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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. 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, e.g. due to spring-cage terminals (PUSH IN)
- Reduced operating costs due to maintenance-free device design
- Price-performance ratio optimized through the use of standard components



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
- 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/approval marks



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Technical data

General Information

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

Switching function	SPST-CO		SPST-NO, bistable	
Switching voltage (max.) ^a	AC 175 V	DC 175 V	DC 230 V	
Switching capacity (max.) ^a	10 VA	10 W	100 W	
Switching current (max.) ^a	0.5 A	0.5 A	1.0 A	
Switching point accuracy ^b	±2 mm	±2 mm	±2 mm	
Installation position	±30°	±30°	±30°	

^a The values must also be adhered to in combination.

^b measured, dry

	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	

Mechanical features

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

Float	Medium density kg/m ³					
	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 ^a 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 ^a Round plug M12 × 1 Connection housing, cube-shaped, small Connection housing, cube-shaped, large Cable socket Cable Terminal head BUZ	PBT-GF30 Aluminum, painted Aluminum, painted PBT-GF30 PVC or silicone or PUR 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 5 to 12.5 mm for terminal head BUZ (electrical connection 110) 0.14 to 1.5 mm ² for 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)

^a The chemical resistance of the materials should be considered for the application.

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Environmental influences

Ambient temperature for electrical connection	
PVC cable	-5 to +80 °C
Silicone cable	-50 to +180 °C
PUR cable	-40 to +90 °C
PVC cable, with AMP connector	-5 to +80 °C
Silicone cable, with AMP connector	-40 to +125 °C
PUR cable, with AMP connector	-40 to +90 °C
PVC cable, with M12 connector	-5 to +85 °C
Silicone cable, with M12 connector	-40 to +85 °C
PUR cable, with M12 connector	-40 to +85 °C
Round plug M12 × 1	-40 to +125 °C
Cable socket	-40 to +125 °C
Terminal head BUZ	-40 to +100 °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	
Guide tube with float	-40 to +150 °C (standard) -52 to +240 °C (upon request)
Moisture	
Operation	100 % rel. humidity including condensation on the product outer shell
Storage	90 % rel. humidity without condensation
Protection type for electrical connection ^a	
Cable	IP68
Cable with AMP Superseal connector	IP67
Cable with M12 connector	IP66
Round plug M12 × 1	IP66
Cable socket	IP65
Terminal head BUZ	IP65
Terminal head Ex d	IP68
Connection housing, cube-shaped, small	IP66
Connection housing, cube-shaped, large	IP66
Vibration ^b	4 g at 2 to 100 Hz

^a According to DIN EN 60529

^b According to IEC 60068-2-6

Approvals/approval marks

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 ISO 80079-36	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 60079-31 DIN ISO 80079-36	Type 408301/462 Type 408301/962
DNV GL	DNV GL	At preparation stage	Class Guidelines CG 0339, November 2016	Type 408301/062 Type 408301/662 Type 408301/962

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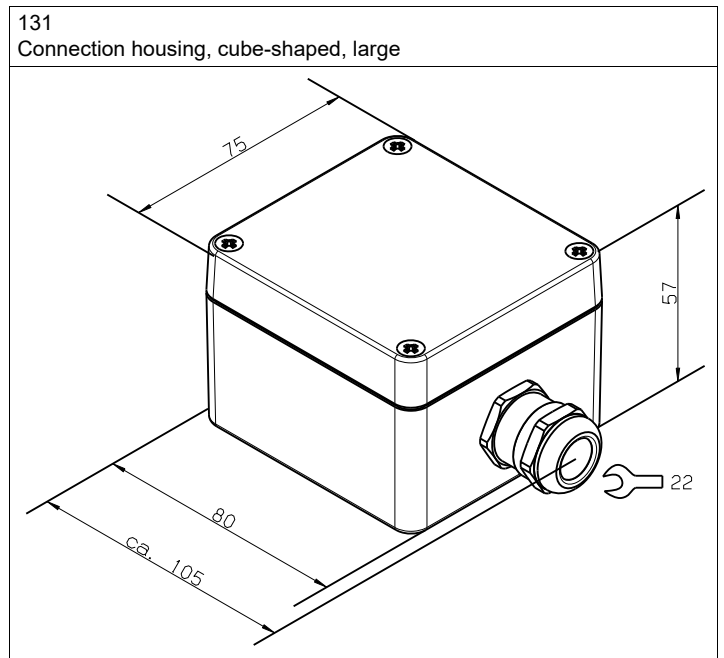
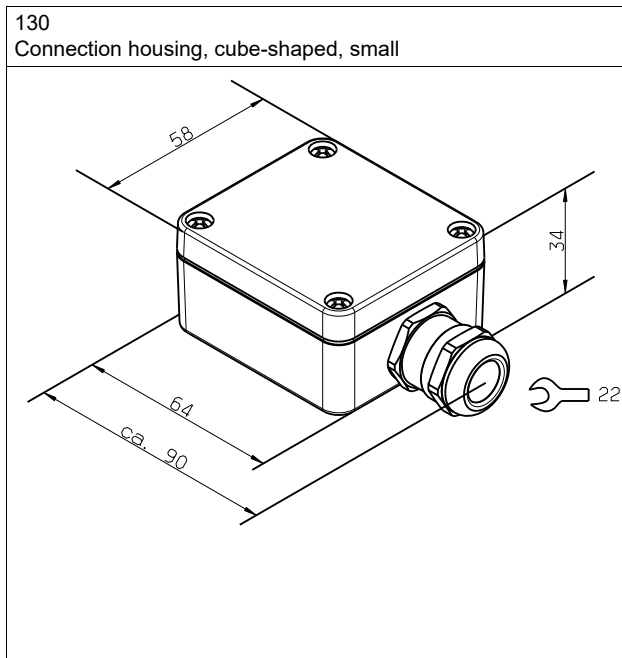
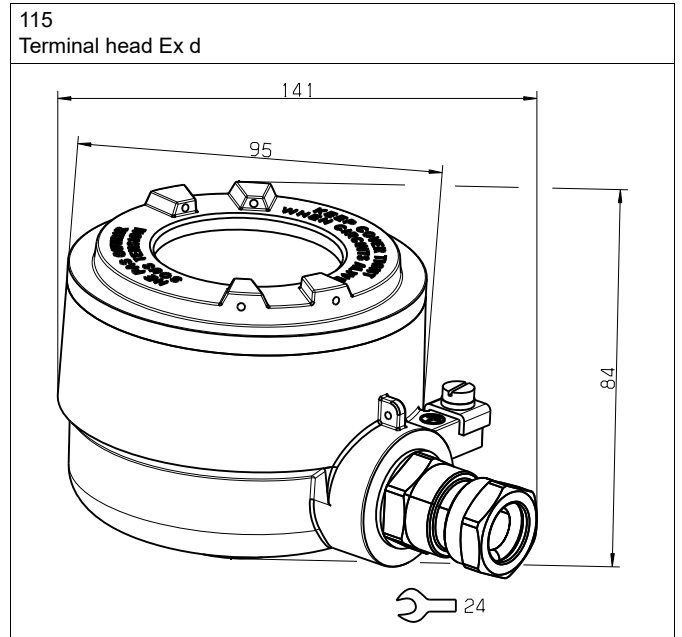
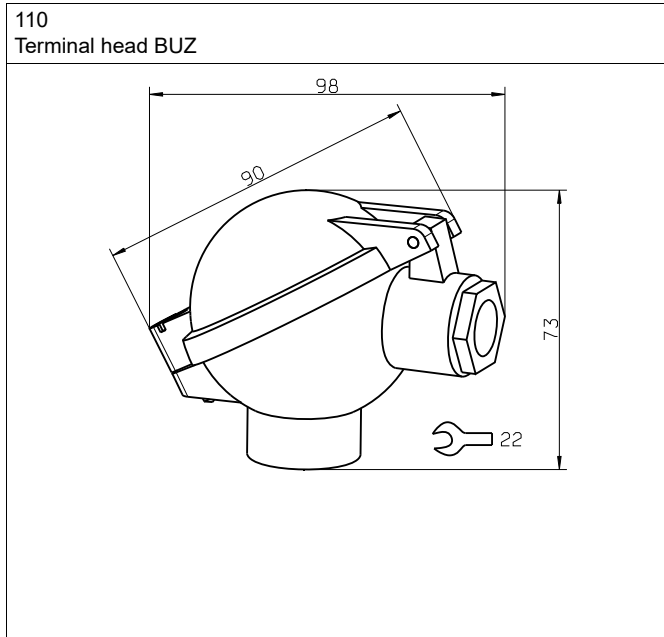
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Dimensions

Electrical connection



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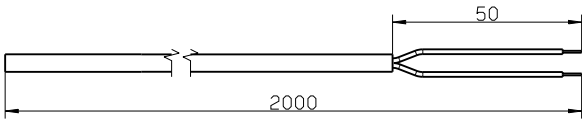
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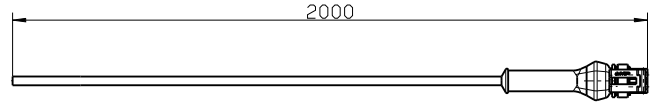
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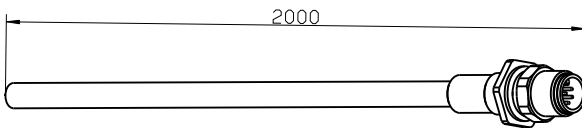
150 PVC, 160 silicone, 170 PUR
 Cable with ferrules



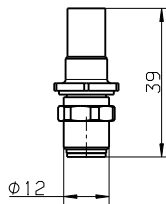
151 PVC, 161 silicone, 171 PUR
 Cable with AMP Superseal connector



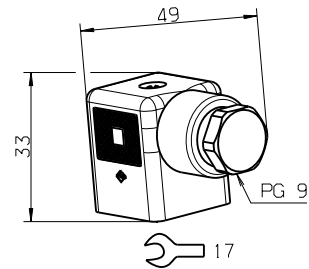
152 PVC, 162 silicone, 172 PUR
 Kabel mit M12-Stecker



036
 Rundstecker M12 x 1

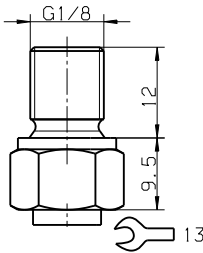


061
 Cable socket DIN EN 175301-803

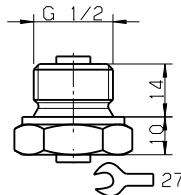


Process connections

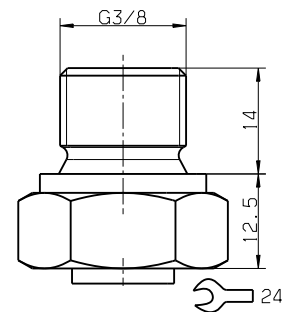
101
 G 1/8 thread upward



104
 G 1/2 thread upward



538
 G 3/8 thread upward

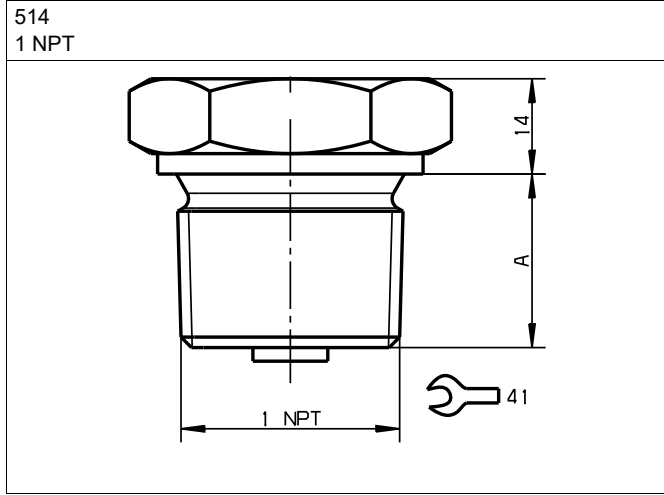


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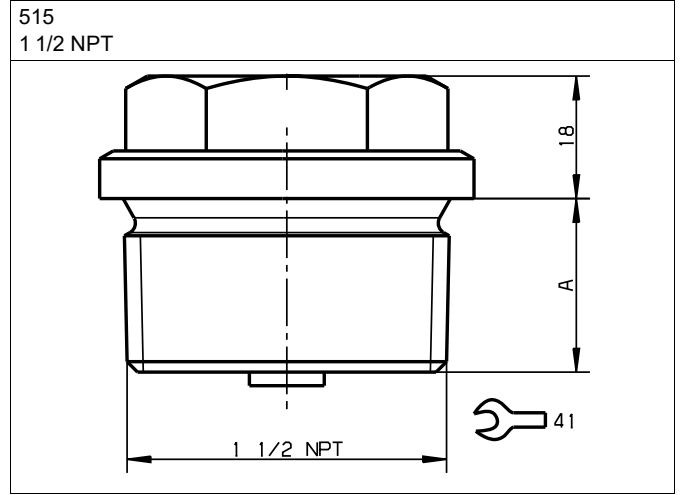
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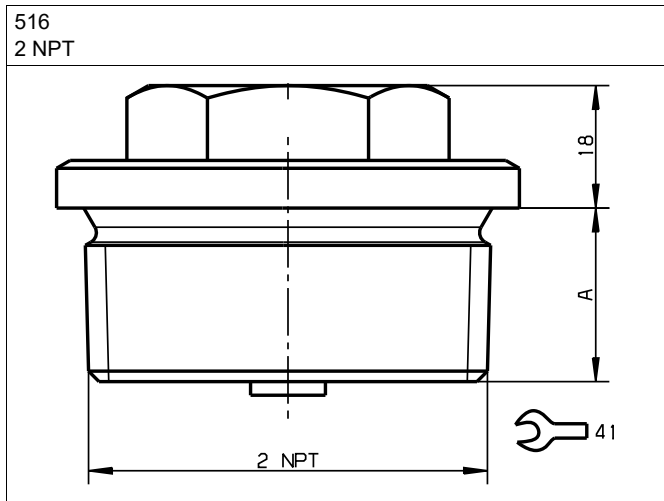
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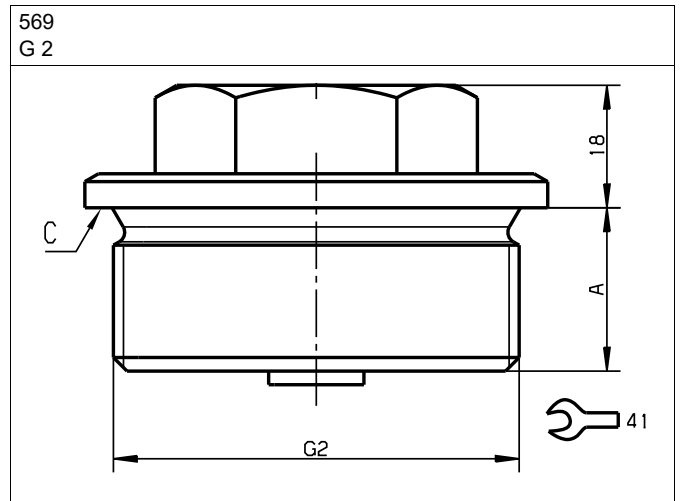
A 25.5



A 25.5

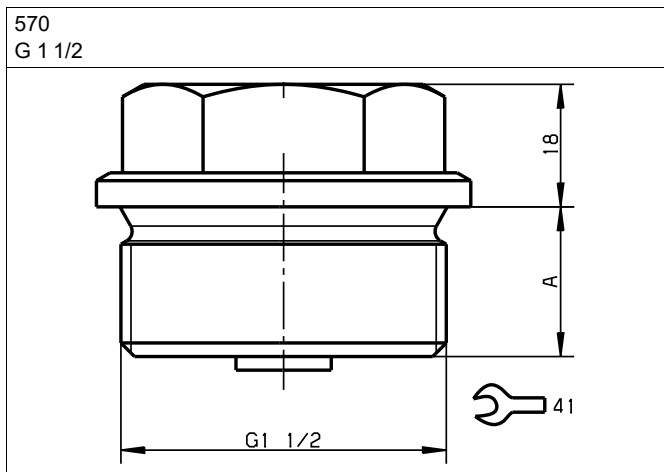


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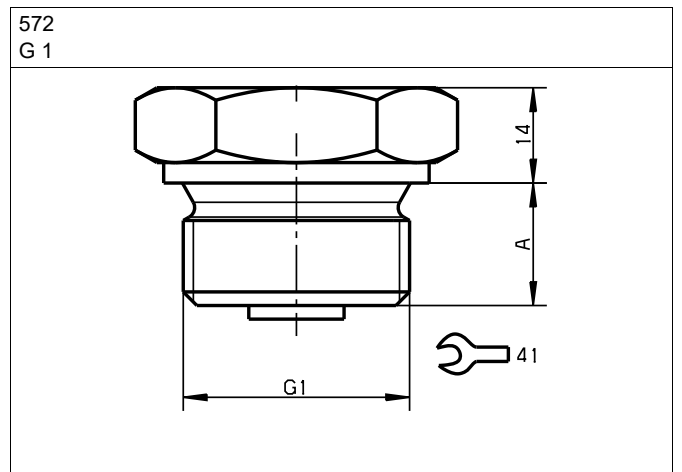


A 24 (25.5 for Ex-d)

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



A 22 (25.5 for Ex-d)



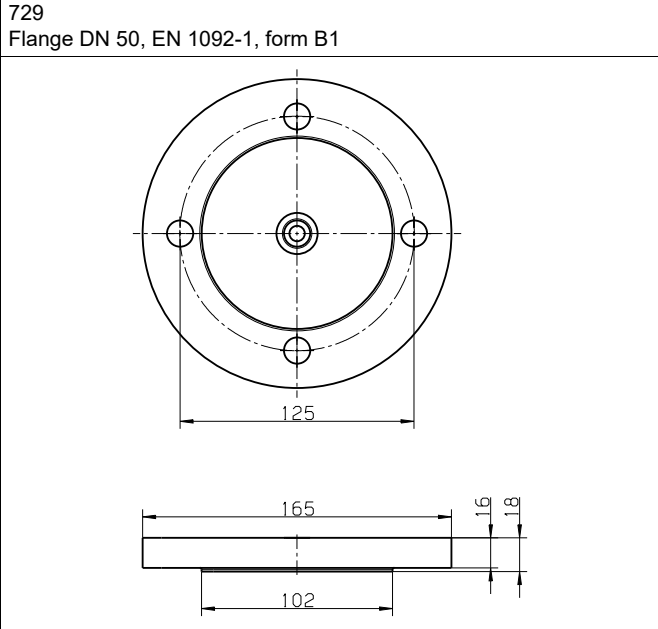
A 18 (25.5 for Ex-d)

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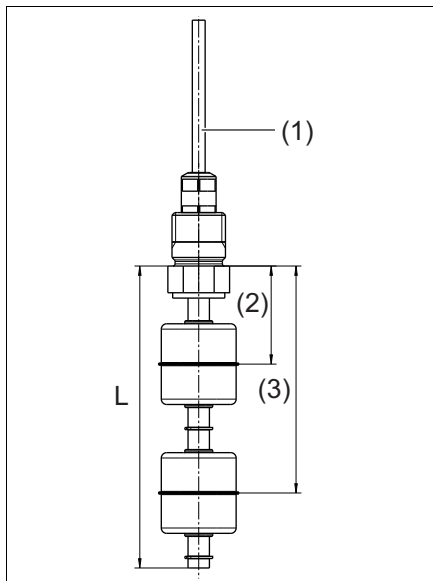
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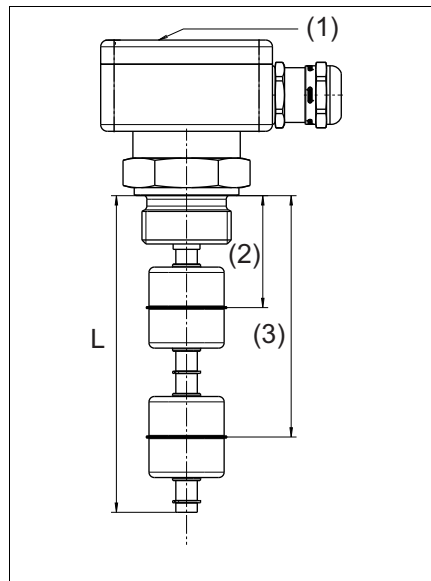
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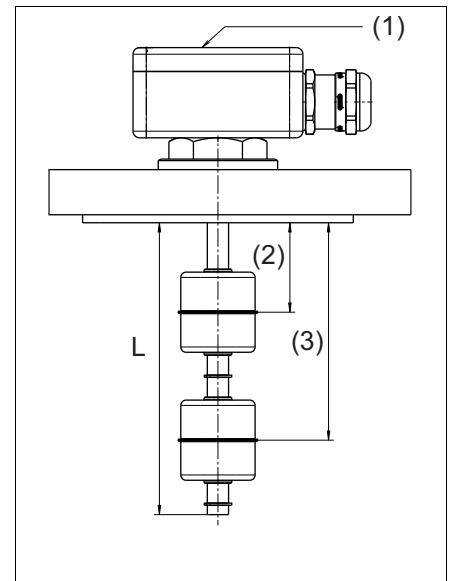
Below are examples for the dimensioning of the guide tube length L depending on the respective process connection.



(1) Process connection
 "thread upward"



(1) Process connection
 "thread"



(1) Process connection
 "flange"

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



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.

Number of contacts										
	Cable SPST- NO/NC	SPDT-CO	Cable socket SPST- NO/NC	SPDT-CO	Connection housing SPST- NO/NC	SPDT-CO	AMP connector SPST- NO/NC	SPDT-CO	Round plug M12 SPST- NO/NC	SPDT-CO
1	<p>Silicone</p> <p>RD</p> <p>WH</p> <p>PUR</p> <p>BN</p> <p>WH</p> <p>PVC</p> <p>BN</p> <p>WH</p>	<p>Silicone</p> <p>RD</p> <p>WH</p> <p>RD/BU</p> <p>PUR</p> <p>BN</p> <p>BU</p> <p>GN/YE</p> <p>PVC</p> <p>BN</p> <p>WH</p> <p>GN</p>	<p>FE</p> <p>1</p> <p>2</p>	<p>FE</p> <p>1</p> <p>2</p> <p>3</p>	<p>FE</p> <p>1</p> <p>2</p>	<p>FE</p> <p>1</p> <p>2</p> <p>3</p>	<p>1</p> <p>2</p>	<p>1</p> <p>2</p> <p>3</p>	<p>1</p> <p>2</p>	<p>1</p> <p>2</p> <p>3</p>
2	<p>Silicone</p> <p>RD</p> <p>WH</p> <p>RD/BU</p> <p>WH/BU</p> <p>PVC</p> <p>BN</p> <p>WH</p> <p>GN</p> <p>YE</p>	<p>Silicone^a</p> <p>RD</p> <p>WH</p> <p>BU</p> <p>RD/BU</p> <p>WH/BU</p> <p>BU</p>	<p>FE</p> <p>1</p> <p>2</p>	<p>FE</p> <p>1</p> <p>2</p> <p>3</p>	<p>FE</p> <p>1</p> <p>2</p>	<p>FE</p> <p>1</p> <p>2</p> <p>3</p> <p>4</p> <p>5</p> <p>6</p>	-	-	<p>1</p> <p>2</p> <p>3</p> <p>4</p>	-
3	<p>Silicone^a</p> <p>RD</p> <p>WH</p> <p>RD/BU</p> <p>WH/BU</p> <p>BU</p> <p>BU</p>	-	-	-	<p>PE</p> <p>1</p> <p>2</p> <p>3</p> <p>4</p> <p>5</p> <p>6</p>	<p>FE</p> <p>1</p> <p>2</p> <p>3</p> <p>4</p> <p>5</p> <p>6</p> <p>7</p> <p>8</p> <p>9</p>	-	-	<p>1</p> <p>2</p> <p>1</p> <p>3</p> <p>1</p> <p>4</p>	-

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Number of contacts										
	Cable SPST-NO/NC	SPDT-CO	Cable socket SPST-NO/NC	SPDT-CO	Connection housing SPST-NO/NC	SPDT-CO	AMP connector SPST-NO/NC	SPDT-CO	Round plug M12 SPST-NO/NC	SPDT-CO
4	-	-	-	-		-	-	-	-	-
Protection rating ^b	2	2	1	1	1	1	2	2	2	2

^a Max. current 2 A

^b According to DIN EN 61140

	Cable	Cable socket	Connection housing	AMP connector	Round plug M12
Temperature sensor Pt100 ^a	Silicone ^b 	-		-	
Temperature sensor Pt1000 ^a	PVC ^b 	-	-	-	-

^a Assignment is always to terminals with the highest numbers

^b For 1x SPST-NO/NC switching contacts

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

Contact function	Max. voltage U _i in V	Max. current U _i in mA	Max. power P _i in mW	Internal inductance in µH	Internal capacitance in pF
SPST-NO	≤ 30	≤ 100	≤ 750	~0 to 1 per m of cable	~0 to 200 per m of cable
SPST-NC					
SPDT-CO					
Pt100					
Pt1000					

Legend: cable	BN	Brown	GN	Green
	WH	White	RD	Red
	BU	Blue	YE	Yellow

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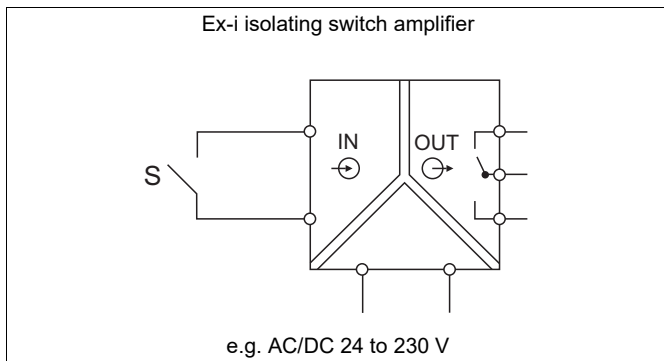
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Connection examples of versions with explosion protection

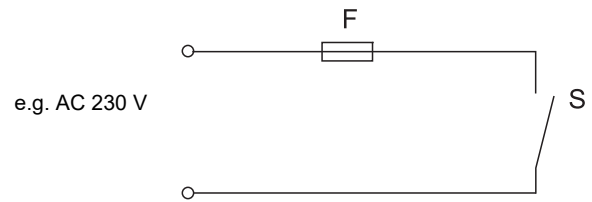
Float switches

Ex i



Ex d

According to operating manual 408301, chapter 6 "Installation", fuse (F) must be selected.



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Order details

	(1) Basic type
408301	JUMO NESOS R01 LS – float switch in miniature form
	(2) Basic type extension
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
	(3) Electrical connection
036	Round plug M12 × 1
061	Cable socket DIN EN 175301-803, Form A
110	Terminal head BUZ
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)
152	Cable, PVC with M12 connector
160	Cable, silicone
161	Cable, silicone with AMP Superseal connector (max. DC 24 V/3 A)
162	Cable, silicone with M12 connector
170	Cable, PUR
171	Cable, PUR with AMP Superseal connector (max. DC 24 V/3 A)
172	Cable, PUR with M12 connector
999	Special version
	(4) Cable length
0	None
100	100 mm
200	200 mm
400	400 mm
2000	2000 mm
5000	5000 mm
100 - 5000	Specifications in plain text (increments of 100 mm)
	(5) Process connection
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
729	Flange DN 50, EN 1092-1, form B1
999	According to customer requirements
	(6) Guide tube length L, diameter 8 mm^a
73	73 mm

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100	100 mm
120	120 mm
225	225 mm
500	500 mm
100 - 500	Specifications in plain text (increments of 50 mm)
(7) Float	
027	Cylinder, CrNi (stainless steel), diameter 27, density 800 kg/m ³
029	Spherical, CrNi (stainless steel), diameter 29, density 900 kg/m ³
729	Spherical, Ti (titanium), diameter 29, density 700 kg/m ³
(8) Number of floats	
1	1 piece
2	2 pieces
3	3 pieces
4	4 pieces
(9) Switching function	
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)
(10) Number of contacts^D	
1	1 contact
2	2 contacts
3	3 contacts
4	4 contacts
(11) Position of contact 1^b	
22	22 mm
70	70 mm
95	95 mm
181	181 mm
20 - 470	Specifications in plain text
(12) Position of contact 2^b	
0	None
70	70 mm
95	95 mm
181	181 mm
20 - 470	Specifications in plain text
(13) Position of contact 3^b	
0	None
70	70 mm
95	95 mm
181	181 mm
20 - 470	Specifications in plain text
(14) Position of contact 4^b	
0	None
95	95 mm
181	181 mm
40 - 470	Specifications in plain text
(15) Extra codes	
000	None
005	Integrated temperature sensor Pt1000 ^C
007	Integrated temperature sensor Pt100 ^C
019	Temperature monitoring of reed contact, Pt1000

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- ^a 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).
- ^b The contact positions are observed from the process connection toward the guide tube end (for details see operating manual, chapter 3.2).
- ^c 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	-	0	/	000