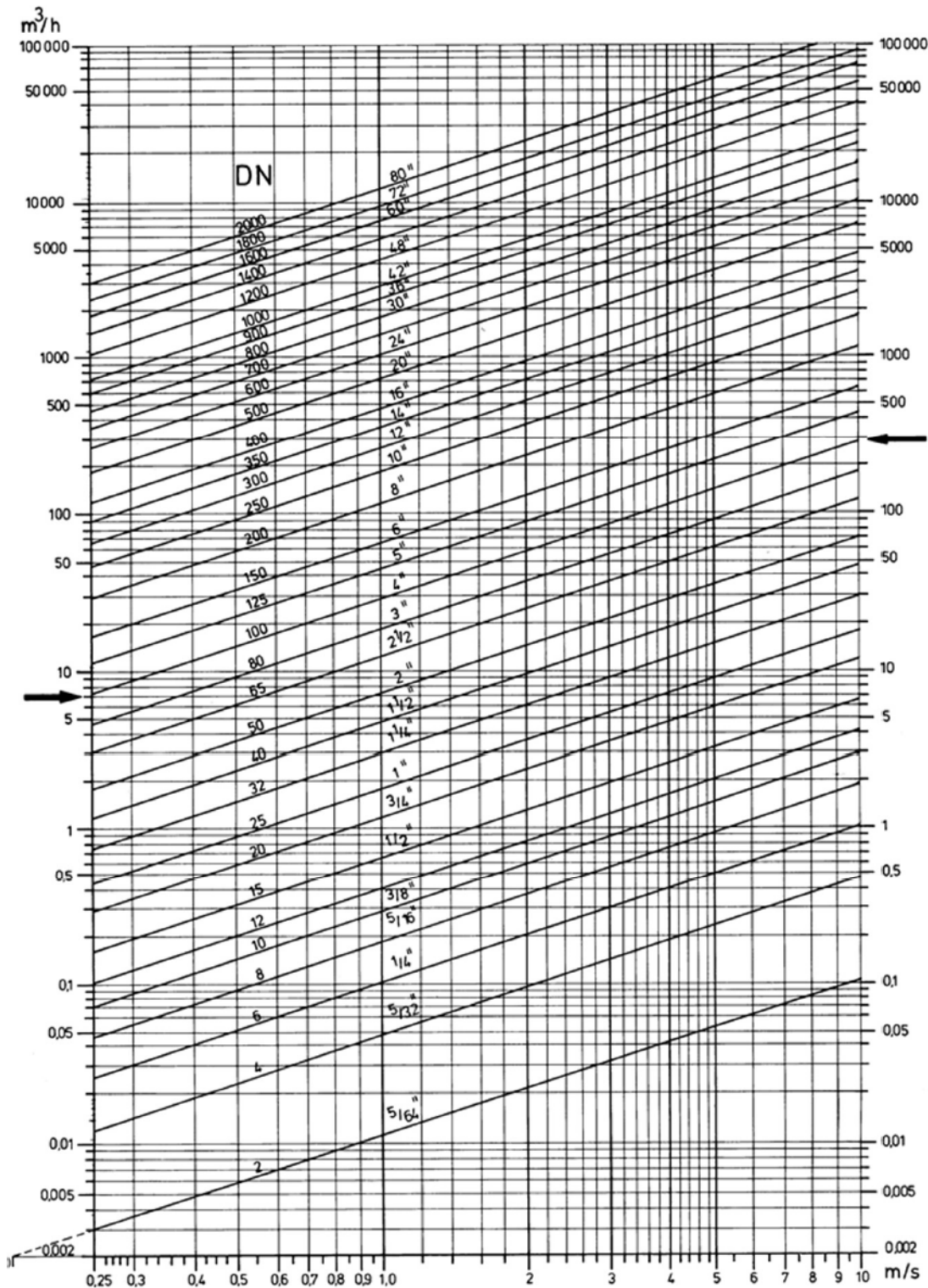


Fig. 1: Nomogram for determining the measurement range end values or selecting the sensor nominal size (DN) – measurement range generally starting at 0 – mag-flux® A standardly available from ½"/DN 15 ... 32"/DN 800



NOMINAL DIAMETER SELECTION

Nominal diameter	Measuring range max. (m³/h) factory setting	Measuring range max. (m³/h) optional
½"/DN 15	3	6.36
1"/DN 25	10	17.67
1¼"/DN 32	10	28.95
1½"/DN 40	10	45.24
2"/DN 50	20	70.69
2½"/DN 65	50	119.5
3"/DN 80	50	181.0
4"/DN 100	70	282.7
5"/DN 125	100	447.8
6"/DN 150	150	636.2
8"/DN 200	250	1 131
10"/DN 250	400	1 767
12"/DN 300	500	2 545
14"/DN 350	700	3 464
16"/DN 400	1 200	4 524
18"/DN 450	1 200	5 726
20"/DN 500	1 200	7 068
24"/DN 600	1 200	8 553
28"/DN 700	3 600	10 179
32"/DN 800	3 600	18 096

SENSORS

With PTFE lining

The mag-flux® A sensor with PTFE lining is protected using a protective disc. In order to avoid formation of a vacuum, the sensor should be installed at the lowest point of the pipeline. Do not remove or damage the bead of the lining along the flanges.

With soft rubber lining

Sensors with soft rubber lining are only available from nominal diameter DN 25 (1").

DIMENSIONS AND WEIGHTS

Flange connection - mm / kg

Nominal diameter		Build-in-length L (mm)				Sensor housing (mm)			
DN	ANSI	Hard and soft rubber	PTFE without protection washers	PTFE with protection washers	Tolerance (mm)	B	D	H	Weight (kg) EN flange*
DN 15 PN 40	½" 150 RF	200	200	206	0 / -3	80,0	130	53	5.00
DN 25 PN 40	1" 150 RF	200	200	206	0 / -3	80,0	130	53	6.00
DN 32 PN 40	1 ¼" 150 RF	200	200	206	0 / -3	80,0	130	53	7.00
DN 40 PN 40	1 ½" 150 RF	200	200	206	0 / -3	80,0	130	53	7.50
DN 50 PN 40	2" 150 RF	200	200	206	0 / -3	80,0	140	57	9.00
DN 65 PN 16	2 ½" 150 RF	200	200	206	0 / -3	80,0	155	63	10.0
DN 80 PN 16	3" 150 RF	200	200	206	0 / -3	80,0	170	70,00	13.0
DN 100 PN 16	4" 150 RF	250	250	256	0 / -3	120	210	86,00	15.0
DN 125 PN 16	5" 150 RF	250	250	256	0 / -3	120	240	98,00	19.0
DN 150 PN 16	6" 150 RF	300	300	306	0 / -3	120	285	117	23.0
DN 200 PN 10	8" 150 RF	350	350	356	0 / -3	200	350	143	36.0
DN 250 PN 10	10" 150 RF	450	450	360	0 / -4	200	440	180	52.0
DN 300 PN 10	12" 150 RF	500	500	460	0 / -4	200	520	213	62.0
DN 350 PN 10	14" 150 RF	550	550	510	0 / -5	225	474	237	95.0
DN 400 PN 10	16" 150 RF	600	600	560	0 / -5	250	524	262	115
DN 450 PN 10	18" 150 RF	600	600	610	0 / -5	270	584	292	135
DN 500 PN 10	20" 150 RF	600	600	610	0 / -5	300	629	315	150
DN 600 PN 10	24" 150 RF	600	600	610	0 / -5	360	734	367	182
DN 700 PN 10	28" 150 RF	700	700		0 / -5				
DN 800 PN 10	32" 150 RF	800	800		0 / -5				

*In the separate version, the weight increases because of the electronics.

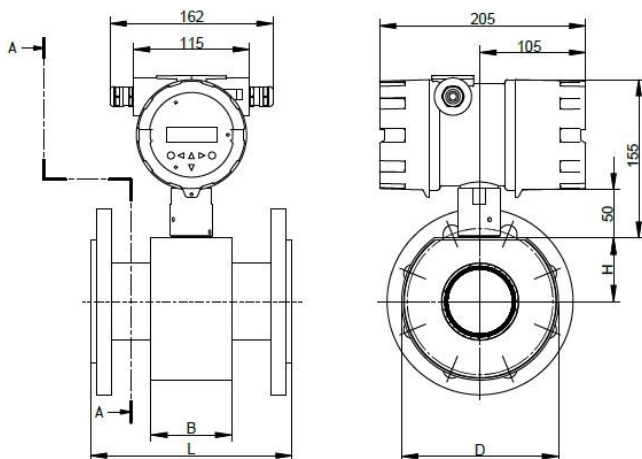


Fig. 2: Dimensions flange connection compact version

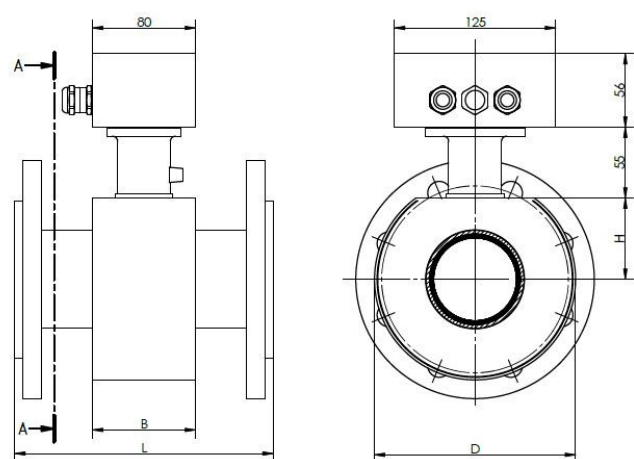


Fig. 3: Dimensions flange connection separate version



Flange connection - in / lbs

Nominal diameter		Build-in-length L (in)				Sensor housing (in)			
DN	ANSI	Hard and soft rubber	PTFE without protection washers	PTFE with protection washers	Tolerance (in)	B	D	H	Weight (lbs) EN flange*
DN 15 PN 40	½" 150 RF	7.87	7.87	8.11	0 / -3	3.15	5.12	2.09	11.0
DN 25 PN 40	1" 150 RF	7.87	7.87	8.11	0 / -3	3.15	5.12	2.09	13.2
DN 32 PN 40	1¼" 150 RF	7.87	7.87	8.11	0 / -3	3.15	5.12	2.09	15.4
DN 40 PN 40	1½" 150 RF	7.87	7.87	8.11	0 / -3	3.15	5.12	2.09	16.5
DN 50 PN 40	2" 150 RF	7.87	7.87	8.11	0 / -3	3.15	5.51	2.24	19.8
DN 65 PN 16	2½" 150 RF	7.87	7.87	8.11	0 / -3	3.15	6.10	2.48	22.1
DN 80 PN 16	3" 150 RF	7.87	7.87	8.11	0 / -3	3.15	6.69	2.76	28.7
DN 100 PN 16	4" 150 RF	9.84	9.84	10.08	0 / -3	4.72	8.27	3.39	33.1
DN 125 PN 16	5" 150 RF	9.84	9.84	10.08	0 / -3	4.72	9.45	3.86	41.9
DN 150 PN 16	6" 150 RF	11.81	11.81	12.05	0 / -3	4.72	11.22	4.61	50.7
DN 200 PN 10	8" 150 RF	13.78	13.78	14.02	0 / -3	7.87	13.38	5.63	79.4
DN 250 PN 10	10" 150 RF	17.72	17.72	14.17	0 / -4	7.87	17.32	7.09	114
DN 300 PN 10	12" 150 RF	19.69	19.69	18.11	0 / -4	7.87	20.47	8.39	136
DN 350 PN 10	14" 150 RF	21.65	21.65	20.08	0 / -5	8.86	18.66	9.33	209
DN 400 PN 10	16" 150 RF	23.62	23.62	22.05	0 / -5	9.84	20.63	10.31	253
DN 450 PN 10	18" 150 RF	23.62	23.62	24.02	0 / -5	10.63	22.99	11.50	297
DN 500 PN 10	20" 150 RF	23.62	23.62	24.02	0 / -5	11.81	24.76	12.40	330
DN 600 PN 10	24" 150 RF	23.62	23.62	24.02	0 / -5	14.17	28.90	14.45	401
DN 700 PN 10	28" 150 RF	27.06	27.06		0 / -5				
DN 800 PN 10	32" 150 RF	31.50	31.50		0 / -5				

*In the separate version, the weight increases because of the electronics.

Measuring transducer mag-flux® M1

Weight (kg / lbs)

3.9 / 8.6

You can find the data in the transducer's data sheet.

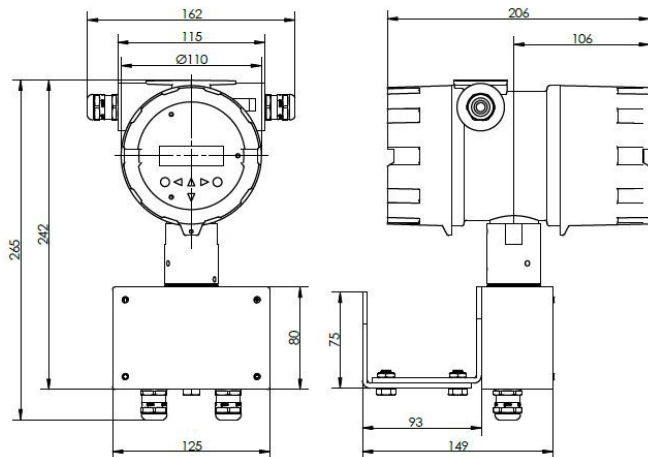


Fig. 4: Dimensions measuring transducer mag-flux® M1 with mounting brackets

MEASURING ACCURACY

The strictly linear relationship between the flow velocity v or flow rate Q and the signal or measurement voltage allows a linear signal processing and thus also for simple and wide adjustment of the measurement ranges as well as precise measurements even with pulsating flows. Neither the viscosity and density of the medium, nor a transition from turbulent to laminar flow (or vice versa) have any significant influence on the accuracy of

the measurement result. A magnetic-inductive flowmeter can measure with the same accuracy in both directions of flow, provided that there are sufficiently long undisturbed and straight inlet lengths on both sides to ensure symmetrical flow conditions in the measuring pipe.

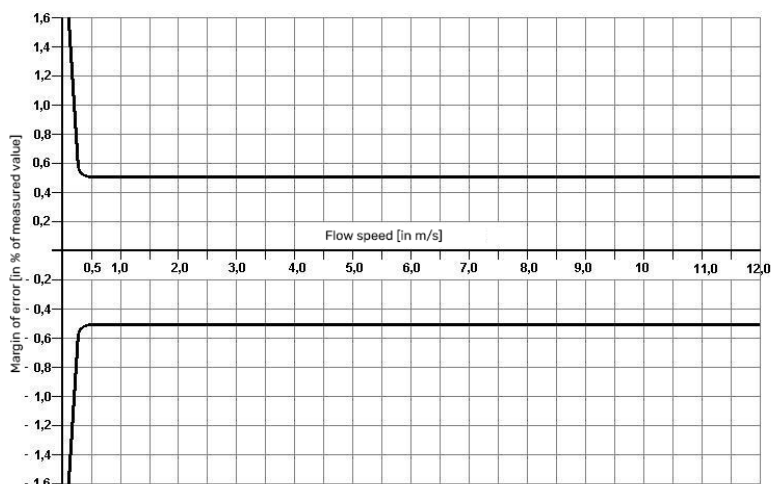


Fig. 5: Typical error limits of a MID under reference conditions



CLASSIFICATION PER PRESSURE EQUIPMENT DIRECTIVE

The devices are designed, based on the directive for fluids of the hazard group Gas 1. The classification varies and depends on the design. Please see table below.

For flange material 1.0460 und 1.0570 a minimum temperature of -10 °C (14 °F) applies.

For flange material 1.4404/306L / 1.4571/316Ti the lowest temperature range is -20 °C (- 4°F).

PFTE lined components PN 25 and PN 40

Nominal diameter	Nominal pressure	Permissible media	Category
½"/DN 15 ... 1"/DN 25	PN 10 ... 20 (145 ... 580 psi)	Gases Fluid group 1 and Liquids Fluid group 1	Article 4.3
1 ¼"/DN 32 ... 4"/DN 100	PN 10 (145 psi)	Gases Fluid group 1 and Liquids Fluid group 1	I
1 ¼"/DN 32 ... 2"/DN 50	PN 16 (232 psi)	Gases Fluid group 1 and Liquids Fluid group 1	I
1 ¼"/DN 32 ... 1 ½"/DN 40	PN 25 (363 psi)	Gases Fluid group 1 and Liquids Fluid group 1	I
4"/DN 100 ... 12"/DN 350	PN 10 (145 psi)	Gases Fluid group 1 and Liquids Fluid group 1	II
2 ½"/DN 65 ... 8"/DN 200	PN 16 (232 psi)	Gases Fluid group 1 and Liquids Fluid group 1	II
2"/DN 50 ... 5"/DN 125	PN 25 (363 psi)	Gases Fluid group 1 and Liquids Fluid group 1	II
1 ¼"/DN 32 ... 3"/DN 80	PN 40 (580 psi)	Gases Fluid group 1 and Liquids Fluid group 1	II
14"/DN 350 ... 32"/DN 800	PN 10 (145 psi)	Gases Fluid group 1 and Liquids Fluid group 1	III
10"/DN 250 ... 24"/DN 600	PN 16 (232 psi)	Gases Fluid group 1 and Liquids Fluid group 1	III
6"/DN 150 ... 24"/DN 600	PN 25 (363 psi)	Gases Fluid group 1 and Liquids Fluid group 1	III
4"/DN 100 ... 24"/DN 600	PN 40 (580 psi)	Gases Fluid group 1 and Liquids Fluid group 1	III



TIGHTENING MOMENTS

PFTE lined components PN 25 and PN 40

DN	PN 25 (Nm)	PN 40 (Nm)
25	25	25
32	35	35
40	45	45
50	55	55
65	50	50
80	50	50
100	70	70
125	100	100
150	135	135
200	140	170
250	210	260
300	220	280
350	330	410
400	440	600
500	470	560
600	650	890
700	700	920
800	1 000	1 370



PRODUCT AND ACCESSORIES

Description code

The description code is made up as follows:

MAG57 -2 0-0 0

① ② ③ ④ ⑤ ⑥ ⑦

① Lining

0	PTFE
1	Hard rubber
2	Hard rubber up to 100 °C (212 °F)
3	Hard rubber for potable water
5	Soft rubber

② Nominal pressure

1	PN 10
2	PN 16 / class 150
3	PN 25 / class 300
4	PN 40
9	Special nominal pressure

③ Nominal diameter

A	½"/DN 15
C	1"/DN 25
D	1¼"/DN 32
E	1½"/DN 40
F	2"/DN 50
G	2 ½"/DN 65
H	3"/DN 80
J	4"/DN 100
K	5"/DN 125
L	6"/DN 150
M	8"/DN 200
N	10"/DN 250
P	12"/DN 300
Q	14"/DN 350
R	16"/DN 400
Y	18"/DN 450



③ Nominal diameter

S	20"/DN 500
T	24"/DN 600
U	28"/DN 700*
V	32"/DN 800*
Z	Other nominal diameters

④ Connection and connection material

A	EN 1092-1, Mat. No. 1.0460 / 1.0570
B	EN 1092-1, Mat. No. 1.4404 / 1.4571
C	ANSI B16.5 150 RF, Mat. No. 1.0432 / 1.0570
D	ANSI B16.5 300 RF, Mat. No. 1.0432 / 1.0570
Z	Other connection / other material

⑤ Electrode material

1	Stainless steel (W. Nr. 1.4571)
2	Hastelloy
3	Titanium
4	Tantalum
6	Platinum

⑥ Cable gland entries

C	M16 x 1.5 separate
V	NPT ½"

⑦ Protection class

B	IP 67 / NEMA 5
C	IP 68 / NEMA 6 with 5 m (16.4 ft) permanently attached cable
D	IP 68 / NEMA 6 with 10 m (32.8 ft) permanently attached cable

*Not for PTFE



Further designs / options

A02	Two grounding electrodes made of stainless steel
A04	Two grounding electrodes made of Hastelloy
A06	Two grounding electrodes made of Titanium
A08	Two grounding electrodes made of Tantalum
A12	Two grounding electrodes made of Platinum
B06	With 3-point calibration certificate
B07	With 6-point calibration certificate
C12	Acceptance test EN 10204 3.1
Y01	Measuring range
Y04	Silicone-free materials
Y17	TAG plate made of stainless steel