



Oil level indicator MESSKO® MTO

Technical data

5784996/05 EN



© All rights reserved by Maschinenfabrik Reinhausen

Dissemination and reproduction of this document and use and disclosure of its content are strictly prohibited unless expressly permitted.

Infringements will result in liability for compensation. All rights reserved in the event of the granting of patents, utility models or designs.

The product may have been altered since this document was published.

We reserve the right to change the technical data, design and scope of supply.

Generally the information provided and agreements made when processing the individual quotations and orders are binding.

The product is delivered in accordance with MR's technical specifications, which are based on information provided by the customer. The customer has a duty of care to ensure the compatibility of the specified product with the customer's planned scope of application.

The original operating instructions were written in German.



Table of contents

1	Design/versions	4
1.1	Design.....	4
1.2	Versions.....	6
1.2.1	Radial float movement.....	9
1.2.2	Axial float movement.....	10
2	Technical data	11
2.1	Ambient conditions.....	11
2.2	Dimensions and weight.....	12
2.3	Electrical connection.....	12
2.3.1	Micro-switches.....	12
2.3.2	4...20 mA outputs.....	14
2.3.3	RS485 interface (types TTM and TTMR).....	14
2.3.4	Relay box relays (type TTMR).....	15
2.3.5	Modbus RTU.....	16
2.3.6	Connection options.....	19
2.4	Float gauge.....	23
2.4.1	Installation positions for axial MTO.....	23
2.4.2	Further types of float gauges.....	27
3	Appendix	28
3.1	9144260_000.....	29
3.2	9146521_000.....	30
3.3	9146747_000.....	31
3.4	9147750_000.....	32
3.5	9147922_000.....	33
3.6	9150605_000.....	34
3.7	9150921_000.....	35
3.8	9151305_000.....	36
3.9	7036358_000.....	37
3.10	7036293_000.....	38
3.11	6771687_000.....	39
3.12	6771692_000.....	40
3.13	6771696_000.....	41

1 Design/versions

This technical document contains detailed information about the technical properties of the product. To place an order, please use the "Bestellangabenblatt (Inquiry and order specifications)" form, which you will find on our website <http://www.reinhausen.com> below the respective product. Further information is available in the MR Reinhausen customer portal: <https://portal.reinhausen.com>.

1.1 Design

Depending on the order, the oil level indicator has either one or two cable glands, one NPT cable gland, one ANSI socket or one MIL socket.

Standard version with cable gland

As an option, the M25x1.5 cable gland is also available in other versions, such as WADI (water-tight) or offshore.

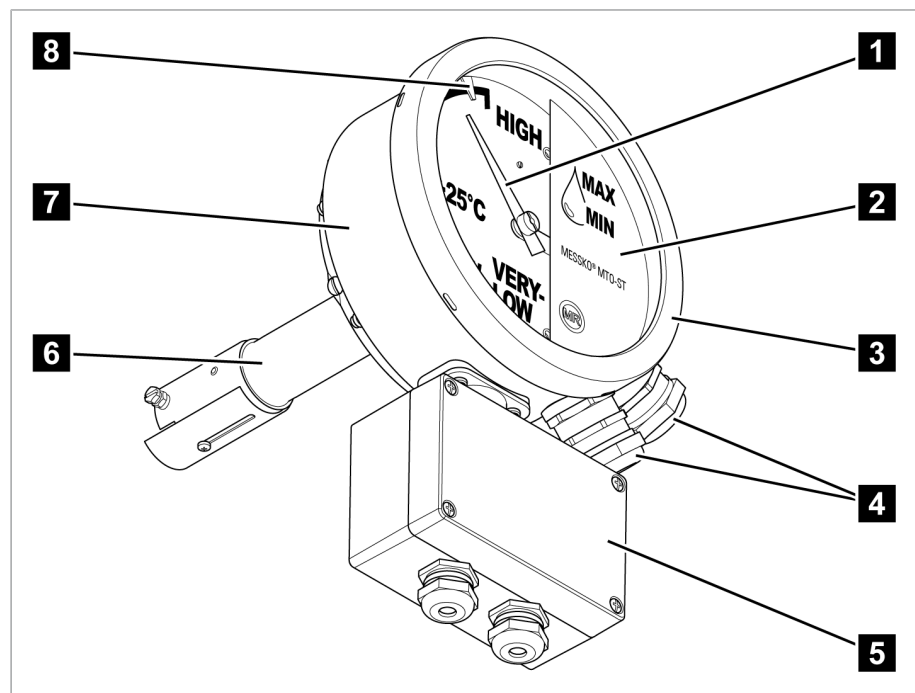


Figure 1: Version with two cable glands and a relay box

1 Pointer	2 Cover plate
3 Bayonet seal ring including viewing glass and rubber gasket	4 Cable glands (optionally with plug)
5 Relay box (optional)	6 Transmitter part
7 Display part	8 Micro-switch (optional)

Version with 1/2" NPT cable gland

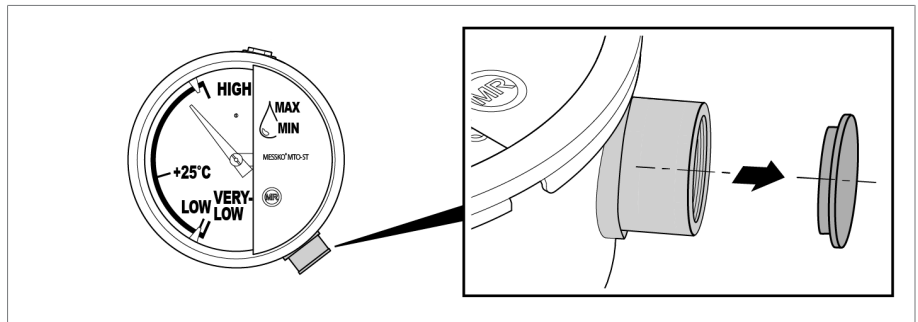


Figure 2: NPT cable gland, with locking cap as a transport lock

Version with sockets

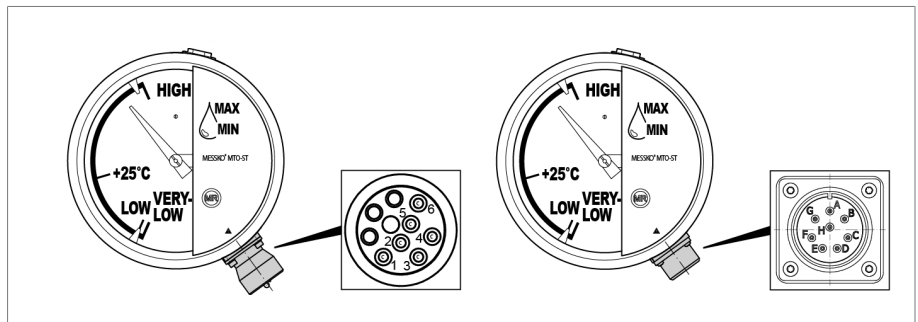


Figure 3: ANSI socket (left); MIL socket (right)

Ventilation

The oil level indicator has a pressure equalization element for preventing the build-up of condensation in the device interior.

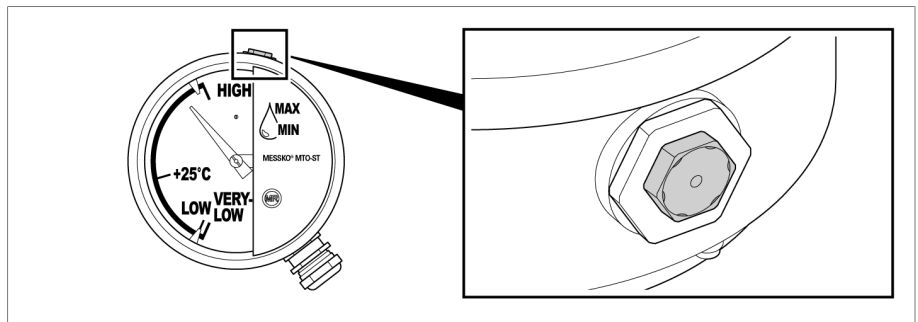


Figure 4: Pressure equalization element



1.2 Versions

The oil level indicator can be equipped as follows:

- Without micro-switch
- With permanently set micro-switches
 - A maximum of 3 micro-switches are permanently mounted
 - Permanently set micro-switches are secured at the factory and cannot be subsequently adjusted.
- With adjustable micro-switches
 - A maximum of 3 micro-switches which can be adjusted across the entire indicator scale.
 - The micro-switches are recognizable via the colored switching triangles (red or blue) on the edge of the dial.
- Depending on the design of the oil conservator, the oil level indicator is available with either radial or axial float movement.
- To improve readability, the oil level indicator is available for vertical or inclined mounting (with 15°, 30° or 45° angle of inclination).

Design	Mounting position	Micro-switches	Float movement
MTO-ST160 MTO-ST160RM MTO-ST160TT ¹⁾ MTO-ST160RMTT ¹⁾ MTO-ST160TTM ²⁾³⁾ MTO-ST160TTMR ²⁾³⁾⁴⁾ MTO-ST160RMTTM ²⁾³⁾ MTO-ST160RMTTMR ²⁾³⁾⁴⁾	Vertical	Maximum 3, adjustable	Radial
MTO-STF160 MTO-STF160TT ¹⁾ MTO-STF160TTM ²⁾³⁾ MTO-STF160TTMR ²⁾³⁾⁴⁾	Vertical	Maximum 3, permanently set	Radial
MTO-ST160V MTO-ST160VTT ¹⁾ MTO-ST160VTTM ²⁾³⁾ MTO-ST160VTTMR ²⁾³⁾⁴⁾	Inclined	Maximum 3, adjustable	Radial
MTO-STF160V MTO-STF160VTT ¹⁾ MTO-STF160VTTM ²⁾³⁾ MTO-STF160VTTMR ²⁾³⁾⁴⁾	Inclined	Maximum 3, permanently set	Radial

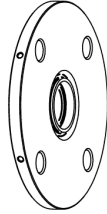


Design	Mounting position	Micro-switches	Float movement
MTO-ST160G MTO-ST160GTT ¹⁾ MTO-ST160GTTM ²⁾³⁾ MTO-ST160GTTMR ²⁾³⁾⁴⁾ MTO-ST160GRM MTO-ST160GRMTT ¹⁾ MTO-ST160GRMTTM ²⁾³⁾ MTO-ST160-GRMTTMR ²⁾³⁾⁴⁾	Vertical or inclined	Maximum 3, adjustable	Axial
MTO-STF160G MTO-STF160GTT ¹⁾ MTO-STF160GTTM ²⁾³⁾ MTO-STF160GTTMR ²⁾³⁾⁴⁾	Vertical or inclined	Maximum 3, permanently set	Axial
¹⁾ Passive analog output	This oil level indicator is equipped with a passive analog output.		
²⁾ Active analog output	This oil level indicator is equipped with an active analog output.		
³⁾ Modbus	This oil level indicator is equipped with a digital Modbus RTU (RS485) interface.		
⁴⁾ Relay box	This oil level indicator is equipped with four additional relays.		

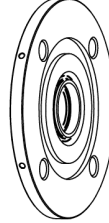


Design types

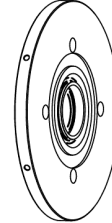
Mounting flange



Standard flange
 Ø 134 mm [Ø 5.28"],
 Bolt circle Ø 102 mm
 [Ø 4.02"]



RM* flange
 Ø 134 mm [Ø 5.28"],
 Bolt circle Ø 101.6 mm
 [Ø 4.000"]



NAT/DS flange
 Ø 134 mm [Ø 5.28"],
 Bolt circle Ø 79.38 mm
 [Ø 3.125"]

*) Version for the US market

For details, see the technical data, Appendix [► Section 3, Page 28]

Color of Housing	RAL 7033 cement gray RAL 7038 agate gray RAL 7032 gravel gray (only for sheet steel housing)
Optional	Offshore version

1.2.1 Radial float movement

The oil level indicators with float movement in the radial direction can be mounted on straight and angled flanges. Inclining the oil level indicator makes it easier to read off the indicated values.

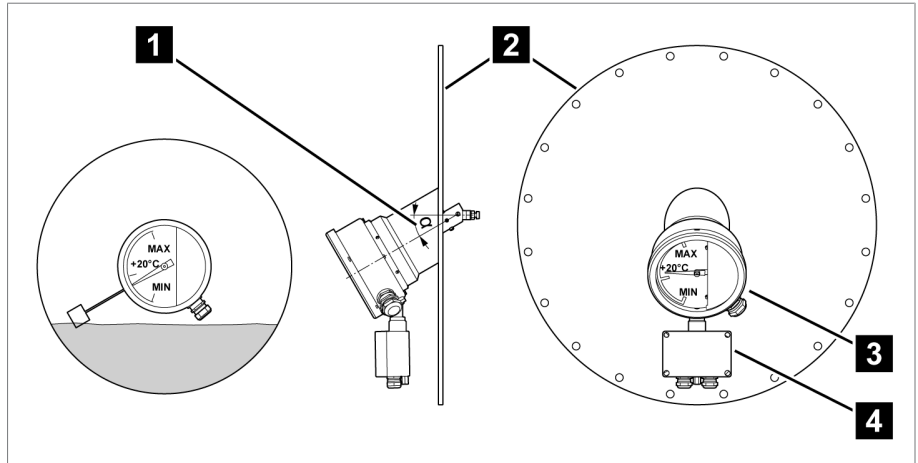


Figure 5: Installation with angle of inclination $\alpha = 0^\circ$ (left) and an example for angle of inclination $\alpha = 45^\circ$ (right)

1 Angle of inclination α (possible values: 0° , 15° , 30° , 45°)	2 Oil conservator cover
3 Inclined oil level indicator	4 Relay box (optional)

1.2.2 Axial float movement

The oil level indicators with float movement in the axial direction are intended for special conditions:

- In oil conservators with a breathing sack.
- In narrow or flat oil conservators in which only very little float movement is possible.

The float movement is transferred to the display part via gearing in the transmitter part in the ratio 1:1, 1:2, 1:3 or 1:4.

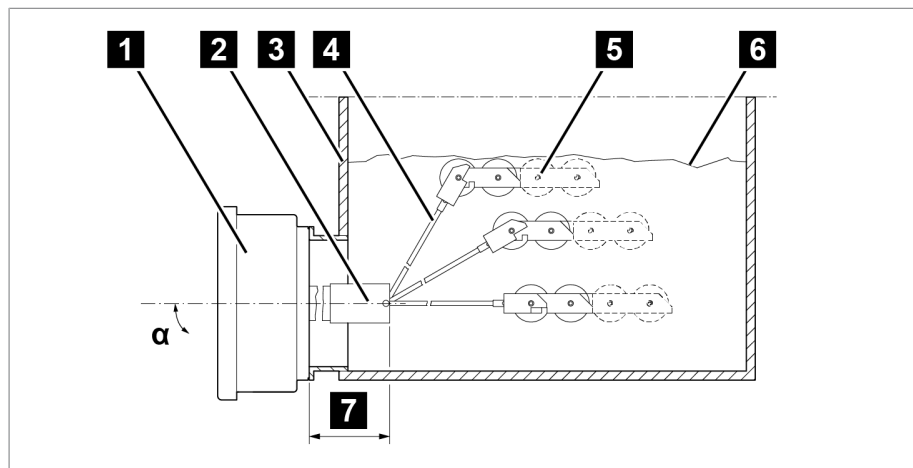


Figure 6: Axial float movement with breathing sack

1 Display part	2 Transmitter part
3 Oil conservator	4 Float rod
5 Float gauge (1, 2, or 4 rollers)	6 Breathing sack
7 Projection	α Inclination $0^\circ \dots 45^\circ$



2 Technical data

2.1 Ambient conditions

Permissible ambient conditions	
Location of use	Indoors and outdoors, tropic-proof
Operating temperature ¹⁾	-40...+80 °C
Storage temperature ¹⁾	-50...+80 °C
Ambient air temperature ¹⁾	-40...+80 °C*
Relative humidity	Fog-free up to 80%
Ventilation	Pressure equalization element in the indicator for the prevention of water condensation
Installation altitude ¹⁾	Up to 2,000 m above mean sea level
Degree of protection in accordance with IEC 60529	IP66 MTO with WADI cable gland, offshore cable gland or EMC double cable gland MTO without electrical connection IP55 MTO with standard cable gland or 1/2"-14 NPT adapter MTO with plug connection
Protection class	I
Overvoltage category	III
Contamination level	2 (in the closed housing)

¹⁾Extended ranges on request.

Insulating fluid

- Unused insulating oils derived from petroleum products¹⁾ in accordance with IEC 60296 and ASTM D3487 (equivalent standards on request)
- Unused insulating oils derived from other virgin hydrocarbons in accordance with IEC 60296, or blends of these oils with petroleum products¹⁾ in accordance with IEC 60296, ASTM D3487 or equivalent standards on request
- Alternative insulating fluids, such as natural and synthetic esters or silicone oils, on request

¹⁾ Gas-to-liquid oils (GTL oils) are understood in this context as petroleum products



2.2 Dimensions and weight

MESSKO® MTO	
Housing of the gauge part	Ø 173 mm [Ø 6.81"]; height 213 mm [8.39"]; depth 81 mm [3.19"] Height with MESSKO® TT30 (optional): 322 mm [12.68"]
Weight	3.7 kg With relay box (optional): 4.4 kg

Please refer to the Appendices [► Section 3, Page 28] for further specification and details on the MTO versions.

2.3 Electrical connection

2.3.1 Micro-switches

Micro-switches	Freely adjustable	Permanently set (version F)
Quantity	1...3	1...3 Only adjustable at the factory
Display area	Depending on device configuration; Standard; MAX...+20 °C...MIN	
Switch points (depending on order)	Depending on device configuration; Standard; 5° before MIN, 5° before MAX	
	Smallest distance between micro-switches: 10°	–
Switching function:	NO: Fill level rising or falling	
Change-over contact for fill level	NC: Fill level falling or rising	
Protection	Miniature circuit breaker 6 A, type C	Miniature circuit breaker 16 A, type C
Rated insulation voltage in accordance with IEC 60076-22-1	2,500 VAC/1 min; terminals to ground 1,000 VAC/1 min; between open terminals	
Lightning impulse withstand voltage in accordance with IEC 60076-22-1	4,000 V; terminals to ground 3,000 V; between open contacts	
Contact material	Standard: silver alloy Optional: gold-plated contacts	Standard: silver alloy
Contact type	Change-over contact	Change-over contact



Utilization category for freely adjustable micro-switch¹⁾

Utilization category in accordance with IEC 60947-5-1	Typical application	Rating/nominal operation	
		U _N	I _N
AC-12 (50/60 Hz)	Regulation of resistive load and semi-conductor load resistance with disconnection via optocoupler	230 V	5 A
AC-15 (50/60 Hz)	Regulation of electromagnetic load resistance with AC voltage	230 V	0.26 A
		120 V	0.5 A
		24 V	2 A
DC-12	Regulation of resistive load and semi-conductor load resistance with disconnection via optocoupler	220 V	0.2 A
		120 V	0.4 A
		30 V	5 A
DC-13	Regulation of electromagnets with DC voltage	220 V	0.11 A
		120 V	0.21 A
		24 V	1.04 A

¹⁾ Extended ranges on request.

Switching capacity for freely adjustable micro-switch¹⁾

Micro-switch version	U _N	Switching capacity in accordance IEC 60076-22-1
Standard switch	230 V AC	Making capacity: 250 VA, cos φ > 0.5
		Breaking capacity: 60 VA, cos φ > 0.5
	250 V AC	Making capacity: 250 VA, cos φ > 0.5
		Breaking capacity: 60 VA, cos φ > 0.5
	24...220 VDC	Making capacity: 130 W, L/R < 40 ms
		Breaking capacity: 25 W, L/R < 40 ms
Switch with gold-plated contacts ²⁾	230 V AC	Max. 6.9 VA, cos φ = 0.9
	24...220 VDC	Max. 6.6 W, L/R < 25 ms

¹⁾ Extended ranges on request.

²⁾ Switching higher loads destroys the gold plating.

Switching capacity for permanently set micro-switch¹⁾

Micro-switch version	U _N	Switching capacity
Permanently set	250 V AC	15 A, cos φ = 1
		With MIL plug: 13 A, cos φ = 1
	250 VDC	0.25 A with resistive load
	12 VDC	5 A with resistive load



¹⁾ Extended ranges on request.

2.3.2 4...20 mA outputs

4...20 mA output (type TT)	
Feed-in voltage of the passive current loop	18...30 VDC unregulated, max. 10% residual ripple, protected against polarity reversal
Output signal	4...20 mA; passive; 2-conductor wiring <3.6 mA: Device diagnoses error
Max. load resistance	750 Ω at $U_b = 24$ VDC
Repetition accuracy	$\leq \pm 0.1\%$ from the end value
4...20 mA output (types TTM and TTMR)	
Supply voltage	24 VDC unregulated, max. 10% residual ripple, protected against polarity reversal
Output signal	4...20 mA; active; 4-conductor wiring <3.6 mA: Device diagnoses error
Max. current consumption	40 mA without relay 80 mA with four active relays
Max. load resistance	750 Ω at $U_b = 24$ VDC
Repetition accuracy	$\leq \pm 0.1\%$ from the end value

2.3.3 RS485 interface (types TTM and TTMR)

RS485 interface	
Supply voltage	24 VDC unregulated, max. 10% residual ripple, protected against polarity reversal
Max. current consumption	40 mA without relay 80 mA with four active relays
Standard	EIA/TIA-485
Wiring	2-wire; half-duplex
Terminal designation	Polarity: A = D+; B = D-; COM = common ground Expected voltage between A and B in the idle state: >+200 mV



2.3.4 Relay box relays (type TTMR)

Relay box relays	
Relay type	4 change-over contacts
Protection	Miniature circuit breaker 6 A, type C
Max. voltage	250 V AC 220 V DC
Switching capacity	5 A at 230 VAC, resistive load 5 A at 30 VDC, resistive load 0.3 A at 220 VDC, resistive load

2.3.5 Modbus RTU

Factory settings

Modbus address	Baud rate	Parity
25	19200	EVEN

Input register

Function code "04" to read the information

Validity of the measured value stored in the INPUT register addresses 1...3: It can be seen via the DISC register with address 4 (Boolean) whether the measured value is invalid (0) or valid (1). We strongly recommend evaluating this register in parallel to the measured value query.

Device status:

The INPUT register with address 0 indicates the device status (0: the device self-diagnostic could not find any errors). We recommend querying the device status either parallel to the measured values or when needed (e.g. during troubleshooting, fault elimination). For details, see Fault elimination.



Register	Data type	Designation
0	UINT16	Device status
1, 2	FLOAT32	Oil level in % (floating decimal)
3	SINT16	Oil level in % (integer)
4-16	-	Reserved for future use
17	UINT16	Firmware version major
18	UINT16	Firmware version minor
19	UINT16	Firmware version patch

Configuration via holding register

Each address must be unique in the BUS system. For example, when using two identical devices (same default address!), configure them to different addresses before commissioning.



Function code "03" to read the information



Function code "06/16" to write the information

Register	Data type	Designation	Setting option
0	UINT16	Modbus address	1...247 25 ¹⁾
1	UINT16	Modbus baud rate	0: 4800 1: 9600 2: 19200 ¹⁾ 3: 38400 4: 57600 5: 19200
2	UINT16	Modbus parity	0: None 1: Even ¹⁾ 2: Odd
3	-	Reserved	-
4	-	4...20 mA interface	0: Deactivated 1: Activated ^{1), 2)}
5	SINT16	Switching point relay 1	-300...+500 ¹⁾ in percent [%] Scale_min = 0% Scale_max = 100% 500: Relay function deactivated
6	UINT16	Hysteresis relay 1	1 to 100, 2 ¹⁾
7	UINT16	Switching direction relay 1	0: Rising ¹⁾ 1: Dropping
8.9, 10	See 5, 6, 7	Relay 2	See 5, 6, 7
11, 12, 13	See 5, 6, 7	Relay 3	See 5, 6, 7
14, 15, 16	See 5, 6, 7	Relay 4	See 5, 6, 7
17-72	-	Reserved	-
73-79 ³⁾	STRING	Serial number	7-digit, 1 number per register in ASCII-format

¹⁾Delivery condition/default settings

²⁾ We recommend deactivating the 4...20 mA analog output when it is not needed. This will prevent the pseudo-error "4...20 mA output defective". This will also reduce the power loss in the device and extend its service life.

³⁾Cannot be overwritten by the customer

Float parameters are saved in big-endian word order.



Relay information and relay functions via DISC register 0...3

Function code "02" to read the information

Register	Data type	Designation
0	BOOL	Status relay 1
1	BOOL	Status relay 2
2	BOOL	Status relay 3
3	BOOL	Status relay 4

Validity of the measured value via DISC register

Function code "02" to read the information from DISC register address 4.

Register	Data type	Designation
4	BOOL	Validity of the measured value (input register 1...3): 0: Invalid 1: Valid

2.3.6 Connection options

Standard cable gland

M25x1.5 nickel-plated brass

Clamping range 9...20 mm

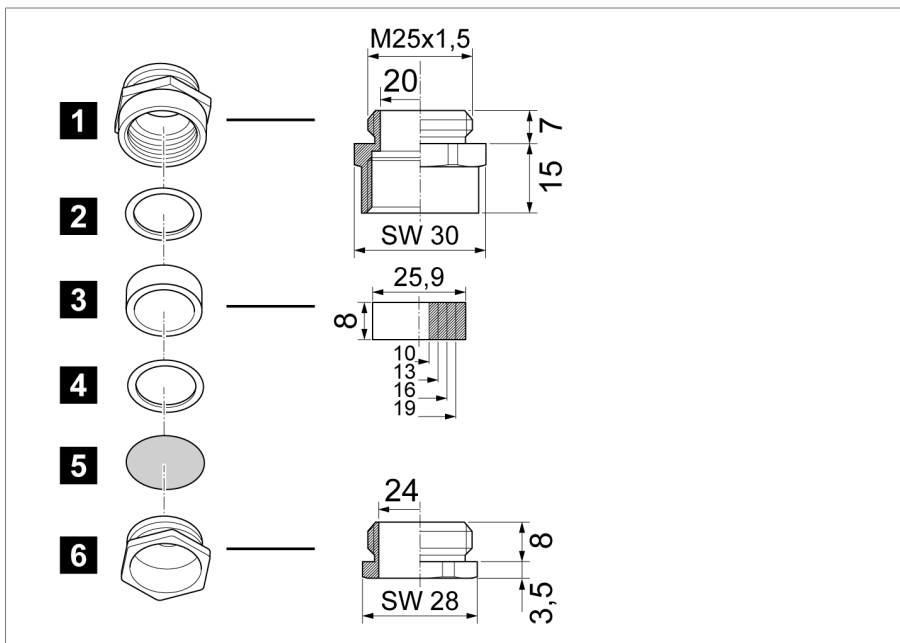


Figure 7: Standard cable gland

1 Gland base	2 Pressure ring
3 Universal sealing ring, NBR	4 Pressure ring
5 Dust protection disk	6 Pressure screw

WADI cable screw connection (water-tight; optional)

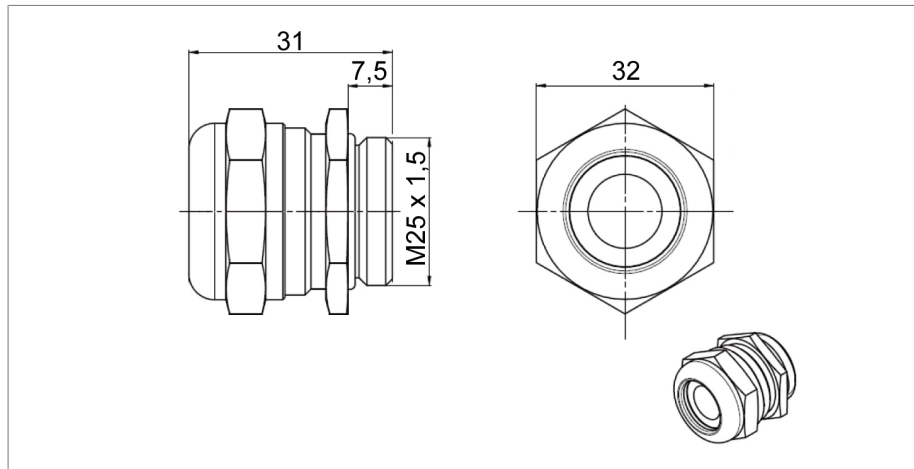


Figure 8: WADI cable screw connection; material: nickel-plated brass; clamping range 13...20 mm

Offshore cable screw connection (optional)

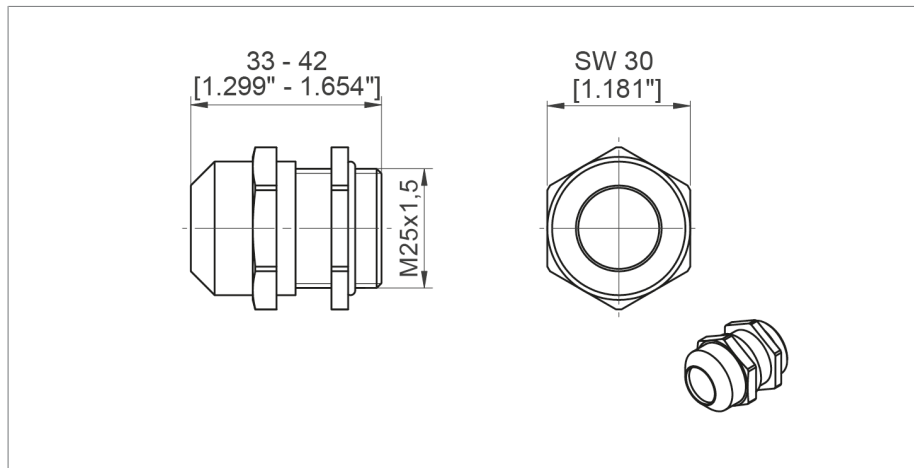


Figure 9: Offshore cable screw connection; material: stainless steel (V4A); clamping range 9...17 mm



EMC double cable gland (optional)

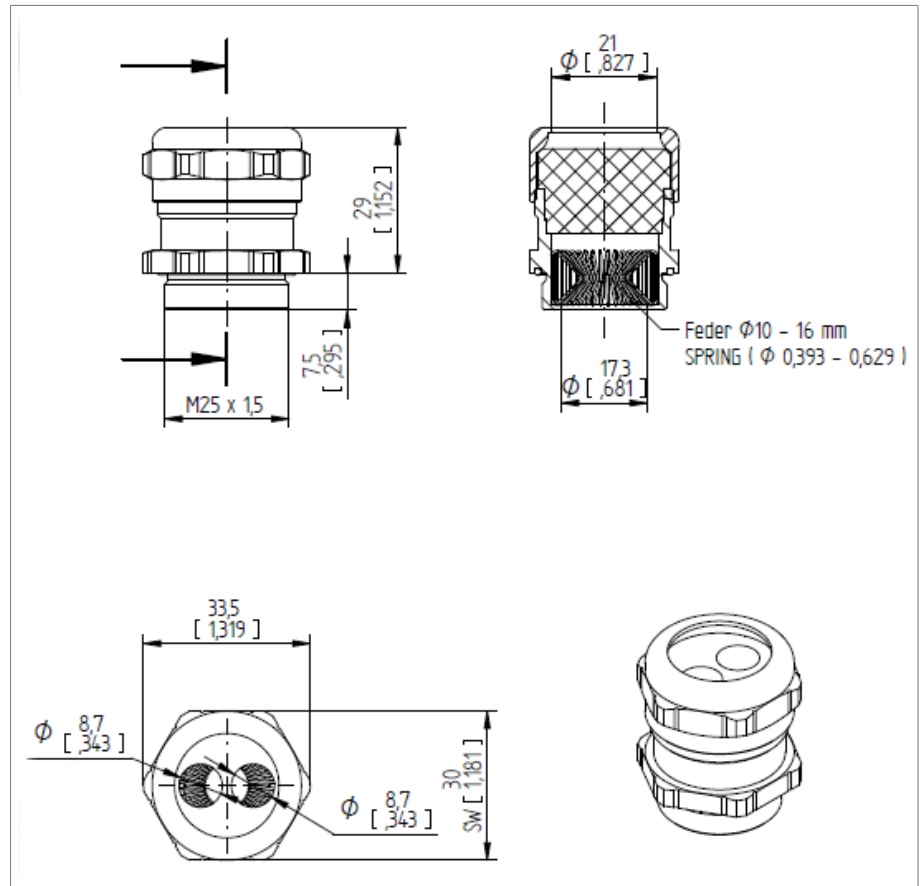


Figure 10: EMC double cable gland

1/2" NPT screw connection (optional)

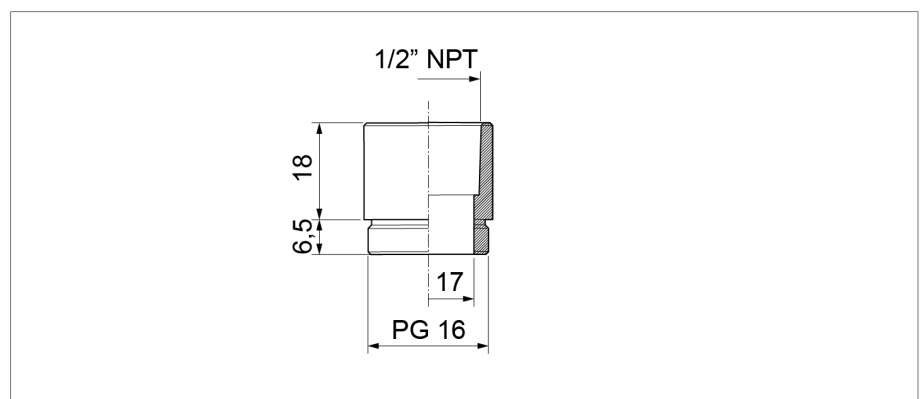


Figure 11: Connecting joint for NPT screw connection; material: nickel-plated brass

ANSI plug (optional)

Connecting cable with ANSI socket not included in the scope of delivery; can be ordered separately

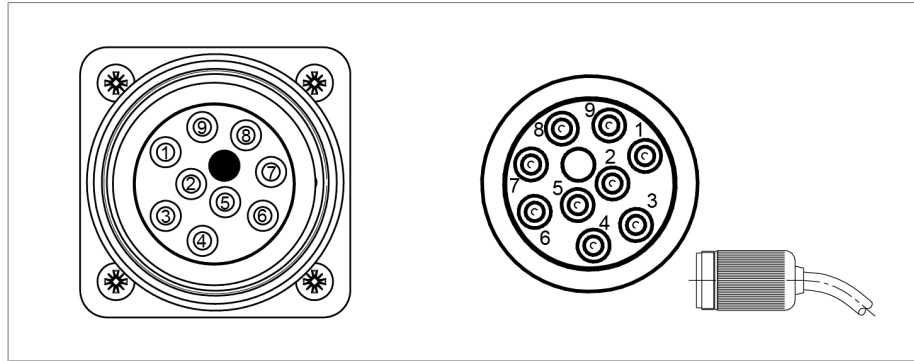


Figure 12: ANSI plug on the device (left); Connecting cable with ANSI socket (right)

PIN	Color	Terminal	PIN	Color	Terminal
1	Black	12	4	Orange	22
2	Red	11	5	Yellow	21
3	Blue	14	6	Brown	24
Additionally for 3 micro-switches (longer terminal strip); these colors may differ depending on the configuration:			7	Red-black	32
			8	Blue-black	31
			9	Orange-black	34

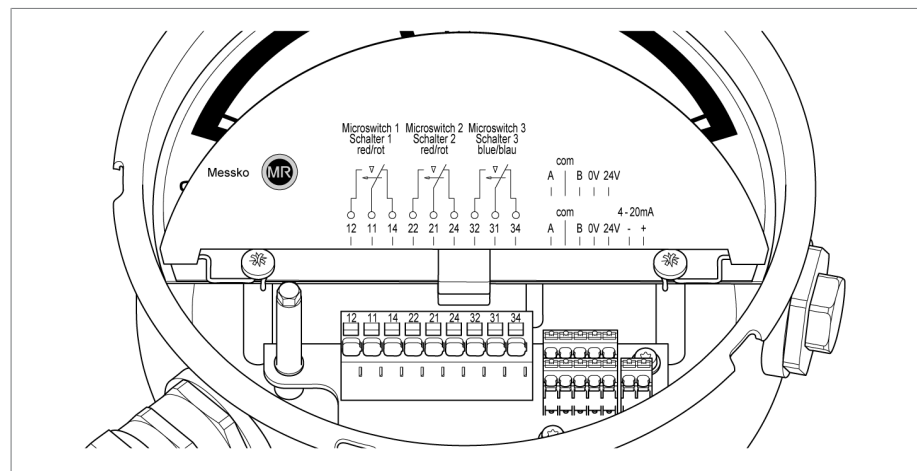


Figure 13: Terminal strip assignment

2.4 Float gauge

The values specified may vary depending on the configuration of the oil level indicator.

2.4.1 Installation positions for axial MTO

MTO axial, option 1 without breathing sack

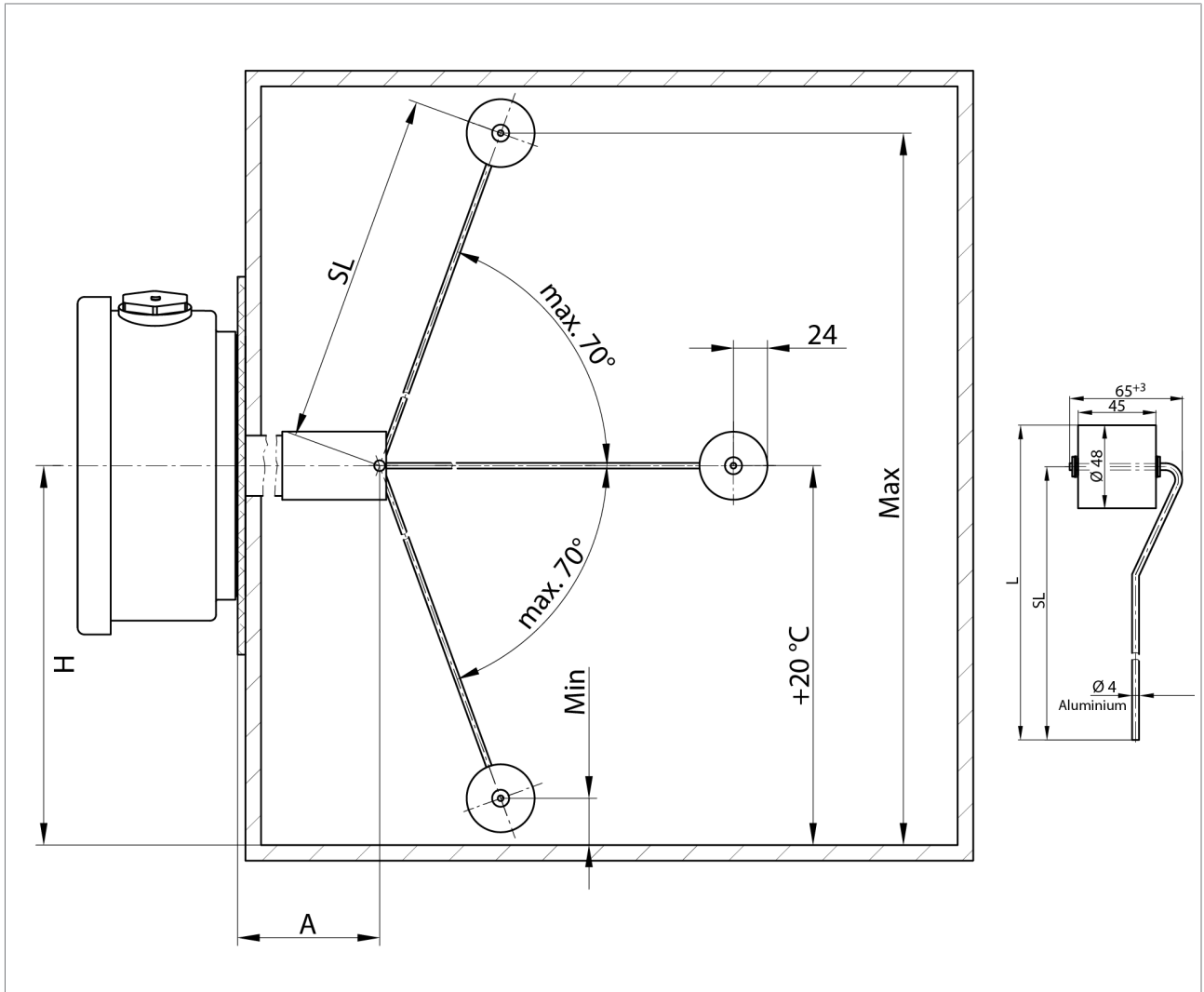


Figure 14: Option 1 without breathing sack, with associated float gauge

A	Projection	SL	Float gauge length for dimensioning
H	Installed height, depending on float gauge length	L =	SL + 1/2 diameter of the float buoy

MTO axial, option 2 and 3, with breathing sack

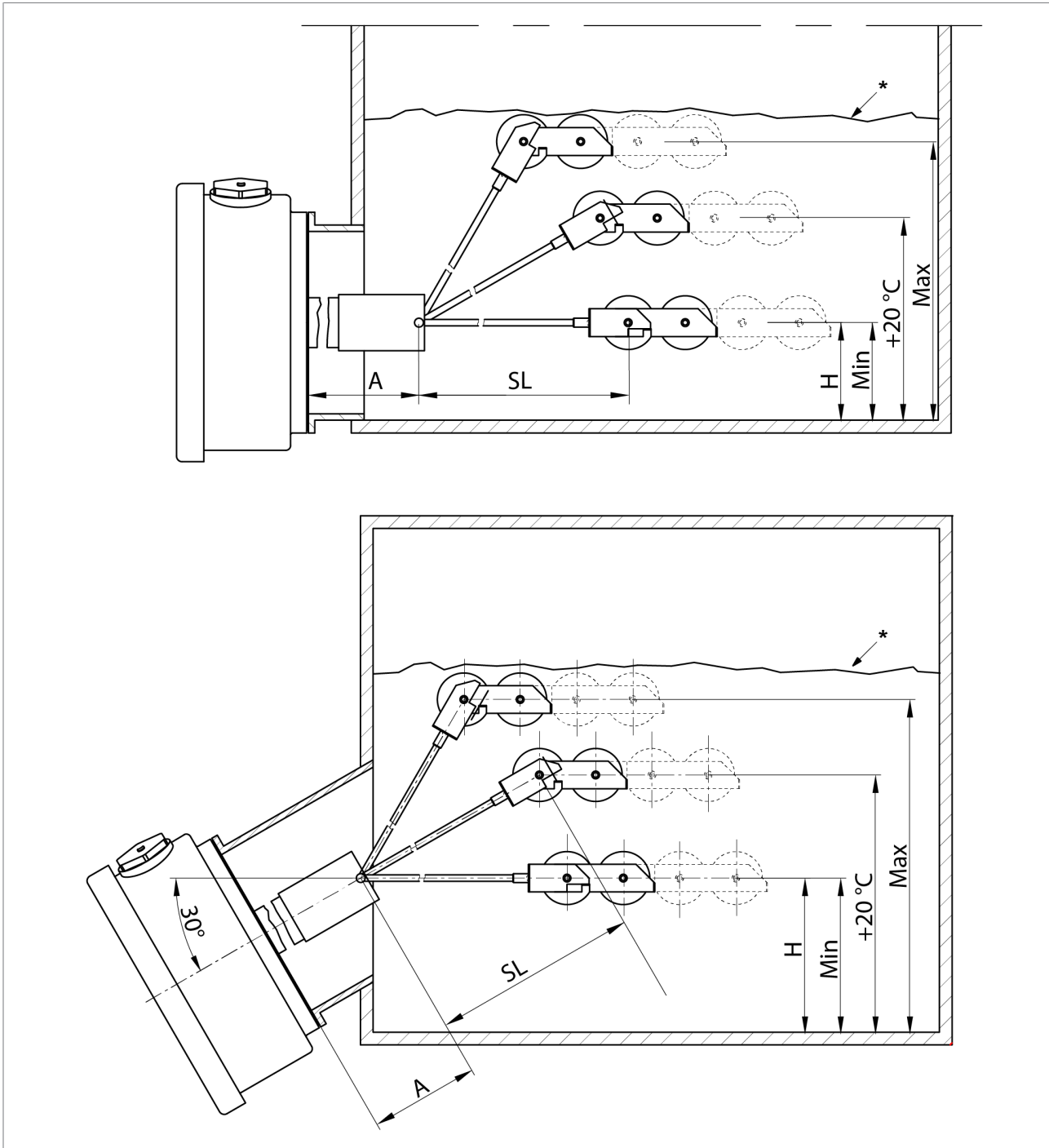


Figure 15: Option 2 with upright installation; Option 3 with angled installation; float gauge see also option 4

2 Technical data



A Projection	SL Float gauge length for dimensioning
H Installed height, depending on mounting position	* Breathing sack

MTO axial, option 4, with breathing sack and float gauge

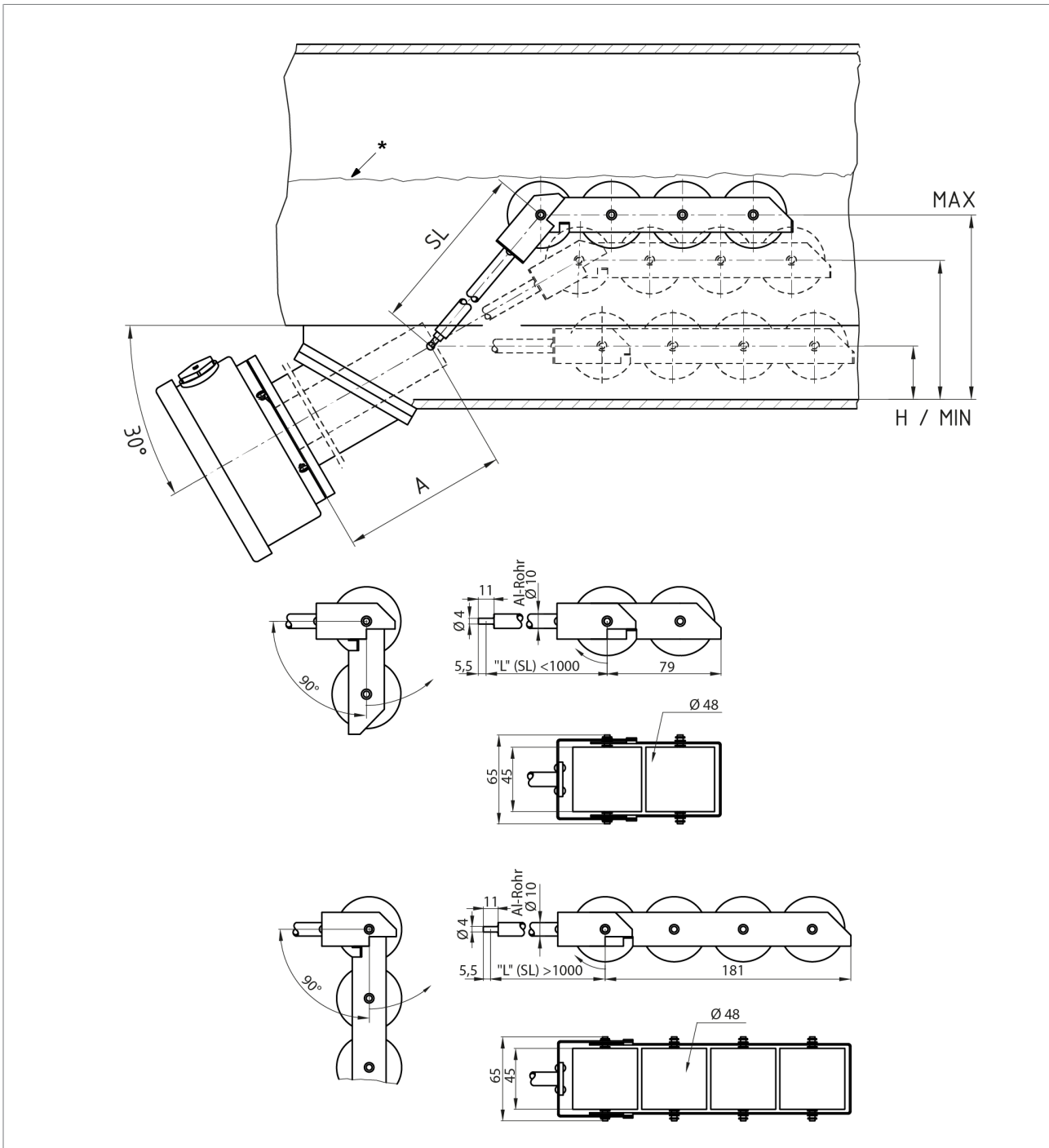


Figure 16: Option 4 with installation angled from below; float gauge for options 2, 3, 4



A Projection	SL Float gauge length for dimensioning
H Installed height, depending on mounting position	* Breathing sack

2.4.2 Further types of float gauges

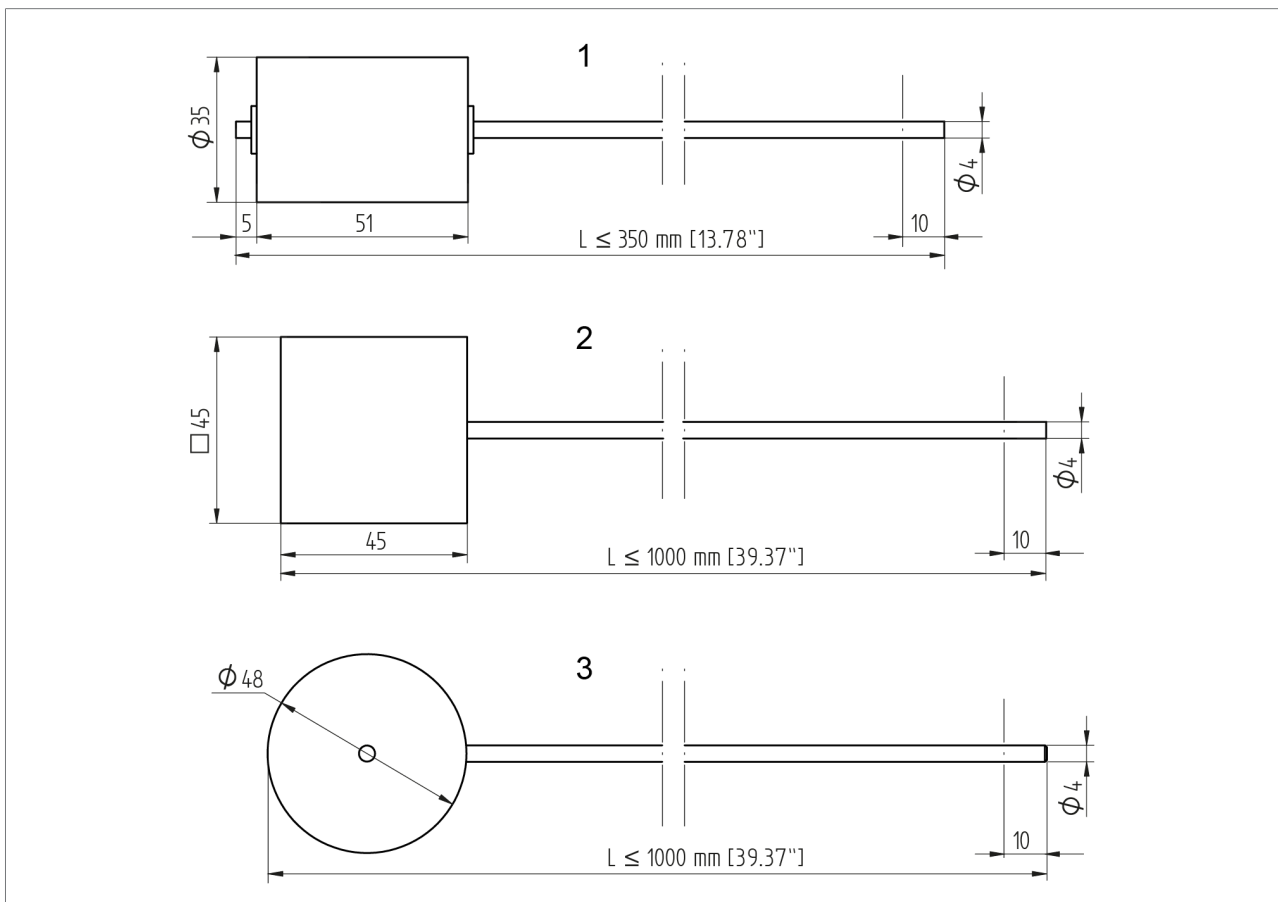


Figure 17: Types of float gauges

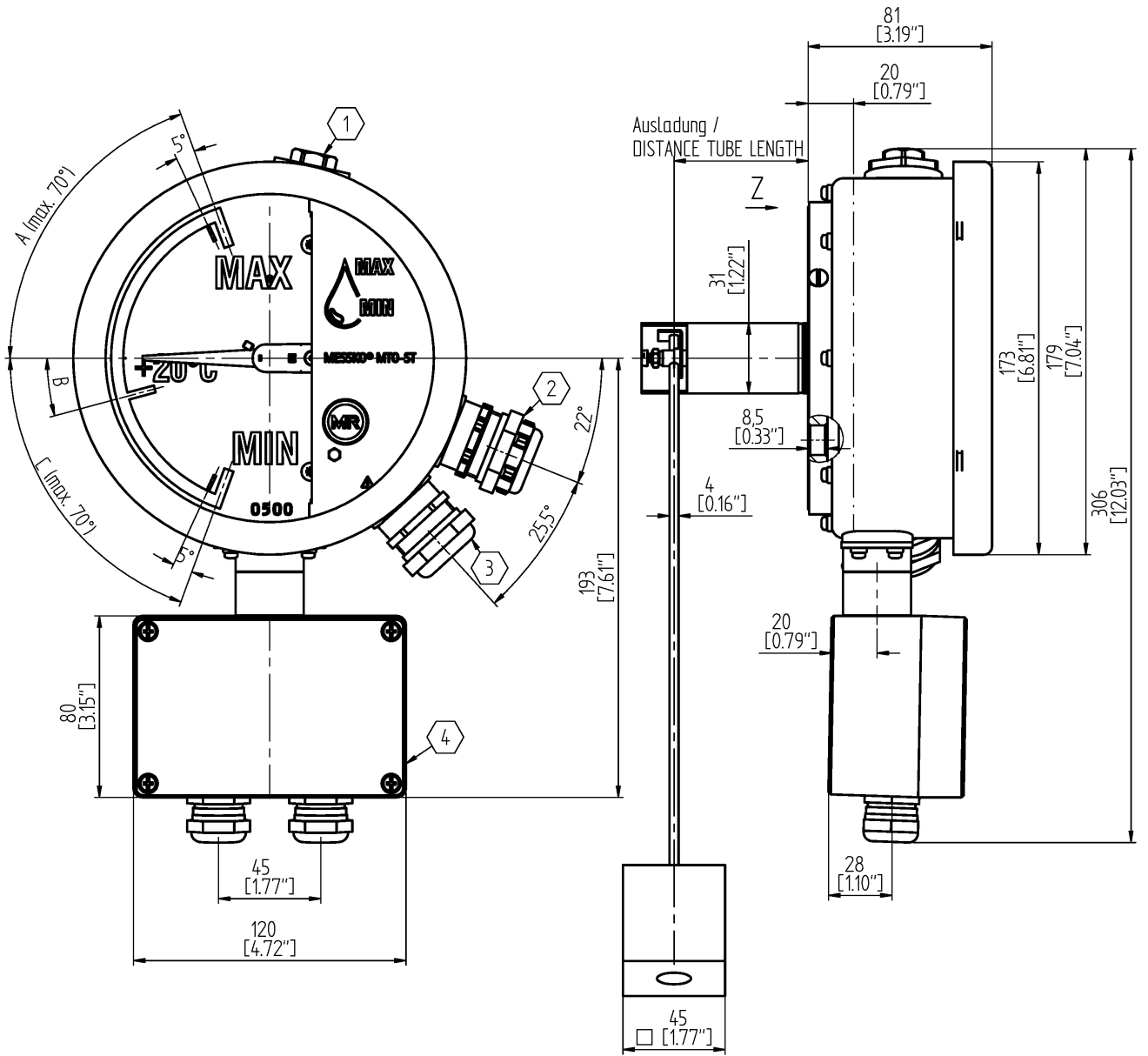
1 RM float gauge (rod: brass)	MTO-ST160RM	For radial and axial
2 Cubic float gauge (rod: aluminum)	MTO-ST160	For radial
3 Cylindrical float gauge (rod: aluminum)	MTO-ST160 (TT)	For radial angled design 15° / 30° / 45°

Float length SL = L - 10 mm.

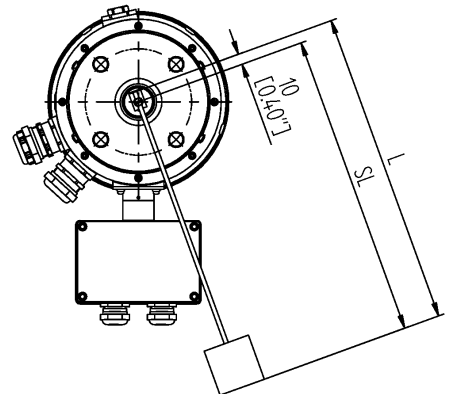


3 Appendix

© MASCHINENFABRIK REINHAUSEN GMBH 2018
 THE REPRODUCTION, DISTRIBUTION AND UTILIZATION OF THIS DOCUMENT AS WELL AS THE COMMUNICATION OF ITS CONTENTS TO OTHERS WITHOUT EXPRESS AUTHORIZATION IS PROHIBITED. OFFENDERS WILL BE HELD LIABLE FOR THE PAYMENT OF DAMAGES. ALL RIGHTS RESERVED IN THE EVENT OF THE GRANT OF A PATENT, UTILITY MODEL OR DESIGN.



1:5
 Ansicht / VIEW Z



- ① Druckausgleichselement / PRESSURE COMPENSATION ELEMENT
- ② Kabelverschraubung Modbus / CABLE GLAND MODBUS
- ③ Kabelverschraubung Schalter / CABLE GLAND SWITCH
- ④ Relais Box / RELAIS BOX

DATE	NAME	DOCUMENT NO.
15.02.2023	REHNELT	SED 9144260 000 01
16.02.2023	THIELEK	CHANGE NO.
17.02.2023	WANNINGER	118584
JFTR.		SCALE
CHKD.		1:2
STAND.		

DIMENSION
 IN mm
 EXCEPT AS
 NOTED



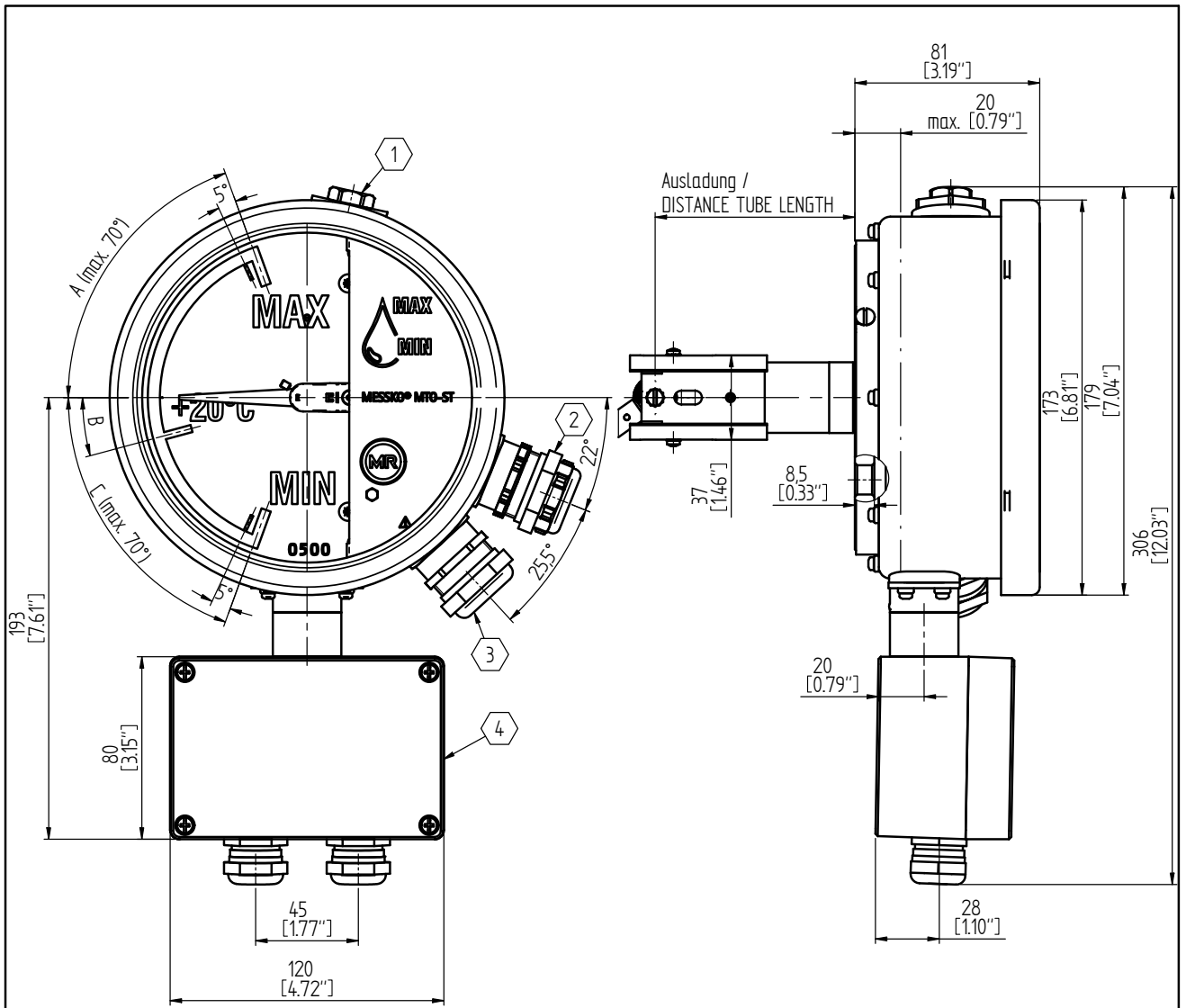
TRANSFORMER ACCESSORIES
 OIL LEVEL INDICATOR MTO-ST160TTMR
 RADIAL DESIGN, TERMINAL BOX

SERIAL NUMBER

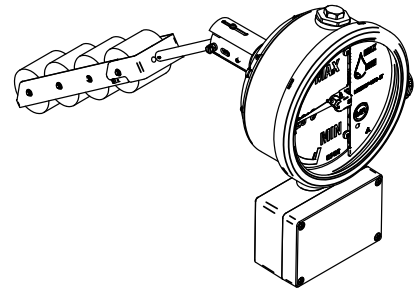
MATERIAL NUMBER
 101736710M

SHEET
 1 / 1

© MASCHINENFABRIK REINHAUSEN GMBH 2018
 THE REPRODUCTION, DISTRIBUTION AND UTILIZATION OF THIS DOCUMENT AS WELL AS THE COMMUNICATION OF ITS CONTENTS TO OTHERS WITHOUT EXPRESS AUTHORIZATION IS PROHIBITED. OFFENDERS WILL BE HELD LIABLE FOR THE PAYMENT OF DAMAGES. ALL RIGHTS RESERVED IN THE EVENT OF THE GRANT OF A PATENT, UTILITY MODEL OR DESIGN.



1:5



- ① Druckausgleichselement / PRESSURE COMPENSATION ELEMENT
- ② Kabelverschraubung Modbus / CABLE GLAND MODBUS
- ③ Kabelverschraubung Schalter / CABLE GLAND SWITCH
- ④ Relais Box / RELAIS BOX

DATE	NAME	DOCUMENT NO.
10.11.2022	REHNELT	SED 9146521 000 00
10.11.2022	THIELEK	CHANGE NO.
11.11.2022	WANNINGER	1118584
		SCALE
		1:2

DIMENSION
 IN mm
 EXCEPT AS
 NOTED



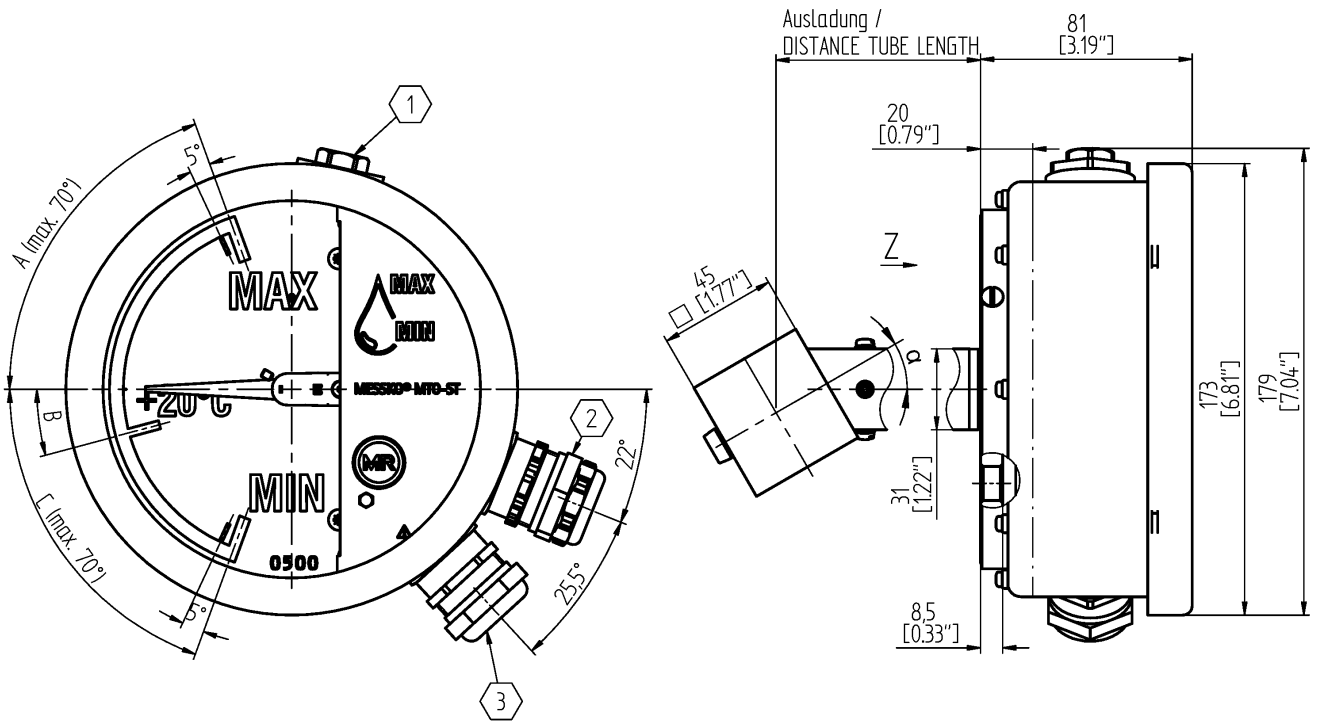
TRANSFORMER ACCESSORIES
 OIL LEVEL INDICATOR MTO-ST160/TTMR
 AXIAL DESIGN, TERMINAL BOX

SERIAL NUMBER

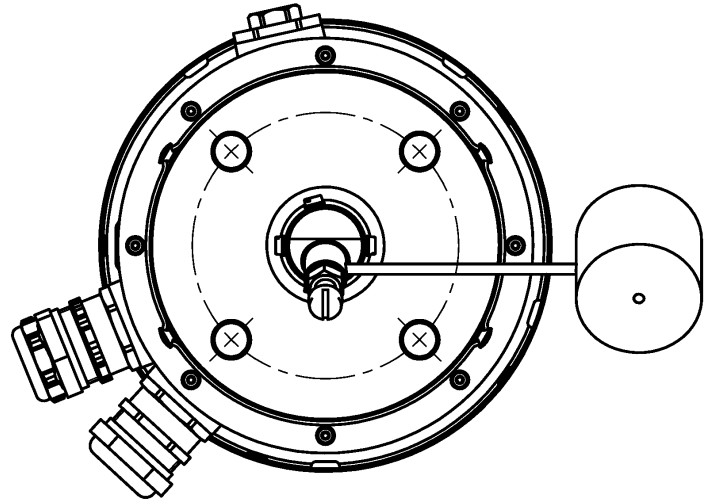
MATERIAL NUMBER
 101736690M

SHEET
 1 / 1

© MASCHINENFABRIK REINHAUSEN GMBH 2018
 THE REPRODUCTION, DISTRIBUTION AND UTILIZATION OF THIS DOCUMENT AS WELL AS THE COMMUNICATION OF ITS CONTENTS TO OTHERS WITHOUT EXPRESS AUTHORIZATION IS PROHIBITED. OFFENDERS WILL BE HELD LIABLE FOR THE PAYMENT OF DAMAGES. ALL RIGHTS RESERVED IN THE EVENT OF THE GRANT OF A PATENT, UTILITY MODEL OR DESIGN.

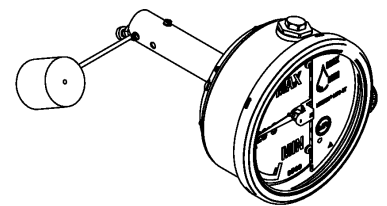


Ansicht Z



- ① Druckausgleichselement / PRESSURE COMPENSATION ELEMENT
- ② Kabelverschraubung Modbus / CABLE GLAND MODBUS
- ③ Kabelverschraubung Schalter / CABLE GLAND SWITCH

1:5



DATE	NAME	DOCUMENT NO.
15.02.2023	REHNELT	SED 9146747 000 01
CHKD.	THIELEK	CHANGE NO.
16.02.2023	WANNINGER	118584
STAND		SCALE
17.02.2023		1:2

DIMENSION
 IN mm
 EXCEPT AS
 NOTED



TRANSFORMER ACCESSORIES
 OIL LEVEL INDICATOR MTO-ST160V/TTM
 RADIAL DESIGN

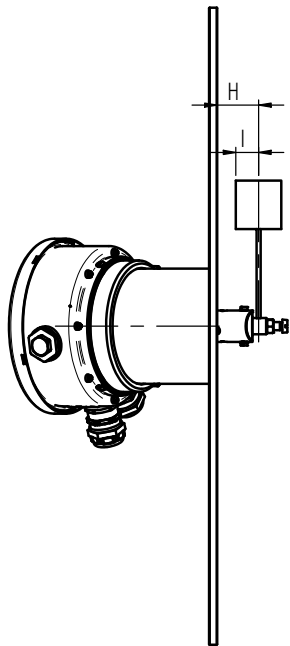
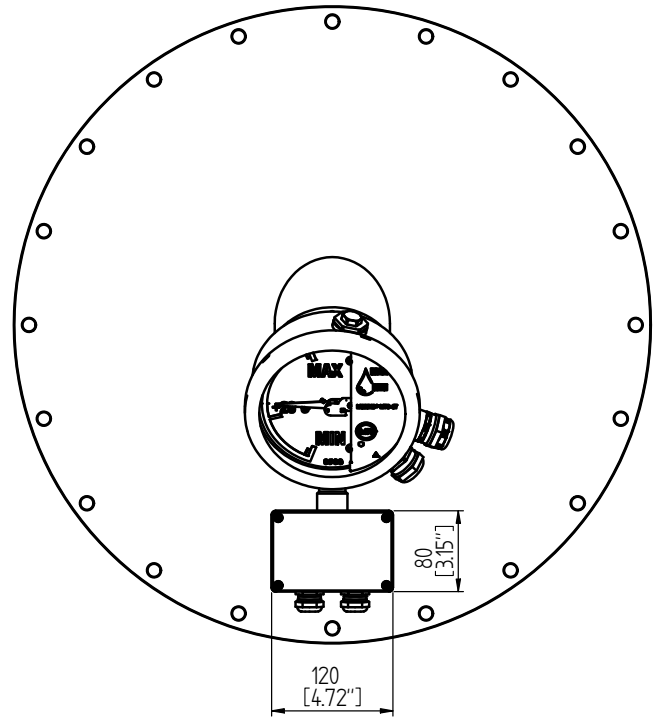
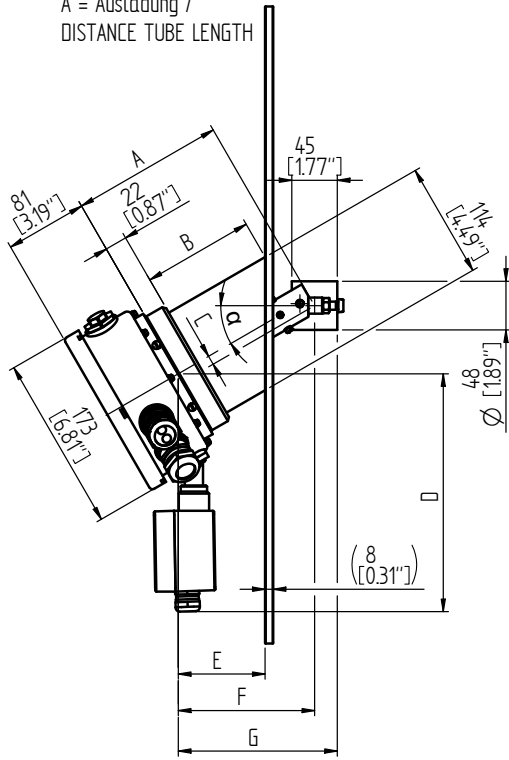
SERIAL NUMBER

MATERIAL NUMBER 101736600M SHEET 1 / 1

© MASCHINENFABRIK REINHAUSEN GMBH 2018
 THE REPRODUCTION, DISTRIBUTION AND UTILIZATION OF THIS DOCUMENT AS WELL AS THE COMMUNICATION OF ITS CONTENTS TO OTHERS WITHOUT EXPRESS AUTHORIZATION IS PROHIBITED. OFFENDERS WILL BE HELD LIABLE FOR THE PAYMENT OF DAMAGES. ALL RIGHTS RESERVED IN THE EVENT OF THE GRANT OF A PATENT, UTILITY MODEL OR DESIGN.

DATE	NAME	DOCUMENT NO.
-	-	SED 9147750 000 00
-	-	CHANGE NO.
-	-	1118584
DFTR.	SCALE	1:5
CHKD.		
STAND.		

A = Ausladung /
 DISTANCE TUBE LENGTH



Maße / DIMENSIONS mm / [IN]	Neigung / INCLINATION $\alpha = 15^\circ$	Neigung / INCLINATION $\alpha = 30^\circ$	Neigung / INCLINATION $\alpha = 45^\circ$
A	150 +1 [5.91" +.04"]	150+1 [5.91" +.04"]	274 +1 [10.79" +.04"]
B	97 [3.82"]	109,5 [4.31"]	251 [9.88"]
C	5 [.2"]	9 [.35"]	13 [.51"]
D	230 [9.1"]	236 [9.29"]	245 [9.65"]
E	<100 [<3.94"]	<86 [<3.39"]	<135 [<5.31"]
F	146 [5.75"]	135 [5.31"]	203 [7.99"]
G	168,5 [6.63"]	157,5 [6.2"]	225,5 [8.27"]
H	38 [1.5"]	41 [1.61"]	44,5 [1.75"]
I	16 [.62"]	18 [.71"]	22 [.87"]

DIMENSION
 IN mm
 EXCEPT AS
 NOTED



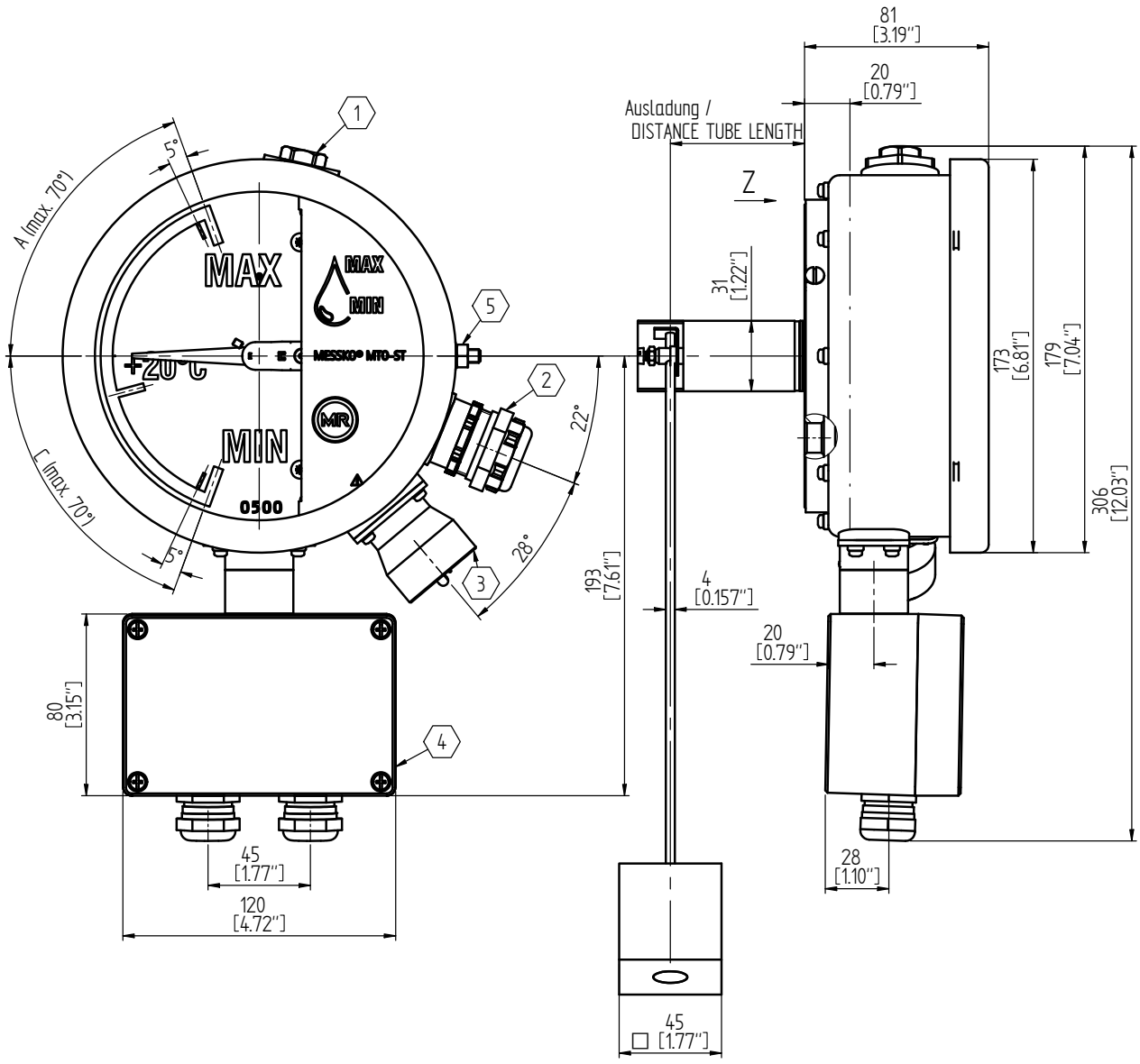
TRANSFORMER ACCESSORIES
 OIL LEVEL INDICATOR MTO-ST160V/TTMR
 RADIAL DESIGN, TERMINAL BOX

SERIAL NUMBER

MATERIAL NUMBER
 101736610M

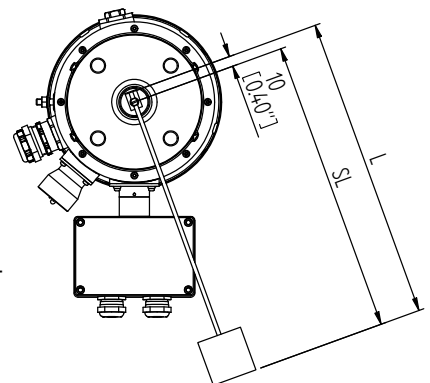
SHEET
 1 / 1

© MASCHINENFABRIK REINHAUSEN GMBH 2018
 THE REPRODUCTION, DISTRIBUTION AND UTILIZATION OF THIS DOCUMENT AS WELL AS THE COMMUNICATION OF ITS CONTENTS TO OTHERS WITHOUT EXPRESS AUTHORIZATION IS PROHIBITED. OFFENDERS WILL BE HELD LIABLE FOR THE PAYMENT OF DAMAGES. ALL RIGHTS RESERVED IN THE EVENT OF A PATENT, UTILITY MODEL OR DESIGN.



1:5

Ansicht / VIEW Z



- ① Druckausgleichselement / PRESSURE COMPENSATION ELEMENT
- ② Kabelverschraubung Modbus / CABLE GLAND MODBUS
- ③ Steckeranschluss ANSI od. Westinghouse / CONNECTION ANSI OR. WESTINGHOUSE
- ④ Relais Box / RELAIS BOX
- ⑤ Anschluss Masseausgleich / CONNECTION MASS BALANCING

DATE	NAME	DOCUMENT NO.
10.11.2022	REHNELT	SED 9147922 000 00
10.11.2022	THIELEK	CHANGE NO.
11.11.2022	WANNINGER	1118584
DFTR.	SCALE	1:2
CHKD.		
STAND.		

DIMENSION
 IN mm
 EXCEPT AS
 NOTED



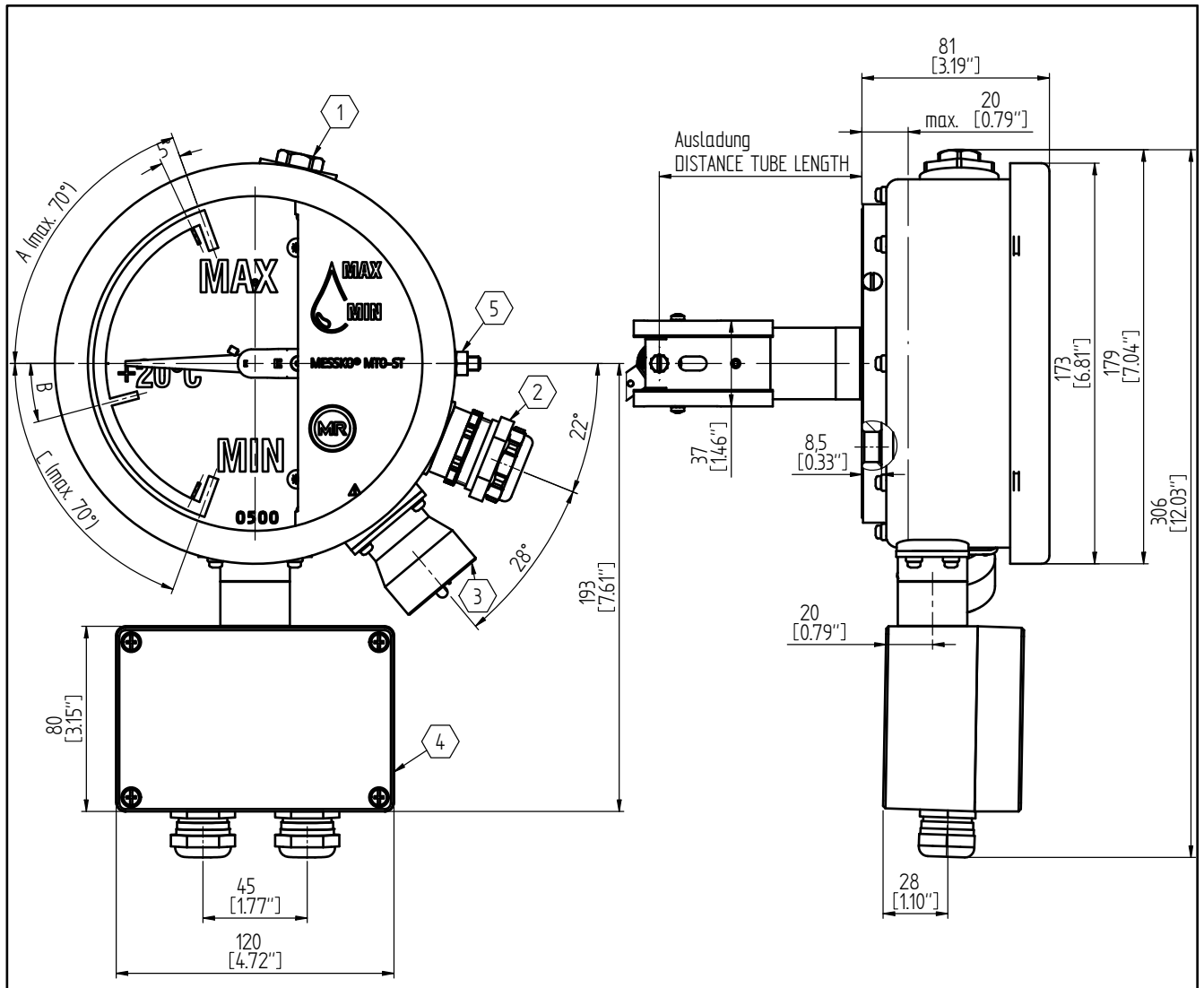
TRANSFORMER ACCESSORIES
 OIL LEVEL INDICATOR MTO-ST/TTMR ANSI
 RADIAL DESIGN, TERMINAL BOX

SERIAL NUMBER

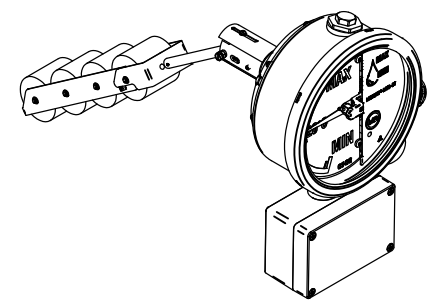
MATERIAL NUMBER
 101736700M

SHEET
 1 / 1

© MASCHINENFABRIK REINHAUSEN GMBH 2018
 THE REPRODUCTION, DISTRIBUTION AND UTILIZATION OF THIS DOCUMENT AS WELL AS THE COMMUNICATION OF ITS CONTENTS TO OTHERS WITHOUT EXPRESS AUTHORIZATION IS PROHIBITED. OFFENDERS WILL BE HELD LIABLE FOR THE PAYMENT OF DAMAGES. ALL RIGHTS RESERVED IN THE EVENT OF THE GRANT OF A PATENT, UTILITY MODEL OR DESIGN.



1:5



DATE	NAME	DOCUMENT NO.
10.11.2022	REHNELT	SED 9150605 000 00
10.11.2022	THIELEK	CHANGE NO.
11.11.2022	WANNINGER	1118584
		SCALE
		1:2

- ① Druckausgleichselement / PRESSURE COMPENSATION ELEMENT
- ② Kabelverschraubung Modbus / CABLE GLAND MODBUS
- ③ Steckeranschluss ANSI od. Westinghouse / CONNECTION ANSI OR. WESTINGHOUSE
- ④ Relais Box / RELAIS BOX
- ⑤ Anschluss Masseausgleich / CONNECTION MASS BALANCING

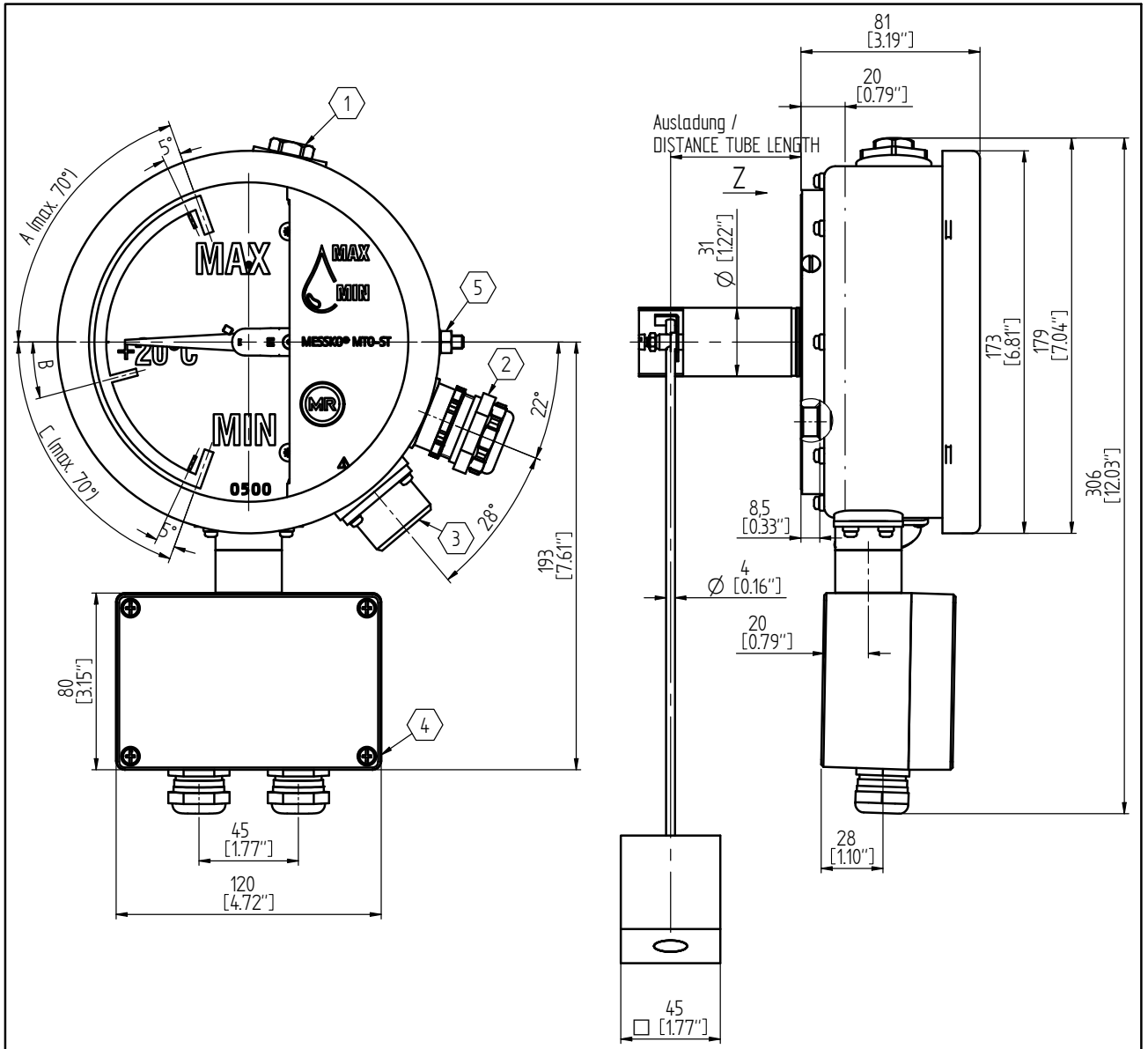
DIMENSION
 IN mm
 EXCEPT AS
 NOTED



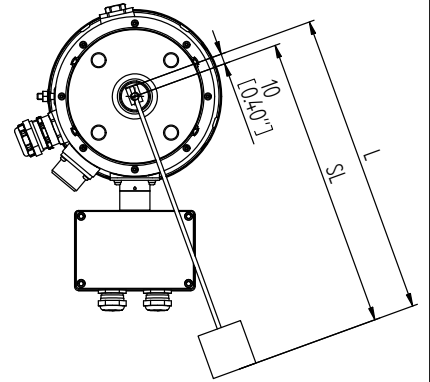
TRANSFORMER ACCESSORIES
 OIL LEVEL INDICATOR MTO-ST160/TTMR ANSI
 AXIAL DESIGN, TERMINAL BOX

SERIAL NUMBER	
MATERIAL NUMBER	SHEET
101736740M	1 / 1

© MASCHINENFABRIK REINHAUSEN GMBH 2018
 THE REPRODUCTION, DISTRIBUTION AND UTILIZATION OF THIS DOCUMENT AS WELL AS THE COMMUNICATION OF ITS CONTENTS TO OTHERS WITHOUT EXPRESS AUTHORIZATION IS PROHIBITED. OFFENDERS WILL BE HELD LIABLE FOR THE PAYMENT OF DAMAGES. ALL RIGHTS RESERVED IN THE EVENT OF THE GRANT OF A PATENT, UTILITY MODEL OR DESIGN.



1:5
 Ansicht / VIEW Z



- ① Druckausgleichselement / PRESSURE COMPENSATION ELEMENT
- ② Kabelverschraubung Modbus / CABLE GLAND MODBUS
- ③ Steckeranschluss Mil. od. M / CONNECTION MIL. OR. M
- ④ Relais Box / RELAIS BOX
- ⑤ Anschluss Masseausgleich / CONNECTION MASS BALANCING

DATE	NAME	DOCUMENT NO.
10.11.2022	REHNELT	SED 9150921 000 00
10.11.2022	THIELEK	CHANGE NO.
11.11.2022	WANNINGER	1118584
		SCALE 1:2

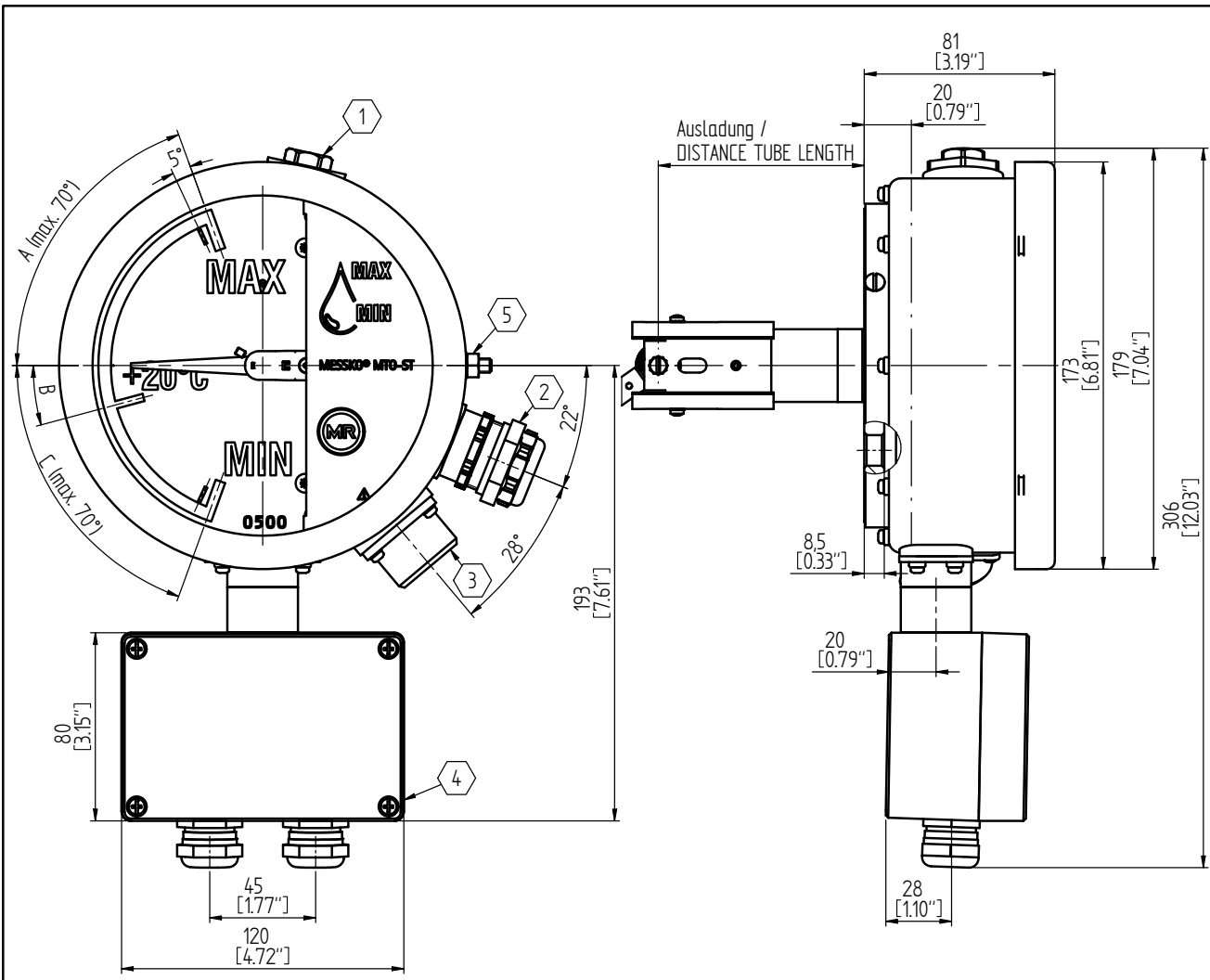
DIMENSION
 IN mm
 EXCEPT AS
 NOTED



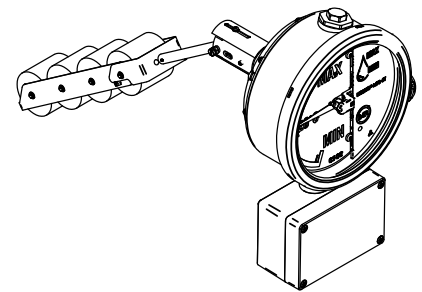
TRANSFORMER ACCESSORIES
 OIL LEVEL INDICATOR MTO-ST/TTMR Mil od. M Stecker
 RADIAL DESIGN, TERMINAL BOX

SERIAL NUMBER	
MATERIAL NUMBER	SHEET
101736790M	1 / 1

© MASCHINENFABRIK REINHAUSEN GMBH 2018
 THE REPRODUCTION, DISTRIBUTION AND UTILIZATION OF THIS DOCUMENT AS WELL AS THE COMMUNICATION OF ITS CONTENTS TO OTHERS WITHOUT EXPRESS AUTHORIZATION IS PROHIBITED. OFFENDERS WILL BE HELD LIABLE FOR THE PAYMENT OF DAMAGES. ALL RIGHTS RESERVED IN THE EVENT OF THE GRANT OF A PATENT, UTILITY MODEL OR DESIGN.



1:5



- ① Druckausgleichselement / PRESSURE COMPENSATION ELEMENT
- ② Kabelverschraubung Modbus / CABLE GLAND MODBUS
- ③ Steckeranschluss MIL. od. M / CONNECTION MIL. OR. M
- ④ Relais Box / RELAIS BOX
- ⑤ Anschluss Masseausgleich / CONNECTION MASS BALANCING

DATE	NAME	DOCUMENT NO.
10.11.2022	REHNELT	SED 9151305 000 00
10.11.2022	THIELEK	CHANGE NO.
11.11.2022	WANNINGER	1118584
STAND		12

DIMENSION
 IN mm
 EXCEPT AS
 NOTED

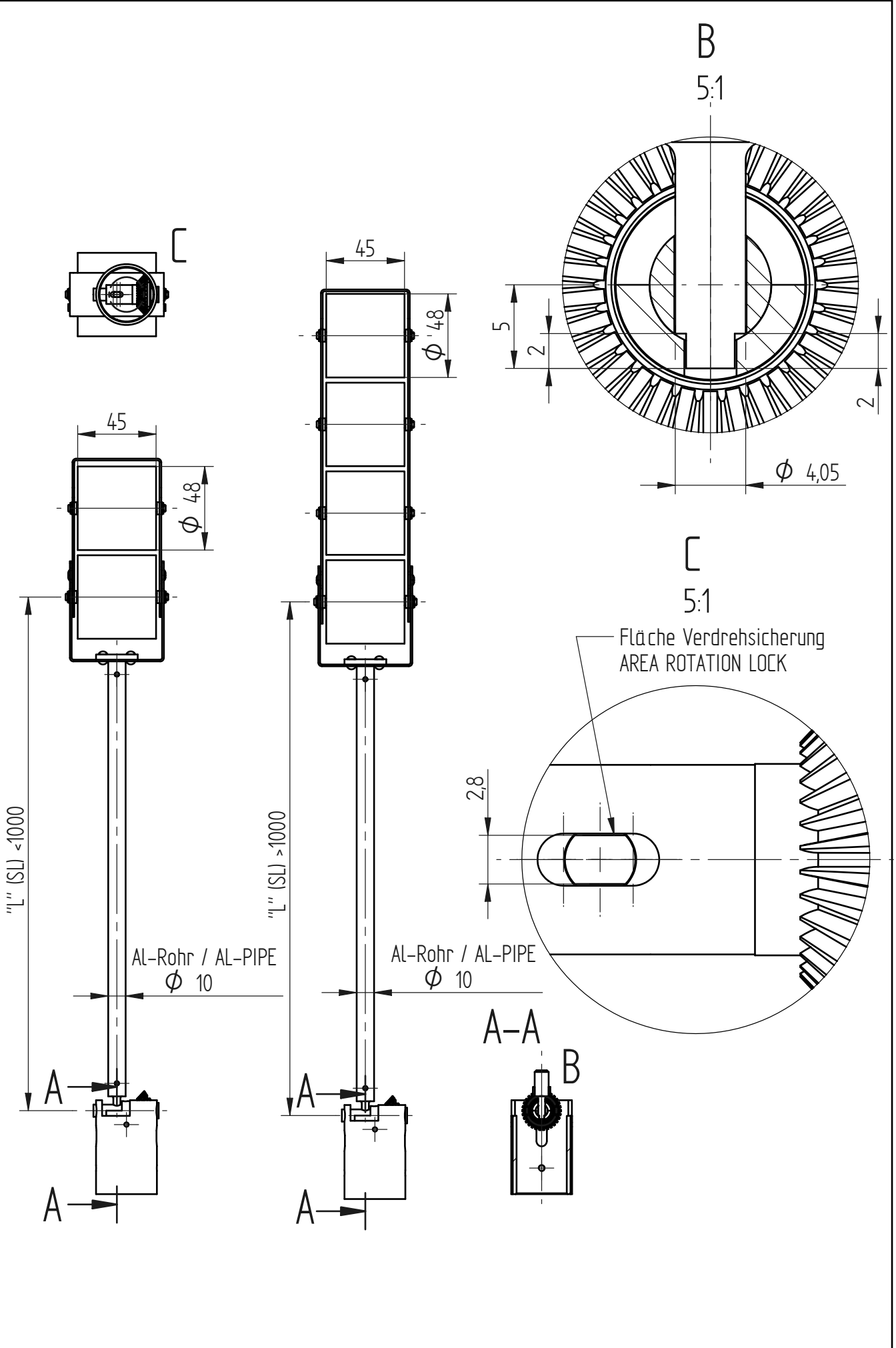


TRANSFORMER ACCESSORIES
 OIL LEVEL INDICATOR MTO-ST160/TTMR Mi.Lod. M PLUG
 AXIAL DESIGN, TERMINAL BOX

SERIAL NUMBER	
MATERIAL NUMBER	SHEET
101736800M	1 / 1

© MASCHINENFABRIK REINHAUSEN GMBH 2019
 Weitergabe sowie Vervielfältigung dieses Dokuments, Verwertung und Mitteilung seines Inhaltes sind verboten, soweit nicht ausdrücklich gestattet.
 Zuwiderhandlungen verpflichten zu Schadensersatz. Alle Rechte für den Fall der Patent-, Gebrauchsmuster- oder Designeintragung vorbehalten.

Datum	Name	Dokumentnummer
20.09.2019	REHNELT	SED 7036293 000 00
Gepr.: 20.09.2019	SCHAEFFERB	Änderungsnummer: Maßstab
Norm.: 20.09.2019	SCHAEFFERB	1096774 1:2



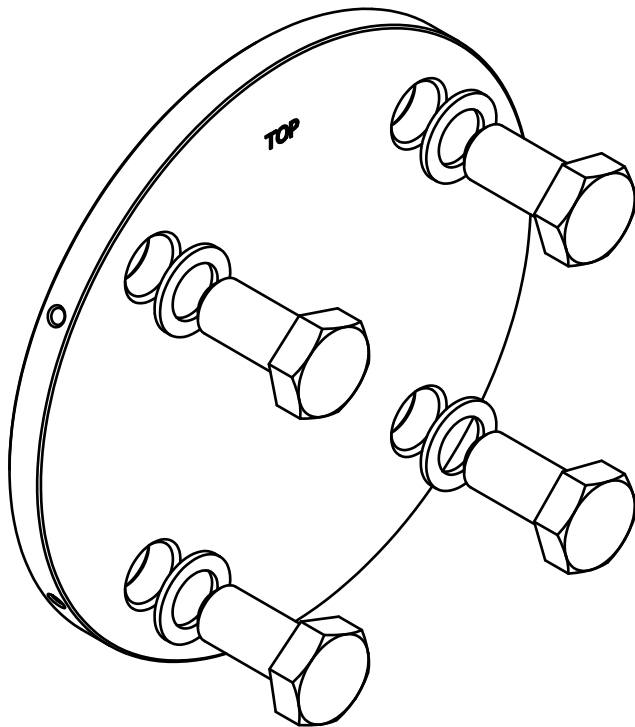
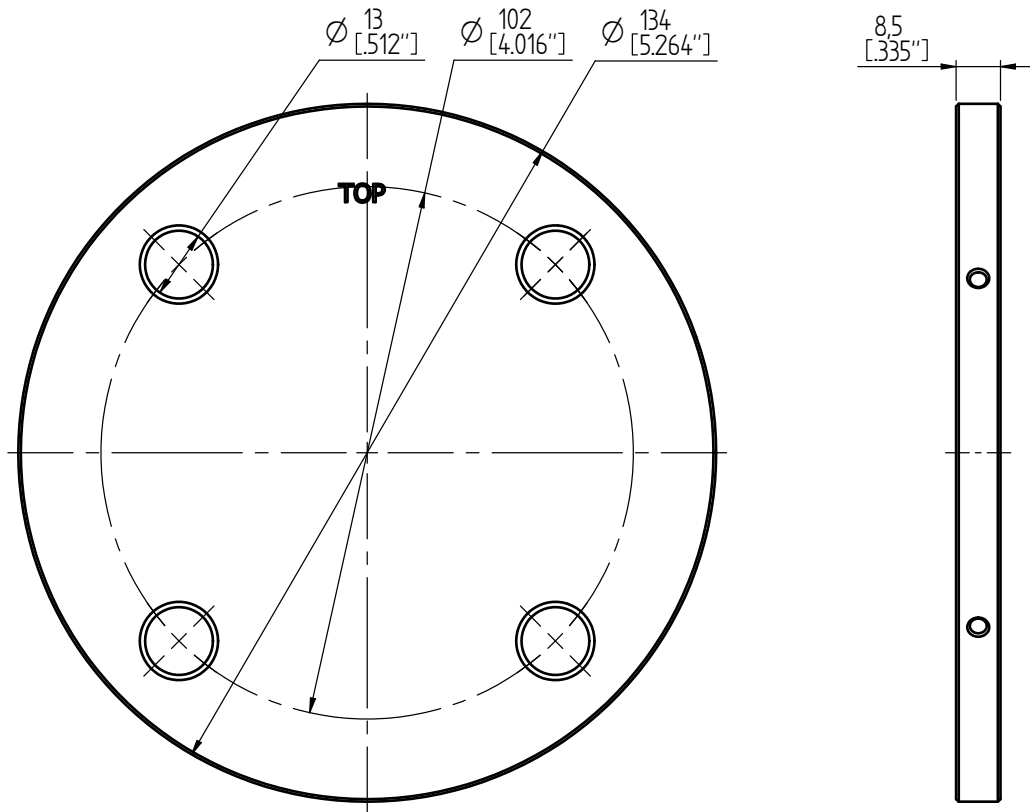
Maßangaben
 in mm, soweit
 nicht anders
 angegeben



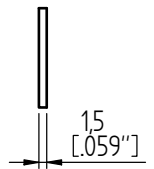
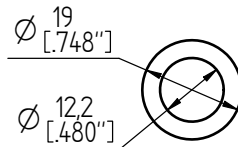
ROTATION LOCK 2 AND 4 ROLLER FLOAT
 OLI LEVEL INDICATOR MTO-ST160G(TT)
 AXIAL DESIGN

Serialnummer	-
Materialnummer	101266890M
Blatt	1 / 1

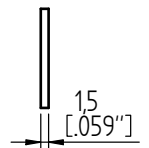
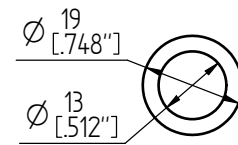
© MASCHINENFABRIK REINHAUSEN GMBH 2019
 THE REPRODUCTION, DISTRIBUTION AND UTILIZATION OF THIS DOCUMENT AS WELL AS THE COMMUNICATION OF ITS CONTENTS TO OTHERS WITHOUT EXPRESS AUTHORIZATION IS PROHIBITED. OFFENDERS WILL BE HELD LIABLE FOR THE PAYMENT OF DAMAGES. ALL RIGHTS RESERVED IN THE EVENT OF THE GRANT OF A PATENT, UTILITY MODEL OR DESIGN.



4x Dichtungsscheibe / GASKET M12
 Material / MATERIAL:
 EN AW - 1200 (AL99) ; H14 ; 32 ... 45 HB
 ANSI H35.1 (M)-1200 ; H14 ; 32 ... 45 HB
 GB/T 3190-1200 ; H14 ; 32 ... 45 HB



4x Dichtungsscheibe / GASKET 1/2" - 13 UNC
 Material / MATERIAL:
 EN AW - 1200 (AL99) ; H14 ; 32 ... 45 HB
 ANSI H35.1 (M)-1200 ; H14 ; 32 ... 45 HB
 GB/T 3190-1200 ; H14 ; 32 ... 45 HB



Für Varianten / FOR VARIANTS:
 MTO-ST160 ; MTO-ST160TT ; MTO-STF160 ; MTO-STF160TT ; MTO-ST160V ; MTO-ST160VTT ;
 MTO-STF160V ; MTO-STF160VTT ; MTO-ST160G ; MTO-ST160GTT ; MTO-STF160G ; MTO-STF160GTT

DATE	NAME	DOCUMENT NO.
-	-	SED 6771687 000 00
CHKO.	CHANGE NO.	SCALE
-	1090955	1:1
STAND.	-	-

DIMENSION
 IN mm
 EXCEPT AS
 NOTED



TRANSFORMER ACCESSORIES
 OIL LEVEL INDICATOR MTO
 STANDARD FLANGE LK 102

SERIAL NUMBER	
-	
MATERIAL NUMBER	SHEET
101242570M	1 / 1

© MASCHINENFABRIK REINHAUSEN GMBH 2019
 THE REPRODUCTION, DISTRIBUTION AND UTILIZATION OF THIS DOCUMENT AS WELL AS THE COMMUNICATION OF ITS CONTENTS TO OTHERS WITHOUT EXPRESS AUTHORIZATION IS PROHIBITED. OFFENDERS WILL BE HELD LIABLE FOR THE PAYMENT OF DAMAGES. ALL RIGHTS RESERVED IN THE EVENT OF THE GRANT OF A PATENT, UTILITY MODEL OR DESIGN.

DATE	NAME	DOCUMENT NO.
DFTR	-	SED 6771692.000.00
CHKD	-	CHANGE NO.
STAND	-	1090955
		SCALE
		1:1

Für Varianten / FOR VARIANTS:
 MTO-ST160RM
 MTO-ST160RMTT
 MTO-ST160GRM
 MTO-ST160GRMTT

DIMENSION
 IN mm
 EXCEPT AS
 NOTED

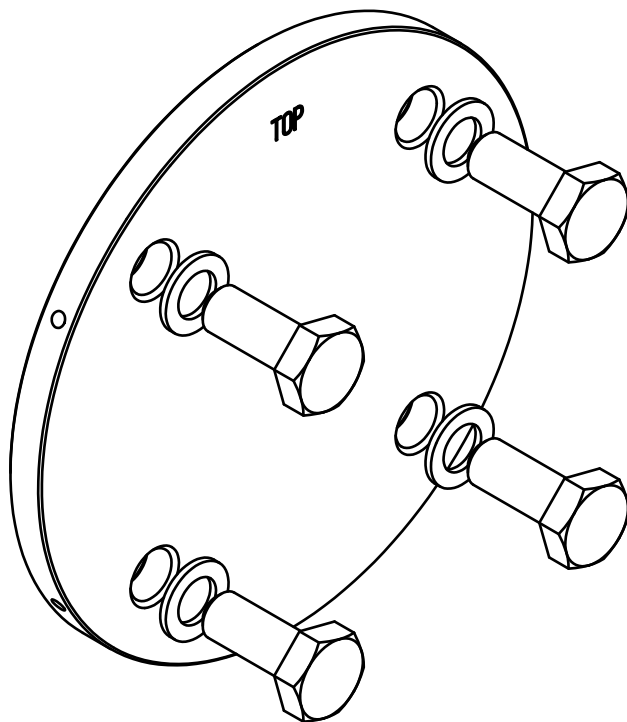
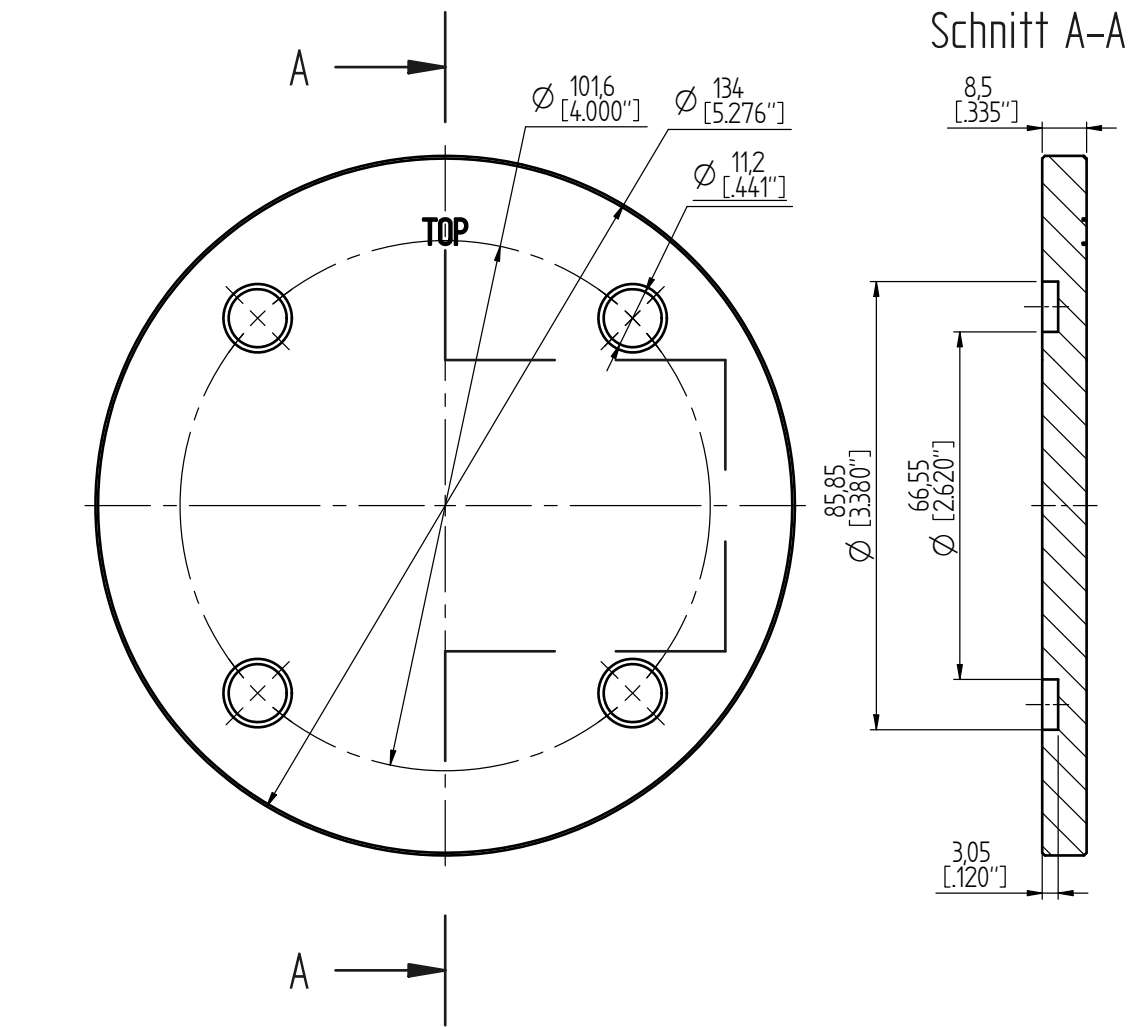


TRANSFORMER ACCESSORIES
 OIL LEVEL INDICATOR MTO
 RM FLANGE LK 101,6

SERIAL NUMBER

MATERIAL NUMBER
 101242580M

SHEET
 1 / 1



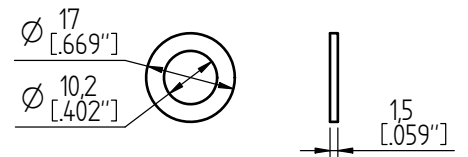
4x Dichtungsscheibe / GASKET M10

Material / MATERIAL:

EN AW - 1200 (AL99) ; H14 ; 32 ... 45 HB

ANSI H35.1 (M)-1200 ; H14 ; 32 ... 45 HB

GB/T 3190-1200 ; H14 ; 32 ... 45 HB



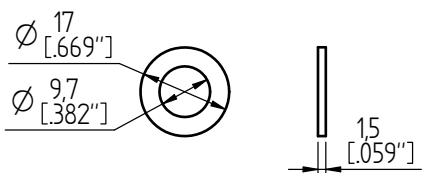
4x Dichtungsscheibe / GASKET 3/8" - 16 UNC

Material / MATERIAL:

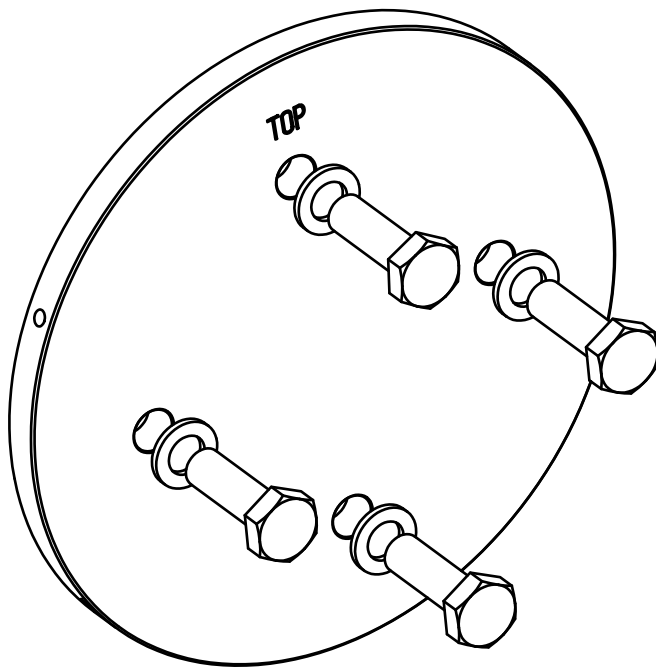
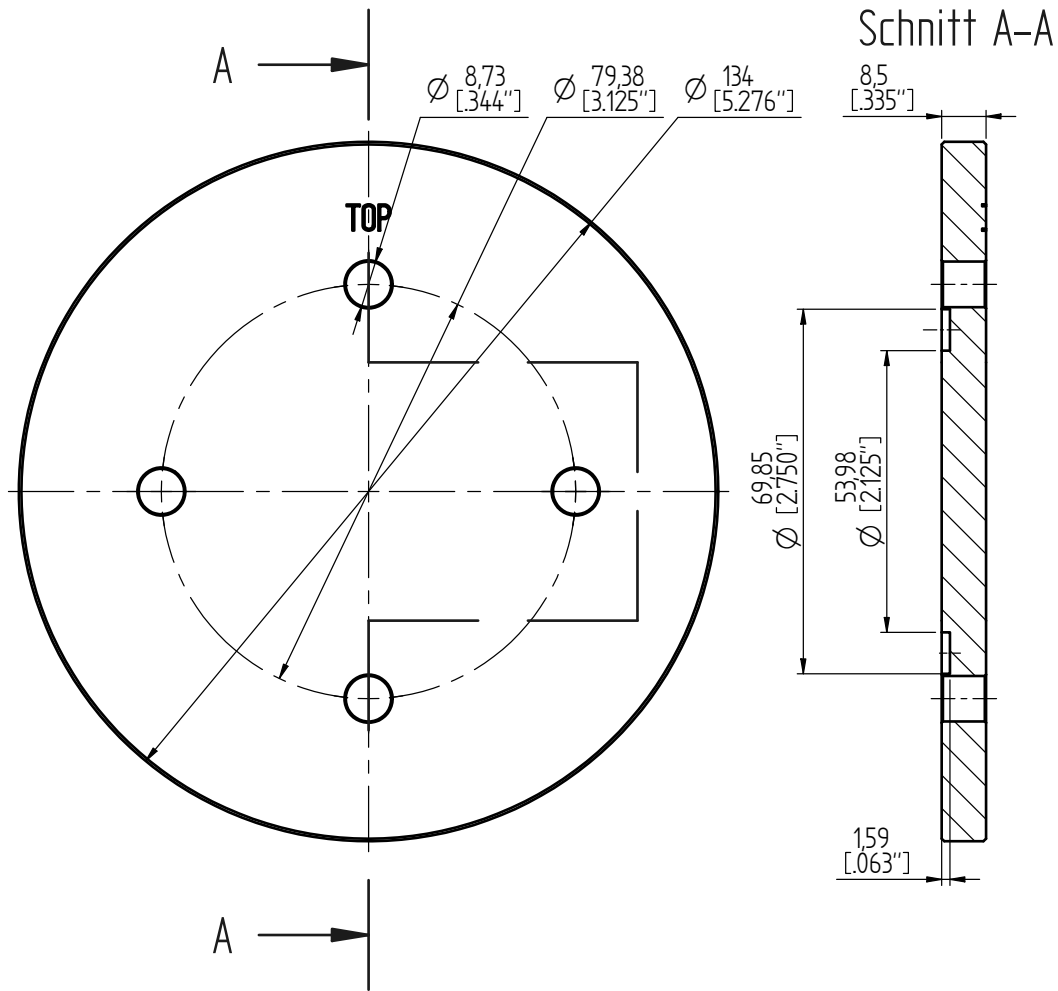
EN AW - 1200 (AL99) ; H14 ; 32 ... 45 HB

ANSI H35.1 (M)-1200 ; H14 ; 32 ... 45 HB

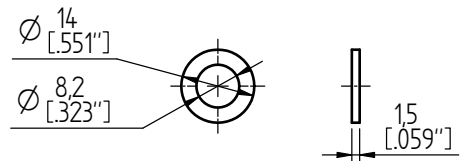
GB/T 3190-1200 ; H14 ; 32 ... 45 HB



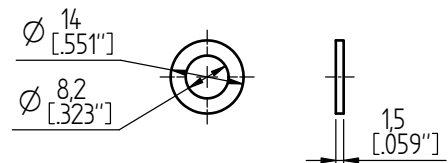
© MASCHINENFABRIK REINHAUSEN GMBH 2019
 THE REPRODUCTION, DISTRIBUTION AND UTILIZATION OF THIS DOCUMENT AS WELL AS THE COMMUNICATION OF ITS CONTENTS TO OTHERS WITHOUT EXPRESS AUTHORIZATION IS PROHIBITED. OFFENDERS WILL BE HELD LIABLE FOR THE PAYMENT OF DAMAGES. ALL RIGHTS RESERVED IN THE EVENT OF THE GRANT OF A PATENT, UTILITY MODEL OR DESIGN.



4x Dichtungsscheibe / GASKET M8
 Material / MATERIAL:
 EN AW - 1200 (AL99) ; H14 ; 32 ... 45 HB
 ANSI H35.1 (M)-1200 ; H14 ; 32 ... 45 HB
 GB/T 3190-1200 ; H14 ; 32 ... 45 HB



4x Dichtungsscheibe / GASKET 5/16" - 18 UNC
 Material / MATERIAL:
 EN AW - 1200 (AL99) ; H14 ; 32 ... 45 HB
 ANSI H35.1 (M)-1200 ; H14 ; 32 ... 45 HB
 GB/T 3190-1200 ; H14 ; 32 ... 45 HB



DATE	NAME	DOCUMENT NO.
-	-	SED 6771696 000 00
CHKO	CHANGE NO.	SCALE
STAND	1090955	1:1

Für Varianten / FOR VARIANTS:
 MTO-ST160RM (NAT/DS)
 MTO-ST160RMTT (NAT/DS)
 MTO-ST160GRM (NAT/DS)
 MTO-ST160GRMTT (NAT/DS)

DIMENSION
 IN mm
 EXCEPT AS
 NOTED



TRANSFORMER ACCESSORIES
 OIL LEVEL INDICATOR MTO
 NAT/DS FLANGE LK 79,38

SERIAL NUMBER

MATERIAL NUMBER 101242590M SHEET 1 / 1

Maschinenfabrik Reinhausen GmbH

Falkensteinstrasse 8
93059 Regensburg

☎ +49 (0)941 4090-0

✉ sales@reinhausen.com

www.reinhausen.com

5784996/05 EN - MESSKO® MTO -

- 12/23 - Maschinenfabrik Reinhausen GmbH 2023

THE POWER BEHIND POWER.

