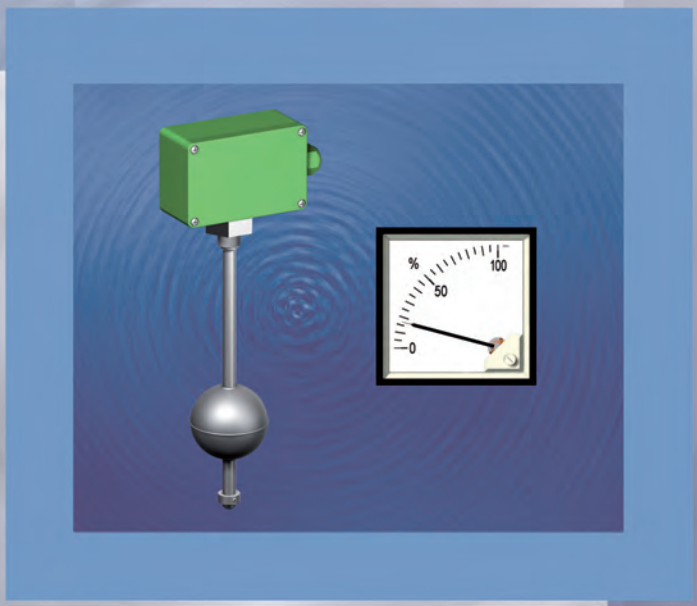
TSQ
level indicators

using the float method



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Jola Spezialschalter GmbH & Co. KG sells only business-to-business (B2B).

The units described in this documentation may only be installed, connected, started up, serviced and replaced by suitably qualified personnel!

Subject to deviations from the diagrams and technical data.

The details in this brochure are product specification descriptions and do not constitute assured properties in the legal sense.

TSQ 4-20/... level indicators

The TSQ 4-20/... level indicators consist of:

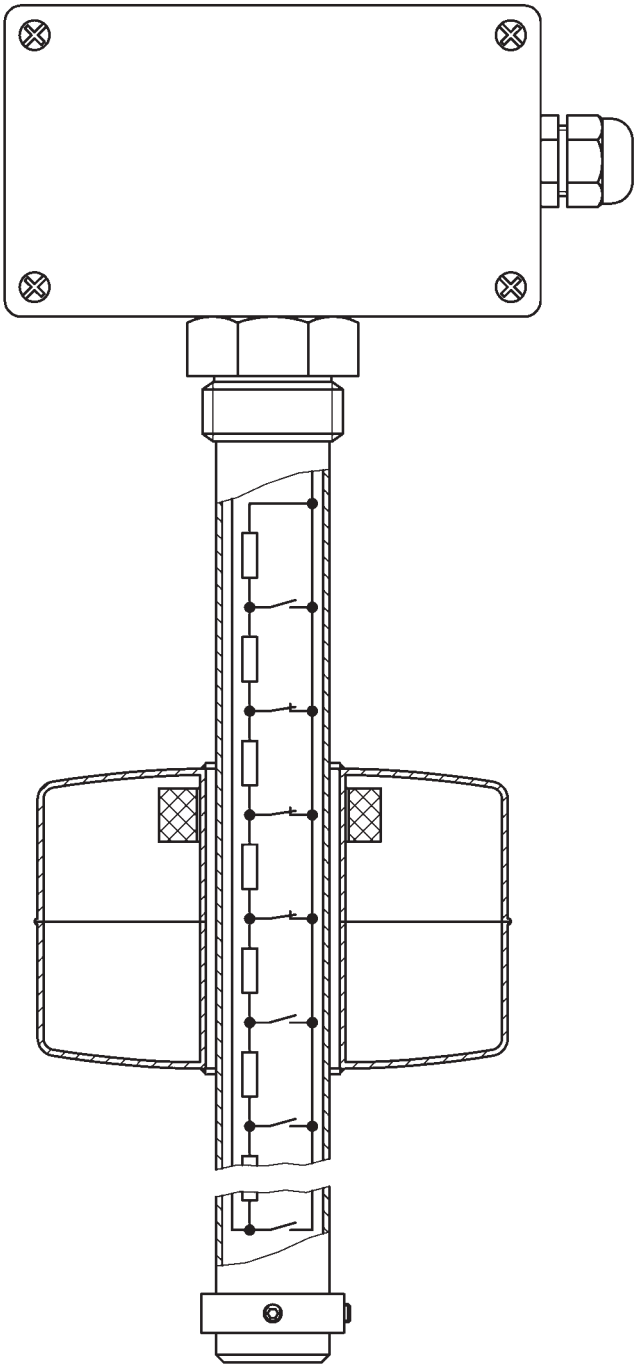
- **a sensor:**
  Switchable resistances activated by float via reed contacts.
- **a transmitter:**
  A 2-wire module in the terminal box of the level indicator converts the resistance values into a load-independent current signal 4 ... 20 mA.

Working principle

A float with built-in permanent magnet moves up and down with the liquid level on a probe tube.

Inside the probe tube, there is a chain made up of reed contacts and series-connected resistors. The magnet in the float switches the reed contact(s) which are at the same position as the float. This results in a quasi-continuous height-proportional resistance measurement.

The change in resistance resulting from the upward and downward motion of the float is recorded via a current loop transmitter in the terminal box and is converted into a load-independent current 4 ... 20 mA.



Area of application

The TSQ 4-20/... level indicators are designed for use in low-viscosity liquids or liquids with only low solid content in open or closed tanks.

They are not suitable for use in liquids that are prone to deposit formation, adhesion or crystallisation which might hinder the movement of the float on the probe tube.

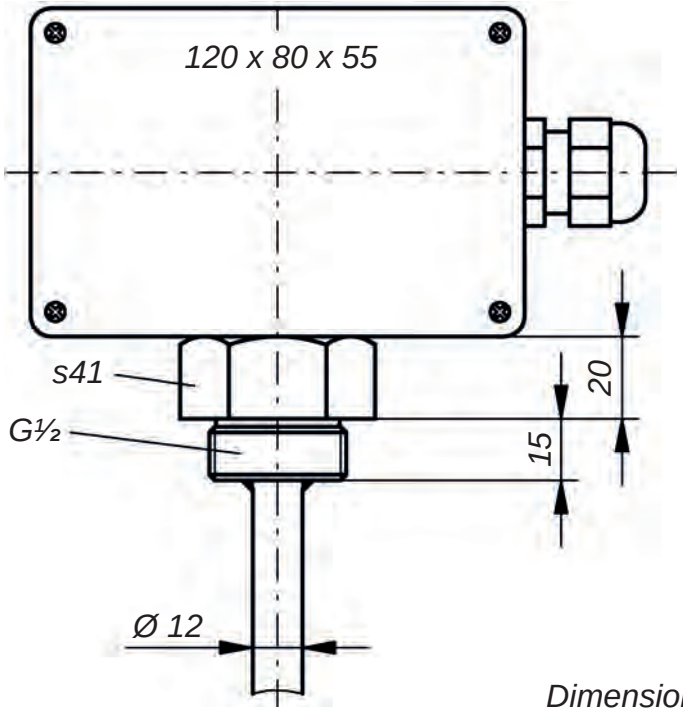
They are also not suitable for use in liquids with **permanently** moving surface and/or on vibrating machines.

Following types are available:

Types	Distance between 2 reed contacts						Max. length of probe tube
	3.75	7.5	15	22.5	30	37.5	
TSQ 4-20/ED/P/7.5	—	●	—	—	—	—	1,500 mm
TSQ 4-20/ED/PK/7.5	—	●	—	—	—	—	1,500 mm
TSQ 4-20/ED/E8/7.5	—	●	—	—	—	—	1,500 mm
TSQ 4-20/ED/E2/7.5	—	●	—	—	—	—	1,500 mm
TSQ 4-20/ED/E7/7.5	—	●	—	—	—	—	1,500 mm
TSQ 4-20/ED/E5/7.5	—	●	—	—	—	—	1,500 mm
TSQ 4-20/EW/E5/...	●	●	—	—	—	—	1,500 mm
TSQ 4-20/EW/E9/...	—	—	●	●	●	●	4,000 mm
TSQ 4-20/P/P/7.5	—	●	—	—	—	—	750 mm
TSQ 4-20/P/PG/7.5	—	●	—	—	—	—	1,500 mm
TSQ 4-20/PVDF/D/7.5	—	●	—	—	—	—	750 mm
TSQ 4-20/PVDF/W/7.5	—	●	—	—	—	—	1,500 mm

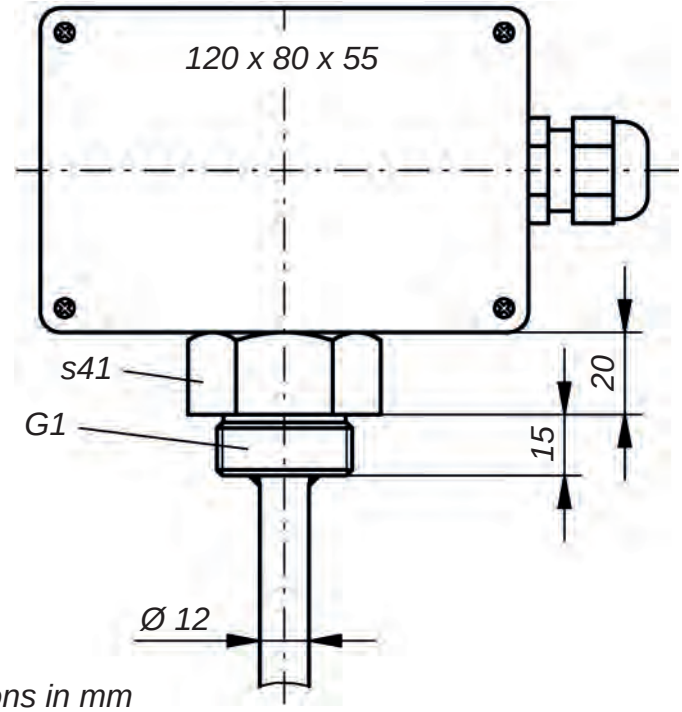
Probe tube		Float		Page
Material	**Ext. Ø**	**Material**	**Dimensions**	
stainless steel 316Ti	12 mm	PP	53 mm Ø x 50 mm	5-1-5
stainless steel 316Ti	12 mm	PP	29 mm Ø x 50 mm	5-1-5
stainless steel 316Ti	12 mm	stainless steel 316Ti	72 mm Ø	5-1-7
stainless steel 316Ti	12 mm	stainless steel 316Ti	44.5 mm Ø x 52 mm	5-1-7
stainless steel 316Ti	12 mm	stainless steel 316Ti	52 mm Ø x 88 mm	5-1-9
stainless steel 316Ti	12 mm	stainless steel 316Ti	98 mm Ø	5-1-9
stainless steel 316Ti	20 mm	stainless steel 316Ti	98 mm Ø	5-1-11
stainless steel 316Ti	20 mm	stainless steel 316Ti	97 mm Ø x 100 mm	5-1-11
PP	14 mm	PP	53 mm Ø x 50 mm	5-1-13
PP	16 mm	PP	89 mm Ø x 60 mm	5-1-13
PVDF	14 mm	PVDF	53 mm Ø x 50 mm	5-1-15
PVDF	16 mm	PVDF	89 mm Ø x 60 mm	5-1-15

Technical data	TSQ 4-20/ED/P/7.5	TSQ 4-20/ED/PK/7.5
Sensor		
Probe tube: • material • diameter • length	stainless steel 316Ti 12 mm on request, max. 1,500 mm	
Screw-in nipple	G½	G1 on request: • G1, G1½ or G2 | • G½, G1½ or G2 • with R1½/G½ or R2/G½ reducing nipple made of stainless steel casting
Float	PP, 53 mm Ø x 50 mm	PP, 29 mm Ø x 50 mm mounting possible through a G2 or R2 socket | G1 socket for liquids with a density ≥ 0.8 g/cm³ | ≥ 0.85 g/cm³
Electrical connection	A 307 terminal box made of PP, 120 x 80 x 55 mm, IP65	
Mounting orientation	vertical	
Temperature range	– 20°C to + 80°C	
Pressure resistance	max. 2 bar at + 20°C, however only for hydraulic pressures and not suitable for pressures in line with the Pressure Equipment Directive 2014/68/EU	
Measuring principle	The magnet of the float activates switchable series-connected resistances via reed contacts. This provides a quasi-continuous height-proportional measuring signal.	
Measuring precision	distance between 2 reed contacts: 7.5 mm	
Transmitter		
Measuring electronics	2 wires (independent of polarity)	
Setting possibility	• potentiometer for 0 % = 4 mA • potentiometer for 100 % = 20 mA The 0 % point of the level indicator has to be set to 4 mA, then a fine adjustment has to be done at the upper end of the measuring range (100 % = 20 mA).	
Power supply	DC 15 - 30 V (independent of polarity)	
Measuring signal	with rising float: 0 ... 100 % = 4 ... 20 mA When the float has got lost, the measuring signal is at the maximum and corresponds to the measuring signal given when the float has reached the upper end of the measuring range of the level indicator.	
Admissible load in the current loop	• max. 200 Ohm at 15 V • max. 900 Ohm at 30 V	
Connecting terminals	for max. 2.5 mm² solid cable or max. 1.5 mm² flexible cable	
EMC	• for interference emission in accordance with the appliance-specific requirements for households, business and commerce as well as small companies • for interference immunity in accordance with the appliance-specific requirements for industrial companies	



TSQ 4-20/ED/P/7.5

Dimensions in mm

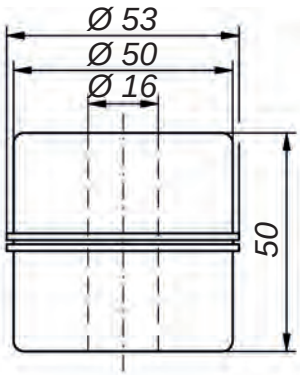


TSQ 4-20/ED/PK/7.5

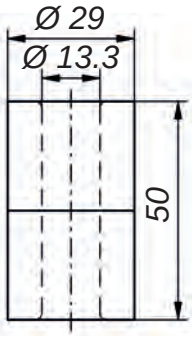
TSQ 4-20/ED/P/7.5

TSQ 4-20/ED/PK/7.5
with G½ screw-in nipple

Float for TSQ 4-20/ED/P/7.5



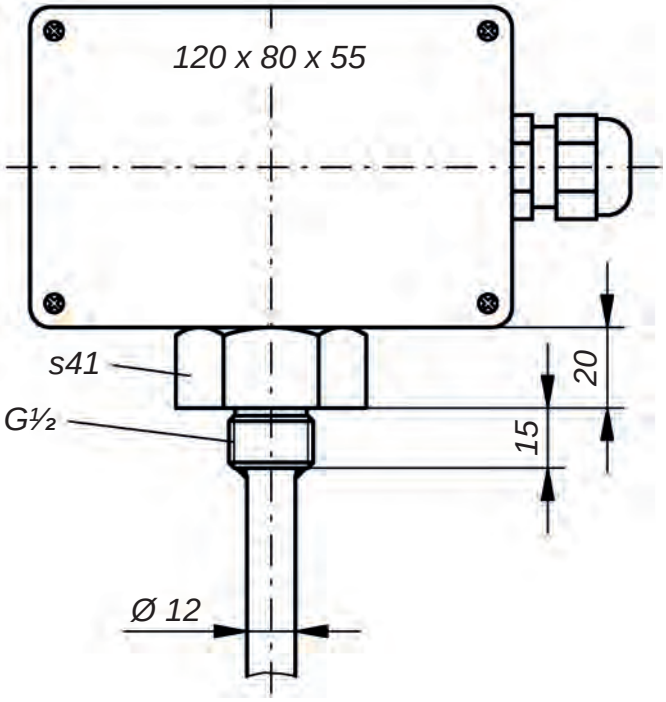
Float for TSQ 4-20/ED/PK/7.5



Optional extra:
see page 5-1-18

For inquiries or orders, please complete the questionnaire on page 5-1-17

Technical data	TSQ 4-20/ED/E8/7.5	TSQ 4-20/ED/E2/7.5
Sensor		
Probe tube: • material • diameter • length	stainless steel 316Ti 12 mm on request, max. 1,500 mm	
Screw-in nipple	G½ on request: • G1, G1½ or G2 • with R1½/G½ or R2/G½ reducing nipple made of stainless steel casting	
Float	stainless steel 316Ti 72 mm Ø for liquids with a density ≥ 0.7 g/cm³	44.5 mm Ø x 52 mm mounting possible through a G1½ or R1½ socket ≥ 0.95 g/cm³
Electrical connection	A 307 terminal box made of PP, 120 x 80 x 55 mm, IP65	
Mounting orientation	vertical	
Temperature range	– 20°C at + 80°C	
Pressure resistance	max. 12 bar at + 20°C, however only for hydraulic pressures and not suitable for pressures in line with the Pressure Equipment Directive 2014/68/EU	
Measuring principle	The magnet of the float activates switchable series-connected resistances via reed contacts. This provides a quasi-continuous height-proportional measuring signal.	
Measuring precision	distance between 2 reed contacts: 7.5 mm	
Transmitter		
Measuring electronics	2 wires (independent of polarity)	
Setting possibility	• potentiometer for 0 % = 4 mA • potentiometer for 100 % = 20 mA The 0 % point of the level indicator has to be set to 4 mA, then a fine adjustment has to be done at the upper end of the measuring range (100 % = 20 mA).	
Power supply	DC 15 - 30 V (independent of polarity)	
Measuring signal	with rising float: 0 ... 100 % = 4 ... 20 mA When the float has got lost, the measuring signal is at the maximum and corresponds to the measuring signal given when the float has reached the upper end of the measuring range of the level indicator.	
Admissible load in the current loop	• max. 200 Ohm at 15 V • max. 900 Ohm at 30 V	
Connecting terminals	for max. 2.5 mm² solid cable or max. 1.5 mm² flexible cable	
EMC	• for interference emission in accordance with the appliance-specific requirements for households, business and commerce as well as small companies • for interference immunity in accordance with the appliance-specific requirements for industrial companies	



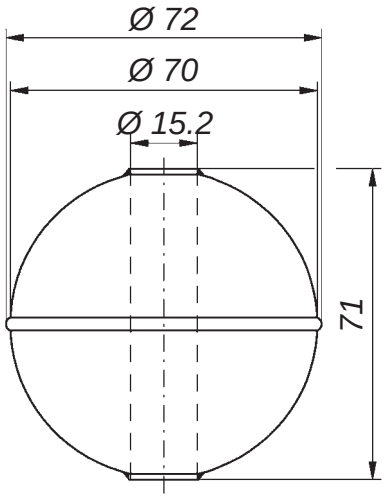
Dimensions in mm

TSQ 4-20/ED/E./7.5

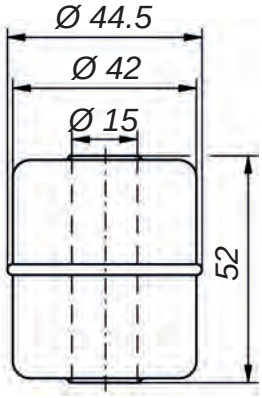
TSQ 4-20/ED/E8/7.5

TSQ 4-20/ED/E2/7.5

Float for TSQ 4-20/ED/E8/7.5



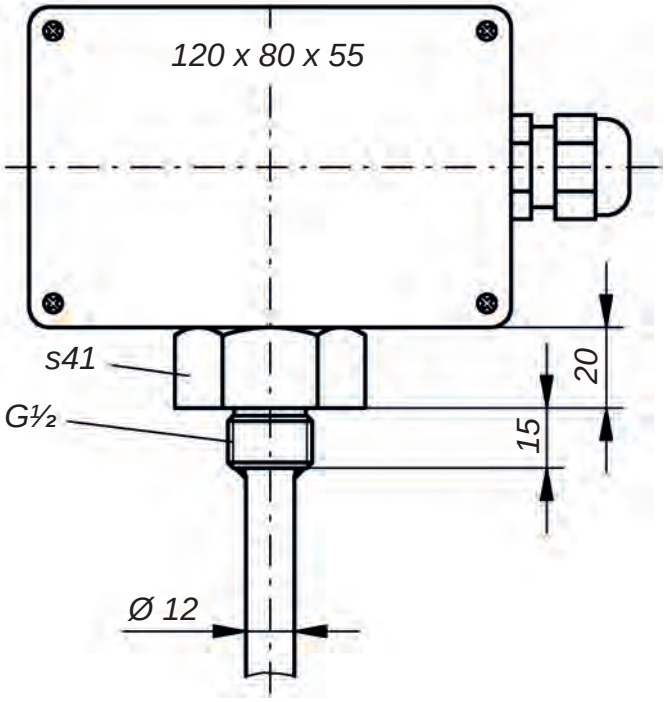
Float for TSQ 4-20/ED/E2/7.5



Optional extra:
see page 5-1-18

For inquiries or orders, please complete the questionnaire on page 5-1-17

Technical data	TSQ 4-20/ED/E7/7.5	TSQ 4-20/ED/E5/7.5
Sensor		
Probe tube: • material • diameter • length	stainless steel 316Ti 12 mm on request, max. 1,500 mm	
Screw-in nipple	G½ on request: • G1, G1½ or G2 • with R1½/G½ or R2/G½ reducing nipple made of stainless steel casting	
Float	stainless steel 316Ti 52 mm Ø x 88 mm mounting possible through a G2 or R2 socket	98 mm Ø
	for liquids with a density ≥ 0.7 g/cm³	
Electrical connection	A 307 terminal box made of PP, 120 x 80 x 55 mm, IP65	
Mounting orientation	vertical	
Temperature range	– 20°C to + 80°C	
Pressure resistance	max. 12 bar at + 20°C, however only for hydraulic pressures and not suitable for pressures in line with the Pressure Equipment Directive 2014/68/EU	
Measuring principle	The magnet of the float activates switchable series-connected resistances via reed contacts. This provides a quasi-continuous height-proportional measuring signal.	
Measuring precision	distance between 2 reed contacts: 7.5 mm	
Transmitter		
Measuring electronics	2 wires (independent of polarity)	
Setting possibility	• potentiometer for 0 % = 4 mA • potentiometer for 100 % = 20 mA The 0 % point of the level indicator has to be set to 4 mA, then a fine adjustment has to be done at the upper end of the measuring range (100 % = 20 mA).	
Power supply	DC 15 - 30 V (independent of polarity)	
Measuring signal	with rising float: 0 ... 100 % = 4 ... 20 mA When the float has got lost, the measuring signal is at the maximum and corresponds to the measuring signal given when the float has reached the upper end of the measuring range of the level indicator.	
Admissible load in the current loop	• max. 200 Ohm at 15 V • max. 900 Ohm at 30 V	
Connecting terminals	for max. 2.5 mm² solid cable or max. 1.5 mm² flexible cable	
EMC	• for interference emission in accordance with the appliance-specific requirements for households, business and commerce as well as small companies • for interference immunity in accordance with the appliance-specific requirements for industrial companies	



TSQ 4-20/ED/E./7.5

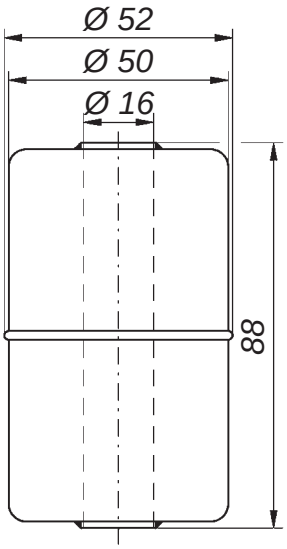
Dimensions in mm

For inquiries or orders, please complete the questionnaire on page 5-1-17

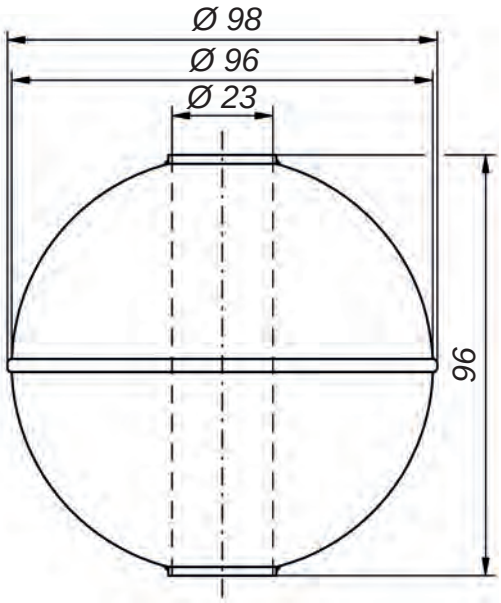
TSQ 4-20/ED/E7/7.5

TSQ 4-20/ED/E5/7.5

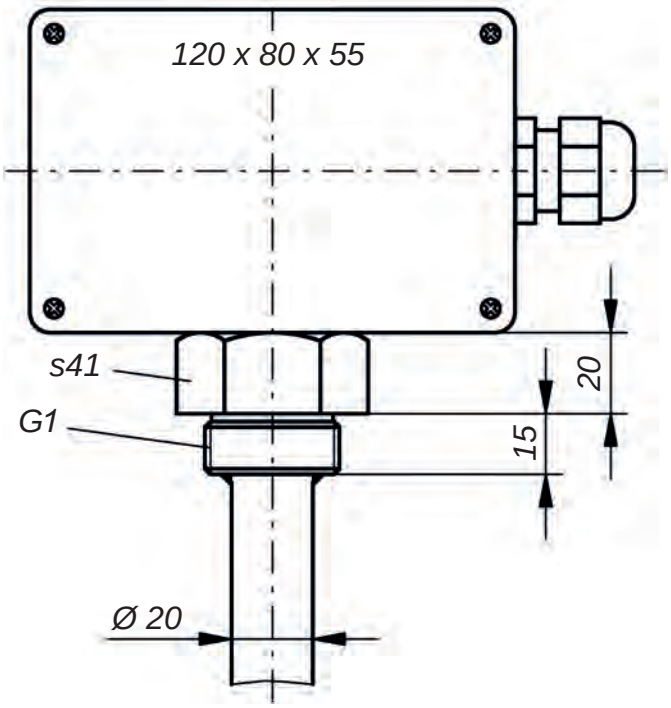
Float for TSQ 4-20/ED/E7/7.5



Float for TSQ 4-20/ED/E5/7.5



Technical data	TSQ 4-20/EW/E5/...	TSQ 4-20/EW/E9/...
	... = additional type designation, see “Measuring precision” below	
Sensor		
Probe tube: • material • diameter • length	stainless steel 316Ti 20 mm on request, max. 1,500 mm	max. 4,000 mm
Screw-in nipple	G1 on request G1½ or G2	
Float	stainless steel 316Ti 98 mm Ø	97 mm Ø x 100 mm
	for liquids with a density ≥ 0.7 g/cm³	≥ 0.8 g/cm³
Electrical connection	A 307 terminal box made of PP, 120 x 80 x 55 mm, IP65	
Mounting orientation	vertical	
Temperature range	– 20°C to + 80°C	
Pressure resistance	max. 12 bar at + 20°C,	max. 8 bar at + 20°C, however only for hydraulic pressures and not suitable for pressures in line with the Pressure Equipment Directive 2014/68/EU
Measuring principle	The magnet of the float activates switchable series-connected resistances via reed contacts. This provides a quasi-continuous height-proportional measuring signal.	
Measuring precision	to be specified ... mm distance between 2 reed contacts (additional type designation): 3.75 7.5	15 22.5 30 37.5
Transmitter		
Measuring electronics	2 wires (independent of polarity)	
Setting possibility	• potentiometer for 0 % = 4 mA • potentiometer for 100 % = 20 mA The 0 % point of the level indicator has to be set to 4 mA, then a fine adjustment has to be done at the upper end of the measuring range (100 % = 20 mA).	
Power supply	DC 15 - 30 V (independent of polarity)	
Measuring signal	with rising float: 0 ... 100 % = 4 ... 20 mA When the float has got lost, the measuring signal is at the maximum and corresponds to the measuring signal given when the float has reached the upper end of the measuring range of the level indicator.	
Admissible load in the current loop	• max. 200 Ohm at 15 V • max. 900 Ohm at 30 V	
Connecting terminals	for max. 2.5 mm² solid cable or max. 1.5 mm² flexible cable	
EMC	• for interference emission in accordance with the appliance-specific requirements for households, business and commerce as well as small companies • for interference immunity in accordance with the appliance-specific requirements for industrial companies	



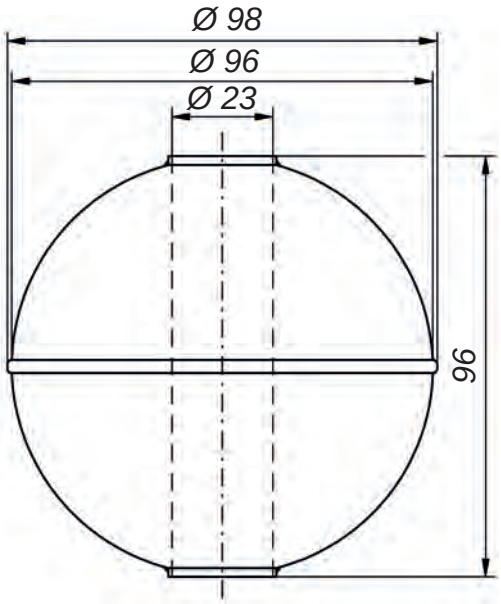
TSQ 4-20/EW/E./...

For inquiries or orders, please complete the questionnaire on page 5-1-17

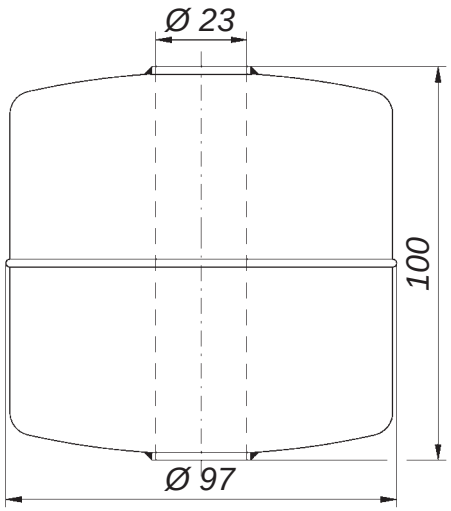
Dimensions in mm

TSQ 4-20/EW/E5/... **TSQ 4-20/EW/E9/...**

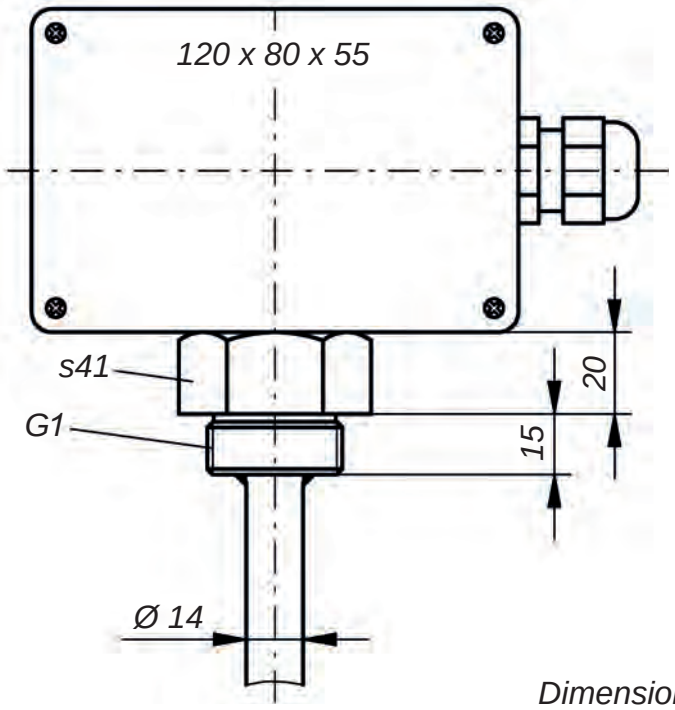
Float for TSQ 4-20/EW/E5/...



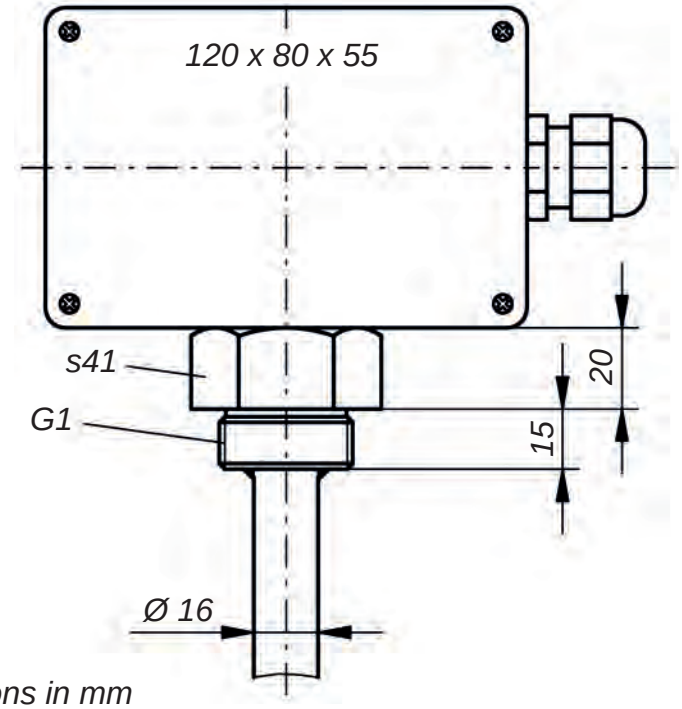
Float for TSQ 4-20/EW/E9/...



Technical data	TSQ 4-20/P/P/7.5	TSQ 4-20/P/PG/7.5
Sensor		
Probe tube: • material • diameter • length	PP 14 mm on request, max. 750 mm however shorter with temperatures above + 60°C (see “Temperature range...” below)	PP 16 mm on request, max. 1,500 mm however shorter with temperatures above + 40°C (see “Temperature range...” below)
Screw-in nipple	G1, on request: • G2 • with G2/G1 reducing nipple made of PP	
Float	PP 53 mm Ø x 50 mm mounting possible through a G2 socket for liquids with a density ≥ 0.8 g/cm³	PP 89 mm Ø x 60 mm for liquids with a density ≥ 0.8 g/cm³
Electrical connection	A 307 terminal box made of PP, 120 x 80 x 55 mm, IP65	
Mounting orientation	vertical	
Temperature range taking into account the probe tube length up to: - max. 1,500 mm - max. 1,000 mm - max. 750 mm - max. 500 mm - max. 400 mm	 — — 0°C to + 60°C 0°C to + 75°C 0°C to + 80°C	 0°C to + 40°C 0°C to + 50°C 0°C to + 60°C 0°C to + 75°C 0°C to + 80°C
Pressure resistance	max. 2 bar at + 20°C, however only for hydraulic pressures and not suitable for pressures in line with the Pressure Equipment Directive 2014/68/EU	
Measuring principle	The magnet of the float activates switchable series-connected resistances via reed contacts. This provides a quasi-continuous height-proportional measuring signal.	
Measuring precision	distance between 2 reed contacts: 7.5 mm	
Transmitter		
Measuring electronics	2 wires (independent of polarity)	
Setting possibility	• potentiometer for 0 % = 4 mA • potentiometer for 100 % = 20 mA The 0 % point of the level indicator has to be set to 4 mA, then a fine adjustment has to be done at the upper end of the measuring range (100 % = 20 mA).	
Power supply	DC 15 - 30 V (independent of polarity)	
Measuring signal	with rising float: 0 ... 100 % = 4 ... 20 mA When the float has got lost, the measuring signal is at the maximum and corresponds to the measuring signal given when the float has reached the upper end of the measuring range of the level indicator.	
Admissible load in the current loop	• max. 200 Ohm at 15 V • max. 900 Ohm at 30 V	
Connecting terminals	for max. 2.5 mm² solid cable or max. 1.5 mm² flexible cable	
EMC	• for interference emission in accordance with the appliance-specific requirements for households, business and commerce as well as small companies • for interference immunity in accordance with the appliance-specific requirements for industrial companies	



TSQ 4-20/P/P/7.5



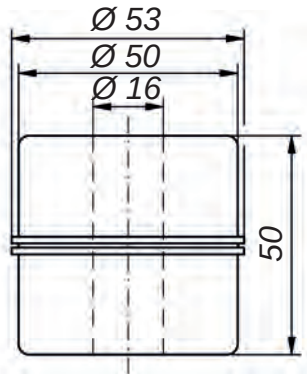
TSQ 4-20/P/PG/7.5

Dimensions in mm

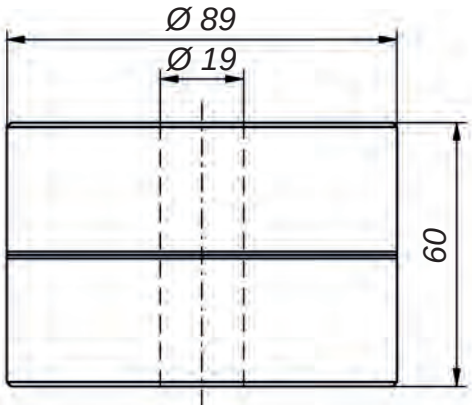
TSQ 4-20/P/P/7.5

TSQ 4-20/P/PG/7.5

Float for TSQ 4-20/P/P/7.5



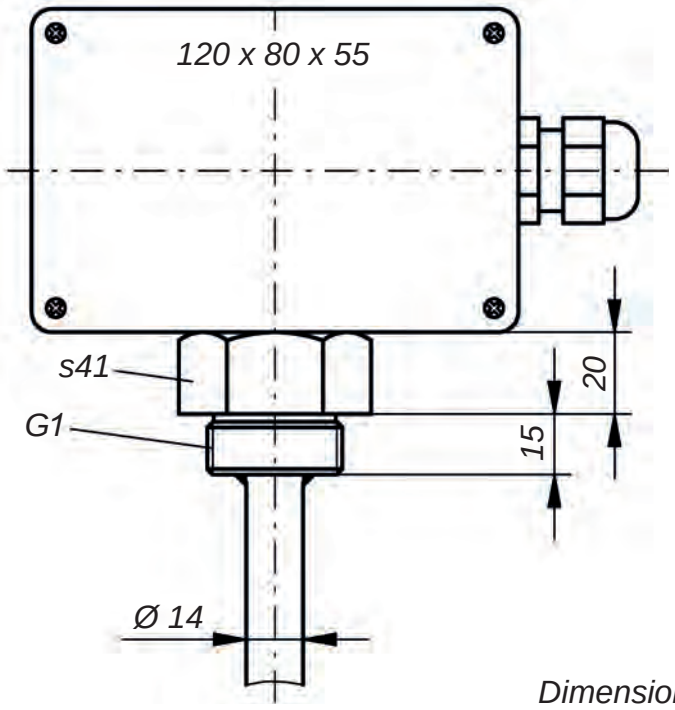
Float for TSQ 4-20/P/PG/7.5



Optional extra:
see page 5-1-18

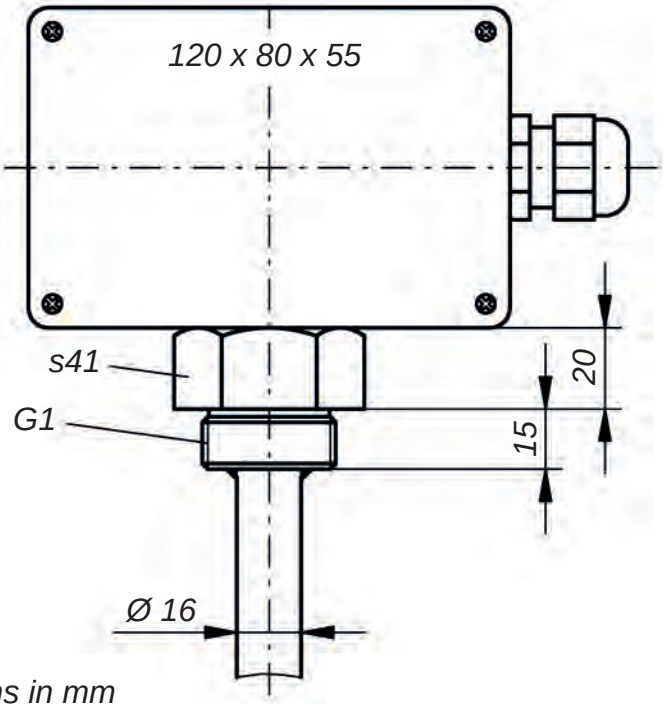
For inquiries or orders, please complete the questionnaire on page 5-1-17

Technical data	TSQ 4-20/PVDF/D/7.5	TSQ 4-20/PVDF/W/7.5
Sensor		
Probe tube: • material • diameter • length	PVDF 14 mm on request, max. 750 mm however shorter with temperatures above + 70°C (see “Temperature range...” below)	16 mm max. 1,500 mm + 45°C
Screw-in nipple	G1, on request G2	
Float	PVDF 53 mm Ø x 50 mm mounting possible through a G2 socket for liquids with a density ≥ 1 g/cm³	89 mm Ø x 60 mm
Electrical connection	A 307 terminal box made of PP, 120 x 80 x 55 mm, IP65	
Mounting orientation	vertical	
Temperature range taking into account the probe tube length up to: - max. 1,500 mm - max. 1,000 mm - max. 750 mm - max. 500 mm	 — — 0°C to + 70°C 0°C to + 80°C	 0°C to + 45°C 0°C to + 55°C 0°C to + 70°C 0°C to + 80°C
Pressure resistance	max. 2 bar at + 20°C, however only for hydraulic pressures and not suitable for pressures in line with the Pressure Equipment Directive 2014/68/EU	
Measuring principle	The magnet of the float activates switchable series-connected resistances via reed contacts. This provides a quasi-continuous height-proportional measuring signal.	
Measuring precision	distance between 2 reed contacts: 7.5 mm	
Transmitter		
Measuring electronics	2 wires (independent of polarity)	
Setting possibility	• potentiometer for 0 % = 4 mA • potentiometer for 100 % = 20 mA The 0 % point of the level indicator has to be set to 4 mA, then a fine adjustment has to be done at the upper end of the measuring range (100 % = 20 mA).	
Power supply	DC 15 - 30 V (independent of polarity)	
Measuring signal	with rising float: 0 ... 100 % = 4 ... 20 mA When the float has got lost, the measuring signal is at the maximum and corresponds to the measuring signal given when the float has reached the upper end of the measuring range of the level indicator.	
Admissible load in the current loop	• max. 200 Ohm at 15 V • max. 900 Ohm at 30 V	
Connecting terminals	for max. 2.5 mm² solid cable or max. 1.5 mm² flexible cable	
EMC	• for interference emission in accordance with the appliance-specific requirements for households, business and commerce as well as small companies • for interference immunity in accordance with the appliance-specific requirements for industrial companies	



TSQ 4-20/PVDF/D/7.5

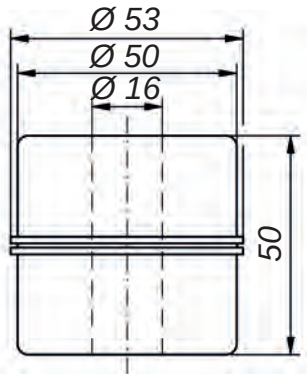
Dimensions in mm



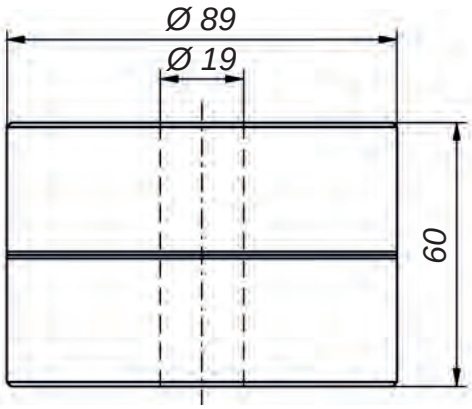
TSQ 4-20/PVDF/W/7.5

TSQ 4-20/PVDF/D/7.5 TSQ 4-20/PVDF/W/7.5

Float for TSQ 4-20/PVDF/D/7.5



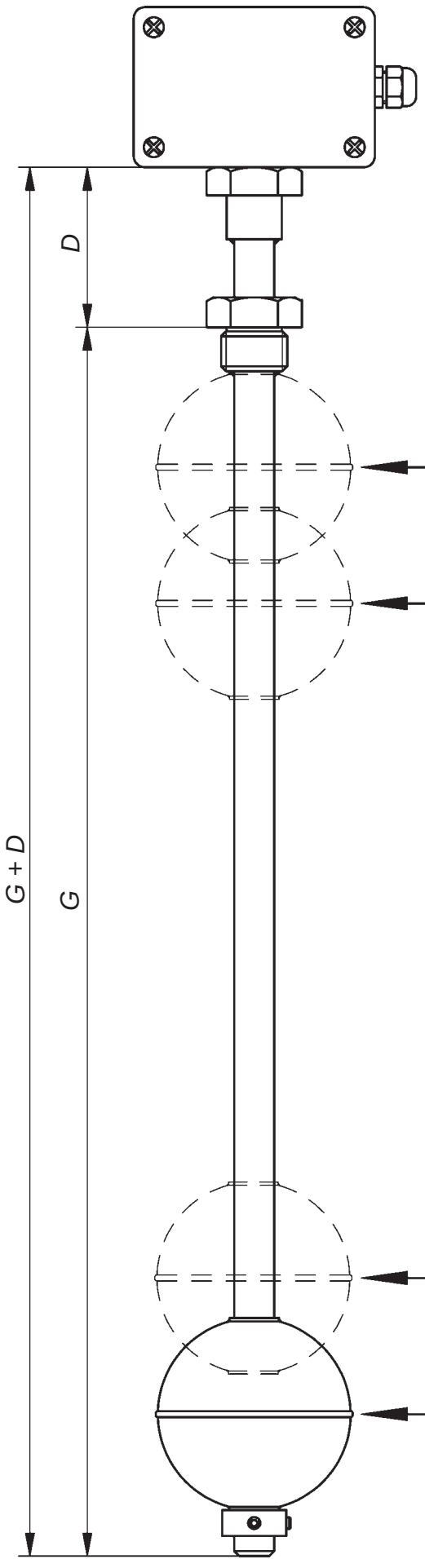
Float for TSQ 4-20/PVDF/W/7.5



Optional extra:
see page 5-1-18

For inquiries or orders, please complete the questionnaire on page 5-1-17

Questionnaire for the customised design of the TSQ 4-20/... level indicator
(please cross as applicable)



Signal evaluation

Desired probe tube length (dimension G):

D = 20 mm,
other dimension on request

☐ 100 % set to maximum filling level that can be evaluated

or

☐ 100 % set to desired filling level, the 100 % value is retained if this level is exceeded

or

☐ 100 % set to desired filling level, if exceeded, the value jumps to a higher value, e.g. 120 %, and remains there

or

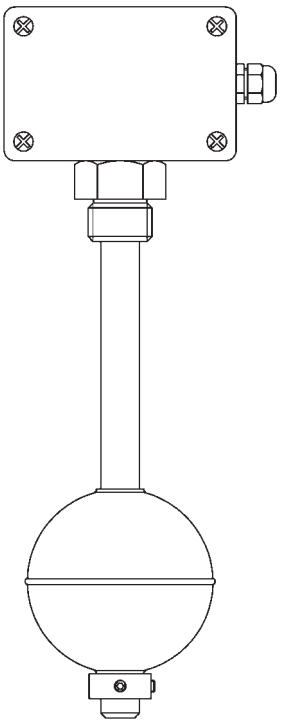
☐ 100 % set to maximum filling level that can be evaluated, adjusted to the desired 100 % filling level via multi-turn trim pot, if this level is exceeded, the signal continuously increases to above 100 %

☐ Measurement begins at 0 % at specified dimension above bottom edge of probe, below this level, the signal remains at 0 %, “negative” filling level is not possible

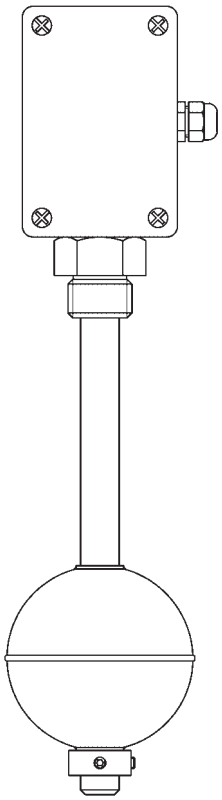
or

☐ Measurement begins at 0 % where filling level from bottom edge of probe = immersion depth of the float

Position of terminal box

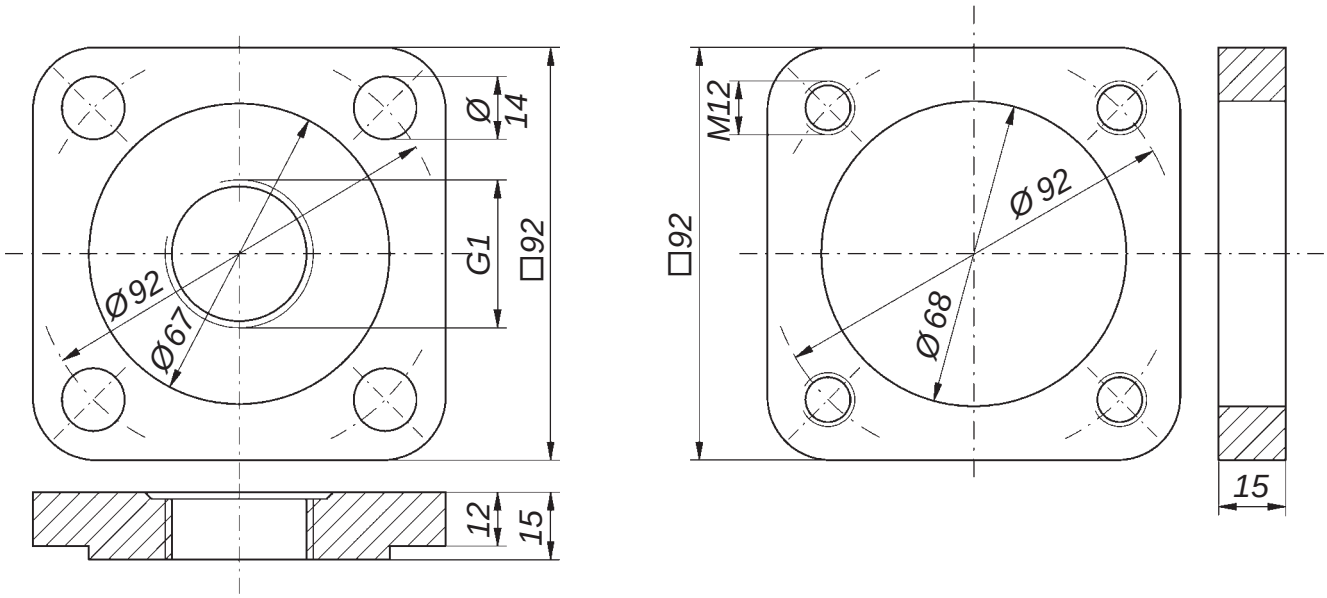


☐ horizontal (standard)



☐ vertical

Optional extra:
square blind flange with G1 threaded hole
and
corresponding counter flange
made of stainless steel 316Ti, PP or PVDF
for TSQ 4-20/... level indicator with G1 screw-in nipple



Dimensions in mm