



Instruction Manual

FS10, FS11

***Magnetic float level switch for
vertical and horizontal mounting***



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Safety Information

General Instructions

To ensure safe operation, the device should only be operated according to the specifications in the instruction manual. The requisite Health & Safety regulations for a given application must also be observed. This statement also applies to the use of accessories.

Every person who is commissioned with the initiation or operation of this device must have read and understood the operating instructions and in particular the safety instructions!

The work safety instructions in this manual as well as the safety, accident prevention and environmental protection regulations generally valid for the work area must be observed.

The liability of the manufacturer expires in the event of damage due to improper use, non-observance of this operating manual, use of insufficiently qualified personnel and unauthorized modification of the device.

Proper Usage

The Level switches FS10 and FS11 are designed to control the level in vessels of liquids which do not attack the device materials. All other usage is regarded as being improper and outside the scope of the device.

In particular, applications in which shock loads occur (for example, pulsed operation) should be discussed and checked in advance with our technical staff.

The series FS10 and FS11 should not be deployed as the sole agents to prevent dangerous conditions occurring in plant or machinery. Machinery and plant need to be designed in such a manner that faulty conditions and malfunctions do not arise that could pose a safety risk for operators.

Dangerous substances

For dangerous media such as e.g. Oxygen, Acetylene, flammable or toxic substances as well as refrigeration systems, compressors, etc. must comply with the relevant regulations beyond the general rules.

Qualified Personnel

The FS10 and FS11 devices may only be installed by trained, qualified personnel who are able to mount the devices correctly. Qualified personnel are persons, who are familiar with assembling, installation, placing in service and operating these devices and who are suitably trained and qualified.

Inward Monitoring

Please check directly after delivery the device for any transport damages and deficiencies. Additional with reference to the accompanying delivery note the number of parts must be checked.

Claims for replacement or goods which relate to transport damage can only be considered valid if the delivery company is notified without delay.

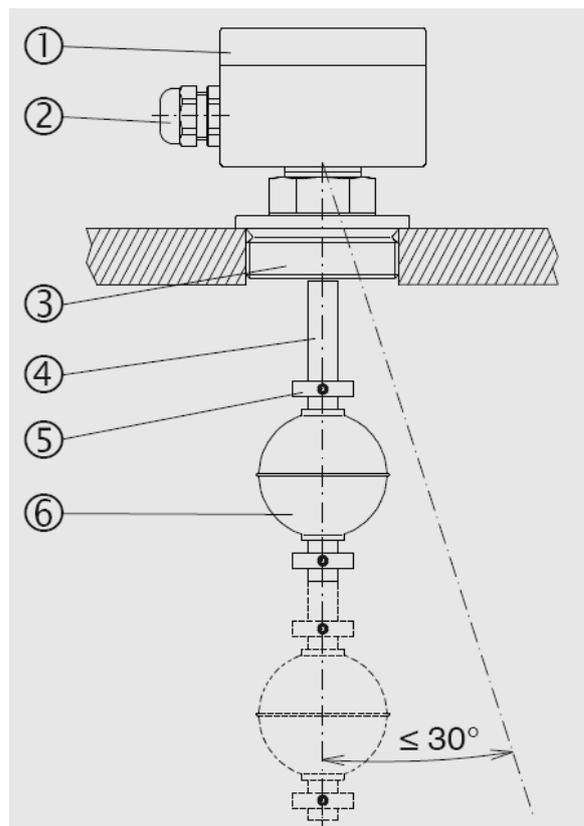
Design and Function

Functional description:

Magnetic float switches work on the float principle with magnetic transmission. A reed contact integrated in the guide tube ④ is actuated through the magnetic field of a permanent magnet, when a preset switch point is reached. The permanent magnet is located within a float ⑥, which changes its height with the level of the medium it is monitoring.

The switching status of the reed contact can be evaluated and processed by a connected control device.

The number and arrangement of floats is dependent on the number of the defined switch points, their contact function and also the distance between the switch points.



- 1: Connection housing
- 2: Cable bushing
- 3: Mounting thread
- 4: Guide tube
- 5: Float stop
- 6: Float

Safety

- ◆ The liquids must not have any large contamination or coarse particulates and must not have a tendency to crystallise. Ensure that the wetted materials of the magnetic float switch are sufficiently resistant to the medium being monitored. Not suitable for dispersions, abrasive liquids, highly viscous media and colours.
- ◆ This instrument is not permitted to be used in hazardous areas! Excluded are magnetic float switches which are marked as simple electrical equipment per EN 60079-11.
- ◆ The operating conditions specified in the operating instructions must be observed.
- ◆ Do not operate the instrument in the direct vicinity of ferromagnetic environments (min. distance 50 mm).
- ◆ Do not operate the instrument in the immediate vicinity of strong electromagnetic fields or in the immediate vicinity of equipment that can be affected by magnetic fields (min. clearance 1 m).
- ◆ The magnetic float switches must not be exposed to heavy mechanical strain (impact, bending, vibration).
- ◆ The technical specifications contained in these operating instructions must be observed. Improper handling or operation of the instrument outside of its technical specifications requires the instrument to be taken out of service immediately and inspected by an authorised PKP service engineer.

Danger:

Work on vessels involves the danger of intoxication and suffocation. No work is allowed to be carried out unless by taking suitable personal protective measures (e.g. respiratory protection apparatus, protective outfit etc.).

Mounting

- ◆ Observe all instructions given on the shipment packaging for removing the transportation safety devices.
- ◆ Remove the magnetic float switch carefully from the packaging!
- ◆ When unpacking, check all components for any external damage.

Mounting preparation:

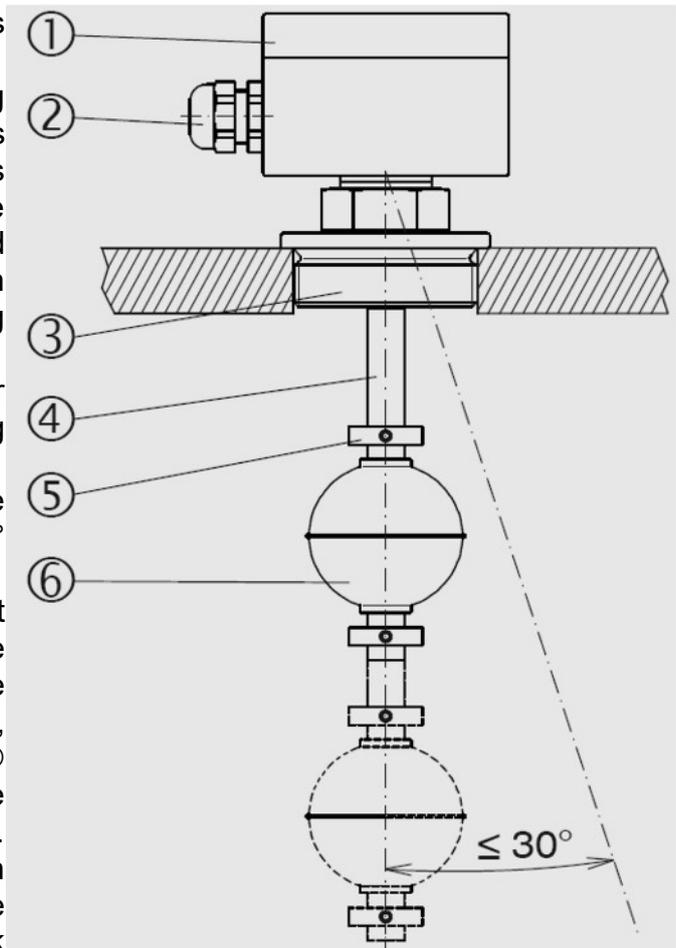
Functional check:

Before mounting, the float switch can be connected as described in chapter 5.3 and the switch points can be operated manually.

Ensure that the functional check does not start any unintended processes.

Mounting:

- ◆ Observe the torque values of screws specified in pipefitting work.
- ◆ In the selection of the mounting material (sealings, screws, washers and nuts), take the process conditions into account. The suitability of the sealing must be specified with regard to the medium and its vapours. In addition, ensure it has corresponding corrosion resistance.
- ◆ Mount the magnetic float switch either via mounting thread ③ or mounting flange (not illustrated).
- ◆ The guide tube ④ should not be inclined more than a maximum of 30° to the vertical.
- ◆ If the geometry of the float does not fit through the process connection, the float must be removed before mounting. - For this, before removal, mark the position of the float stops ⑤ with a waterproof pen - Mark the mounting position of the floats (e.g. "Up") - After the magnetic float switch has been mounted, the float should be re-attached within the inside of the tank (pay attention to the mounting position!). - Float stops ⑤ must then be re-attached at the marked points.
- ◆ The number of floats and also the position of the float stops are dependent upon the dimension and the number of switch points.



Electrical Connection

- ◆ The electrical connection must only be made by qualified skilled personnel.
- ◆ Connection details and switching functions are given on the connection diagram on the instrument and the connection terminals are appropriately marked (exception: Versions with only one normally closed or normally open contact).
- ◆ Seal the cable bushing ② at the connection housing ①.
- ◆ The mains connection lines to be provided must be dimensioned for maximum instrument current supply and comply with IEC 227 or IEC 245.

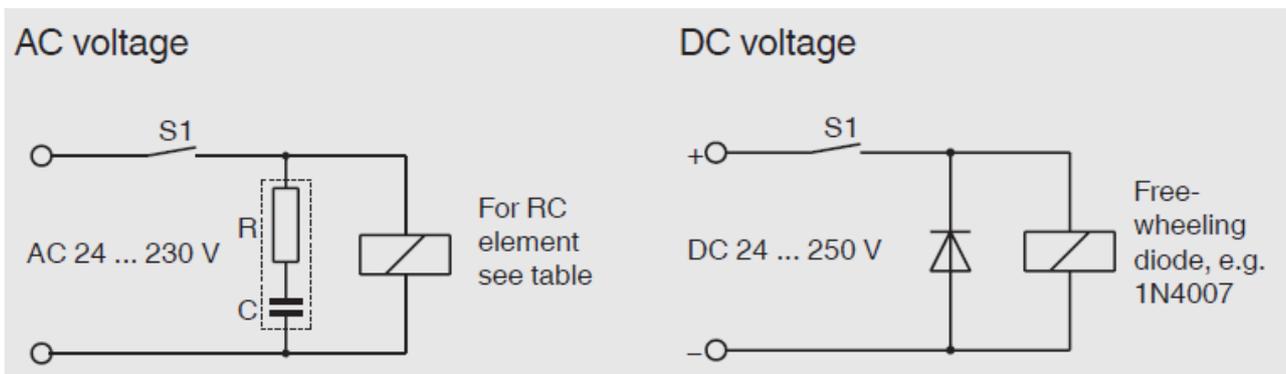
Warning:

Electrical connection errors of the magnetic float switches can destroy the reed contacts. This can lead to a malfunction in the plant and thus lead to injury to personnel or damage to equipment.

- ▶▶ No direct operation in circuits with inductive loads.
- ▶▶ No direct operation in circuits with capacitive loads, e.g. PLC, PCS or cable lengths > 50 m.
- ▶▶ Do not exceed the permissible switching power.

Connection with inductive load:

With inductive loads, the magnetic float switches should be protected by connection to an RC element or a free-wheeling diode.



RC elements for reed contacts 10 ... 40 VA

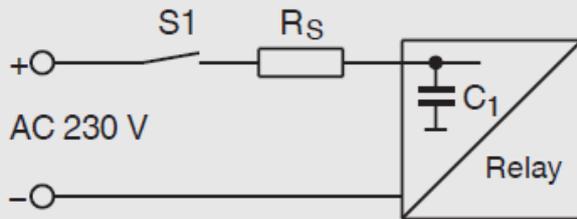
Voltage	Resistance	Capacitance	Type of RC element
AC 24 V	100 Ω	0.33 μF	A 3/24
AC 48 V	220 Ω	0.33 μF	A 3/48
AC 115 V	470 Ω	0.33 μF	A 3/115
AC 230 V	1,500 Ω	0.33 μF	A 3/230

RC elements for reed contacts 40 ... 100 VA

Voltage	Resistance	Capacitance	Type of RC element
AC 24 V	47 Ω	0.33 μF	B 3/24
AC 48 V	100 Ω	0.33 μF	B 3/48
AC 115 V	470 Ω	0.33 μF	B 3/115
AC 230 V	1,000 Ω	0.33 μF	B 3/230

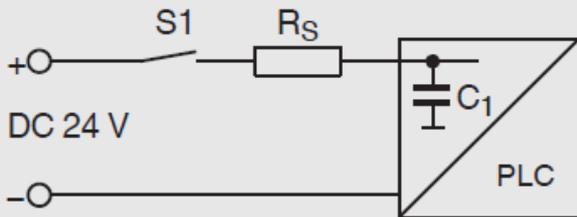
Connection with capacitive load:

AC voltage current limitation
e.g. for electronic time relay



$R_S = 220 \Omega$ (for AC 230 V)
 $C_1 =$ internal capacitance

Current limitation, DC voltage
e.g. for PLC, PCS and cables > 50 m



$R_S = 22 \Omega$ (47 Ω for contacts ≤ 10 VA)
 $C_1 =$ internal capacitance

Attention:

To increase the service life of the contacts, we recommend operation with a contact protection relay.

Connection diagrams:

Colour coding per IEC 757

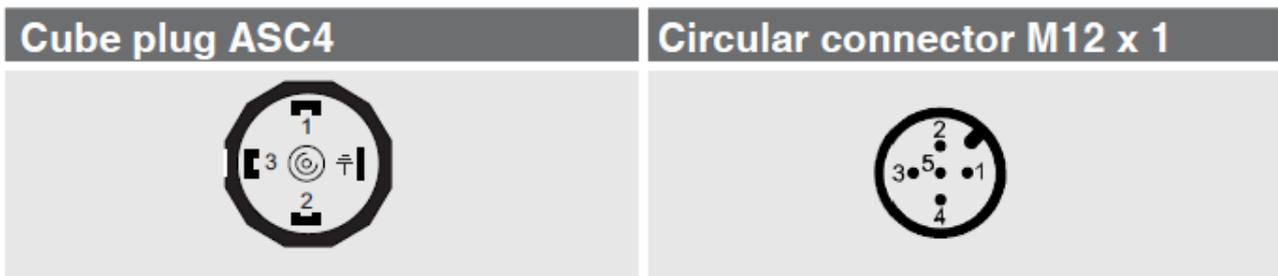
Abbreviations, definitions: L-SP: Level switch point
 T-SP: Temperature switch point
 NO/NC: Normally open / normally closed
 CO: Change-over

Number of switch points	PVC cable		Silicone cable		Connection housing	
	NO/NC	CO	NO/NC	CO	NO/NC	CO
1 L-SP	GY L1 BK	GY L1 BN BK	GY L1 BK	GY L1 BN BK	GY 1 L1 BN 2	GY 1 L1 BN 2 BK 3
2 L-SP	BK L1 BK L1 BN L2 GY L2	YE L1 GN BK BU L2 PK GY	BK L1 BK L1 BN L2 GY L2	YE L1 GN BK BU L2 RD WH	BK 1 L1 BK 2 L1 BN 3 L2 GY 4 L2	YE 1 L1 GN 2 L1 BN 3 GY 4 L2 RD 5 L2 WH 6
3 L-SP	GN L1 BN L1 YE L2 GY L2 PK L3 BU L3	BU-RD L1 RD WH YE L2 GN BN BU L3 PK GY	GN L1 BN L1 YE L2 GY L2 PK L3 BU L3	-	BN 1 L1 WH 2 L1 YE 3 L2 GN 4 L2 GY 5 L3 RD 6 L3	WH 1 L1 BK 2 L1 OG 3 YE 4 L2 GN 5 L2 BN 6 BU 7 L3 PK 8 L3 GY 9
4 L-SP	RD L1 WH L1 GN L2 BN L2 YE L3 GY L3 PK L4 BU L4	GY-RD L1 BK VT BU-RD L2 RD WH YE L3 GN BN BU L4 PK GY	-	-	RD 1 L1 WH 2 L1 GN 3 L2 BN 4 L2 YE 5 L3 GY 6 L3 PK 7 L4 BU 8 L4	WH 1 L1 BK 2 L1 OG 3 YE 4 L2 GN 5 L2 BN 6 BU 7 L3 PK 8 L3 GY 9 RD 10 L4 VT 11 L4 CLEAR 12

Number of switch points	PVC cable		Connection housing	
	NO/NC		NO/NC	
5 L-SP	BK ———— L1		RD 1 ———— L1	
	VI ———— L1		WH 2 ———— L1	
5 L-SP	RD ———— L2		GN 3 ———— L2	
	WH ———— L2		BN 4 ———— L2	
5 L-SP	GN ———— L3		YE 5 ———— L3	
	BN ———— L3		GY 6 ———— L3	
5 L-SP	YE ———— L4		PK 7 ———— L4	
	GY ———— L4		BU 8 ———— L4	
5 L-SP	PK ———— L5		VT 9 ———— L5	
	BU ———— L5		CLEAR 10 ———— L5	
6 L-SP	GY-RD ———— L1		RD 1 ———— L1	
	BU-RD ———— L1		WH 2 ———— L1	
6 L-SP	BK ———— L2		GN 3 ———— L2	
	VT ———— L2		BN 4 ———— L2	
6 L-SP	RD ———— L3		YE 5 ———— L3	
	WH ———— L3		GY 6 ———— L3	
6 L-SP	GN ———— L4		PK 7 ———— L4	
	BN ———— L4		BU 8 ———— L4	
6 L-SP	YE ———— L5		VT 9 ———— L5	
	GY ———— L5		CLEAR 10 ———— L5	
6 L-SP	PK ———— L6		BK 11 ———— L6	
	BU ———— L6		OG 12 ———— L6	

Number of switch points	PVC cable		Silicone cable		Connection housing	
	NO/NC	CO	NO/NC	CO	NO/NC	CO
1 L-SP and 1 T-SP	BK ———— L1	GY ———— L1	BK ———— L1	GY ———— L1	BK 1 ———— L1	GY 1 ———— L1
	BK ———— L1	RD ———— L1	BK ———— L1	RD ———— L1	BK 2 ———— L1	RD 2 ———— L1
1 L-SP and 1 T-SP	BN ———— ϑ	WH ———— ϑ	BN ———— ϑ	WH ———— ϑ	BN 3 ———— ϑ	WH 3 ———— ϑ
	GY ———— ϑ	BN ———— ϑ	GY ———— ϑ	BN ———— ϑ	GY 4 ———— ϑ	BN 4 ———— ϑ
1 L-SP and 2 T-SP	GN ———— L1	BU-RD ———— L1	GN ———— L1	BU-RD ———— L1	GN 1 ———— L1	BU-RD 1 ———— L1
	BN ———— L1	RD ———— L1	BN ———— L1	RD ———— L1	BN 2 ———— L1	RD 2 ———— L1
1 L-SP and 2 T-SP	YE ———— $\vartheta_{55^{\circ}\text{C}}$	WH ———— $\vartheta_{55^{\circ}\text{C}}$	YE ———— $\vartheta_{55^{\circ}\text{C}}$	WH ———— $\vartheta_{55^{\circ}\text{C}}$	YE 3 ———— $\vartheta_{55^{\circ}\text{C}}$	WH 3 ———— $\vartheta_{55^{\circ}\text{C}}$
	GY ———— $\vartheta_{55^{\circ}\text{C}}$	YE ———— $\vartheta_{55^{\circ}\text{C}}$	GN ———— $\vartheta_{55^{\circ}\text{C}}$	YE ———— $\vartheta_{55^{\circ}\text{C}}$	GN 4 ———— $\vartheta_{55^{\circ}\text{C}}$	YE 4 ———— $\vartheta_{55^{\circ}\text{C}}$
1 L-SP and 2 T-SP	PK ———— $\vartheta_{75^{\circ}\text{C}}$	GN ———— $\vartheta_{55^{\circ}\text{C}}$	BU ———— $\vartheta_{75^{\circ}\text{C}}$	GN ———— $\vartheta_{55^{\circ}\text{C}}$	PK 5 ———— $\vartheta_{75^{\circ}\text{C}}$	BU ———— $\vartheta_{75^{\circ}\text{C}}$
	BU ———— $\vartheta_{75^{\circ}\text{C}}$	PK ———— $\vartheta_{75^{\circ}\text{C}}$	RD ———— $\vartheta_{75^{\circ}\text{C}}$	PK ———— $\vartheta_{75^{\circ}\text{C}}$	RD 6 ———— $\vartheta_{75^{\circ}\text{C}}$	PK 8 ———— $\vartheta_{75^{\circ}\text{C}}$
1 L-SP and 2 T-SP		GY ———— $\vartheta_{75^{\circ}\text{C}}$		GY ———— $\vartheta_{75^{\circ}\text{C}}$		GY 9 ———— $\vartheta_{75^{\circ}\text{C}}$

Connector pin assignment:



Number of switch points	Cube plug ASC4		Circular connector M12 x 1	
	NO/NC	CO	NO/NC	CO
1 L-SP	1 L1 2	1 L1 3 L1 2	BN 1 L1 WH 2	WH 2 L1 BN 1 L1 BK 4
2 L-SP	2 L1 1 L2 3	-	BN 1 L1 WH 2 L1 BU 3 L2 BK 4	-
1 L-SP and 1 T-SP	2 L1 1 L1 3	-		

Switching capacity:

exact switching capacity: see device sticker!

Permissible switching capacity

Exact switching capacity: see device label!

Model	Voltage	N/O / N/C	Changeover switch
St. st. with cable	safety extra-low voltage	AC 50 V; 100 VA; 1 A DC 75 V; 50 W; 0,5 A	AC 50 V; 40 VA; 1 A DC 75 V; 20 W; 0,5 A
St. st. with housing or plug			
Hygienic version with cable			
St. st. with cable	low voltage	AC 250 V; 100 VA; 1 A DC 250 V; 50 W; 0,5 A	AC 250 V; 40 VA; 1 A DC 250 V; 20 W; 0,5 A
St. st. with housing or plug			
Plastic with cable			
Plastic with housing or plug			
Hygienic version with housing			
Mini st. st. with cable	safety extra-low voltage	AC 50 V; 10 VA; 0,5 A DC 75 V; 5 W; 0,25 A	AC 50 V; 5 VA; 0,25 A DC 75 V; 2,5 W; 0,15 A
Mini st. st. with housing or plug			
Hygienic version 3A with housing	low voltage	AC 250 V; 50 VA; 1 A DC 250 V; 50 W; 0,5 A	AC 250 V; 50 VA; 1 A DC 250 V; 20 W; 0,5 A

Bold versions are standard.

Information for Float switches which are marked as simple apparatus per EN 60079-11 section 5.7:

Only for connection to a certified intrinsically safe circuit Ex ia or Ex ib.

$U_i \leq 36 \text{ V}$, $I_i \leq 100 \text{ mA}$, $P_i \leq 0,84 \text{ W}$

Commissioning

Switch on the voltage supply of the connected control device. Fill the vessel and check the switch points of the magnetic float switch for function.

Warning:

Ensure that the functional check does not start any unintended processes.

Always observe the mounting and operating instructions of accessories when commissioning them.

Faults

The following table contains the most frequent causes of faults and the necessary countermeasures.

Faults	Causes	Measures
Magnetic float switch cannot be mounted at the planned place on the vessel	Process connection of the magnetic float switch does not match the process connection of the vessel.	Modification of the vessel Return to the factory
	Process connection at the vessel defective	Rework the thread or replace the screwed coupling
	Mounting thread at the magnetic float switch defective	Return to the factory
No or undefined switching function	Electrical connection incorrect	See chapter 5.3 "Electrical connection". Check assignment with the aid of the connection diagram.
	Temperature contact defective	Return to the factory
	Reed contact defective	

Caution:

Physical injuries and damage to property and the environment

If faults cannot be eliminated by means of the listed measures, the instrument must be taken out of operation immediately.

- ◆ Ensure that there is no longer any pressure present and protect against being put into operation accidentally.
- ◆ Contact the manufacturer.
- ◆ If a return is needed, please follow the instructions given in chapter "Return".

Maintenance and Cleaning

When used properly, the magnetic float switches work maintenance-free. They must be subjected to visual inspection within the context of regular maintenance, however, and included in the vessel pressure test.

DANGER!

Work on vessels involves the danger of intoxication and suffocation. No work is allowed to be carried out unless by taking suitable personal protective measures (e.g. respiratory protection apparatus, protective outfit etc.).

Repairs must only be carried out by the manufacturer.

Perfect functioning of the magnetic float switches can only be guaranteed when original accessories and spare parts are used.

CAUTION!

Improper cleaning may lead to physical injuries and damage to property and the environment. Residual media in the dismantled instrument can result in a risk to persons, the environment and equipment.

- ◆ Rinse or clean the removed instrument.
 - ◆ Sufficient precautionary measures must be taken.
1. Prior to cleaning, properly disconnect the instrument from the process and the power supply.
 2. Clean the instrument carefully with a moist cloth.
 3. Electrical connections must not come into contact with moisture!

CAUTION!

Improper cleaning may lead to damage to the instrument!

- ◆ Do not use any aggressive cleaning agents.
- ◆ Do not use any pointed and hard objects for cleaning.

Dismounting, Return and Disposal

- ◆ Only disconnect the measuring instrument once the system has been depressurised and the power disconnected!
- ◆ Wash or clean the dismantled instrument, in order to protect persons and the environment from exposure to residual media.
- ◆ Please send a detailed error description with the device to
PKP Prozessmesstechnik GmbH, Borsigstraße 24, D-65205 Wiesbaden

FS10

Vertically-Mounted Magnetic Float Level Sensor

- reliable and robust, heavy duty technology
- mounting thread, tank fittings or flange
- installation at top or bottom of vessel
- versions made of stainless steel, Titanium, PVC, PP or PVDF
- N/C, N/O or SPDT Reed contacts available (PNP or NPN switch output available also)
- P_{max} : 80 bar, T_{max} : 350 °C
- max. tube length: 6000 mm
-  Ex-Version acc. to ATEX



Description:

The FS10 level sensor is based on a float with magnetic transmission technology. The sensor is comprised of a guide tube with embedded Reed contacts, one or more floats with fitted ring magnets and a process connection module. The float is raised by the rising liquid in the tank and operates a Reed contact through the guide tube wall by means of the magnetic field produced by permanent magnets located in the float. This Reed contact can be designed as a NO, NC or changeover function.

Float stops mounted on the guide tube prevent the float from passing the contact, this assures bistable switching. Consequently, a maximum of 2 contacts per float can be operated. If more contacts are fitted, more floats must be used.

Applications:

FS10 magnetic float level sensors are suitable for monitoring the level of practically all liquids, e.g. as a full or empty tank sensor, for controlling valves and pumps and for alarm function. The potential free Reed contacts fitted in the level sensor make it an ideal control element when coupled with PLC controllers

Versions:

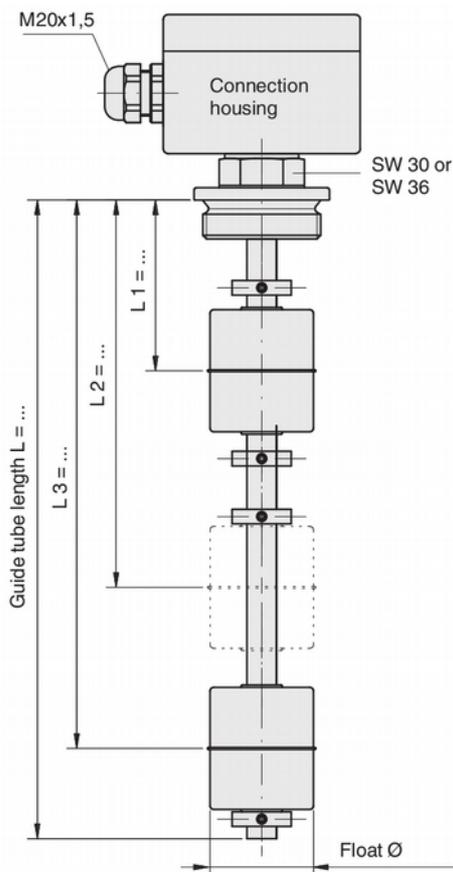
- Standard (stainless steel)
- Miniature version (stainless steel)
- Plastic version (PVC, PP, PVDF)
- Ex version (on request)
- ECTFE coating (on request)

Structure of the measuring instrument:

Each magnetic float level sensor consists of the three key modules below, which, depending on requirements, are available in different models:

- guide tube
- float
- process connection

Secondary instrumentation like contact protection relays complete the measuring system.



Guide tube:

The guide tube is the key component in the level sensor: it houses the reed contacts and can be supplied in a variety of materials and diameters.

Float:

The choice of float is based on the liquid being monitored (corrosion, density), the process parameters (pressure, temperature) and the guide tube materials and diameters. The available float models are listed in the following table.

The selection of the adequate float is best done by technical advise by PKP engineers.

Special floats (e.g. electropolished, increased length, etc.) on request.

Float models and dimensions (Table 1):

Type	Material	Min. DN of thread or flange	Ø ID/OD [mm]	Min. density [kg/m³]	Max. press. [bar]	Max. temp. [C°]
Cylinder float						
E1027	stainless steel	1" / DN40	10 / 27	790	16	100
E1544		1 1/2" / DN50	15 / 44	820	16	300
EE1445	VA ECTFE	2" / DN65	14 / 45	780	16	*)
T1544	Titan	1 1/2" / DN50	15 / 44	720	16	300
B0920	Buna	1" / DN40	9 / 20	940	3	80
B0923		1" / DN40	9 / 23	800	3	80
B0925		1" / DN40	9 / 25	790	3	80
B1330		1 1/2" / DN50	13 / 30	680	3	80
B1540		1 1/2" / DN50	15 / 40	580	3	80
B1950		2" / DN65	19 / 50	500	3	80
PV1444	PVC	1 1/2" / DN50	14 / 44	650	3	60
PV2255		2" / DN65	22 / 55	800	3	60
PV2655		2" / DN65	26 / 55	920	3	60
PV2580		- / DN80	25 / 80	570	3	60
PP0927	PP	1" / DN40	9 / 27	760	3	80
PP0935		1 1/2" / DN50	9 / 35	680	3	80
PP1444		1 1/2" / DN50	14 / 44	480	3	80
PP2255		2" / DN65	22 / 55	580	3	80
PP2655		2" / DN65	26 / 55	670	3	80
PP2580		- / DN80	25 / 80	430	3	80
PF1444	PVDF	1 1/2" / DN50	14 / 44	780	3	100
PF2255		2" / DN65	22 / 55	820	3	100
PF2655		2" / DN65	26 / 55	1140	3	100
PF2580		- / DN80	25 / 80	430	3	100
Ball float						
E0929	stainless steell	1 1/2" / DN50	9 / 29	980	6	100
E0929H		1 1/2" / DN50	9 / 29	1070	25	100
E1552		2" / DN65	15 / 52	770	40	300
E1562		- / DN65	15 / 62	600	32	300
E1583		- / DN80	15 / 83	410	25	300
E2380		- / DN80	23 / 80	680	25	300
E2398		- / DN100	23 / 98	600	25	300
E23105		-	23 / 105	530	25	300
E23120		-	23 / 120	390	25	300
EE1453		VA-ECTFE	2" / DN65	14 / 53	740	25
EE1463	- / DN65		14 / 63	590	25	*)
EE1484	- / DN100		14 / 84	400	25	*)
EE2281	- / DN80		22 / 81	720	25	*)
EE2299	- / DN100		22 / 99	680	25	*)
EE22106	-		22 / 106	630	25	*)
EE22121	-	22 / 121	460	25	*)	
T0929	Titan	1 1/2" / DN50	9 / 29	820	30	100
T1552		2" / DN65	15 / 52	710	25	300
T1552M		2" / DN65	15 / 52	850	60	300
T1552H		2" / DN65	15 / 52	1060	80	300
T1562		- / DN65	15 / 62	510	25	300
T1583		- / DN100	15 / 83	280	25	300
T2380		- / DN80	23 / 80	670	25	300
T2396		- / DN100	23 / 96	500	25	300
T23105		-	23 / 105	370	25	300
T23120		-	23 / 120	330	25	300

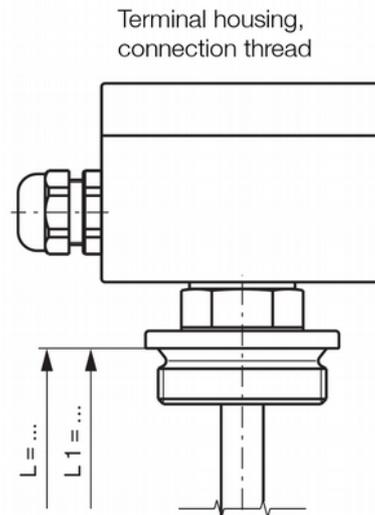
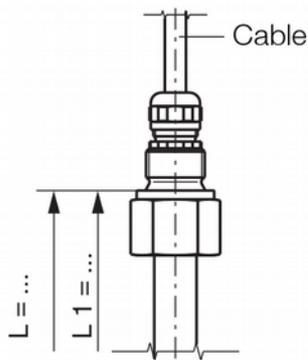
*) Maximum process temperature depends on media.

Process connection:

Typically, the magnetic float level sensors are screwed in the top of the vessel from inside with a male-threaded fitting (NPT or G, 1/8" to 2"). When installed in this fashion, the devices are supplied with a PVC or silicone-jacket connection cable.

To mount the float level sensor from outside through the top of the vessel the device must be fitted with a tank fitting (NPT or G, 1", 1 1/2", or 2" male thread) or with flanges. In this case it is recommended, that the diameter of the tank fitting or flange is large enough to allow the float to pass through the opening in the top of vessel. In the standard version, an adjustable stop ring is fixed to the end of the guide tube, therefore the float can be removed and afterwards mounted from inside the vessel, if the diameter of the process connection is too small.

Miniature Version, Stainless Steel:



Technical Data:

Guide tube diameter:	8 mm
Guide tube length L:	max. 500 mm
Guide tube material:	st. st. 1.4571 titanium (others on request)
Process connection:	
cable version:	screw in connection to top, G 1/8 male
housing version:	screw in connection to bottom, G 3/4 AG, G 1 male
Temperature range:	
with PVC-cable:	-10...+80 °C
with silicone cable:	-30...+150 °C
housing version:	
NBR / PP-Float:	-10...+80 °C
st. st. / titanium float.:	-10...+150 °C Tmax for floats: see table 1
Float:	stainless steel 1.4571 NBR PP titanium
Float diameter:	20...35 mm
Mounting position:	vertical +/- 30°

Possible Float Types:

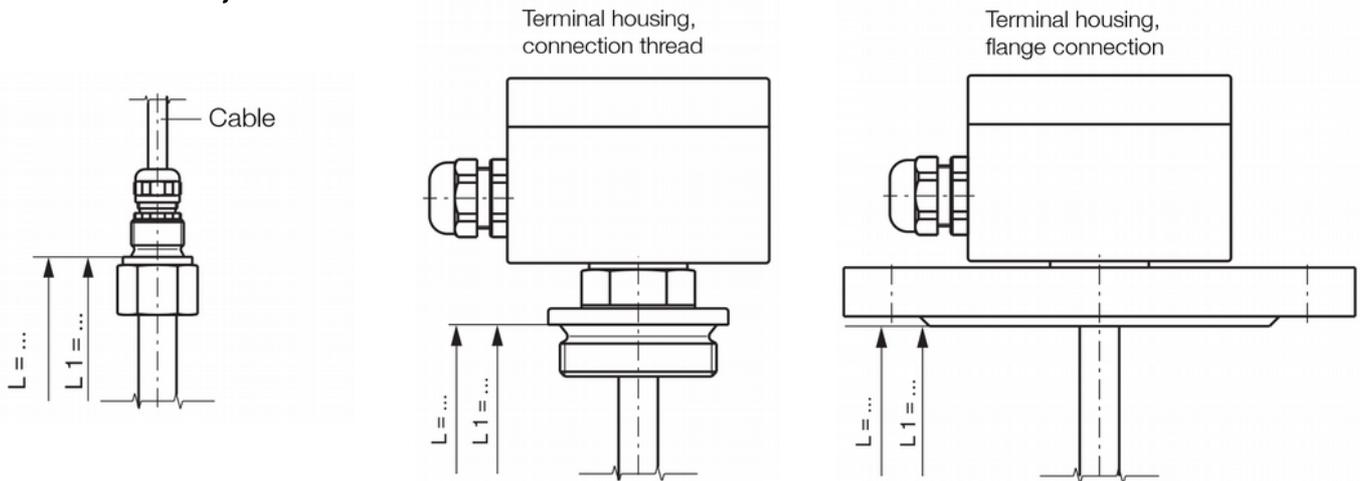
(see table 1 also)

E1027
B0920
B0923
B0925
E0929
E0929H
T0929

Electrical Data:

Electrical connection:	cable made of PVC cable made of silicone terminal housing: aluminium 64x58x34 mm
Switching function: (Reed contact)	N/O N/C SPDT (on rising level)
Max. number of contacts:	3 x N/O or N/C or 2 x SPDT
Switching position:	dimension L1, L2, L3 (from sealing surface, starting from the top)
Switching point distance:	min. 20 mm
Switching capacity:	depending on switching function (please observe contact protection action, exact details see type plate)
	N/O and N/C: 50 VAC, 10 VA, 0,5 A 75 VDC, 5 W, 0,25 A
	SPDT: 50 VAC, 5 VA, 0,25 A 75 VDC, 2,5 W, 0,15 A
Protection class:	IP65 (plastic housing, plug) IP66/IP68 (alu or stainless steel housing)

Standard Version, Stainless Steel:



Technical Data:

Guide tube diameter:	12, 14, 18 mm
Guide tube length L:	max. 3000 mm (Ø 12, 14 mm) max. 6000 mm (Ø 18 mm)
Guide tube material:	stainless steel 1.4571 titanium (others on request)
Process connection:	
cable version:	screw in connection to top, G 3/8 male, G 1/2 male
housing version:	screw in connection to bottom, G 1 1/2 male, G 2 male
	flange connections: DIN DN 50...DN 200 PN 6... PN 100
	ANSI 2"...8", Class 150...600
Temperature range:	
with PVC-cable:	-10...+80 °C
with silicone cable:	-30...+180 °C
housing version:	-30...+180 °C
	optional: high temp. version: -30...+250 (350) °C
	low temperature version: -50...+180 °C
	Tmax for floats: see table 1
Float:	stainless steel 1.4571 NBR titanium
Float diameter:	44...120 mm
Mounting position:	vertical +/- 30°

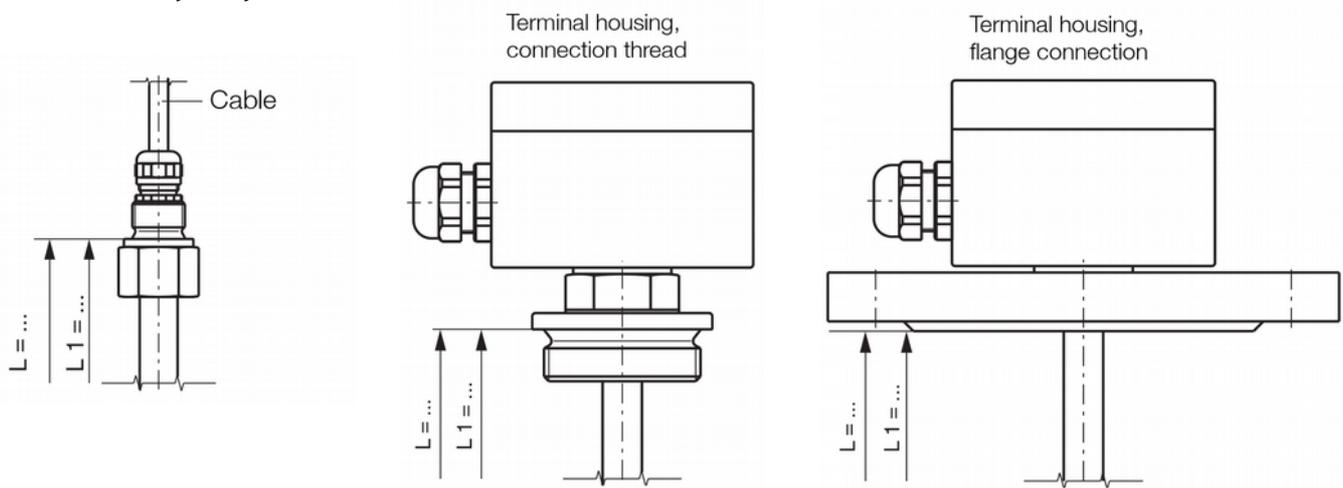
Electrical Data:

Electrical connection:	cable made of PVC cable made of silicone terminal housing: aluminium 64x58x34 mm (1 contact) 80x75x57 mm (from 2 contacts)
Switching function:	N/O, N/C
(Reed contact)	SPDT (on rising level)
Max. number of contacts:	6 x N/O or N/C or 4 x SPDT
Switching point distance:	dimens. L1, L2, L3, (from seal- ing surface, starting from top)
Switching point distance:	min. 20 mm
Switching capacity:	depending on switching function (please observe contact protection action, exact details see type plate)
	N/O and N/C: 230 VAC, 100 VA, 1 A 230 VDC, 50 W, 0,5 A
	SPDT: 230 VAC, 40 VA, 1 A 230 VDC, 20 W, 0,5 A
Protection class:	IP65 (plastic housing, plug) IP66/IP68 (alu or stainless steel housing)

Possible Float Types:

Guide tube diameter		
12 mm	14 mm	18 mm
E1544	E1544	B1950
EE1445	T1544	E2380
T1544	B1540	E2398
B1330	E1552	E23105
B1540	E1562	E23120
E1552	E1583	EE2281
E1562	T1552	EE2299
E1583	T1552M	EE22106
EE1453	T1552H	EE22121
EE1463	T1562	T2380
EE1484	T1583	T2396
T1552		T23105
T1552M		T23120
T1552H		
T1562		
T1583		

Plastic Version, PVC, PP or PVDF:



Technical Data:

Guide tube diameter:	12, 16, 20 mm
Guide tube length L:	max. 500 mm (Ø 12 mm) max. 3000 mm (Ø 16 mm) max. 5000 mm (Ø 20 mm)
Guide tube material:	PVC PP PVDF
Process connection:	
cable version:	screw in connection to top, G 3/8 male
housing version:	screw in connection to bottom, G 1 1/2, G 2 male
	flange connection: DIN DN 50...DN 200 PN 6... PN 100
	ANSI 2"...8", Class 150...600
Temperature range:	
PVC:	0...60 °C
PP:	-10...+80 °C
PVDF:	-10...+100 °C
Float	PVC, PP, PVDF
Float diameter	44...80 mm
Mounting position	vertical +/- 30°

Electrical Data:

Electrical connection:	cable made of PVC terminal housing: PP: 80x82 x55 PE: 80x75x55 mm
Switching function: (Reed contact)	N/O N/C SPDT (on rising level)
Max. number of contacts:	6 x N/O or N/C or 4 x SPDT
Switching position:	dimension L1, L2, L3, (from sealing surface, starting from the top)
Switching point distance:	min. 20 mm
Switching capacity:	depending on switching function (please observe contact protection action, exact details see type plate)
	N/O and N/C: 230 VAC, 100 VA, 1 A 230 VDC, 50 W, 0,5 A
	SPDT: 230 VAC, 40 VA, 1 A 230 VDC, 20 W, 0,5 A
Protection class:	IP65 (plastic housing, plug) IP66/IP68 (alu or stainless steel housing)



Possible Float Types:

(see table 1 also)

Guide tube diameter		
12 mm	16 mm	20 mm
B1380	B1950	PV2255
B1540	PV2255	PV2655
PV1440	PP2255	PV2580
PP1444	PF2255	PP2655
PF1444		PP2580
		PF2255
		PF2655
		PF2580

Order Code:

Order number: **FS10. 2. 1. 3. G06. 1. 1. E1027. 0**

Magnetic float level switch

Guide tube material:

- 2 = stainless steel
- 3 = PVC
- 4 = PP
- 5 = PVDF
- 7 = titanium
- 9 = special version

Guide tube diameter:

- 1 = 8 mm (miniature)
- 2 = 12 mm (standard, plastic)
- 3 = 14 mm (standard)
- 4 = 16 mm (plastic)
- 5 = 18 mm (standard)
- 6 = 20 mm (plastic)
- 9 = special version

Material process connection:

- 3 = stainless steel 1.4571
- 4 = PVC
- 5 = PP
- 6 = PVDF
- 7 = stainless steel 1.4435
- 8 = stainless steel 1.4404
- 9 = stainless steel 1.4539

Process connection:

G06...FD200/100

(see table "process connections")

Electrical connection:

- 1 = terminal housing aluminium
- 2 = terminal housing stainless steel
- 3 = terminal housing (PP or Polyester)
- 4 = plug (please indicate version)
- 6PVC1 = PVC cable 1 m
- 6SIL1 = silicone cable 1 m
(please indicate other length directly)
- 9 = special version

Contacts (from top to bottom):

please indicate distance of each contact individually, measured from sealing surface of process connection

- 1 = N/O at rising level / contact position [mm]
- 2 = N/C at rising level / contact position [mm]
- 3 = SPDT / contact position [mm]
- L = total length [mm]

Float model: (see Table 1)

E1027-T23120

9 = special version

Approvals and options:

0 = without

see Table 12 „Approvals and Options“

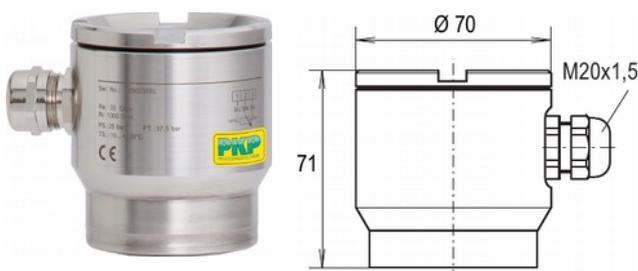
Approvals and options:

Description	Code	
High temperature version (-30...+250 °C)	HT1	for standard version only
Highest temperature version (-30...+350 °C)	HT2	
Low temperature version (-50...+180 °C)	TT	
Adjustable version	HA	please inquire individually
explosion proof, intrinsic safe acc. to ATEX Ex ia, zone 0, gas	E1	
explosion proof, flame-proof enclosure acc. to ATEX Ex d, Zone 1, gas and dust	E2	
Germanischer Lloyd	GL	
Det Norske Veritas	DNV	
American Bureau of Shipping	ABS	

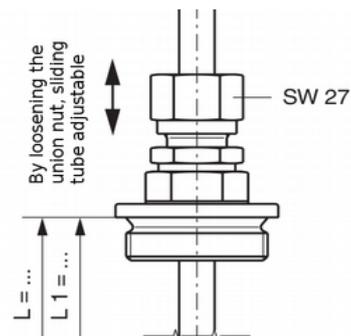
Process connections:

Miniature version:			
code	connection	tube-Ø	electr. connec.
G06	G 1/8 male	8 mm	cable version
G20	G 3/8 male		housing version
G25	G 1 male		housing version
Standard version:			
G10	G 3/8 male	12, 14, 18 mm	cable version
G15	G 1/2 male		
G40	G 1 1/2 male		
G50	G 2 male		
FD50 to FD200...	DIN flange DN 50...DN 200		housing version
.../6 to 100	PN 6...PN 100		
FA2 to FA8...	ANSI flange 2"...8"		
.../150 to 600	Class 150 to 600		
Plastic version:			
G10	G 3/8 male	12, 16, 20 mm	cable version
G40	G 1 1/2 male		
G50	G 2 male		
FD50 bis FD200...	DIN flange DN 50...DN 200		housing version
.../6 bis 100	dimensions like PN 6...PN 100		
FA2 bis FA8...	ANSI flange 2"...8"		
.../150 bis 600	Class 150 bis 600		

Stainless steel terminal housing:



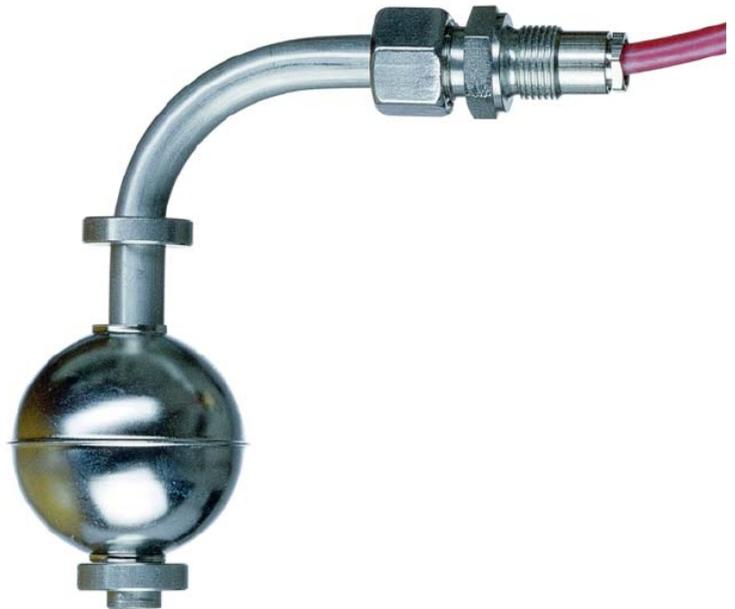
Version with adjustable tube (option):



FS11

Magnetic Float Switch Angled, for Lateral Installation

- side installation into vessel wall
- reliable and robust technique
- screw in thread, tank screw
- design in stainless steel
(plastic on request)
- contact as N/C, N/O, or SPDT
- P_{\max} : 40 bar, T_{\max} : 180 °C
- max. guide tube length: 3000 mm



Description:

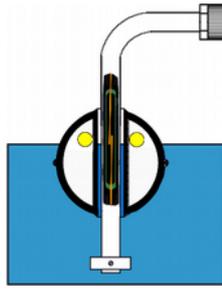
The level switch of the model type series FS11 operates according to float principle with magnetic transmission. The sensor consists of a guide tube with embedded Reed contacts, one or more floats with fitted ring magnets and a process connection module. The float is raised by the rising liquid in the tank and operates a Reed contact through the guide tube wall by means of the magnetic field produced by permanent magnets located in the float. The Reed contact can be designed as a NO, NC or SMDT function.

Typical applications:

The FS11 magnetic float level sensors are suitable for monitoring the level practically all liquids, e.g. as a full or empty tank sensor, for controlling valves and pumps and for alarm function. The potential free Reed contacts fitted in the level sensor make it an ideal control element when coupled with PLC controllers.

Function:

A ring magnet installed in the float operates Reed contacts, which are embedded at defined positions in the guide tube, via its magnetic field through the walls of the guide tube. Float stops mounted on the guide tube prevent the float from passing the contact – this assures bistable switching. Consequently, a maximum of 2 contacts per float can be operated. If more contacts are fitted, more floats must be used.



Structure of the measuring instrument:

Each magnetic float level sensor consists of the three key modules below, which, depending on requirements, are available in different models:

- Guide tube
- Float
- Process connection

Secondary instrumentation like contact protection relays complete the measuring system.

Guide tube:

The guide tube is the key component in the level sensor: it houses the reed contacts and it is made of st. steel 1.4571 with 12 mm diameter.

Guide tube length:

max. length of vertical branch: 3000 mm
length of horizontal branch: Standard = 70 mm
(special lengths on request)

Number of contacts inside guide tube:

Electrical connection	Max. number of contacts	
	N/O or N/C	SPDT
PVC/PUR cable	6	4
Silicone cable	5	3
Housing	6	4

Recommended accessories: contact protection relay type MSR01, also suitable for direct pump control

isolating amplifier type P+F

Floats:

The choice of float is based on the liquid being monitored (corrosion, density), the process parameters (pressure, temperature) and the guide tube materials and diameters. The available float models are listed in the following table.

Float models and dimensions (Table 1):

Type	Material	Min. DN G / flange	Ø ID/AD [mm]	Min. density [kg/m ³]	Max. press. [bar]	Max. temp [°C]
Cylinder float						
E1544	st. steel	1 ½" / DN 50	15 / 44	820	16	300
Ball float						
E1552	st. steel	2" / DN 65	15 / 52	770	40	300
E1562		- / DN 65	15 / 62	600	32	300
E1583		- / DN 80	15 / 83	410	25	300

Process connection:

Typically, the magnetic float level sensors are screwed from inside the vessel with a 3/8" female thread. When installed in this fashion, the devices are supplied with a PVC or silicone-jacket connection cable.

To mount the float level sensor from outside through the wall of the vessel the device must be fitted with a tank fitting or with flanges. In this case it is recommended, that the diameter of the tank fitting or flange is large enough to allow the float to pass through the opening in the top of vessel. In the standard version, an adjustable stop ring is fixed to the end of the guide tube, therefore the float can be removed and afterwards mounted from inside the vessel, if the diameter of the process connection is too small.

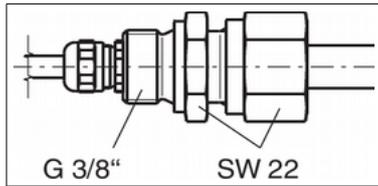
Contact rating of Reed switches:

Contact function	Maximum contact rating	
	AC	DC
N/O	230 V, 1 A, 100 VA	230 V, 0,5 A, 50 VA
N/C	230 V, 1 A, 100 VA	230 V, 0,5 A, 50 VA
SPDT	230 V, 1 A, 40 VA	230 V, 0,5 A, 20 VA

Please take contact protection measures into account. For exact details, see type plate.

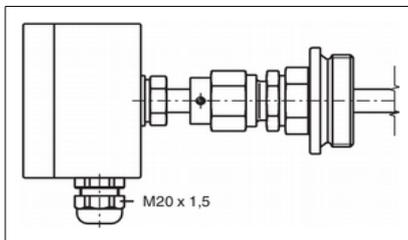
Process Connections:

Male thread with cable connection:



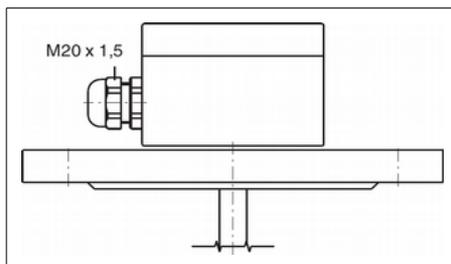
Process connection: G 3/8
Material: stainless steel 1.4571 or 1.4404
Cable material: PVC
temperature range -10...+80°C
Silicone
temperature range -30...+150°C
Connection code: **G10**

With tank fitting and terminal housing:



Process connection: Tank fitting G 1 1/2 or G 2
Material: stainless steel 1.4571 or 1.4404
Temperature range: -30...+180°C
Connection codes: G 1 1/2: **TG40**
G 2: **TG50**

With connection flange and terminal housing:



Process connection: flange acc. to DIN EN 1092
DN50...DN200, PN6...PN40
flange acc. to ANSI
1 1/2"...8", #150 RF, #300 RF
Material: stainless steel 1.4571
Temperature range: -30...+180°C
Connection codes: DN 50...DN 200: FD50 to FD200...
.../6 to 100 (PN 6... PN 40)
example: **FD50/6**
ANSI, 2"...8": FA2...FA8...
.../150 bis 300 (Class 150...300)
example: **FA2/150**

Technical Data:

Guide tube material: stainless steel 1.4571 or 1.4404

Guide tube diameter: 12 mm

Guide tube length: maximal 3000 mm

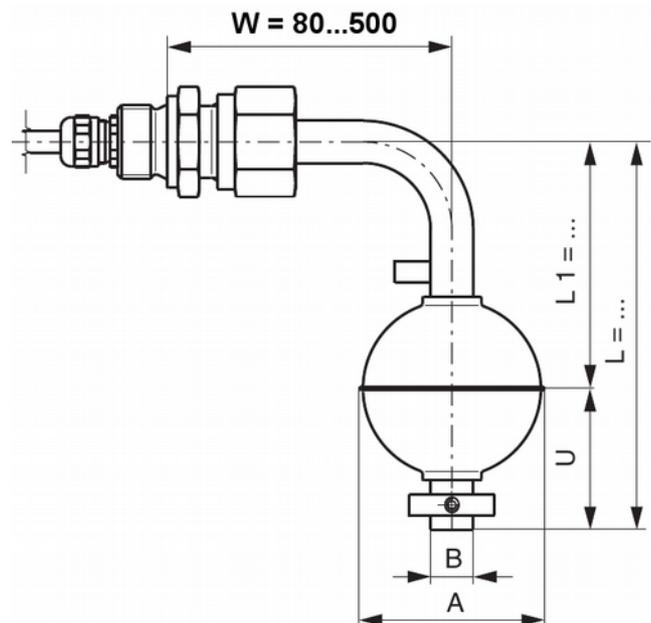
Process connections: male thread
tank fitting
flange connection

Max. pressure: depends on selected float and
PN of process connection

Temperature range: depends on selected float, and
PN of process connection

further data of order: position and function of contacts,
measured from sealing edge of thread,
total length of guide tube L,
length of horizontal part W.

Dimensions:



Order Code:

Order Number: FS11. 2. 2. 3. G10. 1. 1. E1544. 0

**Magnetic Float Switch
angled, for lateral installation**

Guide tube material:

2 = stainless steel 1.4571
3 = stainless steel 1.4404
(plastic on request)

Guide tube diameter:

2 = 12 mm

Material process connection:

3 = stainless steel as guide tube material
(plastic on request)

Connection code:

G10...FD200/40
(see chapter "process connections")

Electrical connection:

1 = aluminium terminal housing
2 = stainless steel terminal housing
3 = PP terminal housing
6PVC1 = 1 m connection cable PVC
6SIL1 = 1 m connection cable Silicone
(other length please specify)
9 = special

Contacts (from top to bottom)*:

Distance of contacts from centre line of horizontal part,
please indicate for each contact individually.

1 = N/O at rising level
2 = N/C at rising level
3 = SPDT

Float models (see table 1):

E1544...E1583
9 = special

Options:

0 = without
9 = please specify in plain text

Special designs are available on request.