

Float switch

For nuclear power plants

Model FLS

WIKA data sheet LM 30.07



for further approvals
see page 2

Applications

- Level measurement for almost all liquid media
- Pump and level control and monitoring for distinct filling levels
- Chemical, petrochemical, natural gas, offshore, shipbuilding, machine building, power generating equipment, power plants

Special features

- Large range of application due to the simple, proven functional principle
- For harsh operating conditions, long service life
- Operating limits:
 - Operating temperature: $T = -50 \dots +350 \text{ }^{\circ}\text{C}$
 - Operating pressure: $P = \text{Vacuum to } 40 \text{ bar}$
 - Limit density: $\rho \geq 300 \text{ kg/m}^3$
- Wide variety of different electrical connections, process connections and materials
- Qualification: K3 + ad qualified according to RCC-E and IEC/IEEE 60780-323

Description

A float with a permanent magnet moves reliably along with the liquid level on a guide tube. Within the guide tube is fitted a reed contact (inert gas contact), which is energised, through the non-magnetic walls of the float and guide tube, by the approach of the float magnet. By using a magnet and reed contact the switching operation is non-contact, free from wear and needs no power supply. The contacts are potentialfree. Magnetic float switches are also available with multiple switch points.

The switch functions always refer to a rising liquid level: normally open, normally closed or change-over contact.



Stainless steel version, mounting thread

Through the use of a float for a max. of 2 switch points a bistable switch operation can be achieved, meaning that the switching status also remains available, when the filling level continues to rise above or drop below the switch point.

The float switch is simple to mount and maintenance-free, so the costs of mounting, commissioning and operation are low.






Further special features

- Process connection, guide tube and float from stainless steel 1.4571, plastic or Buna
- Universal signal processing: connection direct to a PLC is possible, NAMUR connection, signal amplification / contact protection relays
- Works independently of foaming, conductivity, dielectricity, pressure, vacuum, temperature, steam, condensation, bubble formation, boiling effects and vibrations
- Multiple functionality in a single instrument - up to 8 potential-free contacts
- Exact repeatability of the switch points
- Magnetic float switches qualify as passive electrical equipment in accordance with DIN IEC 60079-11 and can be installed in 'Zone 1' hazardous areas without certification, so long as the equipment is operated in a certified intrinsically safe circuit with a minimum explosion protection of Ex ib

Options

- Customer-specific solutions
- Special versions for interface layer detection $\Delta\rho \geq 100 \text{ kg/m}^3$
- Process connection, guide tube material and float from stainless steel 1.4435, 1.4539, titanium, Hastelloy (others on request)

Approvals

Logo	Description	Country
  	EU declaration of conformity <ul style="list-style-type: none"> ■ Directive for nuclear facilities IEC/IEEE 60780-323 ■ RoHS directive ■ ATEX directive (option) Hazardous areas <ul style="list-style-type: none"> - Ex i Zone 0, gas II 1/2G Ex ia IIC T6 ... T1 Ga/Gb Zone 1, gas II 2G Ex d IIC T6 Gb Zone 0, dust II 2D Ex ib IIIC T80 ... T230 °C Db Zone 1, dust II 2D Ex tb IIIC T80 °C Db 	European Union
	DNV (option) <ul style="list-style-type: none"> ■ Ships, shipbuilding (e.g. offshore) ■ Hazardous areas 	International
	ABS (option) Ships, shipbuilding (e.g. offshore)	International

Manufacturer's information and certificates

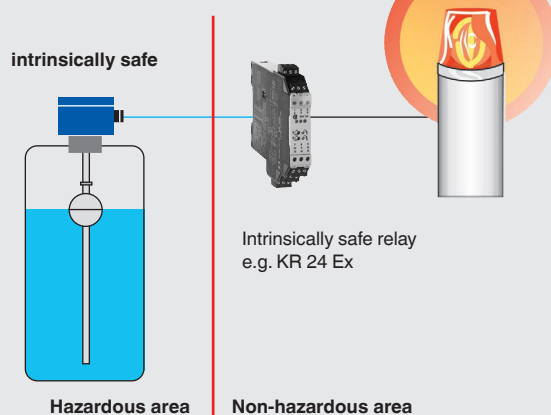
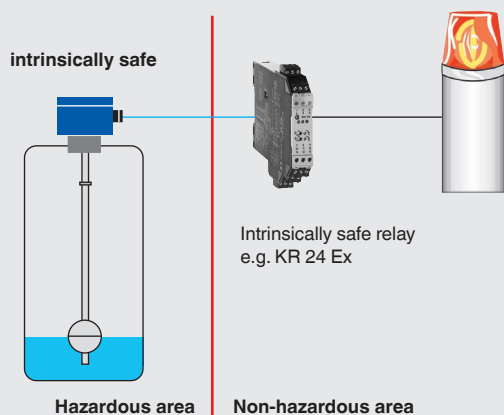
Logo	Description
RCC-E	RCC-E Design and construction rules for the electrical equipments of nuclear islands

Combinations of approvals here listed on request. Approvals, which are not shown here can also be acquired on request.

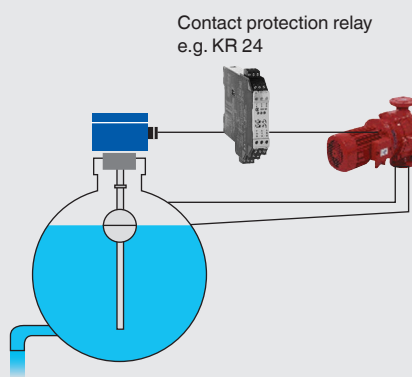
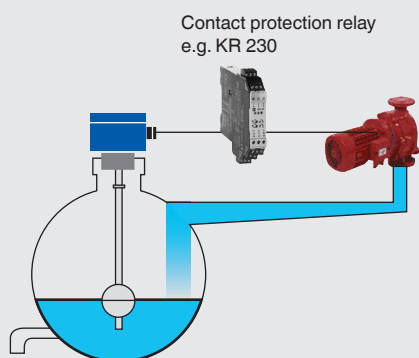
Approvals and certificates, see website

Application examples

Full detector (Ex i)

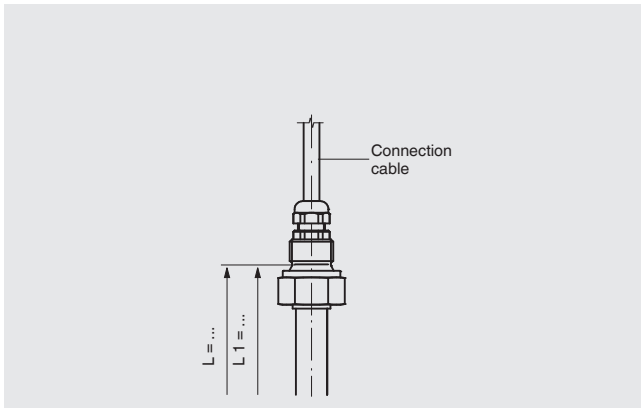


Level control (min/max control)



Standard version without connection housing, model FLS-S

Process connection, guide tube material and float from stainless steel 1.4571 (316Ti)

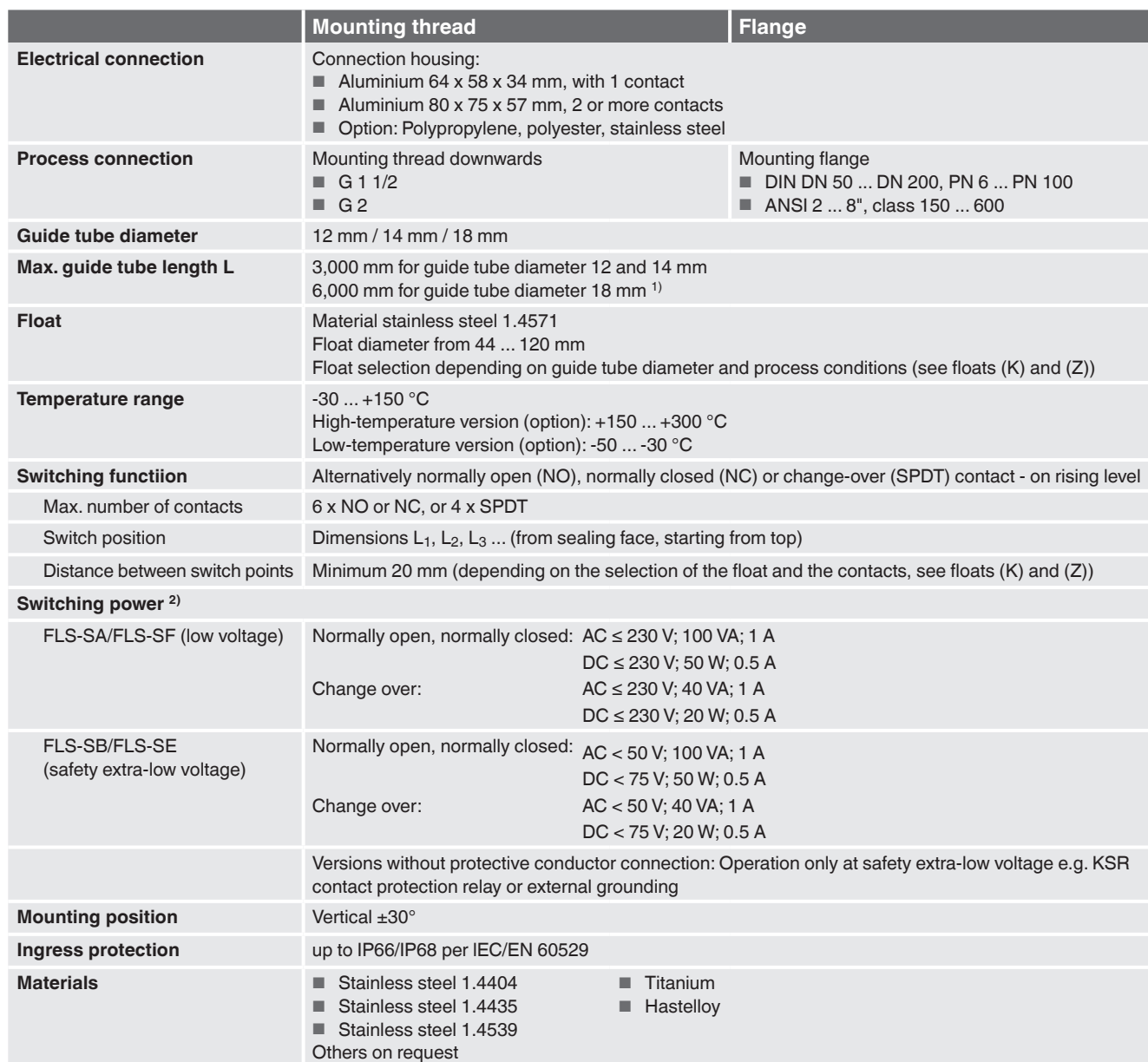


	Mounting thread (without connection housing)
Electrical connection	Connection cable: <ul style="list-style-type: none"> ■ PVC ■ Silicone ■ PUR
Process connection	Mounting thread upwards <ul style="list-style-type: none"> ■ G 3/8 (others on request) ■ G 1/2 (others on request)
Guide tube diameter	12 mm / 14 mm / 18 mm
Max. guide tube length L	3,000 mm for guide tube diameter 12 and 14 mm 6,000 mm for guide tube diameter 18 mm ¹⁾
Float	Material stainless steel 1.4571 Float diameter from 44 ... 120 mm Float selection depending on guide tube diameter and process conditions (see floats (K) and (Z))
Temperature range	PVC cable: -10 ... +80 °C Silicone cable: -30 ... +130 °C
Switching function	Alternatively normally open (NO), normally closed (NC) or change-over (SPDT) contact - on rising level
Max. number of contacts	PVC cable: 6 x NO or NC, or 4 x SPDT Silicone cable: 5 x NO or NC, or 3 x SPDT
Switch position	Dimensions L ₁ , L ₂ , L ₃ ... (from sealing face, starting from top)
Distance between switch points	Minimum 20 mm (depending on the selection of the float and the contacts, see floats (K) and (Z))
Switching power ²⁾	
FLS-SA/FLS-SF (low voltage)	Normally open, normally closed: AC ≤ 230 V; 100 VA; 1 A DC ≤ 230 V; 50 W; 0.5 A Change over: AC ≤ 230 V; 40 VA; 1 A DC ≤ 230 V; 20 W; 0.5 A
FLS-SB/FLS-SE (safety extra-low voltage)	Normally open, normally closed: AC < 50 V; 100 VA; 1 A DC < 75 V; 50 W; 0.5 A Change over: AC < 50 V; 40 VA; 1 A DC < 75 V; 20 W; 0.5 A
	Versions without protective conductor connection: Operation only at safety extra-low voltage e.g. KSR contact protection relay or external grounding
Mounting position	Vertical ±30°
Ingress protection	up to IP66/IP68 per IEC/EN 60529
Materials	<ul style="list-style-type: none"> ■ Stainless steel 1.4404 ■ Stainless steel 1.4435 ■ Stainless steel 1.4539 <ul style="list-style-type: none"> ■ Titanium ■ Hastelloy <p>Others on request</p>

¹⁾ 6,000 mm without stilling tube longer version on request

²⁾ Dependent on number of switching points, distance between contacts and insulation possibilities in the guide tube

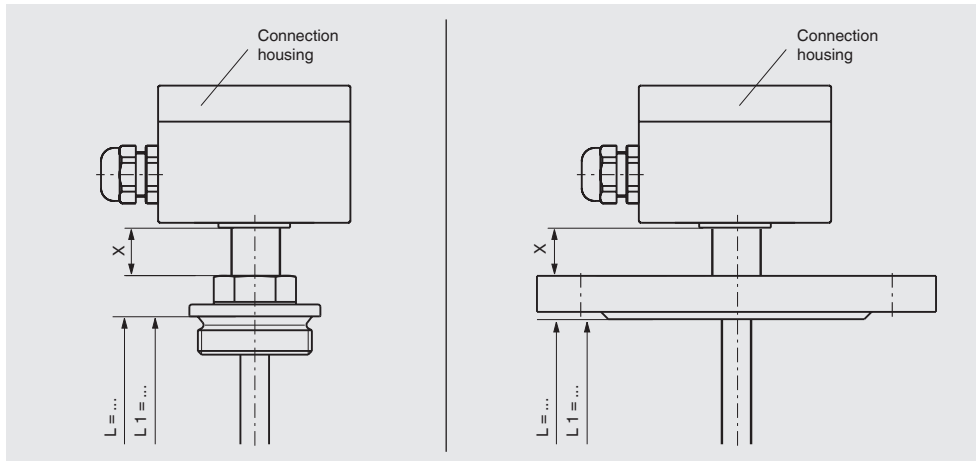
Process connection, guide tube material and float from stainless steel 1.4571 (316Ti)



2) Dependent on number of switching points, distance between contacts and insulation possibilities in the guide tube

Explosion-protected version Ex i, intrinsically safe, model FLS-S

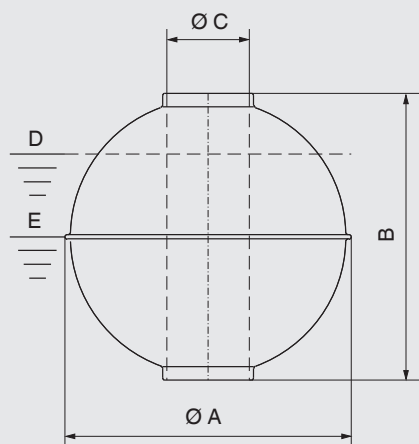
Process connection, guide tube material and float from stainless steel 1.4571 (316Ti)



	Mounting thread			Flange		
Electrical connection	Connection housing: ■ Aluminium 80 x 75 x 57 mm ■ Option: Polyester, stainless steel					
Process connection	Mounting thread downwards ■ G 1 1/2 ■ G 2 others on request			Mounting flange ■ DIN DN 50 ... DN 150, PN 6 ... PN 64 ■ ANSI 2 ... 6", class 150 ... 600		
Guide tube diameter	12 mm / 14 mm / 18 mm / 30 mm					
Max. guide tube length L	3,000 mm for guide tube diameter 12 and 14 mm 6,000 mm for guide tube diameter 18 mm ¹⁾ 15,000 mm for guide tube diameter 30 mm					
Float	Material stainless steel 1.4571 Float diameter from 44 ... 120 mm Float selection depending on guide tube diameter and process conditions (see floats (K) and (Z))					
Temperature class	T1	T2	T3	T4	T5	T6
Surface temperature (EPL Db)	Max. 230 °C	230 °C	195 °C	130 °C	95 °C	80 °C
Process temperature	Max. 230 °C	230 °C	195 °C	130 °C	95 °C	80 °C
Ambient temperature at connection housing (T _a)	Max. 80 °C	80 °C	80 °C	80 °C	65 °C	50 °C
Switching functiion	Alternatively normally open (NO), normally closed (NC) or change-over (SPDT) contact - on rising level					
Max. number of contacts	6 x NO or NC, or 4 x SPDT					
Switch position	Dimensions L ₁ , L ₂ , L ₃ ... (from sealing face, starting from top)					
Distance between switch points	Minimum 20 mm (depending on the selection of the float and the contacts, see floats (K) and (Z))					
Switching power	Only for connection to a certified intrinsically safe circuit with U _{max} 30 V, I _{max} 100 mA					
Mounting position	Vertical ±30°					
Ingress protection	Up to IP66/IP68 per IEC/EN 60529					
Options	■ Housing heightening X (state dimension X) ■ Temperature resistance Pt100 or Pt1000 ■ Bimetal thermal contact 40 ... 120 °C (in 5 degree steps)					
Materials	■ Stainless steel 1.4435 ■ Titanium ■ Hastelloy Others on request					

1) 6,000 mm without stilling tube longer version on request

Spherical float



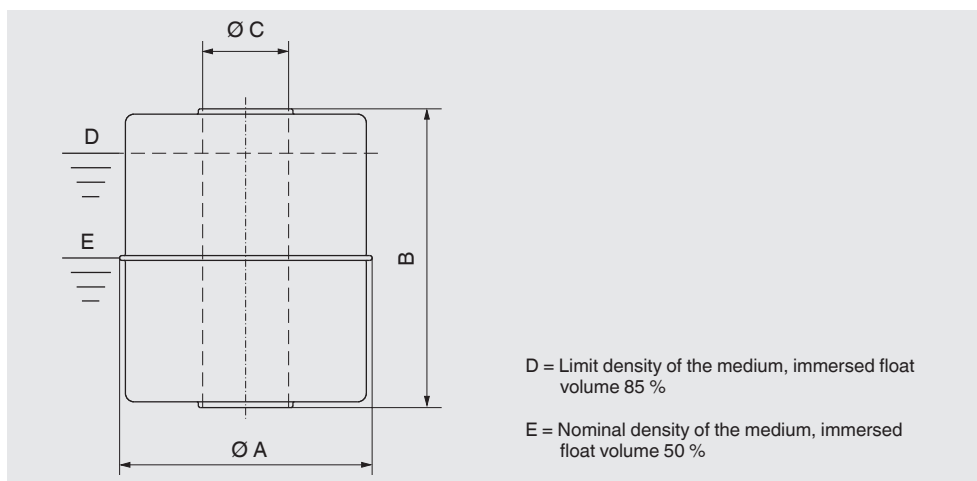
D = Limit density of the medium, immersed float volume 85 %

E = Nominal density of the medium, immersed float volume 50 %

Material	Suits guide tube Ø in mm	Ø A in mm	B in mm	Ø C in mm	Max. operating pressure in bar	Max. operating temperature in °C	Limit density 85 % in kg/m ³
Stainless steel 1.4571	8	29	28	9	6	100	977
	8	29	28	9	25	100	1069
	12	52	52	15	40	300	769
	12	53	53	14	25	Depending on medium	745
	12	62	61	15	32	300	597
	12	83	81	15	25	300	408
	18	80	76	23	25	300	679
	18	98	96	23	25	300	597
	18	105	103	23	25	300	533
	18	120	117	23	25	300	389
Titanium 3.7035	8	29	28	9	30	100	822
	12	52	52	15	25	300	707
	12	52	52	15	60	300	852
	12	52	52	15	80	300	1060
	12	62	62	15	25	300	505
	12	83	81	15	25	300	278
	18	80	76	23	25	300	665
	18	98	96	23	25	300	495
	18	105	103	23	25	300	369
	18	120	117	23	25	300	329

Note: The optimum float will be selected after a feasibility test carried out by WIKA.

Cylindrical float



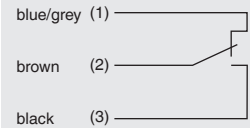
Material	Suits guide tube Ø in mm	Ø A in mm	B in mm	Ø C in mm	Max. operating pressure in bar	Max. operating temperature in °C	Limit density 85 % in kg/m ³
Stainless steel 1.4571	8	27	31	10	16	100	787
	12	44	52	15	16	300	818
Titanium 3.7035	12	44	52	15	16	300	720

Note: The optimum float will be selected after a feasibility test carried out by WIKA.

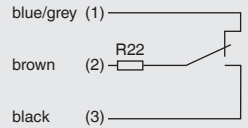
Electrical connections

Reed contact

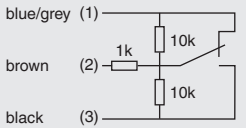
1 switch point



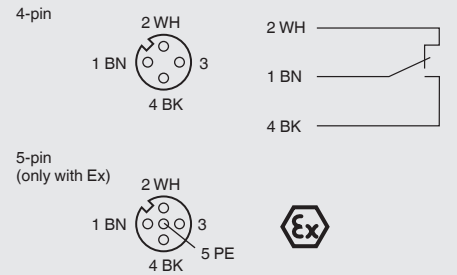
1 switch point
Wiring for operation with a PLC



1 switch point
NAMUR circuit per DIN EN 60947-5-6



Connector, pin assignment



Nuclear qualified plug (HAN® 7D, SAIB, SORIAU, KKS) on request.

Connection cable

Connection cable	Cross-section
PVC	4 x 0.5 mm ²
Silicone	4 x 0.75 mm ²
Armoured silicone	4 x 0.75 mm ²
LMGSG	3 x 1.5 mm ²

Other nuclear specific cables on request

Colour coding per IEC 60757

Colour	Short symbol
Black	BK
Brown	BN
Red	RD
Orange	OG
Yellow	YE
Green	GN
Blue	BU
Violet	VT
Grey	GY
White	WH
Pink	PK
Turquoise	TQ
Green-yellow	GNYE

Ordering information

Model / Version / Electrical connection / Process connection / Guide tube diameter / Guide tube length (insertion length) L / 100 % mark L1 / Measuring range M (span 0 ... 100 %) / Process specifications (operating temperature and pressure, limit density) / Options

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