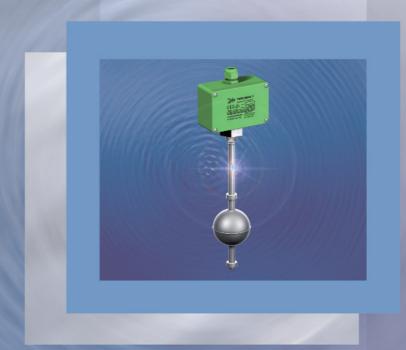


TSR immersion probes

Controlling devices with magnetically operated reed contacts, for automatic control, regulation and signalling of liquid levels





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TSR/./ED/P			PP	53 mm Ø x 50 mm	3-1-5
TSR/./ED/PK			1 1	29 mm Ø x 50 mm	3-1-5
TSR/./ED/E8		12 mm		72 mm Ø	3-1-7
TSR/./ED/E2	stainless steel 316 Ti	12 mm	stainless steel 316 Ti	44.5 mm Ø x 52 mm	3-1-7
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TSR/./TiW/Ti4	titanium	19 or 20 mm	titanium	79 mm Ø x 95 mm	3-1-15
TSR/0/ED/E6	stainless steel 316 Ti stainless steel 44.5 mm Ø x 47.5 mm		3-1-17		
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The units described in this documentation may only be installed, connected and started up 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.



Magnetically operated automatic liquid level controls

Construction and operating principle of TSR immersion probes

The TSR immersion probes have a probe tube with built-in reed contacts. The float is fitted with a permanent magnet and moves freely up and down the probe tube, activating the reed contacts as it rises and falls.

It should be noted that reed contacts do **not** lock but that they switch only for as long as they are influenced by the magnetic field. Once the float passes beyond a contact upwards or downwards, the latter returns to its original position. However, the contacts can be made to hold by using collars to limit the motion of the float.

For use outside potentially explosive atmospheres, the costumer can choose the model <u>TSR/3/...</u> or <u>TSR/1/...</u> (not suitable for the type TSR/0/ED/E6, see page 3-1-17):

Туре	TSR/3/	TSR/1/
Application Switching voltage Switching current Switching capacity	for applications up to max. 250 V AC/DC 24 V – 250 V AC 100 mA – 2 A (0.4 A) max. 100 VA	for light current applications AC/DC 1 V – 42 V AC 1 mA – 500 mA max. 20 VA
VDE manka liaanaa	DV _E	
VDE marks licences	EMC	EMC

Instruction for working with inductive loads:

When using the TSR types with inductive loads, a RC combination of 0.22 μ F + 220 Ω must be connected in parallel to the magnetic coil of the contactor.

Caution!

If a TSR immersion probe is to be used with a KR protection relay, you must choose the model TSR/1/... .

We recommend this apparatus combination.

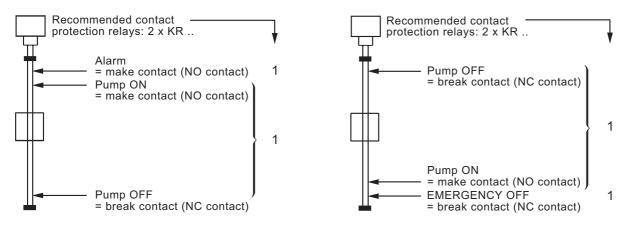
Specimen application 1: Automatic emptying of a tank

The float rises with the liquid to the maximum level and trips the "make" (= normally open) contact which in turn activates the contactor solenoid, serving, for example, to set a pump in operation. Liquid is pumped out. When the minimum level is reached, the "break" (= normally closed) contact at the bottom is activated, thus interrupting the contactor holding circuit. The arrangement is therefore exactly the same as with ON-OFF pushbuttons.

Specimen application 2: Automatic filling of a tank

The float falls with the liquid to the minimum level and trips the "make" (= normally open) contact which in turn activates the contactor solenoid, serving, for example, to set a pump in operation. Liquid is then pumped in. When the maximum level is reached, the upper "break" (= normally closed) contact is activated, thus interrupting the contactor holding circuit. The arrangement is therefore exactly the same as with ON-OFF pushbuttons.

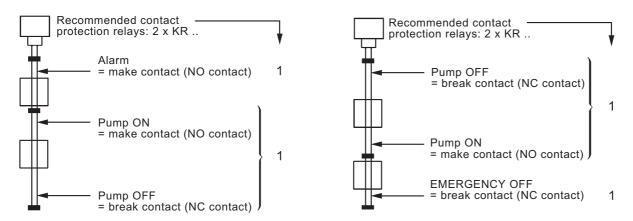
Examples of standard operation Standard operations with 1 float and a collar fitted above the upper contact.



The collar fitted at the top stops the float at the upper contact, so that the latter cannot be overrun. If this collar was not fitted, it is conceivable that, in the case of a short power failure and freely entering liquid, for example, the contact for "Pump ON" or the alarm contact would be overrun during the short power failure without the pump being switched on or an alarm signal being given. This could then lead to an overflow.

For the same reasons, the probe tube should be of such a length that when the float reaches the lower contact, it rests on the lower holding washer or collar (For information on the recommended distances between contact and end of probe tube, see the technical data of the individual TSR models under "Minimum distances").

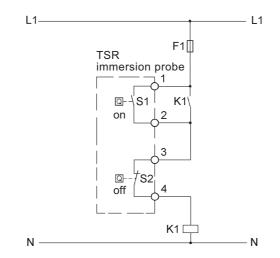
Standard operations with 2 or more floats

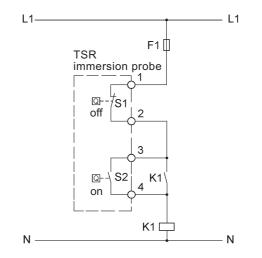


The use of an additional float together with the corresponding collar ensures that not only the uppermost and lowest but also another important contact is held when the liquid level rises above or falls below the level at which the contact is set. Depending on the desired switching function, it is possible to use several floats together with the corresponding collars.

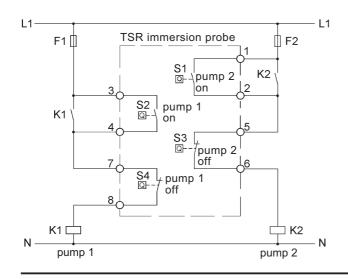
When fixing the levels at which the contacts are to be set, care should be taken to ensure that wherever a float is stopped at a contact by a collar, the minimum distance to an adjacent contact activated by another, separate float should be increased in varying degrees, depending on the model of floats planned. Please consult us regarding exact spacing!

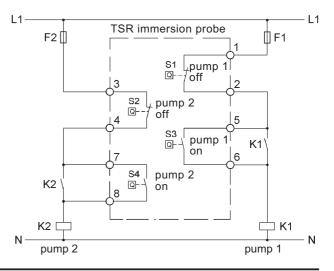
using a TSR



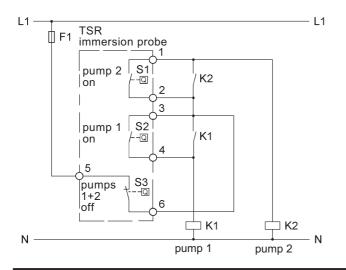


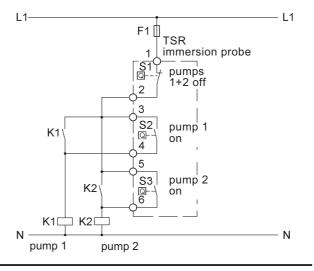
using a TSR for 2 pumps





using a TSR for 2 pumps with a common switch-off contact





The above contact positions correspond to a liquid level situated between the respective switch-on and switch-off points.



TSR/... immersion probes with • probe tube made of stainless steel • float made of PP

Туре	TSR/3/ED/	TSR/1/ED/
Application	for applications up to max. 250 V	for light current applications
Switching voltage Switching current Switching capacity	AC/DC 24 V – 250 V AC 100 mA – 2 A (0.4 A) max. 100 VA	AC/DC 1 V – 42 V AC 1 mA – 500 mA max. 20 VA

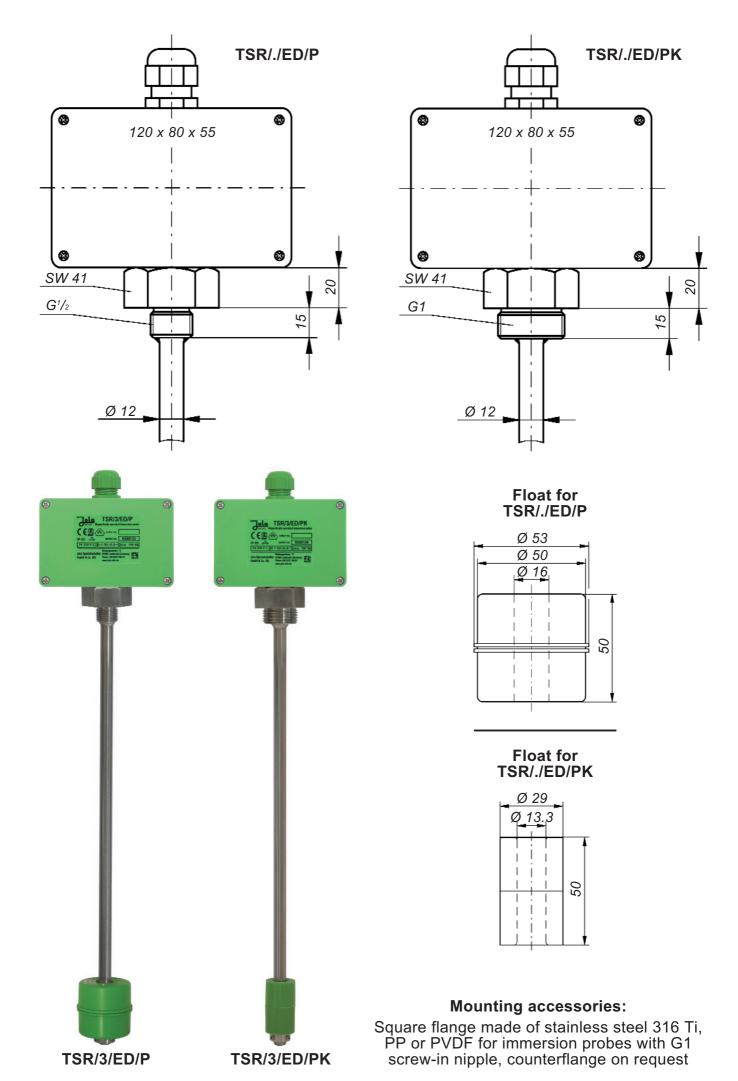
Switching capacity	IIIax. 100 VA	IIIax. 20 VA	
Technical data	TSR/3/ED/P TSR/1/ED/P	TSR/3/ED/PK TSR/1/ED/PK	
Probe tube: material diameter length	stainless steel 316 Ti 12 mm acc. to customer's specification, however max. 3,000 mm		
Screw-in nipple	G¹/₂, on request G1, G1, on request G¹/₂, on request G1¹/₂ or G2; on request with reducing nipple made of malleable cast iron R1¹/₂ or R2 conical		
Float	P 53 mm Ø x 50 mm (mounting possible through a G/R2 socket)	P, 29 mm Ø x 50 mm (mounting possible through a G1 socket)	
Float suitable for use in media with a specific gravity	≥ 0.8 g/cm³	≥ 0.85 g/cm³	
Terminal box	PP, A 307, 120 x 80 x 55 mm, protection class IP65, with max. 12 terminals; other terminal boxes on request; with free connecting cable on request		
Mounting orientation	verl	tical	
Temperature range	− 20°C to + 80°C		
Pressure resistance at + 20° C	max. 2 bar		
Contacts	reed contacts: make (NO), break (NC) or changeover (OC)		
Max. number of contacts		3	
Min. distances to be observed (based on liquids with a specific gravity of 1 g/cm³): • from the nipple sealing surface to the upper contact	approx. 70 mm	approx. 70 mm	
 between contacts from the lower contact to the end of the probe tube (when float is falling) 	approx. 70 mm approx. 80 mm	approx. 70 mm approx. 80 mm	

Also available with angled probe tube for mounting from the side

The above equipment will be manufactured in accordance with your specifications

For inquiries or orders, please complete the questionnaire on page 3-1-19

Option for TSR/1/... immersion probes: diodes or resistors





TSR/... immersion probes with probe tube made of stainless steel float made of stainless steel

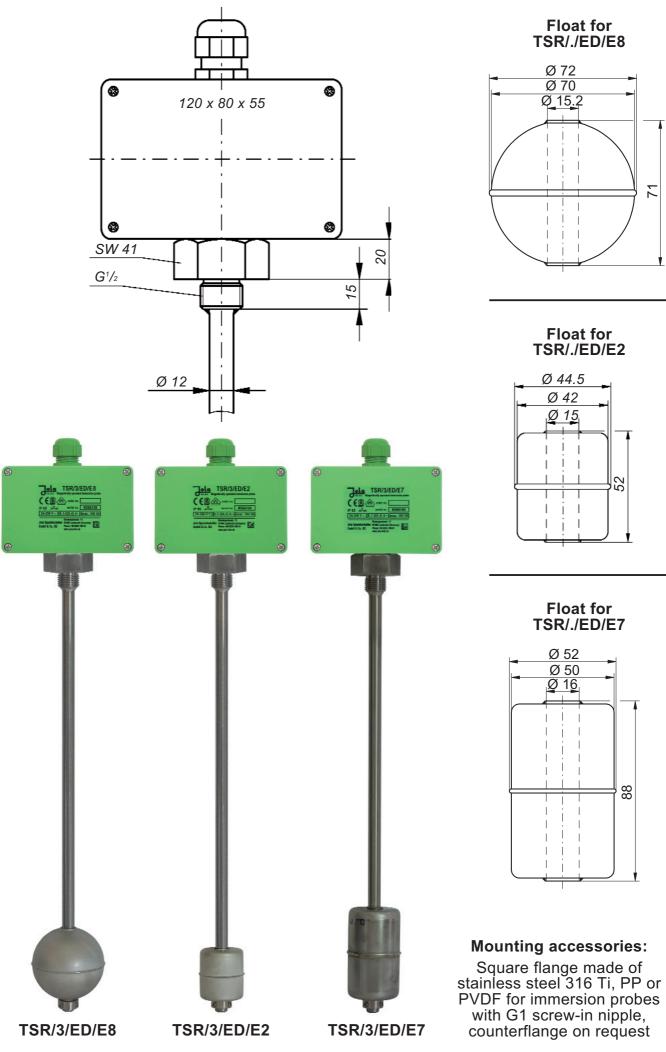
Туре	TSR/3/ED/E.	TSR/1/ED/E.
Application	for applications up to max. 250 V	for light current applications
Switching voltage Switching current Switching capacity	AC/DC 24 V – 250 V AC 100 mA – 2 A (0.4 A) max. 100 VA	AC/DC 1 V – 42 V AC 1 mA – 500 mA max. 20 VA

Technical data	TSR/3/ED/E8 TSR/1/ED/E8	TSR/3/ED/E2 TSR/1/ED/E2	TSR/3/ED/E7 TSR/1/ED/E7
Probe tube: material diameter length	stainless steel 316 Ti 12 mm acc. to customer's specification, however max. 3,000 n		
Screw-in nipple	G¹/₂, on request G1, G1¹/₂ or G2; —— on request with reducing nipple made of malleable cast iron R1¹/₂ conical R2 conical		
Float	stainless steel 316 Ti, 72 mm Ø 44.5 mm Ø x 52 mm 52 mm Ø x 88 m mounting possible through a G/R1¹/₂ socket G/R2 socket		52 mm Ø x 88 mm
Float suitable for use in media with a specific gravity	≥ 0.7 g/cm³	≥ 0.95 g/cm³	≥ 0.7 g/cm³
Terminal box	PP, A 307, 120 x 80 x 55 mm, protection class IP65, for max. 12 terminals; other terminal boxes on request; with free connecting cable on request		
Mounting orientation	vertical		
Temperature range	– 20°C to + 100°C; on request: – 20°C to + 130°C		
Pressure resistance at + 20°C	max. 12 bar, higher pressure resistance on request		
Contacts	reed contacts: make (NO), break (NC) or changeover (OC)		
Max. number of contacts		3	
Min. distances to be observed (based on liquids with a specific gravity of 1 g/cm³): • from the nipple sealing surface to the upper contact • between contacts	approx. 80 mm approx. 80 mm	approx. 70 mm approx. 80 mm	approx. 80 mm approx. 80 mm
 from the lower contact to the end of the probe tube (when float is falling) 	approx. 60 mm	approx. 60 mm	approx. 70 mm
Also available with angled probe tube for mounting from the side			

The above equipment will be manufactured in accordance with your specifications

For inquiries or orders, please complete the questionnaire on page 3-1-19

Option for TSR/1/... immersion probes: diodes or resistors

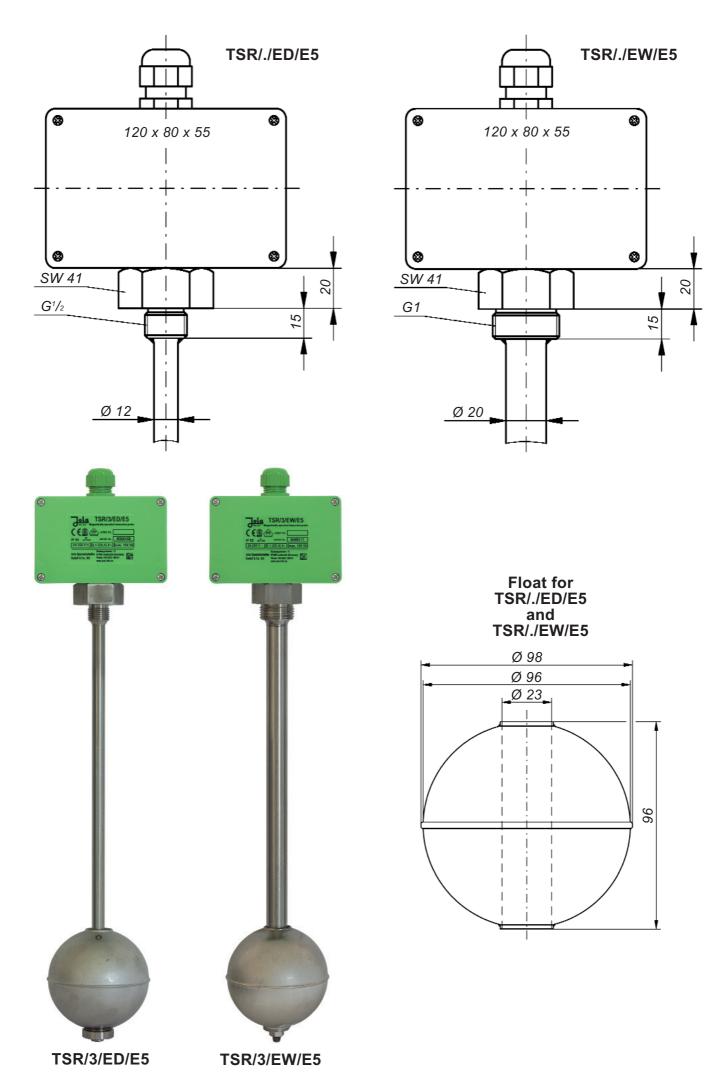




TSR/... immersion probes with probe tube made of stainless steel float made of stainless steel

Туре	TSR/3/E./E5	TSR/1/E./E5
Application Switching voltage Switching current Switching capacity	for applications up to max. 250 V AC/DC 24 V – 250 V AC 100 mA – 2 A (0.4 A) max. 100 VA	for light current applications AC/DC 1 V – 42 V AC 1 mA – 500 mA max. 20 VA
Technical data	TSR/3/ED/E5 TSR/1/ED/E5	TSR/3/EW/E5 TSR/1/EW/E5
Probe tube: material diameter length	stainless s 12 mm acc. to customer's sp max. 3,000 mm	teel 316 Ti 20 mm Decification, however max. 6,000 mm
Screw-in nipple	G¹/₂, on request G1, on request on request on request with reducing cast iron R1¹/₂	G1, G1¹/₂ or G2;
Float	stainless st 98 Ø mm	
Float suitable for use in media with a specific gravity Terminal box	protection class IP65, v	g/cm³ x 80 x 55 mm, with max. 12 terminals; oxes on request;
Mounting orientation Temperature range	vert - 20°C to + 100°C	
Pressure resistance at + 20°C	max. 12 bar,	max. 12 bar (heat-resistant version: max. 3 bar),
		sistance on request
Contacts Max. number of contacts	reed contacts: make (NO), broad	eak (NC) or changeover (OC) 6, more on request
Min. distances to be observed (based on liquids with a specific gravity of 1 g/cm³): • from the nipple sealing surface to the upper		
contact • between contacts • from the lower contact to the end of the probe tube	approx. 90 mm approx. 80 mm	approx. 90 mm approx. 80 mm
(when float is falling)	approx. 60 mm bbe tube for mounting from the	approx. 70 mm side

The above equipment will be manufactured in accordance with your specifications

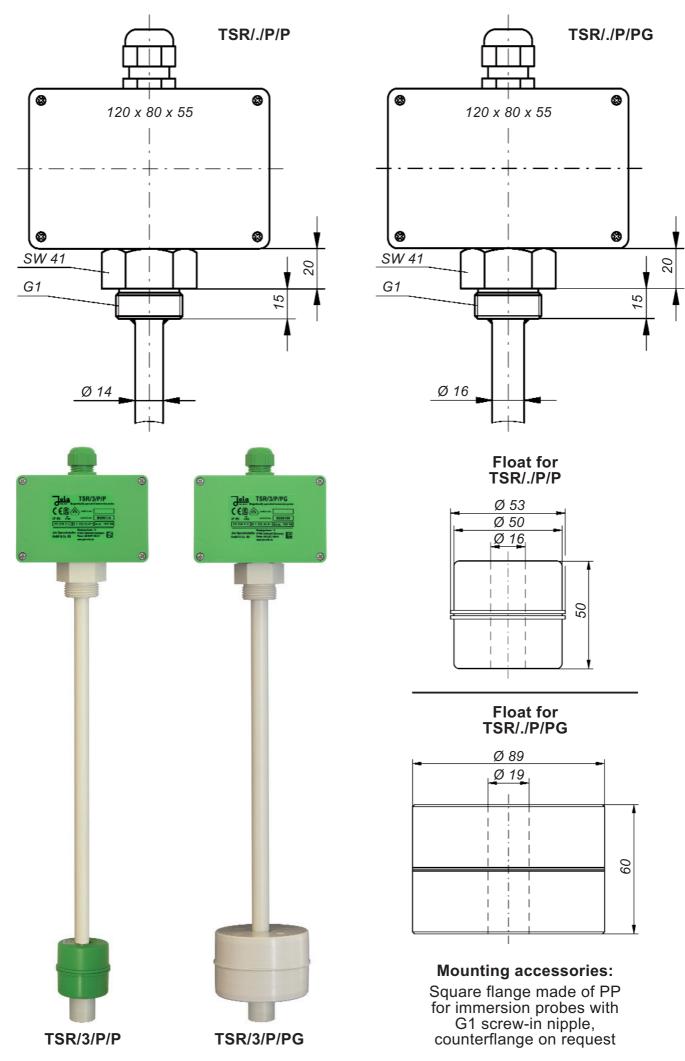




TSR/... immersion probes with probe tube made of PP • float made of PP

Туре	TSR/3/P/P	TSR/1/P/PG	
Application	for applications	for light current	
Application	up to max. 250 V	applications	
Switching voltage	AC/DC 24 V – 250 V	AC/DC 1 V – 42 V	
Switching current	AC 100 mA – 2 A (0.4 A)	AC 1 mA – 500 mA	
Switching capacity	max. 100 VA	max. 20 VA	
Technical data	TSR/3/P/P TSR/1/P/P	TSR/3/P/PG TSR/1/P/PG	
Probe tube: material	P		
		on request, with metal inner tube to strengthen the plastic probe tube	
diameter	14 mm	16 mm	
length	max. 1,000 mm,	specifications, however max. 2,000 mm,	
	taking into account the max. possible liquid		
Screw-in nipple	G1, on requ	G1,	
Float		P,	
	53 mm Ø x 50 mm (mounting possible through a G2 socket)	89 mm Ø x 60 mm	
Float suitable for use in media with a specific gravity	, ≥ 0.8 g/cm³		
Terminal box	PP, A 307, 120 x 80 x 55 mm, protection class IP65,		
M 6	with max. 12 terminals; other terminal boxes on request; with free connecting cable on request vertical		
Mounting orientation Temperature range	ven	ical	
taking into account the probe tube length:			
– max. 2,000 mm		0°C to + 35°C	
max. 1,500 mmmax. 1,000 mm	0°C to	0°C to + 40°C	
– max. 750 mm	0°C to		
– max. 500 mm	0°C to	+ 75°C	
 max. 400 mm Pressure resistance at + 20°C 	0°C to	+ 80°C 2 bar	
Contacts	reed contacts: make (NO), br		
Max. number of contacts: • without inner tube	3	6	
with inner tube		6 3	
Min. distances to be			
observed (based on liquids with a specific gravity of			
1 g/cm³):			
from the nipple sealing auritage to the upper			
surface to the upper contact	approx. 70 mm	approx. 80 mm	
 between contacts 	approx. 80 mm	approx. 80 mm	
 from the lower contact to the end of the probe tube 			
(when float is falling)	approx. 60 mm	approx. 50 mm	

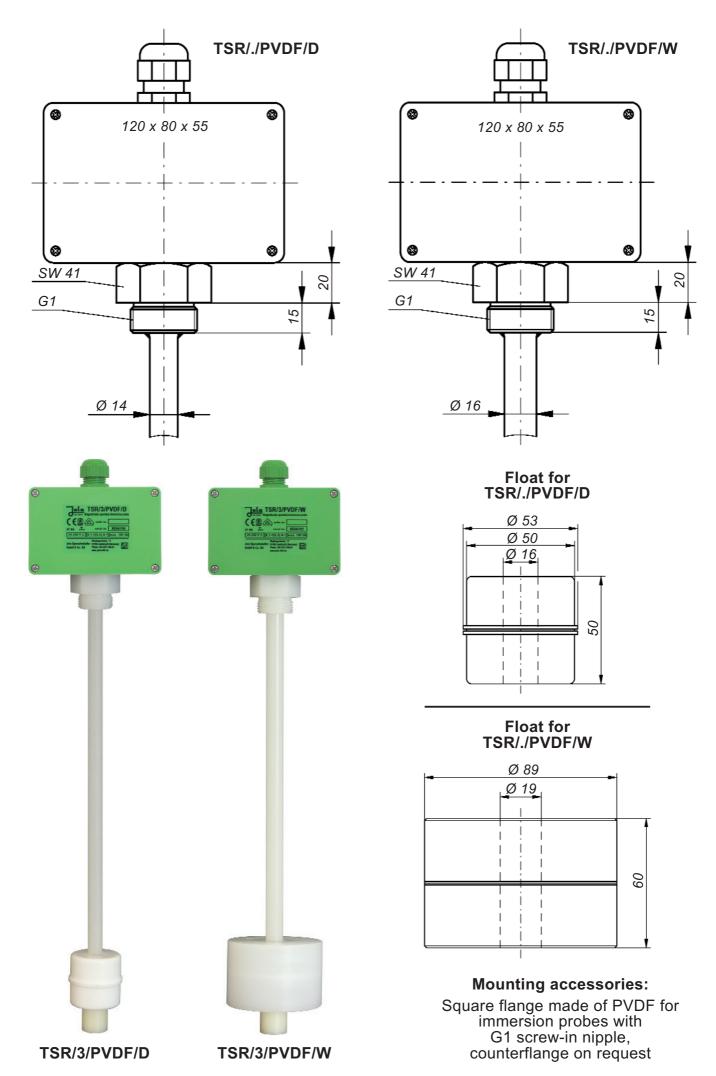
The above equipment will be manufactured in accordance with your specifications





TSR/... immersion probes with probe tube made of PVDF • float made of PVDF

Туре	TSR/3/PVDF/.	TSR/1/PVDF/.	
Application	for applications	for light current	
Switching voltage Switching current Switching capacity	up to max. 250 V AC/DC 24 V – 250 V AC 100 mA – 2 A (0.4 A) max. 100 VA	applications AC/DC 1 V – 42 V AC 1 mA – 500 mA max. 20 VA	
Technical data	TSR/3/PVDF/D TSR/1/PVDF/D	TSR/3/PVDF/W TSR/1/PVDF/W	
Probe tube: material diameter length	14 mm according to customer's max. 1,000 mm, taking into account the max.	on request, with metal inner tube to strengthen the plastic probe tube 16 mm specifications, however max. 2,000 mm, temperature in the tank and	
Screw-in nipple	G1, on requ	l G1,	
Float		DF, 89 mm Ø x 60 mm	
Float suitable for use in media with a specific gravity Terminal box	≥ 1 g/cm³ ≥ 1 g/cm³ PP, A 307, 120 x 80 x 55 mm, protection class IP65, with max. 12 terminals; other terminal boxes on request; with free connecting cable on request		
Mounting orientation Temperature range taking into account the probe tube length: – max. 2,000 mm – max. 1,500 mm – max. 1,000 mm – max. 750 mm – max. 500 mm Pressure resistance at + 20°C	vert O°C to O°C to O°C to	0°C to + 40°C 0°C to + 45°C + 55°C + 70°C	
Contacts	reed contacts: make (NO), break (NC) or changeover (O		
Max. number of contacts: • without inner tube • with inner tube Min. distances to be observed (based on liquids with a specific gravity of 1 g/cm³): • from the nipple sealing	3	6 3	
surface to the upper contact • between contacts • from the lower contact to the end of the probe tube	approx. 80 mm approx. 80 mm	approx. 80 mm approx. 80 mm	
(when float is falling) The above equipment will be	approx. 70 mm manufactured in accordance	approx. 65 mm with your specifications	





TSR/... immersion probes with

- probe tube made of titanium
- float made of titanium

Type	TSR/3/Ti./Ti.	TSR/1/Ti./Ti.	
Application Switching voltage Switching current Switching capacity	for applications up to max. 250 V AC/DC 24 V – 250 V AC 100 mA – 2 A (0.4 A) max. 100 VA	for light current applications AC/DC 1 V – 42 V AC 1 mA – 500 mA max. 20 VA	
Technical data	TSR/3/TiD/Ti7 TSR/1/TiD/Ti7	TSR/3/TiW/Ti4 TSR/1/TiW/Ti4	
Probe tube: material diameter length	titan 12 mm according to customer's max. 3,000 mm	nium 19 or 20 mm specifications, however max. 6,000 mm	
Screw-in nipple	G ¹ / ₂	G1	
Float	titan 44.5 mm Ø x 52 mm	ium, 79 mm Ø x 95 mm	
Float suitable for use in media with a specific gravity	≥ 0.95 g/cm³	≥ 0.7 g/cm³	
Terminal box	PP, A 307, 120 x 80 x 55 mm, protection class IP65, with max. 12 terminals; other terminal boxes on request; with free connecting cable on request		
Mounting orientation	vertical		
Temperature range	- 20°C to + 100°C		
Pressure resistance at + 20°C	max. 10 bar, max. 7 bar, higher pressure resistance on request		
Contacts	reed contacts: make (NO), break (NC) or changeover (C		
Max. number of contacts	3	6, more on request	

surface to the upper contact approx. 70 mm approx. 90 mm approx. 80 mm approx. 80 mm

the end of the probe tube (when float is falling) approx. 60 mm approx. 75 mm

Also available with angled probe tube for mounting from the side

The above equipment will be manufactured in accordance with your specifications

For inquiries or orders, please complete the questionnaire on page 3-1-19

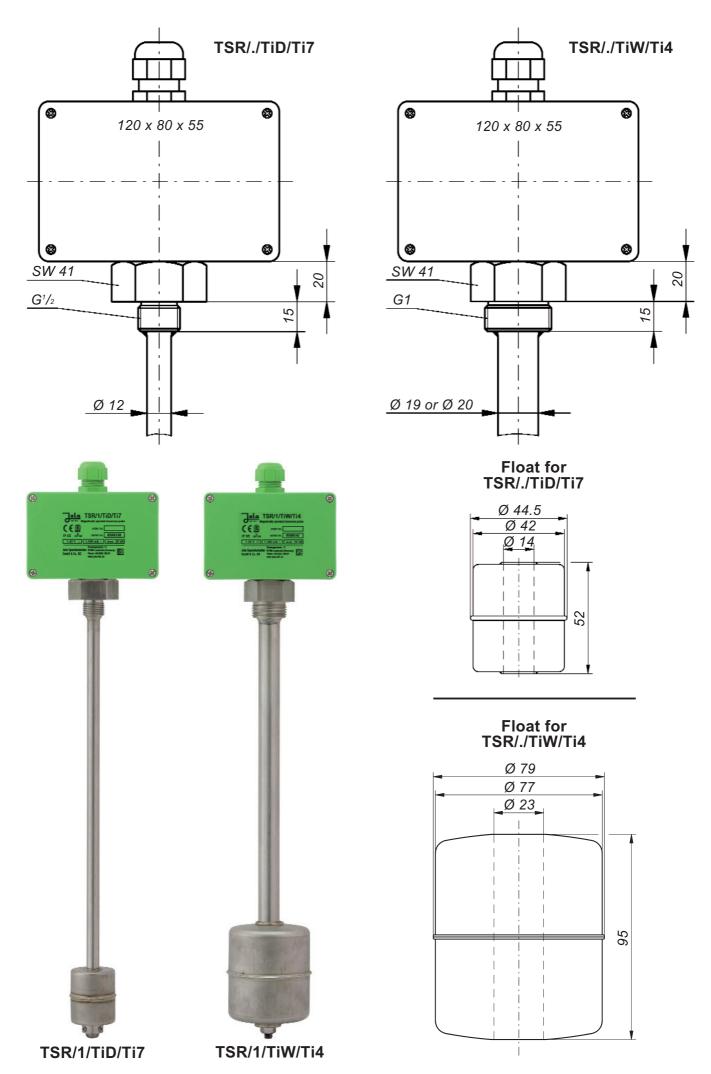
Option for TSR/1/... immersion probes: diodes or resistors

Min. distances to be

1 g/cm³):

observed (based on liquids with a specific gravity of

from the nipple sealing

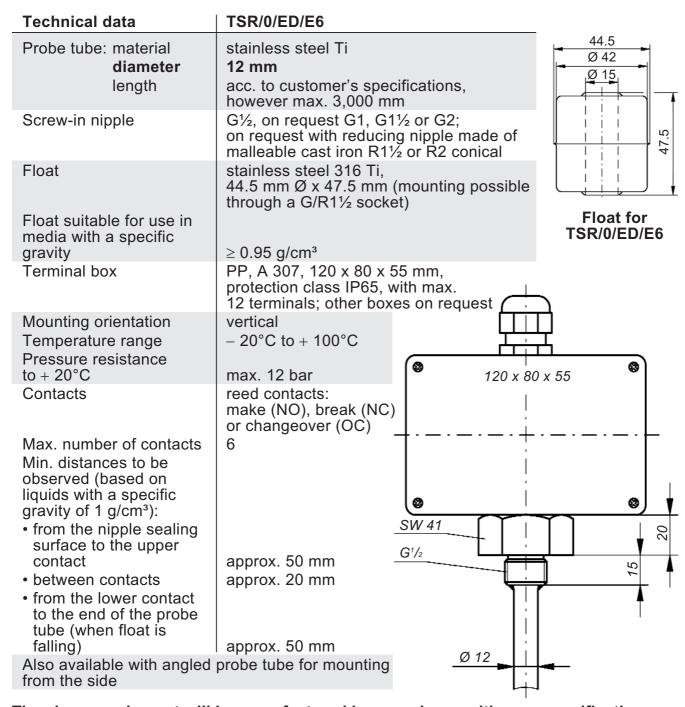




TSR/0/ED/E6 immersion probe with

- probe tube made of stainless steel
- float made of stainless steel with mini-contacts for small contact distances and/or a higher number of contacts

Types	TSR/0/ED/E6
Application Switching voltage Switching current Switching capacity	for light current applications AC/DC 1 V - 42 V AC 1 mA - 100 mA max. 2 VA



The above equipment will be manufactured in accordance with your specifications

DK 3 switching bowls

For lateral mounting on tanks or pipelines, suitable for TSR immersion probes.

The use of a switching bowl is necessary wherever heavy turbulences would impede or prevent the operation of an immersion probe inside a tank or where these units cannot be installed for reasons of space.

Technical data	DK 3
Material	stainless steel 316 Ti; other materials on request
Diameter	102 mm
Height	according to customer's specifications
Socket size	according to customer's specifications; on request: flanges of any dimensions
Distance between sockets (or flanges)	according to customer's specifications

DK 3 switching bowl: standard model Upper switching point at least 110 mm 120 below the t = 55nipple sealing 27 surface holes circle Ø 130 80 8 x Ø 9 O-Ring <u>Ø 10</u>5 x Ø 4 6 according to customer's specifications according to customer's specifications Ų 50 Ø 150 30 G 1/2 Ø 102

DK 3 switching bowl:

special design with gauge glass and

*) according to customer's specifications

Other dimensions on request.

For inquiries or orders, please complete the following questionnaire: Desired switching functions (max./min. indication, pump or valve ON/OFF, filling or emptying, run-dry or overflow protection): Tank dimensions and installation conditions (attach sketch if necessary): Specific gravity: _____ Type of liquid: Viscosity: Temperature: Working pressure: Desired type of immersion probe: TSR/..... 8 8 <u>*</u> Dim. Desired probe tube length (dimension G): Please mark desired floats and collars on the probe tube! * = specify dimension D, otherwise 20 mm. Dimension G+ Desired version (please tick off): Dimension ○ TSR/3/... ○ TSR/1/... AC/DC 24 V - 250 V AC/DC 1 V - 42 V Switching voltage 2 Switching current AC 100 mA – 2 A (0.4 A) AC 1 mA – 500 mA Switching capacity max. 100 VA max. 20 VA O TSR/0/ED/E 6 Desired options:

	Contact type: make = NO break = NC changeover = OC	Distance from the sealing surface of the screw-in nipple in mm	Switching function (e.g. high alarm, pump ON, pump OFF etc.)	If float has a working direction: rising = ↑ falling = ↓
1				
2				
3				
4				
5				
6				

Immersion probes will be manufactured according to customer's specifications. It is therefore not possible to return these special designs.

3-1-19 07/2015