

# JUMO NESOS R01 LS

## Float Switch in Miniature Form

### Applications

- Point level measurement of liquids in storage tanks, containers, oil sumps, and tanks
- Water and wastewater treatment
- Mechanical and plant engineering
- Shipbuilding
- Energy technology
- Tempering equipment

### Brief description

The point level measurement is carried out according to the Archimedes' principle for liquids. The float moves along the guide tube as the level rises or falls. The magnet in the float actuates the reed contact(s) installed in the guide tube with its magnetic field. The switching status of the reed contact can be evaluated and processed through downstream electronic components, relays or contactors. Alarms, pumps, signal lamps, valves, and horns are typically switched via a contact protection relay.

Compact versions with diameters from 27 mm are available for applications involving low installation heights and tank openings. Variants with a connecting plug help to minimize mounting work.

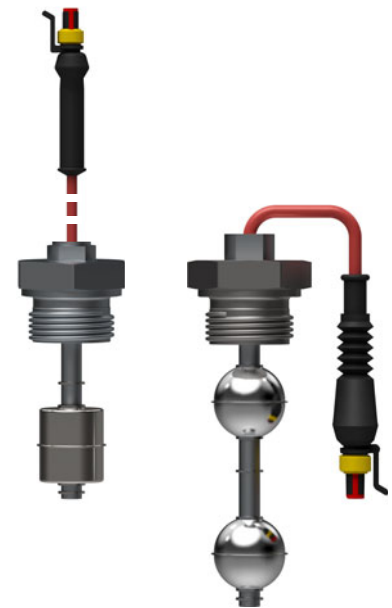
Depending on the variant ordered, various electrical connections, process connections, guide tube lengths, floats, and number of and positions of contacts as well as their function (SPST-NO [N/O contact], SPST-NC [N/C contact], SPDT-CO [changeover contact], and bistable contacts) are available.

With the optional temperature sensor, both the point level measurement and the temperature can be acquired via just one measuring point. Variants for monitoring the reed contact temperature are also available.

Variants with an intrinsically safe [Ex i] design and flameproof enclosure [Ex d] are available for applications involving explosion protection, as are approvals for shipbuilding. No isolating switch amplifier is required for installations with a flameproof enclosure.

### Customer benefits

- Cost-effective installation and mounting, due to spring-cage terminals (Push-In®), for example
- Reduced operating costs due to maintenance-free device design
- Price-performance ratio optimized through the use of standard components
- No isolating switch amplifier required for [Ex d] (flameproof enclosure) applications



Type 408301

### Special features

- Approvals for shipbuilding and explosion protection are available
- High switching voltages and switching currents
- Wide media temperature range from -52 to +240 °C
- Wide pressure range from -1 to +35 bar
- Up to 4 switching outputs are user-definable as N/O contact, N/C contact, changeover contact, and bistable contact
- Temperature sensor/temperature switch are available

### Approvals and approval marks



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## Technical data

### General Information

Function principle	Magnetic float switch with reed contact					
Installation position (vertical)	±30°					
Switching point accuracy <sup>a</sup>	±2 mm					
Switching function (potential-free)	01 SPST-NO		02 SPST-NC		10 SPST-NO	
Switching voltage (max.) <sup>b</sup>	AC 175 V	DC 175 V	AC 175 V	DC 175 V	AC 230 V	DC 230 V
Switching power (max.) <sup>b</sup>	10 VA	10 W	10 VA	10 W	100 VA	100 W
Switching current (max.) <sup>b</sup>	0.5 A	0.5 A	0.5 A	0.5 A	1.0 A	1.0 A

Switching function	03 SPDT-CO		15 SPST-NO, bistable	
Switching voltage (max.) <sup>b</sup>	AC 175 V	DC 175 V	AC 230 V	DC 200 V
Switching power (max.) <sup>b</sup>	10 VA	10 W	50 VA	50 W
Switching current (max.) <sup>b</sup>	0.5 A	0.5 A	1.5 A	1.5 A

<sup>a</sup> measured, dry

<sup>b</sup> The values must also be adhered to in combination.

	Pt100	Pt1000
Measuring range	-40 to +150 °C	-40 to +150 °C
Accuracy	DIN class B According to DIN EN 60751 the limit deviation in °C is: $\pm(0.3 + 0.005  t )$ $ t $ = temperature in °C regardless of prefix sign	

Special features for products with protection class 3 (see „Connection diagram“) <sup>a</sup>	Switching voltage (max.)	AC ≤ 33 V (AC 46 V peak value)	DC 70 V
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<sup>a</sup> Limit values according to EN 61010-1

### Mechanical features

Float	Form	Material	Outer diameter	Min. density kg/m <sup>3</sup>	Pressure range (nominal pressure) in bar	Weight in grams
027	Cylinder	AISI 316 series	27	800	-1 to +16	8
029	Spherical	AISI 316 series	29	900	-1 to +35	8
729	Spherical	Titanium grade 2	29	700	-1 to +15	7

Float	Medium density kg/m <sup>3</sup>					
	700	800	900	1000	1200	1400
	Immersion depth mm					
027		23.6	21	18.9	15.8	13.5
029			20.3	18.5	16.2	14.6
729	21.9	19.3	17.5	16.3	14.4	13.1

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Materials of parts in contact with medium <sup>a</sup> For example, process connection, float, guide tube	AISI 316 series; in the case of float 744 only floats made from titanium
Materials of parts not in contact with medium <sup>a</sup> Cable Cable socket Round plug M12 × 1 Terminal head Ex d Connection housing, cube-shaped, small Connection housing, cube-shaped, large	PVC or silicone or PUR PBT-GF30 PBT-GF30 Aluminum, painted Aluminum, painted Aluminum, painted
Clamping range Cable fitting  Terminal block	Diameter 6 to 12 mm for connection housing, cube-shaped, small (electrical connection 130) and connection housing, cube-shaped, large (electrical connection 131) Diameter 6.5 to 11.9 mm for terminal head Ex d (electrical connection 115) Diameter 6 to 8 mm for cable socket (electrical connection 061) 0.14 to 2.5 mm <sup>2</sup> for connection housing, cube-shaped, small (electrical connection 130) 0.14 to 1.5 mm <sup>2</sup> for terminal head Ex d (electrical connection 115) and connection housing, cube-shaped, large (electrical connection 131)
Weight	300 g for a guide tube length of 100 mm, process connection G 1 (process connection 572), and assembled cable measuring 0.4 m with AMP connector (electrical connection 161)

<sup>a</sup> The chemical resistance of the materials should be considered for the application.

## Environmental influences

Moisture Operation Storage	100 % rel. humidity including condensation on the product outer shell 90 % rel. humidity without condensation
Protection type for electrical connection <sup>a</sup> Cable Cable with AMP Superseal connector Cable with M12 connector Round plug M12 × 1 Cable socket Terminal head Ex d Connection housing, cube-shaped, small Connection housing, cube-shaped, large	IP68 IP67 IP66 IP66 IP66 IP65 IP68 IP66 IP66
Vibration <sup>b</sup>	0.7 g at 13.2 to 100 Hz
Ambient temperature for electrical connection <sup>c</sup> PVC cable Silicone cable PUR cable PVC cable, with AMP Superseal connector Silicone cable, with AMP Superseal connector PUR cable, with AMP Superseal connector PVC cable, with M12 connector Silicone cable, with M12 connector PUR cable, with M12 connector Round plug M12 × 1	-5 to +80 °C -50 to +180 °C -40 to +90 °C -5 to +80 °C -40 to +125 °C -40 to +90 °C -5 to +80 °C -40 to +85 °C -40 to +85 °C -30 to +90 °C

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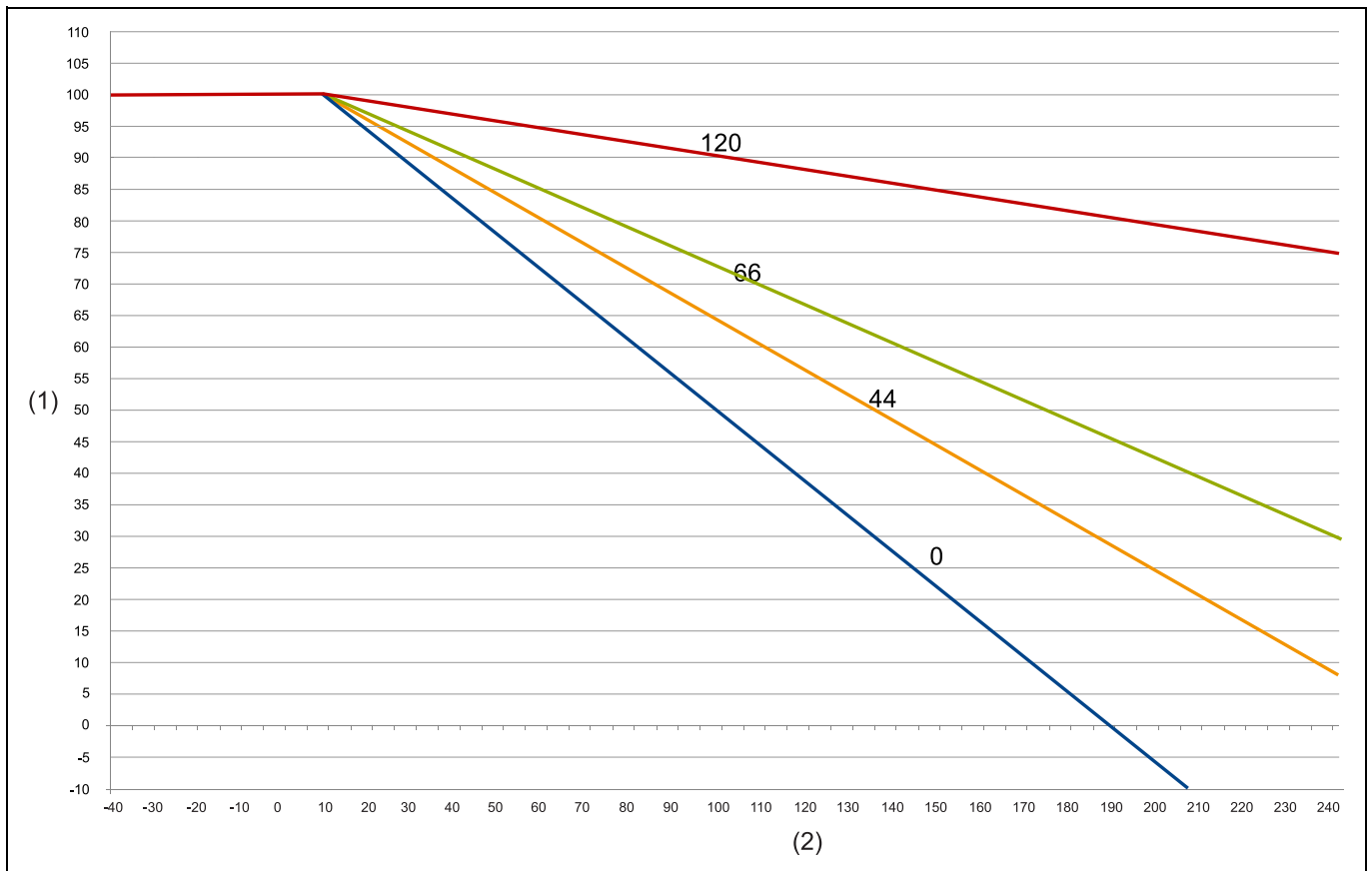


Cable socket	-40 to +125 °C
Terminal head Ex d	-40 to +100 °C
Connection housing, cube-shaped, small	-40 to +100 °C
Connection housing, cube-shaped, large	-40 to +100 °C
Process temperature	
Parts in contact with medium (e.g. guide tube with float)	-40 to +150 °C (standard) -52 to +240 °C (upon request)

- <sup>a</sup> According to DIN EN 60529
- <sup>b</sup> According to IEC 60068-2-6
- <sup>c</sup> Note dependency of extension tube length on process temperature, see diagrams below.

**Maximum ambient temperature depending on extension tube and process temperature**

Connection housing small and large, extension tube in mm



- (1) Maximum ambient temperature
- (2) Medium temperature

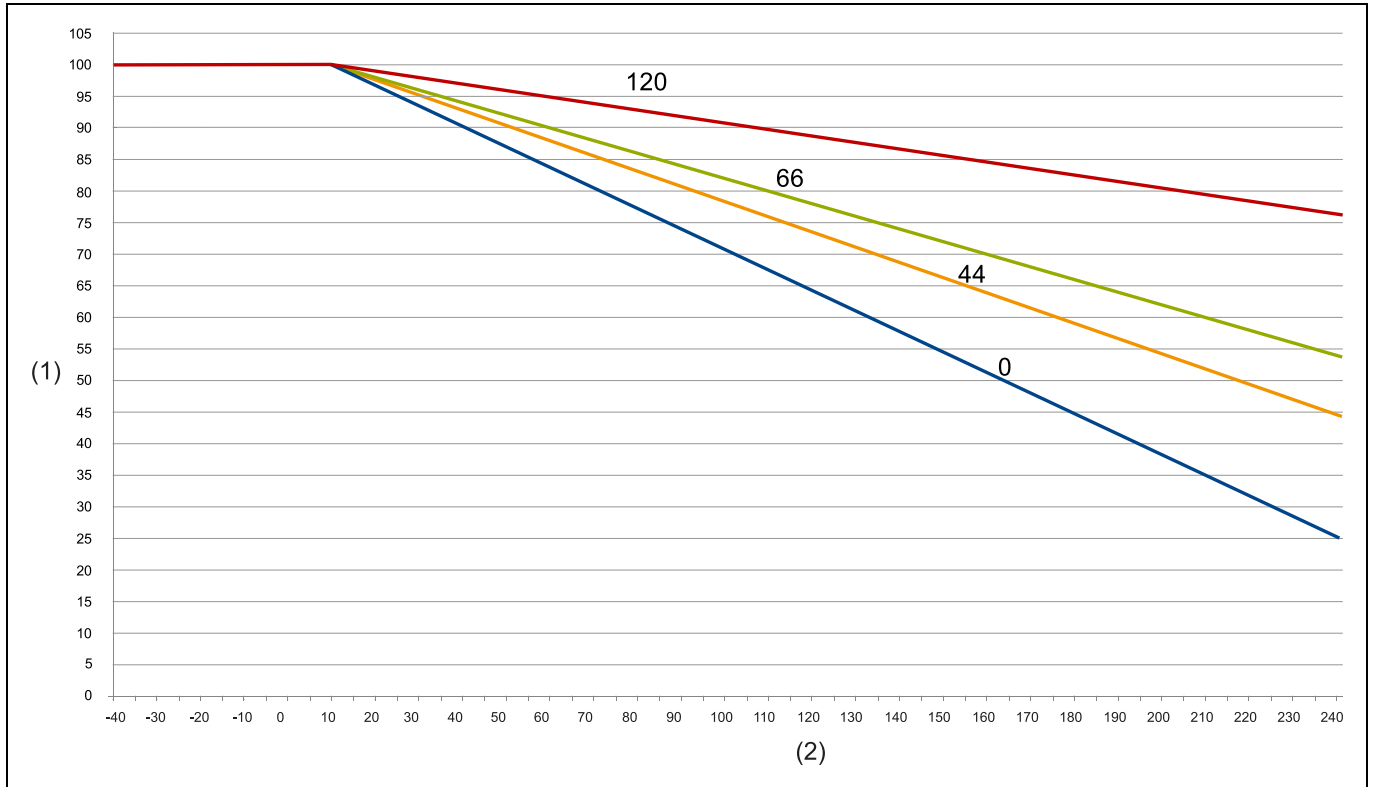
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Connection housing Ex d, extension tube in mm



- (1) Maximum ambient temperature
- (2) Medium temperature

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Approval mark	Test facility	Certificate/ certification number	Inspection basis	Valid for
ATEX, IEC EX intrinsically safe, Ex i	Eurofins Electrosuisse Product Testing	SEV 18 ATEX 0134 X IECEX SEV 18.0011X	IEC/EN 60079-0 IEC/EN 60079-11 IEC/EN 60079-26 DIN EN ISO 80079-36 DIN EN ISO 80079-37	Type 408301/362 Type 408301/662
ATEX, IEC EX flameproof enclosure, Ex d	Eurofins Electrosuisse Product Testing	SEV 18 ATEX 0133 X IECEX SEV 18.0010X	IEC/EN 60079-0 IEC/EN 60079-1 IEC/EN 60079-26 IEC/EN 60079-31 DIN EN ISO 80079-36 DIN EN ISO 80079-37	Type 408301/462 Type 408301/962
DNV GL	DNV GL	TAA00001VR	Class Guidelines CG 0339, November 2016	Type 408301/062 Type 408301/662 Type 408301/962

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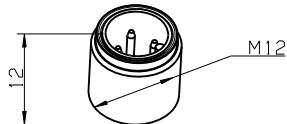
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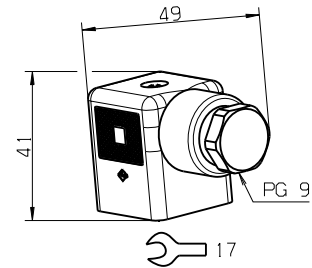
## Dimensions

### Electrical connection

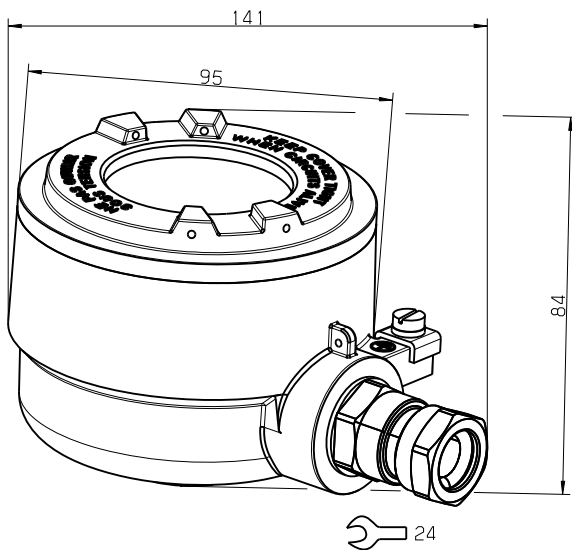
036  
 Round plug M12 × 1



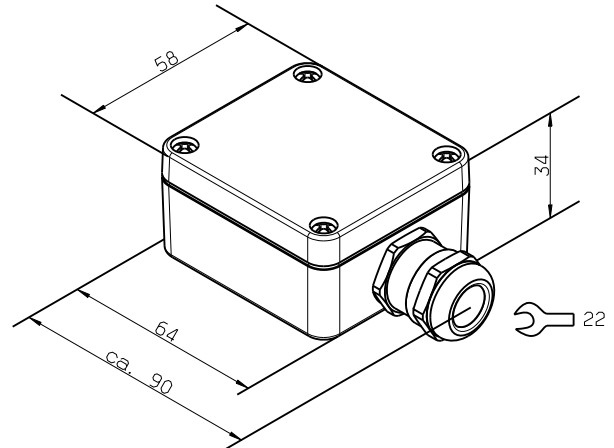
061  
 Cable socket DIN EN 175301-803



115  
 Terminal head Ex d



130  
 Connection housing, cube-shaped, small



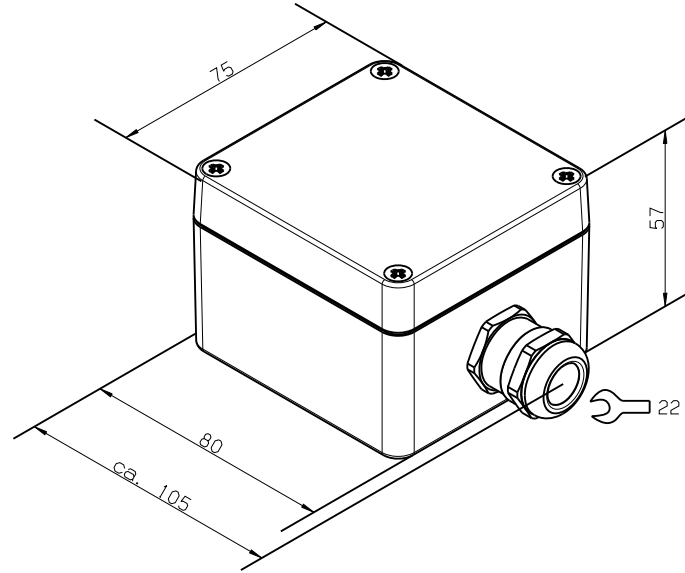
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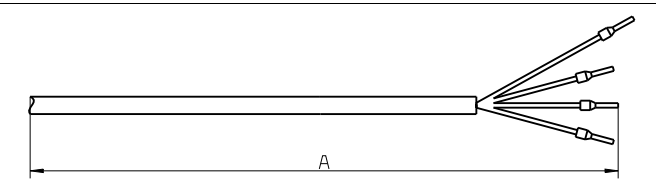
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131  
 Connection housing, cube-shaped, large

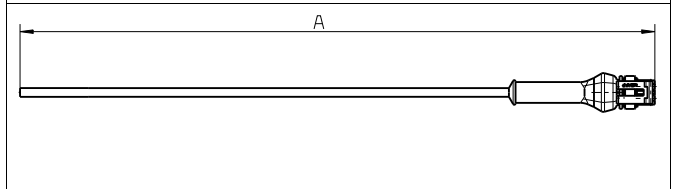


150 PVC, 160 silicone, 170 PUR  
 Cable with ferrules



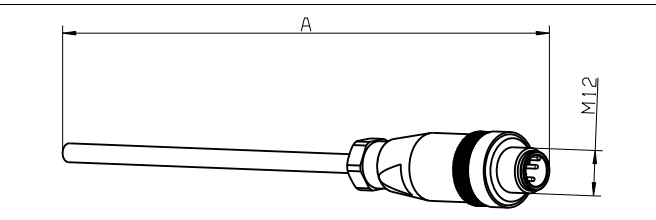
A Cable length, see order details

151 PVC, 161 silicone, 171 PUR  
 Cable with AMP Superseal connector



A Cable length, see order details

152 PVC, 162 silicone, 172 PUR  
 Cable with M12 connector



A Cable length, see order details

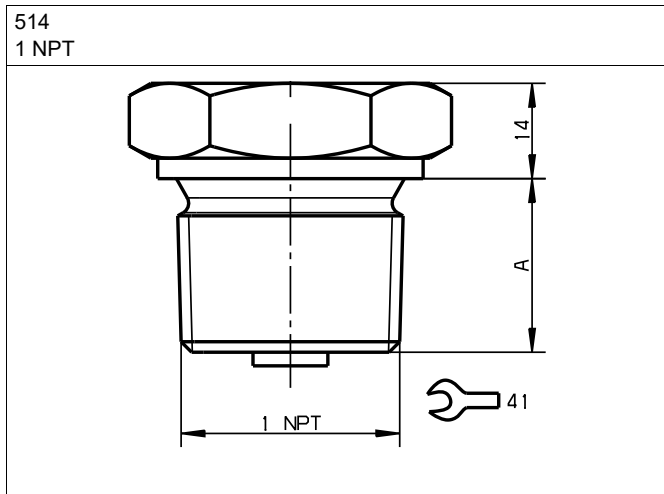
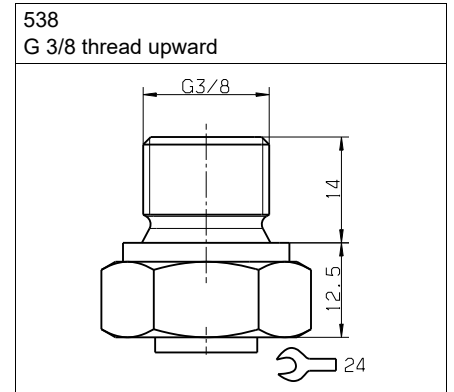
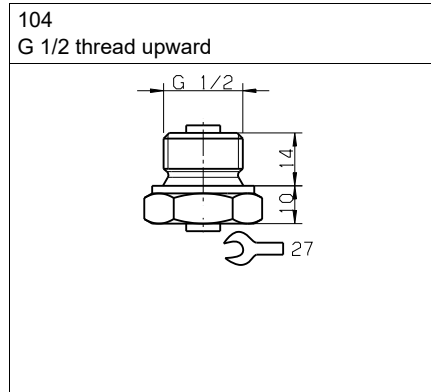
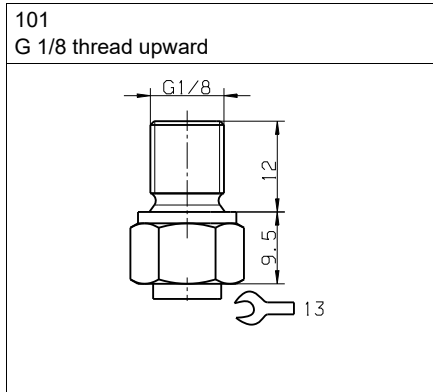
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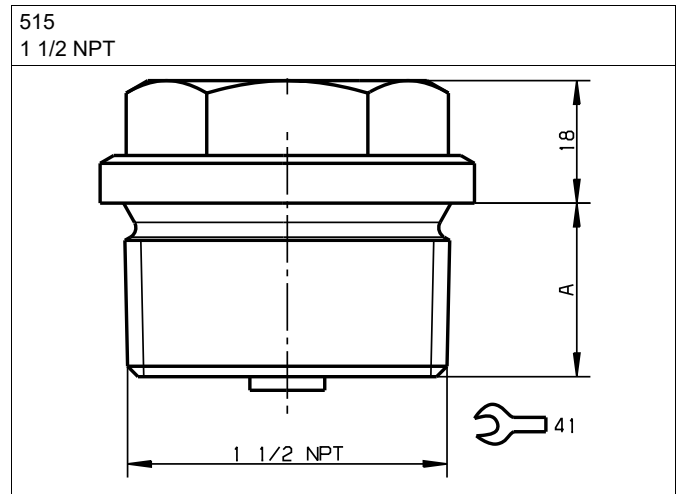
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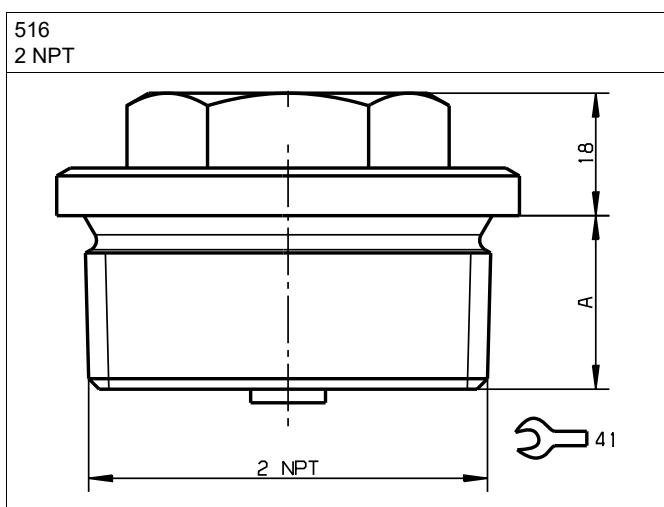
**Process connections**



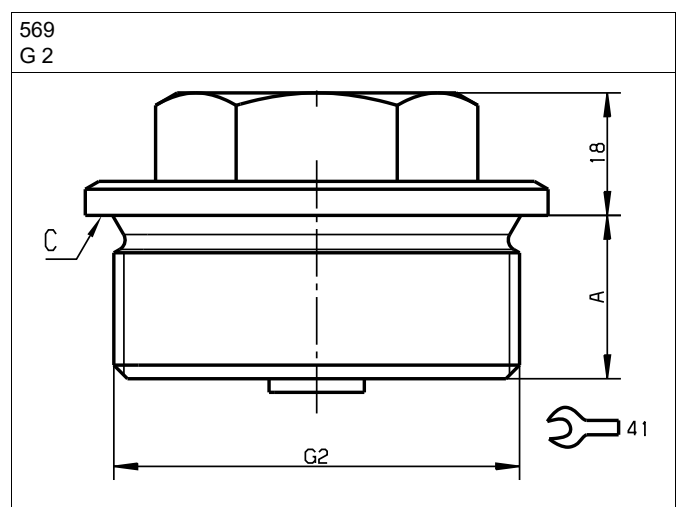
A 25.5



A 25.5



A 25.5



A 24 (25.5 for Ex d)

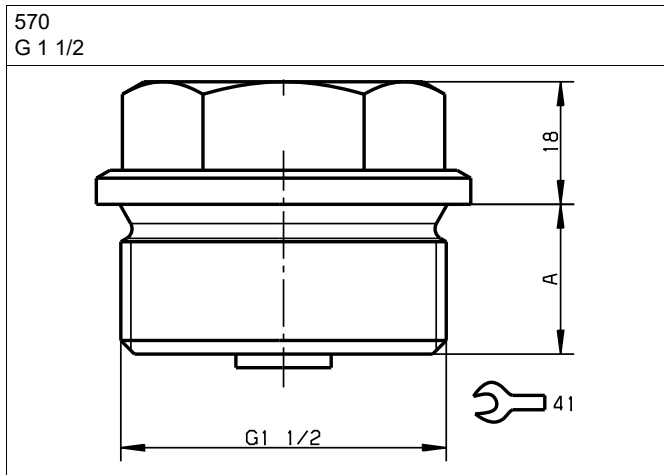
C A seal/O-ring with a thickness of at least 2 mm is recommended.



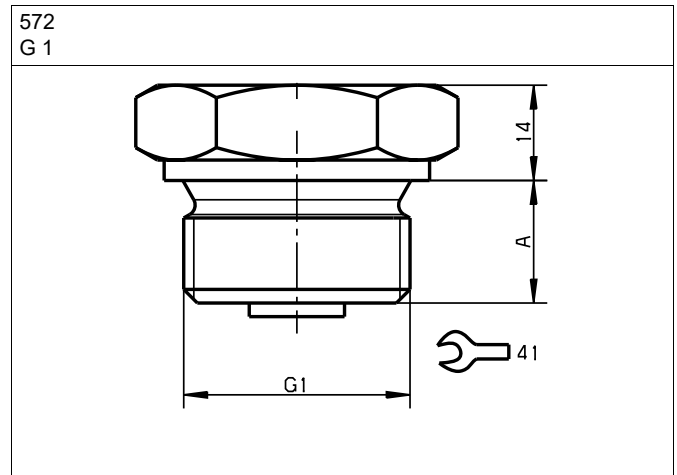
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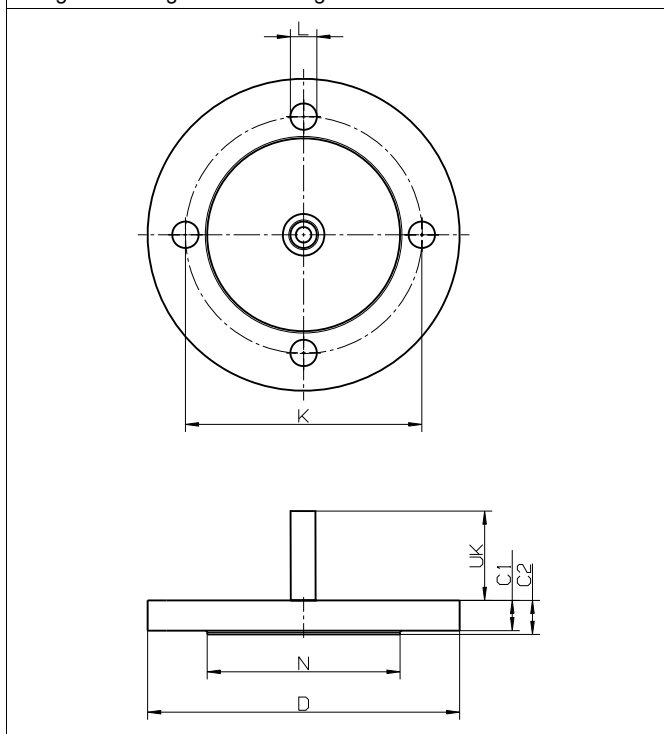


A 22 (25.5 for Ex d)



A 18 (25.5 for Ex d)

Flange according to the following table



Example for extension tube, also available for other process connections;

UK = extension tube length + 9 mm

Order code	Flange designation	Hole circle K	Number of holes	Diameter of holes L	Exterior diameter D	Diameter of sealing strip N	Strength of flange C1	Strength of flange including sealing strip C2
714	Flange 2" 300 lbs ANSI B 16.5 RF	127	8	19	165.1	92.1	20.6	22.2
729	Flange DN 50, PN40 EN 1092-1, form B1 with sealing strip	125	4	18	165	102	17	20
784	Flange DN 65, PN40 EN 1092-1, form B1 with sealing strip	145	8	18	185	122	19	22
785	Flange DN 80, PN40 EN 1092-1, form B1 with sealing strip	160	8	18	200	138	21	24

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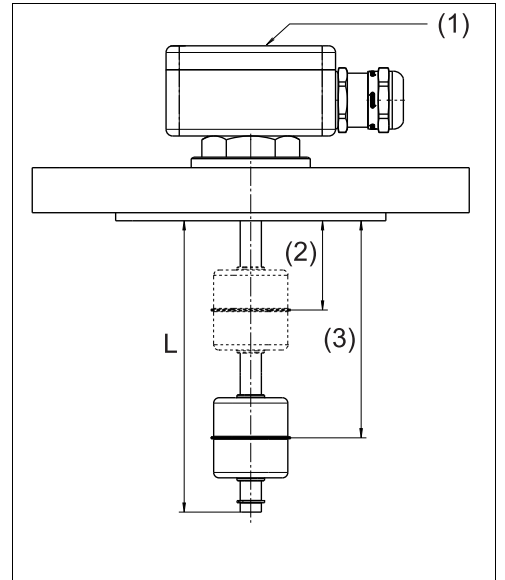
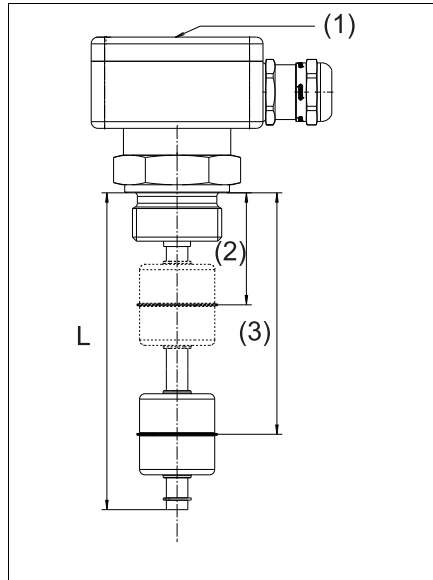
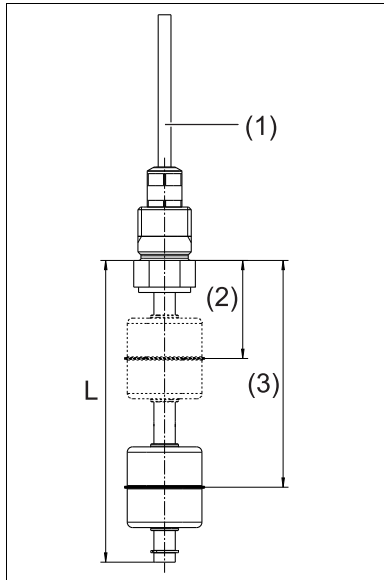
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**Notes to the order details**

Below are examples for the dimensioning of the guide tube length L, the measuring range start (3) as well as measuring range end (2) depending on the respective process connection.



(1) Process connection  
 „thread upward“

(1) Process connection  
 „thread“

(1) Process connection  
 „flange“

- (2) Position contact 1 (switching point) in mm
- (3) Position contact 2 (switching point) in mm
- L Guide tube length in mm

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# Connection diagram

The connection diagram in the data sheet provides preliminary information about the connection options. For the electrical connection, only use the installation instructions or the operating manual. The knowledge and the correct technical compliance with the safety information and warnings contained in these documents are mandatory for mounting, electrical connection, and startup as well as for safety during operation.

For product configurations with more than one switching contact, the mixing of hazardous network circuits and SELV circuits is not permitted.

Number of contacts										
	Cable		Cable socket		Connection housing		AMP Superseal connector		Round plug M12	
	SPST-NO/NC	SPDT-CO	SPST-NO/NC	SPDT-CO	SPST-NO/NC	SPDT-CO	SPST-NO/NC	SPDT-CO	SPST-NO/NC	SPDT-CO
1	Silicone RD WH PUR BN WH PVC BN WH	Silicone RD WH RD/BU BU BK PVC BN WH GN								
2	Silicone RD WH RD/BU WH/BU PVC BN WH GN YE	Silicone <sup>a</sup> RD WH BU RD/BU WH/BU BU PVC <sup>b</sup> RD BK BN OG GN YE PUR <sup>c</sup> PK WH YE BN GN GY								

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Number of contacts										
	Cable		Cable socket		Connection housing		AMP Superseal connector		Round plug M12	
	SPST-NO/NC	SPDT-CO	SPST-NO/NC	SPDT-CO	SPST-NO/NC	SPDT-CO	SPST-NO/NC	SPDT-CO	SPST-NO/NC	SPDT-CO
3	Silicone <sup>a</sup> RD WH RD/BU WH/BU BU BU PVC <sup>b</sup> RD BK BN OG GN YE	-	-	-			-	-		-
4	-	-	-	-			-	-	-	-
Protection rating <sup>d</sup>	prepared for 2 according to EN 61010-1		1	1	1	1	3	3	3	3

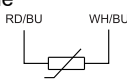
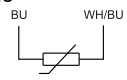
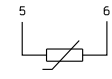
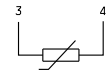
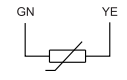
<sup>a</sup> According to VDE 0298-4 max. current 0.5 A at max. 175 °C or 1 A at max. 170 °C  
<sup>b</sup> According to VDE 0298-4 max. current 0.8 A at max. 75 °C or 1 A at max. 70 °C, not available with shipbuilding approval (basic type extension 062), shipbuilding approval and explosion protection, intrinsically safe, Ex i (basic type extension 662) and shipbuilding approval and explosion protection, pressure resistant, Ex d (basic type extension 962).  
<sup>c</sup> Only available with protection class 3.  
<sup>d</sup> According to DIN EN 61140

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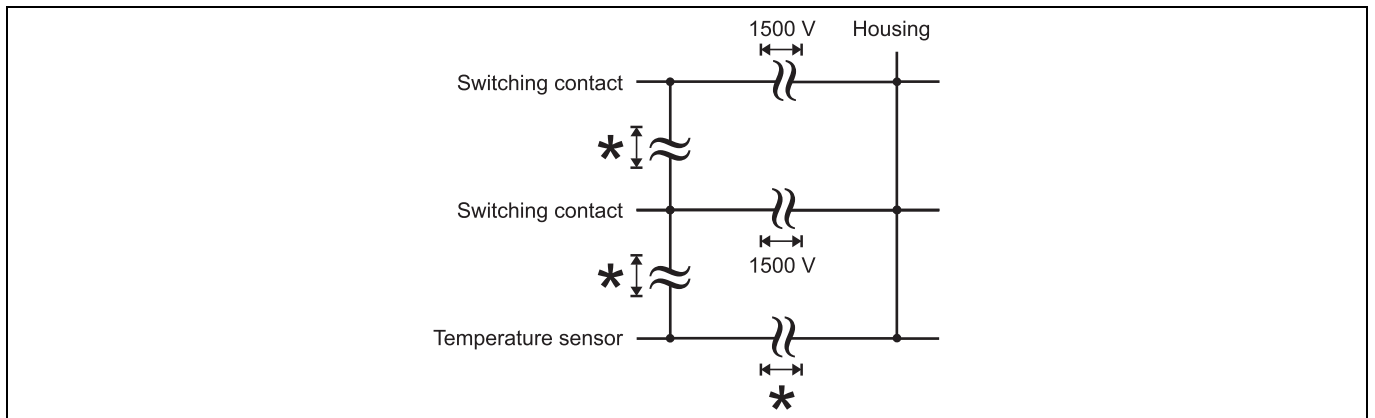


	Cable	Cable socket	Connection housing	AMP Superseal connector	Round plug M12
Temperature sensor Pt100 <sup>a, b</sup>	Silicone <sup>c</sup>  Silicone <sup>d</sup> 	-		-	
Temperature sensor Pt1000 <sup>a, b</sup>	PVC <sup>c</sup> 	-	-	-	-

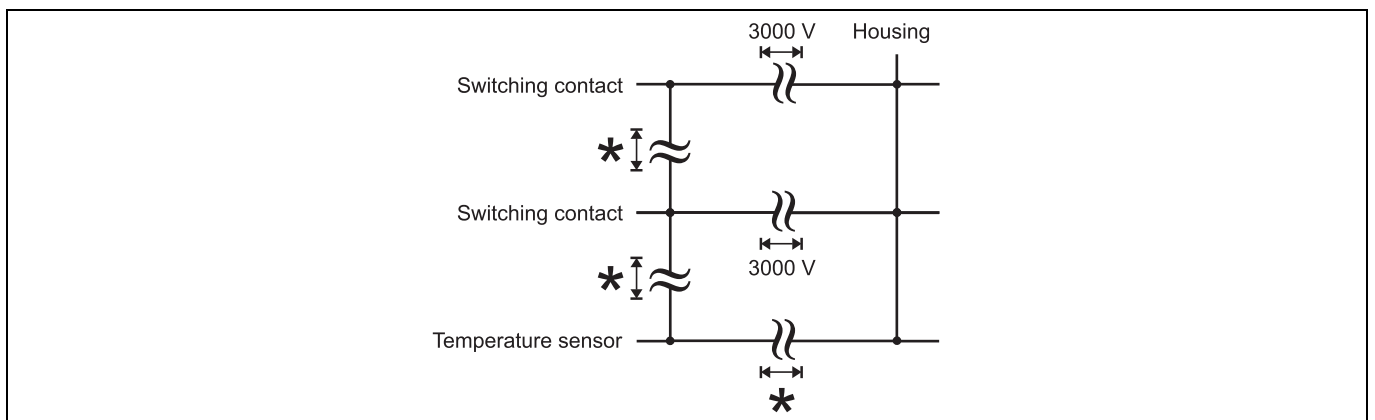
- <sup>a</sup> Connect all measuring circuits of a product to SELV circuits.
- <sup>b</sup> Assignment is always to terminals with the highest numbers
- <sup>c</sup> For 1x SPST-NO/NC switching contacts
- <sup>d</sup> For 1x SPDT-CO switching contacts

The galvanic isolation is realized according as follows:

Protection class 1



Protection class 2



**Caution:**

\* Functional galvanic isolation

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If connected to a certified intrinsically safe electrical circuit Ex i, the following maximum values are admissible.

Contact function	Max. voltage $U_i$ in V	Max. current $I_i$ in mA	Max. power $P_i$ in mW	Internal inductance in $\mu$ H	Internal capacitance in pF
SPST-NO	$\leq 30$	$\leq 100$	$\leq 750$	~0 for cable version 1 $\mu$ H/m connecting cable	~0 for cable version 200 pF/m connecting cable
SPST-NC					
SPDT-CO					

When using explosion-proof versions (intrinsically safe, Ex i, and flameproof enclosure, Ex d) the following values are given.

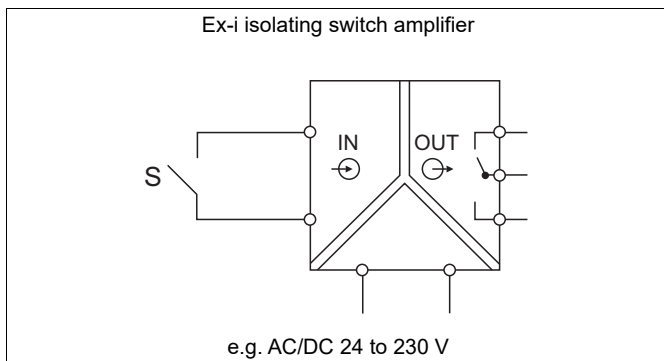
Contact function	Max. voltage $U_i$ in V	Max. current $I_i$ in mA	Max. power $P_i$ in mW	Internal inductance in $\mu$ H	Internal capacitance in pF
Pt100	$\leq 30$	$\leq 55$	$\leq 413$	~0 for cable version 1 $\mu$ H/m connecting cable	~0 for cable version 200 pF/m connecting cable
Pt1000					

Legend: cable	BN	Brown	GN	Green
	WH	White	RD	Red
	BU	Blue	YE	Yellow
	PK	Pink	GY	Grey

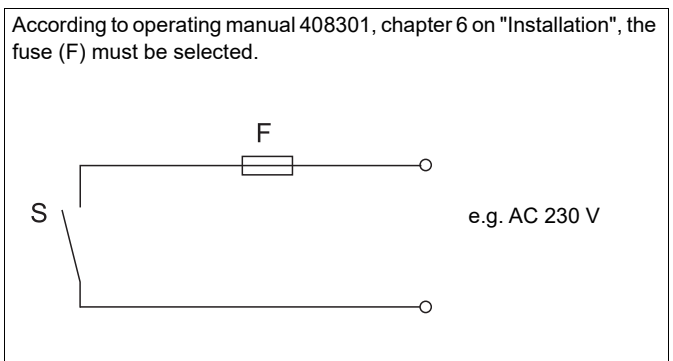
## Connection examples of versions with explosion protection

### Float switch (S)

Ex i



Ex d



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## Order details

	<b>(1) Basic type</b>
408301	JUMO NESOS R01 LS – float switch in miniature form
	<b>(2) Basic type extension</b>
000	None
062	Shipbuilding approval
362	Explosion protection, intrinsically safe, Ex i
462	Explosion protection, pressure resistant, Ex d
662	Shipbuilding approval and explosion protection, intrinsically safe, Ex i
962	Shipbuilding approval and explosion protection, pressure resistant, Ex d
999	Special version
	<b>(3) Electrical connection</b>
036	Round plug M12 × 1
061	Cable socket DIN EN 175301-803, Form A
115	Terminal head Ex d
130	Connection housing, cube-shaped, small
131	Connection housing, cube-shaped, large
150	Cable, PVC
151	Cable, PVC with AMP Superseal connector (max. DC 24 V/3 A) <sup>a</sup>
152	Cable, PVC with M12 connector
160	Cable, silicone
161	Cable, silicone with AMP Superseal connector (max. DC 24 V/3 A) <sup>a</sup>
162	Cable, silicone with M12 connector
170	Cable, PUR
171	Cable, PUR with AMP Superseal connector (max. DC 24 V/3 A) <sup>a</sup>
172	Cable, PUR with M12 connector
999	Special version
	<b>(4) Cable length</b>
0	None
2000	2000 mm
5000	5000 mm
100 - 5000	Specifications in plain text (increments of 100 mm)
	<b>(5) Process connection</b>
101	G 1/8, thread upward
104	G 1/2, thread upward
514	1 NPT
515	1 1/2 NPT
516	2 NPT
538	G 3/8, thread upward
569	G 2
570	G 1 1/2
572	G 1
714	Flange 2" 300 lbs ANSI B 16.5 RF
729	Flange DN 50, PN40 EN 1092-1, form B1 with sealing strip
784	Flange DN 65, PN40 EN 1092-1, form B1 with sealing strip
785	Flange DN 80, PN40 EN 1092-1, form B1 with sealing strip
999	According to customer requirements
	<b>(6) Guide tube length L, diameter 8 mm<sup>b</sup></b>
30 - 500	Specifications in plain text

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<b>(7) Float</b>	
027	Cylinder, CrNi (stainless steel), diameter 27, density 800 kg/m <sup>3</sup>
029	Spherical, CrNi (stainless steel), diameter 29, density 900 kg/m <sup>3</sup>
729	Spherical, Ti (titanium), diameter 29, density 700 kg/m <sup>3</sup>
<b>(8) Number of floats</b>	
1	1 piece
2	2 pieces
3	3 pieces
4	4 pieces
<b>(9) Switching function</b>	
01	SPST-NO, N/O contact (10 W/DC 175 V/0.5 A)
02	SPST-NC, N/C contact (10 W/DC 175 V/0.5 A)
03	SPDT-CO, single-pole changeover contact (10 W/DC 175 V/0.5 A)
10	SPST-NO, N/O contact (100 W/DC 230 V/1 A)
15	SPST-NO, N/O contact, bistable (100 W/DC 230 V/1 A)
<b>(10) Number of contacts<sup>c</sup></b>	
1	1 contact
2	2 contacts
3	3 contacts
4	4 contacts
<b>(11) Position of contact 1<sup>c</sup></b>	
20 - 470	Specifications in plain text
<b>(12) Position of contact 2<sup>c</sup></b>	
0	None
20 - 470	Specifications in plain text
<b>(13) Position of contact 3<sup>c</sup></b>	
0	None
40 - 470	Specifications in plain text
<b>(14) Position of contact 4<sup>c</sup></b>	
0	None
40 - 470	Specifications in plain text
<b>(15) Extra codes</b>	
000	None
005	Integrated temperature sensor Pt1000 <sup>d</sup>
007	Integrated temperature sensor Pt100 <sup>d</sup>
019	Temperature monitoring of reed contact, Pt1000
370	Extension tube

<sup>a</sup> Not available with shipbuilding approval (basic type extension 062), shipbuilding approval and explosion protection, intrinsically safe, Ex i (basic type extension 662) and shipbuilding approval and explosion protection, pressure resistant, Ex d (basic type extension 962).

<sup>b</sup> The dimensioning is in mm in relation to the contact/reference surface (threaded bushing of the container/tank wall) of the selected process connection (for details see operating manual, chapter 3.2).

<sup>c</sup> The contact positions are observed from the process connection toward the guide tube end (for details see operating manual, chapter 3.2).

<sup>d</sup> The temperature sensor is positioned at the end of the guide tube.

**Order code**                    **(1)**            **(2)**            **(3)**            **(4)**            **(5)**            **(6)**            **(7)**            **(8)**  
 \_\_\_\_\_ / \_\_\_\_\_ - \_\_\_\_\_ - \_\_\_\_\_ - \_\_\_\_\_ - \_\_\_\_\_ - \_\_\_\_\_ - \_\_\_\_\_ - \_\_\_\_\_ -  
**Order example**                    408301    /    000    -    160    -    1000    -    101    -    47    -    027    -    1    -

**(9)**            **(10)**            **(11)**            **(12)**            **(13)**            **(14)**            **(15)**  
 \_\_\_\_\_ - \_\_\_\_\_ - \_\_\_\_\_ - \_\_\_\_\_ - \_\_\_\_\_ - \_\_\_\_\_ / \_\_\_\_\_  
 10    -    1    -    23    -    0    -    0    -    0    /    000

Minimum order volume:                    1 piece