



# КАТАЛОГ ПРОДУКЦИИ

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





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Орел (4862)44-53-42  
Оренбург (3532)37-68-04  
Пенза (8412)22-31-16

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Симферополь (3652)67-13-56  
Смоленск (4812)29-41-54  
Сочи (862)225-72-31  
Ставрополь (8652)20-65-13

Сургут (3462)77-98-35  
Тверь (4822)63-31-35  
Томск (3822)98-41-53  
Тула (4872)74-02-29  
Тюмень (3452)66-21-18  
Ульяновск (8422)24-23-59  
Уфа (347)229-48-12  
Хабаровск (4212)92-98-04  
Челябинск (351)202-03-61  
Череповец (8202)49-02-64  
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## Approvals

	Sanitary Standards
	American Bureau of Shipping
	ATEX Atmosphère Explosibles
	Bureau Veritas
	Det Norske Veritas
	Factory Mutual
	Germanischer Lloyd
	HPQ
	ISO 9000
	Lloyd's Register
	NEPSI
	NSQ 100
	Safety Integrity Level
	Wasserhaushaltsgesetz
	EurAsian Conformity

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# Industries

## Process

- Power engineering
- Chemical
- Petrochemical
- Oil & Gas
- Water, waste water



## Industrial

- Machine building
- Heating, Ventilation, Air-conditioning
- Refrigeration
- Technical gases
- Semiconductor

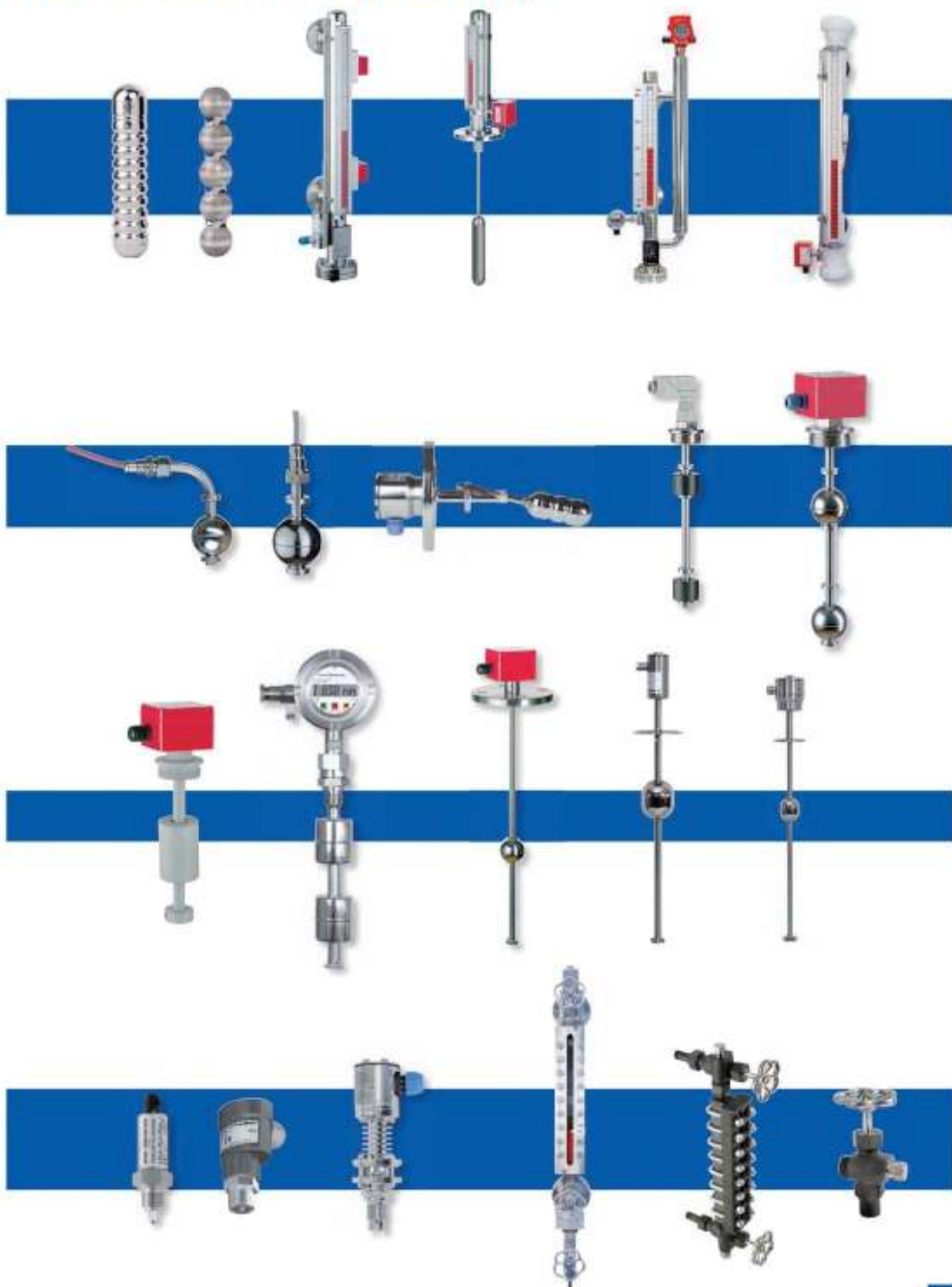


## Hygienic

- Food
- Pharmaceutical
- Beverage
- Biotechnology
- Cosmetics



# KSR Product diversity





# Product overview

## Bypass Level Indicators model BNA



### Continuous level measurement with visual indication of level without power supply

- Simple, robust, and solid design
- Display proportional to the height of the level or the contents of the vessel
- Pressure- and gas-proof separation of chamber and display
- Available for applications in all areas of industry through versatile design and corrosion-resistant materials
- Explosion-proof designs
- Interface

## Magnetic Float Switches model FLS

### Detection of one or more distinct levels of a liquid

- Suitable for virtually all liquids
- Switching operation is without direct contact with the liquid, free of wear and tear and does not require any power supply
- Universal signal processing of volt-free contacts:
  - PLC
  - Control circuit to DIN NAMUR 60947-5-6
- Multiple switch points in one unit (up to 8)
- Explosion-proof designs
- Interface
- Application specific designs available
- Simple installation and commissioning, maintenance-free



# Product overview

## Level Sensors model FLR/FLM



### Continuous level measurement, interface measurement

- Protocols: HART, Profibus, Foundation Fieldbus ®
- Signal transmission over large distances
- Simple installation and commissioning, one-time calibration only, no re-calibration necessary
- Display proportional to the height of the level or the contents of the vessel
- Set point relays continuously adjustable over full range
- High repeatability of set points
- Interface
- Application specific designs available
- Explosion-proof designs

## Opto Level Switch model OLS

### Opto Level Switches are used for monitoring liquid levels

- Option: Interface
- High precision
- Independent of color, density, dielectric constant, conductivity and refractive index
- Small measurement volume
- Small size
- Explosion-proof designs







## KSR – Your Partner for the Chemical and Petrochemical Industry

The manufacture of chemical products from natural gas and naphtha in refineries places high demands on the process instrumentation. In different process steps, such as cracking, condensation or distillation, the respective intermediate or finished products are manufactured under defined pressure and temperature conditions. The high precision and quality of KSR time-proven products ensures maximum plant availability here. Since the handling of the various gas mixtures and the highly flammable naphtha is not without danger, for example, our ATEX tested and certified measuring instruments make a contribution to the required safety.

Particularly in applications with aggressive media, in combination with high media temperatures, individual solutions are essential. For all application examples for level measurement, KSR offers an unrivalled programme of level measuring instruments. Our standard product range includes products that can be used in numerous ways. Individually tailored advice and proposals, to match solutions to your needs, supplement our extensive offering of products. Our expertise and dependability, in addition to our worldwide sales and service network, has made WIKA a global contracting partner with many well-known names in the international chemical industry.

## Bypass level indicator With magnetic display Model BNA

KSR data sheet BNA



### Applications

- Continuous level indication without power supply
- Indication of the level proportional to height
- Individual design and corrosion resistant materials make the products suitable for a broad range of applications
- Chemical, petrochemical industry, oil and natural gas extraction (on- and offshore), shipbuilding, machine building, power generating equipment, power plants
- Process water and drinking water treatment, food industry, pharmaceutical industry

### Special features

- Process- and system-specific production
- Operating limits:
  - Operating temperature:  $T = -196 \dots +450 \text{ }^\circ\text{C}$
  - Operating pressure:  $P = \text{vacuum to } 400 \text{ bar}$
  - Limit density:  $\rho \geq 340 \text{ kg/m}^3$
- Wide variety of different process connections and materials
- Mounting of level sensors and magnetic switches possible as an option
- Explosion-protected versions

### Description

The bypass level indicator model BNA consists of a bypass chamber, which, as a communicating tube, is connected laterally to a vessel via at least 2 process connections (flanged, threaded or welded). Through this type of arrangement, the level in the bypass chamber corresponds to the level in the vessel. The float with a built-in permanent magnetic system, which is mounted within the bypass chamber, transmits the liquid level, contact-free, to the magnetic display mounted to the outside of the bypass chamber. In this are fitted, at 10 mm intervals, two-coloured plastic rollers or stainless steel flaps with bar magnets.



Bypass level indicator, model BNA with level sensor and magnetic switch

Through the magnetic field of the permanent magnetic system in the float, the display elements, through the wall of the bypass chamber, are turned through  $180^\circ$ . For an increasing level from white to red; for a falling level from red to white.

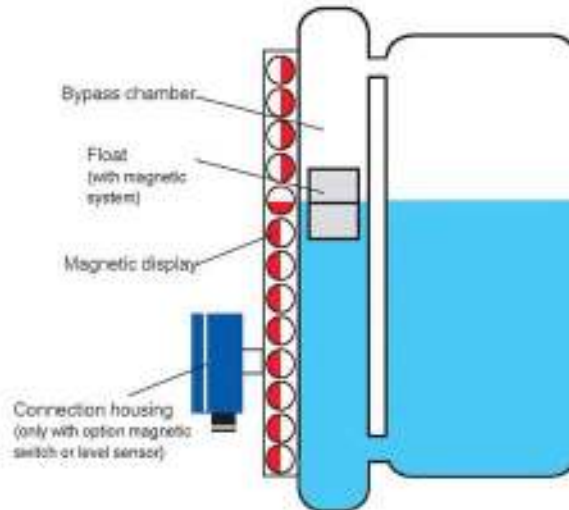
Thus the bypass level indicator clearly displays the level of a vessel **without power supply**.



## Further special features

- Simple, robust and solid design, long service life
- Bypass chamber and float from stainless steel 1.4571, 1.4404 or special materials
- Pressure- and gas-tight separation between measuring and display chamber
- Measuring and indicating of the level of aggressive, combustible, toxic, hot and contaminated media
- Functioning of the magnetic display guaranteed even in the case of power failures
- By using a variety of corrosion-resistant materials, applicable for virtually all industrial applications
- Continuous measurement of levels, independent of physical and chemical changes of the media such as: Foaming, conductivity, dielectric constant, vapours, bubble formation, boiling effects
- Interface-layer level measurement from  $\Delta$  density  $100 \text{ kg/m}^3$
- Special versions: Food compliant, coatings, liquid gas, heating jacket

## Illustration of the principle

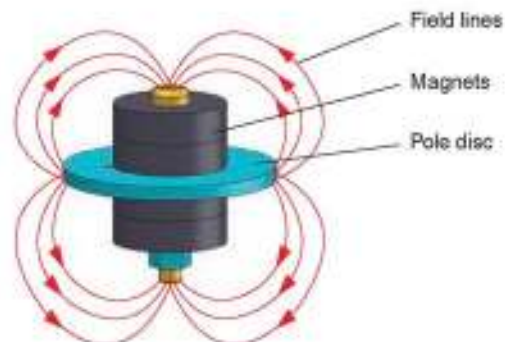


## Design and operating principle

- In a communicating bypass chamber mounted to the side of a vessel a float moves with the level of the medium to be measured.
- The magnetic field of the radial-symmetric magnetic system positioned in the float activates the magnetic display attached to the outside of the bypass chamber as well as the switching and measuring elements.

## Magnetic system

The magnetic system is assembled from a pole disc and various magnets. These can be individually adapted to the different chamber dimensions and for temperatures up to  $450 \text{ }^\circ\text{C}$ .



## Model overview

Bypass level indicator	Approval							Material	Max. pressure in bar	Medium temperature in °C
	with-out	Ex c	Ex c, GL	Ex c, DNV	GL	DNV	ABS			
Compact version, model BNA-C	x	x	x	x	x	x		Stainless steel 1.4571 (316Ti)	40	-196 ... +150
Standard version, model BNA-S	x	x	x	x	x	x	x	Stainless steel 1.4571 (316Ti), 1.4404 (316L), 1.4401/1.4404 (316/316L)	64	-196 ... +450
High-pressure version, model BNA-H	x	x	x	x	x	x		Stainless steel 1.4571 (316Ti), 1.4404 (316L)	400	-196 ... +450
Plastic version, model BNA-P	x							PP, PVDF	6	-10 ... +100
DUPlus version, standard, model BNA-SD	x	x						Stainless steel 1.4571 (316Ti), 1.4404 (316L), 1.4401/1.4404 (316/316L)	64	-196 ... +450
DUPlus version, high pressure, model BNA-HD	x	x						Stainless steel 1.4571 (316Ti), 1.4404 (316L), 1.4401/1.4404 (316/316L)	160	-196 ... +450
Liquid gas/KOPlus version, model BNA-L	x	x						Stainless steel 1.4571 (316Ti), 1.4404 (316L)	25	-60 ... +300
Special materials, model BNA-X	x	x						Stainless steel 6Mo 1.4547 (UNS S31254)	250	-196 ... +450
	x							Stainless steel 1.4571 (316Ti) with internal coating E-CTFE, ETFE or PTFE	16	depending on the medium
	x	x	x	x	x	x		Titanium 3.7035	64	-196 ... +450
	x	x	x	x	x	x		Hastelloy C276 (2.4819)	160	-196 ... +450
Heating jacket version, model BNA-J	x	x	x		x			Stainless steel 1.4571 (316Ti), 1.4404 (316L)	64	-60 ... +450

## Ex approvals

Explosion protection	Ignition protection type	Model	Zone	Approval number
ATEX	Ex c	BNA-S, BNA-H, BNA-C, BNA-SD, BNA-HD, BNA-X, BNA-J	Zone 0/1, gas	KEMA 02 ATEX 2106 X II 1/2 G c T1 ... T6
	Ex c + GL	BNA-S, BNA-H, BNA-C, BNA-X, BNA-J	Zone 0/1, gas	KEMA 02 ATEX 2106 X II 1/2 G c T1 ... T6 + GL - 35 949 - 87
	Ex c + DNV	BNA-S, BNA-H, BNA-C, BNA-X	Zone 0/1, gas	KEMA 02 ATEX 2106 X II 1/2 G c T1 ... T6 + DNV - A-11451

## Type approval

Approval	Model	Approval number
GL	BNA-S, BNA-H, BNA-C, BNA-X, BNA-J	GL - 35 949 - 87 HH
DNV	BNA-S, BNA-H, BNA-C, BNA-X	DNV A-11451
ABS	BNA-S	ABS 07-HG218425-1-PDA
GOST-R	all	0959333

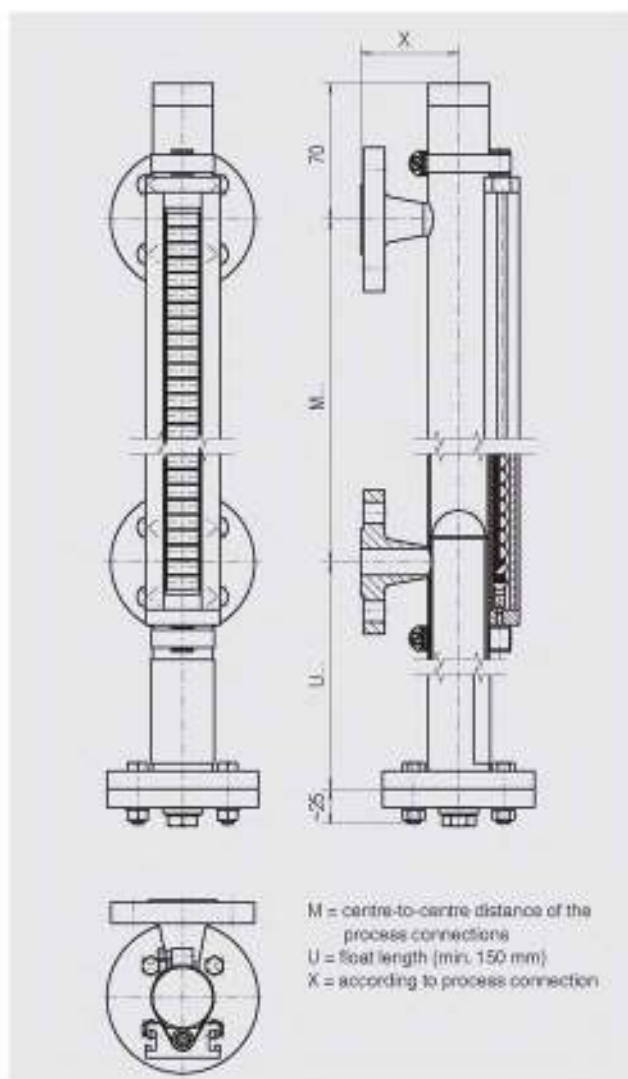
Further approvals on request

Detailed information on floats, magnetic displays, sensors (reed chains and magnetostrictive) and magnetic switches can be found in the following data sheets:

- Float; model BFT; see data sheet LM 10.02
- Magnetic display; model BMD; see data sheet LM 10.03
- Reed sensor; model BLR; see data sheet LM 10.04
- Magnetostrictive sensor; model BLM; see data sheet LM 10.05
- Magnetic switch; model BGU; see data sheet LM 10.06

## Bypass level indicator, compact version, model BNA-C

Bypass chamber from stainless steel



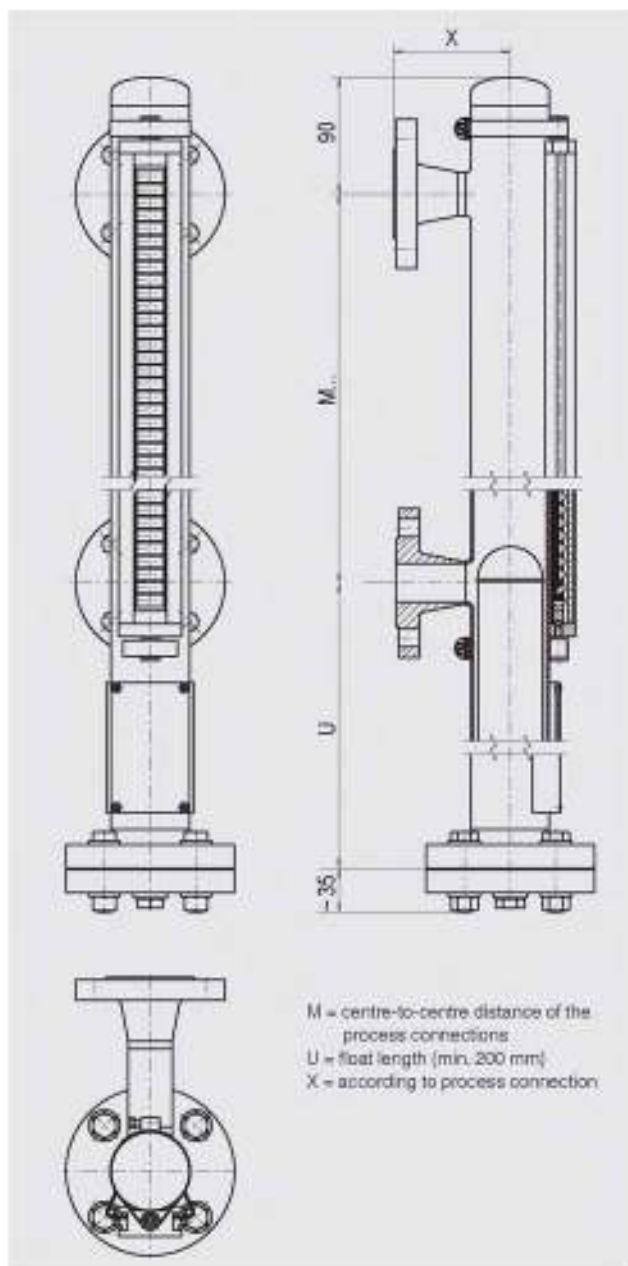
### Specifications

Bypass chamber	Ø 42.2 x 2 mm, max. 40 bar
Chamber end top	Flat top, flange or threaded connection Options: (see page 14) ■ Vent screw ■ Vent valve ■ Vent flange
Chamber end bottom	Flange connection or threaded connection Options: (see page 14) ■ Drain plug ■ Drain valve ■ Drain flange
Process connections	2 x lateral (options see page 15) Flange EN 1092-1, DN 10 - DN 50, PN 6 - PN 40 Flange DIN, DN 10 - DN 50, PN 6 - PN 40 Flange ANSI B 16.5, 1/2" - 2.5", class 150 - class 300 Weld stub 1/2" - 1" Threaded bushing G/NPT 1/2" - 1" Threaded nipple G/NPT 1/2" - 1"
Centre-to-centre distance	Min. 150 mm to max. 5,000 mm
Material	Stainless steel 1.4571 (316Ti)
Nominal pressure	Max. 40 bar
Temperature range	-196 ... +150 °C
Float	Cylindrical float, model BFT-H32, see data sheet LM 10.02
Magnetic display	Magnetic display, model BMD-S; see data sheet LM 10.03
Level sensor	Reed sensor, model BLR, see data sheet LM 10.04 Magnetostrictive sensor, model BLM, see data sheet LM 10.05
Magnetic switches	Magnetic switch, model BGU, see data sheet LM 10.06
Approvals	Ex c, GL, DNV, GOST-R

Special versions on request

## Bypass level indicator, standard version, model BNA-S

Bypass chamber from stainless steel



### Specifications

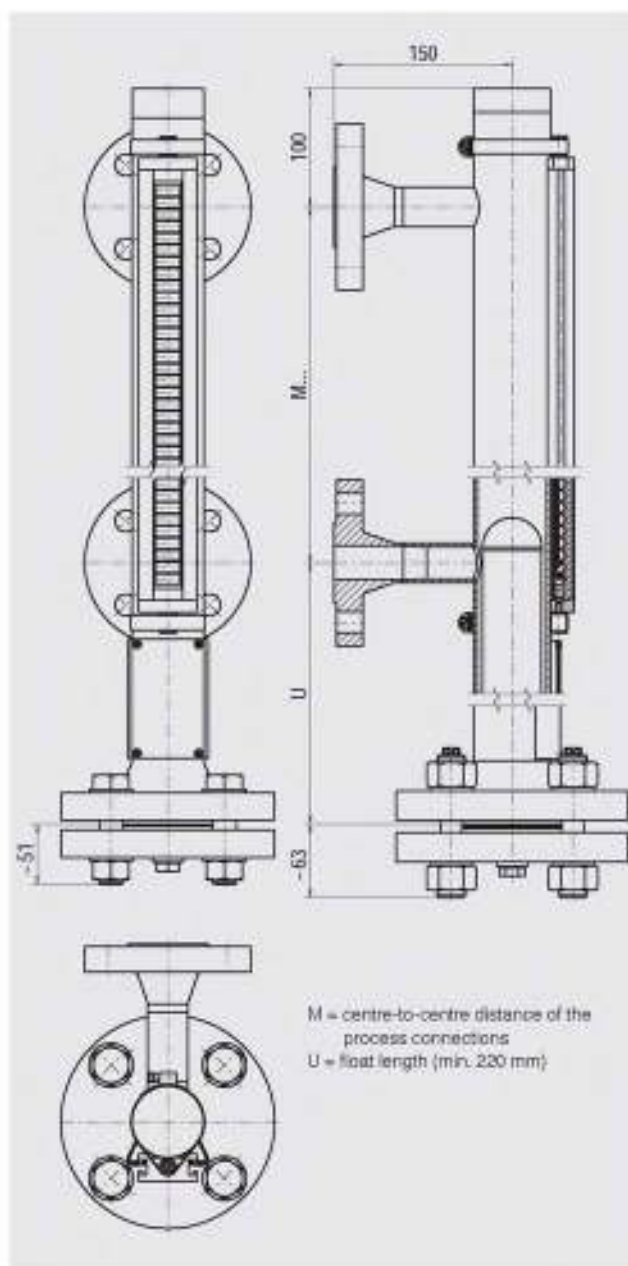
Bypass chamber	<ul style="list-style-type: none"> <li>Ø 60.3 x 2 mm, max. 40 bar</li> <li>Ø 60.3 x 2.77 mm, max. 64 bar</li> </ul>
Chamber end top	<ul style="list-style-type: none"> <li>Flat top or flange connection</li> <li>Options: (see page 14)                             <ul style="list-style-type: none"> <li>■ Vent screw</li> <li>■ Vent valve</li> <li>■ Vent flange</li> </ul> </li> </ul>
Chamber end bottom	<ul style="list-style-type: none"> <li>Flange connection</li> <li>Options: (see page 14)                             <ul style="list-style-type: none"> <li>■ Drain plug</li> <li>■ Drain valve</li> <li>■ Drain flange</li> </ul> </li> </ul>
Process connections	<ul style="list-style-type: none"> <li>2 x lateral (options see page 15)</li> <li>Flange EN 1062-1, DN 10 - DN 100, PN 6 - PN 63</li> <li>Flange DIN, DN 10 - DN 100, PN 6 - PN 64</li> <li>Flange ANSI B 16.5, 1/2" - 4", class 150 - class 600</li> <li>Weld stub 1/2" - 1"</li> <li>Threaded bushing G/NPT 1/2" - 1"</li> <li>Threaded nipple G/NPT 1/2" - 1"</li> </ul>
Centre-to-centre distance	Min. 150 mm to max. 8,000 mm (larger distances on request)
Material	Stainless steel 1.4571 (316Ti), 1.4404 (316L), 1.4401/1.4404 (316/316L)
Nominal pressure	Max. 64 bar
Temperature range	-196 ... +450 °C
Float	Cylindrical float, model BFT-H or corrugated float, model BFT-S, see data sheet LM 10.02
Magnetic display	<ul style="list-style-type: none"> <li>Standard version, model BMD-S; &lt; 200 °C</li> <li>High-temperature version, model BMD-F; &gt; 200 °C, see data sheet LM 10.03</li> </ul>
Level sensor	<ul style="list-style-type: none"> <li>Reed sensor, model BLR, see data sheet LM 10.04</li> <li>Magnetostrictive sensor, model BLM, see data sheet LM 10.05</li> </ul>
Magnetic switches	Magnetic switch, model BGM, see data sheet LM 10.06
Approvals	Ex c; GL, DNV, ABS, GCST-R

Special versions on request



## Bypass level indicator, high-pressure version, model BNA-H

Bypass chamber from stainless steel



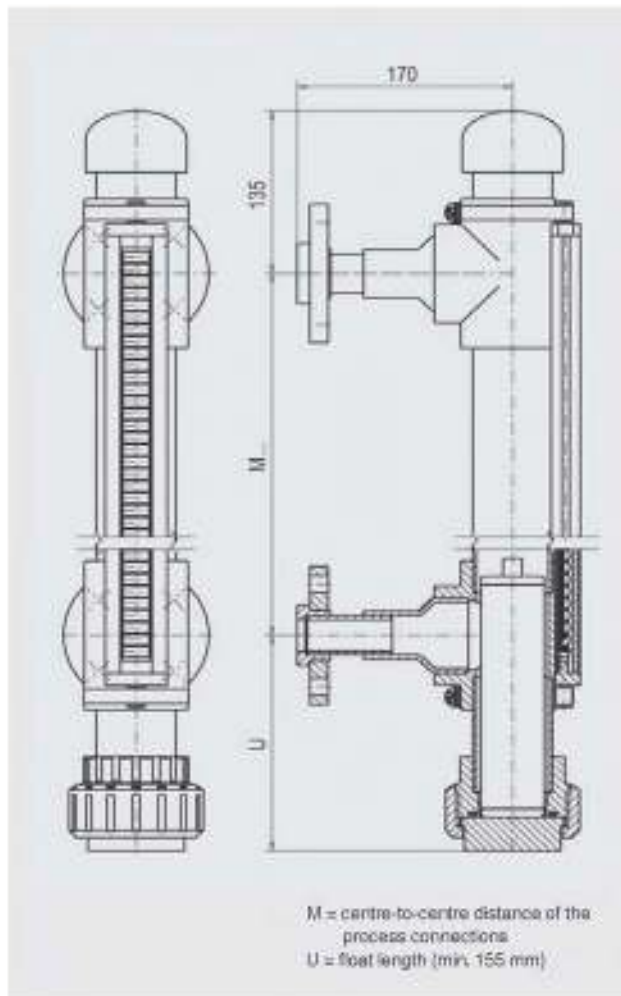
### Specifications

Bypass chamber	Stainless steel 1.4571: Ø 60.3 x 3.91 mm, max. 160 bar Ø 76.1 x 5 mm, max. 160 bar Ø 71 x 7.5 mm, max. 250 bar Ø 76.1 x 10 mm, max. 420 bar  Stainless steel 1.4404: Ø 60.3 x 3.91 mm, max. 100 bar Ø 60.3 x 5.54 mm, max. 150 bar Ø 73 x 7.01 mm, max. 150 bar
Chamber end top	Flat top or flange connection Options: (see page 14) ■ Vert screw ■ Vert valve ■ Vert flange
Chamber end bottom	Flange connection Options: (see page 14) ■ Drain plug ■ Drain valve ■ Drain flange
Process connections	2 x lateral (options see page 15) Flange EN 1062-1, DN 10 - DN 100, PN 63 - PN 400 Flange DIN, DN 10 - DN 100, PN 64 - PN 400 Flange ANSI B 16.5, 1/2" - 4", class 600 - class 2,500 Weld stub 1/2" - 1" Threaded bushing GANPT 1/2" - 1" Threaded nipple GANPT 1/2" - 1"
Centre-to-centre distance	Min. 150 mm to max. 6,000 mm (larger distances on request)
Material	Stainless steel 1.4571 (Ø 60.3 x 3.91 mm, Ø 76.1 x 5 mm, Ø 71 x 7.5 mm, Ø 76.1 x 10 mm) or stainless steel 1.4404 (Ø 60.3 x 3.91 mm, Ø 60.3 x 5.54 mm, Ø 73 x 7.01 mm)
Nominal pressure	Max. 400 bar
Temperature range	-196 ... +450 °C
Float	Cylindrical float, model BFT-H, ball-segment float, model BFT-K or foam float, model BFT-F, see data sheet LM 10.02
Magnetic display	Standard version, model BMD-S: < 200 °C High-temperature version, model BMD-F: > 200 °C, see data sheet LM 10.03
Level sensor	Reed sensor, model BLR, see data sheet LM 10.04 Magnetostrictive sensor, model BLM, see data sheet LM 10.05
Magnetic switches	Magnetic switch, model BGU, see data sheet LM 10.06
Approvals	Ex c, GL, DNV, GOST-R

Special versions on request

## Bypass level indicator, plastic version, model BNA-P

Bypass chamber and float from PVDF or PP



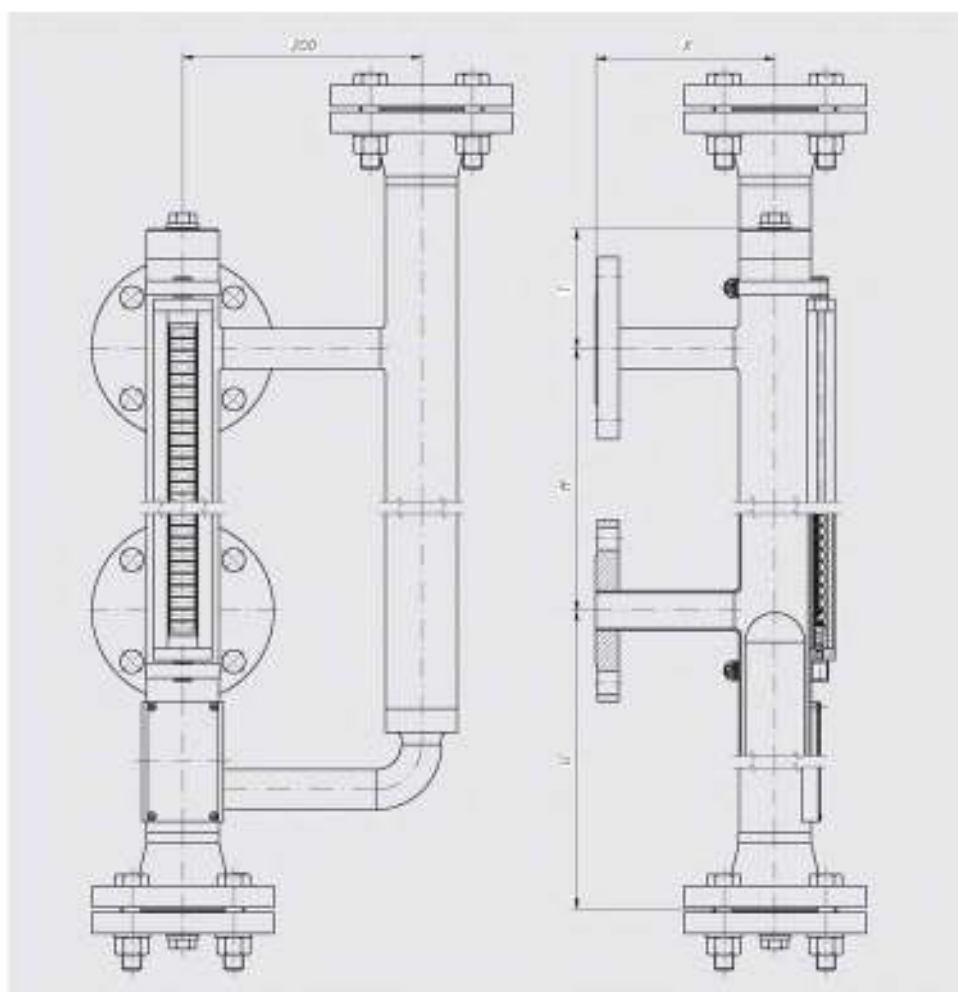
### Specifications

Bypass chamber	D 63 x 3 mm, max. 6 bar
Chamber end top	Welding cap, threaded connection Options: (see page 14) <ul style="list-style-type: none"> <li>■ Vent screw</li> <li>■ Vent valve</li> <li>■ Vent flange</li> </ul>
Chamber end bottom	Threaded connection Options: (see page 14) <ul style="list-style-type: none"> <li>■ Drain plug</li> <li>■ Drain valve</li> <li>■ Drain flange</li> </ul>
Process connections	2 x lateral (options see page 15) Flange EN 1092-1, DN 15 - DN 50, PN 16 Flange DIN, DN 15 - DN 50, PN 16 Flange ANSI B 16.5, 1/2" - 2", class 150 Weld stub 1/2" - 1" Threaded bushing G/NPT 1/2" - 1" Threaded nipple G/NPT 1/2" - 1"
Centre-to-centre distance	Min. 200 mm to max. 4,000 mm (larger distances on request)
Material	PVDF or PP
Nominal pressure	Max. 6 bar
Temperature range	PVDF: -10 ... +100 °C PP: -10 ... +80 °C
Float	Plastic float, model BFT-P, see data sheet LM 10.02
Magnetic display	Standard version, model BMD-S, see data sheet LM 10.03
Level sensor	Reed sensor, model BLR, see data sheet LM 10.04 Magnetostrictive sensor, model BLM, see data sheet LM 10.05
Magnetic switches	Magnetic switch, model BGU, see data sheet LM 10.06
Approvals	-

Special versions on request

## Bypass level indicator, DUPlus version, standard, model BNA-SD

Bypass chamber from stainless steel



### Specifications

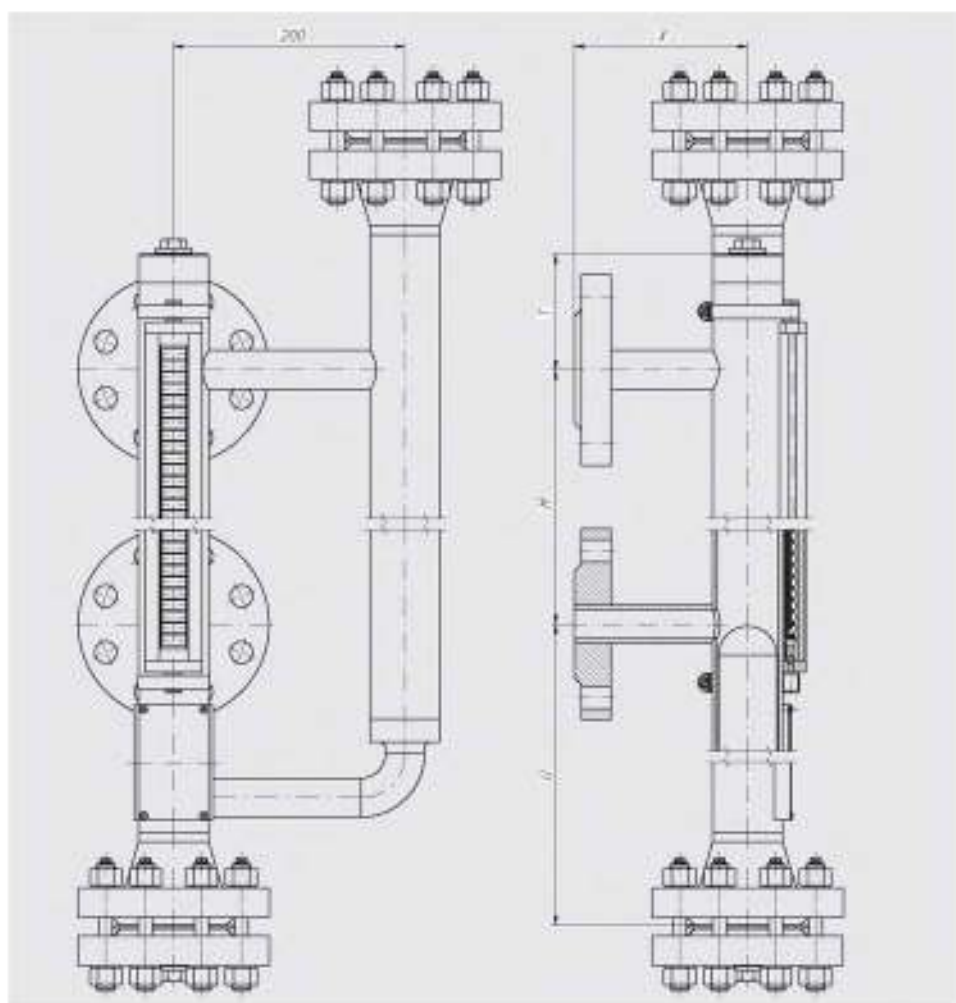
Bypass chamber	<p>Ø 60.3 x 2 mm, max. 40 bar</p> <p>Ø 60.3 x 2.77 mm, max. 64 bar</p>
Chamber end top	<p>Flange connection</p> <p>Options: (see page 14)</p> <ul style="list-style-type: none"> <li>■ Vent screw</li> <li>■ Vent valve</li> <li>■ Vent flange</li> </ul>
Chamber end bottom	<p>Flat top or flange connection</p> <p>Options: (see page 14)</p> <ul style="list-style-type: none"> <li>■ Drain plug</li> <li>■ Drain valve</li> <li>■ Drain flange</li> </ul>
Process connections	<p>2 x lateral (options see page 15)</p> <p>Flange DIN, DN 10 - DN 100, PN 6 - PN 64</p> <p>Flange ANSI B 16.5, 1/2" - 4", class 150 - class 600</p> <p>Weld stub 1/2" - 1"</p> <p>Threaded bushing G/NPT 1/2" - 1"</p> <p>Threaded nipple G/NPT 1/2" - 1"</p>
External sensor connection	<p>Flange EN 1092-1, DN 50, PN 6 - PN 64</p> <p>Flange DIN, DN 50, PN 6 - PN 64</p> <p>Flange ANSI B 16.5, 2" class 150 - class 600</p> <p>Female thread G/NPT 3/4" - 2"</p>

Centre-to-centre distance	Min. 150 mm to max. 6,000 mm (larger distances on request)
Material	Stainless steel 1.4571, 1.4404 or 1.4401/1.4404
Nominal pressure	Max. 64 bar
Temperature range	-196 ... +450 °C
Float	Cylindrical float, model BFT-H or corrugated float, model BFT-S, see data sheet LM 10.02
Magnetic display	Standard version, model BMD-S: < 200 °C High-temperature version, model BMD-F: > 200 °C, see data sheet LM 10.03
Level sensor	Rod sensor, model BLR, see data sheet LM 10.04 Magnetostrictive sensor, model BLM, see data sheet LM 10.05 Guided wave radar, model GTR, see data sheet LM 20.05
Magnetic switches	Magnetic switch, model BGU, see data sheet LM 10.06
Approvals	Ex c, GOST-R

Special versions on request

## Bypass level indicator, DUPlus version, high pressure, model BNA-HD

Bypass chamber from stainless steel



### Specifications

Bypass chamber	Ø 60.3 x 3.91 mm, max. 160 bar
Chamber end top	<p>Flange connection</p> <p>Options: (see page 14)</p> <ul style="list-style-type: none"> <li>■ Vent screw</li> <li>■ Vent valve</li> <li>■ Vent flange</li> </ul>
Chamber end bottom	<p>Flat top or flange connection</p> <p>Options: (see page 14)</p> <ul style="list-style-type: none"> <li>■ Drain plug</li> <li>■ Drain valve</li> <li>■ Drain flange</li> </ul>
Process connections	<p>2 x lateral (options see page 15)</p> <p>Flange DIN, DN 10 - DN 100, PN 64 - PN 160</p> <p>Flange ANSI B 16.5, 1/2" - 4", class 600 - class 1,500</p> <p>Weld stub 1/2" - 1"</p> <p>Threaded bushing G/NPT 1/2" - 1"</p> <p>Threaded nipple G/NPT 1/2" - 1"</p>
External sensor connection	<p>Flange EN 1082-1, DN 50, PN 6 - PN 160</p> <p>Flange DIN, DN 50, PN 6 - PN 160</p> <p>Flange ANSI B 16.5, 2" class 150 - class 1,500</p> <p>Female thread G/NPT 3/4" - 2"</p>

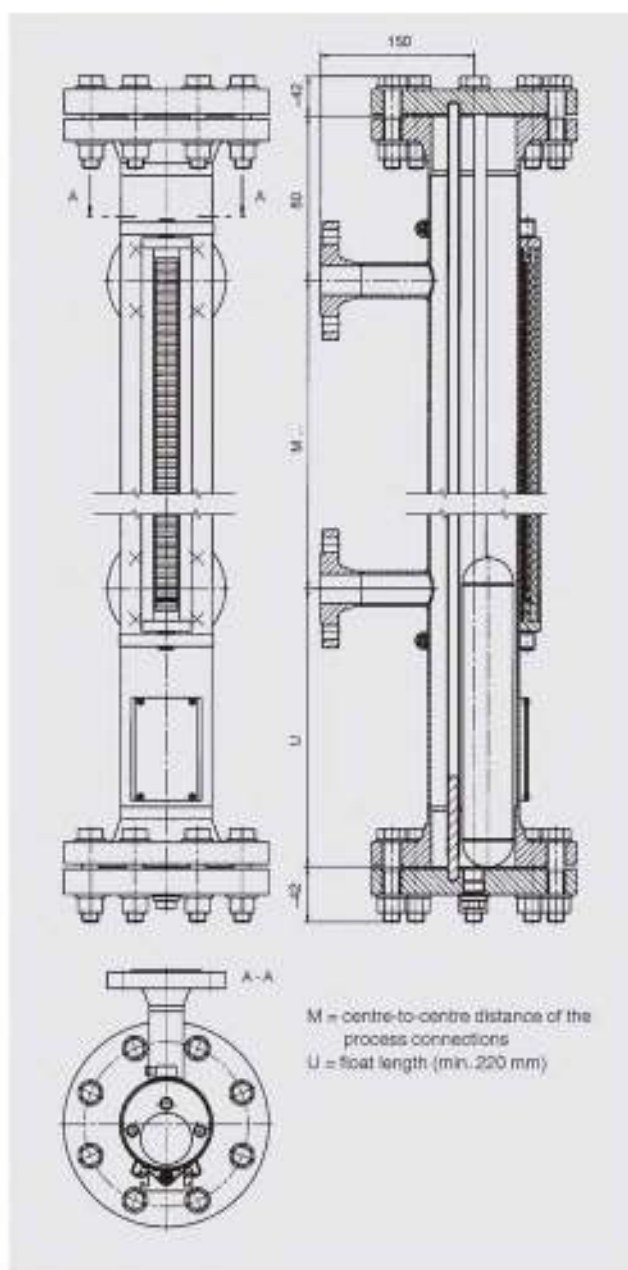
Centre-to-centre distance	Min. 150 mm to max. 6,000 mm (larger distances on request)
Material	Stainless steel 1.4571, 1.4404 or 1.4401/1.4404
Nominal pressure	Max. 160 bar
Temperature range	-195 ... +450 °C
Float	Cylindrical float, model BFT-H, corrugated float, model BFT-S, ball-segment float, model BFT-K or foam float, model BFT-F, see data sheet LM 10.02
Magnetic display	Standard version, model BMD-S; < 200 °C High-temperature version, model BMD-F; > 200 °C, see data sheet LM 10.03
Level sensor	Reed sensor, model BLR, see data sheet LM 10.04 Magnetostrictive sensor, model BLM, see data sheet LM 10.05 Guided wave radar, model GTR, see data sheet LM 20.05
Magnetic switches	Magnetic switch, model @GU, see data sheet LM 10.06
Approvals	Ex c, GOST-R

Special versions on request



## Bypass level Indicator, liquid gas/KOPlus version, model BNA-L

Bypass chamber from stainless steel

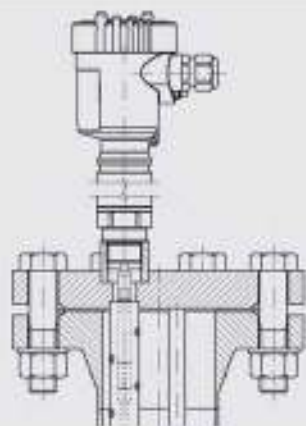


### Specifications

Bypass chamber	<ul style="list-style-type: none"> <li>Ø 88.9 x 2 mm, max. 25 bar</li> <li>Ø 88.9 x 2.9 mm, max. 40 bar</li> </ul>
Chamber end top	<ul style="list-style-type: none"> <li>Flange connection</li> <li>Options: (see page 14)                             <ul style="list-style-type: none"> <li>■ Vent screw</li> <li>■ Vent valve</li> <li>■ Vent flange</li> </ul> </li> </ul>
Chamber end bottom	<ul style="list-style-type: none"> <li>Flange connection</li> <li>Options: (see page 14)                             <ul style="list-style-type: none"> <li>■ Drain plug</li> <li>■ Drain valve</li> <li>■ Drain flange</li> </ul> </li> </ul>
Process connections	<ul style="list-style-type: none"> <li>2 x lateral (options see page 15)</li> <li>Flange EN 1092-1, DN 10 - DN 100, PN 6 - PN 63</li> <li>Flange DIN, DN 10 - DN 100, PN 6 - PN 64</li> <li>Flange ANSI B 16.5, 1/2" - 4", class 150 - class 600</li> <li>Weld stub 1/2" - 1"</li> <li>Threaded bushing G/NPT 1/2" - 1"</li> <li>Threaded nipple G/NPT 1/2" - 1"</li> </ul>
Centre-to-centre distance	Min. 150 mm to max. 6,000 mm (larger distances on request)
Material	<ul style="list-style-type: none"> <li>Stainless steel 1.4571 (316Ti) (Ø 88.9 x 2 mm, Ø 88.9 x 2.9 mm)</li> <li>Stainless steel 1.4404 (316L) (Ø 88.9 x 2 mm)</li> </ul>
Nominal pressure	Max. 40 bar
Temperature range	-60 ... +300 °C
Float	Cylindrical float, model BFT-H, see data sheet LM 10.02
Magnetic display	<ul style="list-style-type: none"> <li>Standard version, model BMD-S: &lt; 200 °C</li> <li>High-temperature version, model BMD-F: &gt; 200 °C, see data sheet LM 10.03</li> </ul>
Level sensor	<ul style="list-style-type: none"> <li>Reed sensor, model BLR, see data sheet LM 10.04</li> <li>Magnetostrictive sensor, model BLM, see data sheet LM 10.05</li> <li>Guided wave radar, model GTR (for KOPlus version), see data sheet LM 20.05</li> </ul>
Magnetic switches	Magnetic switch, model BGU, see data sheet LM 10.06
Approvals	Ex c, GOST-R

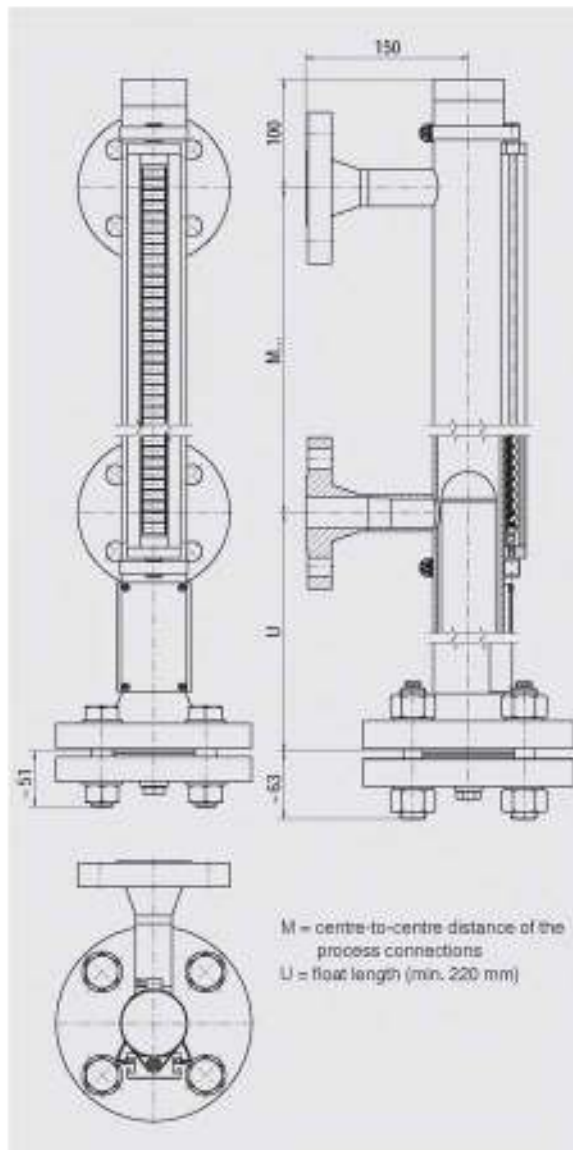
Special versions on request

### KOPlus version



## Bypass level indicator, special materials, model BNA-X

Bypass chamber from Titanium, Hastelloy or stainless steel 6Mo



### Specifications

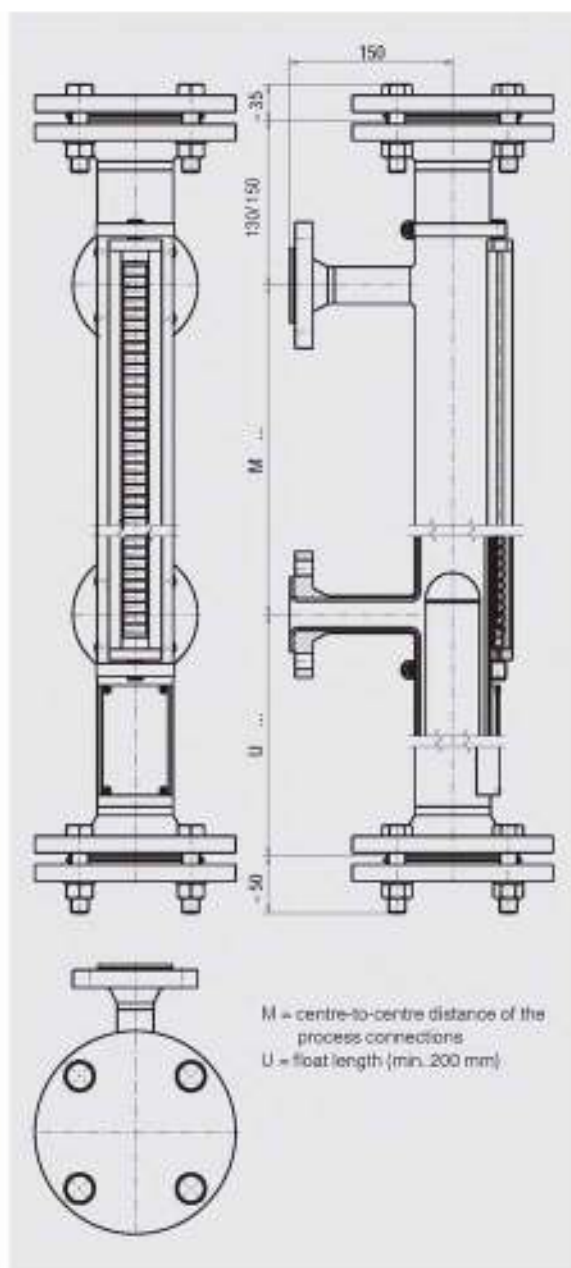
Material <sup>1)</sup>	Titanium 3.7035	Hastelloy C276	Stainless steel 6Mo 1.4547 (UNS S31254)
Bypass chamber	Ø 60.3 x 2 mm, max. 40 bar Ø 60.3 x 2.77 mm, max. 64 bar	Ø 60.3 x 2.77 mm, max. 64 bar Ø 60.3 x 3.91 mm, max. 160 bar	Ø 60.3 x 2.77 mm, max. 64 bar Ø 60.3 x 3.91 mm, max. 160 bar Ø 60.3 x 5.54 mm, max. 250 bar
Chamber end top	Flat top or flange connection Options: (see page 14) <ul style="list-style-type: none"> <li>■ Vent screw</li> <li>■ Vent valve</li> <li>■ Vent flange</li> </ul>		
Chamber end bottom	Flange connection Options: (see page 14) <ul style="list-style-type: none"> <li>■ Drain plug</li> <li>■ Drain valve</li> <li>■ Drain flange</li> </ul>		
Process connections (2 x lateral, options see page 15)	Flange EN 1092-1, DN 10 - DN 100, PN 6 - PN 63 Flange DIN, DN 10 - DN 100, PN 6 - PN 64 Flange ANSI B 16.5, 1/2" - 4", class 150 - class 600	Flange EN 1092-1, DN 10 - DN 100, PN 6 - PN 400 Flange DIN, DN 10 - DN 100, PN 6 - PN 400 Flange ANSI B 16.5, 1/2" - 4", class 150 - class 2,500	Flange EN 1092-1, DN 10 - DN 100, PN 63 - PN 400 Flange DIN, DN 10 - DN 100, PN 64 - PN 400 Flange ANSI B 16.5, 1/2" - 4", class 600 - class 2,500
Centre-to-centre distance	Min. 150 mm to max. 6,000 mm (larger distances on request)		
Nominal pressure	Max. 64 bar	Max. 160 bar	Max. 250 bar
Temperature range	-196 ... +450 °C		
Float	Cylindrical float, model BFT-H or corrugated float, model BFT-S (titanium 3.7035 and stainless steel 1.4547), see data sheet LM 10.02		
Magnetic display	Standard version, model BMD-S: < 200 °C High-temperature version, model BMD-F: > 200 °C, see data sheet LM 10.03		
Level sensor	Reed sensor, model BLR, see data sheet LM 10.04 Magnetostrictive sensor, model BLM, see data sheet LM 10.05		
Magnetic switches	Magnetic switch, model BGU, see data sheet LM 10.06		
Approvals	Ex c, GL, DNV, GOST-R	Ex c, GL, DNV, GOST-R	Ex c, GOST-R

<sup>1)</sup> Other materials on request

Special versions on request

## Bypass level indicator, special materials, model BNA-X

Bypass chamber from stainless steel with internal coating E-CTFE, ETFE or PTFE



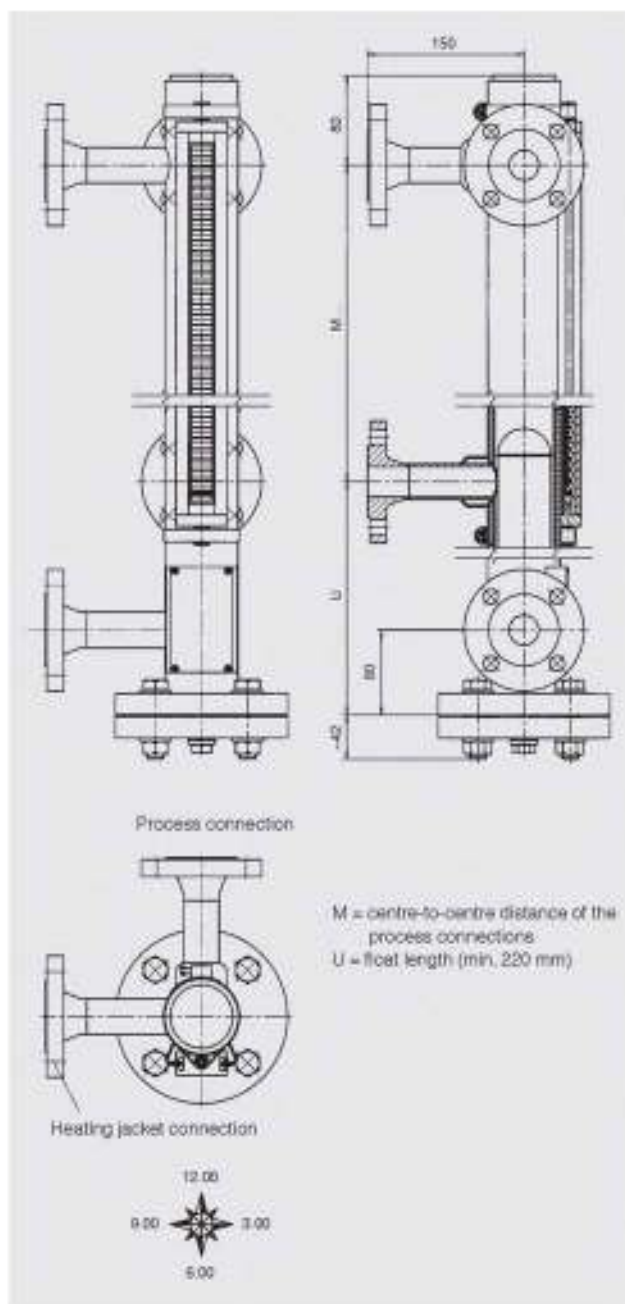
### Specifications

Material	Stainless steel 1.4571 with internal coating		
	E-CTFE	ETFE	PTFE
Bypass chamber	Ø 64 x 2 mm, max. 16 bar	Ø 70 x 2 mm, max. 16 bar	Ø 70 x 2 mm, max. 10 bar
Chamber end top	Flange connection Options: (see page 14) ■ Vent flange		
Chamber end bottom	Flange connection Options: (see page 14) ■ Drain flange		
Process connections	2 x lateral (options see page 15) Flange EN 1092-1, DN 10 - DN 50, PN 6 - PN 16 Flange DIN, DN 10 - DN 50, PN 6 - PN 16 Flange ANSI B 16.5, 1/2" - 4", class 150 - class 300		
Centre-to-centre distance	Min. 150 mm to max. ... mm (overall pipe length max. 2,500 mm) With overall pipe length > 2,500 mm: Bypass chamber separated by flange connection		
Nominal pressure	Max. 16 bar	Max. 16 bar	Max. 10 bar
Temperature range	depending on the medium		
Float	Cylindrical float, model BFT-H, see data sheet LM 10.02		
Magnetic display	Standard version, model BMD-S, see data sheet LM 10.03		
Level sensor	Reed sensor, model BLR, see data sheet LM 10.04 Magnetostrictive sensor, model BLM, see data sheet LM 10.05		
Magnetic switches	Magnetic switch, model BGU, see data sheet LM 10.06		
Approvals	GOST-R		

Special versions on request

## Bypass level indicator, heating jacket version, model BNA-J

Bypass chamber and heating jacket pipe from stainless steel



### Specifications

Bypass chamber	<ul style="list-style-type: none"> <li>Ø 60.3 x 2 mm, max. 40 bar</li> <li>Ø 60.3 x 2.77 mm, max. 64 bar</li> </ul>
Heating jacket pipe	Ø 70 x 2 mm
Chamber end top	<ul style="list-style-type: none"> <li>Flat top</li> <li>Options: (see page 14)                             <ul style="list-style-type: none"> <li>■ Vent screw</li> <li>■ Vent valve</li> <li>■ Vent flange</li> </ul> </li> </ul>
Chamber end bottom	<ul style="list-style-type: none"> <li>Flange connection</li> <li>Options: (see page 14)                             <ul style="list-style-type: none"> <li>■ Drain plug</li> <li>■ Drain valve</li> <li>■ Drain flange</li> </ul> </li> </ul>
Process connections	<ul style="list-style-type: none"> <li>2 x lateral (options see page 15)</li> <li>Flange EN 1092-1, DN 10 - DN 100, PN 6 - PN 100</li> <li>Flange DIN, DN 10 - DN 100, PN 6 - PN 100</li> <li>Flange ANSI B 16.5, 1/2" - 4", class 150 - class 600</li> <li>Weld stub 1/2" - 1"</li> <li>Threaded bushing G/NPT 1/2" - 1"</li> <li>Threaded nipple G/NPT 1/2" - 1"</li> </ul>
Heating jacket connection	<ul style="list-style-type: none"> <li>Flange EN 1092-1, DN 10 - DN 25, PN 6 - PN 40</li> <li>Flange DIN, DN 10 - DN 25, PN 6 - PN 40</li> <li>Flange ANSI B 16.5, 1/2" - 4", class 150 - class 300</li> <li>Threaded bushing G/NPT 1/2" - 1"</li> <li>Threaded nipple G/NPT 1/2" - 1"</li> </ul>
Centre-to-centre distance	Min. 150 mm to max. 6,000 mm (larger distances on request)
Material	<ul style="list-style-type: none"> <li>Stainless steel 1.4571 with bypass chamber Ø 60.3 x 2 mm (standard version)</li> <li>Stainless steel 1.4404 with bypass chamber Ø 60.3 x 2.77 mm on request</li> </ul>
Nominal pressure	Max. 64 bar
Temperature range	-60 ... +450 °C
Float	Cylindrical float, model BFT-H, see data sheet LM 10.02
Magnetic display	<ul style="list-style-type: none"> <li>Standard version, model BMD-S: &lt; 200 °C</li> <li>High-temperature version, model BMD-F: &gt; 200 °C, see data sheet LM 10.03</li> </ul>
Level sensor	<ul style="list-style-type: none"> <li>Reed sensor, model BLR, see data sheet LM 10.04</li> <li>Magnetostrictive sensor, model BLM, see data sheet LM 10.05</li> </ul>
Magnetic switches	Magnetic switch, model BGL, see data sheet LM 10.06
Approvals	Ex c, GL, GOST-R

Special versions on request



## Option bypass chamber end

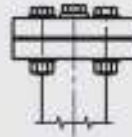
### Bypass chamber end top (examples)



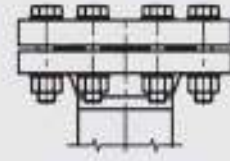
1  
Flat top without venting



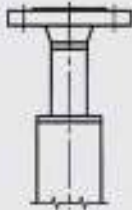
2  
Flat top with vent plug G 1/2"



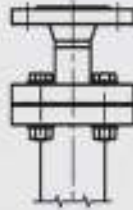
3  
Flange connection with vent plug G 1/2"



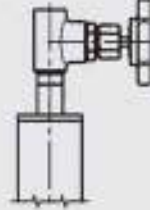
4  
Flange connection  
e.g. sealing faces  
groove/tongue per DIN 2512



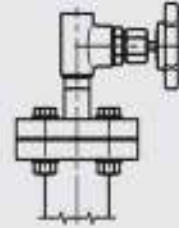
5  
Flat top with vent flange



6  
Flange connection  
vent flange



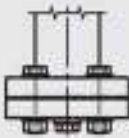
7  
Flat top with vent valve



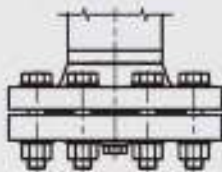
8  
Flange connection  
with vent valve

Other ends on request

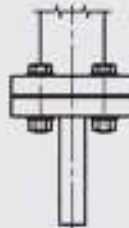
### Bypass chamber end bottom (examples)



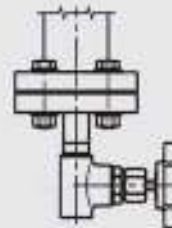
9  
Flange connection  
with drain plug  
G/NPT 1/2"



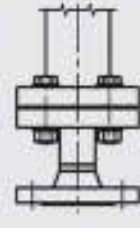
10  
Flange connection e.g.  
sealing faces groove/  
tongue per DIN 2512 with  
drain plug G 1/2"



11  
Flange connection  
with drain nozzle



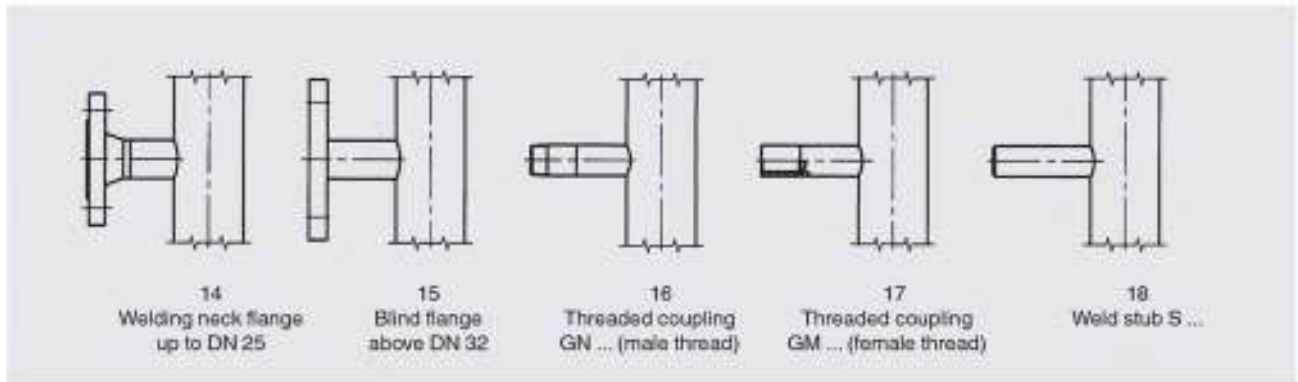
12  
Flange connection  
with drain valve



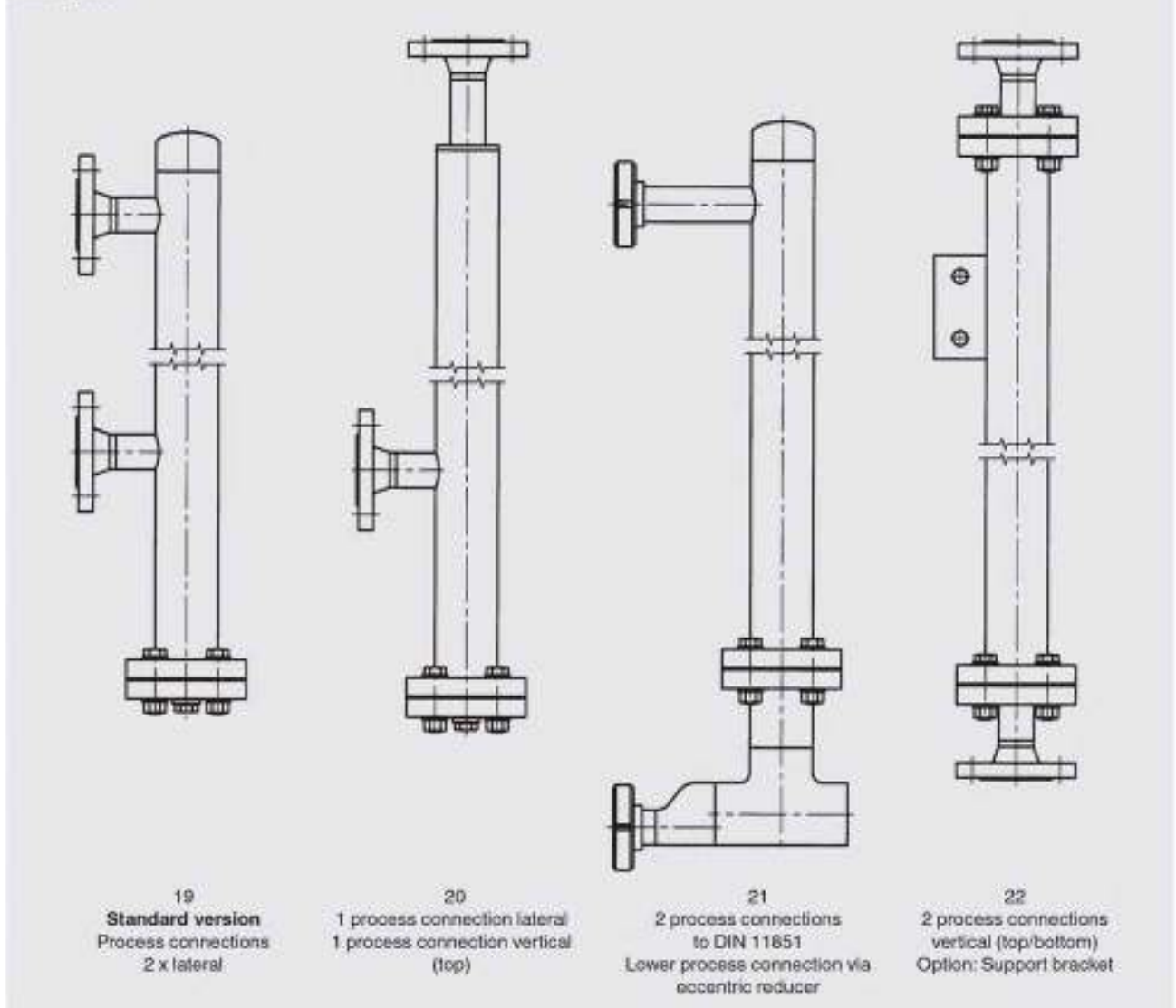
13  
Flange connection  
with drain flange

Other ends on request

## Option process connection



## Examples



Other connections on request

## CE conformity

### Pressure equipment directive

97/23/EC, pressure accessory

### ATEX directive (option)

94/9/EC, ignition protection type Ex c, zone 0/1, gas

## Approvals

- **GL**, ships, shipbuilding, offshore, Germany
- **DNV**, ships, shipbuilding, offshore, Norway
- **ABS**, ships, shipbuilding, offshore, USA
- **GOST**, national standard for Russia, Kazakhstan and Belarus

Approvals and certificates, see website

## Ordering information

Model / Approval / Material / Process specifications (operating temperature and pressure, density) / Process connection / Centre-to-centre distance M ...

Detailed information on floats, magnetic displays, sensors (reed chains and magnetostrictive) and magnetic switches can be found in the following data sheets:

- Float, model BFT; see data sheet LM 10.02
- Magnetic display; model BMD; see data sheet LM 10.03
- Reed sensor; model BLR; see data sheet LM 10.04
- Magnetostrictive sensor; model BLM; see data sheet LM 10.05
- Guided wave radar, model GTR, see data sheet LM 20.05
- Magnetic switch; model BGU; see data sheet LM 10.06

# Appendix

## Cross Reference BNA

Type	Description	Replaced Type
BNA-C	Compact version	BNA-.../...-M...-V42x2-...
BNA-S	Standard version	BNA-.../...-M...-V60x...-...[-Ex]
BNA-H	High-pressure version	BNA-.../...-M...-V...x...-...[-Ex]
BNA-P	Plastic version	
	PVDF	BNA-.../16-M...-PF63x3-...
	PP	BNA-.../16-M...-PP63x3-...
BNA-SD	DUPlus version, standard	BNA-...DU.../...-M...-V60x2/60x2-...
BNA-HD	DUPlus version, high pressure	BNA-...DU.../...-M...-V...x.../...x...-...
BNA-L	Liquid gas version	BNA-.../...-M...-V88x2-...
	KOPlus version	BNA/KO.../...-M...-V88x2-...
BNA-X	Special version	
	E-CTFE-coated	BNA-.../16-M...-VEC64x2-...
	ETFE-coated	BNA-.../16-M...-VET70x2-...
	PTFE-coated	BNA-.../16-M...-VTF70x2-...
	Titanium 3.7035	BNA-.../...-M...-T...x...-...
	Hastelloy C276	BNA-.../...-M...-HC...x...-...
	6Mo 1.4547 (UNS S31254)	BNA-.../...-M...-Mo...x...-...
BNA-J	Heating jacket version	BNA-.../...-M...-V60/70-...

## Type Code

Code		Basic type		Process connections		Option: Level sensor		Distance centre-to-centre		Material and chamber dimensions	
1	BNA	Magnetic Level Indicator									
2		1st Key Nom. size		2nd Key Nom. pressure		3rd Key Flange face					
...	EN...	EN 1092 DN 10 - DN 100		...	PN6 - PN400	...	Form B1, B2, C, D				
	...	DIN DN 10 - DN 100			PN6 - PN400		Form C, N, F				
	...	ANSI 1/2" - 4"			Class 150 - Class 400		Form RF, SF, FF, RTJ				
	JIS...	JIS DN 10 - DN 100			5 K - 63 K		Form RF, SF, FF, RTJ				
	GN...	Thread male DIN									
	GM...	Thread female DIN									
	NPTM...	Thread male NPT									
	NPTM...	Thread female NPT									
	S...	Welding stubs									
3	MG	Basic type without optional code									
4	M...	Distance between flange centres in mm									
5		1st Key Material		2nd Key Chamber dimensions							
...	V	Stainless steel 1.4571		HC	Hastelloy C	...	Chamber OD x Wall thickness in mm				
	L	Stainless steel 1.4404		MO	SS 1.4529 (6Mo)						
	VE	Stainless steel electro-polished		M	Monel						
	VTF	Stainless steel PTFE-lined		PP	Polypropylene						
	VET	Stainless steel E-CTFE-coated		PF	PVDF						
	VEC	Stainless steel E-CTFE-coated									



6 Magnetic Roller Display									
1st Key Design				2nd Key Scale					
...	MRA	Aluminium case with plastic rollers			SK	with scale (plastic), graduation in cm (printed)			
	MRK	Aluminium case with ceramic rollers			SA	Aluminium scale graved			
	MNAV	Stainless steel case with plastic rollers			SV	Stainless steel graved			
	MNKV	Stainless steel with ceramic rollers			P	with sight glass extender (for insulations)			
	MRAV	Stainless steel case with T-slot and plastic rollers							
	MRFV	Stainless steel case with T-slot and stainless steel flaps							
7 Option Magnetic Switches 1st Key Quantity									
2nd Key Design				3rd Key Cable length		4th Key Options			
...	M	BGU	MVE	BGU-V-E	1	1 m	R22	Pre resistance R22 for PLC	
	ME	BGU-E	MVD	BGU-V-Exd	2	2 m	N	NAMUR circuit according DIN EN 60947-5-6	
	MS12	BGU-M12	MHT	BGU-AHT	3	3 m			
	MES12	BGU-E-M12	MVHT	BGU-VHT	—	—			
	MA	BGU-A	MILH	BGU-ALH					
	MAE	BGU-A-E	MAR	BGU-AR					
	MD	BGU-Exd	MAD	BGU-AD					
	MV	BGU-V	MAM	BGU-AM					
8 Float (cylindrical) 2nd Key Diameter/Length in mm									
1st Key Material				3rd Key Pressure class			4th Key Magnetic system		
Z.S.	.V...	Stainless steel 1.4571	.G...	Borosilicate glass	PN16	PN16	R48H	R48H	
	.T...	Titanium 3.7035	.VEC...	Stainless steel 1.4571 E-CTFE-coated	PN25	PN25	K92	K92	
	.HC...	Hastelloy C			—	—	K74	K74	
	.CF...	CF340	.TEC...	Titanium 3.7035 E-CTFE-coated			A90	A90	
	.PP...	Polypropylene					A110	A110	
	.PE...	PVDF					A125	A125	
9 Approvals									
—	Ex	Ex-Design							

## Ordering Example

	Basic type	Connection size	Option level sensor	Distance centre-to-centre	Material Chamber dimensions	Magnetic roller display	Option Magnetic switch	Float design	Certificates
Code	1	2	3	4	5	6	7	8	9
	BNA	EN25/16/61	MG	M1500	V60x2	MRA/SK	3/M/2	ZV55165...	

## Float For bypass level indicators Model BFT

KSR data sheet BFT

### Applications

- Float for the monitoring of liquids in bypass level indicators
- Individual design and corrosion resistant materials make the products suitable for a broad range of applications
- Chemical, petrochemical, natural gas, offshore, shipbuilding, machine building, power generating equipment, power plants
- Process water and drinking water treatment, food industry, pharmaceutical industry

### Special features

- Sealed, pressure retaining design
- Density range from 340 kg/m<sup>3</sup>
- Pressures up to 400 bar
- Medium temperatures from -196 ... +450 °C
- Versions for interface layer

### Description

The model BFT float serves for the monitoring of liquids in bypass level indicators. The magnetic system built into the float transmits the liquid level, contact-free, to externally mounted displays, switches and sensors. Due to its omnidirectional, radial magnetic field, a guide within the tube is not needed.

The design will depend on the application, chemical resistance and the 3 physical quantities of pressure, temperature and density.



Fig. left: Corrugated float, model BFT-S  
Fig. centre: Cylindrical float, model BFT-H  
Fig. right: Plastic float, model BFT-P



Fig. left: Foam float, model BFT-F  
Fig. right: Ball-segment float, model BFT-K

## Model overview

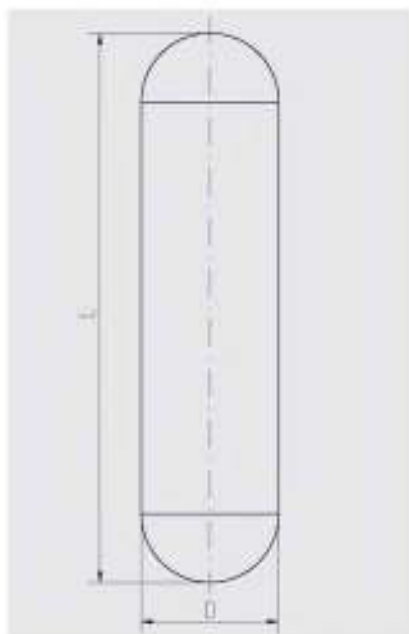
Float	Material	Density range	Pressure range	Temperature range
Cylindrical float, model BFT-H	Stainless steel 1.4571	> 470 kg/m <sup>3</sup>	Vacuum ... 100 bar	-200 ... +450 °C
	Titanium 3.7035	> 340 kg/m <sup>3</sup>		
Corrugated float, model BFT-S	Stainless steel 1.4571	> 470 kg/m <sup>3</sup>	Vacuum ... 25 bar	-50 ... +200 °C
	Titanium 3.7035	> 340 kg/m <sup>3</sup>		
Ball-segment float, model BFT-K	Titanium 3.7065	> 400 kg/m <sup>3</sup>	Vacuum ... 250 bar	-200 ... +450 °C
Plastic float, model BFT-P	PP	> 590 kg/m <sup>3</sup>	Vacuum ... 6 bar	-20 ... +80 °C
	PVDF	> 790 kg/m <sup>3</sup>		
Foam float, model BFT-F	Syntactic foam	> 750 kg/m <sup>3</sup>	Vacuum ... 450 bar	-20 ... +100 °C

## Classification of the floats

Bypass level indicator	Suitable float				
	Model BFT-S	Model BFT-H	Model BFT-P	Model BFT-F	Model BFT-K
Standard version, model BNA-S	x	x			
High-pressure version, model BNA-H		x		x	x
Plastic version, model BNA-P			x		
Compact version, model BNA-C		x			
DUPlus version, model BNA-SD	x	x			
Heating jacket version, model BNA-SJ		x			
Liquid gas/KOPlus version, model BNA-L		x			

## Cylindrical float, model BFT-H32 (with order no.)

Permissible temperature: -200 ... +400 °C

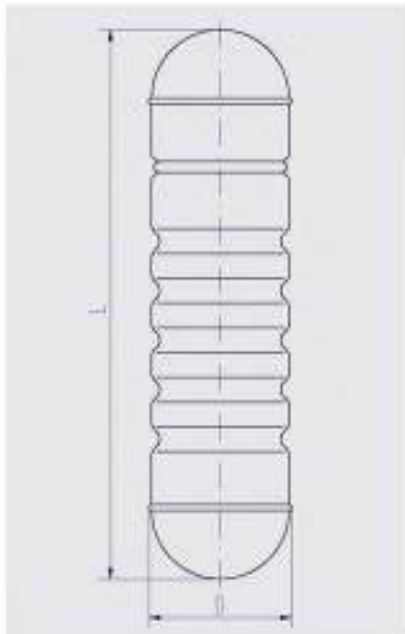


PN	Density range in kg/m <sup>3</sup>	Diameter in mm	Length in mm	Material	Order no.
16	1,270 ... 2,000	32	125	Stainless steel (1.4571)	506369
	1,090 ... 1,350	32	150	Stainless steel (1.4571)	030098
	940 ... 1,110	32	180	Stainless steel (1.4571)	029781
	850 ... 980	32	210	Stainless steel (1.4571)	100430
	780 ... 880	32	245	Stainless steel (1.4571)	110570
	730 ... 800	32	285	Stainless steel (1.4571)	032023
40	1,360 ... 2,000	32	125	Stainless steel (1.4571)	506374
	1,140 ... 1,400	32	155	Stainless steel (1.4571)	030108
	1,010 ... 1,180	32	185	Stainless steel (1.4571)	029808
	900 ... 1,020	32	225	Stainless steel (1.4571)	030107
	820 ... 910	32	265	Stainless steel (1.4571)	030106
	760 ... 830	32	315	Stainless steel (1.4571)	029828
	1,130 ... 2,000	32	125	Titanium (3.7035)	029834
	900 ... 1,100	32	160	Titanium (3.7035)	029835
	770 ... 900	32	200	Titanium (3.7035)	030104
	670 ... 770	32	240	Titanium (3.7035)	030293
	610 ... 680	32	290	Titanium (3.7035)	030090
	580 ... 620	32	350	Titanium (3.7035)	030743
	530 ... 570	32	420	Titanium (3.7035)	030101
	490 ... 530	32	510	Titanium (3.7035)	031537



## Corrugated float, model BFT-S50 (with order no.)

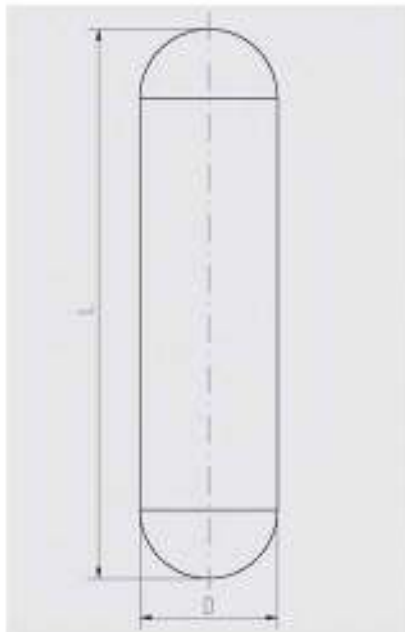
Permissible temperature: -50 ... +200 °C



PN	Density range in kg/m <sup>3</sup>	Diameter in mm	Length in mm	Material	Order no.
25	990 ... 2,000	50	150	Stainless steel (1.4571)	029044
	830 ... 1,000	50	185	Stainless steel (1.4571)	029045
	730 ... 840	50	225	Stainless steel (1.4571)	029046
	640 ... 730	50	275	Stainless steel (1.4571)	029047
	590 ... 650	50	335	Stainless steel (1.4571)	029048
	550 ... 600	50	400	Stainless steel (1.4571)	031229
	520 ... 560	50	470	Stainless steel (1.4571)	031230
	490 ... 530	50	555	Stainless steel (1.4571)	031231
	470 ... 500	50	650	Stainless steel (1.4571)	031232
	820 ... 2,000	50.8	150	Titanium (3.7035)	031235
	710 ... 850	50.8	180	Titanium (3.7035)	030683
	600 ... 710	50.8	215	Titanium (3.7035)	030684
	540 ... 610	50.8	250	Titanium (3.7035)	029034
	480 ... 540	50.8	300	Titanium (3.7035)	029035
430 ... 490	50.8	365	Titanium (3.7035)	029036	
400 ... 440	50.8	410	Titanium (3.7035)	029037	
380 ... 410	50.8	465	Titanium (3.7035)	029038	
370 ... 390	50.8	525	Titanium (3.7035)	029039	
360 ... 380	50.8	595	Titanium (3.7035)	029040	
340 ... 370	50.8	680	Titanium (3.7035)	029041	

## Cylindrical float, model BFT-H

Permissible temperature: -200 ... +450 °C

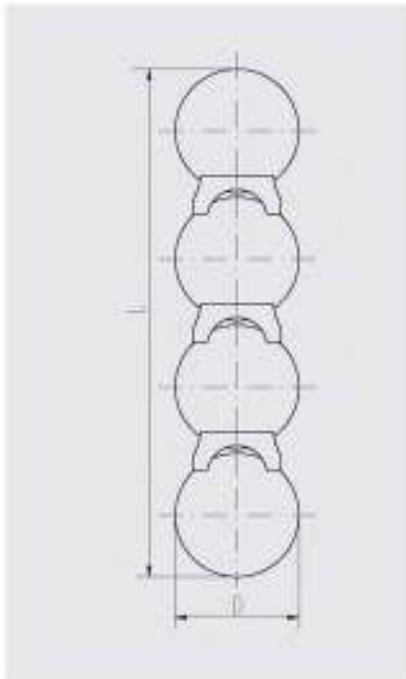


**Material:** Stainless steel 1.4571  
**Diameter:** 50 mm  
**Length:** 150 ... 650 mm (depending on pressure, density and temperature)  
**Weight:** depending on pressure, density and temperature  
**Magnetic system:** depending on pressure, density and temperature  
**Nominal density:** depending on pressure, density and temperature  
**Density range:** depending on pressure, density and temperature  
**Max. pressure:** < 40 bar

**Material:** Titanium 3.7035  
**Diameter:** 45, 50.8 or 60 mm  
**Length:** 150 ... 650 mm (depending on pressure, density and temperature)  
**Weight:** depending on pressure, density and temperature  
**Magnetic system:** depending on pressure, density and temperature  
**Nominal density:** depending on pressure, density and temperature  
**Density range:** depending on pressure, density and temperature  
**Max. pressure:** < 100 bar

## Ball-segment float, model BFT-K

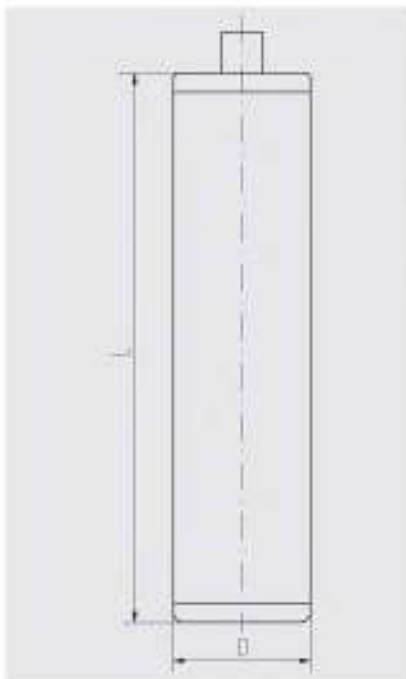
Permissible temperature: -200 ... +450 °C



<b>Material:</b>	Titanium 3.7065
<b>Diameter:</b>	45, 50.8 or 60 mm
<b>Length:</b>	150 ... 700 mm (depending on pressure, density and temperature)
<b>Weight:</b>	depending on pressure, density and temperature
<b>Magnetic system:</b>	depending on pressure, density and temperature
<b>Nominal density:</b>	depending on pressure, density and temperature
<b>Density range:</b>	depending on pressure, density and temperature
<b>Max. pressure:</b>	< 250 bar

## Plastic float, model BFT-P

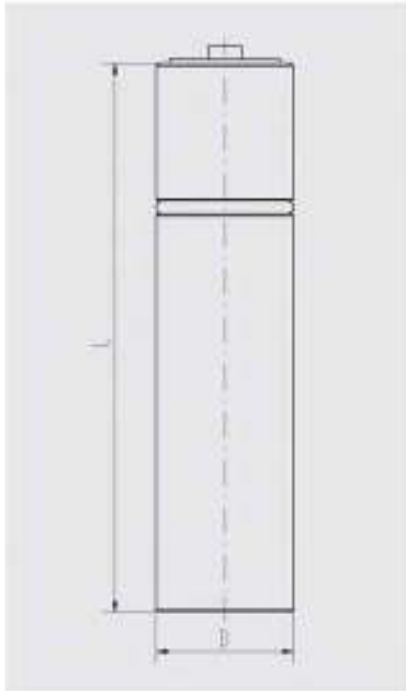
Permissible temperature: -20 ... +80 °C (PP), -50 ... +100 °C (PVDF)



<b>Material:</b>	PP or PVDF
<b>Diameter:</b>	50 mm
<b>Length:</b>	150 ... 450 mm (depending on pressure, density and temperature)
<b>Weight:</b>	depending on pressure, density and temperature
<b>Magnetic system:</b>	depending on pressure, density and temperature
<b>Nominal density:</b>	depending on pressure, density and temperature
<b>Density range:</b>	depending on pressure, density and temperature
<b>Max. pressure:</b>	< 6 bar

## Foam float, model BFT-F

Permissible temperature: -20 ... +100 °C



<b>Material:</b>	Syntactic foam
<b>Diameter:</b>	40 ... 80 mm
<b>Length:</b>	150 ... 750 mm (depending on pressure, density and temperature)
<b>Weight:</b>	depending on pressure, density and temperature
<b>Magnetic system:</b>	depending on pressure, density and temperature
<b>Nominal density:</b>	depending on pressure, density and temperature
<b>Density range:</b>	depending on pressure, density and temperature
<b>Max. pressure:</b>	< 600 bar

### Ordering information

To order the described product the order number (if available) is sufficient.

Alternatively:

Model / Material / Diameter / Length / Pressure rating / Magnetic system / Interface layer



# Appendix

## Cross Reference BFT

Replaced Type	Type	Description
ZVS	BFT-H	Cylindrical float, stainless steel
ZTS	BFT-H	Cylindrical float, titanium
ZVSS	BFT-S	Corrugated float, stainless steel
ZTSS	BFT-S	Corrugated float, titanium
ZPPS	BFT-P	Plastic float, PP
ZPFS	BFT-P	Plastic float, PVDF
ZFCS	BFT-F	Foam float
ZTKS	BFT-K	Ball-segment float
BG10xxx	Successor: BFT-	Floats in various designs (Phoenix). Please contact our Customer Service.

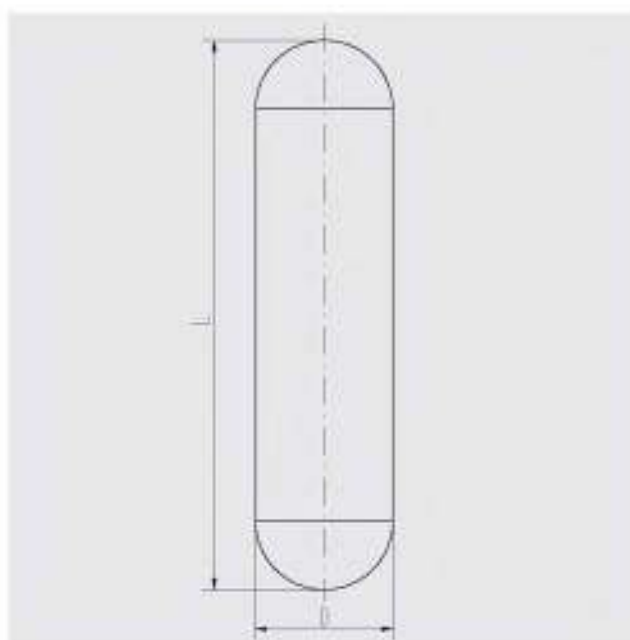
## Type Code

Code	
<b>1</b>	<b>Basic type</b>
ZVS	Cylindrical float, stainless steel
ZTS	Cylindrical float, titanium
ZVSS	Corrugated float, stainless steel
ZTSS	Corrugated float, titanium
ZPPS	Plastic float, PP
ZPFS	Plastic float, PVDF
ZFCS	Foam float
ZTKS	Ball-segment float
<b>2</b>	<b>Diameter</b>
...	in mm (omitted for OD 50 or 50,8)
<b>3</b>	<b>Length</b>
...	in mm
<b>4</b>	<b>Pressure stage</b>
...	in bar
<b>5</b>	<b>Magnetic system</b>
...	
<b>6</b>	<b>Interface float (omitted when not required)</b>
...	

## Ordering Example

	Basic type	Diameter	Length	Pressure stage	Magnetic system	Interface
Code	1	3	3	4	5	6

## BFT-H32



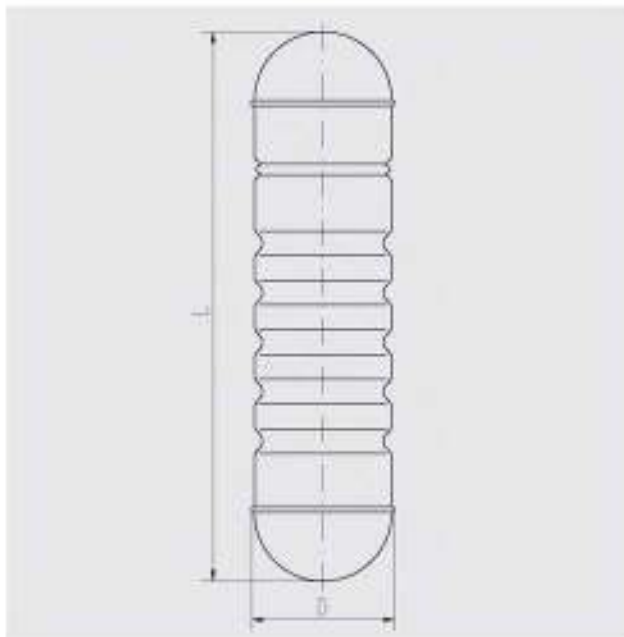
### Technical Specifications

Form: Cylindrical float

Temperature: -200 ... +400°C

Type	PN	Density range [kg/m <sup>3</sup> ]	Diameter [mm]	Length [mm]	Material	Order no.
ZVS32/125/PN16/A990	16	1270 - 2000	32	125	Stainless steel (1.4571)	506369
ZVS32/150/PN16/A990	16	1060 - 1350	32	150	Stainless steel (1.4571)	030098
ZVS32/180/PN16/A990	16	940 - 1110	32	180	Stainless steel (1.4571)	029781
ZVS32/210/PN16/A990	16	850 - 980	32	210	Stainless steel (1.4571)	100430
ZVS32/245/PN16/A990	16	780 - 880	32	245	Stainless steel (1.4571)	110570
ZVS32/285/PN16/A990	16	730 - 800	32	285	Stainless steel (1.4571)	032023
ZVS32/125/PN40/A990	40	1360 - 2000	32	125	Stainless steel (1.4571)	506374
ZVS32/155/PN40/A990	40	1140 - 1400	32	155	Stainless steel (1.4571)	030108
ZVS32/185/PN40/A990	40	1010 - 1180	32	185	Stainless steel (1.4571)	029808
ZVS32/225/PN40/A990	40	900 - 1020	32	225	Stainless steel (1.4571)	030107
ZVS32/265/PN40/A990	40	820 - 910	32	265	Stainless steel (1.4571)	030106
ZVS32/315/PN40/A990	40	760 - 830	32	315	Stainless steel (1.4571)	029828
ZTS32/125/PN40/A990	40	1130 - 2000	32	125	Titanium (3.7035)	029834
ZTS32/160/PN40/A990	40	900 - 1100	32	160	Titanium (3.7035)	029835
ZTS32/200/PN40/A990	40	770 - 900	32	200	Titanium (3.7035)	030104
ZTS32/240/PN40/A990	40	670 - 770	32	240	Titanium (3.7035)	030293
ZTS32/290/PN40/A990	40	610 - 660	32	290	Titanium (3.7035)	030090
ZTS32/350/PN40/A990	40	560 - 620	32	350	Titanium (3.7035)	030743
ZTS32/420/PN40/A990	40	530 - 570	32	420	Titanium (3.7035)	030101
ZTS32/510/PN40/A990	40	490 - 530	32	510	Titanium (3.7035)	031537

## BFT-S50



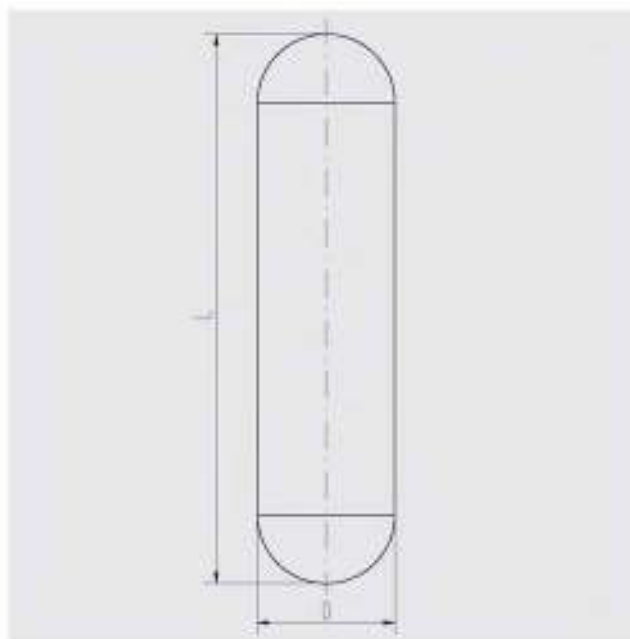
### Technical Specifications

Form: Corrugated float  
 Temperature: -50 ... +200°C

Type	PN	Density range [kg/m <sup>3</sup> ]	Diameter [mm]	Length [mm]	Material	Order no.
ZVSS150/PN25/R48H	25	890 - 2000	50	150	Stainless steel (1.4571)	029044
ZVSS185/PN25/R48H	25	830 - 1000	50	185	Stainless steel (1.4571)	029045
ZVSS225/PN25/R48H	25	730 - 840	50	225	Stainless steel (1.4571)	029046
ZVSS275/PN25/R48H	25	640 - 730	50	275	Stainless steel (1.4571)	029047
ZVSS335/PN25/R48H	25	590 - 650	50	335	Stainless steel (1.4571)	029048
ZVSS400/PN25/R48H	25	560 - 600	50	400	Stainless steel (1.4571)	031229
ZVSS470/PN25/R48H	25	520 - 560	50	470	Stainless steel (1.4571)	031230
ZVSS555/PN25/R48H	25	490 - 530	50	555	Stainless steel (1.4571)	031231
ZVSS650/PN25/R48H	25	470 - 500	50	650	Stainless steel (1.4571)	031232
ZTSS150/PN25/R48H	25	820 - 2000	50,8	150	Titanium (3.7035)	031235
ZTSS180/PN25/R48H	25	710 - 850	50,8	180	Titanium (3.7035)	030663
ZTSS215/PN25/R48H	25	600 - 710	50,8	215	Titanium (3.7035)	030664
ZTSS260/PN25/R48H	25	540 - 610	50,8	260	Titanium (3.7035)	029034
ZTSS300/PN25/R48H	25	480 - 540	50,8	300	Titanium (3.7035)	029035
ZTSS355/PN25/R48H	25	430 - 490	50,8	355	Titanium (3.7035)	029036
ZTSS410/PN25/R48H	25	400 - 440	50,8	410	Titanium (3.7035)	029037
ZTSS465/PN25/R48H	25	380 - 410	50,8	465	Titanium (3.7035)	029038
ZTSS525/PN25/R48H	25	370 - 390	50,8	525	Titanium (3.7035)	029039
ZTSS595/PN25/R48H	25	360 - 390	50,8	595	Titanium (3.7035)	029040
ZTSS680/PN25/R48H	25	340 - 370	50,8	680	Titanium (3.7035)	029041



## BFT-H



### Technical Specifications

Code 1 Basic type	Code 2 Diameter	Code 3 Length	Code 4 Pressure stage	Code 5 Magnetic system	[Code 6 Interface]
ZVS	[omitted]	—	PN ...	—	[...]

s. Type code

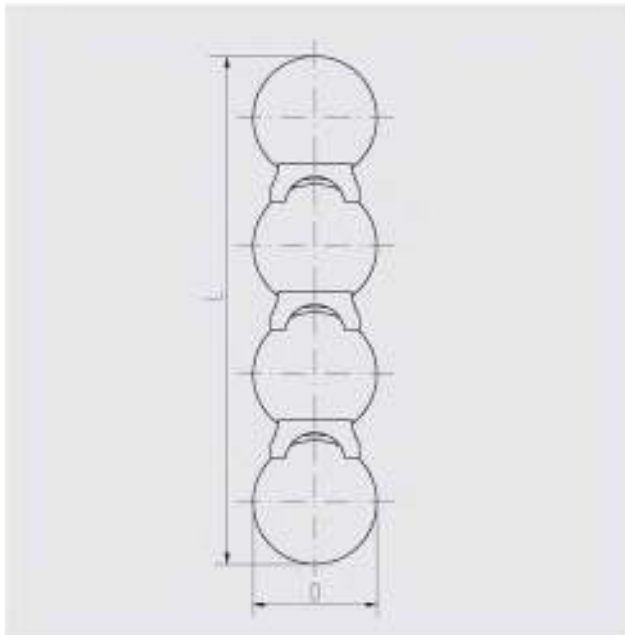
Design and float specification depending on pressure, density and temperature.

Form:	Cylindrical float
Material:	Stainless steel 1.4571
Diameter:	50 mm
Length:	150 – 650 mm (depends on pressure, density and temperature)
Max. pressure:	< 40 bar
Temperature:	-200 ... +450 °C

Code 1 Basic type	Code 2 Diameter	Code 3 Length	Code 4 Pressure stage	Code 5 Magnetic system	[Code 6 Interface]
ZTS	—	—	PN ...	—	[...]

Form:	Cylindrical float
Material:	Titanium 3.7035
Diameter:	45 / 50,8 / 60 mm
Length:	150 – 650 mm (depends on pressure, density and temperature)
Max. pressure:	< 100 bar
Temperature:	-200 ... +450 °C

## BFT-K



### Technical Specifications

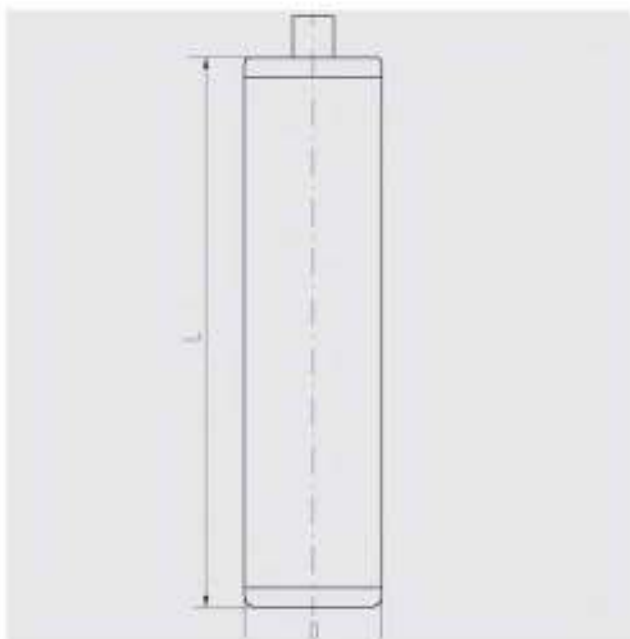
Code 1 Basic type	Code 2 Diameter	Code 3 Length	Code 4 Pressure stage	Code 5 Magnetic system	[Code 6 Interface]
ZTKS	—	—	PN ...	—	[...]

s. Type code

Design and float specification depending on pressure, density and temperature.

Form:	Ball-segment float
Material:	Titanium 3.7035
Diameter:	45 / 50,8 / 60 mm
Length:	150 – 700 mm (depends on pressure, density and temperature)
Max. pressure:	< 250 bar
Temperature:	-200 ... +450°C

## BFT-P



### Technical Specifications

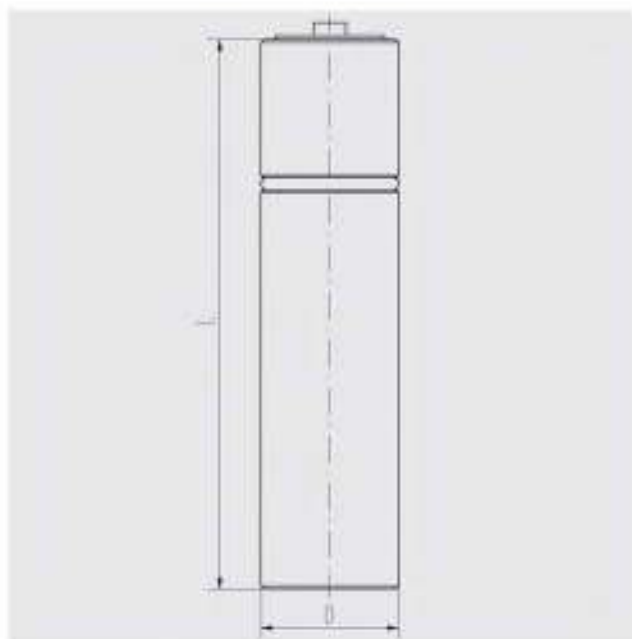
Code 1 Basic type	Code 2 Diameter	Code 3 Length	Code 4 Pressure stage	Code 5 Magnetic system	[Code 6 Interface]
ZPPS ZPFS	[omitted]	—	PN ...	—	[...]

s. Type code

Design and float specification depending on pressure, density and temperature.

Form:	Plastic float
Material:	PP / PVDF
Diameter:	50 mm
Length:	150 – 450 mm (depends on pressure, density and temperature)
Max. pressure:	< 6 bar
Temperature:	-20 ... +80°C (PP) -50 ... +100°C (PVDF)

## BFT-F



### Technical Specifications

Code 1 Basic type	Code 2 Diameter	Code 3 Length	Code 4 Pressure stage	Code 5 Magnetic system	[Code 6 Interface]
ZFCS	...	...	PN ...	...	[...]

a. Type code

Design and float specification depending on pressure, density and temperature.

Form:	Foam float
Material:	Syntactic Foam
Diameter:	40 - 80 mm
Length:	150 - 750 mm (depends on pressure, density and temperature)
Max. pressure:	< 600 bar
Temperature:	-20 ... +100 °C



## Magnetic display For bypass level indicators Model BMD

KSR data sheet BMD

### Applications

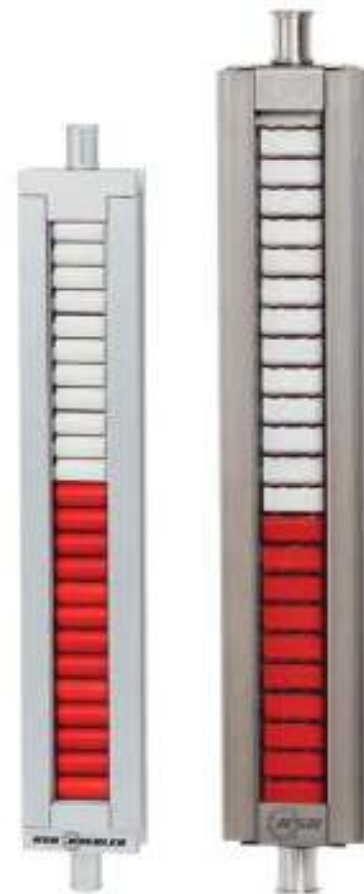
- Display bar for the visualisation of levels in combination with bypass level indicators
- Individual design and corrosion resistant materials make the products suitable for a broad range of applications
- Chemical, petrochemical, natural gas, offshore, shipbuilding, machine building, power generating equipment, power plants
- Process water and drinking water treatment, food industry, pharmaceutical industry

### Special features

- Measured value display by means of rollers or flaps with permanent magnets
- Medium temperatures from -200 ... +450 °C
- Splash-proof
- Without power supply
- Hermetically sealed from the process

### Description

The model BMD magnetic displays are used in combination with bypass level indicators for the display of levels. A magnetic system built into the float transmits the liquid level, contact-free, to the externally mounted display. In this are fitted, at 10 mm intervals, red/white plastic rollers or stainless steel flaps with bar magnets. Through the directional magnetic field of the permanent magnetic system in the bypass float, the magnetic rollers or flaps, through the wall of the bypass chamber, are turned through 180°. For an increasing level from white to red; for a falling level from red to white. Thus the magnetic display indicates the level of a vessel as a red column, without power supply.



#### Magnetic display

Fig. left: Plastic rollers, model BMD-SA

Fig. right: Stainless steel flaps, model BMD-FR

An integrated T-slot serves for the fastening of further attachment parts such as scales, sensors and switches.

For selecting the optimum magnetic display (plastic rollers/ stainless steel flaps, case, scale, measuring range etc.) we offer application-related technical advice.

## Model overview

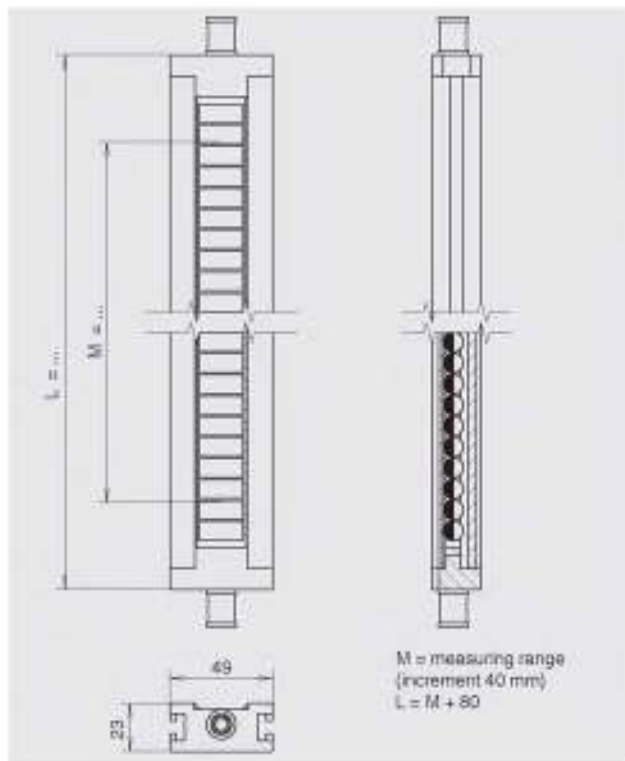
Magnetic display model	Description
BMD-SA	Plastic rollers in aluminium case, with T-slot
BMD-SR	Plastic rollers in stainless steel case with T-slot
BMD-FA	Stainless steel flaps in aluminium case, with T-slot
BMD-FR	Stainless steel flaps in stainless steel case with T-slot

## Options

- Scale with adhesive foil
- Scale engraved aluminium
- Scale engraved stainless steel
- Scale in cm, mm or %
- Special scale
- Acrylic sight glass extender for insulation at low temperatures
- Purge gas connection
- Display elements in the colours red, white, black and yellow (others on request)

### Magnetic display, plastic rollers in aluminium case, with T-slot, BMD-SA

Permissible temperature: -50 ... +200 °C

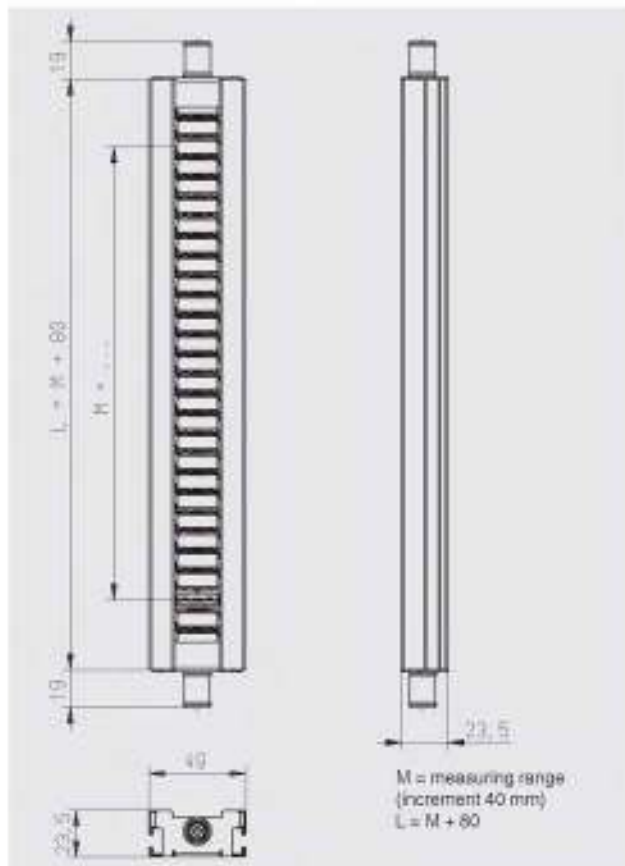


#### Specifications

Case	Aluminium, anodised
Length L	180 ... 6,000 mm
Display element	Plastic rollers, PBT, red/white
Indicator window	Polycarbonate

### Magnetic display, plastic rollers in stainless steel case, with T-slot, BMD-SR

Permissible temperature: -50 ... +200 °C

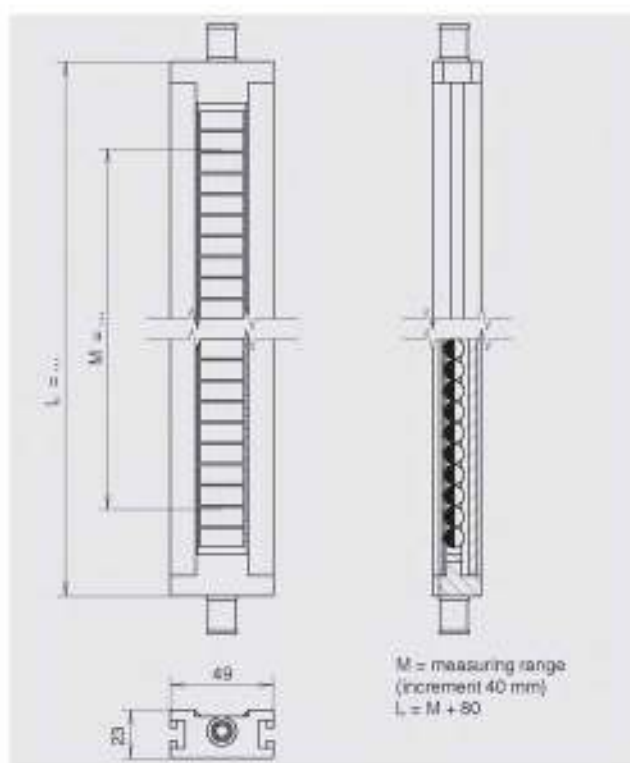


#### Specifications

Case	Stainless steel
Length L	180 ... 6,000 mm
Display element	Plastic rollers, PBT, red/white
Indicator window	Polycarbonate

## Magnetic display, stainless steel flaps in aluminium case, with T-slot, BMD-FA

Permissible temperature: -200 ... +450 °C

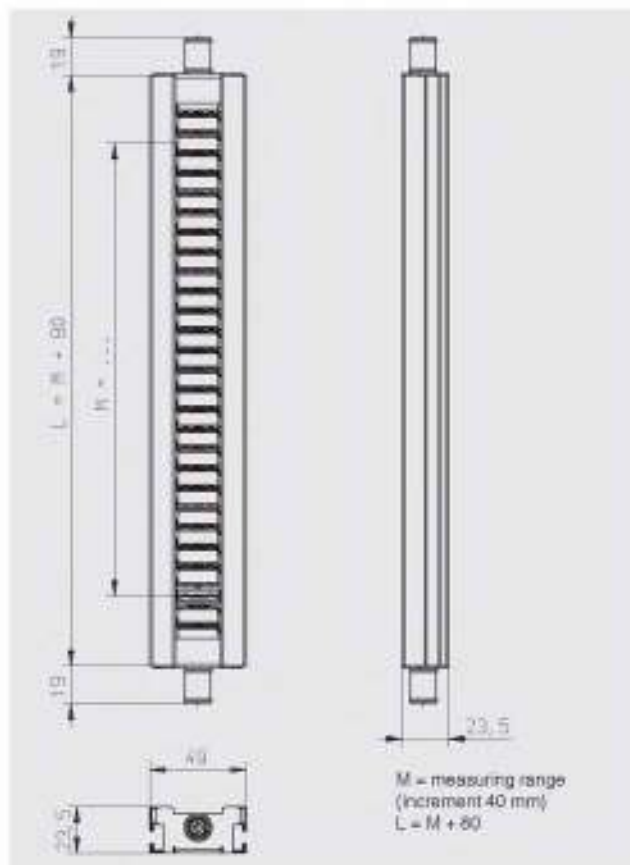


### Specifications

Case	Aluminium, anodised
Length L	180 ... 6.000 mm
Display element	Stainless steel flaps, red/white
Indicator window	Glass

## Magnetic display, stainless steel flaps in stainless steel case, with T-slot, BMD-FR

Permissible temperature: -200 ... +450 °C



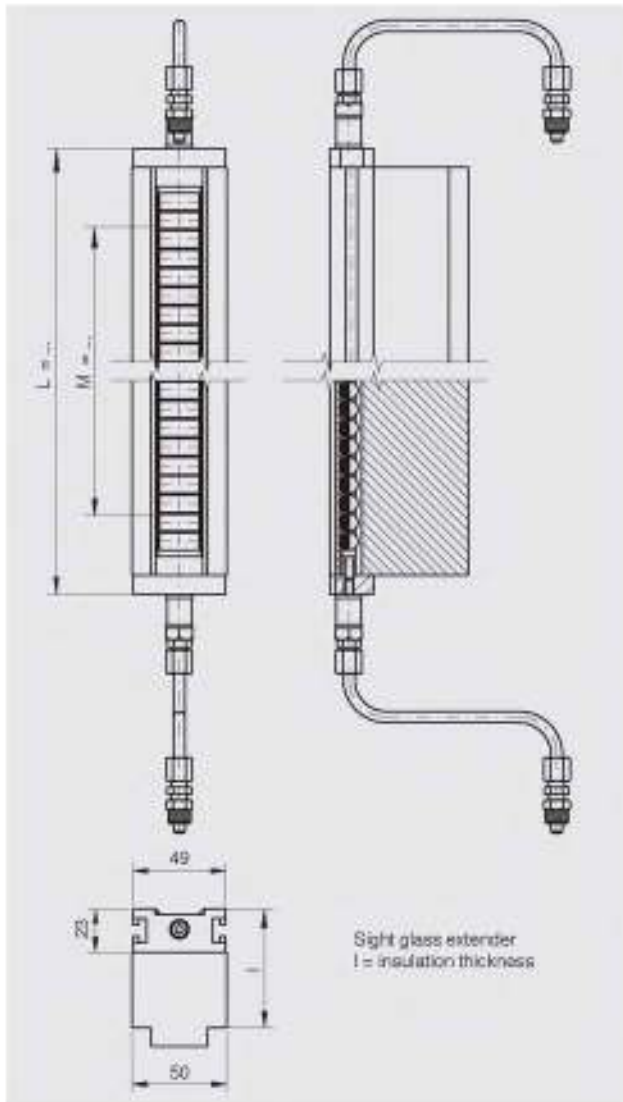
### Specifications

Case	Stainless steel
Length L	180 ... 6.000 mm
Display element	Stainless steel flaps, red/white
Indicator window	Glass



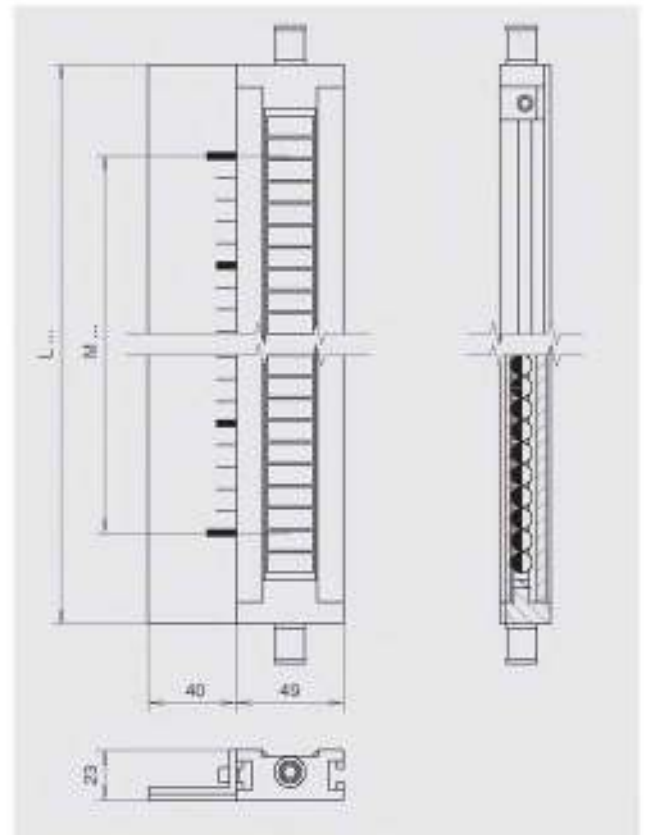
### Option

With sight glass extender and purge gas connection  
(with bypass chamber insulation)



### Option

Scale (adhesive foil, aluminium or stainless steel)  
Aluminium with adhesive foil, cm-graduation  
max. ambient temperature for the adhesive foil: 100 °C  
Aluminium or stainless steel engraved, graduation selectable



### Ordering information

Model / Measuring range / Options

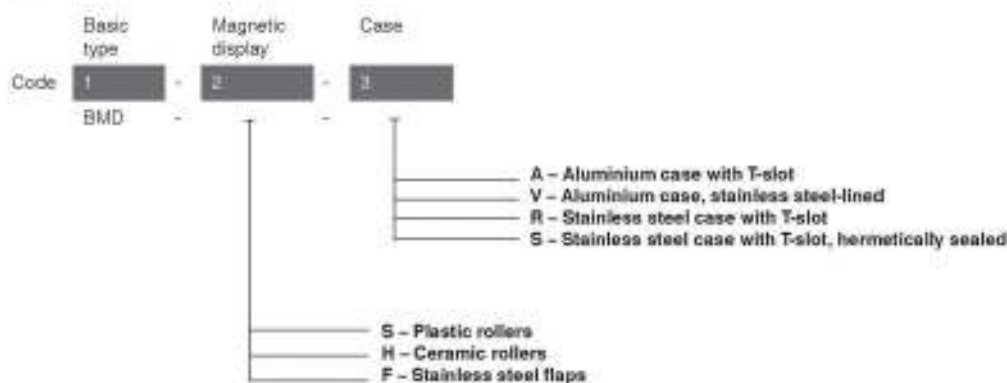
# Appendix

## Cross Reference BMD

Former Type	Type	Replaced by	Description
MRA	BMD-SA		Aluminium case with T-slot, plastic rollers
MRK*	BMD-HA*	BMD-FA	Aluminium case with T-slot, ceramic rollers
MRF	BMD-FA		Aluminium case with T-slot, stainless steel flaps (new)
MNAV*	BMD-SV*	BMD-SR	Aluminium case stainless steel-lined, plastic rollers
MNKV*	BMD-HV*	BMD-FR	Aluminium case stainless steel-lined, ceramic rollers
MRAV	BMD-SR		Stainless steel case with T-slot, plastic rollers (new)
MRFV	BMD-FR		Stainless steel case with T-slot, stainless steel flaps (new)
	BMD-SS		Stainless steel case with T-slot, plastic rollers, hermetically sealed (new)
	BMD-FS		Stainless steel case with T-slot, stainless steel flaps, hermetically sealed (new)
AVG2*		BMD-FS	Stainless steel rollers in glass tube, hermetically sealed (Phoenix design)
AVG3*		BMD-FA	Aluminium case, stainless steel rollers (Phoenix design)
AVV2*		BMD-FA	Aluminium case, stainless steel rollers (Vaihinger design)

\* obsolete

## Type Code



## Reed sensor For bypass level indicators Model BLR

KSR data sheet BLM



### Applications

- Sensor for continuous level measurement of liquids in bypass level indicators
- Chemical and petrochemical industries, oil and natural gas extraction (on- and offshore)
- Shipbuilding, machine building
- Power generating equipment, power plants
- Pharmaceutical, food, water treatment, environmental engineering industries

### Special features

- Installation of head-mounted transmitters in the connection housing possible
- Various contact separations selectable
- Programmable and configurable head-mounted transmitters for field signal 4 ... 20 mA, HART®, PROFIBUS® PA or FOUNDATION™ Fieldbus
- Explosion-protected versions
- Temperature ranges from -100 ... +350 °C

### Description

The model BLR reed sensors are used for continuous monitoring and recording of the liquid level in connection with transmitters. They work on the float principle with magnetic transmission (permanent magnet, reed switch and resistance measuring chain) in a 3-wire potentiometer circuit.

A magnetic system built into the float actuates, through the walls of the bypass chamber and of the sensor tube, reed contacts at a resistance measuring chain (potentiometer). The measurement voltage generated by this is proportional to the fill level.



Reed sensor, model BLR-S

The resistance measuring chain is made up from reed contacts and resistors soldered onto a PCB. Depending on requirements and design several different contact separations from 5 to 18 mm are available.

For selecting the optimum sensor (sensor model, connection housing, electrical connection, sensor tube (material and total length), contact separation, head-mounted transmitter, measuring range, approval) we offer application-related technical advice.

## Model overview

Sensor model	Description	Approval							Temperature range
		without	Ex i	Ex d	GL	DNV	Ex i + GL	Ex i + DNV	
BLR-S	Reed sensor, standard	x			x	x			-50 ... +350 °C
BLR-S-Ex i	Reed sensor, intrinsically safe version Ex i		x				x	x	-50 ... +100 °C
BLR-S-Ex d	Reed sensor, explosion-protected version Ex d			x					-50 ... +100 °C

## Ex approvals

Explosion protection	Ignition protection type	Model	Zone	Approval number
ATEX	Ex i	BLR-S-Ex i	Zone 1, gas	KEMA 01ATEX1052 X II 2G Ex ia IIC T4 ... T6 Gb
	Ex d	BLR-S-Ex d	Zone 1, gas	TÜV 09 ATEX 7632 X II 2G Ex d IIC T6
	Ex i + GL	BLR-S-Ex i	Zone 1, gas	KEMA 01ATEX1052 X II 2G Ex ia IIC T4 ... T6 Gb + GL 35949-87 HH
	Ex i + DNV	BLR-S-Ex i	Zone 1, gas	KEMA 01ATEX1052 X II 2G Ex ia IIC T4 ... T6 Gb + DNV A-11451

## Type approval

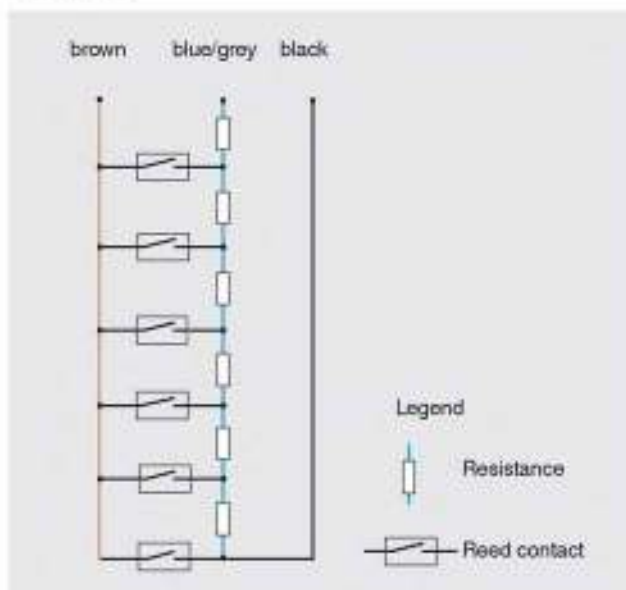
Approval	Model	Approval number
GL	BLR-S	GL - 35 949 - 87 HH
DNV	BLR-S	DNV A-11451
GOST-R	all	0959333

## Options

- 2-wire head-mounted transmitter in the connection housing
- Stainless steel connection housing with digital indicator

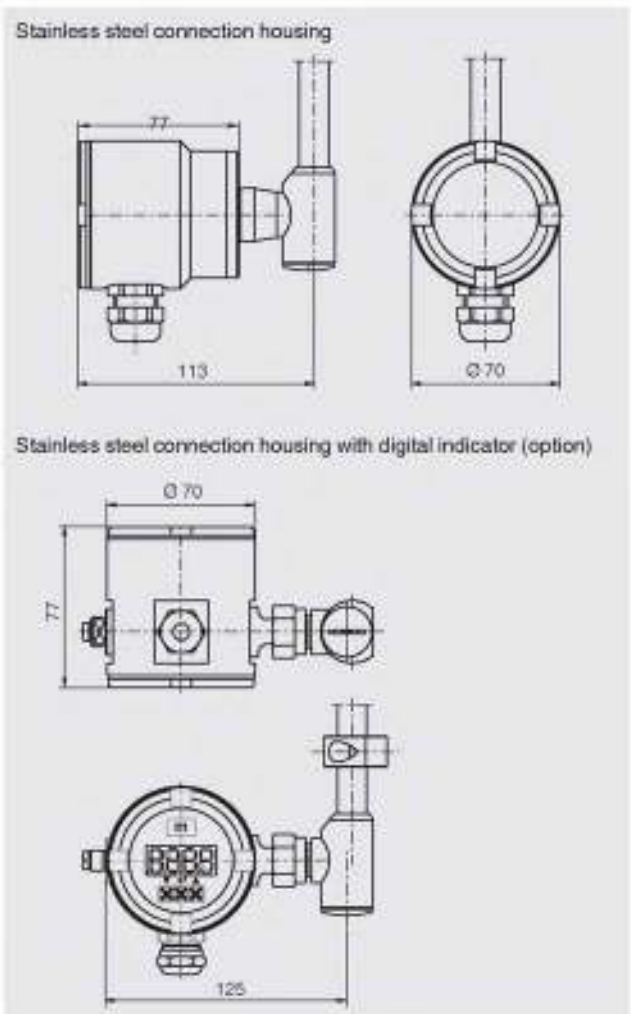
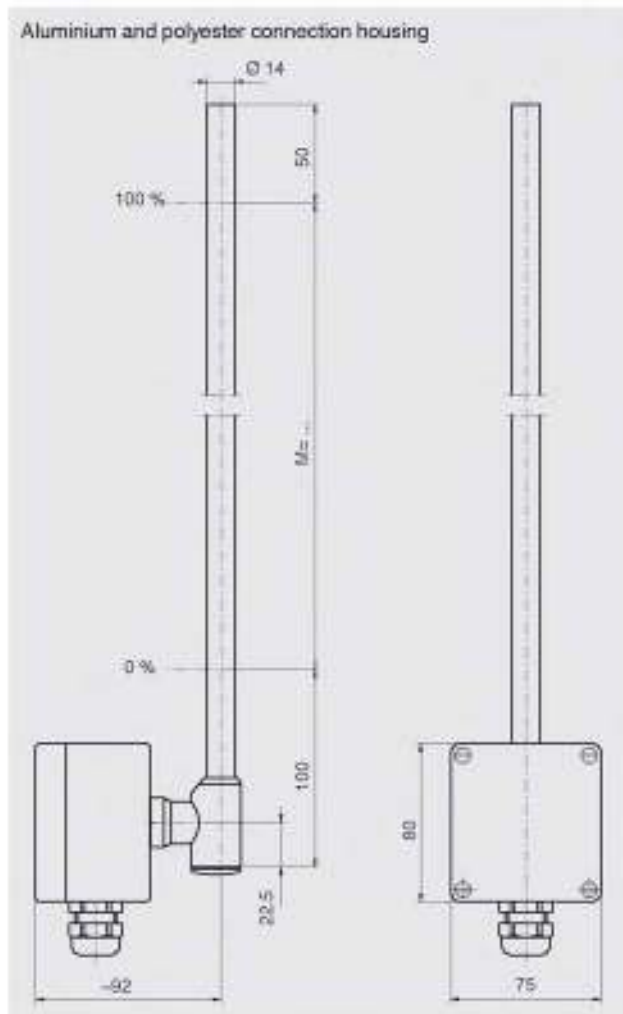
Further approvals on request

## Internal circuit diagram of the reed sensors





## Reed sensors, models BLR-S and BLR-S-Ex i



### Model BLR-S

#### Specifications

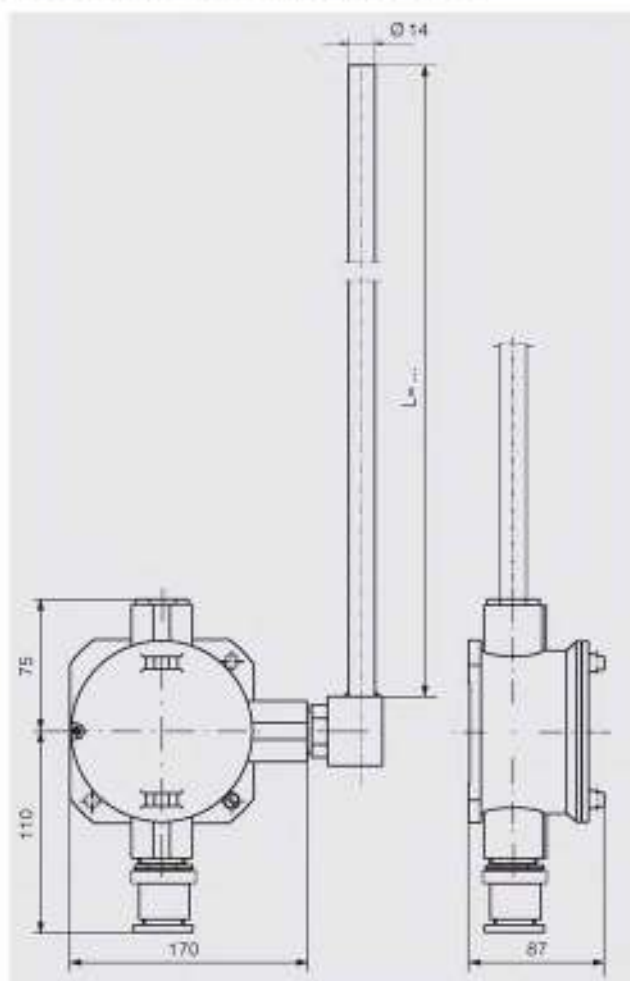
Connection housing	Aluminium	80 x 75 x 57 mm
	Polyester	80 x 75 x 55 mm
	Stainless steel 1.4571	Ø 70 x 77 mm
	Stainless steel 1.4571 with digital indicator	Ø 70 x 77 mm
Sensor tube	Stainless steel 1.4571, tube Ø 14 x 1 mm	
Contact separation	18 mm, standard	
	15 mm, high temperature, low temperature	
	10 mm, standard, high temperature, low temperature	
	5 mm, standard, high temperature, low temperature	
Overall resistance of the measuring chain	Length and separation dependent	
Ambient temperature	Standard version	-50 ... +100 °C
	High temperature version	-50 ... +200 °C
	Low temperature version	-100 ... +100 °C
	Standard version with Microtherm®	-50 ... +250 °C
	High temperature version with Microtherm®	-50 ... +350 °C
Ingress protection	Aluminium and polyester connection housing: IP 65 Stainless steel connection housing: IP 67	

### Model BLR-S-Ex i

#### Specifications

Connection housing	Aluminium	80 x 75 x 57 mm
	Polyester	80 x 75 x 55 mm
	Stainless steel 1.4571	Ø 70 x 77 mm
	Stainless steel 1.4571 with digital indicator	Ø 70 x 77 mm
Sensor tube	Stainless steel 1.4571, tube Ø 14 x 1 mm	
Contact separation	18 mm	
	10 mm	
	5 mm	
Overall resistance of the measuring chain	3.2 ... 50 kΩ	
Max. permissible surface temperature at the sensor tube	T4	+100 °C
	T5	+65 °C
	T6	+50 °C
Ingress protection	Aluminium and polyester connection housing: IP 65 Stainless steel connection housing: IP 67	
Approval	Ex i	

## Reed sensor, model BLR-S-Ex d



### Specifications

Connection housing	Aluminium	170 x 151 x 87 mm
Sensor tube	Stainless steel 1.4571, tube $\varnothing$ 14 x 1 mm	
Contact separation	18 mm 10 mm 5 mm	
Overall resistance of the measuring chain	Length and separation dependent	
Max. permissible surface temperature at the sensor tube	T4 +100 °C T5 +65 °C T6 +55 °C	
Ingress protection	IP 65	
Approval	Ex d	

## Head-mounted transmitter



**Model TE**

**Model T32E**

**Model T53F**

**Model TLEH**

Model	4 ... 20 mA	HART®	PROFIBUS® PA	Fieldbus™	Exi	Display	Order no.
TE	x				x		014832
TS	x						005894
T32E	x	x					025216
T32S	x	x					114795
T53F				x	x		025727
T53P			x		x		034422
TLH	x	x				x	019989
TLEH	x	x			x	x	021104

## CE conformity

**Electromagnetic compatibility (EMC)**  
2004/108/EC

**ATEX directive (option)**  
94/9/EC, ignition protection type Ex i and Ex d, zone 1, gas

## Approvals

- GL, ships, shipbuilding, offshore, Germany
- DNV, ships, shipbuilding, offshore, Norway
- GOST, national standard for Russia, Kazakhstan and Belarus

Approvals and certificates, see website

## Ordering information

To order the described product the order number (if available) is sufficient.

Alternatively:

Sensor model / Connection housing / Electrical connection / Sensor tube (material and total length) / Contact separation, head-mounted transmitter / Measuring range / Approval

# Appendix

## Cross Reference BLR

Replaced Type	Type	Description
MG-A.VK.J.L.../M.../14	BLR-S	Level sensor reed, standard
MG-A.VK.J.L.../M.../14-Ex	BLR-S-Ex i	Level sensor reed, intrinsically design Ex i
AF-ADF	BLR-S-Ex d	Level sensor reed, explosion proof design Ex d

## Type code

### Code

1		Basic type				
MG		Level sensor				
2		Electrical connection (terminal box)				
...	A	Aluminium - top	APL	Polyester - top (Ex-design)	AVG	Stainless steel - top with digital display
	AU	Aluminium - bottom	APLU	Polyester - bottom (Ex-design)	AVGU	Stainless steel - bottom with digital display
	AP	Polyester - top	AV4	Stainless steel - top		
	APU	Polyester - bottom	AV4U	Stainless steel - bottom		
3		1st key	2nd key	Optional code		
...	V	Material sensor tube	Contact separation			
	V	Stainless steel	K18 18 mm			Contact separation 5 / 10 / 15 mm only
			K15 15 mm	HT.		High temperature -50°C ... +350°C
			K10 10 mm	LT.		Low temperature -100°C ... +100°C
			K5 5 mm			
4		(Option) Head mounted transmitter in terminal box				
...	TS	2-wire Standard				
	TE	2-wire Ex i				
	TLH	2-wire HART® with LCD display				
	TLEH	2-wire Ex i HART® with LCD display				
	T32	2-wire Ex i HART® programmable				
	T53P	Ex i Profibus PA programmable				
	T53F	Foundation Fieldbus programmable				
5		1st key	2nd key	3rd key		
...	L	Sensor tube length	Measuring range	Sensor tube dimensions		
	L	Length in mm	M... Range in mm	14	OD Ø 14 mm	
6		Optional code				
...	Ex	Ex Control circuit EEx Ib IIC or EEx ia IIC, resistance of measuring chain: 3.2 kOhm ... 50 kOhm				

## Ordering example

Code	Basic type	Electrical connection	Material Sensor tube Contact separation	Option Head-mounted transmitter	Sensor tube-length Measuring range Sensor tube-dimensions	Optional code
	1	2	3	4	5	6
	MG	AU	VK10	TE	L1650/M1500/14	Ex



## Magnetostrictive sensor For bypass level indicators Model BLM

KSR data sheet BLM


**HART**  
COMMUNICATION PROTOCOL

### Applications

- Sensor for continuous level measurement of liquids in bypass level indicators
- Chemical, petrochemical, offshore industries
- Shipbuilding, machine building
- Power generating equipment, power plants
- Pharmaceutical, food, water treatment, environmental engineering industries

### Special features

- Continuous level measurement on the outside of the bypass
- 2-wire technology 4 ... 20 mA
- Measured value output via digital interface and a selectable measured value as analogue signal
- Case from stainless steel (display from glass)
- Magnetostrictive level measuring instrument with high resolution



Magnetostrictive sensor, model BLM

### Description

Level sensors with a magnetostrictive, high-resolution measuring principle are used for continuous level measurement of liquids and are based on determining the position of a magnetic float following the magnetostrictive measuring principle. The sensors are mounted on the outside of a bypass level indicator.

The measuring process is triggered by a current impulse. This current produces a circular magnetic field along a wire made of magnetostrictive material, which is held under tension inside the sensor tube. At the point being measured (liquid level) there is a cylindrical float with permanent magnets acting as a position transducer, whose field lines run at right angles to the impulse magnetic field. This magnetic field of the float tensions the wire. The superposition of these two

magnetic fields triggers a mechanical wave in the wire. This is converted into an electrical signal at the end of the wire in the sensor housing by a piezoceramic pick-up.

By measuring the elapsed transit time, it is possible to determine the start point of the torsional stress wave and therefore the float position with a high degree of accuracy.

## Model overview

Sensor model	Description	Approval					Temperature range (process)
		without	Ex i	Ex d	NEPSI Ex d	NEPSI nL	
BLM-S	Magnetostrictive sensor, standard	x					-80 ... +185 °C
BLM-S-Ex i	Magnetostrictive sensor, intrinsically safe version Ex i		x			x	-60 ... +185 °C
BLM-S-Ex d	Magnetostrictive sensor, explosion-protected version Ex d			x	x		-60 ... +185 °C

Level sensor model	Materials		
	Stainless steel 1.4571 (316Ti)	Stainless steel 1.4404 (316L)	Titanium 3.7035 (grade 2)
BLM-S	x	x	x
BLM-S-Ex i	x	x	x
BLM-S-Ex d	x	x	x

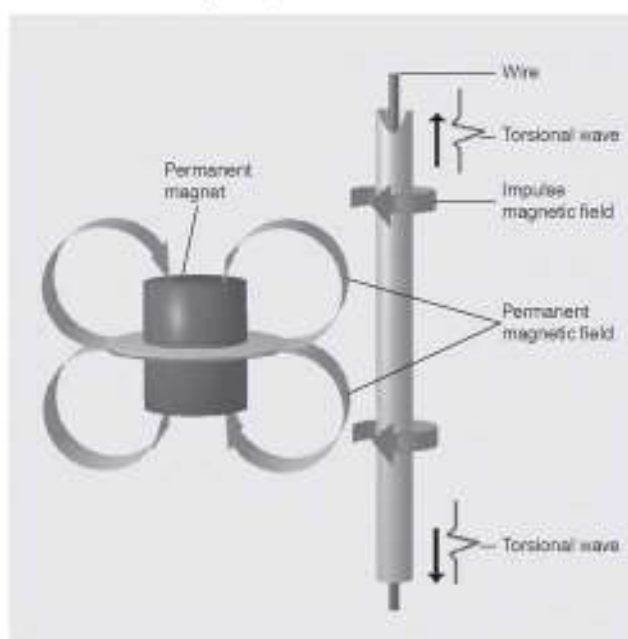
## Ex approvals

Explosion protection	Ignition protection type	Model	Zone	Approval number
ATEX	Ex i	BLM-S-Ex i	Zone 1	ZELM 10 ATEX 0439 II 1/2G Ex ia IIC T3 to T6
	Ex d	BLM-S-Ex d	Zone 1	ZELM 13 ATEX 0508 X II 1/2G Ex d IIB T3 to T6 Ga Gb
NEPSI	NEPSI Ex d	BLM-S-Ex d	Zone 1	GYJ101053 Ex d II CT3-T6
	NEPSI nL	BLM-S-Ex i	Zone 1	-

## Type approval

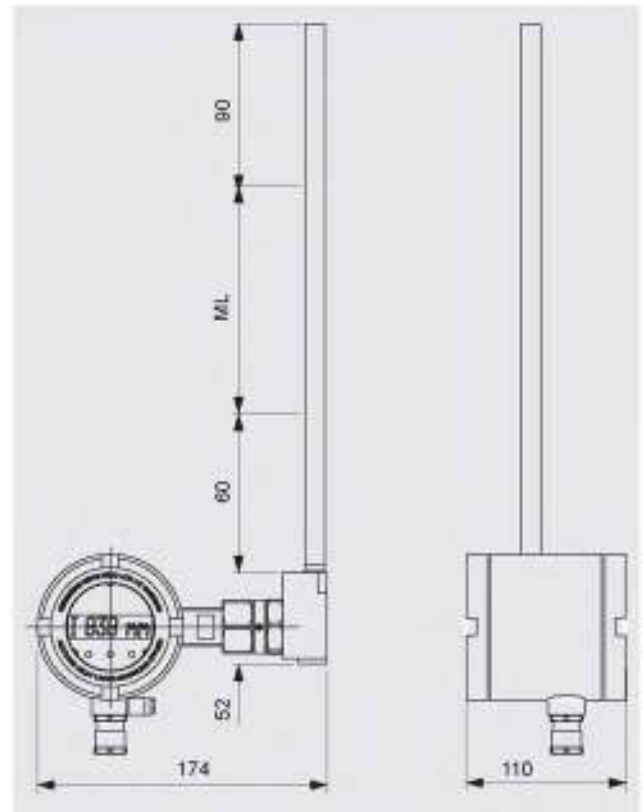
Explosion protection	Model	Approval number
GOST-R	BLM-S (FFG-BP)	0959333

## Illustration of the principle



## Magnetostrictive sensor, model BLM

Specifications	
Connection housing (sensor housing)	Stainless steel 1.4404 Version with or without display, with window
Sensor tube	Stainless steel 1.4571, tube $\varnothing$ 12 mm, tube length L max. 5,800 mm
Temperature range	Medium temperature: -60 ... +185 °C Ambient temperature: - Version without display: -40 ... +65 °C - Version with display: -20 ... +70 °C - Version Ex i: T3/T4/T5/T6 -20 °C ... +70/+70/+70/+60 °C - Version Ex d: T3/T4/T5/T6 -40 °C ... +70/+70/+70/+60 °C
Output signal	4 ... 20 mA, HART®
Power supply	DC 10 ... 30 V
Measuring accuracy	< $\pm 0.5$ mm
Resolution	< 0.1 mm
Load	max. 900 $\Omega$ at 30 V
Mounting position	Vertical $\pm 30^\circ$
Ingress protection	IP 67



### Ordering information

To order the described product the order number (if available) is sufficient.

Alternatively:

Sensor model / Connection housing / Electrical connection / Sensor tube (material and total length) / Contact separation, head-mounted transmitter / Measuring range / Approval

# Appendix

## Cross Reference BLM

Replaced Type	Type	Description
FFG-BP	BLM-S	Magnetostrictive sensor, standard
FFG-BT	BLM-S	Magnetostrictive sensor, high temperature
746.2xxx	Successor: BLM-S	Magnetostrictive sensor (Phoenix design)

## Type Code FFG-BP

FFG-BP. 2 0 H X O X - X X XXX - XXXX

Measuring length ML in mm e.g. 0600 = 600 mm		
PHO	710.098/104	Phoenix
K48	BNA R48H	KSR Kuebler
K92	BNA K92	
INT	ITA	Intra
KRO	BM	Krohne
VAI	75	Vahinger

Interface	HART (4...20 mA)	H
Operating area	Standard	1
	Ex i	2
	Ex d	3
Display	Normal	N
	Display	D

S	M 16 x 1,5	Cable connection
T	M 20 x 1,5	
N	1/2" NPT	
U	up	Head position
D	down	

## Type Code FFG-BT

Code	Basic type		
1	FFG-BT		
Code	Transmitter housing		
2	V Transmitter housing and guide tube stainless steel		
Code	Guide tube length	Measuring range	Diameter
...	L... Length in mm	M... Range in mm	... Tube OD
Code	Approvals		
...	Ex Ex-Design		

## Ordering Example

Code	Basic type	Transmitter housing	Guide tube length measuring range tube OD	Approval
1	FFG-BT	V	L950/M850/12	Ex



## Magnetic switch For bypass level indicators Model BGU

KSR data sheet BGU



### Applications

- Magnetic switches for detecting the limits of filling levels in bypass level indicators
- Chemical and petrochemical industries, oil and natural gas extraction (on- and offshore)
- Shipbuilding, machine building
- Power generating equipment, power plants
- Pharmaceutical, food, water treatment, environmental engineering industries

### Special features

- Proper functioning, even under extreme environmental influences, e.g. dirt, humidity, gases, dust, chips
- Compact and operationally safe design
- Mounting of the switches with tightening strap or via T-slot at the magnetic display
- Medium temperatures from -196 ... +380 °C
- Versions with reed contact, proximity switch, micro switch or rotation magnet



**Magnetic switch**  
Fig. left: Reed switch, model BGU  
Fig. right: High-temperature reed switch, model BGU-AHT

### Description

The model BGU magnetic switches serve to detect the limits of filling levels in bypass level indicators. They generate a binary signal which can be fed to down-stream signalling or control equipment. Bistable versions enable the storage of signals.

The magnetic switches are mounted directly to the bypass level indicator with a tightening strap or to the magnetic display with sliding blocks.

The magnetic switches are available with different approvals and with SIL 1.

For selecting the optimum switch (switch model, approval, switching option, cable length, cable material) we offer application-related technical advice.

## Model overview

Switch model	Description	Approval					Switching power			Proximity switch	Temperature range
		with-out	Ex i	Ex d	GL	Ex i + GL	AC 230 V, 60 VA, 1 A	AC 250 V, 100 VA, 2 A	AC 250 V, 5 A (micro switch)		
BGU	Reed, aluminium case, cable outlet	x	x	x	x	x	x				-50 ... +180 °C
BGU-A	Reed, aluminium connection housing, cable gland	x	x		x	x	x				-50 ... +180 °C
BGU-M12	Reed, aluminium case, connector M12	x	x				x				-40 ... +80 °C
BGU-V	Reed, stainless steel case, cable outlet	x	x	x			x				-50 ... +180 °C
BGU-AD	Reed, aluminium case ATX, cable entry	x		x			x				-40 ... +55 °C
BGU-AM	Micro switch, aluminium case ATX, cable entry	x		x					x		-40 ... +55 °C
BGU-AIH	Proximity switch, high alarm, aluminium case, cable gland	x								x	-40 ... +80 °C
BGU-AIL	Proximity switch, low alarm, aluminium case, cable gland	x								x	-40 ... +80 °C
BGU-AR	Rotational switch, aluminium case, cable gland	x						x			-60 ... +380 °C
BGU-AHT	Reed, high temperature, aluminium case, cable gland	x					x				-196 ... +380 °C
BGU-VHT	Reed, high temperature, stainless steel case, cable gland	x					x				-196 ... +380 °C

## Ex approvals

Explosion protection	Ignition protection type	Model	Zone	Approval number
ATEX	Ex i	BGU, BGU-A, BGU-M12, BGU-V	Zone 0, gas	LCIE 01 ATEX 6047 X / II 1 G Ex ia IIC T6-T3
	Ex d	BGU, BGU-V	Zone 1, gas	LCIE 01 ATEX 6047 X / II 2 G Ex d IIC T6-T3
	Ex d	BGU-AM, BGU-AD	Zone 1, gas/dust	LCIE 02 ATEX 6056 / II 2 G/D Ex d IIC T6-T5
	Ex i + GL	BGU, BGU-A	Zone 0, gas	LCIE 01 ATEX 6047 X / II 1 G Ex ia IIC T6-T3 + GL - 99 355 - 97 HH

## Type approval

Approval	Model	Approval number
GL	BGU, BGU-A	GL - 99 355 - 97 HH
GOST-R	all	0959333

Further approvals on request

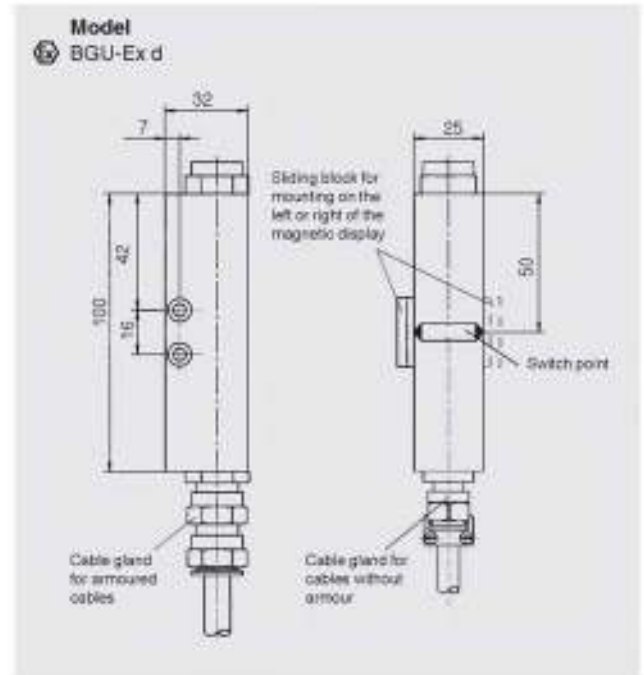
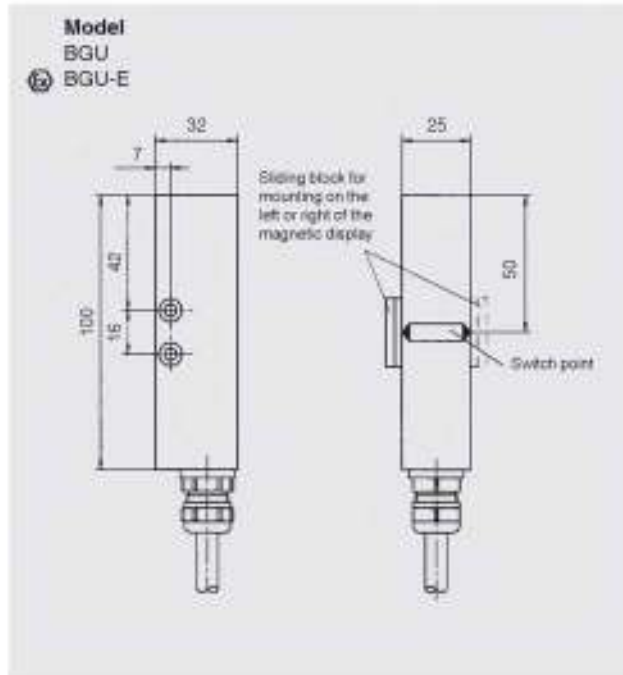
## Manufacturer's declaration

Switching insert	Model	Zone
Proximity switch	BGU-AIL, BGU-AIH	Zone 1

## Options

- Switching option (series resistance R22 for PLC, wiring in accordance with NAMUR per DIN EN 60497-5-6)
- Cable length (1, 2 or 3 m, others on request)
- Cable material (PVC cable, intrinsically safe PVC cable, silicone cable, armoured silicone cable, LMGSG cable for GL approval)

## Magnetic switch, reed, aluminium case, cable outlet, model BGU



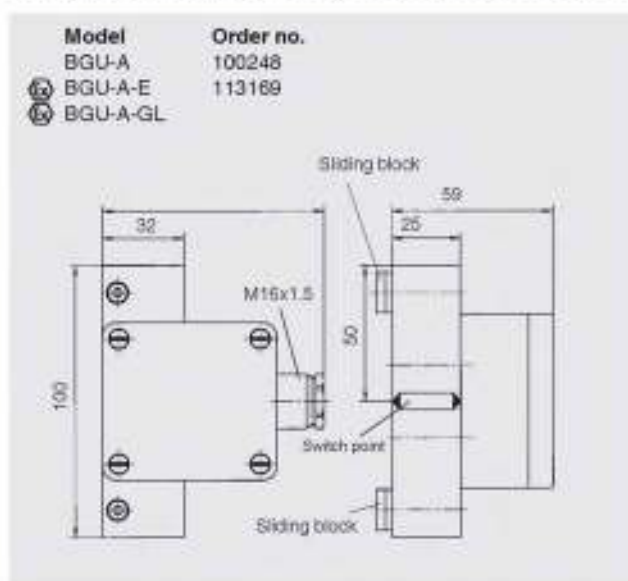
### Specifications

Contact	Reed contact
Contact type	1 change-over contact
Switch behaviour	Bistable
Switching power	
■ Model BGU	AC 230 V, 60 VA, 1 A DC 230 V, 30 W, 0.5 A
■ Model BGU-E	Only for connection to a certified intrinsically safe circuit with max. 100 mA and max. 30 V
Ambient temperature	-50 ... +180 °C
Max. ambient temperature	
■ Switch with connection cable from PVC	90 °C
■ Switch with connection cable from LMGSG	150 °C
■ Switch with connection cable from silicone	180 °C
■ Switch model BGU-E with connection cable from PVC, blue	T6 to 85 °C
Case	Aluminium
Ingress protection	IP 65
Approvals	Ex i

### Specifications

Contact	Reed contact
Contact type	1 change-over contact
Switch behaviour	Bistable
Switching power	AC 230 V, 60 VA, 1 A DC 230 V, 30 W, 0.5 A
Ambient temperature	-40 ... +150 °C
Max. ambient temperature	
■ Switch with connection cable from PVC, grey	T6 to 85 °C
■ Switch with connection cable from silicone or armoured silicone	T6 to 85 °C T5 to 100 °C T4 to 135 °C T3 to 150 °C
Case	Aluminium
Ingress protection	IP 68
Approvals	Ex d

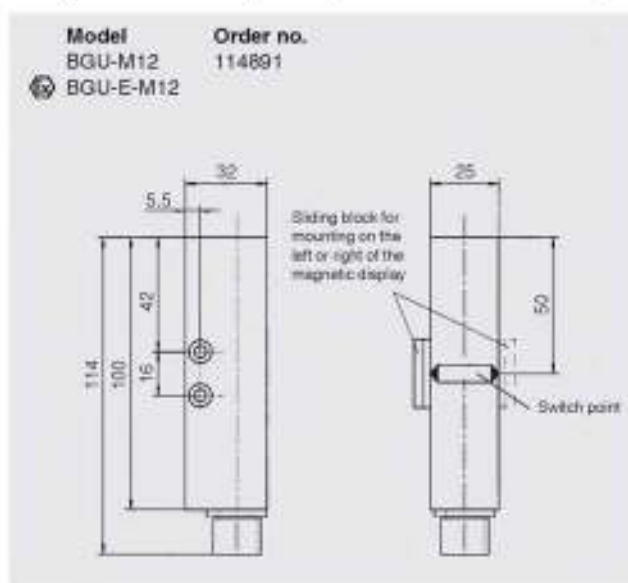
## Magnetic switch, reed, aluminium connection housing, cable gland, model BGU-A



### Specifications

Contact	Reed contact
Contact type	1 change-over contact
Switch behaviour	Bistable
Switching power	
■ Models BGU-A, BGU-A-GL	AC 230 V, 60 VA, 1 A DC 230 V, 30 W, 0.5 A
■ Model BGU-A-E	Only for connection to a certified intrinsically safe circuit with max. 100 mA and max. 30 V
Ambient temperature	-50 ... +180 °C
Max. ambient temperature	
■ Model BGU-A	180 °C
■ Model BGU-A-GL	150 °C
■ Model BGU-A-E	T6 to 85 °C T5 to 100 °C T4 to 135 °C T3 to 150 °C
Case	Aluminium, cable connection M16 x 1.5
Ingress protection	IP 65
Approvals	Ex i

## Magnetic switch, reed, aluminium case, connector M12, model BGU-M12



### Specifications

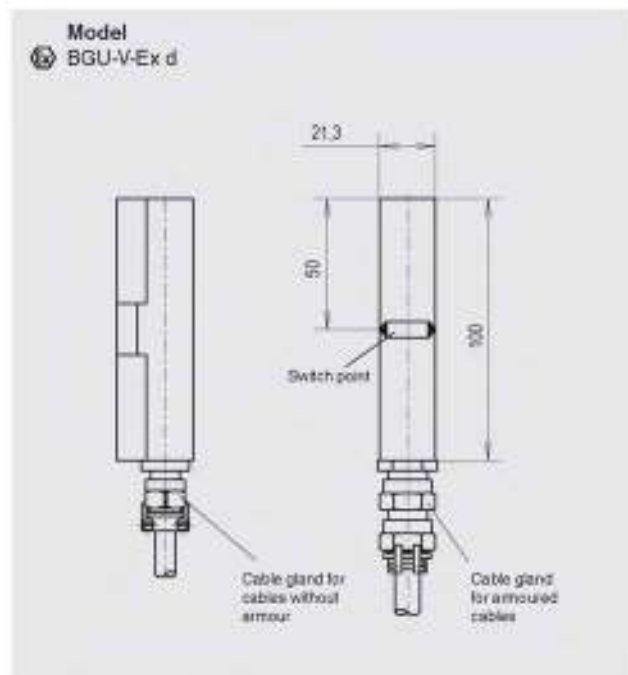
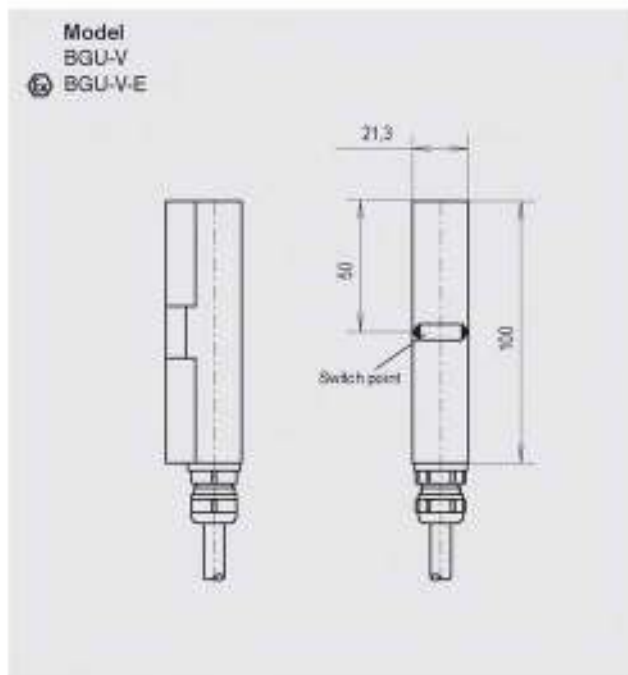
Contact	Reed contact
Contact type	1 change-over contact
Switch behaviour	Bistable
Switching power	
■ Model BGU-M12	AC 230 V, 60 VA, 1 A DC 230 V, 30 W, 0.5 A
■ Model BGU-E-M12	Only for connection to a certified intrinsically safe circuit with max. 100 mA and max. 30 V
Ambient temperature	-40 ... +80 °C
Max. ambient temperature	
■ Model BGU-M12	80 °C
■ Model BGU-E-M12	T6 to 80 °C
Case	Aluminium
Ingress protection	IP 67
Approvals	Ex i

**Model**  
BGU-M12, with mating connector and 2 m PVC cable

**Order no.**  
114448



## Magnetic switch, reed, stainless steel case, cable outlet, model BGU-V

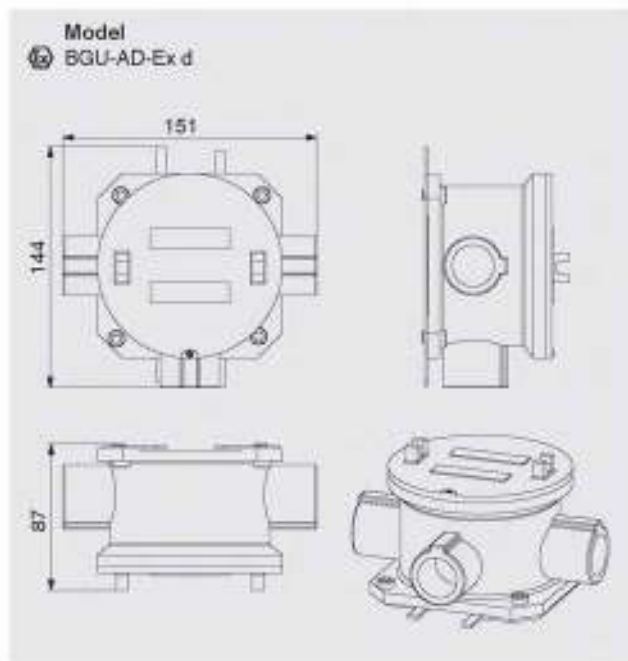


Specifications	
Contact	Reed contact
Contact type	1 change-over contact
Switch behaviour	Bistable
Switching power	
■ Model BGU-V	AC 230 V, 60 VA, 1 A DC 230 V, 30 W, 0.5 A
■ Model BGU-V-E	Only for connection to a certified intrinsically safe circuit with max. 100 mA and max. 30 V
Ambient temperature	-50 ... +180 °C
Max. ambient temperature	
■ Switch with connection cable from PVC	90 °C
■ Switch with connection cable from silicone	180 °C
■ Switch model BGU-V-E with connection cable from PVC, blue	T6 to 85 °C
Case	Stainless steel 1.4571 (316Ti)
Ingress protection	IP 65
Approvals	Ex i

Specifications	
Contact	Reed contact
Contact type	1 change-over contact
Switch behaviour	Bistable
Switching power	AC 230 V, 60 VA, 1 A DC 230 V, 30 W, 0.5 A
Ambient temperature	-50 ... +150 °C
Max. ambient temperature	
■ Switch with connection cable from PVC, grey	T6 to 85 °C
■ Switch with connection cable from silicone or armoured silicone	T6 to 85 °C T5 to 100 °C T4 to 135 °C T3 to 150 °C
Case	Stainless steel 1.4571 (316Ti)
Ingress protection	IP 68
Approvals	Ex d



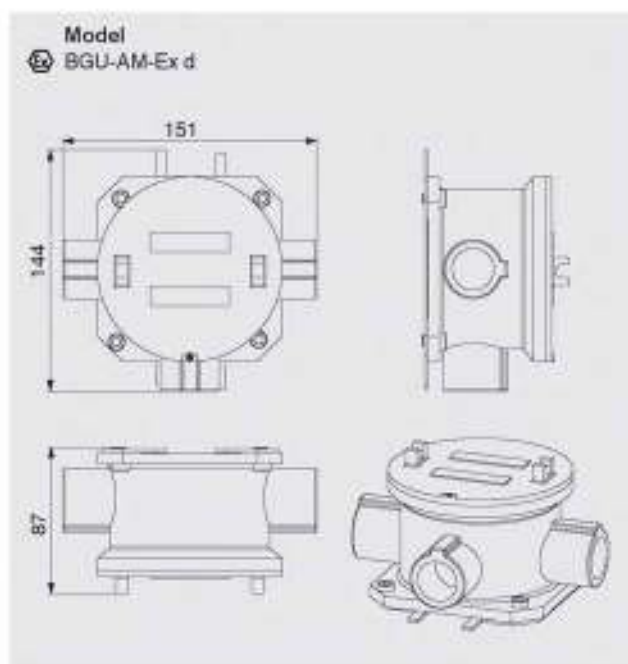
## Magnetic switch, reed, aluminium case ATX, cable entry, model BGU-AD



### Specifications

Contact	Reed contact
Contact type	1 change-over contact
Switch behaviour	Bistable
Switching power	AC 230 V, 60 VA, 1 A DC 230 V, 30 W, 0.5 A
Ambient temperature	-40 ... +55 °C
Max. ambient temperature	T6 to 40 °C T5 to 55 °C T4 to 95 °C
Case	Aluminium
Cable entries	1/2" NPT(F) with adapter 3/4" NPT(F) M20 x 1.5 with adapter
Ingress protection	IP 66
Approvals	Ex d

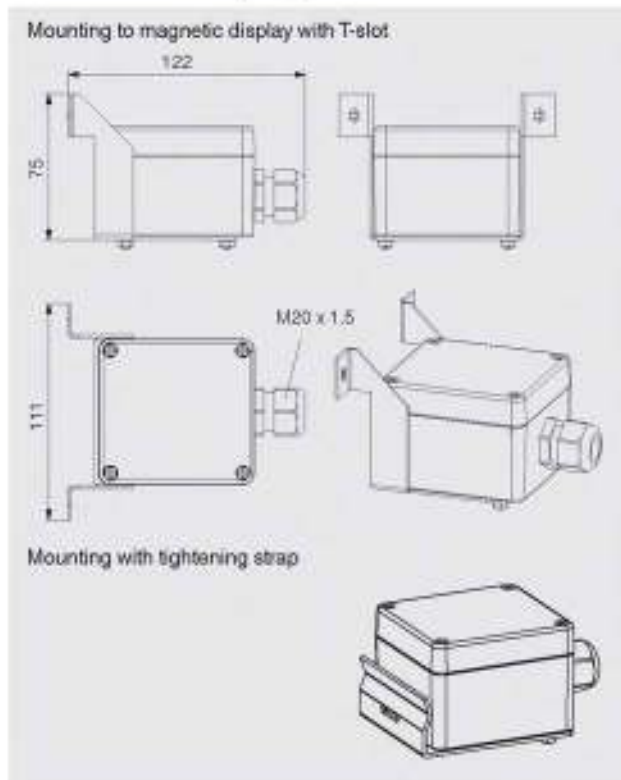
## Magnetic switch, micro switch, aluminium case ATX, cable entry, model BGU-AM



### Specifications

Contact	Micro switch
Contact type	1 change-over contact
Switch behaviour	Bistable
Switching power	AC 250 V, 5 A
Ambient temperature	-40 ... +55 °C
Max. ambient temperature	T6 to 40 °C T5 to 55 °C T4 to 95 °C
Case	Aluminium
Cable entries	1/2" NPT(F) with adapter 3/4" NPT(F) M20 x 1.5 with adapter
Ingress protection	IP 66
Approvals	Ex d

## Magnetic switch, proximity switch, aluminium case, cable gland, model BGU-AIH, high alarm and model BGU-AIL, low alarm



Model	Normally open with	Mounting	Order no.
BGU-AIH	rising level	T-slot	115162
BGU-AIL	falling level	T-slot	115163
BGU-AIH	rising level	Tightening strap	114687
BGU-AIL	falling level	Tightening strap	114688

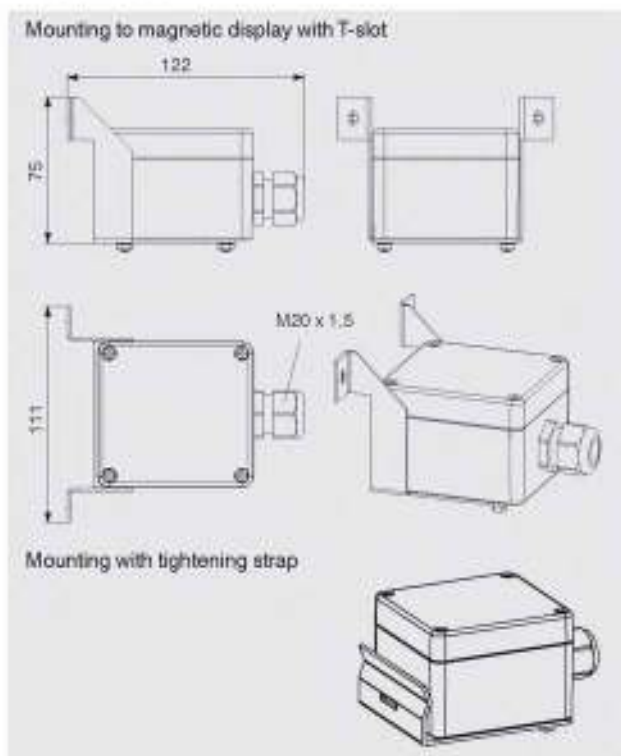
### Specifications

Contact	Inductive proximity sensor SJ 3.5-SN
Contact type	Code AIH: High alarm Code AIL: Low alarm
Switch behaviour	Bistable
Nominal voltage	DC 8 V ( $R_L -1$ k $\Omega$ )
Permissible residual ripple	< 5 %
Operating voltage $U_B$	5 ... 25 V
Current supply	active area free: > 3 mA active area covered: > 1 mA
Permissible resistance of control cable	< 100 $\Omega$
Self-inductance	160 $\mu$ H
Self-capacitance	20 nF
Ambient temperature	-40 ... +80 °C
Case	Aluminium, 80 x 75 x 57 mm Cable connection M20 x 1.5
Ingress protection	IP 65

### Accessories

Tightening strap	Standard: OD 50-70 mm Option: OD 30-45, 40-60, 60-80, 80-100 mm
------------------	--

## Magnetic switch, rotational switch, aluminium case, cable gland, model BGU-AR



Model	Mounting	Order no.
BGU-AR	T-slot	115636
BGU-AR	Tightening strap	115157
BGU-AR m	Tightening strap (with Microtherm®)	115158

### Specifications

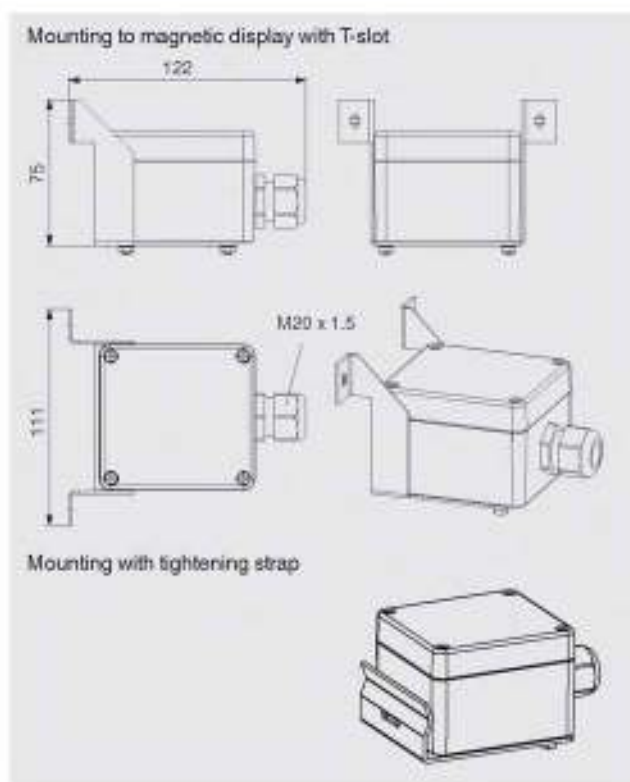
Contact	Rotary magnet with contact rocker switch
Contact type	1 change-over contact
Switch behaviour	Bistable
Switching power	AC 250 V, 100 VA, 2 A DC 200 V, 40 W, 2 A
Ambient temperature <sup>1)</sup>	-60 ... +250 °C -60 ... +380 °C with Microtherm®
Case	Aluminium, 80 x 75 x 57 mm Cable connection M20 x 1.5
Ingress protection	IP 65

<sup>1)</sup> With additional insulation the temperature ranges can change.

### Accessories

Tightening strap	Standard: OD 50-70 mm Option: OD 30-45, 40-60, 60-80, 80-100 mm
------------------	--

## Magnetic switch, reed, high temperature, aluminium case, cable gland, model BGU-AHT



Model	Mounting	Order no.
BGU-AHT	T-slot	115159
BGU-AHT	Tightening strap	110486

### Specifications

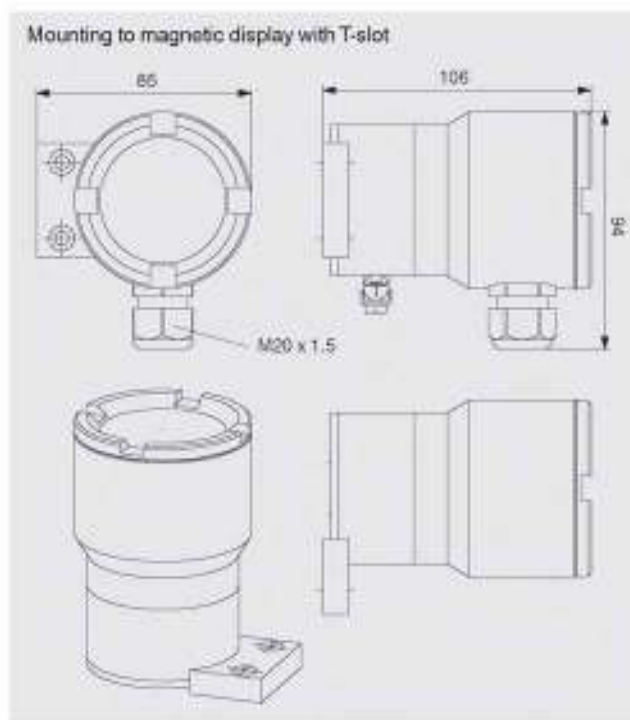
Contact	Reed contact
Contact type	1 change-over contact
Switch behaviour	Bistable
Switching power	AC 230 V, 60 VA, 1 A DC 230 V, 30 W, 0.5 A
Ambient temperature <sup>1)</sup>	-196 ... +380 °C
Case	Aluminium, 80 x 75 x 57 mm Cable connection M20 x 1.5
Ingress protection	IP 65

<sup>1)</sup> With additional insulation the temperature ranges can change

### Accessories

Mounting with tightening strap, including Mikroterm®

## Magnetic switch, reed, high temperature, stainless steel case, cable gland, model BGU-VHT



Model	Mounting	Order no.
BGU-VHT	Pipe Ø 42,3 mm	115038
BGU-VHT	Pipe Ø 60,3 mm	111342

### Specifications

Contact	Reed contact
Contact type	1 change-over contact
Switch behaviour	Bistable
Switching power	AC 230 V, 60 VA, 1 A DC 230 V, 30 W, 0.5 A
Ambient temperature <sup>1)</sup>	-196 ... +380 °C
Case	Stainless steel
Ingress protection	IP 67

<sup>1)</sup> With additional insulation the temperature ranges can change

## Electrical connections

### Reed contact, micro switch, rotation magnet

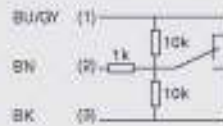
1 switch point



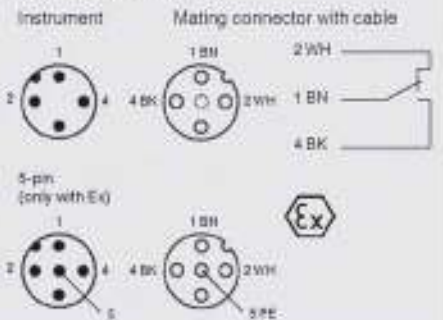
1 switch point  
Wiring for operation  
with a PLC



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

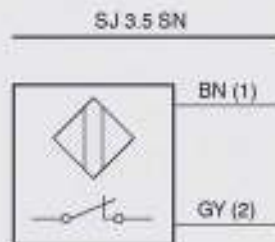


### Connector M12, pin assignment (for model BGU-M12)



### Proximity switch

(for models BGU-AIH  
and BGU-AIL)



### Connection cable

(for models BGU and BGU-V)

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

### 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

## CE conformity

### Electromagnetic compatibility (EMC)

2004/108/EC

### ATEX directive (option)

94/9/EC, ignition protection type Ex i, zone 0, gas

94/9/EC, ignition protection type Ex d, zone 1, gas, dust

## Approvals

- **GL**, ships, shipbuilding, offshore, Germany
- **GOST**, national standard for Russia, Kazakhstan and Belarus



## Contact protection measures

The reed contacts should be protected against any voltage or current spikes that might occur.

Depending on the different load types different protective circuits are used.



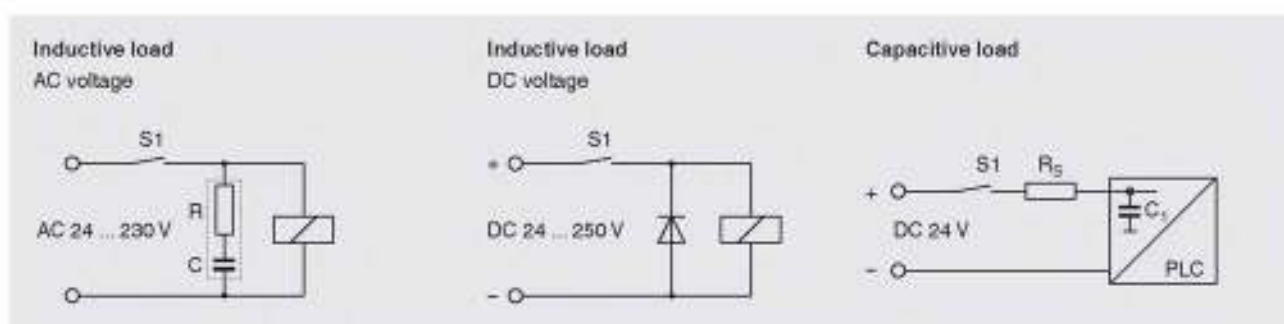
Model KR 24



RC module

Contact protection relays	Contacts	Input	Power supply	Approval marking	Order no.
KR 24	1 x change-over AC 250 V, 2 A	2 x contacts	DC 20 ... 30 V		112941
KR 24-EX	2 x change-over AC 253 V, 2 A	2 x contacts	DC 20 ... 30 V	PTB 02 ATEX 2072 / II(1) GD [EEx ia] IIC	112944
KR 230	1 x change-over AC 250 V, 2 A	2 x contacts	AC 230 V		112942
KR 230-EX	2 x change-over AC 253 V, 2 A	2 x contacts	AC 230 V	II 1 GD EEx ia IIC, PTB 02 ATEX 2073 / II(1) GD [EEx ia] IIC	112943

RC module	Capacity	Resistance	Voltage	Order no.
B3/115	0.33 $\mu$ F	470 $\Omega$	AC 115 V	110446
B3/230	0.33 $\mu$ F	1000 $\Omega$	AC 230 V	110460



### Ordering information

To order the described product the order number (if available) is sufficient.

Alternatively:

Model / Approval / Switching option / Cable length / Cable material



# Appendix

## Cross Reference BGU

Replaced Type	Type
STMI-H (KSR design)	BGU-AIH
STMI-L (KSR design)	BGU-AIL
STMU (KSR design)	BGU-AHT
STMU-V (KSR design)	BGU-VHT
MDA (KSR design)	BGU-AD
MSDA (KSR design)	BGU-AM
BGU-5716 (KSR design)	BGU-M12
740.0062 (Phoenix design)	No replacement
740.0064 (Phoenix design)	Successor: BGU-AR
740.0065 (Phoenix design)	Successor: BGU-A
740.0200 (Phoenix design)	Successor: BGU-AI
75/90 (Vaihinger design)	Successor: BGU-AR
75/51 (Vaihinger design)	Successor: BGU-AI

## Type Code

### Code

1	Basic type
BGU	Reed, aluminium housing, cable outlet
BGU-A	Reed, aluminium connection housing, cable gland
BGU-M12	Reed, aluminium housing, connector M12
BGU-V	Reed, stainless steel housing, cable outlet
BGU-AD	Reed, aluminium housing ATX, cable entry, 230VAC, 60VA, 1A
BGU-AM	Micro switch, aluminium housing ATX, cable entry, 250 VAC, 5A
BGU-AIH	Proximity switch high alarm, aluminium housing, cable gland
BGU-AIL	Proximity switch low alarm, aluminium housing, cable gland
BGU-AHT	Reed, high temperature, aluminium housing, cable gland, 230VAC, 60VA, 1A
BGU-VHT	Reed, high temperature, stainless steel housing, cable gland, 230VAC, 60VA, 1A
BGU-AR	Rotational switch, aluminium housing, cable gland, 250VAC, 100VA, 2A
2	Approval
E	Ex i
Ex d	Ex d
GL	Germanischer Lloyd
3	Contact Option
R22	With 22 Ohm resistor as protection for PLC use
N	With circuit acc. to NAMUR EN 60947-5-6
4	Cable length
1	1m
2	2m
3	3m
...	...
5	Cable material
PVC	Cable PVC
SIL	Cable silicone
SILA	Cable silicone armoured
LMGSG	Cable LMGSG for GL approval

## Ordering example

	Basic type	Approval	Contact option	Cable length	Cable material
Code	1	2	3	4	5
	BGU-V	E	/R22	1	SIL

## Magnetic float switch For vertical installation Model FLS

KSR data sheet FLS



for further approvals  
see page 3

### 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
- Process water and drinking water treatment, food and beverage industry

### Special features

- Large range of application due to the simple, proven functional principle
- For harsh operating conditions, long service life
- Operating limits:
  - Operating temperature:  $T = -196 \dots +350 \text{ }^{\circ}\text{C}$
  - 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
- Explosion-protected versions

### 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 potential-free. Magnetic float switches are also available with multiple switch points.



Fig. left: Stainless steel version, mounting thread  
Fig. right: Plastic version, flange connection

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

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 EEx 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)

## Model overview

Float switch model	Description	Approval							
		without	Ex i	Ex d	GL	Ex i + GL	ABS	DNV	3-A
FLS-S	Magnetic float switch, standard version	x	x	x	x	x	x	x	
FLS-SX	Magnetic float switch, angled version, adjustable version, coated version								
FLS-M	Magnetic float switch, 8 mm guide tube	x	x						
FLS-P	Magnetic float switch, plastic version	x							
FLS-H	Magnetic float switch, pharmaceutical and food version	x							
	Magnetic float switch, 3-A hygienic version								x

Float switch model	Materials									Temperature range
	Stainless steel 1.4571 (316Ti)	Stainless steel 1.4404 (316L)	Titanium 3.7035 (grade 2)	Stainless steel 1.4435 (316L)	Stainless steel 1.4571 (316Ti) / PP	Stainless steel 1.4571 (316Ti) / PA	Stainless steel 1.4571 (316Ti) / brass	PVC, PP, PVDF	Stainless steel 1.4571 (316Ti) / Buna (NBR)	
FLS-S	x	x	x	x	x	x	x		x	-50 ... +350 °C
FLS-SX	x	x								-10 ... +100 °C
FLS-M	x	x			x		x		x	-10 ... +100 °C
FLS-P								x	x	-10 ... +100 °C
FLS-H		x		x						-20 ... +200 °C

## Ex approvals

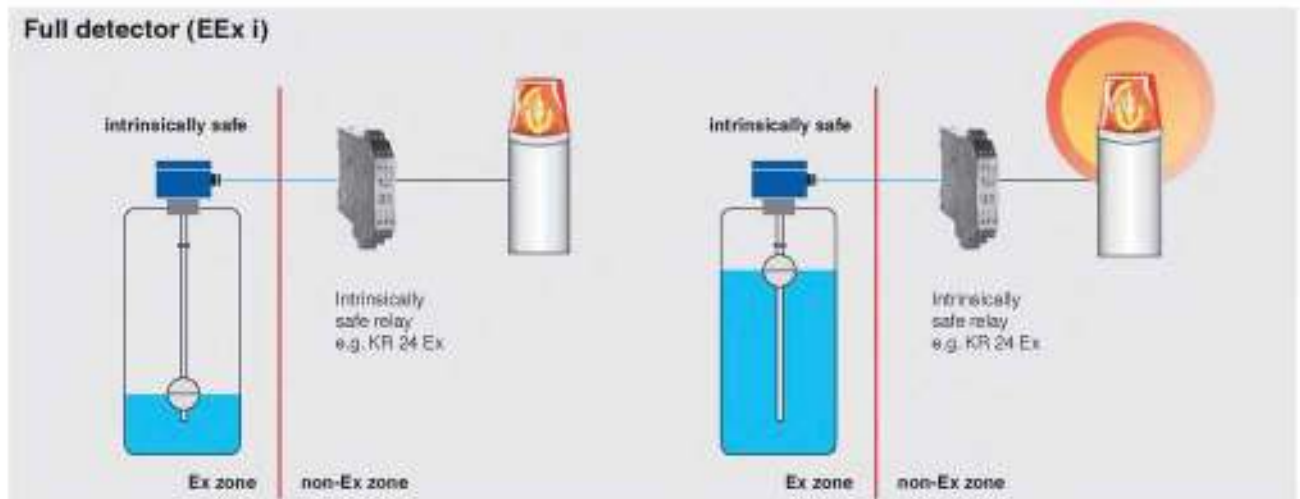
Explosion protection	Ignition protection type	Model	Zone	Approval number
ATEX	Ex i	FLS-S	Zone 0, gas	KEMA 01 ATEX1053 X II 1/2G Ex ia IIC T3 ... T6
	Ex i	FLS-M	Zone 0, gas	KEMA 01 ATEX1053 X II 1/2G Ex ia IIC T3 ... T6
	Ex d	FLS-S	Zone 1, gas/dust	TÜV 13 ATEX 7399 X II 2G Ex d IIC T6 Gb / II 2 D Ex tb III C T80 °C Db
	Ex d	FLS-S	Zone 1, gas/dust	IECEX TUR 09.0002X -40 °C ≤ ta ≤ +55 °C Ex d IIC T6 Ex tD A21 IP 65 T80 °C
	Ex i + GL	FLS-S	Zone 0, gas	KEMA 01 ATEX1053 X II 1/2G Ex ia IIC T3 ... T6 + GL - 96 716 - 95 HH

## Type approval

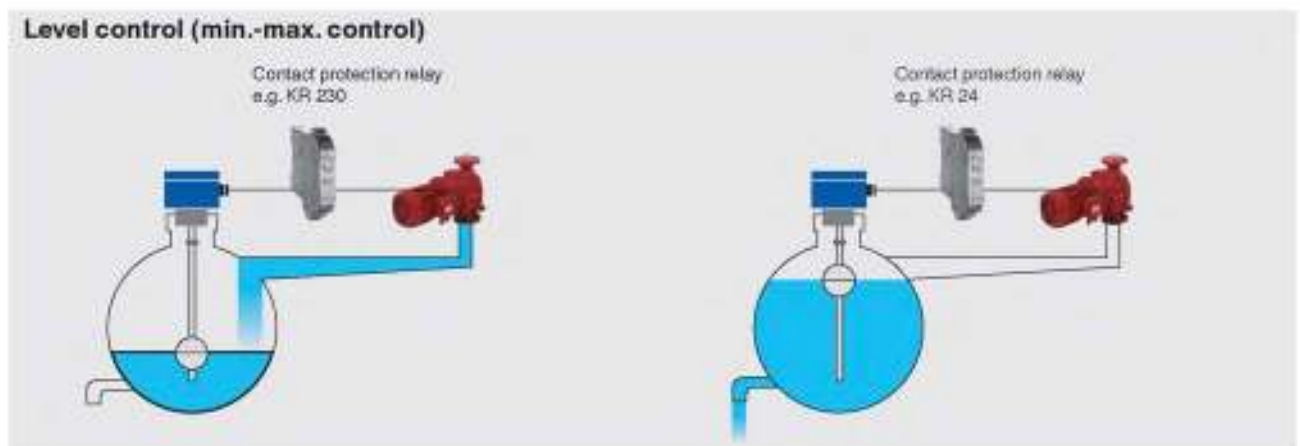
Explosion protection	Model	Approval number
GL	FLS-S	GL - 96 716 - 95 HH
ABS	FLS-S	ABS-02-HG286246-2-PDA
DNV	FLS-S	DNV - A-11453
GOST	FLS-S, FLS-P; FLS-H	959333
3-A	FLS-H	3-A Sanitary Standards, 1698

## Application examples

### Full detector (EEx i)



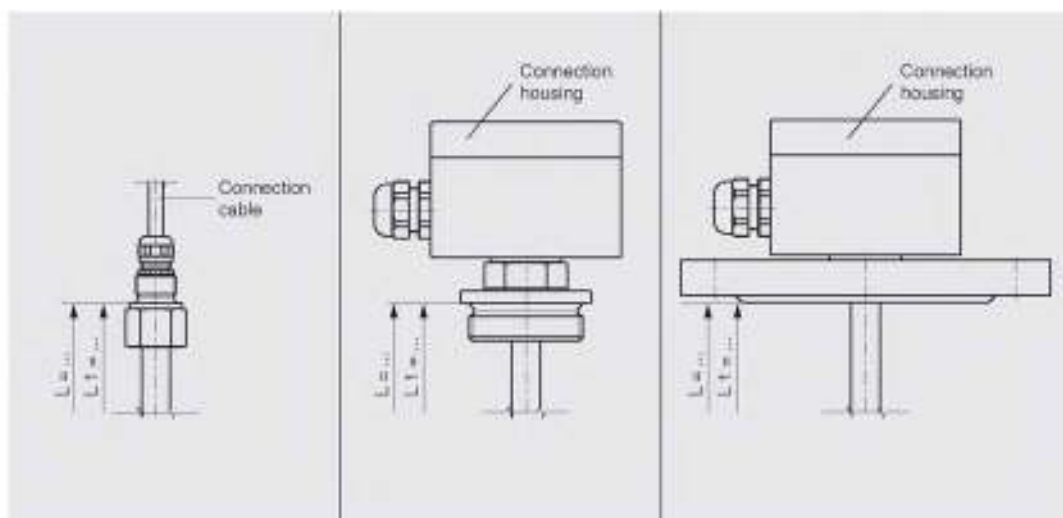
### Level control (min.-max. control)





## Magnetic float switch, standard version, model FLS-S

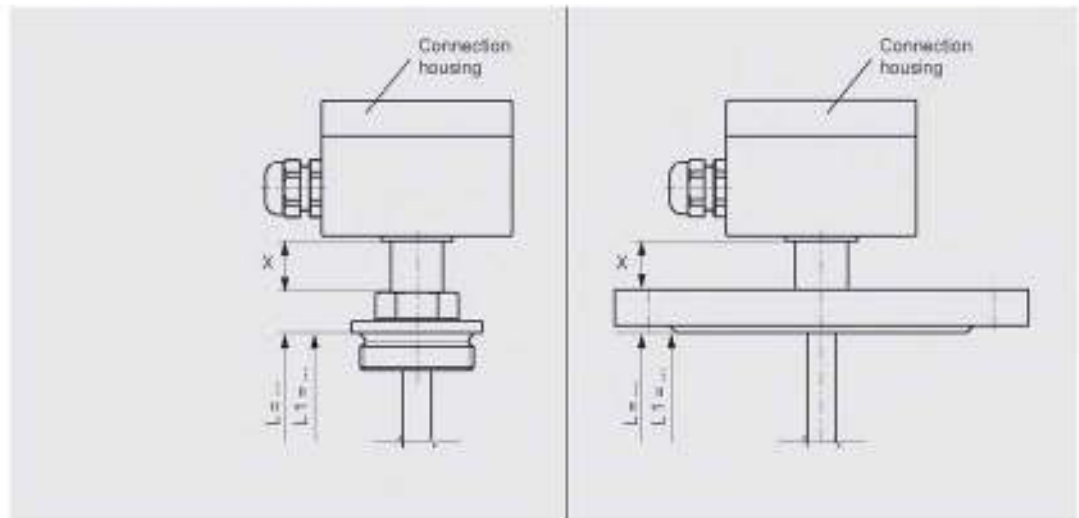
Process connection, guide tube material and float from stainless steel 1.4571 (316Ti)



	Mounting thread (without connection housing)		Mounting thread		Flange	
Electrical connection	Connection cable ■ PVC ■ Silicone ■ PUR		Connection housing ■ Aluminium 64 x 58 x 34 mm, with 1 contact ■ Aluminium 80 x 75 x 57 mm, 2 or more contacts Option: Polypropylene, polyester, stainless steel			
Process connection	Mounting thread upwards G 3/8" (others on request)		Mounting thread downwards G 1 1/2" or G 2"		Mounting flange ■ DIN DN 50 ... DN 200, PN 6 ... PN 100 ■ ANSI 2" ... 8", class 150 ... 600	
Guide tube diameter	12 or 14 mm	16 mm	12 or 14 mm	16 mm	12 or 14 mm	16 mm
Guide tube length L max.	3,000 mm	6,000 mm	3,000 mm	6,000 mm	3,000 mm	6,000 mm
Float	Material stainless steel 1.4571 (Option: Buna (NBR), titanium) Float diameter from 44 ... 120 mm Float selection depending on guide tube diameter and process conditions (see page 20 and 21)					
Temperature range standard	PVC cable -10 ... +80 °C Silicone cable -30 ... +130 °C		-30 ... +150 °C Option: ■ High-temperature version: +150 ... +300 °C Option: ■ Low-temperature version: -196 ... -30 °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		6 x NO or NC, or 4 x SPDT			
Switch position	Dimensions L <sub>1</sub> , L <sub>2</sub> , L <sub>3</sub> ... (from sealing face, starting from top)					
Distance between switch points	Minimum 20 mm (depending on the selection of the float and the contacts, see page 20 and 21)					
Switching power	Normally open AC 230 V; 100 VA; 1 A Normally closed AC 230 V; 100 VA; 1 A Change-over AC 230 V; 40 VA; 1 A		DC 230 V; 50 W; 0.5 A DC 230 V; 50 W; 0.5 A DC 230 V; 20 W; 0.5 A		<b>Please observe contact protection measures (see page 23)!</b>	
	<b>Attention:</b> 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	IP 65 per EN 60529 / IEC 60529					
Materials	Stainless steel 1.4404, 1.4435, 1.4535, titanium, Hastelloy and others on request					

## Magnetic float switch, explosion-protected version Ex i, intrinsically safe, model FLS-S

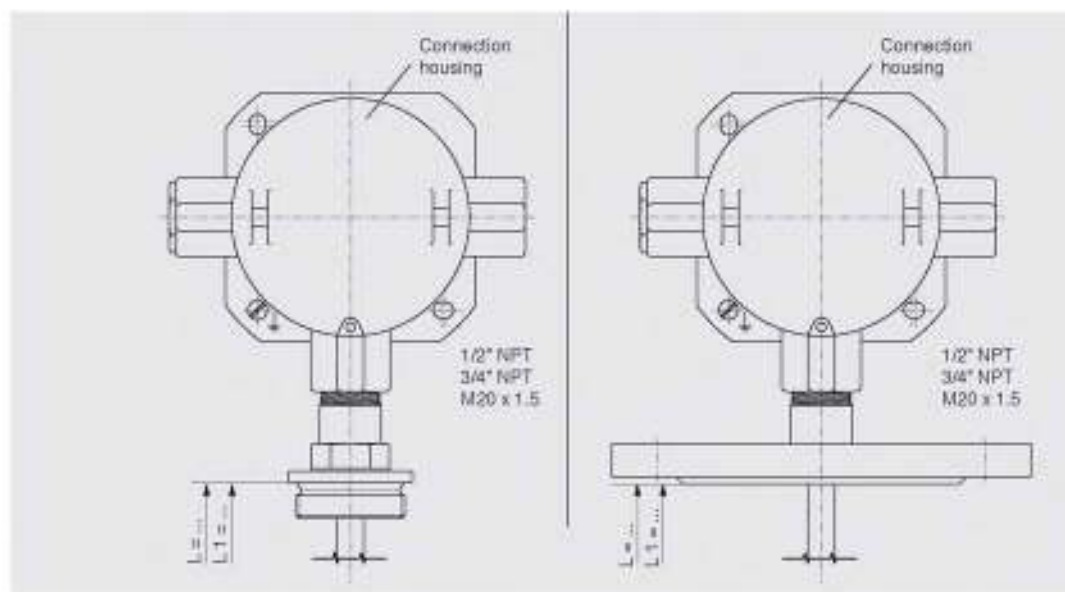
Process connection, guide tube material and float from stainless steel 1.4571 (316Ti)



	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" or G 2" (others on request)				Mounting flange ■ DIN DN 50 ... DN 150, PN 6 ... PN 64 ■ ANSI 2" ... 8", class 150 ... 600	
Guide tube diameter	12 or 14 mm	18 mm				12 or 14 mm   18 mm
Guide tube length L max.	3,000 mm	6,000 mm				3,000 mm   6,000 mm
Float	Material stainless steel 1.4571 (Option: Buna (NBR), titanium) Float diameter from 44 ... 120 mm Float selection depending on guide tube diameter and process conditions (see page 20 and 21)					
Temperature class		T3	T4	T5	T6	
Process temperature	Max.	180 °C	130 °C	95 °C	80 °C	
Ambient temperature at connection housing	Max.	60 °C	60 °C	60 °C	60 °C	
Switching function	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 <sub>1</sub> , L <sub>2</sub> , L <sub>3</sub> ... (from sealing face, starting from top)					
Distance between switch points	Minimum 20 mm (depending on the selection of the float and the contacts, see page 20 and 21)					
Switching power	Only for connection to a certified intrinsically safe circuit with U <sub>max</sub> 36 V, I <sub>max</sub> 100 mA					
Mounting position	Vertical ±30°					
Ingress protection	IP 65 per EN 60529 / IEC 60529					
Options	<ul style="list-style-type: none"> <li>■ Housing heightening X (state dimension X)</li> <li>■ Temperature resistance Pt100 or Pt1000</li> <li>■ Bimetal thermal contact 40 ... 120 °C (in 5 degree steps)</li> </ul>					
Materials	Stainless steel 1.4435, titanium, Hastelloy on request					

## Magnetic float switch, explosion-protected version Ex d, flameproof enclosure, model FLS-S

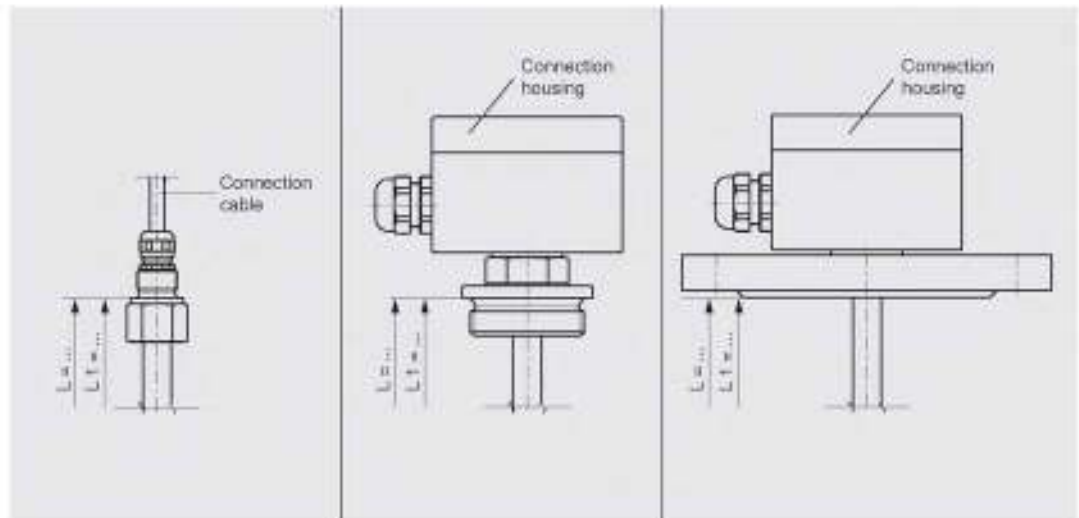
Process connection, guide tube and float from stainless steel 1.4571 (316Ti) or 1.4404 (316L)



Mounting thread		Flange	
Electrical connection	Connection housing ■ Aluminium Option: Stainless steel		
Process connection	Mounting thread downwards G 1 1/2" or G 2" (others on request)		Mounting flange ■ DIN DN 50 ... DN 200, PN 6 ... PN 100 ■ ANSI 2" ... 8", class 150 ... 600
Guide tube diameter	12 or 14 mm	18 mm	12 or 14 mm
Guide tube length L max.	3,000 mm	6,000 mm	3,000 mm
Float	Material stainless steel 1.4571 Float diameter from 44 ... 120 mm Float selection depending on guide tube diameter and process conditions (see page 20 and 21)		
Temperature class	T4	T5	T6
Process temperature	Max. 120 °C	95 °C	80 °C
Switching function	Change-over SPDT - on rising level		
max. number of contacts	4 x SPDT		
Switch position	Dimensions L <sub>1</sub> , L <sub>2</sub> , L <sub>3</sub> ... (from sealing face, starting from top)		
Distance between switch points	Minimum 20 mm (depending on the selection of the float and the contacts, see page 20 and 21)		
Switching power	Change-over	AC 230 V; 40 VA; 1 A DC 230 V; 20 W; 0.5 A	<b>Please observe contact protection measures (see page 23)!</b>
Mounting position	Vertical ±30°		
Ingress protection	IP 65 per EN 60529 / IEC 60529		
Options	■ Temperature resistance Pt100 or Pt1000 ■ Bimetal thermal contact 40 ... 120 °C (in 5 degree steps)		
Materials	Stainless steel 1.4404 and others on request		

## Magnetic float switch, stainless steel and Buna, model FLS-S

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

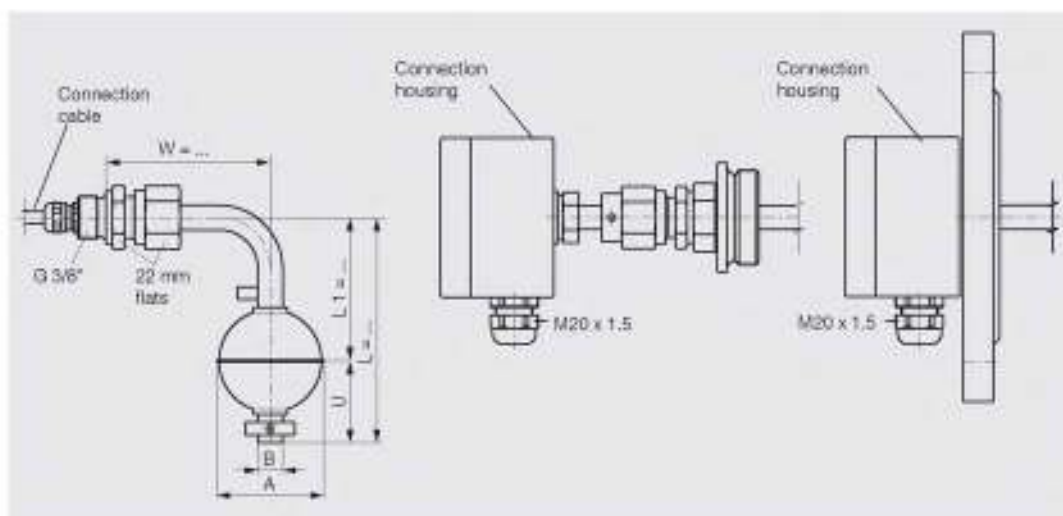


	Mounting thread (without connection housing)	Mounting thread	Flange
Electrical connection	Connection cable ■ PVC ■ Silicone ■ PUR	Connection housing: ■ Aluminium 64 x 58 x 34 mm, with 1 contact ■ Aluminium 80 x 75 x 57 mm, 2 or more contacts Option: Polypropylene, polyester, stainless steel	
Process connection	Mounting thread upwards G 3/8" (others on request)	Mounting thread downwards G 1", G 1 1/2" or G 2"	Mounting flange: ■ DIN DN 50 ... DN 200, PN 6 ... PN 40 ■ ANSI 1 1/2" ... 8", class 150 ... 300
Guide tube diameter	12 mm		
Guide tube length L max.	3,000 mm		
Float	Material Buna (NBR) Float diameter from 44 ... 120 mm Float selection depending on guide tube diameter and process conditions (see page 20 and 21)		
Temperature range standard	-10 ... +80 °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	5 x NO or NC, or 4 x SPDT	
Switch position	Dimensions L <sub>1</sub> , L <sub>2</sub> , L <sub>3</sub> ... (from sealing face, starting from top)		
Distance between switch points	Minimum 20 mm (depending on the selection of the float and the contacts, see page 20 and 21)		
Switching power	Normally open AC 230 V; 50 VA; 1 A Normally closed AC 230 V; 50 VA; 1 A Change-over AC 230 V; 50 VA; 1 A Protective conductor connection on request	DC 230 V; 50 W; 0.5 A DC 230 V; 50 W; 0.5 A DC 230 V; 20 W; 0.5 A	<b>Please observe contact protection measures (see page 23)!</b>
	<b>Attention:</b> 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	IP 65 per EN 60529 / IEC 60529		
Materials	Stainless steel 1.4571, 1.4404, Buna (NBR) and others on request		



## Magnetic float switch, angled version, model FLS-SX

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

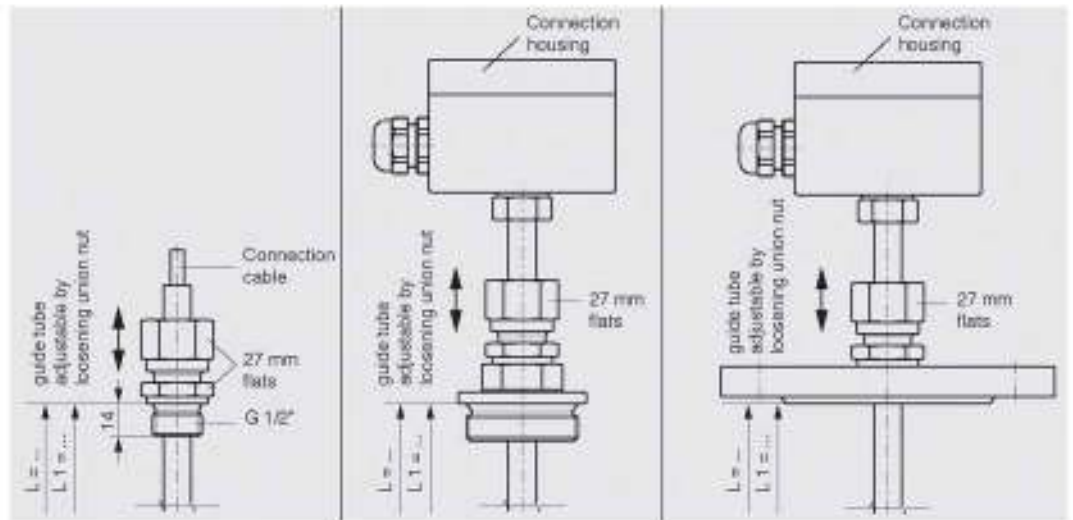


	Mounting thread (without connection housing)	Mounting thread	Flange
Electrical connection	Connection cable ■ PVC ■ Silicone ■ PUR	Connection housing ■ Aluminium 64 x 58 x 34 mm, with 1 contact ■ Aluminium 80 x 75 x 57 mm, 2 or more contacts Option: Polypropylene, polyester, stainless steel	
Process connection	Mounting thread lateral G 3/8" (others on request)	Mounting thread lateral G 1 1/2" or G 2"	Mounting flange ■ DIN DN 50 ... DN 200, PN 6 ... PN 40 ■ ANSI 1 1/2" ... 8", class 150 ... 300
Guide tube diameter	12 mm		
Guide tube length L max.	3,000 mm		
Float	Material stainless steel 1.4571 Float diameter from 44 ... 120 mm Float selection depending on guide tube diameter and process conditions (see page 20 and 21)		
Temperature range standard	PVC/PUR cable -10 ... +80 °C Silicone cable -30 ... +150 °C	-30 ... +150 °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	6 x NO or NC, or 4 x SPDT	
Switch position	Dimensions L <sub>1</sub> , L <sub>2</sub> , L <sub>3</sub> ... (from sealing face, starting from top)		
Distance between switch points	Minimum 20 mm (depending on the selection of the float and the contacts, see page 20 and 21)		
Switching power	Normally open AC 230 V; 100 VA; 1 A Normally closed AC 230 V; 100 VA; 1 A Change-over AC 230 V; 40 VA; 1 A Protective conductor connection on request	DC 230 V; 50 W; 0.5 A DC 230 V; 50 W; 0.5 A DC 230 V; 20 W; 0.5 A	<b>Please observe contact protection measures (see page 23)</b>
	<b>Attention:</b> 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	IP 65 per EN 60529 / IEC 60529		
Materials	Stainless steel 1.4571, 1.4404 and others on request		



## Magnetic float switch, version with adjustable guide tube, model FLS-SX

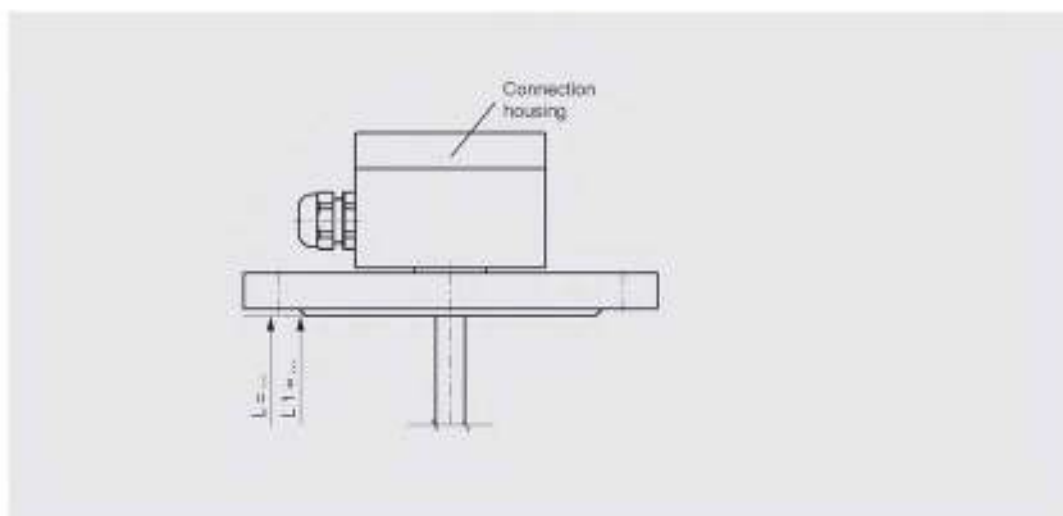
Process connection, guide tube and float from stainless steel 1.4571 (316Ti)



	Mounting thread (without connection housing)	Mounting thread	Flange
Electrical connection	Connection cable ■ PVC ■ Silicone ■ PUR	Connection housing: ■ Aluminium 64 x 58 x 34 mm, with 1 contact ■ Aluminium 80 x 75 x 57 mm, 2 or more contacts Option: Polypropylene, polyester, stainless steel	
Process connection	Mounting thread downwards G 1/2" (others on request)	Mounting thread downwards G 1 1/2" or G 2" (others on request)	Mounting flange ■ DIN DN 50 ... DN 200, PN 6 ... PN 100 ■ ANSI 2" ... 8", class 150 ... 600
Guide tube diameter	12 mm		
Guide tube length L max.	3,000 mm		
Float	Material stainless steel 1.4571 (Option: Buna (NBR), titanium) Float diameter from 44 ... 83 mm Float selection depending on guide tube diameter and process conditions (see page 20 and 21)		
Nominal pressure	5 bar		
Temperature range standard	PVC / PUR cable -10 ... +80 °C Silicone cable -30 ... +180 °C	-30 ... +150 °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	5 x NO or NC, or 4 x SPDT	
Switch position	Dimensions L <sub>1</sub> , L <sub>2</sub> , L <sub>3</sub> ... (from sealing face, starting from top)		
Distance between switch points	Minimum 20 mm (depending on the selection of the float and the contacts, see page 20 and 21)		
Switching power	Normally open AC 230 V; < 50 VA; 1 A Normally closed AC 230 V; < 50 VA; 1 A Change-over AC 230 V; < 50 VA; 1 A Protective conductor connection on request	DC 230 V; 50 W; 0.5 A DC 230 V; 50 W; 0.5 A DC 230 V; 20 W; 0.5 A	<b>Please observe contact protection measures (see page 23)!</b>
	<b>Attention:</b> 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	IP 54 per EN 60529 / IEC 60529	IP 65 per EN 60529 / IEC 60529	
Materials	Stainless steel 1.4435, 1.4539, titanium, Hastelloy and others on request		

## Magnetic float switch, flange, E-CTFE coated, model FLS-SX

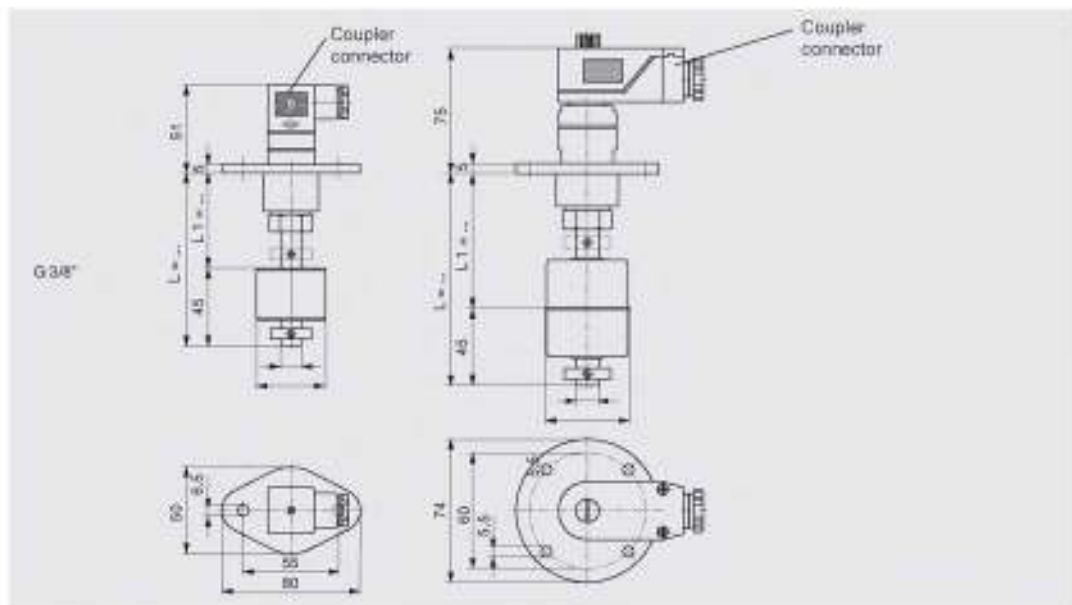
Process connection, guide tube and float from stainless steel 1.4571 (316Ti), E-CTFE coated



	Flange (Guide tube diameter 12 mm)	Flange (Guide tube diameter 18 mm)
Electrical connection	Connection housing ■ Aluminium 64 x 58 x 34 mm, with 1 contact ■ Aluminium 80 x 75 x 57 mm, 2 or more contacts Option: Polypropylene, polyester, stainless steel	
Process connection	Mounting flange ■ DIN DN 50 ... DN 200, PN 6 ... PN 40 ■ ANSI 2" ... 8", class 150 ... 300	
Guide tube diameter	12 mm	18 mm
Guide tube length L max.	2,000 mm	4,000 mm
Float	Material stainless steel 1.4571 (E-CTFE coated) Float diameter from 45 ... 121 mm Float selection depending on guide tube diameter and process conditions (see page 10)	
Temperature range	Depending on medium	
Switching function	Alternatively normally open (NO), normally closed (NC) or change-over (SPDT) contact - on rising level	
max. number of contacts	3 x NO or NC, or 2 x SPDT	
Switch position	Dimensions L <sub>1</sub> , L <sub>2</sub> , L <sub>3</sub> ... (from sealing face, starting from top)	
Distance between switch points	Minimum 20 mm (depending on the selection of the float and the contacts, see page 10)	
Switching power	Normally open AC 230 V; 100 VA; 1 A DC 230 V; 50 W; 0.5 A 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	
	<b>Attention:</b> 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	IP 65 per EN 60529 / IEC 60529	
Materials	Stainless steel 1.4571, E-CTFE coated, option anti-static	

## Magnetic float switch, special flange, model FLS-SX

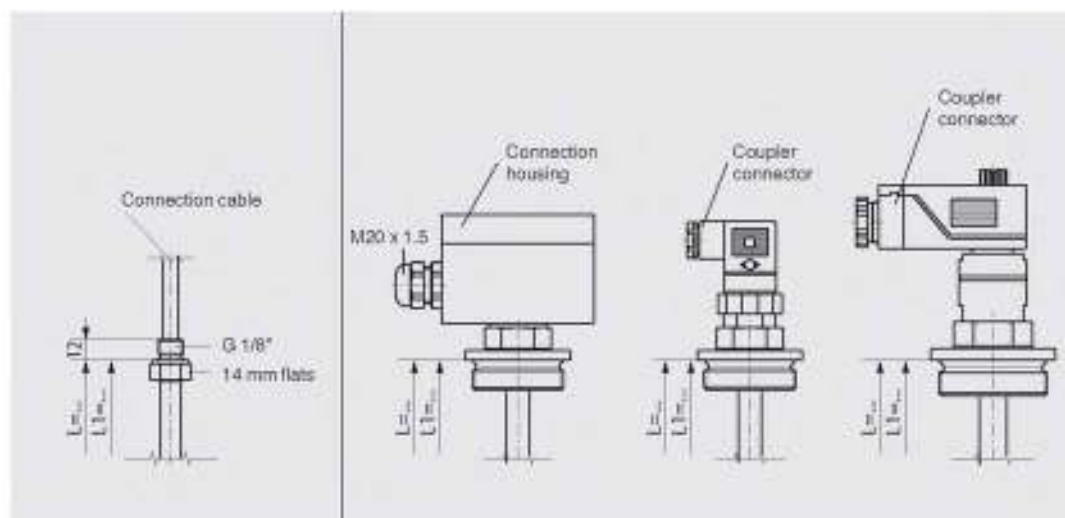
Process connection from polyamide or brass, guide tube from stainless steel 1.4571 (316Ti), float from Buna or stainless steel 1.4571 (316Ti)



	Polyamide flange	Brass flange
Electrical connection	Connector C164-232-F-4P	Connector C164-332-F-5P Connector C164-4337-F-7P
Process connection	Polyamide flange	Brass flange
Guide tube diameter	12 mm	
Guide tube length L max.	3,000 mm	
Float	Material Buna (NBR) or stainless steel 1.4571 Float diameter from 44 ... 120 mm Float selection depending on guide tube diameter and process conditions (see page 20 and 21)	
Temperature range standard	-10 ... +80 °C	
Switching function	Alternatively normally open (NO); normally closed (NC) or change-over (SPDT) contact - on rising level	
max. number of contacts	2 x NO or NC, or 4 x SPDT Silicone cable 5 x NO or NC, or 3 x SPDT	6 x NO or NC, or 4 x SPDT
Switch position	Dimensions L <sub>1</sub> , L <sub>2</sub> , L <sub>3</sub> ... (from sealing face, starting from top)	
Distance between switch points	Minimum 20 mm (depending on the selection of the float and the contacts, see page 20 and 21)	
Switching power	Normally open AC 230 V; 100 VA; 1 A DC 230 V; 50 W; 0.5 A 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 Protective conductor connection on request <b>Please observe contact protection measures (see page 23)!</b>	
	<b>Attention:</b> 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	IP 65 per EN 60529 / IEC 60529	
Materials	Stainless steel 1.4571, 1.4404 and others on request	

## Magnetic float switch, 8 mm guide tube, model FLS-M

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

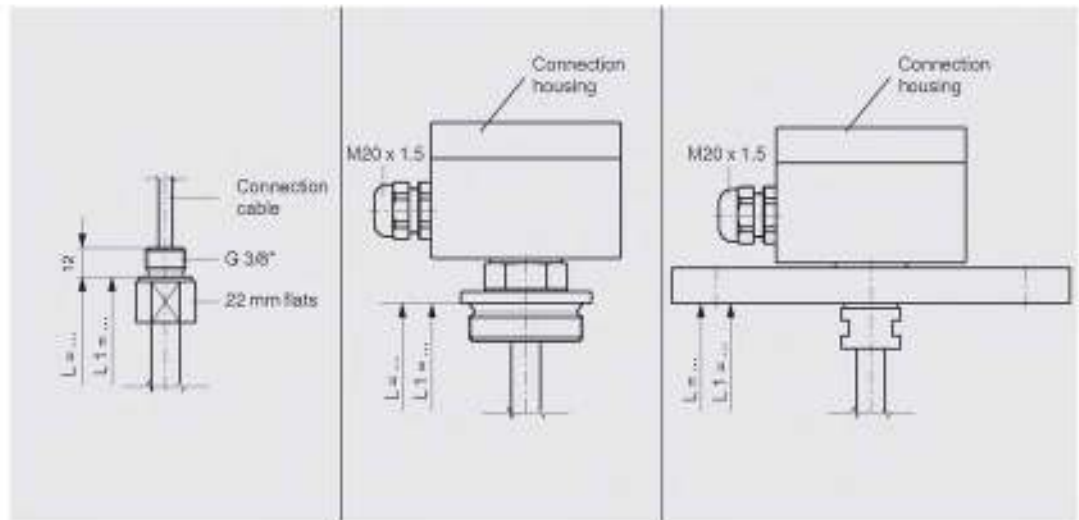


	Mounting thread (without connection housing)	Mounting thread	
Electrical connection	Connection cable <ul style="list-style-type: none"> <li>■ PVC</li> <li>■ Silicone</li> <li>■ PUR</li> </ul>	Connection housing <ul style="list-style-type: none"> <li>■ Aluminium 64 x 56 x 34 mm</li> </ul>	Coupler connector <ul style="list-style-type: none"> <li>■ M12, 4-pin (C164-232-F-4P)</li> </ul>
Process connection	Mounting thread upwards G 1/8" (others on request)	Mounting thread downwards G 3/4", G 1" (others on request)	Coupler connector <ul style="list-style-type: none"> <li>■ M12, 5-pin (C164-332-F-5P)</li> <li>■ N6R, 7-pin (C164-4337-F-7P)</li> </ul>
Guide tube diameter	8 mm		
Guide tube length L max.	500 mm		
Float	Material stainless steel 1.4571 (option: Buna (NBR), polypropylene, titanium) Float diameter from 20 ... 35 mm Float selection depending on guide tube diameter and process conditions (see page 20 and 21)		
Temperature range	-10 ... +100 °C (float material stainless steel or titanium) -10 ... +80 °C (float material Buna (NBR) or polypropylene)		
Switching function	Alternatively normally open (NO), normally closed (NC) or change-over (SPDT) contact - on rising level		
max. number of contacts	3 x NO or NC, or 1 x SPDT		
Switching power	Normally open: AC 250 V; 10 VA; 0.5 A    DC 250 V; 5 W; 0.25 A Normally closed: AC 250 V; 10 VA; 0.5 A    DC 250 V; 5 W; 0.25 A Change-over: AC 28 V; 6 VA; 0.6 A    DC 28 V; 3 W; 0.3 A		
	<b>Attention:</b> 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	IP 54 per EN 60529 / IEC 60529		IP 65 per EN 60529 / IEC 60529



## Magnetic float switch, plastic version, 12 mm guide tube, model FLS-P

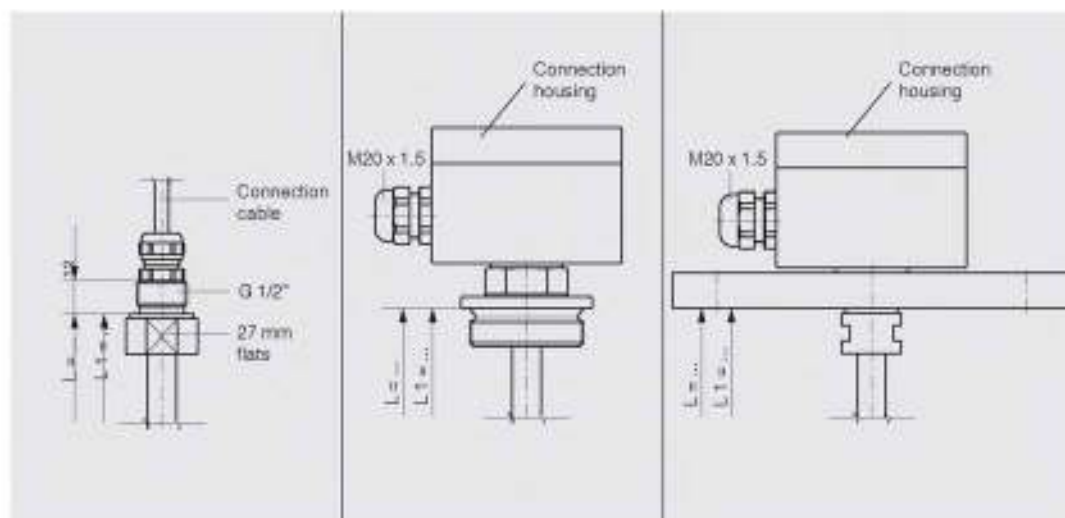
Process connection, guide tube and float from PVC or polypropylene



	Mounting thread (without connection housing)	Mounting thread	Flange
Electrical connection	Connection cable ■ PVC ■ PUR	Connection housing ■ Polypropylene 90 x 82 x 55 mm ■ Polyester 80 x 75 x 55 mm	
Process connection	Mounting thread, upwards G 3/8" (others on request)	Mounting thread, downwards G 1 1/2" or G 2" (others on request)	Mounting flange ■ DIN DN 50 ... DN 125, PN 10, form A ■ ANSI 2" ... 5", class 150 FF
Guide tube diameter	12 mm		
Guide tube length L max.	500 mm		
Float	Material ■ PVC ■ Polypropylene Float diameter from 44 ... 80 mm Float selection depending on guide tube diameter and process conditions (see page 21)		
Temperature range	■ PVC 0 ... +60 °C ■ Polypropylene -10 ... +80 °C		
Switching function	Alternatively normally open (NO), normally closed (NC) or change-over (SPDT) contact - on ring level		
max. number of contacts	4 x NO or NC (PP max. 3), or 3 x SPDT (PP max. 2)		
Switch position	Dimensions L <sub>1</sub> , L <sub>2</sub> , L <sub>3</sub> ... (from sealing face, starting from top)		
Distance between switch points	Minimum 20 mm (depending on the selection of the float and the contacts, see page 21)		
Switching power	Normally open AC 230 V; 100 VA; 1 A Normally closed AC 230 V; 100 VA; 1 A Change-over AC 230 V; 40 VA; 1 A	DC 230 V; 50 W; 0.5 A DC 230 V; 50 W; 0.5 A DC 230 V; 20 W; 0.5 A	<b>Please observe contact protection measures (see page 23)!</b>
	<b>Attention:</b> 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	IP 54 per EN 60529 / IEC 60529	IP 65 per EN 60529 / IEC 60529	
Materials	PVC or polypropylene		

## Magnetic float switch, plastic version, 16 mm guide tube, model FLS-P

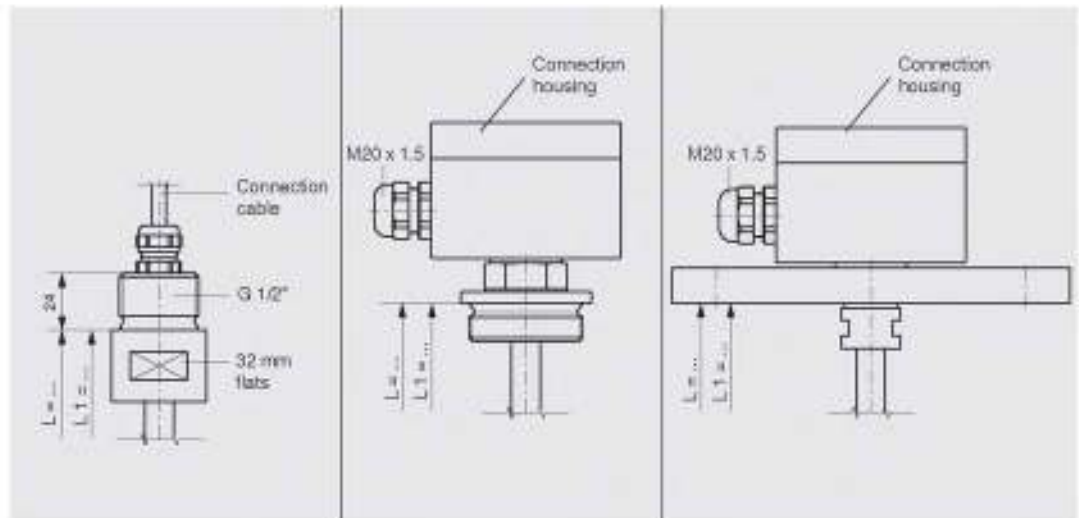
Process connection, guide tube material and float from PVC, polypropylene or PVDF



	Mounting thread (without connection housing)	Mounting thread	Flange
Electrical connection	Connection cable ■ PVC ■ PUR	Connection housing ■ Polypropylene 80 x 75 x 55 mm ■ Polyester 80 x 75 x 55 mm	
Process connection	Mounting thread, upwards G 1" (others on request)	Mounting thread, downwards G 2" (others on request)	Mounting flange ■ DIN DN 65 ... DN 125, PN 10, form A ■ ANSI 2 1/2" ... 5", class 150 FF
Guide tube diameter	16 mm, strengthened with a metallic inner tube		
Guide tube length L max.	3,000 mm		
Float	Material ■ PVC ■ Polypropylene ■ PVDF Float diameter from 44 ... 80 mm Float selection depending on guide tube diameter and process conditions (see page 21)		
Temperature range	■ PVC: 0 ... +60 °C ■ Polypropylene: -10 ... +80 °C ■ PVDF: -10 ... +100 °C		
Switching function	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 <sub>1</sub> , L <sub>2</sub> , L <sub>3</sub> ... (from sealing face, starting from top)		
Distance between switch points	Minimum 20 mm (depending on the selection of the float and the contacts, see page 21)		
Switching power	Normally open AC 230 V; 100 VA; 1 A DC 230 V; 50 W; 0.5 A 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 <b>Please observe contact protection measures (see page 23)!</b>		
	<b>Attention:</b> 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	IP 65 per EN 60529 / IEC 60529		
Materials	PVC, polypropylene or PVDF		

## Magnetic float switch, plastic version, 22 mm guide tube, model FLS-P

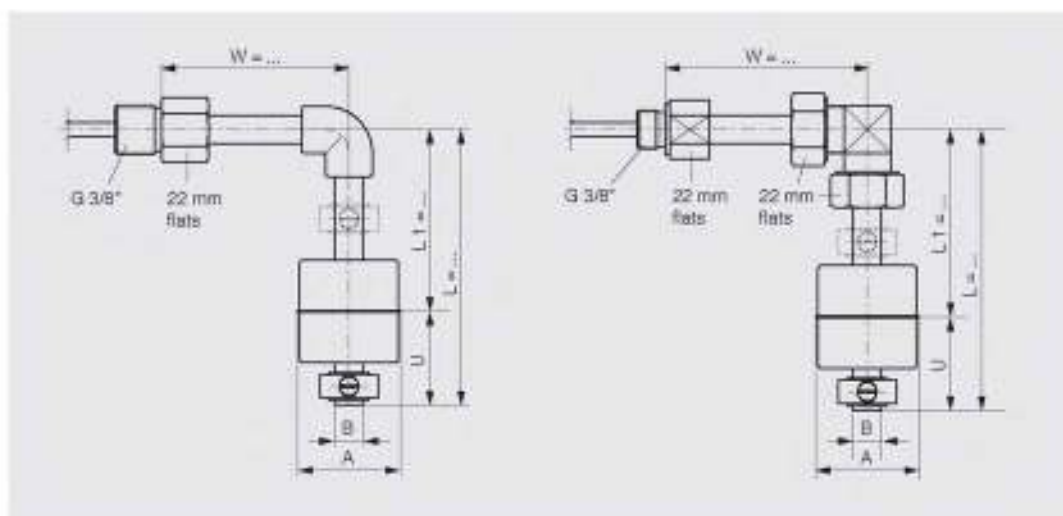
Process connection, guide tube material and float from PVC, polypropylene or PVDF



	Mounting thread (without connection housing)	Mounting thread	Flange
Electrical connection	Connection cable ■ PVC ■ PUR	Connection housing ■ Polypropylene 90 x 75 x 55 mm	
Process connection	Mounting thread, upwards G 1/2" (others on request)	Mounting thread, downwards G 2" (others on request)	Mounting flange ■ DIN DN 65 ... DN 125, PN 10, form A ■ ANSI 2 1/2" ... 4", class 150 FF
Guide tube diameter	20 mm, strengthened with a metallic inner tube		
Guide tube length L max.	5,000 mm		
Float	Material ■ PVC ■ Polypropylene ■ PVDF Float diameter from 44 ... 80 mm Float selection depending on guide tube diameter and process conditions (see page 21)		
Temperature range	■ PVC 0 ... +60 °C ■ Polypropylene -10 ... +80 °C ■ PVDF -10 ... +100 °C		
Switching function	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 <sub>1</sub> , L <sub>2</sub> , L <sub>3</sub> ... (from sealing face, starting from top)		
Distance between switch points	Minimum 20 mm (depending on the selection of the float and the contacts, see page 21)		
Switching power	Normally open AC 230 V; 100 VA; 1 A Normally closed AC 230 V; 100 VA; 1 A Change-over AC 230 V; 40 VA; 1 A	DC 230 V; 50 W; 0.5 A DC 230 V; 50 W; 0.5 A DC 230 V; 20 W; 0.5 A	<b>Please observe contact protection measures (see page 23)!</b>
	<b>Attention:</b> 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	IP 65 per EN 60529 / IEC 60529		
Materials	PVC, polypropylene or PVDF		

## Magnetic float switch, plastic version, angled version, model FLS-PX

Process connection, guide tube and float from PVC or polypropylene

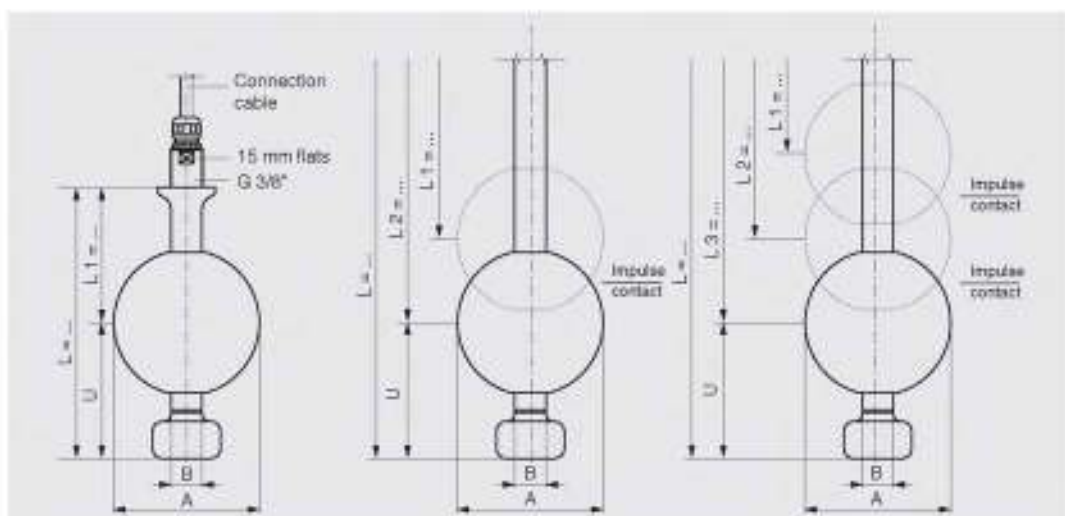


	Mounting thread, PVC version	Mounting thread, polypropylene version
Electrical connection	Connection cable ■ PVC ■ PUR	
Process connection	Mounting thread, lateral G 3/8" (others on request)	
Guide tube diameter	12 mm	
Guide tube length L max.	1,000 mm	
Float	Material ■ PVC ■ Polypropylene Float diameter from 44 ... 80 mm Float selection depending on guide tube diameter and process conditions (see page 21)	
Temperature range	■ PVC 0 ... +60 °C ■ Polypropylene -10 ... +80 °C	
Switching function	Alternatively normally open (NO), normally closed (NC) or change-over (SPDT) contact - on rising level	
max. number of contacts	4 x NO or NC, or 3 x SPDT	
Switch position	Dimensions L <sub>1</sub> , L <sub>2</sub> , L <sub>3</sub> ... (from sealing face, starting from top)	
Distance between switch points	Minimum 20 mm (depending on the selection of the float and the contacts, see page 21)	
Switching power	Normally open AC 230 V; 100 VA; 1 A DC 230 V; 50 W; 0.5 A 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	
	<b>Attention:</b> 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	IP 65 per EN 60529 / IEC 60529	
Materials	PVC or polypropylene	



## Magnetic float switch, pharmaceutical version, model FLS-H

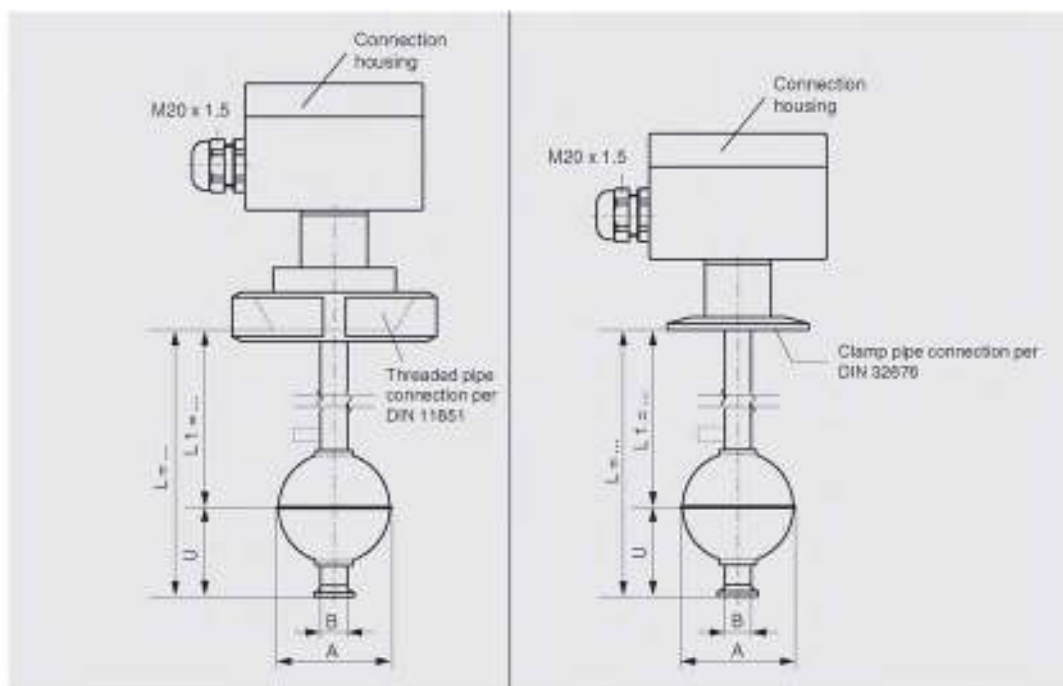
Process connection, guide tube and float from stainless steel



Mounting thread	
Electrical connection	Connection cable ■ PVC ■ Silicone ■ PUR Option connection housing
Process connection	Mounting thread, upwards G 3/8" (others on request) Option ■ Mounting flange per DIN or ANSI ■ Threaded connection per DIN 11851 ■ Clamp pipe connection per DIN 32676 ■ Ingot sanitary fitting
Guide tube diameter	17.2 mm (stainless steel 1.4435 or 1.4539, surface ground and polished)
Guide tube length L max.	5,000 mm
Float	Material stainless steel 1.4435 or 1.4539 Float diameter from 44 ... 80 mm Float selection depending on guide tube diameter and process conditions (see page 21)
Temperature range	■ PVC and PUR -10 ... +80 °C ■ Silicone -30 ... +150 °C
Switching function	Alternatively normally open (NO), normally closed (NC) or change-over (SPDT) contact - on rising level
max. number of contacts	PVC and PUR 6 x NO or NC, or 4 x SPDT, silicone 3 x NO or NC, or 2 x SPDT
Switch position	Dimensions L <sub>1</sub> , L <sub>2</sub> , L <sub>3</sub> ... (from sealing face, starting from top)
Distance between switch points	Minimum 20 mm (depending on the selection of the float and the contacts, see page 21)
Switching power	Normally open AC 230 V; 50 VA; 1 A DC 230 V; 50 W; 0.5 A Normally closed AC 230 V; 50 VA; 1 A DC 230 V; 50 W; 0.5 A Change-over AC 230 V; 50 VA; 1 A DC 230 V; 20 W; 0.5 A <b>Please observe contact protection measures (see page 23)!</b>
	<b>Attention:</b> 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	IP 65 per EN 60529 / IEC 60529

## Magnetic float switch, food version, model FLS-H

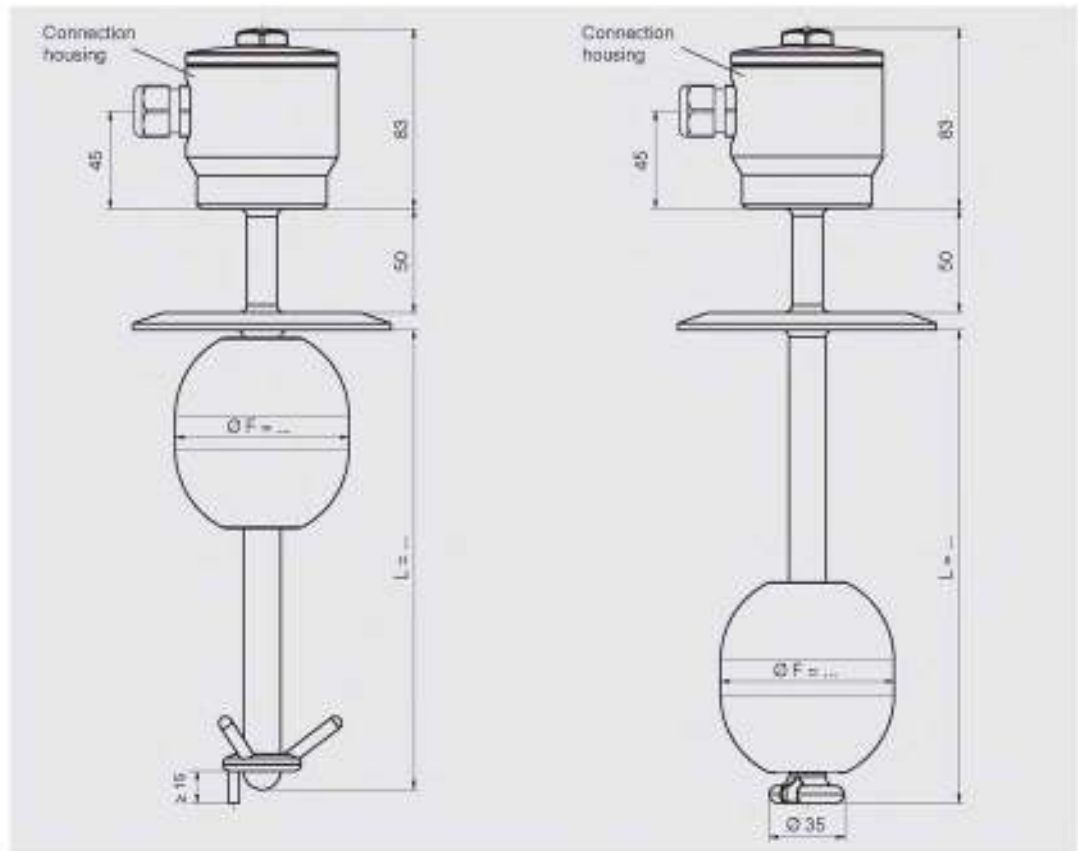
Process connection, guide tube and float from stainless steel



	Threaded pipe connection	Clamp pipe connection
Electrical connection	Connection housing ■ Aluminium 64 x 58 x 34 mm, with 1 contact ■ Aluminium 80 x 75 x 57 mm, 2 or more contacts Option: Polypropylene, polyester, stainless steel	
Process connection	Threaded pipe connection per DIN 11851, downwards DN 50 ... DN 150 (others on request)	Clamp pipe connection per DIN 32676, DN 25 ... DN 100 or 1" ... 4" (others on request)
Guide tube diameter	12 or 14	18 mm
Guide tube length L max.	3,000 mm	6,000 mm
Float	Material stainless steel 1.4435 or 1.4404, option electropolished Float diameter from 44 ... 80 mm Float selection depending on guide tube diameter and process conditions (see page 21)	
Temperature range	-30 ... +150 °C	
Switching function	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 <sub>1</sub> , L <sub>2</sub> , L <sub>3</sub> ... (from sealing face, starting from top)	
Distance between switch points	Minimum 20 mm (depending on the selection of the float and the contacts, see page 21)	
Switching power	Normally open AC 230 V; 100 VA; 1 A DC 230 V; 50 W; 0.5 A 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 <b>Please observe contact protection measures (see page 23)!</b>	
	<b>Attention:</b> 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	IP 65 per EN 60529 / IEC 60529	

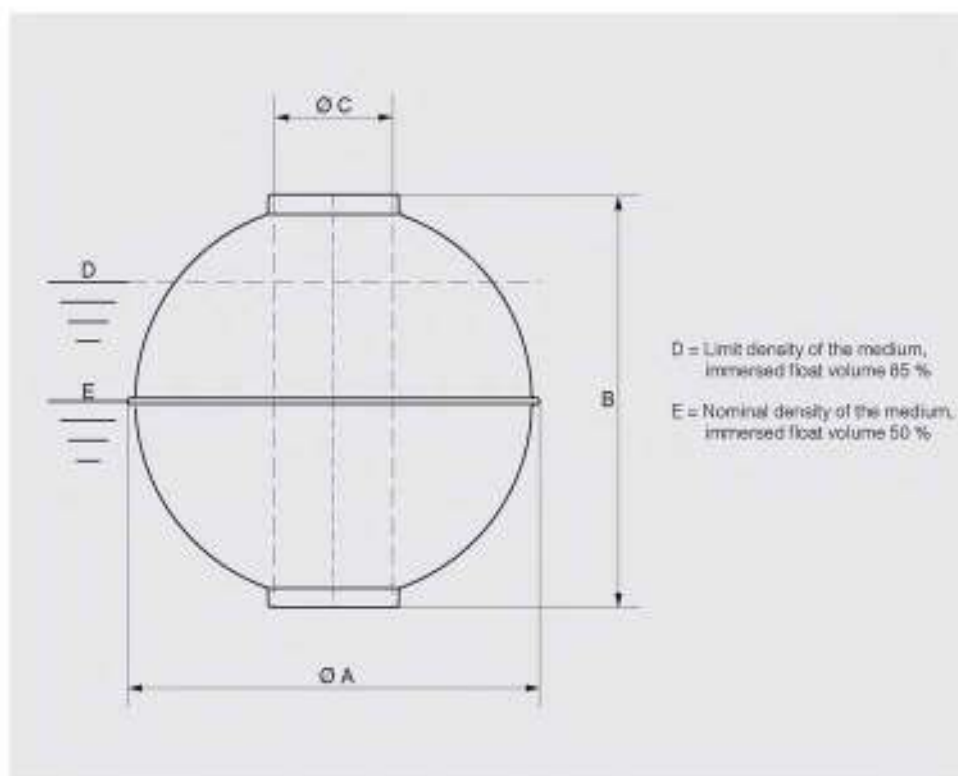
## Magnetic float switch, 3-A hygienic version, model FLS-H

Process connection, guide tube and float from stainless steel



	Version with separate float bracket	Version with welded pipe end
Electrical connection	Connection housing	Stainless steel
Process connection	<ul style="list-style-type: none"> <li>■ Clamp connection ISO 2852 (DN 32 ... DN 100 or 1.5" ... 4")</li> <li>■ Clamp connection DIN 32676 (DN 32 ... DN 100 or 1.5" ... 4")</li> <li>■ Aseptic mounting thread downwards DIN 11864-1 (DN 32 ... DN 100 or 1.5" ... 4")</li> <li>■ Aseptic collar connecting sleeves DIN 11864-1 (DN 32 ... DN 100 or 1.5" ... 4")</li> <li>■ Aseptic flange connection DIN 11864-2 (DN 32 ... DN 50 or 1.5" ... 2")</li> <li>■ Aseptic clamp connection DIN 11864-3 (DN 32 ... DN 100 or 1.5" ... 4")</li> <li>■ VARIVENT® (form F, N and G)</li> <li>■ BioConnect® threaded connection (DN 32 ... DN 100 or 1.5" ... 2")</li> <li>■ BioConnect® flange connection (DN 32 ... DN 100 or 1.5" ... 2")</li> <li>■ BioConnect® clamp connection (DN 32 ... DN 100 or 1.5" ... 2")</li> </ul>	
Guide tube diameter	12, 14 or 17.2 mm (stainless steel 1.4435 or 1.4539, surface ground and polished, Ra < 0.8 µm)	
Guide tube length L max.	5,000 mm	
Float	Material stainless steel 1.4435 or 1.4404 Float diameter 50 or 80 mm Float selection depending on guide tube diameter	
Temperature range	<ul style="list-style-type: none"> <li>■ Medium standard -40 ... +200 °C</li> <li>■ Sensor housing -40 ... +85 °C</li> </ul>	
Switching function	Alternatively normally open (NO); normally closed (NC) or change-over (SPDT) contact - on rising level	
max. number of contacts	3 x NO, NC or SPDT	
Switch position	Dimensions L <sub>1</sub> , L <sub>2</sub> , L <sub>3</sub> ... (from sealing face, starting from top)	
Distance between switch points	Minimum 50 mm (depending on the selection of the float and the contacts, see page 21)	
Switching power	Normally open AC 230 V; 50 VA; 1 A normally closed AC 230 V; 50 VA; 1 A Change-over AC 230 V; 50 VA; 1 A	DC 230 V; 50 W; 0.5 A DC 230 V; 50 W; 0.5 A DC 230 V; 20 W; 0.5 A
	<b>Please observe contact protection measures (see page 23)!</b>	
	<b>Attention:</b> 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	IP 65 per EN 60529 / IEC 60529	

## Spherical floats (K)

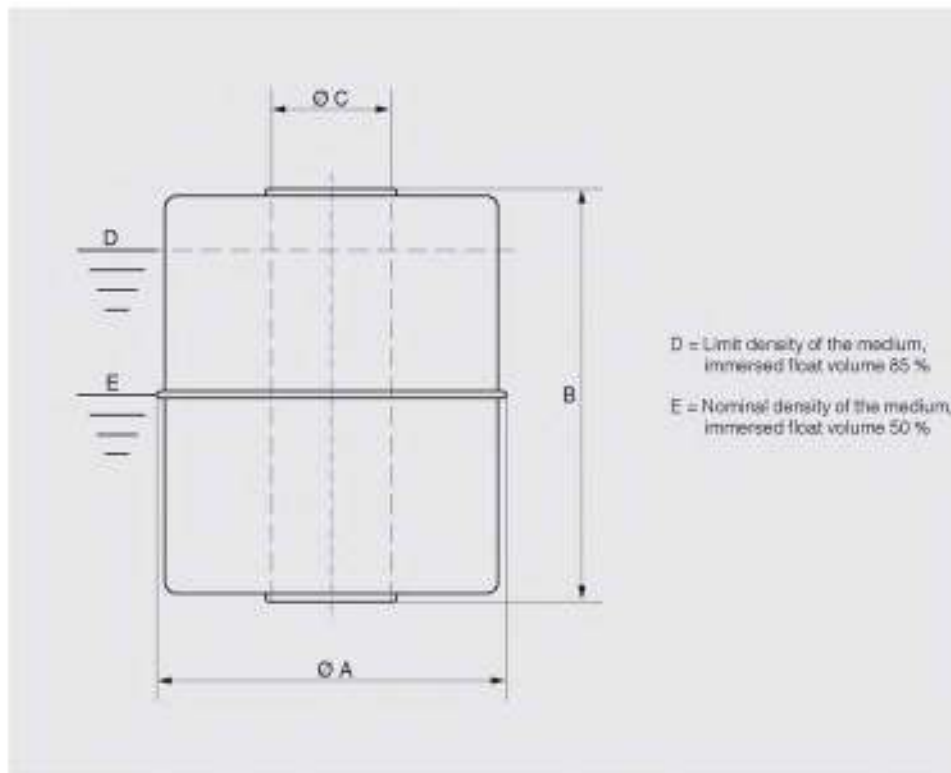


Material	Suits guide tube Ø mm	Ø A mm	B mm	Ø C mm	Max. operating pressure bar	Max. operating temperature °C	Limit density 85 % kg/m <sup>3</sup>	Order no.
Stainless steel 1.4571	8	29	28	9	6	100	977	005454
	8	29	28	9	25	100	1069	027385
	12	52	52	15	40	300	769	005482
	12	62	61	15	32	300	597	005511
	12	83	81	15	25	300	408	005485
	18	80	76	23	25	300	679	005478
	18	98	96	23	25	300	597	005489
	18	105	103	23	25	300	533	020652
	18	120	117	23	25	300	389	021721
Titanium 3.7035	8	29	28	9	30	100	822	005522
	12	52	52	15	25	300	707	005526
	12	52	52	15	60	300	852	-
	12	52	52	15	80	300	1060	-
	12	62	62	15	25	300	505	005536
	12	83	81	15	25	300	278	005544
	18	80	76	23	25	300	665	112263
	18	98	96	23	25	300	495	-
	18	105	103	23	25	300	369	-
Stainless steel 1.4571 E-C/TFE coated	12	53	53	14	25	depending on medium	745	-
	12	63	62	14	25	depending on medium	591	-
	12	84	82	14	25	depending on medium	403	-
	18	81	77	22	25	depending on medium	718	-
	18	99	97	22	25	depending on medium	675	-
	18	105	104	22	25	depending on medium	633	-
	18	121	118	22	25	depending on medium	459	-

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



## Cylindrical floats (Z)



Material	Suits guide tube $\varnothing$ mm	$\varnothing A$ mm	$B$ mm	$\varnothing C$ mm	Max. operating pressure bar	Max. operating temperature °C	Limit density 85 % kg/m <sup>3</sup>	Order no.
Stainless steel 1.4571	8	27	31	10	16	100	797	006679
	12	44	52	15	16	300	818	006681
Titanium 3.7035	12	44	52	15	16	300	720	009744
Buna (NBR)	8	20	20	9	3	80	939	009719
	8	23	25	9	3	80	802	009721
	8	25	14	9	3	80	787	009720
	8	30	45	13	3	80	683	034047
	12	40	30	15	3	80	581	009728
	12	40	120	15	3	80	409	-
	18	50	45	19	3	80	498	009725
PVC	12	44	44	14	3	60	651	033790
	18	55	54	22	3	60	798	-
	20	55	80	26	3	60	919	-
	16	55	70	22	3	60	674	-
	20	60	79	25	3	60	573	033796
Polypropylene	8	27	29	9	3	80	755	015518
	8	35	33	9	3	80	675	100347
	12	44	44	14	3	80	478	015514
	16	55	54	22	3	80	582	033792
	20	55	80	26	3	80	669	-
	20	80	79	25	3	80	431	033795
PvDF	12	44	55	14	3	100	782	033791
	16	55	69	22	3	100	821	116235
	20	55	80	26	3	100	1140	-
	20	80	79	25	3	100	681	033797
Stainless steel 1.4571 E-CTFE coated	12	45	53	14	16	depending on medium	782	-

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

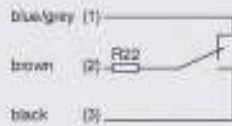
## Electrical connections

### Reed contact

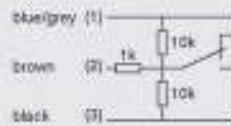
1 switch point



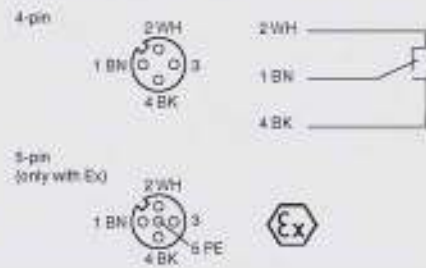
1 switch point  
Wiring for operation  
with a PLC



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



Connector, pin assignment



### Connection cable

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

### 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

## Contact protection measures

The reed contacts should be protected against any voltage or current spikes that might occur.

Depending on the different load types different protective circuits are used.

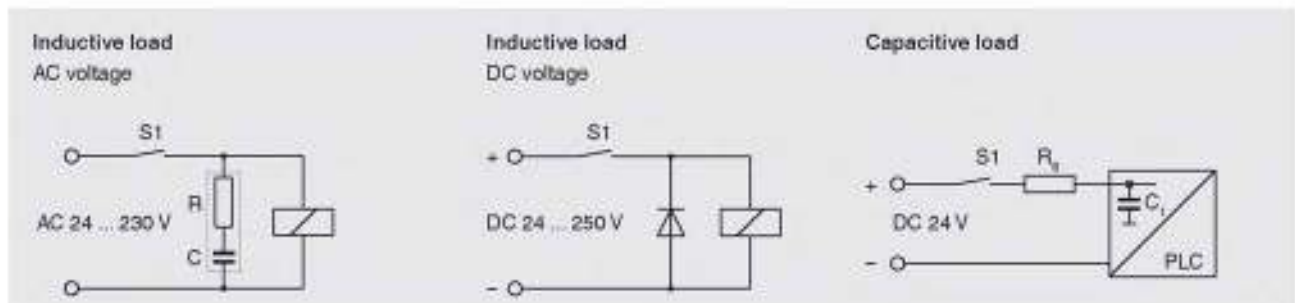


Model KR 24

RC module

Contact protection relays	Contacts	Input	Power supply	Approval number	Order no.
KR 24	1 x change-over AC 250 V, 2 A	2 x contacts	DC 20 ... 30 V		112941
KR 24-EX	2 x change-over AC 253 V, 2 A	2 x contacts	DC 20 ... 30 V	II 1 GD EEx ia IIC, PTB 02 ATEX 2073	112944
KR 230	1 x change-over AC 250 V, 2 A	2 x contacts	AC 230 V		112942
KR 230-EX	2 x change-over AC 253 V, 2 A	2 x contacts	AC 230 V	II 1 GD EEx ia IIC, PTB 02 ATEX 2073	112943

RC module	Capacitance	Resistance	Voltage	Order no.
B3/115	0.33 $\mu$ F	470 Ohm	AC 115 V	110448
B3/230	0.33 $\mu$ F	1,000 Ohm	AC 230 V	110460



### Ordering information

To order the described product the order number (if available) is sufficient.

Alternatively:

Model / Version / Electrical connection / Process connection / Guide tube diameter / Guide tube length L / Information about contact (switching function, number of switch points, switch position) / process details (operating temperature and working pressure, Limit density) / Options

# Appendix

## Cross Reference FLS

Replaced Type	Type	Description
60-ARV...	FLS-S	Approval: ATEX Ex-i; Process connection: mounting thread downwards
60-AFV...	FLS-S	Approval: ATEX Ex-i; Process connection: flange connection
ARV...	FLS-S	Process connection: mounting thread downwards
ERV...	FLS-S	Process connection: mounting thread upwards
AFV...	FLS-S	Process connection: flange connection
RV...	FLS-S	Process connection: mounting thread downwards, adjustable
AFVEC...	FLS-S	Material: Stainless steel 1.4571 E-CTFE ; Option: anti-static
AL-ADF-RV...	FLS-S	Approval: ATEX Ex-d; Process connection: mounting thread downwards
AL-ADF-FV...	FLS-S	Approval: ATEX Ex-d; Process connection: flange connection
ASC4FPA...	FLS-S	Magnetic float switch with coupler plug
ASC...	FLS-S	Magnetic float switch with coupler plug
AMRV...	FLS-H	Food industry design, Process Connection: Dairy fitting
AFCV...	FLS-H	Food industry design, Process Connection: Clamp connection
GMS/FLS-HD...	FLS-H	3-A Symbol Holder Licence, Standard 74-06
Design with 8 mm guide tube OD	FLS-M	Material: Stainless Steel 1.4404 (316L) / 1.4571 (316Ti), Buna, Polypropylen
ERP...	FLS-P	Material: PVC; Process connection: mounting thread upwards
ERPP...	FLS-P	Material: Polypropylen; Process connection: mounting thread upwards
ERPE...	FLS-P	Material: PVDF; Process connection: mounting thread upwards
ABRP...	FLS-P	Material: PVC; Process connection: mounting thread downwards
ABRPP...	FLS-P	Material: Polypropylen; Process connection: mounting thread downwards
ABFPF...	FLS-P	Material: PVDF; Process connection: flange connection
APRP...	FLS-P	Material: PVC; Process connection: mounting thread downwards
APRPP...	FLS-P	Material: Polypropylen; Process connection: mounting thread downwards
APFPF...	FLS-P	Material: PVDF; Process connection: flange connection




## Type Code

Code	1st key	2nd key	3rd key
<b>1</b>	<b>Electrical connection</b>	<b>Process connection</b>	<b>Material process connection</b>
...	- (none) - connection cable	ER Mounting thread upwards (BSP)	V Stainless steel SS 316 Ti
A	Terminal box Aluminium	R Mounting thread downwards (BSP)	VE Stainless steel polished
AB	Terminal box Polypropylene	ENPT Mounting thread upwards (NPT)	VEC Stainless steel ECTFE-coated
AP	Terminal box Polyester	NPT Mounting thread downwards (NPT)	VTF Stainless steel PTFE-lined
AV4	Terminal box Stainless steel SS 316 Ti	MR Dairy fitting acc. to DIN 11851	T Titanium
AL-ADF	Terminal box, flameproof Aluminium	F Flange (DIN, ANSI, JIS)	HC Hastelloy C
ASC4	Coupler plug C 164-232-F-4P	FC Clamp-connection acc. to DIN 32676	P PVC
ASN 6R	Hirschmann coupler plug N6RAM 2D M20	IS Sanitary nozzle (Ingoldstutzen)	PP Polypropylene
ASM	Coupler plug M12		PF PVDF
			M Brass flange OD 74 mm
			K Oval flange, Polyamide
<b>2</b>	<b>Process connection</b>		
...	-- Mounting thread size in inches		
	-- Threaded connection size DN 50 - DN 150		
	.../ Flange nominal size	.../ Flange pressure rating	... Flange face
DIN	DN 50 - DN 200	PN 6 - PN 100	Standard Form C optional E, A, F, N
DIN	DN 50 - DN 200	PN 6 - PN 100	Standard Form B1 optional B2, A, C, D
EN			Standard RF optional RTJ, FF, ST, SG
ANSI	2" - 8"	Class 150 - 600	Standard RF optional RTJ, FF, ST, SG
JIS	2"(DN 50) - 8"(DN 200)	5 K - 63 K	
Clamp	DN 25 - DN 100; 1" - 4"		
<b>3</b>	<b>1st key</b>	<b>2nd key</b>	<b>3rd key</b>
...	<b>Guide tube material</b>	<b>Contact function</b>	<b>Optional code adder</b>
...	V Stainless steel SS 316 Ti	S Closing	/HT.. High temperature +150°C...+300°C
	VE Stainless steel electropolished	O Opening	/TT.. Low temperature -30°C ... -196°C
	VEC Stainless steel ECTFE-coated	U Change over	/H Increased hysteresis
	VTF Stainless steel PTFE-lined		/PT100 Temperature probe PT 100 (2-, 3- or 4-core)
	HB Hastelloy B		/..TH.. Temperature switch ... °C - closing or opening
	HC Hastelloy C		/R... Current limitation using resistor ... Ohm
	P PVC		/N acc. to NAMUR DIN EN 60947-5-6
	PP Polypropylene		
	PF PVDF		
	W... Angular design (V, R, PP)		
<b>4</b>	<b>Guide tube length</b>	<b>OD Guide tube</b>	
...	.../ length in mm	... OD in mm	
<b>5</b>	<b>Float design</b>		
...	.../ Material (code 3, 1st key)	... Float OD in mm	
<b>6</b>	<b>Connection cable</b>	<b>Cable material</b>	
...	.../ length in meter	- PVC, grey	
		blue PVC, blue	
		SIL Silicone	
		PUR PUR	

7	Approval	
-	-	none
Ex	-	Ex i
Ex d	-	ATEX
Ex d	-	IECEX
GL	-	Germanischer Lloyd
DNV	-	Det Norske Veritas
ABS	-	American Bureau of Shipping
3-A	-	3-A certified

## Ordering Example

	Connection design / material	Connection size	Guide tube material contact function	Guide tube length / Ø	Float	Cable length / ma- terial	Approval
Code	1	2	3	4	5	6	7
	AFV	100/F	V S O U	L950/12	V44A	-	-


**Switch function on rising level**  
 Switch point L3 = 905 mm Change over  
 Switch point L2 = 400 mm Opening  
 Switch point L1 = 190 mm Closing

## Magnetic float switch For horizontal installation Model HLS

KSR data sheet HLS



### Applications

- Level measurement for almost all liquid media
- Pump and level control
- Chemical, petrochemical, natural gas, offshore, shipbuilding, machine building, power generating equipment, power plants
- Process and drinking water treatment

### Special features

- Large range of application due to the simple, proven functional principle
- For harsh operating conditions, long service life
- Operating limits:
  - Operating temperature:  $T = -196 \dots +350 \text{ }^\circ\text{C}$
  - Operating pressure:  $P = \text{vacuum to } 232 \text{ bar}$
  - Limit density:  $\rho \geq 600 \text{ kg/m}^3$
- Stainless steel and plastic versions
- Explosion-protected versions



Fig. top: Stainless steel version, model HLS-S

Fig. bottom: Plastic version, model HLS-P

### Description

In addition to the various applications for float switches for vertical installation (model FLS), the model HLS horizontal float switches likewise offer innumerable possibilities to monitor and/or switch levels in order to indicate minimum/maximum levels.

The float is attached to a supported, swivelling lever and moves with the level of the medium being measured. By means of a permanent magnet, fixed to the end of the lever, when a preset switch point is reached, a reed contact (inert gas contact) within the contact pipe is actuated.

By using a permanent magnet and a reed contact the switching operation is non-contact, free from wear and needs no power supply. The functioning of the float switch is independent of foaming, conductivity, vapours, bubble formation and vibrations.

The signal processing is universal. Direct connection to PLCs, NAMUR connections, signal amplifiers or contact protection relays is possible.

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

## Model overview

Float switch model	Description	Approval					
		without	Ex i	Ex d	GL	ABS	Ex i + GL
HLS-S	Magnetic float switch, standard version	x	x	x	x	x	x
HLS-P	Magnetic float switch, plastic version	x					

Float switch model	Materials			Temperature range	Max. pressure
	Stainless steel 1.4571 (316Ti)	Stainless steel 1.4404 (316L)	Polypropylene		
HLS-S	x	x		-196 ... +350 °C	232 bar
HLS-P			x	-10 ... +80 °C	6 bar

## Ex approvals

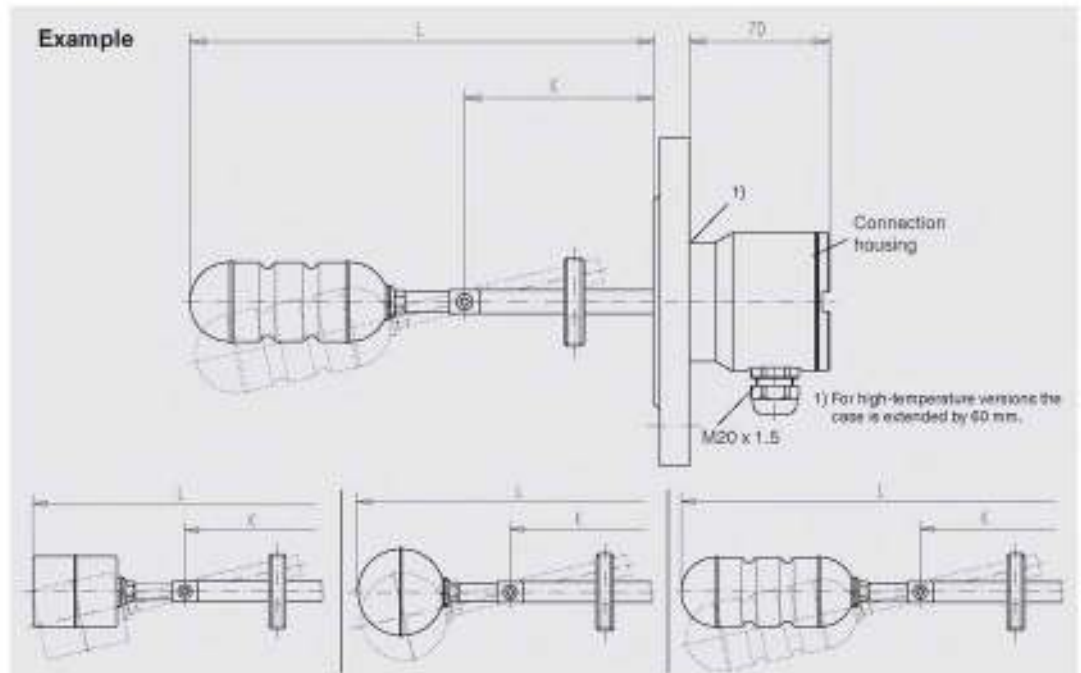
Explosion protection	Ignition protection type	Model	Zone	Approval number
ATEX	Ex i	HLS-S-Ex i	Zone 0, gas Zone 1, gas/dust	IBExU 03 ATEX1038X II 1G/2GD EEx ia IIC T2 ... T6
	Ex d	HLS-S-Ex d	Zone 1, gas	TÜV 09 ATEX 7632X II 2G Ex d IIC T6, II 2D Ex d A21 IP 65 T80 °C
	Ex i + GL	HLS-S-Ex i	Zone 0, gas Zone 1, gas/dust	IBExU03ATEX1038X II 1G/2GD EEx ia IIC T6-T2 + GL-32527 - 06 HH

## Type approval

Approval	Model	Approval number
GL	HLS-S	GL - 32 527 - 06 HH
ABS	HLS-S	ABS-02-HG286248-2-PDA
GOST	HLS-S, HLS-P	959333

## Magnetic float switch, standard version, model HLS-S

Process connection, contact tube and float from stainless steel 1.4571



	Float model V44HI	Float model T52HI and T52HI/Gr. 5	Float model ZVSS43/100HI
Electrical connection	Connection housing	■ Stainless steel 1.4571	
Process connection	Mounting flange	■ DIN DN 50 ... DN 100, PN 6 ... PN 400 ■ EN 1092 DN 50 ... DN 100, PN 6 ... PN 400 ■ ANSI 2" ... 4", class 150 ... 600 ■ Square flange DN 80 and DN 92 (other flanges on request)	
Contact tube			
Insertion length L	193 ... 990 mm	185 ... 990 mm	240 ... 990 mm
Contact tube length K	100 ... 900 mm	100 ... 900 mm	100 ... 900 mm
Float material	Stainless steel 1.4571	Model T52HI: Titanium 3.7035, grade 2 Model T52HI/Gr. 5: Titanium 3.7155, grade 5	Stainless steel 1.4571
Float			
Diameter	44 mm	52 mm	43 mm
Length	52 mm	52 mm	100 mm
Max. operating pressure	6 bar	Model T52HI: 100 bar Model T52HI/Gr. 5: 232 bar	20 bar
Min. density	600 kg/m <sup>3</sup>		
Temperature range			
Standard	-40 ... +250 °C		
Option: ■ High-temperature version:		-20 ... +350 °C	
Option: ■ Low-temperature version:		-196 ... +250 °C	
Switching function	selectable: 1 x change-over SPDT 1 x normally open NO - on rising level 1 x normally closed NC - on rising level 1 x proximity switch I - on rising or falling level		
Switching power	AC 230 V; 40 VA; 1 A	DC 230 V; 20 W; 0.5 A	<b>Please observe contact protection measures!</b>
	Attention: Versions without protective conductor connection - operation only at safety extra-low voltage e.g. contact protection relay or external grounding		
Mounting position	Horizontal ±30°		
Ingress protection	IP 67 per EN 60529 / IEC 60529		

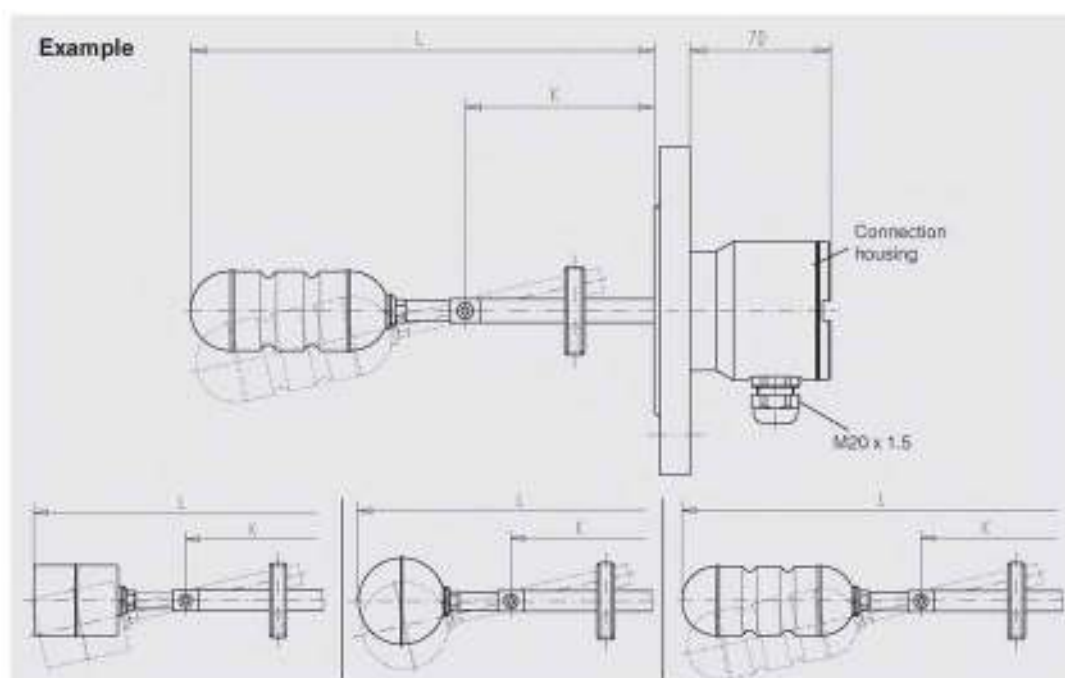
Versions in titanium, Hastelloy or other materials on request



## Magnetic float switch, intrinsically safe, model HLS-S-Ex i

IBExU 03 ATEX1038X II 1G/2GD EEx ia IIC T2 ... T6

Process connection, contact tube and float from stainless steel 1.4571

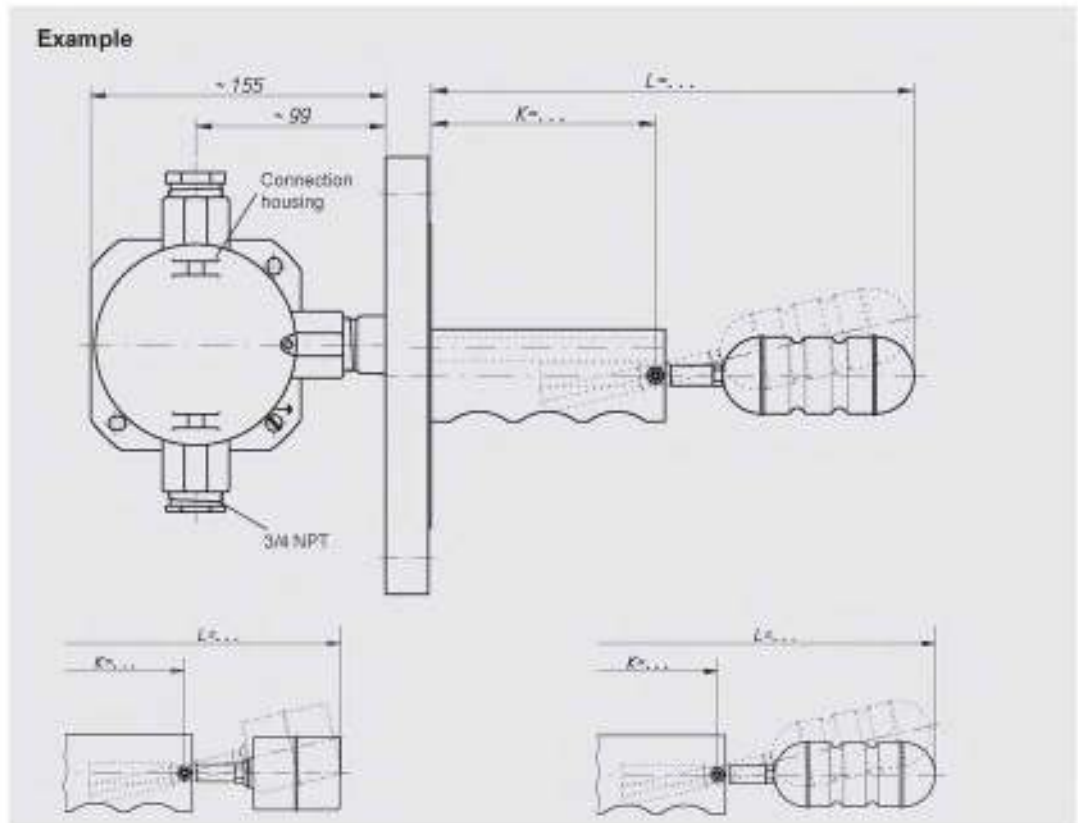


	Float model V44HI	Float model T52HI and T52HI/Gr. 5	Float model ZVSS43/100HI		
Electrical connection	Connection housing ■ Stainless steel 1.4571				
Process connection	Mounting flange ■ DIN DN 50 ... DN 100, PN 6 ... PN 160 ■ EN 1092 DN 50 ... DN 100, PN 6 ... PN 160 ■ ANSI 2" ... 4", class 150 ... 900 ■ Square flange DN 80 and DN 92 (other flanges on request)				
Contact tube					
Insertion length L	193 ... 990 mm	185 ... 990 mm	240 ... 990 mm		
Contact tube length K	100 ... 900 mm	100 ... 900 mm	100 ... 900 mm		
Float material	Stainless steel 1.4571	Model T52HI: Titanium 3.7035, grade 2 Model T52HI/Gr. 5: Titanium 3.7165, grade 5	Stainless steel 1.4571		
Float					
Diameter	44 mm	52 mm	43 mm		
Length	52 mm	52 mm	100 mm		
Max. operating pressure	6 bar	Model T52HI: 100 bar Model T52HI/Gr. 5: 180 bar	20 bar		
Min. density	600 kg/m <sup>3</sup>				
Temperature class	T2	T3	T4	T5	T6
Process temperature	Max. 180 °C	160 °C	108 °C	80 °C	65 °C
Ambient temperature at case	Max. 80 °C	80 °C	80 °C	80 °C	60 °C
Switching function	1 x change-over SPDT				
Switching power	Only for connection to a certified intrinsically safe circuit with U <sub>max</sub> 36 V, I <sub>max</sub> 100 mA				
Mounting position	Horizontal ±30°				
Ingress protection	IP 67 per EN 60529 / IEC 60529				

## Magnetic float switch, flameproof enclosure, model HLS-S-Ex d

TÜV 09 ATEX 7632X II 2G Ex d IIC T6, II 2D Ex tD A21 IP 65 T80 °C

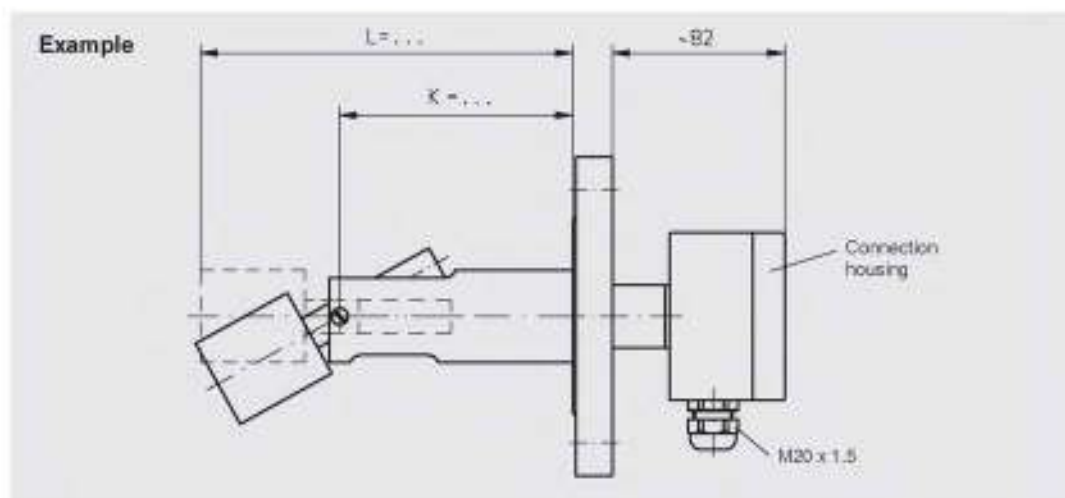
Process connection, contact tube and float from stainless steel 1.4404



	Float model V44HI	Float model ZVSS43/100HI
Electrical connection	Connection housing ■ Aluminium	
Process connection	Mounting flange ■ EN and DIN DN 65 ... DN 100, PN 6 ... PN 100 ■ ANSI 2.5" ... 4", class 150 ... 600 (other flanges on request)	
Contact tube		
Insertion length L	150 mm	193 mm
Contact tube length K	100 mm	100 mm
Float material	Stainless steel 1.4404	
Float		
Diameter	44 mm	43 mm
Length	52 mm	100 mm
Max. operating pressure	6 bar	20 bar
Min. density	600 kg/m <sup>3</sup>	
Temperature range	Standard -10 ... +80 °C	
Switching function	1 x change-over SPDT	
Switching power	AC 230 V; 40 VA; 1 A <b>Please observe contact protection measures!</b>	
Mounting position	Horizontal ±30°	
Ingress protection	IP 65 per EN 60529 / IEC 60529	

## Magnetic float switch, plastic version, model HLS-P

Process connection, contact tube and float from polypropylene



Float model PP44HI	
Electrical connection	Connection housing ■ Polypropylene ■ Polyester
Process connection	Mounting flange ■ DIN DN 50 ... DN 100, PN 16, form A ■ ANSI 2" ... 4", class 150 FF
Contact tube	
Insertion length L	176 mm
Contact tube length K	111 mm
Float material	Polypropylene
Float	
Diameter	44 mm
Length	52 mm
Max. operating pressure	6 bar
Min. density	750 kg/m <sup>3</sup>
Temperature range	-10 ... +80 °C
Switching function	selectable: 1 x change-over SPDT 1 x normally open NO - on rising level 1 x normally closed NC - on rising level
Switching power	AC 230 V; 40 VA; 1 A      DC 230 V; 20 W; 0.5 A <b>Please observe contact protection measures!</b>
	<b>Attention:</b> Versions without protective conductor connection - operation only at safety extra-low voltage e.g. contact protection relay or external grounding
Mounting position	Horizontal ±30°
Ingress protection	IP 65 per EN 60529 / IEC 60529

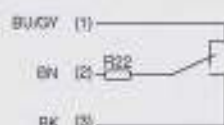
## Electrical connections

### Reed contact

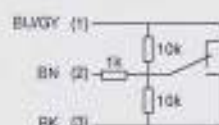
1 switch point



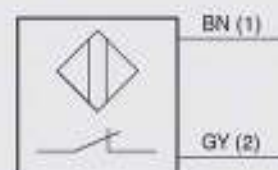
1 switch point  
Wiring for operation  
with a PLC



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



### Proximity switch



## Contact protection measures

The reed contacts should be protected against any voltage or current spikes that might occur.

Depending on the different load types different protective circuits are used.

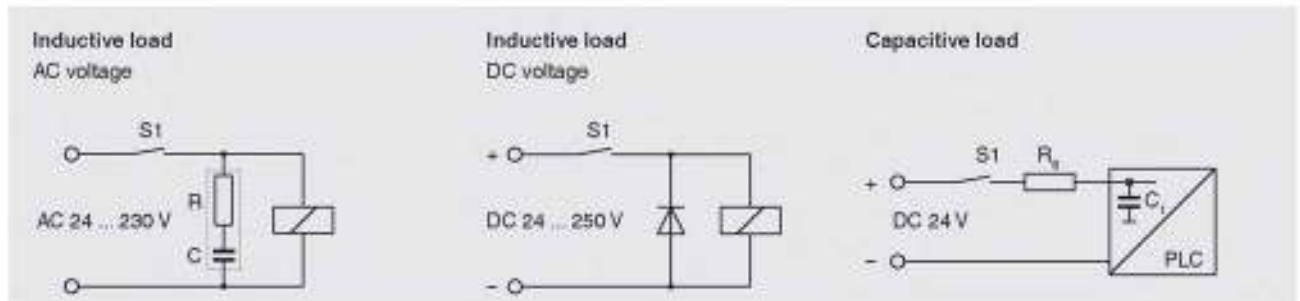


Model KR 24

RC module

Contact protection relays	Contacts	Input	Power supply	Approval number	Order no.
KR 24	1 x change-over AC 250 V, 2 A	2 x contacts	DC 20 ... 30 V		112941
KR 24-EX	2 x change-over AC 253 V, 2 A	2 x contacts	DC 20 ... 30 V	II 1 GD EEx ia IIC, PTB 02 ATEX 2073	112944
KR 230	1 x change-over AC 250 V, 2 A	2 x contacts	AC 230 V		112942
KR 230-EX	2 x change-over AC 253 V, 2 A	2 x contacts	AC 230 V	II 1 GD EEx ia IIC, PTB 02 ATEX 2073	112943

RC module	Capacitance	Resistance	Voltage	Order no.
B3/115	0.33 $\mu$ F	470 Ohm	AC 115 V	110448
B3/230	0.33 $\mu$ F	1,000 Ohm	AC 230 V	110460



### Ordering information

To order the described product the order number (if available) is sufficient.

Alternatively:

Model / Version / Electrical connection / Process connection / Contact tube (insertion length L, contact tube length K) / Options

# Appendix

## Cross Reference HLS

Replaced Type	Type	Description
HIF-FV...	HLS-S	Standard version
HIF-FPP...	HLS-P	Plastic version
HAG...	HLS-ExI	Ex I version
AL-ADF-HI...	HLS-Exd	Ex d version

## Type Code

Code			
<b>1</b>	<b>Basic type</b>		
HIF	Horizontal Float Switch		
HIF-GL	Horizontal Float Switch GL		
HAG	Horizontal Float Switch Ex I		
AL-ADF-HI...	Horizontal Float Switch Ex d		
<b>2</b>	<b>Material float switch</b>		
FV	Stainless steel 316Ti		
FPP	Polypropylene		
FL	Stainless steel 316L		
<b>3</b>	<b>Process connection</b>		
	1. Key Nominal width	2. Key Pressure rating	3. Key Flange facing
.../.../...	EN DIN ANSI Q	EN 1092 DN 50 - DN 100 DIN DN 50 - DN 100 ANSI 2" - 4" Square flange DN 80 and DN 92	PN5 - PN400 PN5 - PN400 Class 150 - Class 2500 Form B1, B2, C, D, E Form, C, N, F, R13, V13 Form RF, RTJ, FF, RFSF
<b>4</b>	<b>Dimensions</b>		
	1. Key Insertion length (depends on float)	2. Key Length contact tube	for float
L.../...	193mm...990mm 185mm...990mm 240mm...990mm 185mm...990mm 185mm...990mm 178mm	100mm...900mm 100mm...900mm 100mm...900mm 100mm...900mm 100mm...900mm 111mm	V44HI T52HI ZVSS43/100HI T52HWGr. S T62HWGr. S PP44HI
<b>5</b>	<b>Raised housing in mm</b>		
/...	0 60	without 60 mm	
<b>6</b>	<b>Material contact tube</b>		
...	V L PP	Stainless steel 316Ti Stainless steel 316L Polypropylene	
<b>7</b>	<b>Contact</b>		
...	U S O I	Change-over SPDT Closing on rising level SPST Opening on rising level SPST Proximity switch	



<b>8</b>	<b>Contact options</b>	
/ ...	R22	Protective resistor R22 for PLC
	N	NAMUR circuit to DIN EN 60497-5-6
<b>9</b>	<b>Float</b>	
	<b>Type</b>	<b>Material</b>
	V44HI	Stainless steel 316Ti
	ZV5543/100HI	Stainless steel 316Ti
	T52HI	Titanium Gr. 2
	T52HI/Gr. 5	Titanium Gr. 5
	T62HI/Gr. 5	Titanium Gr. 5
	PP44HI	Polypropylene
	<b>Pressure</b>	<b>Temperature range</b>
	6 bar	-196°C...350°C
	20 bar	-196°C...350°C
	100 bar	-196°C...350°C
	232 bar	-196°C...350°C
	232 bar	-196°C...350°C
	3 bar	-10°C...80°C
<b>10</b>	<b>Approval</b>	
...	Ex	Ex i intrinsically safe
	Ex d	Ex d explosion-proof

## Ordering example

	Basic type	Material process connection	Process connection	Dimensions	Raised housing	Material contact tube	Contact	Contact options	Float	Approval
Code	1	2	3	4	5	6	7	8	9	10
	HIF	FV	EN25/16/B1	L193/100	/0	V	S	/R22	V44HI	Ex



## KSR – Your Partner for Machine Building

The many applications in the machine-building sector make a wide variety of demands on the components used. Thanks to our close cooperation with partners and professional associations, we are always able to keep an eye on the market.

Closeness to customers is an essential part of our company philosophy. Individually tailored advice and proposals, to match solutions to your needs, supplement our extensive offering of products and services.

## Magnetic float switch

### For horizontal installation, miniature design

#### Model HLS-M

KSR data sheet HLS-M

#### Applications

- For level monitoring and level indication of liquids
- Level measurement for almost all liquid media
- Pump and level control
- Alarm signals
- Dry-run and overflow protection

#### Special features

- Lateral installation in the tank
- Plastic and stainless steel versions
- Space-saving installation
- Switch consists of only one component



Fig. top: Plastic version, for installation from inside, cable outlet

Fig. bottom: Stainless steel version, for installation from outside, cable outlet

#### Description

With its compact design, the model HLS-M magnetic float switch for horizontal installation in miniature design is ideally suited for use in small tanks, for indicating minimum/maximum levels.

The float is attached to a supported, swivelling lever and moves with the level of the medium being measured. By means of a permanent magnet, when a preset switch point is reached, a reed contact (inert gas contact) is actuated.

By using a magnet and reed contact the switching operation is non-contact, free from wear and needs no power supply. The contacts are potential-free.

The switching function refers to a rising liquid level: Standard use as normally open contact (can be used as normally closed contact by a 180° rotation).

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

The following five magnetic float switches are available:

Float switch model	Design	Installation	Electrical connection
HLS-M11	Plastic	from inside	Cable
HLS-M12	Plastic	from outside	Cable
HLS-M21	Stainless steel	from inside	Cable
HLS-M22	Stainless steel	from outside	Cable
HLS-M23	Stainless steel	from outside	Connector



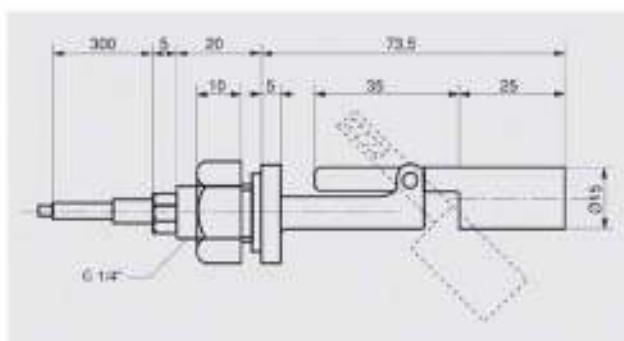
## Plastic version, for installation from inside, cable outlet, model HLS-M11

### Specifications

<b>Switching power</b>	
Normally open contact (can be used as normally closed contact by a 180° rotation)	AC 50 V; 25 VA; 0.5 A DC 50 V; 25 W; 0.5 A
	<b>Attention:</b> Operation only at safety extra-low voltage, e.g. with contact protection relay
<b>Mounting position</b>	horizontal
<b>Medium density</b>	≥ 800 kg/m <sup>3</sup>
<b>Medium temperature</b>	-10 ... +80 °C
<b>Ingress protection</b>	IP 65
<b>Max. operating pressure</b>	1 bar
<b>Material</b>	Polypropylene
<b>Process connection</b>	Male thread G 1/4"
<b>Mounting</b>	for installation in the tank from inside
<b>Float</b>	Outer diameter 15 mm Length 25 mm
<b>Electrical connection</b>	
Cable connection	PVC wires, 2 x 0.5 mm <sup>2</sup> Cable length: 0.3 m



### Dimensions in mm



Order no.: 117612

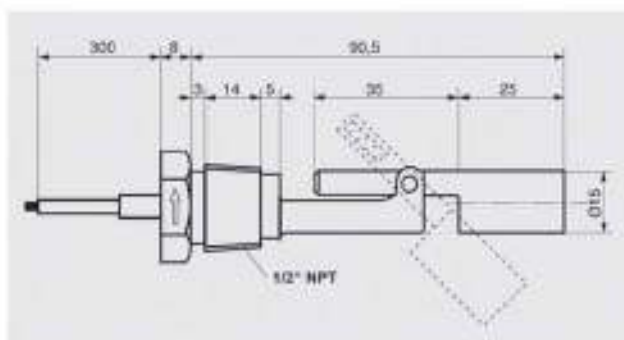
## Plastic version, for installation from outside, cable outlet, model HLS-M12

### Specifications

<b>Switching power</b>	
Normally open contact (can be used as normally closed contact by a 180° rotation)	AC 50 V; 25 VA; 0.5 A DC 50 V; 25 W; 0.5 A
	<b>Attention:</b> Operation only at safety extra-low voltage, e.g. with contact protection relay
<b>Mounting position</b>	horizontal
<b>Medium density</b>	≥ 800 kg/m <sup>3</sup>
<b>Medium temperature</b>	-10 ... +80 °C
<b>Ingress protection</b>	IP 65
<b>Max. operating pressure</b>	1 bar
<b>Material</b>	Polypropylene
<b>Process connection</b>	Male thread 1/2" NPT
<b>Mounting</b>	for installation in the tank from outside
<b>Float</b>	Outer diameter 15 mm Length 25 mm
<b>Electrical connection</b>	
Cable connection	PVC wires, 2 x 0.5 mm <sup>2</sup> Cable length: 0.3 m



### Dimensions in mm



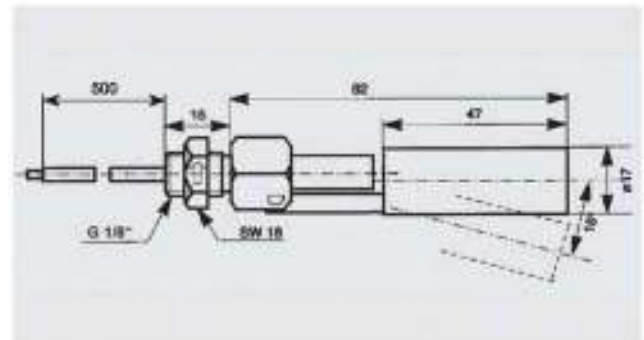
Order no.: 118329

## Stainless steel version, for installation from inside, cable outlet, model HLS-M21

Specifications	
<b>Switching power</b>	
Normally open contact (can be used as normally closed contact by a 180° rotation)	AC 50 V; 25 VA; 0.5 A DC 50 V; 25 W; 0.5 A  <b>Attention:</b> Operation only at safety extra-low voltage, e.g. with contact protection relay
<b>Mounting position</b>	horizontal
<b>Medium density</b>	$\geq 800 \text{ kg/m}^3$
<b>Medium temperature</b>	-40 ... +120 °C
<b>Ingress protection</b>	IP 65
<b>Max. operating pressure</b>	5 bar
<b>Material</b>	Stainless steel 1.4301
<b>Process connection</b>	Male thread G 1/8"
<b>Mounting</b>	for installation in the tank from inside
<b>Float</b>	Outer diameter 17 mm Length 47 mm
<b>Electrical connection</b>	
Cable connection	PVC wires, 2 x 0.5 mm <sup>2</sup> Cable length: 0.5 m



### Dimensions in mm



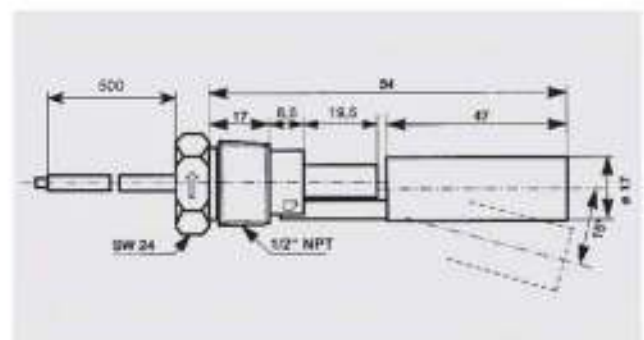
Order no.: 118330

## Stainless steel version, for installation from outside, cable outlet, model HLS-M22

Specifications	
<b>Switching power</b>	
Normally open contact (can be used as normally closed contact by a 180° rotation)	AC 50 V; 25 VA; 0.5 A DC 50 V; 25 W; 0.5 A  <b>Attention:</b> Operation only at safety extra-low voltage, e.g. with contact protection relay
<b>Mounting position</b>	horizontal
<b>Medium density</b>	$\geq 800 \text{ kg/m}^3$
<b>Medium temperature</b>	-40 ... +120 °C
<b>Ingress protection</b>	IP 65
<b>Max. operating pressure</b>	5 bar
<b>Material</b>	Stainless steel 1.4301
<b>Process connection</b>	Male thread 1/2" NPT
<b>Mounting</b>	for installation in the tank from outside
<b>Float</b>	Outer diameter 17 mm Length 47 mm
<b>Electrical connection</b>	
Cable connection	PVC wires, 2 x 0.5 mm <sup>2</sup> Cable length: 0.5 m



### Dimensions in mm



Order no.: 013955



## Stainless steel version, for installation from outside, plug connection, model HLS-M23

### Specifications

#### Switching power

Normally open contact	AC 50 V; 25 VA; 0.5 A
(can be used as normally closed contact by a 180° rotation)	DC 50 V; 25 W; 0.5 A
	Attention: Operation only at safety extra-low voltage, e.g. with contact protection relay

**Mounting position** horizontal

**Medium density**  $\geq 800 \text{ kg/m}^3$

**Medium temperature**  $-40 \dots +120 \text{ }^\circ\text{C}$

**Ingress protection** IP 65

**Max. operating pressure** 5 bar

**Material** Stainless steel 1.4301

**Process connection** Male thread 1/2" NPT

**Mounting** for installation in the tank from outside

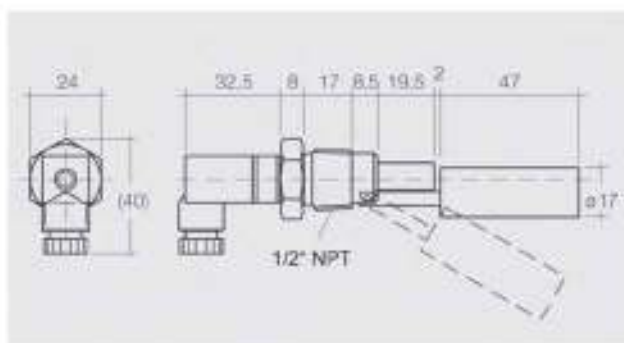
**Float** Outer diameter 17 mm  
Length 47 mm

#### Electrical connection

Plug connection  
Rectangular connector  
EN 175301-803, 2-pin



### Dimensions in mm



Order no.: 118332

### Options

- Other versions on request
- Other cable lengths on request

### CE conformity

#### EMC directive

2004/108/EC, EN 61000-6-4 and EN 61000-6-2

#### Ordering information

To order the described product the order number is sufficient.

Alternatively:

Model / Material / Process connection / Electrical connection / Mounting / Pressure, temperature, density / Options

## Level measurement

# Suspended float switch

KSR data sheet SLS

S  
treatment plants  
ns

## Features

sewage, wastewater and fluids containing  
friendly, since it is mercury and lead-free  
neutral PP case  
and electrical service life of the micro  
use in Ex zones 0, 1 and 2



Suspended float switch  
Fig. left: Model SLS-M2  
Fig. centre: Model SLS-MS1  
Fig. right: Model SLS-MS1-Ex

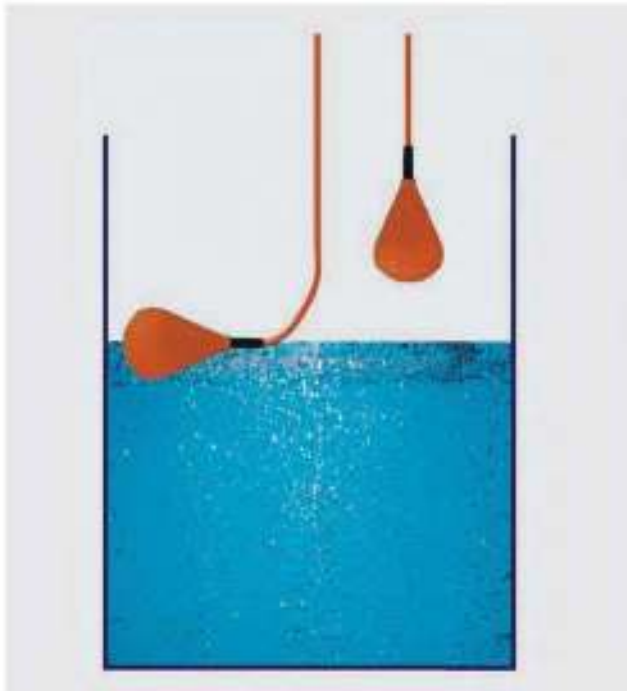
switches are attached to a highly flexi-  
ble cable from above and contain a micro switch,  
enclosed, shock and fracture-proof, in a  
protective system. When the float body is immersed in  
the liquid, the bulb tips and triggers the micro switch.

In the full range, a stabilisation weight is also  
available. It is also suitable for concrete ceilings.

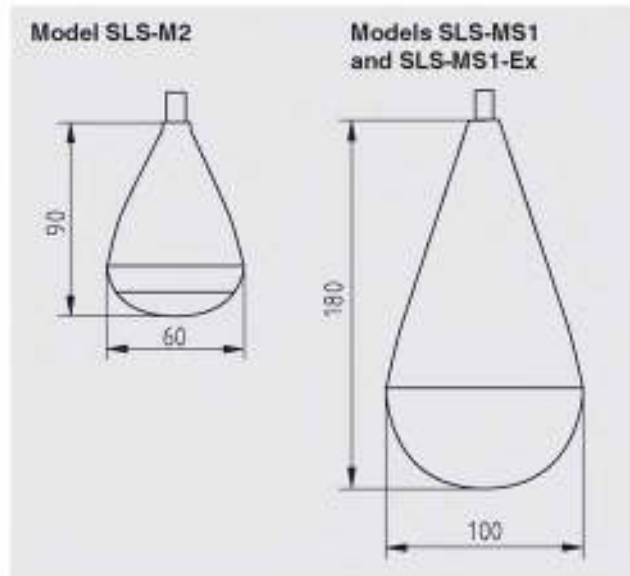
One suspended float switch is required for each switch point.  
The contact is designed as a change-over contact, so that it  
can be configured as a high alarm as well as a low alarm.

Through the patented, centrally mounted micro switch, the  
suspended float switch can switch in any direction, and not  
dependent on the direction in which the switch tips.

## Illustration of the principle



## Dimensions in mm



## CE conformity

Low voltage directive  
2006/95/EC

Environmental protection directive  
RoHS 2002/95/EC

## Specifications

	Model SLS-M2			Model SLS-MS1			Model SLS-MS1-Ex		
Medium density	950 ... 1,050 kg/m <sup>3</sup>			950 ... 1,050 kg/m <sup>3</sup>			950 ... 1,050 kg/m <sup>3</sup>		
Maximum temperature	80 °C			80 °C			80 °C		
Switching power	2 A, 250 V			5 A, 250 V			1 ... 100 mA, 4 ... 40 V		
Case	PP			PP			PP PRE-ELEC (anti-static)		
Colour	orange			orange			black		
Ingress protection	IP 68			IP 68			IP 68		
Cable	TPK/ PVC, orange			TPK/ PVC, orange			TPK/ PVC, blue		
Wire cross-section	3 x 0.5 mm <sup>2</sup>			3 x 0.75 mm <sup>2</sup>			4G0.75 mm <sup>2</sup>		
Cable length	5 m	10 m	20 m	5 m	10 m	20 m	5 m	10 m	20 m
Order no.	008109	006110	006111	008115	006116	112391	010924	006119	006121
Approval	-			-			II 1G EEx ia IIC T6 SNCH 01 ATEX 3249		

## Ordering information

To order the described product the order number is sufficient.

## Level sensor With reed-chain technology Model FLR

KSR data sheet FLR



### Applications

- Level measurement for almost all liquid media
- Chemical, petrochemical, natural gas, offshore, shipbuilding, machine building, power generating equipment, power plants
- Process water and drinking water treatment, food industry, pharmaceutical industry

### Special features

- Process- and system-specific solutions possible
- Operating limits:
  - Operating temperature:  $T = -80 \dots +200 \text{ }^{\circ}\text{C}$
  - Operating pressure:  $P = \text{Vacuum to } 80 \text{ bar}$
  - Limit density:  $\rho \geq 400 \text{ kg/m}^3$
- Wide variety of different electrical connections, process connections and materials
- Optionally with programmable and configurable head-mounted transmitter for 4 ... 20 mA field signals, HART®, PROFIBUS® PA and FOUNDATION™ Fieldbus
- Explosion-protected versions

### Description

The model FLR sensors with reed-chain technology are used for level measurement in liquid media. They work on the float principle with magnetic transmission.

The float's magnetic system in the guide tube actuates a resistance measuring chain that corresponds to a 3-wire potentiometer circuit. The measurement voltage generated by this is proportional to the fill level.

The measurement voltage is very finely-stepped due to the contact separation of the measuring chain and is thus virtually continuous. Resolutions between 5 and 18 mm are available depending on the requirements.



Level sensor with reed-chain technology,  
model FLR-S, flange connection



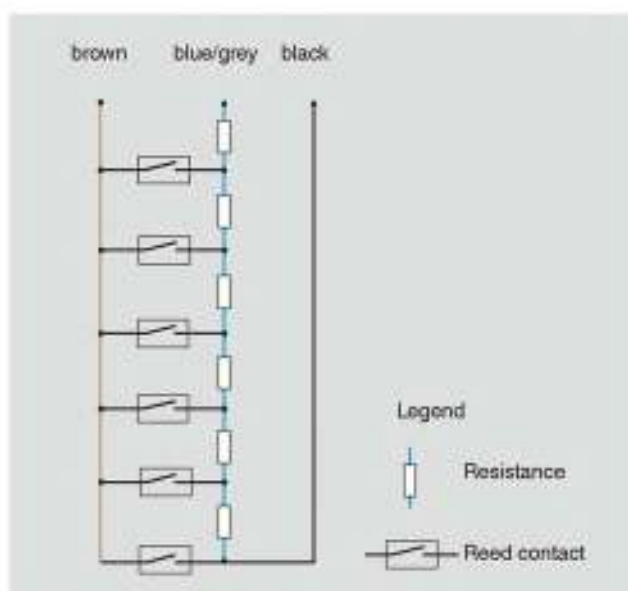
## Further special features

- Large scope of application due to the simple, proven functional principle
- Process connection, guide tube and float from stainless steel 1.4571 or plastic
- For harsh operating conditions, long service life
- Continuous measurement of levels, independent of physical and chemical changes of the media such as: Foaming, conductivity, dielectric, pressure, vacuum, temperature, vapours, condensation, bubble formation, boiling effects, density change
- Signal transmission over long distances
- Simple installation and commissioning, onetime calibration only, no recalibration necessary
- Level displayed proportional to volume or height
- High repeatability
- Interface measurement and overall level from  $\Delta$  density  $50 \text{ kg/m}^3$
- Level sensors with reed-chain technology 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 EEx ib.

## Options

- Customised solutions
- Programmable and configurable head-mounted transmitters in connection housing, output signal 4 ... 20 mA, 2-wire, for HART®, PROFIBUS® PA and FOUNDATION™ Fieldbus
- Process connection, guide tube material and float from stainless steel 1.4435, 1.4539, titanium, Hastelloy (others on request)
- In combination with limit switch, stepless setting of the limit values over the entire measuring range

## Internal circuit diagram of the reed sensors



## Model overview

Sensor model	Description	Materials						Titanium 3.7035 (grade 2)	PVC	PP	PVDF	Buna
		1.4571 (316Ti)	1.4404 (316L)	1.4435 (316L)	1.4571 (316Ti) / PP	1.4571 (316Ti) / PA	1.4571 (316Ti) / Ms					
FLR-S	Reed-chain sensor, standard version	x	x	x	x	x	x					x
FLR-P	Reed-chain sensor, plastic version								x	x	x	
FLR-H	Reed-chain sensor, sterile version		x	x								

Sensor model	Approval											Temperature range (process)
	without	Ex i	Ex d	GL	Ex i + GL	ABS	DNV	Bureau Veritas	3-A	FM	GOST	
FLR-S	x	x	x	x	x	x	x	x		x		-80 ... +200 °C
FLR-P	x											-10 ... +100 °C
FLR-H	x								x		x	-20 ... +200 °C

## Ex approvals

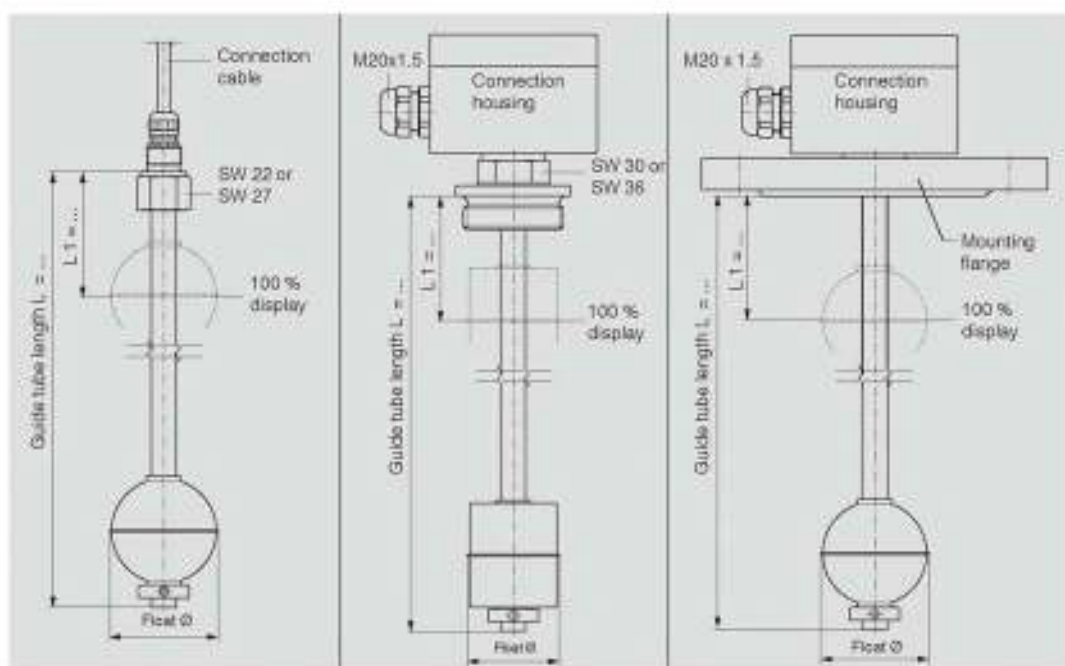
Explosion protection	Ignition protection type	Model	Zone	Approval number
ATEX	Ex i	FLR-S	Zone 0/1/2	KEMA 01 ATEX 1152 X II 1/2G Ex ia IIC T4 ... T6 - II 2 D T80 °C IP 6X
	Ex d	FLR-S	Zone 1/2	TÜV 13 ATEX 7399 X II 2G Ex d IIC T6 Gb / II 2 D Ex tb IIIC T80 °C Db
	Ex d	FLR-S	Zone 1/2	IECEX TUR 09.0002X -40 °C <= ta <= +55 °C Ex d IIC T6 Ex tD A21 IP 65 T80 °C
	Ex i + GL	FLR-S	Zone 1/2	KEMA 01 ATEX 1152 X II 1/2G Ex ia IIC T4 ... T6 - II 2 D T80 °C IP 6X + GL-14788-99 HH
	Ex i + DNV	FLR-S	Zone 1/2	KEMA 01 ATEX 1152 X II 1/2G Ex ia IIC T4 ... T6 - II 2 D T80 °C IP 6X + DNV-A-11452

## Type approval

Explosion protection	Model	Approval number
GL	FLR-S	GL-14788-99 HH
DNV	FLR-S	DNV-A-11452
GOST	FLR-S, FLR-P	0959333
3-A	FLR-H	3-A Sanitary Standards

## Sensor, standard version, model FLR-S

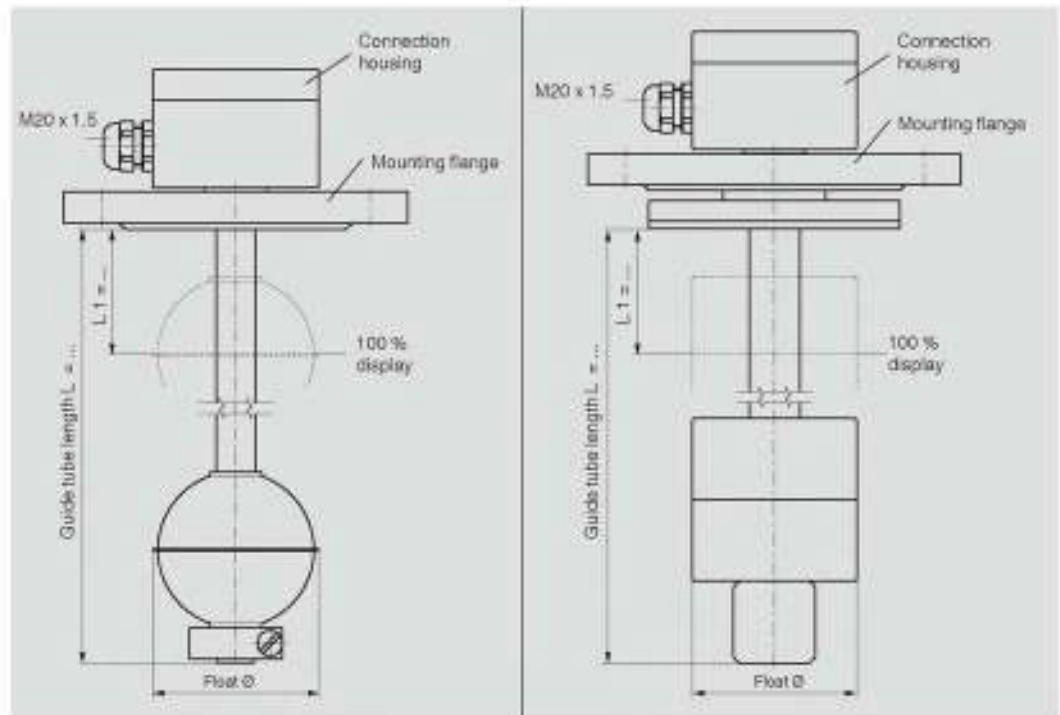
Process connection, guide tube material and float from stainless steel 1.4571



	Mounting thread (without connection housing)			Mounting thread			Flange		
Electrical connection	Connection cable ■ PVC ■ Silicone ■ PUR			Connection housing ■ Aluminium 80 x 75 x 57 mm Option: Polypropylene, polyester, stainless steel					
Process connection	Mounting thread upwards G 3/8" (others on request)   G 1/2" (others on request)			Mounting thread downwards G 1 1/2" or G 2"			Mounting flange ■ DIN DN 50 ... DN 200, PN 6 ... PN 100 ■ ANSI 2" ... 8", class 150 ... 600		
Guide tube diameter	8 mm	12 or 14 mm	18 mm	8 mm	12 or 14 mm	18 mm	8 mm	12 or 14 mm	18 mm
Guide tube length L max.	500 mm	3,000 mm	6,000 mm	500 mm	3,000 mm	6,000 mm	500 mm	3,000 mm	6,000 mm
Float	Material stainless steel 1.4571 (Option: Buna, titanium) Float diameter from 44 ... 120 mm Float selection depending on guide tube diameter and process conditions (see page 14 and 15)								
Max. operating pressure	80 bar, see table page 14 and 15								
Temperature range standard	PVC-/PUR cable -10 ... +80 °C Silicone cable -10 ... +120 °C			-20 ... +120 °C Option: ■ High-temperature version: +120 ... +200 °C Option: ■ Low-temperature version: -80 ... -26 °C					
Contact separation	K 18 = 18 mm (not with option high and low temperature version) K 15 = 15 mm K 10 = 10 mm K 5 = 5 mm								
Overall resistance of the measuring chain	Length and separation dependent								
Connection cable to transmitter	Cable length max. 2,000 m, 3-wire, screened								
Mounting position	Vertical ±30°								
Ingress protection	IP 65 per EN 60529 / IEC 60529								
Materials	Stainless steel 1.4571, 1.4404, 1.4435, 1.4439, titanium 3.7035 (grade 2), Hastelloy and others on request								

## Sensor, E-CTFE coated or PTFE sheathed, model FLR-S

Process connection, guide tube and float from stainless steel 1.4571



	Flange, E-CTFE coated	Flange, PTFE sheathed
Electrical connection	Connection housing ■ Aluminium 80 x 75 x 57 mm Option: Polypropylene, polyester, stainless steel	
Process connection	Mounting flange ■ DIN DN 50 ... DN 200, PN 6 ... PN 100 ■ ANSI 2" ... 8", class 150 ... 600	
Guide tube diameter	16 mm	25 mm, PTFE sheath = 3,5 mm thick
Guide tube length L max.	4,000 mm	5,000 mm
Float	Material ■ Stainless steel 1.4571, E-CTFE coated ■ PVDF ■ PTFE Float diameter from 44 ... 120 mm Float selection depending on guide tube diameter and process conditions (see page 14 and 15)	
Max. operating pressure	see table page 14 and 15	
Temperature range	Depending on medium	
Contact separation	K 18 = 18 mm K 15 = 15 mm K 10 = 10 mm K 5 = 5 mm	
Overall resistance of the measuring chain	Length and separation dependent	
Connection cable to transmitter	Cable length max. 2,000 m, 5-wire, screened	
Mounting position	Vertical ±30°	
Ingress protection	IP 65 per EN 60529 / IEC 60529	
Materials	Stainless steel 1.4571, E-CTFE coated, or PTFE sheathed (option: anti-static)	

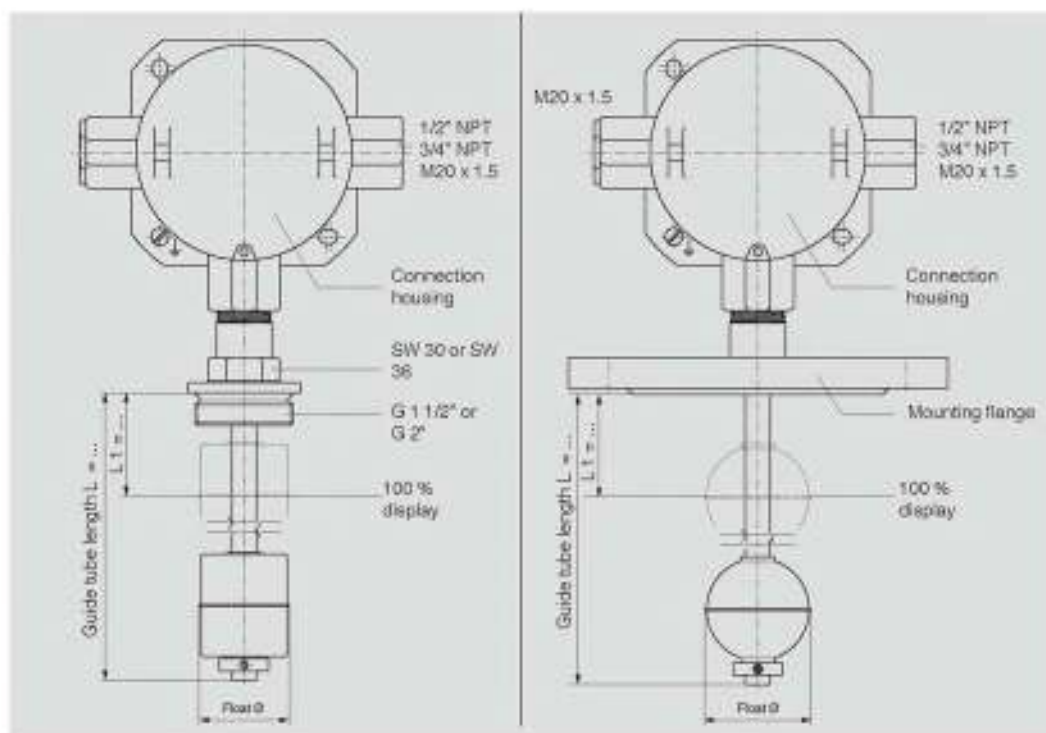


## Reed sensor, explosion-protected version Ex d, flameproof enclosure, model FLR-S

TÜV 13 ATEX 7399 X II 2G Ex d IIC T6 Gb / II 2 D Ex tb IIIC T80 °C Db

IECEX TUR 09.0002X -40 °C <= ta <= +55 °C Ex d IIC T6 Ex tD A21 IP 65 T80 °C

Process connection, guide tube and float from stainless steel 1.4571

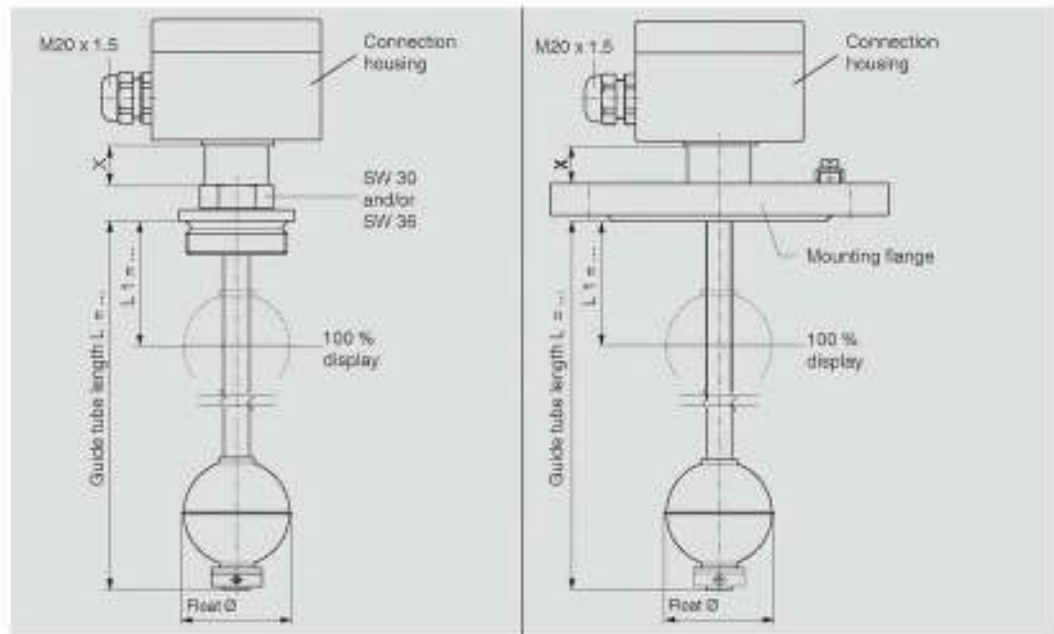


	Mounting thread	Flange
Electrical connection	Connection housing: ■ Aluminium Option: Stainless steel	
Process connection	Mounting thread downwards G 1 1/2" or G 2" (others on request)	Mounting flange ■ DIN DN 60 ... DN 350, PN 6 ... PN 40 ■ ANSI 2" ... 14", class 150 ... 300
Guide tube diameter	12 and 14 mm	18 mm
Guide tube length L max.	3,000 mm	5,000 mm
Float	Material stainless steel 1.4571 Float diameter from 44 ... 120 mm Float selection depending on guide tube diameter and process conditions (see page 14 and 15)	
Max. operating pressure	See table page 14 and 15	
Temperature range	T4: 120 °C, T5: 95 °C, T6: 80 °C	
Contact separation	K 18 = 18 mm K 15 = 15 mm K 10 = 10 mm K 5 = 5 mm	
Overall resistance of the measuring chain	Length and separation dependent	
Connection cable to transmitter	Cable length max. 2,000 m, 3-wire, screened	
Mounting position	Vertical ±30°	
Ingress protection	IP 65 per EN 60529 / IEC 60529	
Materials	Stainless steel 1.4571	

## Sensor, explosion-protected version, intrinsically safe, model FLR-S

KEMA 01 ATEX 1052 X II 1/2G Ex ia IIC T4 ... T6 - II 2 D T80 °C IP 6X

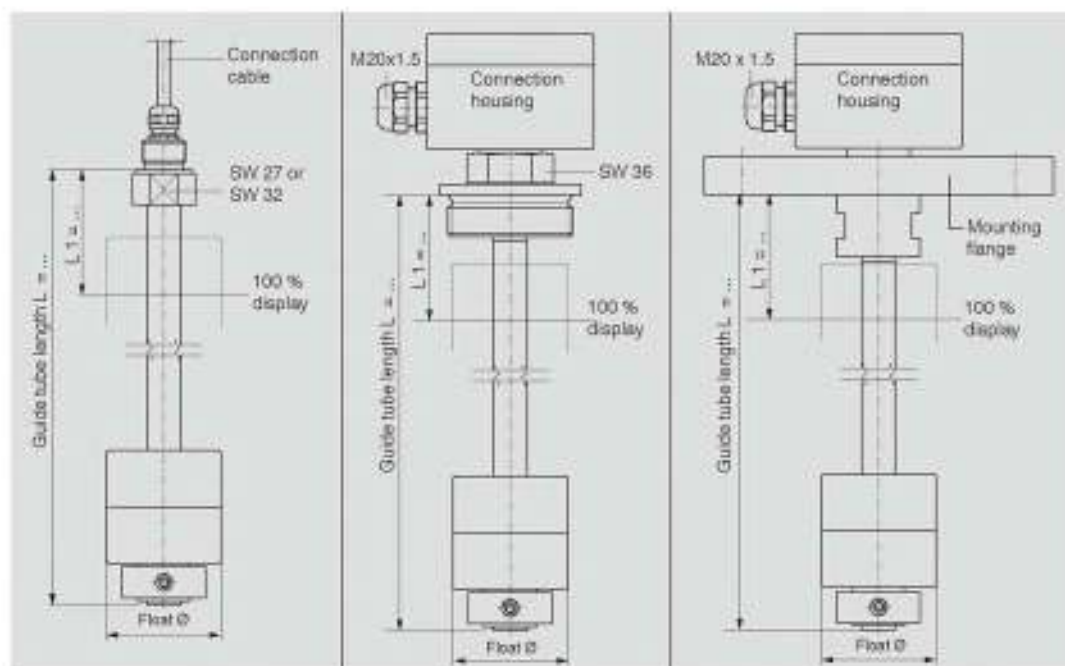
Process connection, guide tube and float from stainless steel 1.4571



	Mounting thread	Flange	
Electrical connection	Connection housing ■ Aluminium 80 x 75 x 57 mm Option: Stainless steel, polyester		
Process connection	Mounting thread downwards G 1 1/2" or G 2" (others on request)	Mounting flange ■ DIN DN 50 ... DN 200, PN 6 ... PN 100 ■ ANSI 2" ... 8", class 150 ... 600	
Guide tube diameter	12, 14 or 18 mm		
Guide tube length L max.	See variants A and B on page 16		
Float	Material stainless steel 1.4571 (Option: Buna, titanium) Float diameter from 44 ... 120 mm Float selection depending on guide tube diameter and process conditions (see page 14 and 15)		
Max. operating pressure	see table page 14 and 15		
Temperature class	T4	T5	T6
Surface temperature	Max. 135 °C	100 °C	85 °C
Process temperature	Max. 100 °C	85 °C	50 °C
Ambient temperature at connection housing	Max. 60 °C	60 °C	60 °C
Contact separation	K 18 = 18 mm K 15 = 15 mm K 10 = 10 mm K 5 = 5 mm		
Overall resistance of the measuring chain	Length and separation dependent		
Control circuit	Ignition protection type EEx ia IIC, only for connection to a certified intrinsically safe control circuit Transmitter external with max. 120 mA, max. 28 V Head-mounted transmitter in accordance with transmitter approvals		
Connection cable to transmitter	Cable length max. 2,000 m, 3-wire, screened		
Mounting position	Vertical ±30°		
Ingress protection	IP 65 per EN 60529 / IEC 60529		
Materials	Stainless steel 1.4571, 1.4404, titanium 3.7035 (grade 2), Hastelloy and others on request		

## Sensor, plastic version, polypropylene, model FLR-P

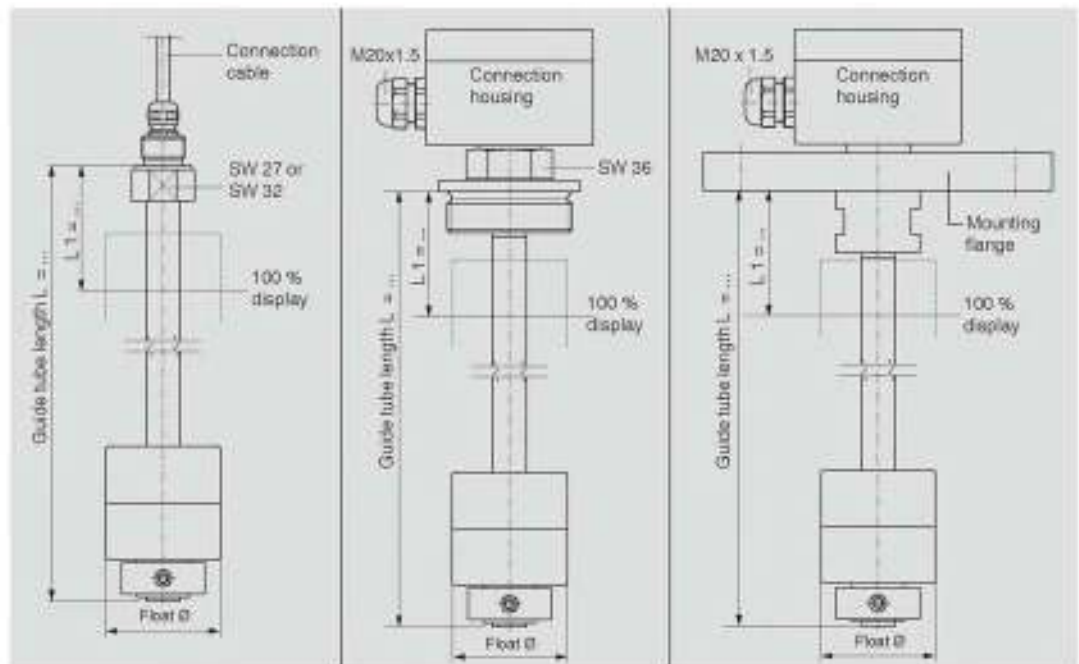
Process connection, guide tube and float from polypropylene



	Mounting thread (without connection housing)	Mounting thread	Flange
Electrical connection	Connection cable ■ PVC ■ Silicone ■ PUR	Connection housing ■ Polyester 80 x 75 x 55 mm	
Process connection	Mounting thread, upwards ■ G 1/2" (guide tube Ø 16 mm) ■ G 1" (guide tube Ø 20 mm) (others on request)	Mounting thread, downwards G 2" (others on request)	Mounting flange ■ DIN DN 65 ... DN 125, PN 10, form A ■ ANSI 2 1/4" ... 5", class 150 FF
Guide tube diameter	16 or 20 mm (strengthened with a metallic inner tube)		
Guide tube length L max.	■ 3,000 mm (guide tube Ø 16 mm) ■ 5,000 mm (guide tube Ø 20 mm)		
Float	Material polypropylene Float diameter from 44 ... 80 mm Float selection depending on guide tube diameter and process conditions (see page 14 and 15)		
Max. operating pressure	3 bar		
Temperature range	-10 ... +60 °C		
Contact separation	K 18 = 18 mm K 15 = 15 mm K 10 = 10 mm K 5 = 5 mm		
Overall resistance of the measuring chain	Length and separation dependent		
Connection cable to transmitter	Cable length max. 2,000 m, 3-wire, screened		
Mounting position	Vertical ±30°		
Ingress protection	IP 65 per EN 60529 / IEC 60529		

## Sensor, plastic version, PVDF, model FLR-P

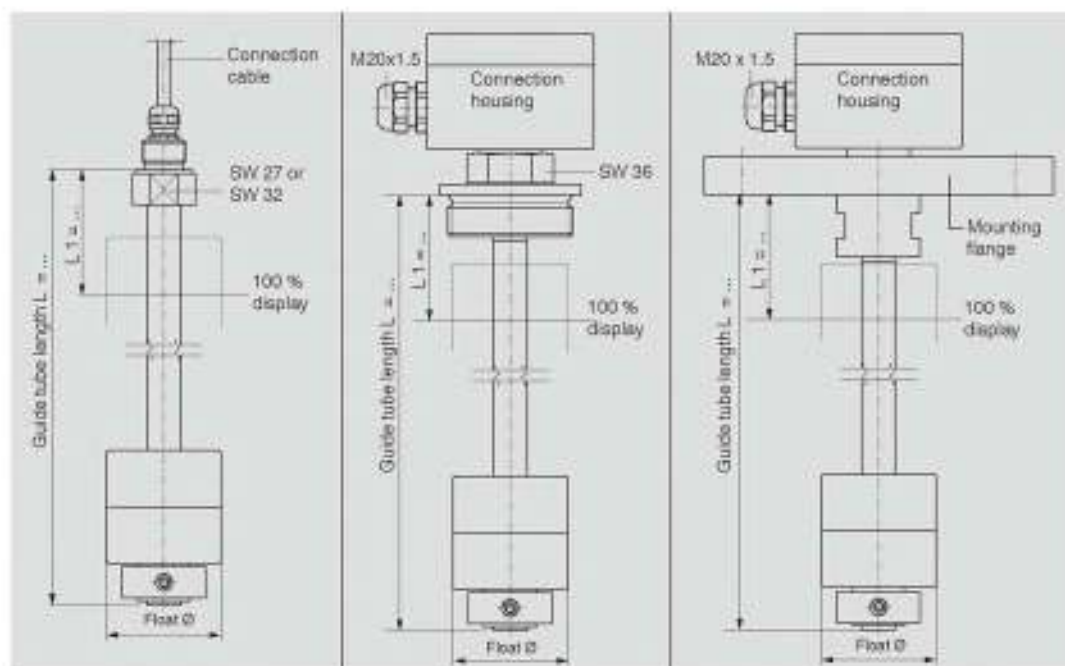
Process connection, guide tube and float from PVDF



	Mounting thread (without connection housing)	Mounting thread	Flange
Electrical connection	Connection cable ■ PVC ■ Silicone ■ PUR	Connection housing: ■ Polyester 80 x 75 x 55 mm	
Process connection	Mounting thread, upwards ■ G 1/2" (guide tube Ø 16 mm) ■ G 1" (guide tube Ø 20 mm) (others on request)	Mounting thread, downwards G 2" (others on request)	Mounting flange ■ DIN DN 65 ... DN 125, PN 10, form A ■ ANSI 2 1/2" ... 5", class 150 FF
Guide tube diameter	16 or 20 mm (strengthened with a metallic inner tube)		
Guide tube length L, max.	■ 3,000 mm (guide tube Ø 16 mm) ■ 5,000 mm (guide tube Ø 20 mm)		
Float	Material PVDF Float diameter from 44 ... 80 mm Float selection depending on guide tube diameter and process conditions (see page 14 and 15)		
Max. operating pressure	3 bar		
Temperature range	-10 ... +100 °C		
Contact separation	K 18 = 18 mm K 15 = 15 mm K 10 = 10 mm K 5 = 5 mm		
Overall resistance of the measuring chain	Length and separation dependent		
Connection cable to transmitter	Cable length max. 2,000 m, 3-wire, screened		
Mounting position	Vertical ±30°		
Ingress protection	IP 65 per EN 60529 / IEC 60529		

## Sensor, plastic version, PVC, model FLR-P

Process connection, guide tube and float from PVC

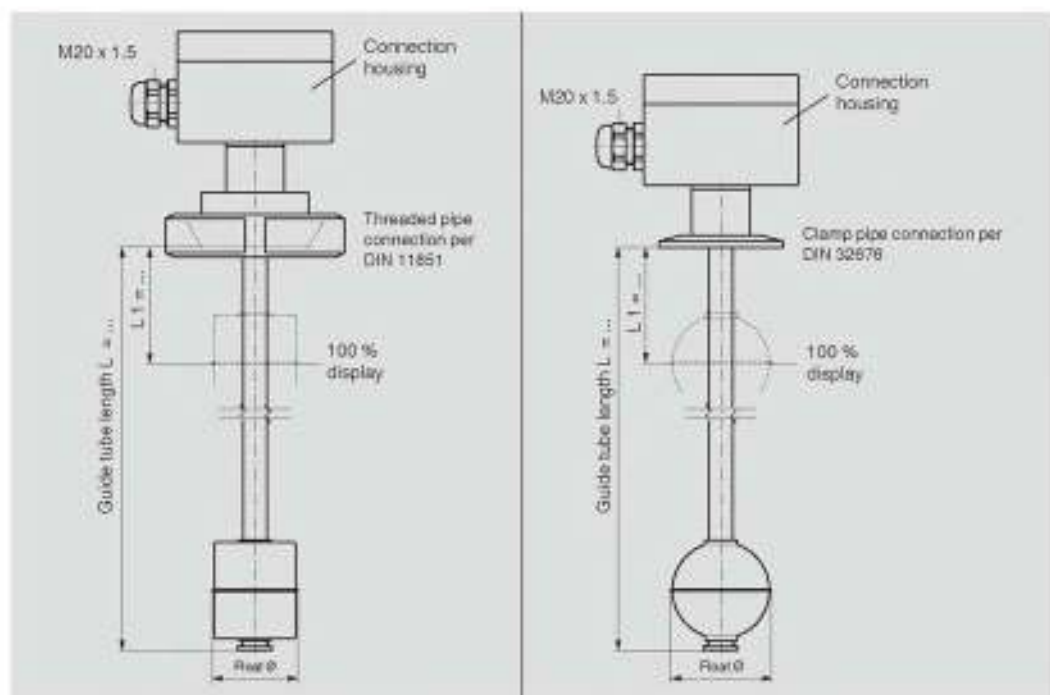


	Mounting thread (without connection housing)	Mounting thread	Flange
Electrical connection	Connection cable ■ PVC ■ Silicone ■ PUR	Connection housing ■ Polyester 80 x 75 x 55 mm	
Process connection	Mounting thread, upwards ■ G 1/2" (guide tube Ø 16 mm) ■ G 1" (guide tube Ø 20 mm) (others on request)	Mounting thread, downwards G 2" (others on request)	Mounting flange ■ DIN DN 65 ... DN 125, PN 10, form A ■ ANSI 2 1/4" ... 5", class 150 FF
Guide tube diameter	16 or 20 mm (strengthened with a metallic inner tube)		
Guide tube length L max.	■ 3,000 mm (guide tube Ø 16 mm) ■ 5,000 mm (guide tube Ø 20 mm)		
Float	Material PVC Float diameter from 44 ... 80 mm Float selection depending on guide tube diameter and process conditions (see page 14 and 15)		
Max. operating pressure	3 bar		
Temperature range	0 ... +60 °C		
Contact separation	K 18 = 18 mm K 15 = 15 mm K 10 = 10 mm K 5 = 5 mm		
Overall resistance of the measuring chain	Length and separation dependent		
Connection cable to transmitter	Cable length max. 2,000 m, 3-wire, screened		
Mounting position	Vertical ±30°		
Ingress protection	IP 65 per EN 60529 / IEC 60529		



## Sensor, sterile version, model FLR-H

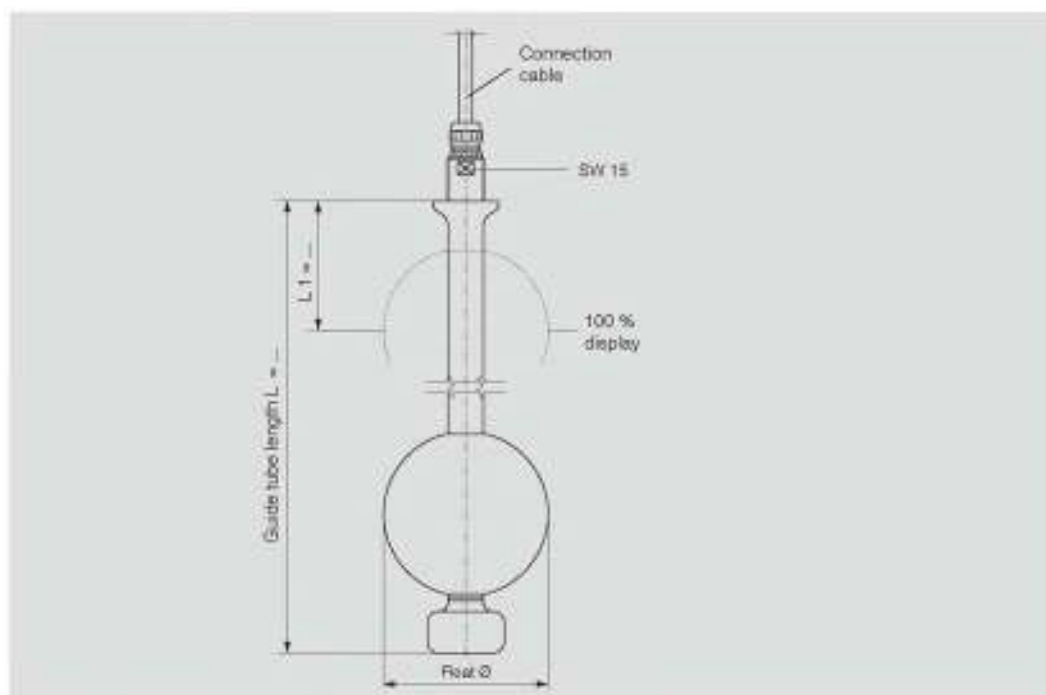
Process connection, guide tube and float from stainless steel 1.4435 (316L) or 1.4404 (316L), surface ground and polished Ra < 0.8 µm or Ra < 0.4 µm, alternatively electropolished



	Threaded pipe connection per DIN 11851	Clamp pipe connection per DIN 32676
Electrical connection	Connection housing ■ Aluminium 80 x 75 x 57 mm Option: Polypropylene, polyester, stainless steel	
Process connection	Threaded pipe connection per DIN 11851, downwards DN 50 ... DN 150 (others on request)	Clamp pipe connection per DIN 32676, DN 25 ... DN 100 or 1" ... 4" (others on request)
Guide tube diameter	12 or 14	18 mm
Guide tube length L max.	3,000 mm	6,000 mm
Float	Material stainless steel 1.4435 or 1.4404, option electropolished Float diameter from 44 ... 120 mm Float selection depending on guide tube diameter and process conditions (see page 14 and 15)	
Max. operating pressure	see table page 14 and 15	
Temperature range standard	-20 ... +120 °C Option: ■ High-temperature version: +120 ... +200 °C Option: ■ Low-temperature version: -80 ... -20 °C	
Contact separation	K 18 = 18 mm (not with high- and low-temperature version) K 15 = 15 mm K 10 = 10 mm K 5 = 5 mm	
Overall resistance of the measuring chain	Length and separation dependent	
Connection cable to transmitter	Cable length max. 2,000 m, 3-wire, screened	
Mounting position	Vertical ±30°	
Ingress protection	IP 65 per EN 60529 / IEC 60529	
Materials	Stainless steel 1.4435 (316L) or 1.4404 (316L)	

## Sensor, sterile version, model FLR-H

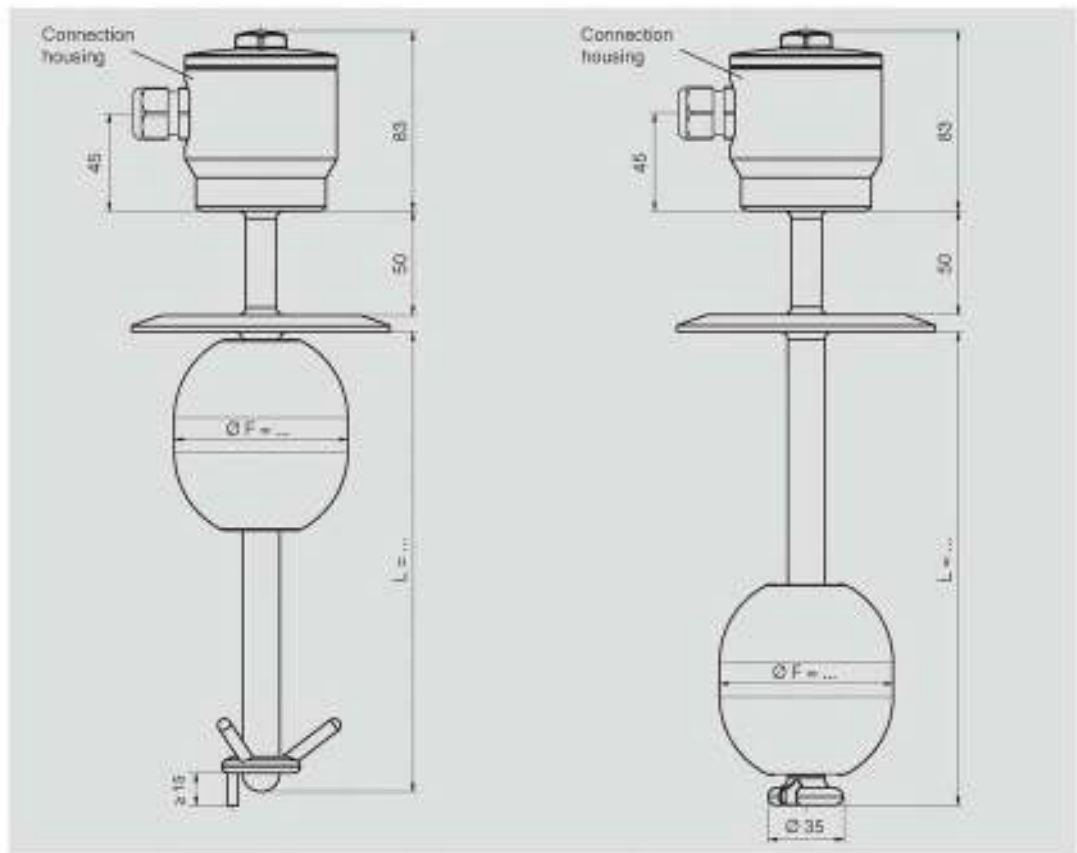
Process connection, guide tube and float from stainless steel 1.4435 (316L) or 1.4404 (316L), surface ground and polished Ra < 0.8 µm or Ra < 0.4 µm, alternatively electropolished



	Mounting thread (without connection housing)	Mounting thread (without connection housing)
Electrical connection	Connection cable ■ PVC ■ Silicone ■ PUR	Connection housing ■ Aluminum 80 x 75 x 57 mm
Process connection	Mounting thread downwards G 3/8" (others on request)	■ Mounting flange per DIN or ANSI ■ Threaded connection per DIN 11851 ■ Clamp pipe connection per DIN 32676 ■ Ingold sanitary fitting
Guide tube diameter	17.2 mm (material stainless steel 1.4435, 1.4439 or 1.4404, surface ground and electropolished)	
Guide tube length L max.	5,000 mm	
Float	Material stainless steel 1.4439 or 1.4404, surface ground and electropolished Float diameter from 44 ... 120 mm Float selection depending on guide tube diameter and process conditions (see page 14 and 15)	
Max. operating pressure	25 bar	
Temperature range standard	PVC/PUR cable -10 ... +80 °C Silicone cable -10 ... +120 °C	-20 ... +120 °C Option: ■ High-temperature version: +120 ... +200 °C Option: ■ Low-temperature version: -80 ... -20 °C
Contact separation	K 18 = 18 mm (not with high- and low-temperature version) K 15 = 15 mm K 10 = 10 mm K 5 = 5 mm	
Overall resistance of the measuring chain	Length and separation dependent	
Connection cable to transmitter	Cable length max. 2,000 m, 3-wire, screened	
Mounting position	Vertical ±30°	
Ingress protection	IP 65 per EN 60529 / IEC 60529	
Materials	Stainless steel 1.4435, 1.4439 and 1.4404	

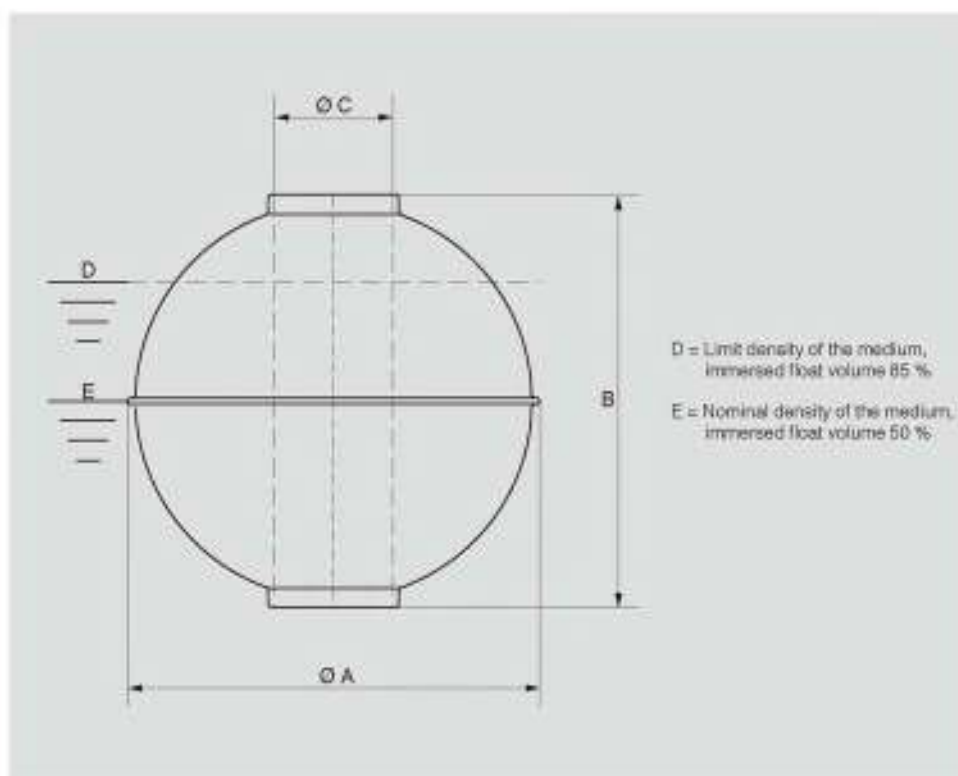
### Sensor, sterile version, 3-A certified, model FLR-H

Process connection, guide tube and float from stainless steel 1.4435 (316L) or 1.4404 (316L), surface ground and polished Ra < 0.8 µm or Ra < 0.4 µm, alternatively electropolished



	Version with separate float bracket	Version with welded pipe end
Electrical connection	Connection housing Stainless steel (1.4571) with cable gland M20 x 1.5 (polysimide or hygienic design)	
Process connection	<ul style="list-style-type: none"> <li>■ Clamp connection ISO 2852 (DN 32 ... DN 100 or 1.5" ... 4")</li> <li>■ Clamp connection DIN 32676 (DN 32 ... DN 100 or 1.5" ... 4")</li> <li>■ Aseptic mounting thread downwards DIN 11864-1 (DN 32 ... DN 100 or 1.5" ... 4")</li> <li>■ Aseptic collar connecting sleeve DIN 11864-1 (DN 32 ... DN 100 or 1.5" ... 4")</li> <li>■ Aseptic flange connection DIN 11864-2 (DN 32 ... DN 50 or 1.5" ... 2")</li> <li>■ Aseptic clamp connection DIN 11864-3 (DN 32 ... DN 100 or 1.5" ... 4")</li> <li>■ VARIVENT® (form F, N and G)</li> <li>■ BioConnect® threaded connection (DN 32 ... DN 100 or 1.5" ... 2")</li> <li>■ BioConnect® flange connection (DN 32 ... DN 100 or 1.5" ... 2")</li> <li>■ BioConnect® clamp connection (DN 32 ... DN 100 or 1.5" ... 2")</li> </ul>	
Guide tube diameter	12, 14 or 17.2 mm (stainless steel 1.4435 or 1.4404, surface ground and polished, Ra < 0.8 µm)	
Guide tube length L max.	6,000 mm	
Float	Material stainless steel 1.4435 or 1.4404 Float diameter 50 or 80 mm Float selection depending on guide tube diameter	
Max. operating pressure	10 bar	
Temperature range	<ul style="list-style-type: none"> <li>■ Medium standard -40 ... +200 °C</li> <li>■ Sensor housing -40 ... +85 °C</li> </ul>	
Contact separation	K 18 = 18 mm K 15 = 15 mm K 10 = 10 mm K 5 = 5 mm	
Overall resistance of the measuring chain	Length and separation dependent	
Connection cable to transmitter	Cable length max. 2,000 m, 3-wire, screened	
Mounting position	Vertical ±30°	
Ingress protection	IP 68 per EN 60529 / IEC 60529	

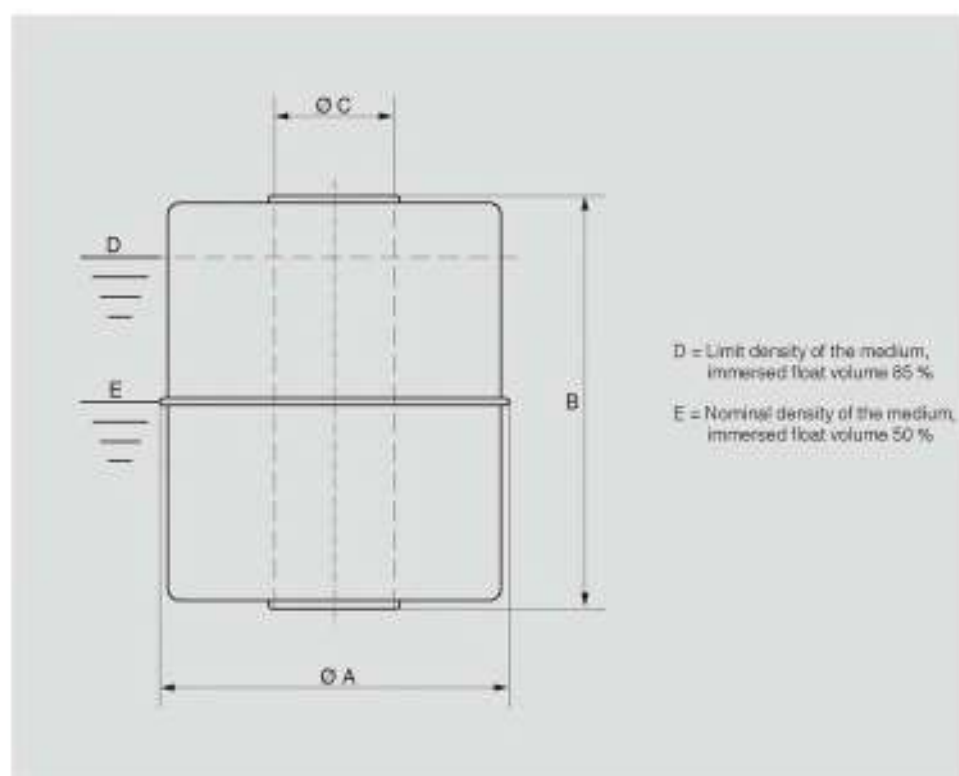
## Spherical floats (K)



Material	Suits guide tube $\varnothing$ mm	$\varnothing A$ mm	B mm	$\varnothing C$ mm	Max. operating pressure bar	Max. operating temperature °C	Limit density 85 % kg/m <sup>3</sup>	Order no.
Stainless steel 1.4571	12	52	52	15	40	250	727	020913
	12	62	61	15	32	250	597	026026
	12	83	81	15	25	250	412	021089
	18	80	76	23	25	250	617	005479
	18	98	96	23	25	250	561	005490
	18	106	103	23	25	250	520	005494
	18	120	117	23	25	250	394	026726
	18-30	120	116	38	25	250	537	-
	18-30	200	192	56	16	250	581	005603
	18-30	300	294	56	16	250	342	-
Titanium 3.7035	12	52	52	15	25	250	623	-
	12	52	52	15	30	250	790	-
	12	52	52	15	30	250	997	-
	12	62	62	15	25	250	482	005538
	12	83	81	15	25	250	343	005544
	18	80	76	23	25	250	666	005543
	18	98	96	23	25	250	536	-
	18	105	103	23	25	250	416	005549
Stainless steel 1.4571 E-CTFE coated	18	81	77	22	25	depending on medium	634	-
	18	99	97	22	25	depending on medium	603	-
	18	106	104	22	25	depending on medium	566	-
	18	121	118	22	3	depending on medium	435	-

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

## Cylindrical floats (Z)



Material	Suits guide tube $\varnothing$ mm	$\varnothing A$ mm	$B$ mm	$\varnothing C$ mm	Max. operating pressure bar	Max. operating temperature °C	Limit density 85 % kg/m <sup>3</sup>	Order no.
Stainless steel 1.4571	12	44	52	15	16	250	740	034196
Titanium 3.7035	12	44	52	15	16	250	645	022639
PVC	16	55	54	22	3	80	805	033696
	20	80	79	25	3	80	577	033697
Polypropylene	16	55	54	22	3	80	562	033700
	20	80	79	25	3	80	438	033701
PVDF	16	55	69	22	3	100	809	033698
	20	80	79	25	3	100	706	033699
PTFE	16-20	60	100	28	3	depending on medium	667	115056
	16-20	90	100	28	3	depending on medium	584	-

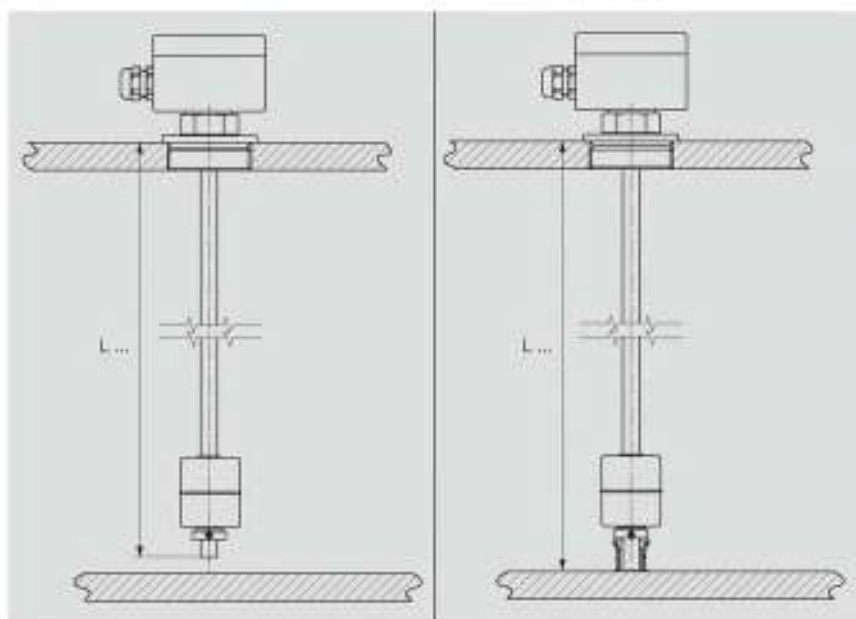
Note: The optimum float will be selected after a feasibility test carried out by KSR.



## Determination of the max. guide tube length L for explosion-protected version, intrinsically safe

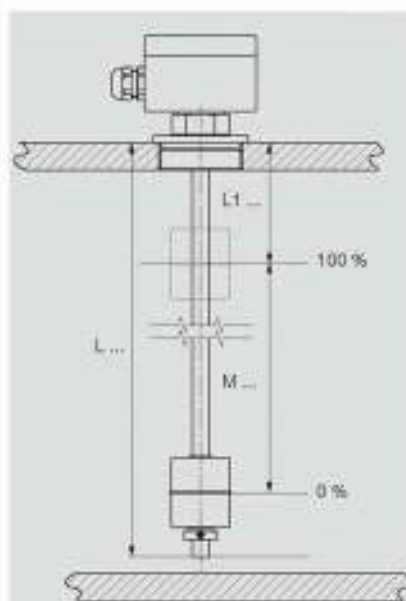
Version A: Fixed to the tank ceiling

Version B: Fixed to the tank ceiling and floor



Guide tube	Max. guide tube length L	
	Version A	Version B
Ø 12 x 1	660 mm	3,500 mm
Ø 14 x 1	940 mm	5,000 mm
Ø 14 x 2	1,600 mm	6,000 mm
Ø 18 x 2	3,000 mm	6,500 mm

## Illustration with the required dimensions for ordering



### Legend

L1 = 100 % Mark (distance sealing face-float center)

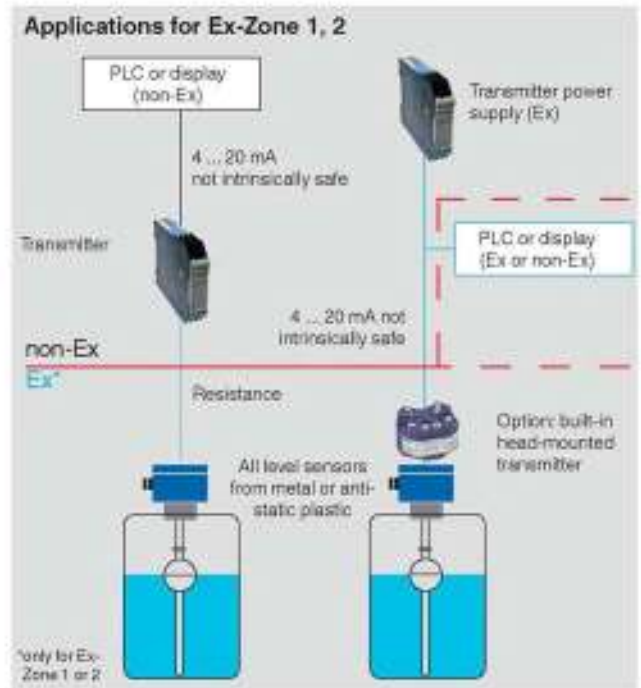
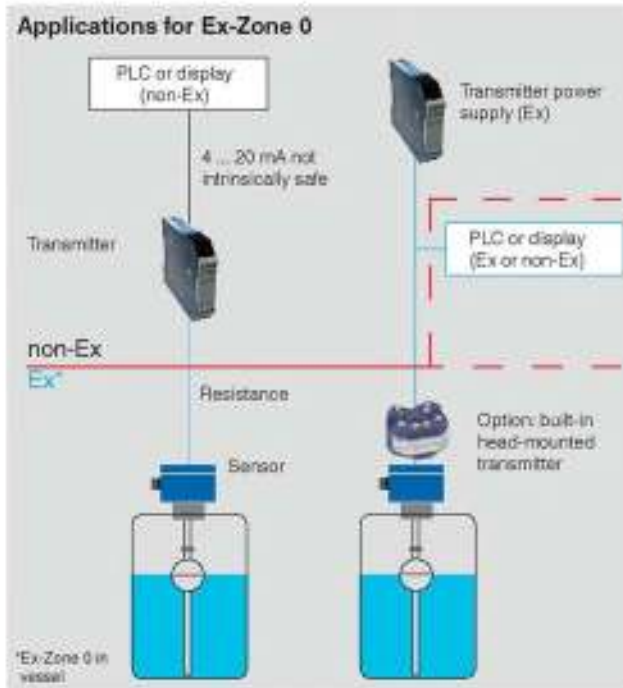
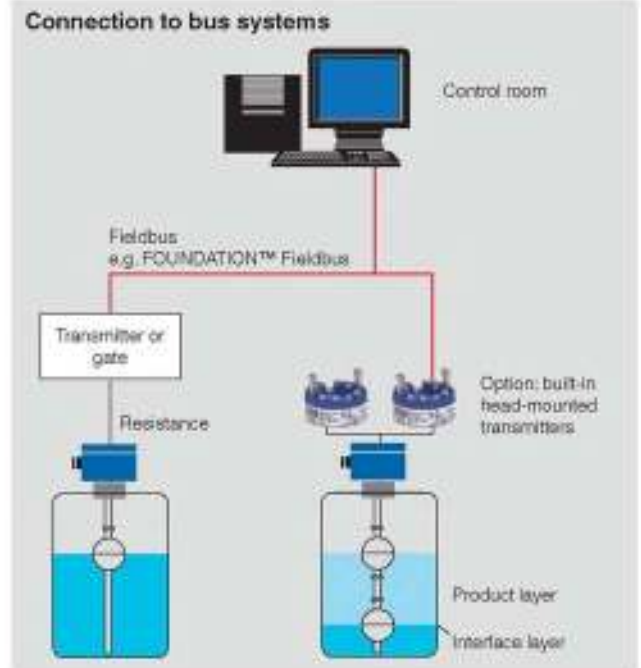
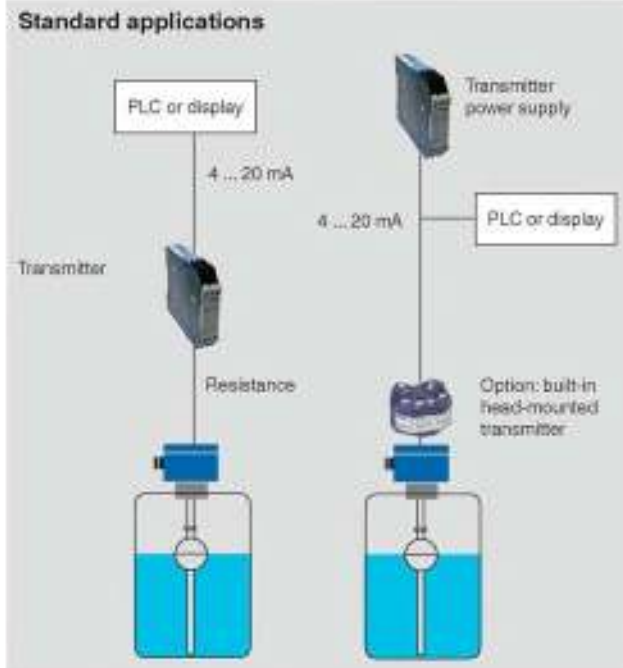
M = measuring range (distance 0 ... 100 %)

L = guide tube length and/or, insertion length of the sensor

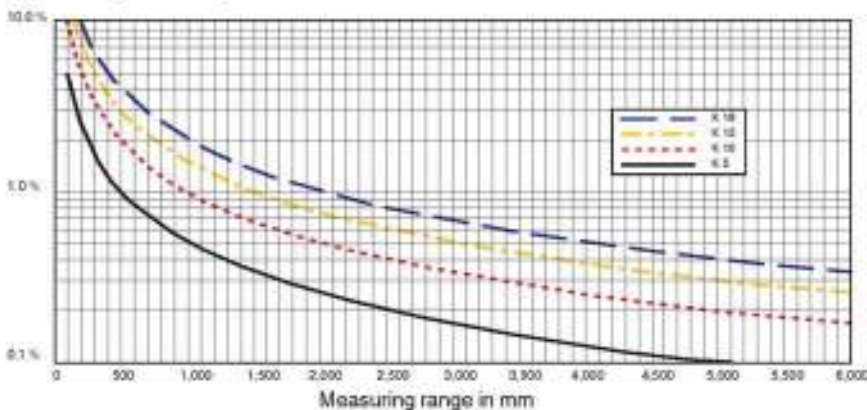
On ordering, the dimension L1 and the guide tube length (immersion length) L must be given.

Subsequent alteration of the measuring range is not possible.

## Application examples



## Measuring accuracy



## Head-mounted transmitter



**Model TE**

**Model T32E**

**Model T53F**

**Model TLEH**

Model	4 ... 20 mA	HART®	PROFIBUS® PA	Fieldbus™	Exi	Display	Order no.
TE	x				x		014832
TS	x						005894
T32E	x	x			x		025216
T32S	x	x					114795
T53F				x	x		025727
T53P			x		x		034422
TLH	x	x				x	019989
TLEH	x	x			x	x	021104

### Ordering information

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

To order the described floats and head-mounted transmitters the order number is sufficient.

# Appendix

## Cross Reference FLR

Replaced Type	Type	Description
ERV...	FLR-S	Process connection: mounting thread upwards
ARV...	FLR-S	Process connection: mounting thread downwards
AFV...	FLR-S	Process connection: flange connection
AFVEC...	FLR-S	Material: Stainless steel 1.4571 E-CTFE-coated ; Option: anti-static
AFVTF...	FLR-S	Material: Stainless steel 1.4571 PTFE-coated ; Option: anti-static
AF-ADF...	FLR-S	Approval: ATEX Ex-d; Process connection: flange connection
NMG125...	FLR-S	Approval: ATEX Ex-e
AMRV...	FLR-H	Food industry design, Process Connection: Dairy fitting
AFCV...	FLR-H	Food industry design, Process Connection: Clamp connection
ERP...	FLR-P	Material: PVC; Process connection: mounting thread upwards
APRP...	FLR-P	Material: PVC; Process connection: mounting thread downwards
APFP...	FLR-P	Material: PVC; Process connection: flange connection
ERPP...	FLR-P	Material: Polypropylen; Process connection: mounting thread upwards
ABRPP...	FLR-P	Material: Polypropylen; Process connection: mounting thread downwards
APFPP...	FLR-P	Material: Polypropylen; Process connection: flange connection
ERPF...	FLR-P	Material: Polypropylen; Process connection: mounting thread upwards
APRPF...	FLR-P	Material: PVDF; Process connection: mounting thread downwards
APFPF...	FLR-P	Material: PVDF; Process connection: flange connection

## Type Code

Code	1st key	2nd key	3rd key
<b>1</b>	<b>Electrical connection</b>	<b>Process connection</b>	<b>Material process connection</b>
...	- (none) - connection cable	ER Mounting thread upwards (BSP)	V Stainless steel 1.4571
A	Terminal box Aluminium	R Mounting thread downwards (BSP)	VE Stainless steel electro-polished
AB	Terminal box Polypropylene	ENPT Mounting thread upwards (NPT)	VEC Stainless steel ECTFE-coated
AP	Terminal box Polyester	NPT Mounting thread downwards (NPT)	VTF Stainless steel PTFE-lined
AV4	Terminal box Stainless steel 1.4571 with screw cap	MR Dairy fitting acc. to DIN 11851	T Titanium
ADF	Terminal box Aluminium flameproof	F Flange (DIN, ANSI, JIS)	HC Hastelloy C
ASC4	Coupler plug C 164-232-F-4P	FC Clamp-connection acc. to DIN 32676	P PVC
ASN6R	Hirschmann coupler plug N6RAM 20 M20	IS Sanitary nozzle (Ingoldstutzen)	PP Polypropylene
ASM12	Plug M12x1-4-pole		PF PVDF
<b>2</b>	<b>Process connection</b>		
...	Mounting thread size in inches		
...	Dairy pipe fitting size DN 50 - DN 150		
...	<b>Flange nominal size</b>	...	<b>Flange pressure rating</b>
DIN	DN 50 - DN 200	PN 5 - PN 100	...
DIN	DN 50 - DN 200	PN 6 - PN 100	Standard Form C optional E, A, F, N
EN			Standard Form B1 optional B2, A, C, D
ANSI	2" - 8"	Class 150 - 600	Standard RF optional RTJ, FF, LT, LG
JIS	3/8" (DN 10) - 4" (DN 100)	5 K - 63 K	Standard RF optional RTJ, FF, LT, LG
Clamp	DN 25 - DN 100; 1" - 4"		



3	Guide tube material		Contact function		Optional code adder	
.../.../...	V	Stainless steel 1.4571	K 18	18 mm	/HT..	High temperature* +150 °C ... +200 °C
	VE	Stainless steel electro-polished	K 15	15 mm	/TT..	Low temperature -10 °C ... -80 °C
	VEC	Stainless steel ECTFE-coated	K 10	10 mm		* only contact separations 5/10/15 mm
	VTF	Stainless steel PTFE-lined	K 5	5 mm	/PT100	Temperature probe PT 100 (2-,3- or 4-core)
	HC	Hasteloy C			/..TH..	Temperature switch ... °C - closing or opening
	P	PVC				
	PP	Polypropylene				
	PF	PVDF				

4	Option, Head-mounted transmitter in terminal box			
	TS	2-wire standard analogue	T53F	Intrinsically safe Foundation Fieldbus programmable
	TE	2-wire intrinsically safe analogue	T53P	Intrinsically safe Profibus PA programmable
	T32.1S	2-wire intrinsically safe HART@ programmable	TLH	2-wire HART@ programmable with LCD display
	T32.xS	2-wire HART@ programmable	TLEH	2-wire intrinsically safe HART@ programmable with LCD display
	T12	universally programmable	none	-

5	Guide tube length		OD Guide tube	
L.../...	L.../...	length in mm	...	OD in mm

6	Float design		Durchmesser	
.../...	.../...	Material (code 3, 1st key)	...	Float OD in mm

7	Connection cable		Cable material	
.../...	.../...	length in meter	—	PVC, gray
			blue	PVC, blue
			SIL	Silicone
			PUR	PUR

8	Approval			
.../.../...	-	none	GL	Germanischer LLoyd
	Ex	Ex I	DNV	Det Norske Veritas
	Ex d	ATEX	ABS	Bureau Veritas
	Ex d	IECEX	3-A	3-A certified

## Ordering Example

	Electrical Connection	Process Connection	Guided tube material	Option	Guide tube	Float	Cable	Approval
	design / material	size	contact separation	transmitter	length / Ø		length / material	
Code	1	2	3	4	5	6	7	8
	AFV	50/6F	VK 15/TT30	TS	L850/12	V44R		



## Level sensor

### Magnetostrictive, high-resolution measuring principle

#### Models FFG-P, FFG-T, FFG-TP, FLM-H

KSR data sheet FFG-P, FFG-T, FFG-TP, FLM-H



#### Applications

- High-accuracy level measurement for almost all liquid media
- Chemical, petrochemical, natural gas, offshore, shipbuilding, machine building, power generating equipment, power plants
- Process water and drinking water treatment, food industry, pharmaceutical industry

#### Special features

- Process- and system-specific solutions possible
- Operating limits:
  - Operating temperature:  $T = -90 \dots +400 \text{ }^\circ\text{C}$
  - Operating pressure:  $P = \text{Vacuum to } 100 \text{ bar}$
  - Limit density:  $\rho \geq 400 \text{ kg/m}^3$
- Resolution  $< 0.1 \text{ mm}$
- Wide variety of different electrical connections, process connections and materials
- Explosion-protected versions

#### Description

The model FFG-P, FFG-T, FFG-TP and FLM-H sensors are used for the high-accuracy, continuous level measurement of liquids and are based on determining the position of a magnetic float according to the magnetostrictive measuring principle.



Level sensor  
Model FFG-T, flange connection

Model	Description
FFG-P	Standard version
FFG-T	High-temperature version
FFG-TP	Plastic version
FLM-H	Sterile version

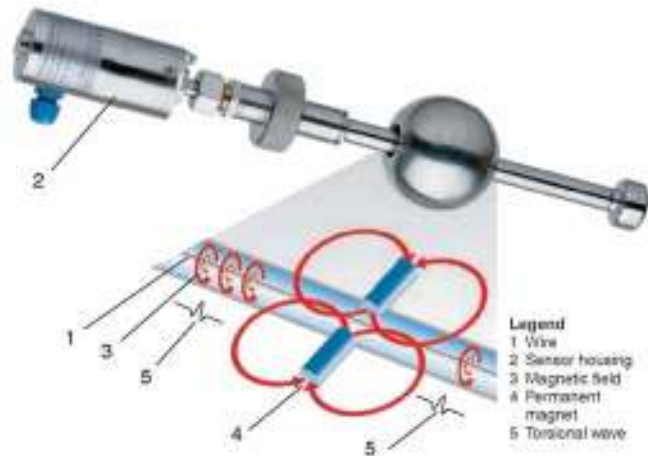
## Further special features

- Large scope of application due to the simple, proven functional principle
- Process connection, guide tube and float from stainless steel 1.4571, 1.4435, 1.4539 or plastic
- For harsh operating conditions, long service life
- Continuous measurement of levels, independent of physical and chemical changes of the media such as: Foaming, conductivity, dielectric constant, pressure, vacuum, temperature, vapours, condensation, bubble formation, boiling effects, density change
- Signal transmission over long distances
- Simple installation and commissioning, onetime calibration only, no recalibration necessary.
- Level displayed proportional to volume or height
- Parallel measurement of interface layer and overall level possible via HART® interface

## Options

- Customised solutions
- Process connection, guide tube material and float from special steel, titanium, Hastelloy (others on request)
- In combination with limit switch, stepless setting of the limit values over the entire measuring range

## Illustration of the principle



## Design and operating principle

- The measuring process is triggered by a current impulse. This current produces a circular magnetic field (3) along a wire (1) made of magnetostrictive material fixed in the guide tube.
- At the point being measured (liquid level) there is a float with permanent magnets (4) acting as a position transducer.
- The interaction of both magnetic fields generates a mechanical torsion wave (5) in the wire.
- This is converted into an electrical signal at the end of the wire in the sensor housing (2) by a piezoceramic converter.
- The measured propagation delay enables the origination point, and thus the float position, to be determined with high accuracy.

## Product overview

Sensor model	Description	Materials						Temperature range (process)
		Stainless steel 1.4571 (316Ti)	Stainless steel 1.4404 (316L)	Titanium 3.7035 (grade 2)	Stainless steel 1.4435 (316L)	PP	PVDF	
FFG-P	Magnetostrictive sensor, standard	x	x	x				-60 ... +185 °C
FFG-T	Magnetostrictive sensor, high temperature	x	x	x				-90 ... +400 °C
FFG-TP	Magnetostrictive sensor, plastic					x	x	-10 ... +100 °C
FLM-H	Magnetostrictive sensor, sterile version		x		x			-40 ... +400 °C

Sensor model	Approval (Option)			
	without	Ex i	Ex d	3A
FFG-P	x	x	x	
FFG-T	x	x		
FLM-H	x			x

## Ex approvals

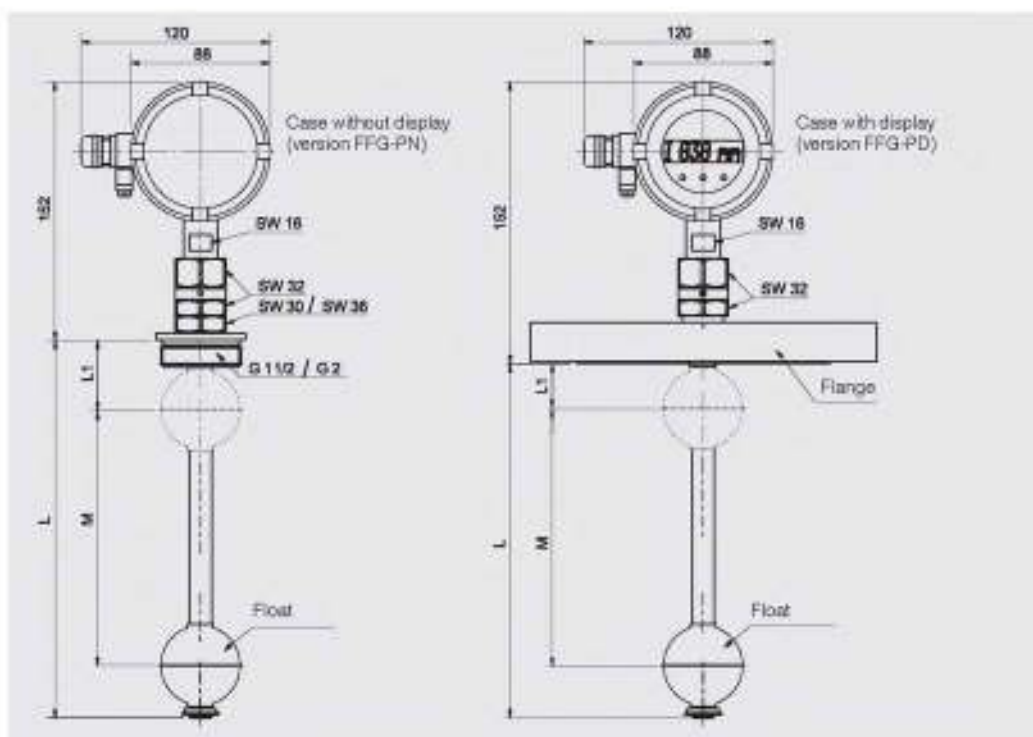
Explosion protection	Ignition protection type	Model	Zone	Approval number
ATEX	Ex i	FFG-T-Ex i	Zone 0	IBExU 02 ATEX 1124 X II 1/2G Ex ia IIC T3 ... T6
	Ex i	FFG-P22H2...	Zone 0	ZELM 10 ATEX 0439 II 1/2G Ex ia IIC T3 ... T6
	Ex d	FFG-P22H3...	Zone 1	ZELM 13 ATEX 0508 X II 1/2G Ex d IIB T3 to T6 Ga Gb

## Type approval

Approval	Model	Approval number
EAC-Ex	FFG-	RU C-DE.GB08.B.00845
EAC	FFG-	TC N RU D-DE.AU14.B.21532
3A	FLM-H	3-A Sanitary Standards 74-06

## Sensor, standard, model FFG-P

Process connection, guide tube and float from stainless steel 1.4571

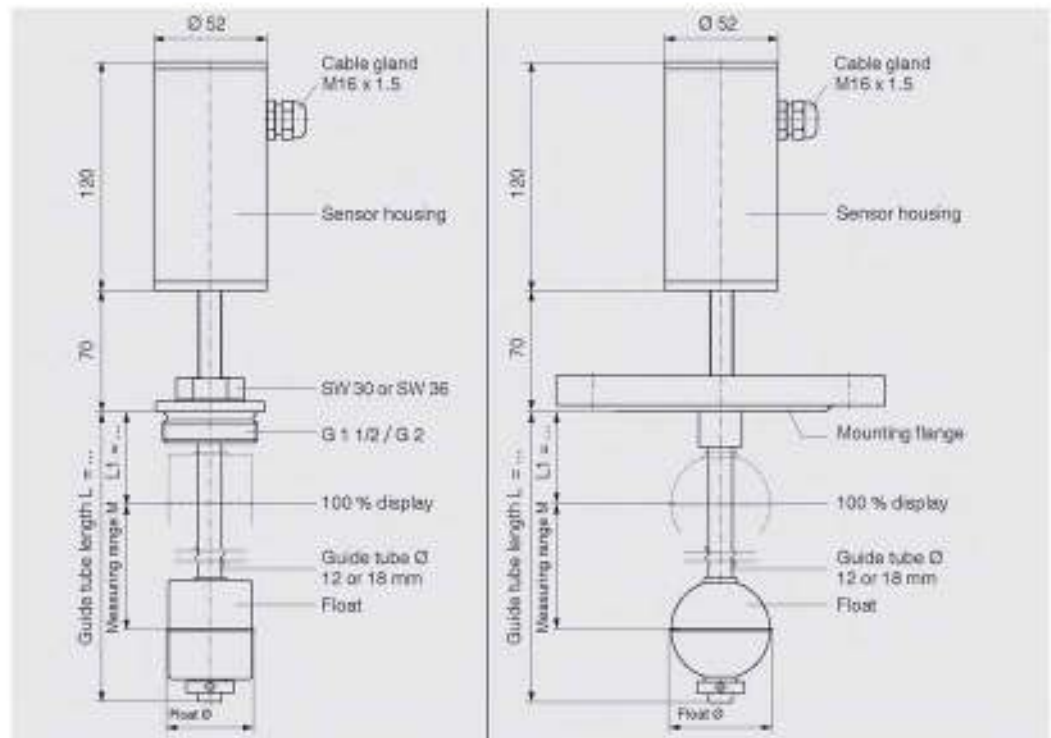


	Mounting thread		Flange	
Electrical connection	Sensor housing, material stainless steel 1.4404 (316L) Version FFG-PN without display Version FFG-PD with window and display			
Display	LCD matrix (only version FFG-PD)			
Process connection	Mounting thread downwards G 1 1/2 or G 2		Mounting flange ■ DIN DN 50 ... DN 200, PN 6 ... PN 100 ■ ANSI 2" ... 8", class 150 ... 600	
Guide tube diameter	14 mm	18 mm	14 mm	18 mm
Guide tube length L max.	3,000 mm	5,800 mm	3,000 mm	5,800 mm
Float	Material stainless steel 1.4571 (option: Titanium) Float diameter from 44 ... 120 mm Float selection depending on guide tube diameter and process conditions (see page 8) Attention: With Ex approval no floats from titanium may be used.			
Max. operating pressure	40 bar (100 bar with float from titanium), see table on page 8			
Temperature range Standard	Medium: -60 ... +185 °C Ambient temperature: - Standard, version without display -40 ... +85 °C - Standard, version with display -20 ... +70 °C - Version Ex I T3/T4/T5: -20 °C ... +70 °C, T6: -20 °C ... +60 °C - Version Ex d T3/T4/T5: -20 °C ... +70 °C, T6: -20 °C ... +60 °C			
Output signal	4 ... 20 mA, HART®			
Power supply	DC 15 ... 30 V			
Measuring accuracy	< ±0.5 mm			
Resolution	< 0.1 mm			
Load	max. 900 Ω at 30 V			
Mounting position	Vertical ±30°			
Ingress protection	IP 67 per EN 60529 / IEC 60529			



## Sensor, high temperature, model FFG-T

Process connection, guide tube and float from stainless steel 1.4571

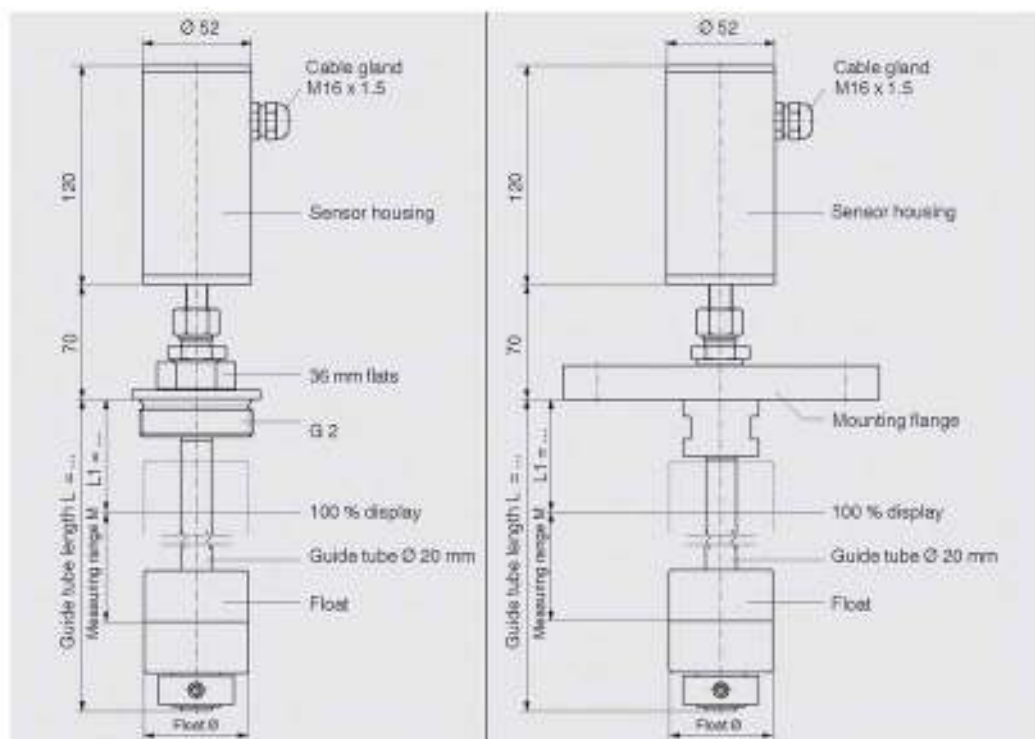


	Mounting thread		Flange	
Electrical connection	Sensor housing, material stainless steel 1.4301			
Process connection	Mounting thread downwards G 1 1/2 or G 2		Mounting flange ■ DIN DN 50 ... DN 200, PN 6 ... PN 100 ■ ANSI 2" ... 8", class 150 ... 600	
Guide tube diameter	12 mm	18 mm	12 mm	18 mm
Guide tube length L max.	3,000 mm	6,000 mm	3,000 mm	6,000 mm
Float	Material stainless steel 1.4571 (option: Titanium) Float diameter from 44 ... 120 mm Float selection depending on guide tube diameter and process conditions (see page 8)			
Max. operating pressure	40 bar (100 bar with float from titanium), see table on page 8			
Temperature range Standard	Medium: - Version FFG-TH: -45 ... +400 °C - Version FFG-TT: -90 ... +125 °C Ambient temperature: -40 ... +85 °C			
Output signal	4 ... 20 mA, HART®			
Power supply	DC 10 ... 30 V			
Measuring accuracy	< ±0.5 mm			
Resolution	< 0.1 mm			
Load	max. 900 Ω at 30 V			
Mounting position	Vertical ±30°			
Ingress protection	IP 68 per EN 60529 / IEC 60529			



## Sensor, plastic, model FFG-TP

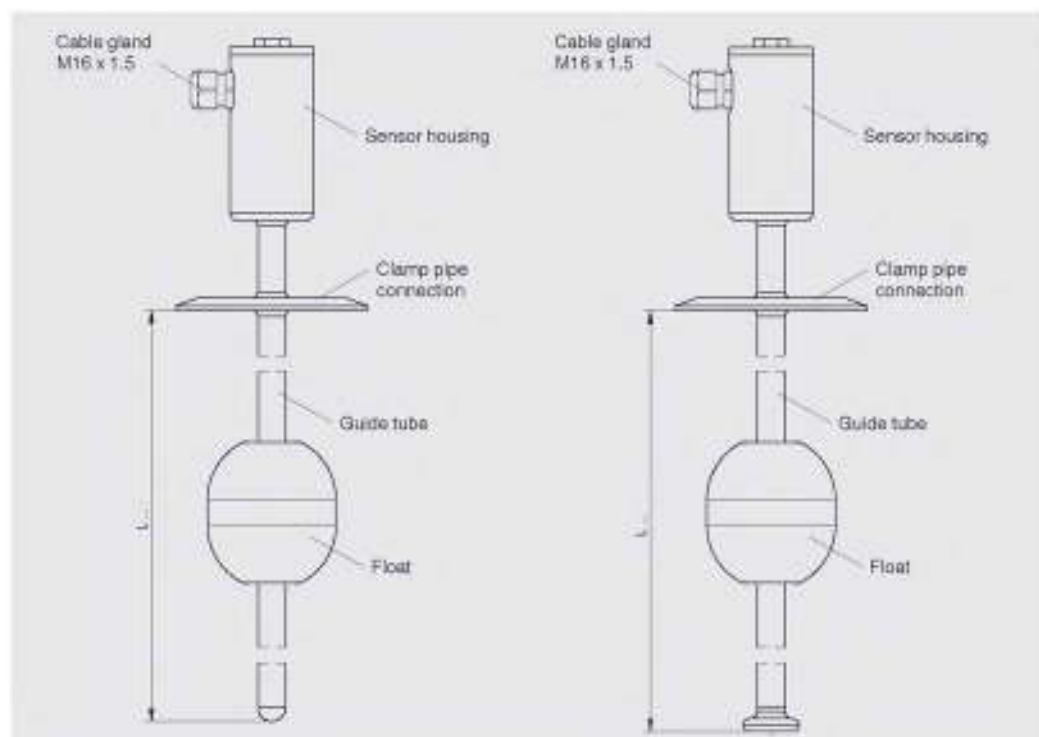
Process connection, guide tube and float from PVC, polypropylene or PVDF



	Mounting thread	Flange
Electrical connection	Sensor housing, material stainless steel 1.4301	
Process connection	Mounting thread downwards G 1 1/2 or G 2	Mounting flange ■ DIN DN 50 ... DN 200, PN 6 ... PN 100 ■ ANSI 2" ... 8", class 150 ... 600
Guide tube diameter	16 or 20 mm	
Guide tube length L max.	5.000 mm	
Float	Material ■ Polypropylene ■ PVDF Float diameter of 55 or 80 mm Float selection depending on guide tube diameter and process conditions (see page 8)	
Max. operating pressure	3 bar	
Temperature range Standard	Medium: ■ Polypropylene -10 ... +80 °C ■ PVDF -10 ... +100 °C Ambient temperature: -40 ... +85 °C	
Output signal	4 ... 20 mA, HART®	
Power supply	DC 10 ... 30 V	
Measuring accuracy	< ±0.5 mm	
Resolution	< 0.1 mm	
Load	max. 900 Ω at 30 V	
Mounting position	Vertical ±30°	
Ingress protection	IP 68 per EN 60529 / IEC 60529	

## Sensor, sterile version, model FLM-H

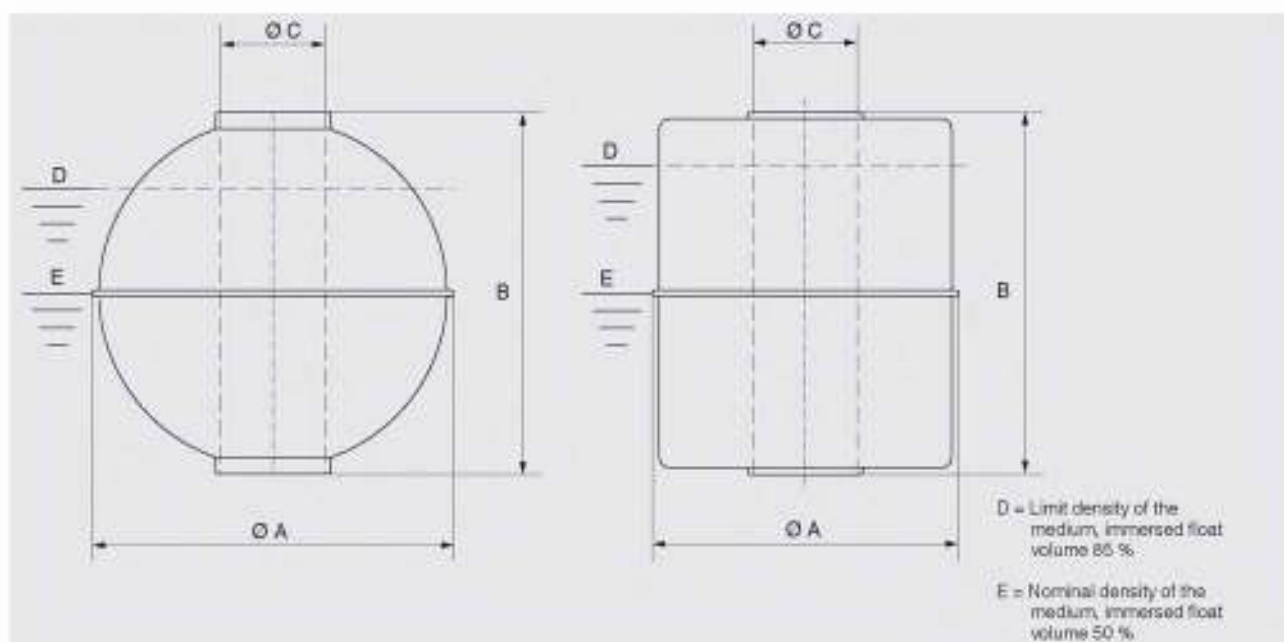
Process connection, guide tube and float from stainless steel 1.4435 (316L) or 1.4404 (316L), surface ground and polished  
 $R_a < 0.8 \mu\text{m}$  or  $R_a < 0.4 \mu\text{m}$ , alternatively electropolished



	Version without floor fixture	Version with separate floor fixture
Electrical connection	Sensor housing, material stainless steel 1.4305	
Process connection	Clamp ISO 2852 Clamp DIN 32767 Aseptic thread DIN 11864-1 Aseptic collar connecting sleeve DIN 11864-1 Aseptic flange DIN 11864-2 Aseptic clamp DIN 11864-3 VARIVENT® BioConnect®	
Guide tube diameter	17.2 mm	
Guide tube length L max.	6,000 mm	
Float	Material stainless steel 1.4435 (316L) or 1.4539 (316L) Float diameter of 80 mm Float selection depending on guide tube diameter and process conditions (see page 8)	
Max. operating pressure	10 bar	
Temperature range Standard	Medium: - Standard, version FLM-H: -40 ... +250 °C - High temperature, version FLM-HT: -40 ... +400 °C Ambient temperature: -40 ... +85 °C	
Output signal	4 ... 20 mA, HART®	
Power supply	DC 10 ... 30 V	
Measuring accuracy	< ±0.5 mm	
Resolution	< 0.1 mm	
Load	max. 900 Ω at 30 V	
Mounting position	Vertical ±30°	
Ingress protection	IP 68 per EN 60529 / IEC 60529	

## Spherical floats (K)

## Cylindrical floats (Z)



Material	Version	Suits guide tube Ø mm	Form	Ø A mm	B mm	Ø C mm	Max. Operating pressure bar	Max. Operating temperature °C	Limit density 85 % kg/m <sup>3</sup>	Nominal density 50 % kg/m <sup>3</sup>
Stainless steel 1.4571 (316Ti)	V44A	14	Z	44	52	15	16	200	818	1.390
	V52A	14	K	52	52	15	40	200	769	1.307
	V62A	14	K	62	61	15	32	200	597	1.015
	V83A	14	K	83	81	15	25	200	408	683
	V80A	18	K	80	76	23	25	200	679	1.155
	V98A	18	K	98	96	23	25	200	597	1.016
	V105A	18	K	105	103	23	25	200	533	907
	V120A	18	K	120	117	23	25	200	389	661
	V120/38A	18	K	120	116	38	25	200	537	914
Titan 3.7035 (Grade 2)	T44A	14	Z	44	52	15	16	200	720	1.224
	T52A	14	K	52	52	15	25	250	707	1.201
	T52/1A	14	K	52	52	15	110	250	1040	1.770
	T62A	14	K	62	62	15	25	250	505	859
	T83A	14	K	83	81	15	25	250	278	473
	T80A	18	K	80	76	23	25	250	685	1.130
	T98A	18	K	98	96	23	25	250	595	841
	T105A	18	K	105	103	23	25	250	369	627
	T120A	18	K	120	117	23	25	250	329	560
PVC	P55A	16	Z	55	54	22	3	60	798	1.357
	P80A	20	Z	80	79	25	3	60	537	974
Polypropylen	PP55A	16	Z	55	54	22	3	80	582	989
	PP80A	20	Z	80	79	25	3	80	431	723
PVDF	PF55A	16	Z	55	69	22	3	100	621	1.398
	PF80A	20	Z	80	79	25	3	100	681	1.157
<b>Sterile version</b>										
Stainless steel 1.4435 (316L)	V80/88/R4/3A/35	17.2	K	80	88	23	16	150	790	1.350
Stainless steel 1.4539 (316L)	V80/R4/3A/39	17.2	K	80	76	23	16	150	621	1.056

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

**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

# Appendix

## Cross Reference FLM

Replaced Type	Type	Description
FFG-P	FLM-S	Magnetostrictive sensor, standard
FFG-T	FLM-ST	Magnetostrictive sensor, high temperature
FFG-TP	FLM-SP	Magnetostrictive sensor, plastic
FFG-T-MRVE...	FLM-H	Magnetostrictive sensor, sterile version with dairy coupling
FFG-T-FCFE...	FLM-H	Magnetostrictive sensor, sterile version with clamp
FFG-T-IS...	FLM-H	Magnetostrictive sensor, sterile version with ingolde nozzle
746.2xxx	Successor: FLM-S	Magnetostrictive sensor (Phoenix design)

## Type Code FFG-P

FFG-P. 2 2 H X O X - X X XX X - XXXX

		2	2	H	X	O	X	-	X	X	XX	X	-	XXXX
														Measuring length ML in mm e.g. 0600 = 600 mm
														4 1.4571 (SS316Ti)
														H 2.4818 (HC276)
														C 2.4610 (HC4)
														I 1.4539 (SS904L)
														C1 V44A (SZ0441570259)
														B1 V52A (SK0521550359)
Interface	HART (4...20 mA)			H										Material in contact with media
Operating area	Standard													Float
	Ex i													
	Ex d													
Display	Normal													Head position
	Display													
														S M 16 x 1,5
														T M 20 x 1,5
														N 1/2" NPT
														U up
														D down

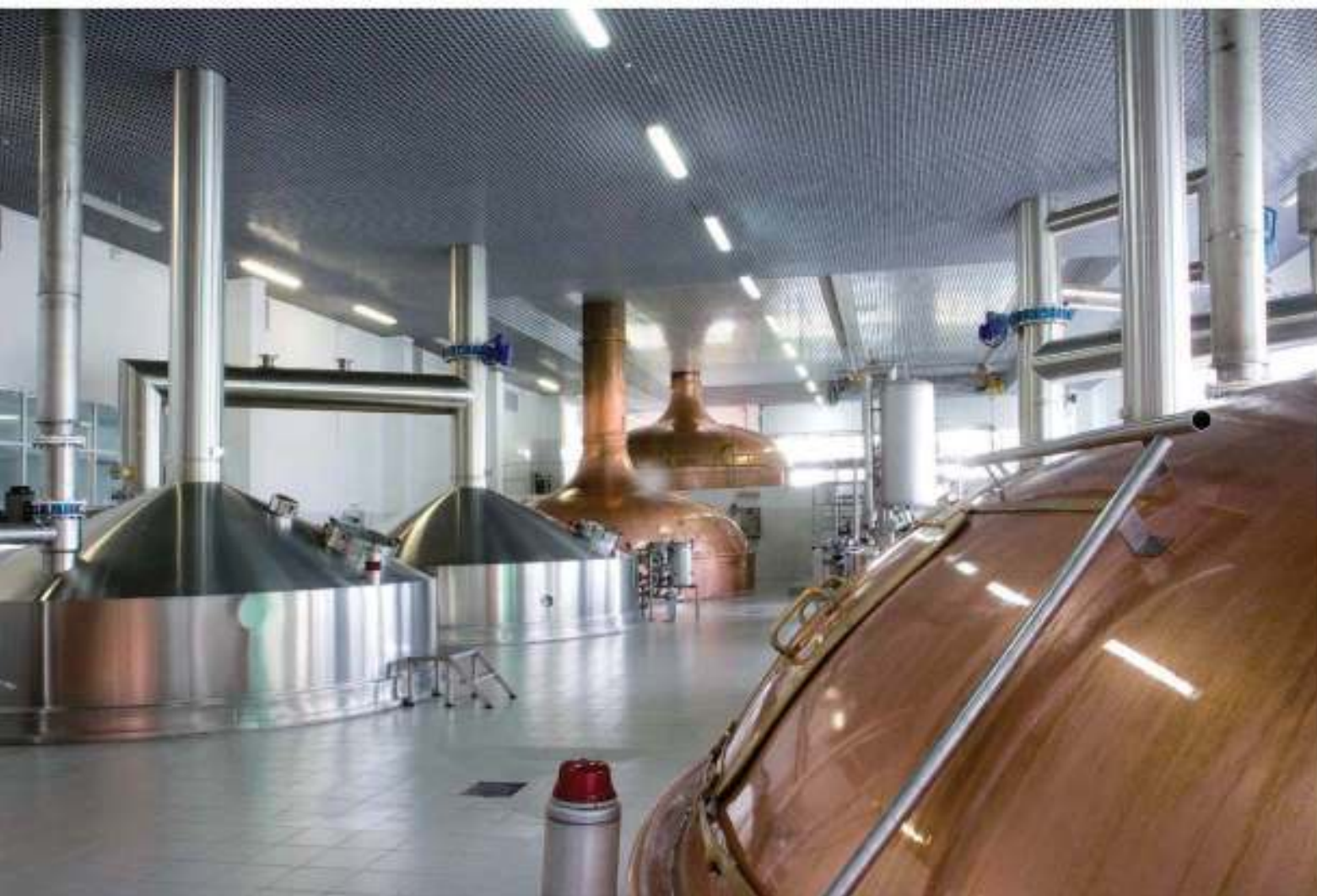


## Type Code FFG-T

Code										
<b>1</b>	<b>Basic type</b>									
	FFG									
<b>2</b>	<b>Transmitter housing</b>									
	T	Transmitter housing stainless steel								
<b>3</b>	<b>Process connection</b>				<b>Material (Process connection)</b>					
...	R	Mounting thread downwards (DIN)		V	Stainless steel 1.4571 (316Ti)					
	NPT	Mounting thread downwards (NPT)		VE	Stainless steel electropolished					
	MR	Dairy pipe fitting to DIN 11851		VEC	Stainless steel E-CTFE-coated					
	F	Flange (DIN, ANSI or JIS)		VTF	Stainless steel PTFE-lined					
	FC	Clamp-connection to DIN 32676		T	Titanium					
	IS	Sanitary nozzle (Ingold nozzle)		HB	Hastelloy B					
				HC	Hastelloy C					
				P	PVC					
				PP	Polypropylene					
				PF	PVDF					
<b>4</b>	<b>Size process connection</b>									
...	...	Mounting thread size in inches								
	...	Dairy pipe fitting size DN 50 - DN 150								
	...	Flange nominal size		...	Flange pressure rating		...	Flange face		
DIN		DN 50 - DN 200			PN 6 - PN 100			Standard Form C optional E, A, F, N		
ANSI		2" - 8"			Class 150 - 600			Standard RF optional RT, FF, ST, SG, LT, LG		
JIS		3/8" (DN 10) - 4" (DN 100)			5 K - 83 K			Standard RF optional RT, FF, ST, SG, LT, LG		
Clamp		DN 25 - DN 100, 1" - 4"								
<b>5</b>	<b>Guide tube (sensor tube) material</b>									
...	V	Stainless steel 1.4571 (316Ti)		HB	Hastelloy B					
	VE	Stainless steel electropolished		HC	Hastelloy C					
	VEC	Stainless steel E-CTFE-coated		P	PVC					
	VTF	Stainless steel PTFE-lined		PP	Polypropylene					
	T	Titanium		PF	PVDF					
<b>6</b>	<b>Guide tube length</b>		<b>Measuring range</b>			<b>Diameter</b>				
...	...	L...	Length in mm		M...	Range in mm		...	Tube OD	
<b>7</b>	<b>Float design</b>									
...	...	Material			...	Float OD in mm				
<b>8</b>	<b>Approvals</b>									
...	Ex	Ex-Design								

## Ordering Example

	Basic type	Transmitter housing	Connection material	Connection size	Guide tube material	Guide tube length measuring range tube OD	Float	Approval
Code	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>
	FFG	T	FV	50&F	V	L950M850/12	V44A	Ex



## KSR – Your Partner for Food and Beverage

Taste, enjoyment and naturalness are three factors that consumers look for in soft drinks.

Beverage manufacturers must therefore handle the ingredients and flavours very carefully in order to produce a safe and perfectly flavoured drink. This premise holds true for breweries and dairies as well as for the soft drink and fruit juice manufacturers. In all process steps, from production to filling, the product must be handled gently and safely. The measuring instruments used for this must securely and accurately determine the measurement parameters. The hygienic design of product-carrying plant components is an essential pre-requisite to avoid microbiological contamination, which goes with ensuring the product's quality.

As part of the overall hygienic concept of a plant, the measuring instruments used must comply with special requirements on material, surface quality, process safety, connection engineering and cleaning in the scope of the CIP process.

KSR offers an extensive programme of measuring instruments with hygienic design. These enable easy cleaning both in the areas in contact with the product as well on the side that is away from the product itself. This is confirmed through the EHEDG (European Hygienic Engineering & Design Group) and 3-A Sanitary Standards, Inc. certificates.

## Level sensor

### Magnetostrictive, high-resolution measuring principle

### For sanitary applications, model FLM-H

KSR data sheet FLM-H



#### Applications

- Food and beverage industry
- Pharmaceutical industry
- Biotechnology
- Level measurement in fermenters

#### Special features

- Fully welded and dead space free
- Operating limits:
  - Operating temperature:  $T = -40 \dots +250 \text{ }^\circ\text{C}$
  - Operating pressure:  $P = \text{Vacuum to } 10 \text{ bar}$
- Insensitive to foaming, ideal for interface measurement
- High-precision level measurement; Accuracy  $< 0.5 \text{ mm}$
- Wide variety of hygienic process connections

#### Description

The model FLM-H magnetostrictive sensor has been specifically designed for the requirements of the food and beverage, pharmaceutical and biotechnology industries. The sensor is particularly suitable for the special conditions of CIP/SIP cleaning processes, such as chemical stability towards cleaning liquids and high temperatures.

The guide tube is directly welded to the process connection, which guarantees a crevice-free connection, additional sealings are not required.

The sensor is supplied with a DC voltage of 10 ... 30 V. Available output signals are 4 ... 20 mA or 4 ... 20 mA with HART® signal.



Level sensor, for sanitary applications, model FLM-H

The hygienically designed sensor housing, with an ingress protection of up to IP 68, offers a secure protection for external cleaning with splash water and enables its use in high-humidity environments.

The model FLM-H sensor fulfils the high demands of sanitary applications. It is marked with the 3-A symbol and current version number, as it conforms, based on a third party verification, to the 3-A standard.



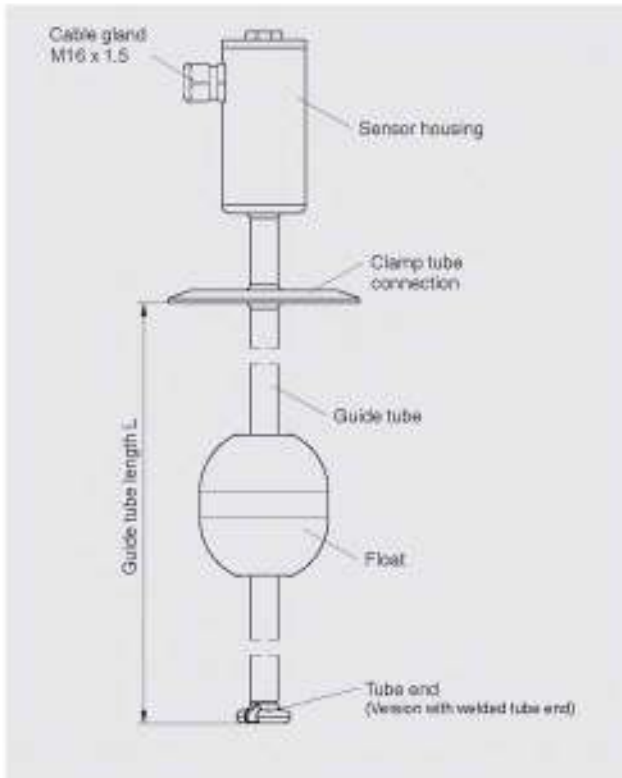
## Further special features

- Large range of application due to the simple, proven functional principle
- For harsh operating conditions, long service life
- Continuous measurement of levels, independent of physical and chemical changes of the media such as: Foaming, conductivity, dielectric, pressure, vacuum, temperature, vapours, condensation, bubble formation, boiling effects, density change
- Signal transmission over long distances
- Simple installation and commissioning, onetime calibration only, no recalibration necessary
- Level displayed proportional to volume or height

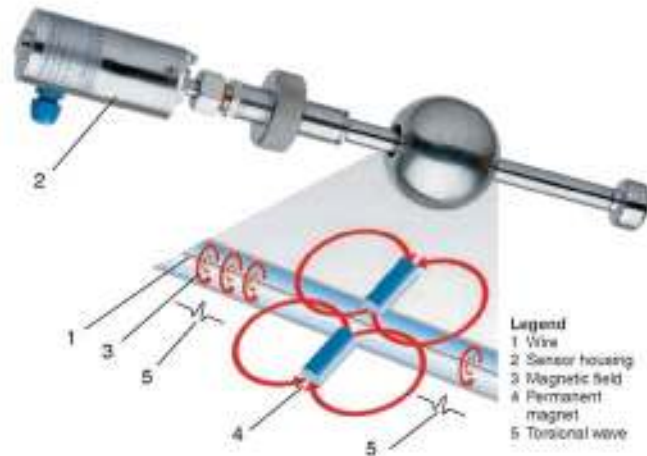
## Options

- Customised solutions

## Components of the level sensor, model FLM-H



## Illustration of the principle



## Design and operating principle

- The measuring process is triggered by a current impulse. This current produces a circular magnetic field (3) along a wire (1) made of magnetostrictive material fixed in the guide tube.
- At the point being measured (liquid level) there is a float with permanent magnets (4) acting as a position transducer.
- The interaction of both magnetic fields generates a mechanical torsion wave (5) in the wire.
- This is converted into an electrical signal at the end of the wire in the sensor housing (2) by a piezoceramic converter.
- The measured propagation delay enables the origination point of the mechanical wave, and thus the float position, to be determined with high accuracy.

## Overview of the process connections

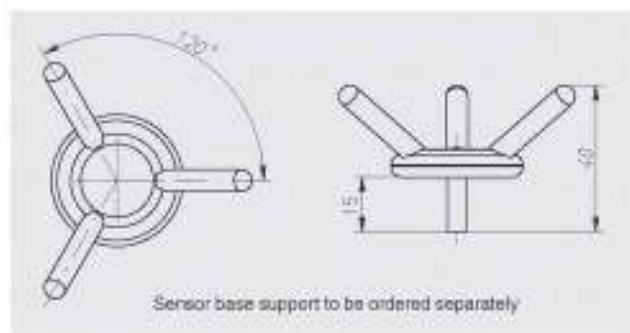


VARIVENT® is a registered trademark of the company GEA Tuchenhagen.  
BioControl® is a registered trademark of the company NEUMO.

## Tube ends

### Version with separate sensor base support

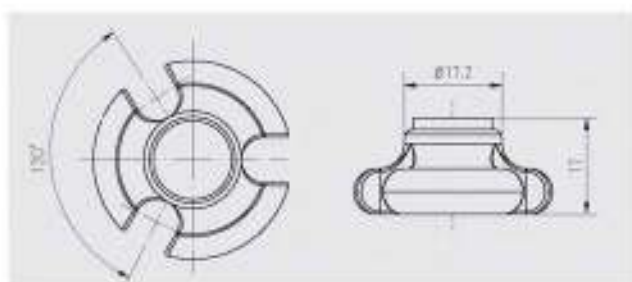
This sensor base support is welded "separately" at the bottom of the tank. When mounting the sensor, the guide tube with the float can be fitted into the sensor base support inside the vessel to fix it. Thus the float is held in position and serves as a position transducer for the level. With stirring movement within the container, the sensor is fixed. Additional advantage: If the lid of the process vessel is large enough and the float can be placed onto the sensor, then small process connections can be used.



### Version with welded pipe end

This tube end is fully welded at the end of the guide tube and offers a dead-space free end to the sensor guide tube. The geometry of the end of the guide tube enables CIP/SIP cleaning.

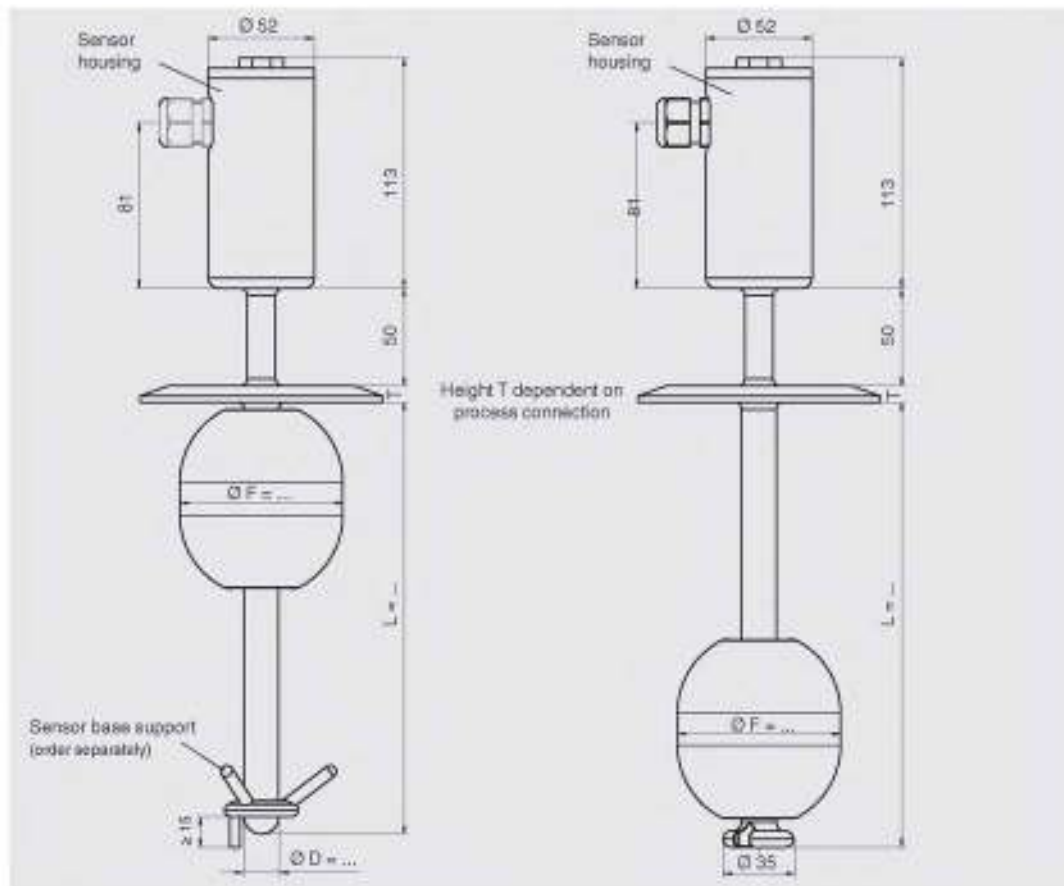
This variant can be selected when the sensor including the float (taking into account the float diameter) can be mounted through the process connection.





## Sensor, sterile version, model FLM-H

Process connection, guide tube and float from stainless steel 1.4435 (316L) or 1.4404 (316L), surface ground and polished  
 $Ra < 0.8 \mu\text{m}$  or  $Ra < 0.4 \mu\text{m}$ , alternatively electropolished



	Version with separate sensor base support	Version with welded tube end
Electrical connection	Sensor housing: Stainless steel 1.4305 with cable gland M16 x 1.5 polyamide or hygienic design	
Process connection	<ul style="list-style-type: none"> <li>■ Clamp connection ISO 2852 (DN 32 ... DN 100 or 1.5" ... 4")</li> <li>■ Clamp connection DIN 32675 (DN 32 ... DN 100 or 1.5" ... 4")</li> <li>■ Aseptic mounting thread downwards DIN 11864-1 (DN 32 ... DN 100 or 1.5" ... 4")</li> <li>■ Aseptic collar connecting sleeve DIN 11864-1 (DN 32 ... DN 100 or 1.5" ... 4")</li> <li>■ Aseptic flange connection DIN 11864-2 (DN 32 ... DN 50 or 1.5" ... 2")</li> <li>■ Aseptic clamp connection DIN 11864-3 (DN 32 ... DN 100 or 1.5" ... 4")</li> <li>■ VARIVENT® (form F, N and G)</li> <li>■ BioConnect® threaded connection (DN 32 ... DN 100 or 1.5" ... 2")</li> <li>■ BioConnect® flange connection (DN 32 ... DN 100 or 1.5" ... 2")</li> <li>■ BioConnect® clamp connection (DN 32 ... DN 100 or 1.5" ... 2")</li> </ul>	
Guide tube diameter	12, 14 or 17.2 mm (stainless steel 1.4435 or 1.4404; surface ground and polished, $Ra \leq 0.8 \mu\text{m}$ or $Ra \leq 0.4 \mu\text{m}$ )	
Guide tube length L max.	6,000 mm	
Float	Material stainless steel 1.4435 or 1.4404 Float diameter 50 or 80 mm Float selection depending on guide tube diameter	
Density range	Float diameter 50 mm: 1100 kg/m <sup>3</sup> ... 1860 kg/m <sup>3</sup> Float diameter 80 mm: 770 kg/m <sup>3</sup> ... 1162 kg/m <sup>3</sup>	
Max. operating pressure	10 bar	
Temperature range	<ul style="list-style-type: none"> <li>■ Medium standard -40 ... +250 °C</li> <li>■ Ambient temperature at the sensor housing -40 ... +85 °C</li> <li>■ Storage temperature: -20 ... +60 °C</li> </ul>	
Output signal	4 ... 20 mA, HART®	
Power supply	DC 10 ... 30 V	
Accuracy	< ±0.5 mm	
Resolution	< 0.1 mm	
Load	max. 900 Ω at 30 V	
Mounting position	Vertical ±30°	
Ingress protection	IP 68 per EN 60529 / IEC 60529	

## Certificates (option)

- 2.2 test report
- 3.1 inspection certificate
- 3-A conformity
- Safety Integrity Level (SIL 2)

## Ordering information

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

# Appendix

## Cross Reference FLM-H

Replaced Type	Type	Description
FFG-T-MRVE...	FLM-H	Process Connection: Dairy fitting
FFG-T-FCFE...	FLM-H	Process Connection: Clamp connection
FFG-T-IS...	FLM-H	Process Connection: Ingold nozzle

## Type Code

Code	
<b>1</b>	<b>Basic type</b>
	FLM-H
<b>2</b>	<b>Electrical connection</b>
7	M 16 x 1,5 Polyamide
8	M 16 x 1,5 Hygienic Design
<b>3</b>	<b>Version</b>
2	open end with separate float stopper
1	welded float stopper at the end of the guide tube
<b>4</b>	<b>Process connection</b>
1	Clamp connection ISO 2852 (DN32 – DN100 or 1,5" – 4")
B	Clamp connection DIN 32676 (DN32 – DN100 or 1,5" – 4")
2	Aseptik-mounting thread downwards DIN 11 864-1 (DN32 – DN100 or 1,5" – 4")
3	Aseptik-linear blank DIN 11 864-1 (DN32 – DN100 or 1,5" – 4")
4	Aseptik-flange connection DIN 11 864-2 (DN32 – DN50 or 1,5" – 2")
5	Aseptik-clamp-connection DIN 11 864-3 (DN32 – DN100 or 1,5" – 4")
6	Varivent (Form F, N and G)
7	BioConnect® screwed version (DN32 – DN100 or 1,5" – 2")
8	BioConnect® flange connection (DN32 – DN100 or 1,5" – 2")
9	BioConnect® clamp-connection (DN32 – DN100 or 1,5" – 2")
<b>5</b>	<b>Size process connection</b>
	DIN DN 32 up to DN 100
	ANSI 1,5" up to 4"
	Form F, N or G
<b>6</b>	<b>Guide tube length</b>
L.../	Length in mm
<b>7</b>	<b>Measuring range</b>
L.../	Length in mm
<b>8</b>	<b>Guide tube OD</b>
...	12 mm
	14 mm
	17,2 mm
<b>9</b>	<b>Pressure</b>
...	

10	Temperature
11	Density
12	Surface roughness
R	Ra ≤ 0,8 µm
H	Ra ≤ 0,8 µm, electro-polished

## Ordering Example

	Basic type	Electrical connection	Version	Process connection	Size process connection	Guide tube length Measuring range Guide tube OD	Pressure Temperature Density	Surface roughness
Code	1	2	3	4	5	6/7/8	9/10/11	12
	FLM-H	8	1	1	2,5"	L1000/M950/12	100/2/1000	R





## KSR – Your Partner for Oil and Gas

KSR level measuring instruments can be found worldwide in the field of oil and gas production and regeneration, offshore as well as onshore. Our measuring instruments are manufactured in close cooperation with members of ISO 15156 and NACE committee in accordance with the respective latest revision.

## Sight glass level indicator Model LGG

KSR data sheet LGG

### Applications

- Continuous level indication without power supply
- Direct indication of the level
- Individual design and corrosion resistant materials make the products suitable for a broad range of applications
- Chemical, petrochemical industry, oil and natural gas extraction (on- and offshore), shipbuilding, machine building, power generating equipment, power plants
- Oil and gas, heat transfer and refrigeration systems, plants for cryogenics

### Special features

- Process- and system-specific production
- Operating limits:
  - Operating temperature:  $-196 \dots +374 \text{ }^{\circ}\text{C}$  <sup>1)</sup>
  - Operating pressure: Vacuum to 250 bar <sup>1)</sup>
- Wide variety of different process connections and materials
- Illumination optional
- Heating and/or insulation optional

<sup>1)</sup> Individual limit values. For application limits, the joint consideration of temperature and pressure is required!



Sight glass level indicator model LGG-E

### Description

The main element of the sight glass level indicator is the body. Incorporated into this body are the liquid channel (if necessary the heating channel) and the seating faces for the chambered seals and sight glasses.

Onto the body are mounted, or are already integrated, the valve heads and process connections. Drain or vent are also possible.

The glasses and/or mica discs as well as the seals are fitted, secured and sealed with the aid of U-bolts and covers or pressure frames. Glasses from borosilicate glass in accordance with DIN 7081 are used.

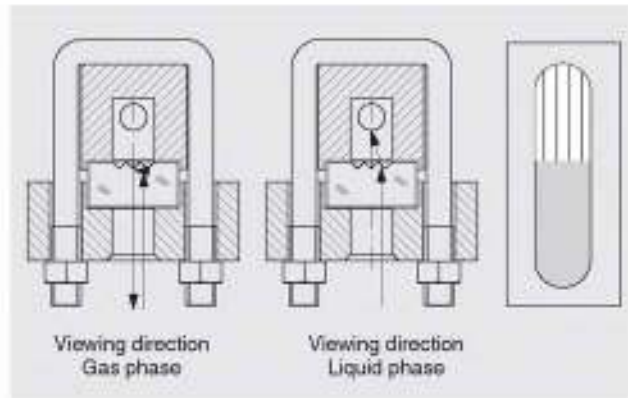
For steam, the glasses can be used up to  $243 \text{ }^{\circ}\text{C}$ , with mica design to  $300 \text{ }^{\circ}\text{C}$ . For other media, temperatures up to  $300 \text{ }^{\circ}\text{C}$  are possible, in special cases up to  $374 \text{ }^{\circ}\text{C}$ . The use of mica is needed for specific applications.

## Operating principle

### Reflex glasses per DIN 7081

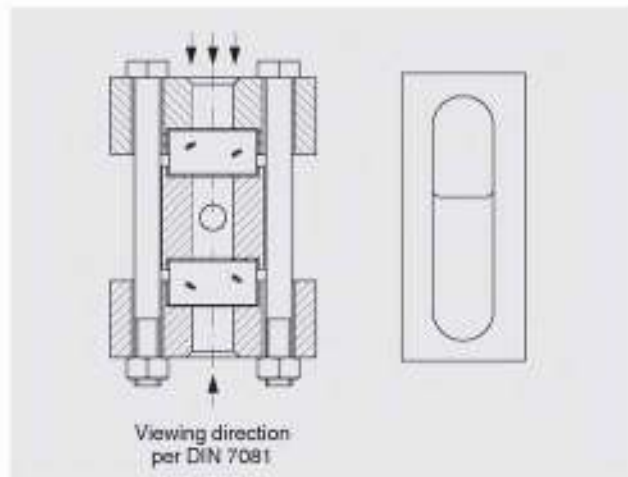
In the viewing direction, incident light strikes the reflective grooves of the sight glass plate and are refracted into the liquid present. With gases, the light is reflected. Thus the filling level is visible as a darker column, the gaseous area as a silvery column over it.

Reflex glasses are very well suited for the display of clear liquids.



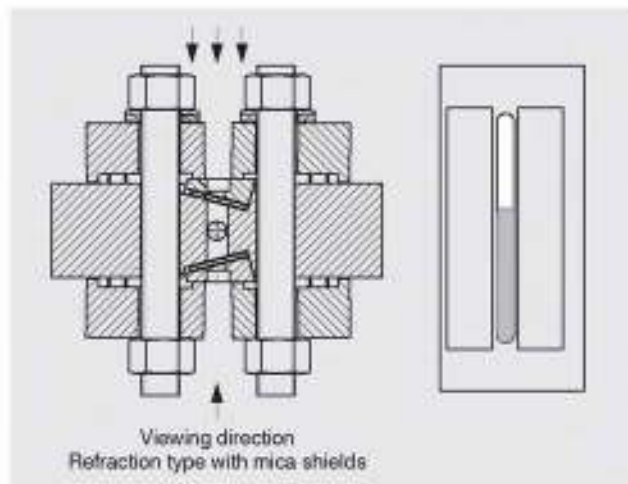
### Transparent glasses per DIN 7081

From the rear, incident light passes through both sight glass plates with the media between them. The fill level is visible as a line (meniscus) or directly due to the liquid itself.



### Refraction principle with mica shields

From the rear, incident light from a lamp passes through both mica shields with the media between them. The lamp and the media are arranged at an angle. In the gaseous phase, the light passes straight through, with liquids, the light is refracted. Thus the level is visible as a black column, with the gaseous area visible as a light column above.



If unprotected sight glasses are used in boiler systems with aqueous media, high temperatures and high pH values can lead to increased glass erosion. The effect of glass corrosion is increased with the introduction of chemical additives, such as in water treatment. The geometric changes to the sight glass resulting from the erosion lead to risks in the operational safety.

For temperatures from 243 °C, KSR KUEBLER recommends the use of **transparent sight glasses with mica design**. These prevent chemical attack at high water temperatures on the otherwise unprotected glass.



## Construction of sight glass level indicators

### Body

The main body of the sight glass level indicator, contains the liquid channel

### Cover

For the clamping of the sight glass plate

### Flat gasket

Chambered sealing between the liquid channel and the environment

### Glass

Sight glass plates per DIN 7081 from borosilicate glass

### Cushion

Mechanical protection between cover and glass

### U-bolt, nut

Hold the forces from the internal pressure

### Glass size

Standard lengths L of sight glass plates per DIN 7081, width 34 mm, thickness 17 mm

### Visible length VL

The entire visible length in the sight glass, glass separations are included

### Individual visible length ESL

Visible range of a single segment

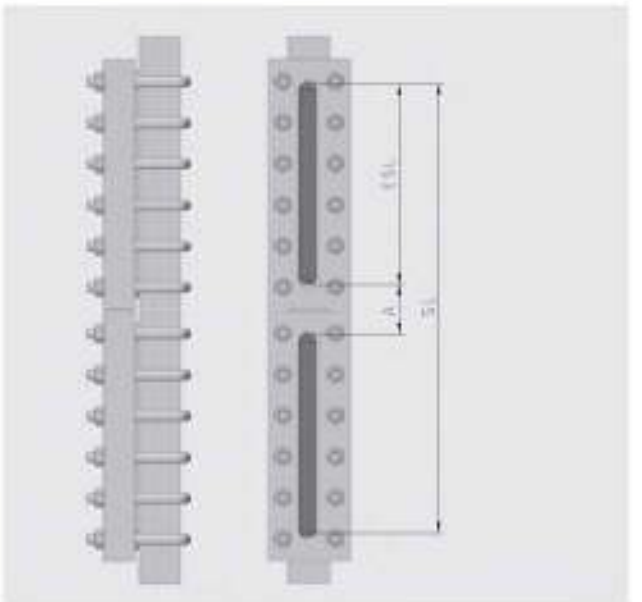
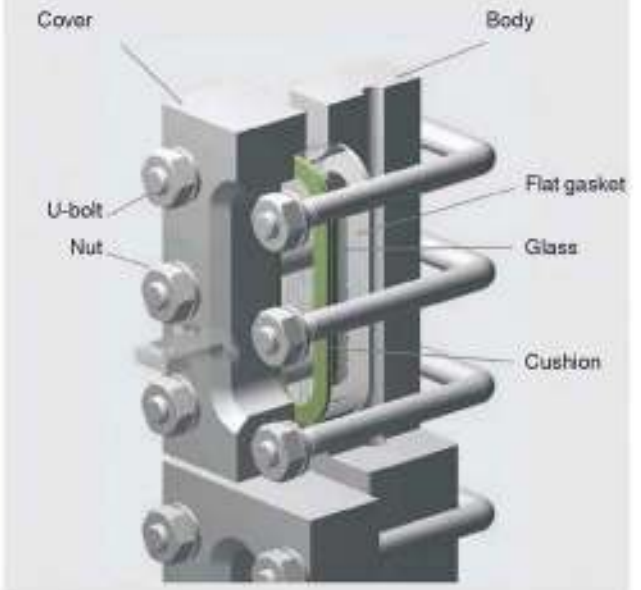
### Segment

Field of view consisting of a single sight glass plate

### Glass distance A

Non-visible range, results from the linking together of segments

### Example



## Visible lengths and glass sizes in mm

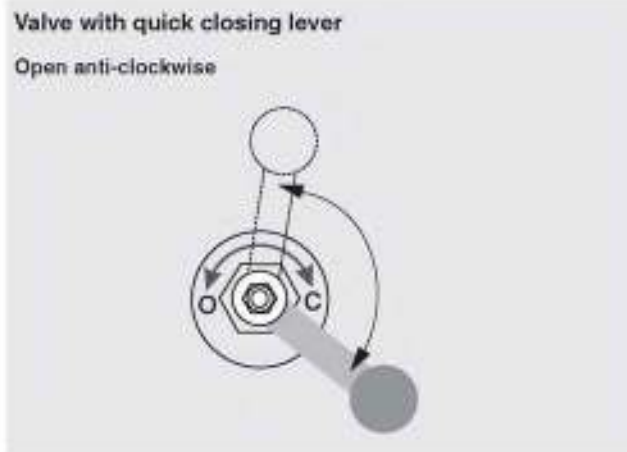
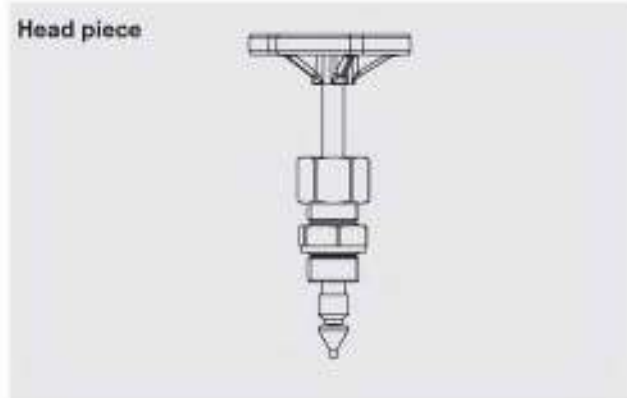
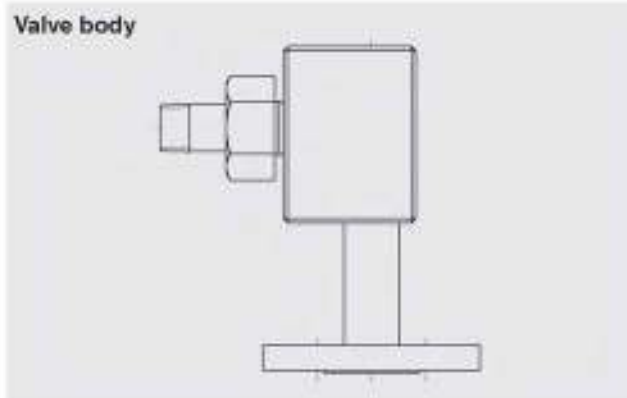
Length	Glass size									
	2	3	4	5	6	7	8	9	10	11
L	140	165	190	220	250	280	320	340	370	400
ESL	120	145	170	200	230	260	300	320	350	380
Number of segments	Visible length VL									
	1	120	145	170	200	230	260	300	320	350
2	285	335	385	445	505	565	645	695	745	805
3	450	525	600	690	780	870	990	1,050	1,140	1,230
4	615	715	815	935	1,055	1,175	1,335	1,415	1,535	1,655
5	780	905	1,030	1,180	1,330	1,480	1,680	1,780	1,930	2,080
6	945	1,095	1,245	1,425	1,605	1,785	2,025	2,145	2,325	2,505
7	1,110	1,285	1,460	1,670	1,880	2,090	2,370	2,510	2,720	2,930

Matrix valid for glass separation A = 45 mm

The visible length SL can deviate from the specified value by  $\pm 3$  mm due to construction.

## Valve heads

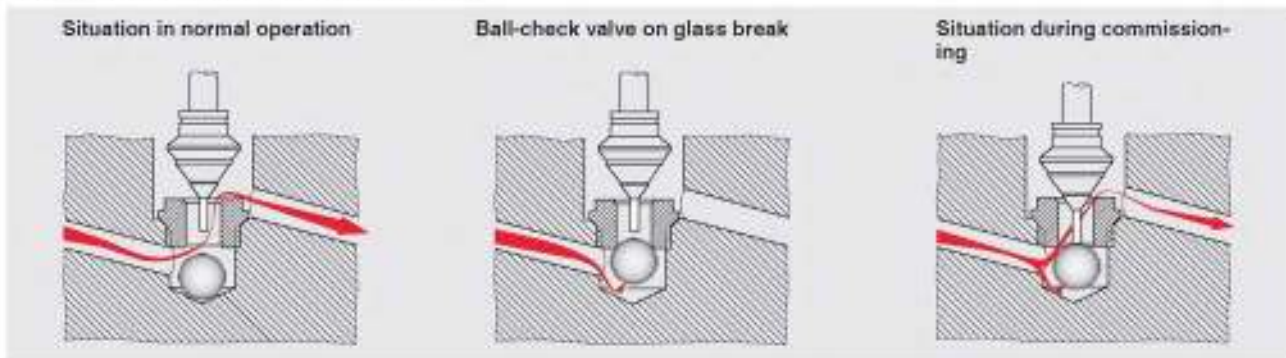
Valve heads isolate the vessel from the sight glass level indicator. They consist of the valve body and the head piece. They are actuated by a valve with quick closing lever or handwheel. In general, they are fitted with a ball-check valve as a safety element.



## Ball-check valve

The ball-check valve should prevent any major spillage from the sight glass level indicator in the event of any glass or mica breakage or other sizable leakage. For this purpose there is, under the valve seat, a ball within a recess. As soon as the display starts to leak, the incipient flow lifts the ball from the recess and forces it against the valve seat (pressure > 0.5 bar). In this way, the flow is sharply reduced. The closing of the valve presses the ball back into its starting position.

### Illustration of the ball-check valve principle





## Model overview

Sight glass level indicator	Material	Display	Max. pressure in bar	Temperature range in °C	Glass size	Number of segments
<b>Reflex indicator</b>						
"Carbon-Line" version, model LGG-RP	Steel A350LF2	Sight glass	100	-40 ... +300	4 ... 9	1 ... 5
Compact version with side pieces, model LGG-E	Steel 1.0460/1.0570	Sight glass	40	-10 ... +300	2 ... 11	1 ... 3
Standard version, model LGG-RE	Steel 1.0570 (A350LF2)	Sight glass	160	-10 ... +300	2 ... 11	1 ... 5
	Stainless steel 1.4404 (316L)			-196 ... +300		
High-pressure version, model LGG-Rt	Steel 1.5415 (15Mo3)	Sight glass	250	-10 ... +100	2 ... 9	1 ... 5
	Stainless steel 1.4404 (316L)			-196 ... +100		
Weld-in version, model LGG-WR	Steel 1.0570 (A350LF2)	Sight glass	40	-10 ... +300	2 ... 9	1
	Stainless steel 1.4404 (316L)			-196 ... +300		
<b>Transparent indicator</b>						
"Carbon-Line" version, model LGG-TP	Steel A350LF2	Glass (mica)	100	-40 ... +300	4 ... 9	1 ... 5
Standard version, model LGG-TE	Steel 1.0570 (A350LF2)	Glass (mica)	160	-10 ... +300	2 ... 11	1 ... 5
	Stainless steel 1.4404 (316L)			-196 ... +300		
High-pressure version, model LGG-TI	Steel 1.5415 (15Mo3)	Glass (mica)	250	-10 ... +100	2 ... 9	1 ... 5
	Stainless steel 1.4404 (316L)			-196 ... +100		
Superheated steam version, model LGG-T3	Steel 1.5415 (15Mo3)	Glas + mica	160	-10 ... +100	2 ... 9	1 ... 5
	Stainless steel 1.4404 (316L)			-196 ... +300		
Weld-in version, model LGG-WT	Steel 1.0570 (A350LF2)	Glass (mica)	40	-10 ... +300	2 ... 9	1
	Stainless steel 1.4404 (316L)			-196 ... +300		
Glass tube, standard, model LGG-GA	Brass	Glass tube 13 mm	10	-10 ... +120	110 ... 1,200 mm	1
	Stainless steel 1.4571 (316Ti)			-10 ... +200		
Glass tube, for large lengths with interposing glass-holder, model LGG-GB	Stainless steel 1.4404 (316L)	Glass tube 16 mm	25	-10 ... +200	150 ... 4,500 mm	1 ... 3
<b>Refraction indicator</b>						
Highest-pressure version, model LGG-M	Steel 1.5415 (15Mo3)	Mica	160/250	-10 ... +374	2 ... 11	1 ... 9

## Examples

Reflex indicator, "Carbon-Line" version, model LGG-RP



Reflex indicator, compact version with side pieces, model LGG-E



Transparent indicator, standard version, model LGG-TE



Reflex indicator, high-pressure version, model LGG-Rt



## Model overview of valve heads

Valve head	Material		Max. pressure in bar	Operation	Ball-check valve	Mount	Thru-way
	Body	Head piece					
Glass tube fitting with handwheel, model LGV-01	Stainless steel	Stainless steel	PN 250	Handwheel	yes	top/bottom	Offset
Glass tube fitting with quick closing lever, model LGV-03	Stainless steel	Stainless steel	PN 100	Quick closing lever	yes	top/bottom	Offset
Compact glass tube fitting without valve, model LGV-04	Stainless steel	Stainless steel	PN 10	Handwheel	no	top/bottom	angled
Glass tube fitting compact with handwheel, model LGV-05	Brass or stainless steel	without	PN 10	without	no	top/bottom	angled
Double valve, model LGV-18	Steel 15Mo3	Stainless steel	PN 160	Double handwheel, double-lever	yes	lateral	angled
Double valve high pressure, model LGV-19	Steel 15Mo3	Stainless steel	PN 250	Double handwheel, double-lever	yes	lateral	angled
Forged valve with handwheel, model LGV-33	Steel A350LF2, nitrocarburised	Stainless steel	PN 250	Handwheel	yes	top/bottom	Offset
Forged valve with quick closing lever, model LGV-38	Steel A350LF2, nitrocarburised	Stainless steel	PN 100	Quick closing lever	yes	top/bottom	Offset
Straight valve with handwheel, model LGV-51	Steel, stainless steel	Stainless steel	PN 250	Handwheel	yes	lateral, back	straight
Angled valve with handwheel, model LGV-52	Steel, stainless steel	Stainless steel	PN 250	Handwheel	yes	lateral	angled
Offset valve with handwheel, model LGV-53	Steel, stainless steel	Stainless steel	PN 250	Handwheel	yes	top/bottom	Offset
Straight valve with quick closing lever, model LGV-56	Steel, stainless steel	Stainless steel	PN 100	Quick closing lever	yes	lateral, back	straight
Angled valve with quick closing lever, model LGV-57	Steel, stainless steel	Stainless steel	PN 100	Quick closing lever	yes	lateral	angled
Offset valve with quick closing lever, model LGV-58	Steel, stainless steel	Stainless steel	PN 100	Quick closing lever	yes	top/bottom	Offset

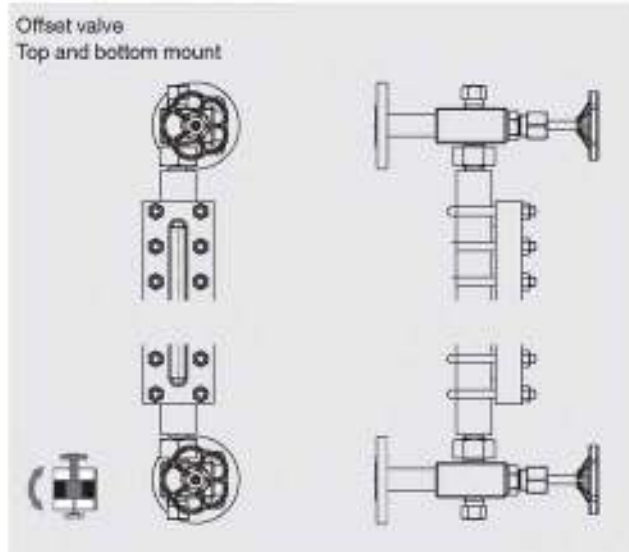
## Examples



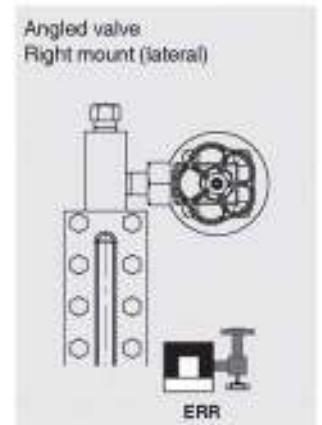
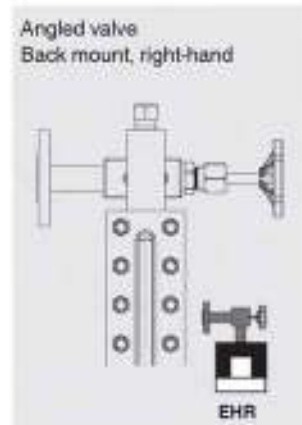
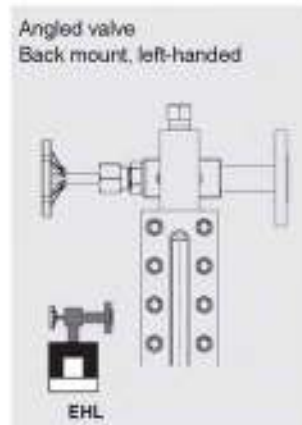
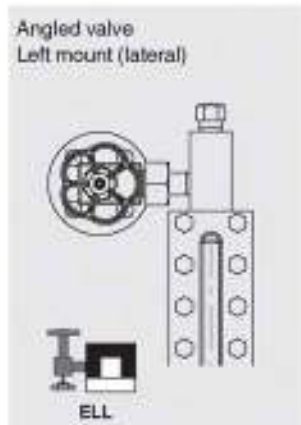
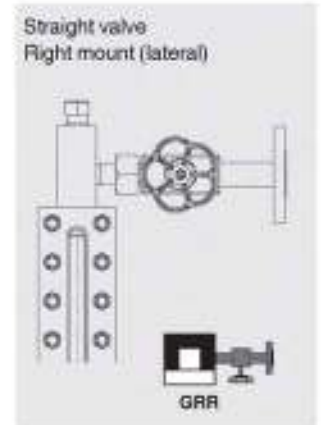
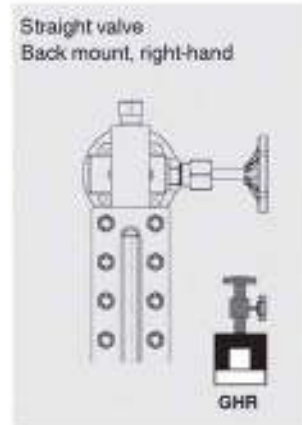
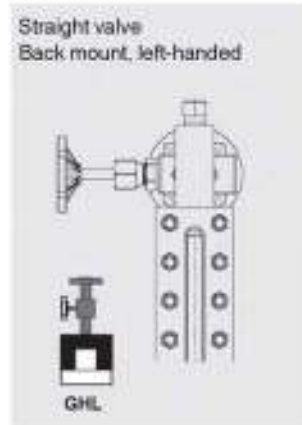
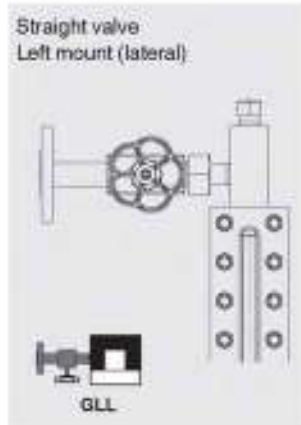
## Valve head arrangement

The valve arrangement is always specified in relation to the viewing direction.

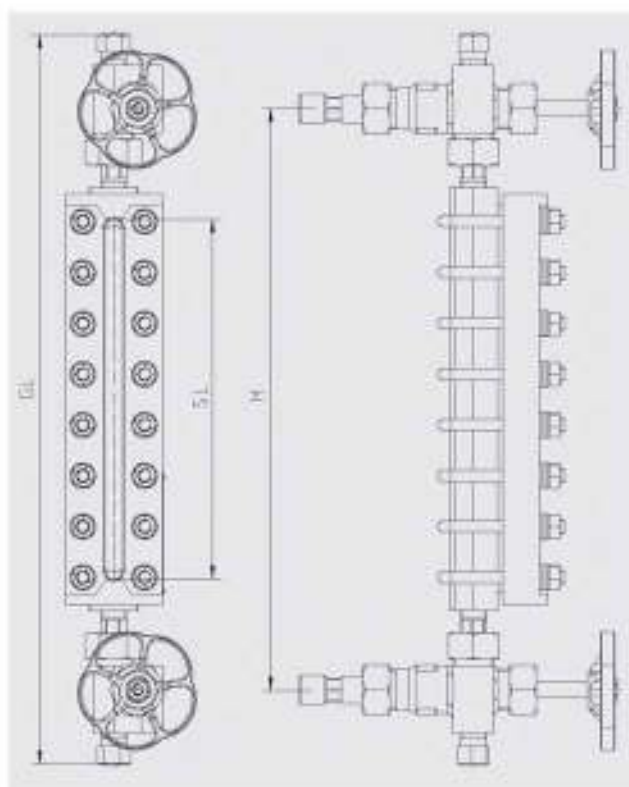
### Rotatable field of view



### Fixed field of view



## Sight glass level indicator, reflex, "Carbon-Line" version Model LGG-RP

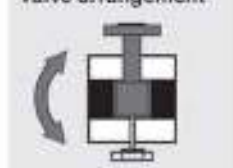


### Specifications

Material	Steel A350 LF2, nitrocarbured
Body	40 x 40 mm, forged
Cover	80 x 30 mm, forged
Sight glass	Borosilicate, reflex per DIN 7081
Max. operating pressure	100 bar <sup>1)</sup>
Temperature range	-40 ... +243 °C (steam) -40 ... +280 °C
Process connections	<ul style="list-style-type: none"> <li>■ Male thread 1/2 NPT, 3/4 NPT</li> <li>■ Weld stub 1/2", 3/4"</li> <li>■ Flange DIN/EN: DN 15 ... 50, PN 16 ... 100</li> <li>■ Flange ANSI: 1/2 ... 2", class 150 ... 600</li> </ul>
Centre-to-centre distance M	freely selectable, min. visible length SL + 180 mm
Vent	Plug 1/2 NPT (option: Valve)
Drain	Plug 1/2 NPT (option: Valve)
Glass size	4 ... 9
Number of segments	1 ... 5
Suitable valve heads	<ul style="list-style-type: none"> <li>■ Handwheel</li> <li>■ Quick closing lever</li> </ul>
	<ul style="list-style-type: none"> <li>■ Model LGV-33 (PN 250)</li> <li>■ Model LGV-36 (PN 100)</li> </ul>

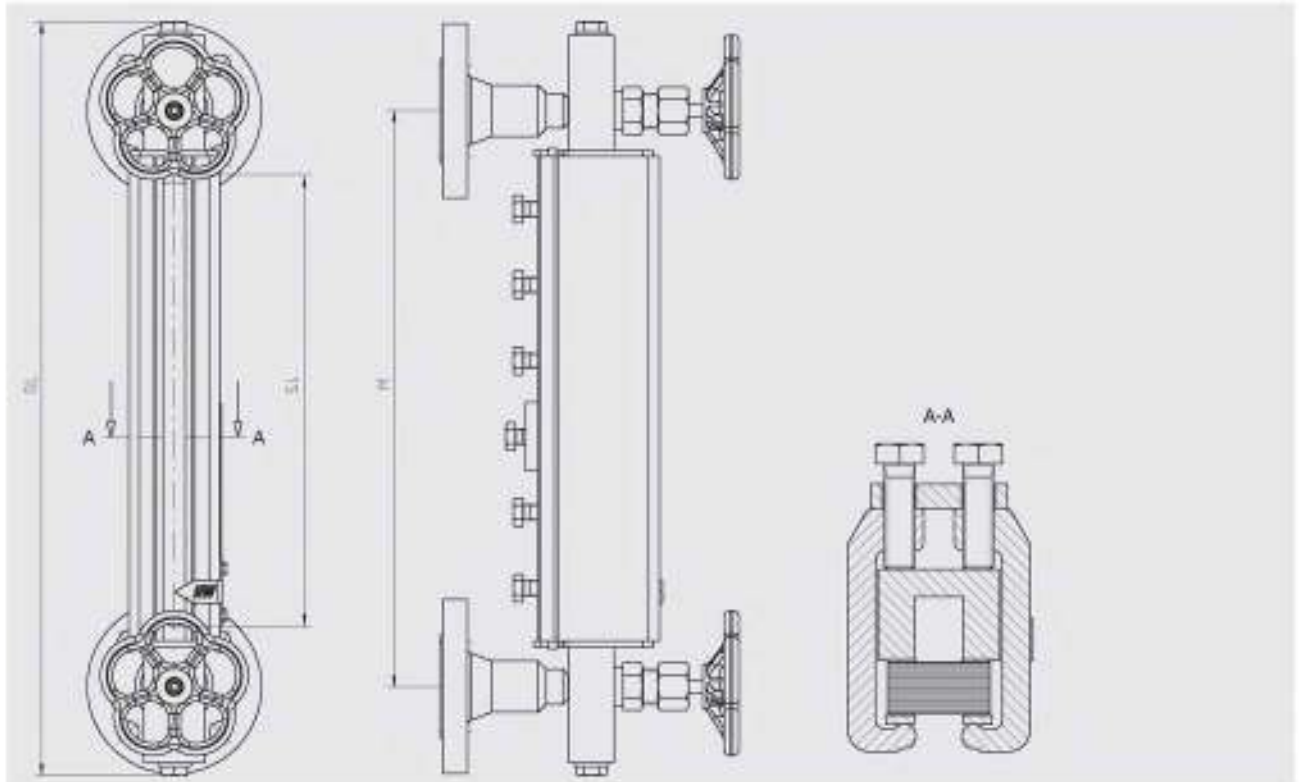
<sup>1)</sup> Depending on the temperature, the material properties must be observed

### Valve arrangement





## Sight glass level indicator, reflex, compact version with side pieces Model LGG-E

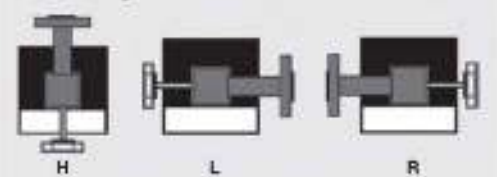


### Specifications

Material	Steel 1.0460, 1.0570
Body	40 x 30 mm, machined
Cover	Clamping through side components, hinged
Sight glass	Borelucate, reflex per DIN 7081
Max. operating pressure	40 bar <sup>1)</sup>
Temperature range	-10 ... +243 °C (steam)
Process connections	<ul style="list-style-type: none"> <li>■ Flange DINEN: DN 15 ... 50, PN 16 ... 40</li> <li>■ Flange ANSI: 1/2 ... 2", class 150 ... 300</li> </ul>
Centre-to-centre distance M	freely selectable, min. visible length SL + 80 mm
Vent	Plug G 3/8 (option: Valve, ball cock)
Drain	Plug G 3/8 (option: Valve, ball cock)
Glass size	2 ... 11
Number of segments	1 ... 3
Suitable valve heads	integrated with ball-check valve, mounting components from stainless steel

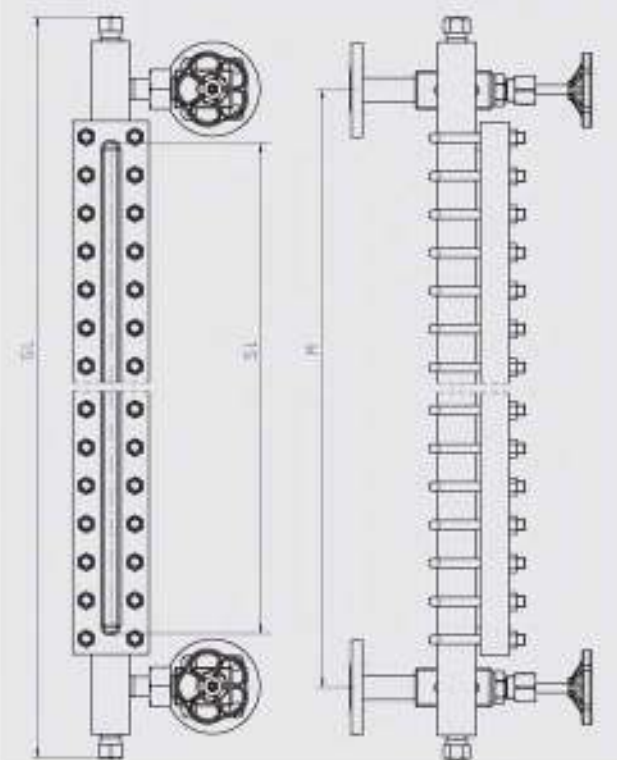
1) Depending on the temperature, the material properties must be observed

### Valve arrangement

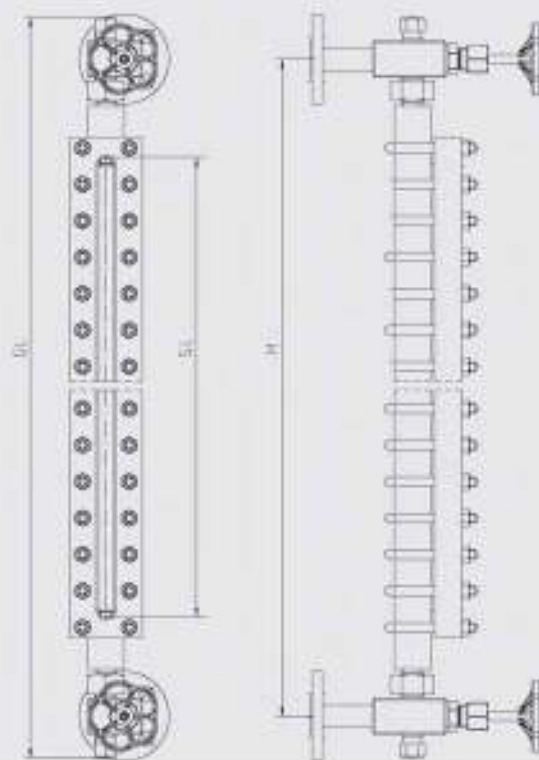


## Sight glass level indicator, reflex, standard version Model LGG-RE

Version with valve head, lateral, model LGV-52



Version with valve head, top/bottom, model LGV-53

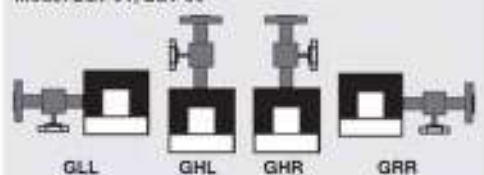


Specifications	Steel version	Stainless steel version
Material	Steel 1.0570, A350 LF2	Stainless steel 1.4404 (316L)
Body	40 x 40 mm, machined	
Cover	<ul style="list-style-type: none"> <li>80 x 30 mm, forged (PN 40, size 4 ... 9)</li> <li>80 x 30 mm, machined (PN 40)</li> <li>80 x 40 mm, machined (PN 100, PN 160)</li> </ul>	<ul style="list-style-type: none"> <li>80 x 30 mm, machined (PN 40)</li> <li>80 x 40 mm, machined (PN 100, PN 160)</li> </ul>
Sight glass	Borosilicate, reflex per DIN 7065	
Max. operating pressure	40 bar, 100 bar, 160 bar <sup>1)</sup>	
Temperature range	-10 ... +243 °C (steam) -10 ... +300 °C	-195 ... +243 °C (steam) -195 ... +300 °C
Process connections	<ul style="list-style-type: none"> <li>Male thread 1/2 NPT, 3/4 NPT</li> <li>Weld stub 1/2", 3/4"</li> <li>Flange DIM/EN: DN 15 ... 50, PN 16 ... 160</li> <li>Flange ANSI: 1/2 ... 2", class 150 ... 900</li> </ul>	
Centre-to-centre distance M	<ul style="list-style-type: none"> <li>freely selectable, min. visible length SL + 180 mm (with mounted valve heads model LGV-33, LGV-38, LGV-53, LGV-58)</li> <li>freely selectable, min. visible length SL + 80 mm (with mounted valve heads model LGV-51, LGV-52, LGV-56, LGV-57)</li> <li>Special version, visible length = M (with mounted valve heads model LGV-51, LGV-52, LGV-56, LGV-57)</li> </ul>	
Vent	Plug G 3/8 (option: Weld stub, flange, valve or ball cock)	
Drain	Plug G 3/8 (option: Weld stub, flange, valve or ball cock)	
Glass size	2 ... 11	
Number of segments	1 ... 5 (more on request)	
Suitable valve heads	<ul style="list-style-type: none"> <li>Handwheel</li> <li>Quick closing lever</li> </ul>	
	<ul style="list-style-type: none"> <li>Model LGV-33, LGV-51, LGV-52, LGV-53 (PN 250)</li> <li>Model LGV-38, LGV-56, LGV-57, LGV-58 (PN 100)</li> </ul>	<ul style="list-style-type: none"> <li>Model LGV-51, LGV-52, LGV-53 (PN 250)</li> <li>Model LGV-56, LGV-57, LGV-58 (PN 100)</li> </ul>

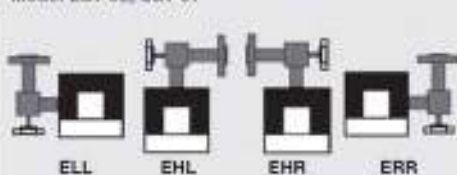
<sup>1)</sup> Depending on the temperature, the material properties must be observed

### Other materials on request

Valve arrangement  
Model LGV-51, LGV-56



Model LGV-52, LGV-57

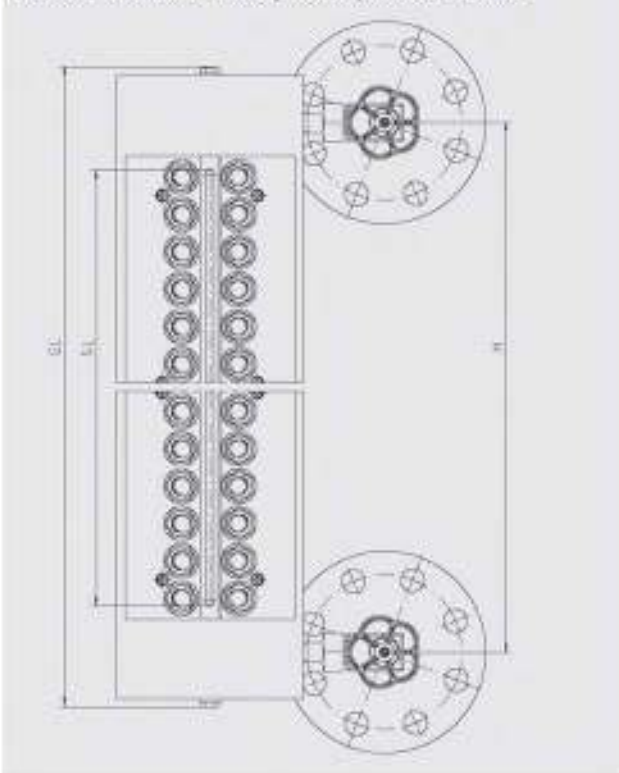


Model LGV-33, LGV-38,  
LGV-53, LGV-58

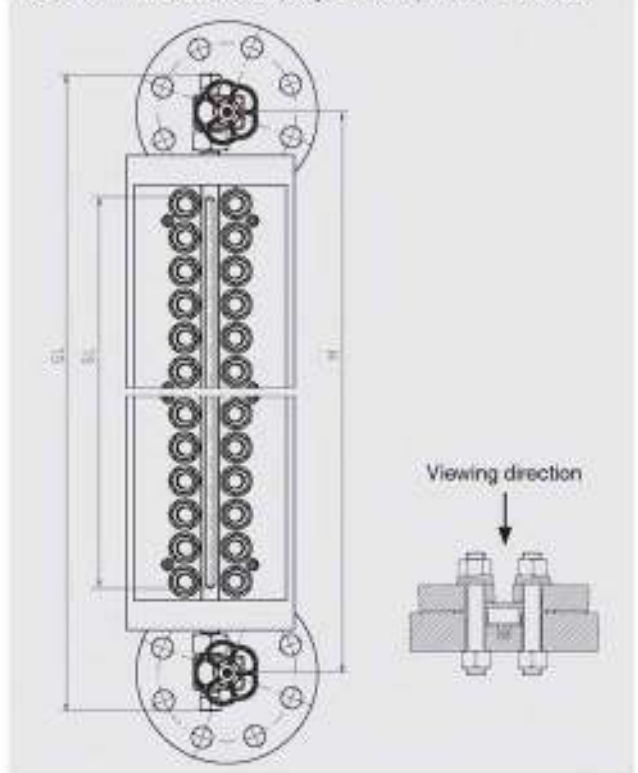


## Sight glass level indicator, reflex, high-pressure version Model LGG-RI

Version with valve head, lateral, model LGV-52



Version with valve head, top/bottom, model LGV-53

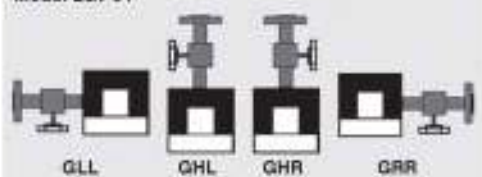


Specifications	Steel version	Stainless steel version
Material	Steel 1.5415 (15Mo3)	Stainless steel 1.4404 (316L)
Body	140 x 40 mm, machined	
Cover	Pressure frame	
Sight glass	Borosilicate, reflex per DIN 7081	
Max. operating pressure	250 bar <sup>1)</sup>	
Temperature range	-10 ... +100 °C	-196 ... +100 °C
Process connections	<ul style="list-style-type: none"> <li>■ Male thread 1/2 NPT, 3/4 NPT</li> <li>■ Weld stub 1/2", 3/4"</li> <li>■ Flange DIN/EN: DN 15 ... 50, PN 16 ... 250</li> <li>■ Flange ANSI: 1/2 ... 2", class 150 ... 1,500</li> </ul>	
Centre-to-centre distance M	<ul style="list-style-type: none"> <li>■ freely selectable, min. visible length SL + 180 mm (with mounted valve head model LGV-53)</li> <li>■ freely selectable, visible length SL &lt; M (with mounted valve heads model LGV-51, LGV-52)</li> </ul>	
Vent	Plug G 3/8 (option: Weld stub, flange, valve or ball cock)	
Drain	Plug G 3/8 (option: Weld stub, flange, valve or ball cock)	
Glass size	2 ... 9	
Number of segments	1 ... 5	
Suitable valve heads	Model LGV-51, LGV-52, LGV-53	
Handwheel		

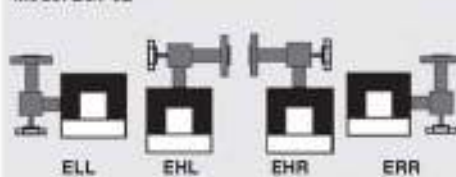
<sup>1)</sup> Depending on the temperature, the material properties must be observed

Other materials on request

Valve arrangement  
Model LGV-51



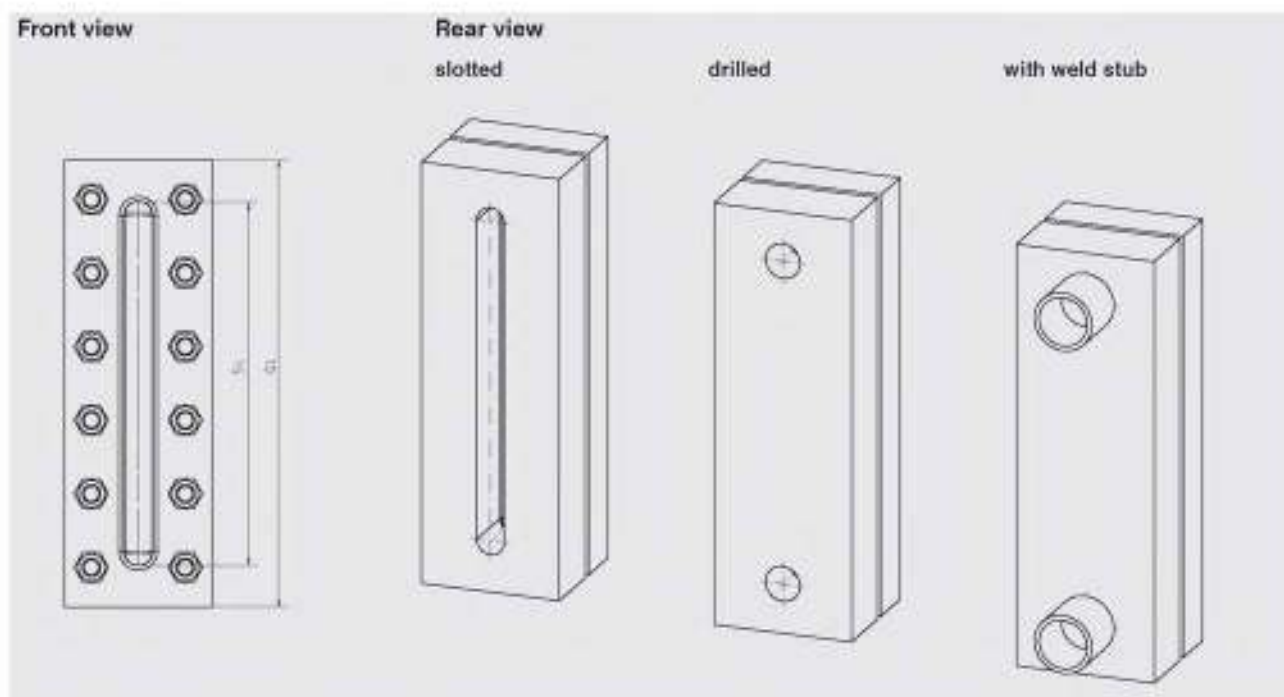
Model LGV-52



LGV-53



## Sight glass level indicator, reflex, weld-in version Model LGG-WR



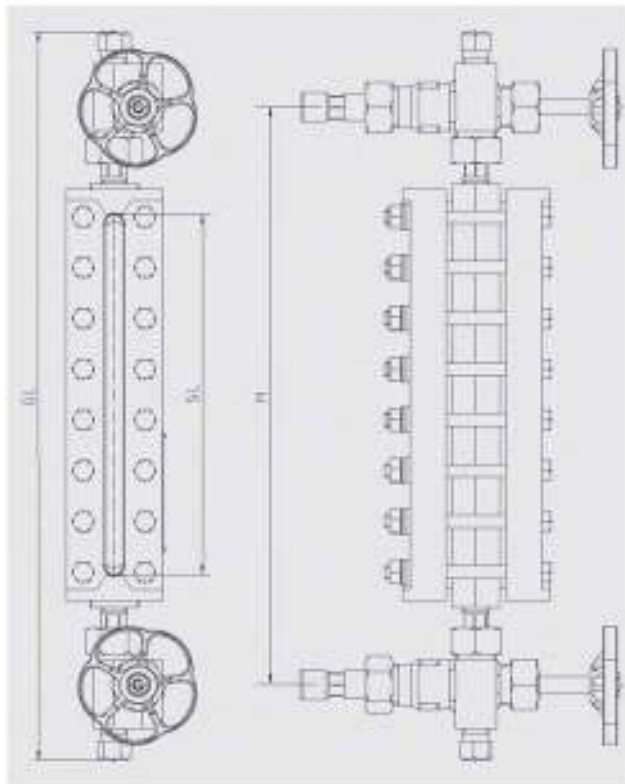
Specifications	Steel version	Stainless steel version
Material	Steel 1.0670	Stainless steel 1.4404 (316L)
Body	40 x 40 mm, machined	
Cover	40 x 40 mm, machined	
Sight glass	Borosilicate, reflex per DIN 7081	
Max. operating pressure	40 bar 1) (display must be included in the pressure test for the vessel)	
Temperature range	-10 ... +243 °C (steam) -10 ... +300 °C	-196 ... +243 °C (steam) -196 ... +300 °C
Overall length GL	Visible length BL + 43 mm	
Glass size	2 ... 9 (larger on request)	
Number of segments	1	

1) Depending on the temperature, the material properties must be observed

Other materials on request



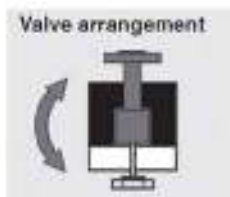
## Sight glass level indicator, transparent, "Carbon-Line" version Model LGG-TP



Specifications	
Material	Steel A350 LF2, nitrocarburised
Body	40 x 40 mm, forged
Cover	80 x 34 mm, forged
Sight glass	Borosilicates, transparent per DIN 7061 (option: Mica design)
Max. operating pressure	100 bar <sup>1)</sup>
Temperature range	-40 ... +243 °C (steam, without mica design) -40 ... +300 °C (steam, with mica design) -40 ... +300 °C
Process connections	<ul style="list-style-type: none"> <li>■ Male thread 1/2 NPT, 3/4 NPT</li> <li>■ Weld stub 1/2", 3/4"</li> <li>■ Flange DIN EN DN 15 ... 50, PN 16 ... 100</li> <li>■ Flange ANSI 1/2" ... 2", class 150 ... 600</li> </ul>
Centre-to-centre distance M	freely selectable, min. visible length SL + 180 mm
Vent	Plug 1/2 NPT (option: Valve)
Drain	Plug 1/2 NPT (option: Valve)
Glass size	4 ... 9
Number of segments	1 ... 5
Suitable valve heads	<ul style="list-style-type: none"> <li>■ Handwheel</li> <li>■ Quick closing lever</li> </ul>
	<ul style="list-style-type: none"> <li>■ Model LGV-33 (PN 250)</li> <li>■ Model LGV-38 (PN 100)</li> </ul>

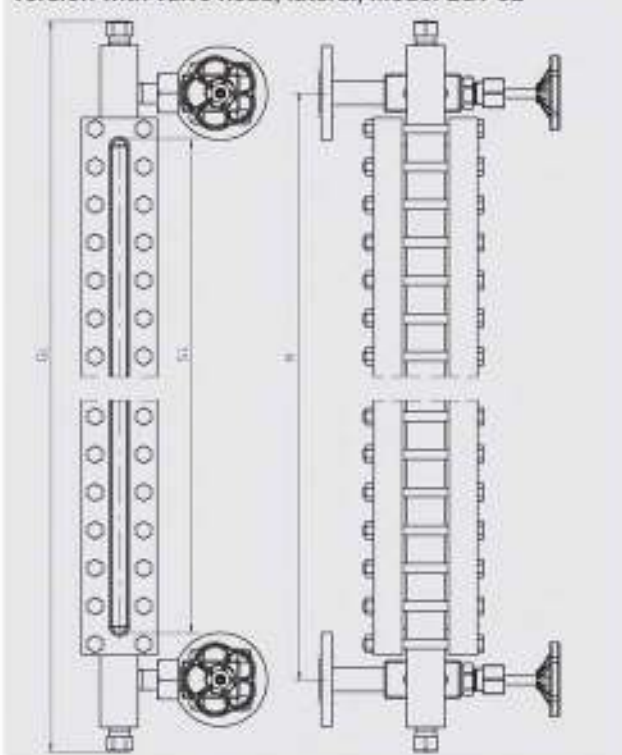
<sup>1)</sup> Depending on the temperature, the material properties must be observed

Other materials on request

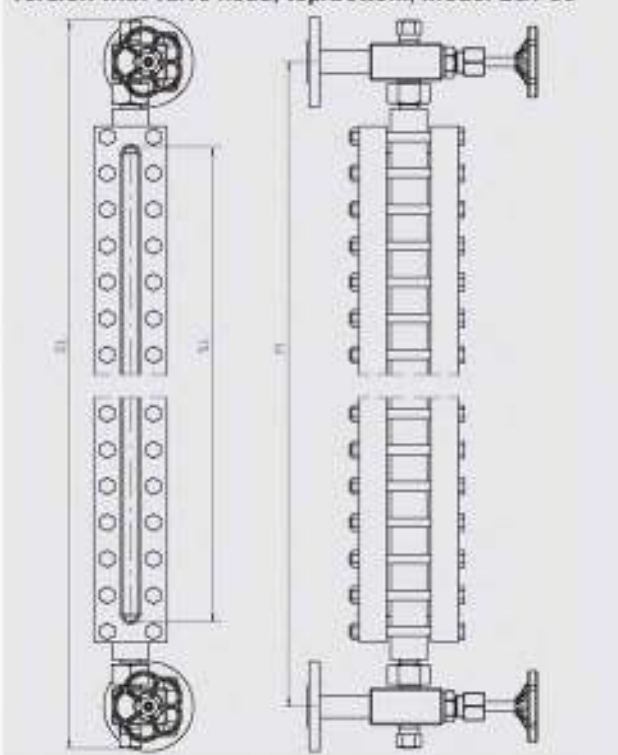


## Sight glass level indicator, transparent, standard version Model LGG-TE

Version with valve head, lateral, model LGV-52



Version with valve head, top/bottom, model LGV-53

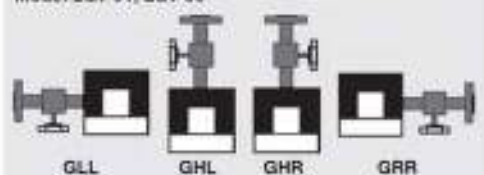


Specifications	Steel version	Stainless steel version
Material	Steel 1.0570, A350 LF2	Stainless steel 1.4404 (316L)
Body	40 x 40 mm, machined	
Cover	<ul style="list-style-type: none"> <li>80 x 30 mm, forged (PN 40, size 4 ... 9)</li> <li>80 x 30 mm, machined (PN 40)</li> <li>80 x 40 mm, machined (PN 100, PN 160)</li> </ul>	<ul style="list-style-type: none"> <li>80 x 30 mm, machined (PN 40)</li> <li>80 x 40 mm, machined (PN 100, PN 160)</li> </ul>
Sight glass	Borosilicate, transparent per DIN 7081 (option: Mica design)	
Max. operating pressure	40 bar, 100 bar, 160 bar <sup>1)</sup>	
Temperature range	<ul style="list-style-type: none"> <li>-10 ... +243 °C (steam, without mica design)</li> <li>-10 ... +300 °C (steam, with mica design)</li> <li>-10 ... +300 °C</li> </ul>	<ul style="list-style-type: none"> <li>-195 ... +243 °C (steam, without mica design)</li> <li>-195 ... +300 °C (steam, with mica design)</li> <li>-195 ... +300 °C</li> </ul>
Process connections	<ul style="list-style-type: none"> <li>Male thread 1/2 NPT, 3/4 NPT</li> <li>Weld stub 1/2", 3/4"</li> <li>Flange DIN EN 10 901 15 ... 50, PN 16 ... 160</li> <li>Flange ANSI 1/2 ... 2", class 150 ... 900</li> </ul>	
Centre-to-centre distance M	<ul style="list-style-type: none"> <li>freely selectable, min. visible length SL + 180 mm (with mounted valve heads model LGV-33, LGV-38, LGV-53, LGV-58)</li> <li>freely selectable, min. visible length SL + 80 mm (with mounted valve heads model LGV-51, LGV-52, LGV-56, LGV-57)</li> <li>Special version, visible length = M (with mounted valve heads model LGV-51, LGV-52, LGV-56, LGV-57)</li> </ul>	
Vent	Plug G 3/8 (option: Weld stub, flange, valve or ball cock)	
Drain	Plug G 3/8 (option: Weld stub, flange, valve or ball cock)	
Glass size	2 ... 11	
Number of segments	1 ... 5 (more on request)	
Suitable valve heads	<ul style="list-style-type: none"> <li>Handwheel</li> <li>Quick closing lever</li> </ul>	
	<ul style="list-style-type: none"> <li>Model LGV-33, LGV-51, LGV-52, LGV-53 (PN 250)</li> <li>Model LGV-38, LGV-56, LGV-57, LGV-58 (PN 100)</li> </ul>	<ul style="list-style-type: none"> <li>Model LGV-51, LGV-52, LGV-53 (PN 250)</li> <li>Model LGV-56, LGV-57, LGV-58 (PN 100)</li> </ul>

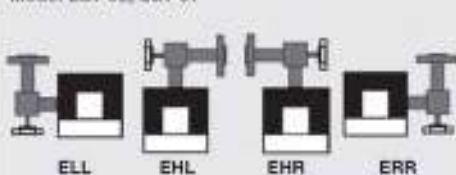
<sup>1)</sup> Depending on the temperature, the material properties must be observed

Other materials on request

Valve arrangement  
Model LGV-51, LGV-56



Model LGV-52, LGV-57

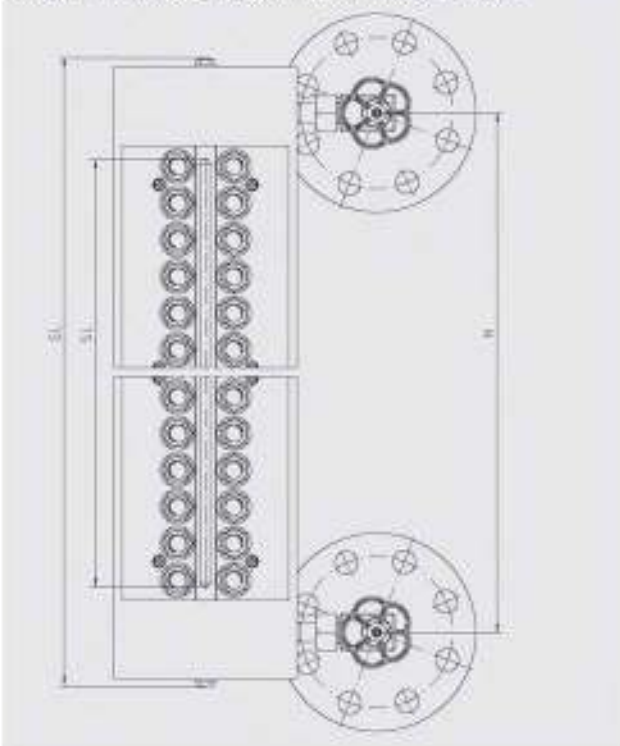


Model LGV-33, LGV-38,  
LGV-53, LGV-58

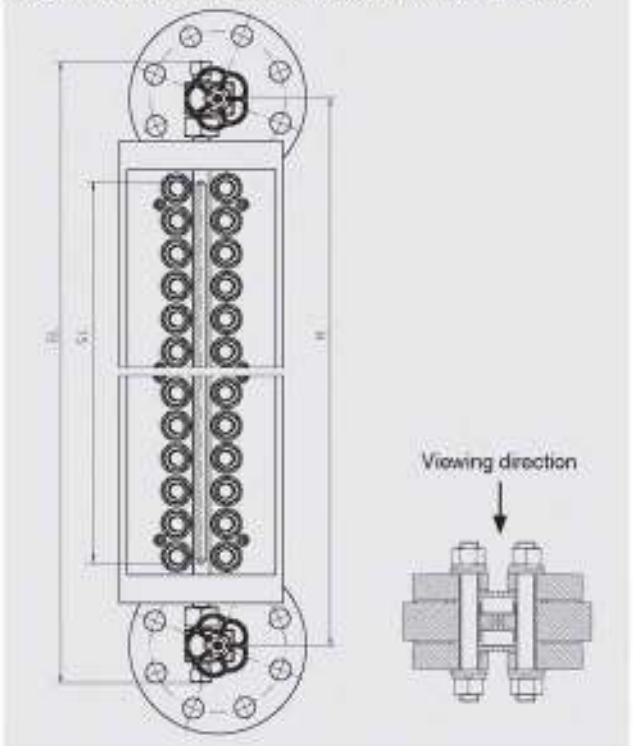


## Sight glass level indicator, transparent, high-pressure version Model LGG-TI

Version with valve head, lateral, model LGV-52



Version with valve head, top/bottom, model LGV-53



Specifications	Steel version	Stainless steel version
Material	Steel 1.5415 (15Mo3)	Stainless steel 1.4404 (316L)
Body	140x 40 mm, machined	
Cover	Pressure frame	
Sight glass	Borosilicate, transparent per DIN 7081	
Max. operating pressure	250 bar <sup>1)</sup>	
Temperature range	-10 ... +100 °C	-196 ... +100 °C
Process connections	<ul style="list-style-type: none"> <li>■ Male thread 1/2 NPT, 3/4 NPT</li> <li>■ Weld stub 1/2", 3/4"</li> <li>■ Flange DIN/EN DN 15 ... 50; PN 16 ... 250</li> <li>■ Flange ANSI 1/2 ... 2", class 150 ... 1,500</li> </ul>	
Centre-to-centre distance M	<ul style="list-style-type: none"> <li>■ freely selectable, min. visible length SL + 180 mm (with mounted valve head model LGV-53)</li> <li>■ freely selectable, visible length SL ≤ M (with mounted valve heads model LGV-51, LGV-52)</li> </ul>	
Vent.	Plug G 3/8 (option: Weld stub, flange, valve or ball cock)	
Drain	Plug G 3/8 (option: Weld stub, flange, valve or ball cock)	
Glass size	2 ... 9	
Number of segments	1 ... 5	
Suitable valve heads		
■ Handwheel	Model LGV-51, LGV-52, LGV-53	

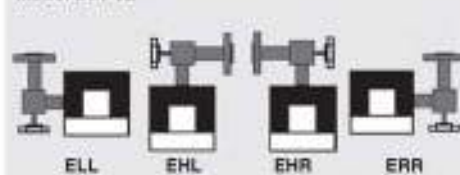
<sup>1)</sup> Depending on the temperature, the material properties must be observed

Other materials on request

Valve arrangement  
Model LGV-51



Model LGV-52



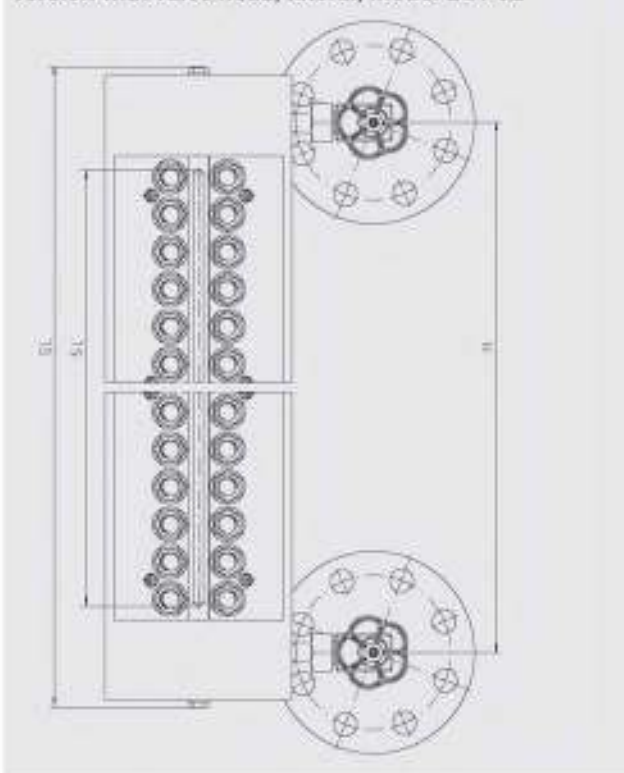
LGV-53



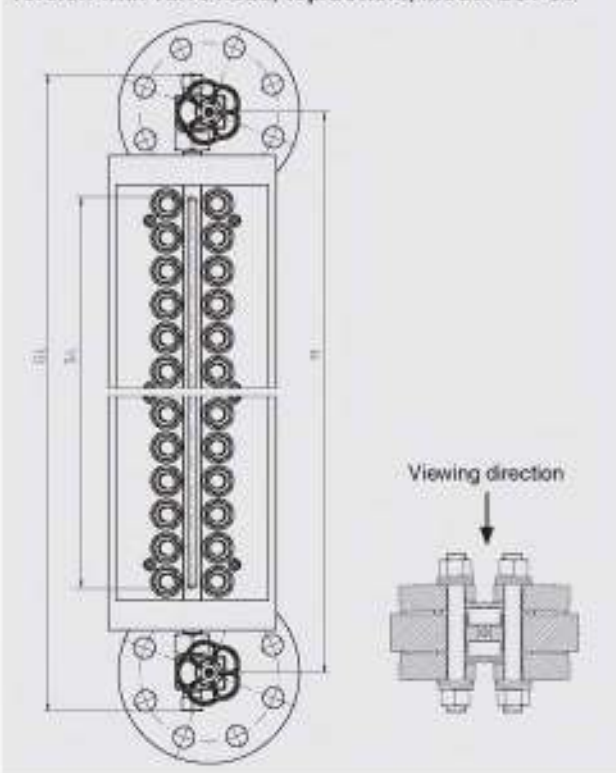


## Sight glass level indicator, transparent, superheated steam version Model LGG-T3

Version with valve head, lateral, model LGV-52



Version with valve head, top/bottom, model LGV-53

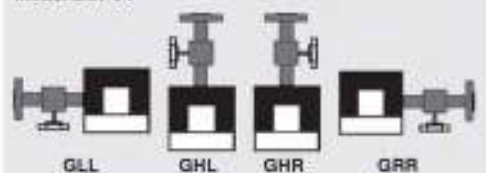


Specifications	Steel version	Stainless steel version
Material	Steel 1.5415 (15Mo3)	Stainless steel 1.4404 (316L)
Body	140 x 40 mm, machined	
Cover	Pressure frame	
Sight glass	Borosilicate, transparent per DIN 7981 (with mica design)	
Max. operating pressure	160 bar <sup>1)</sup>	
Temperature range	-10 ... +300 °C	-156 ... +300 °C
Process connections	<ul style="list-style-type: none"> <li>■ Male thread G 1/2, G 3/4, 1/2 NPT, 3/4 NPT</li> <li>■ Weld stub 1/2", 3/4"</li> <li>■ Flange DIN EN DN 15 ... 50, PN 16 ... 100</li> <li>■ Flange ANSI 1/2 ... 2", class 150 ... 600</li> </ul>	
Centre-to-centre distance M	<ul style="list-style-type: none"> <li>■ freely selectable, min. visible length SL + 180 mm (with mounted valve head model LGV-53)</li> <li>■ freely selectable, visible length SL ≤ M (with mounted valve heads model LGV-51, LGV-52)</li> </ul>	
Vent	Plug G 3/8 (option: Weld stub, flange, valve or ball cock)	
Drain	Plug G 3/8 (option: Weld stub, flange, valve or ball cock)	
Glass size	2 ... 9	
Number of segments	1 ... 5	
Suitable valve heads	Model LGV-51, LGV-52, LGV-53	

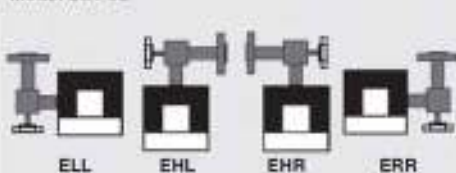
### Other materials on request

<sup>1)</sup> Depending on the temperature, the material properties must be observed

Valve arrangement  
Model LGV-51



Model LGV-52

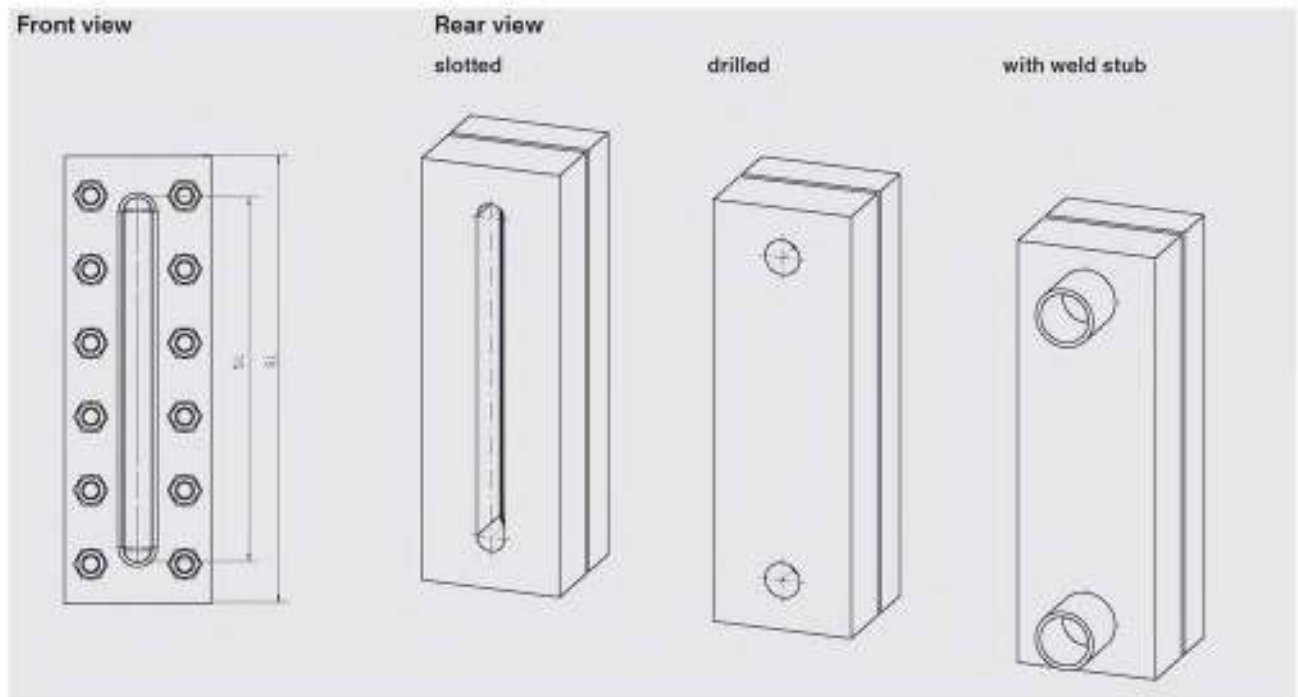


LGV-53





## Sight glass level indicator, transparent, weld-in version Model LGG-WT

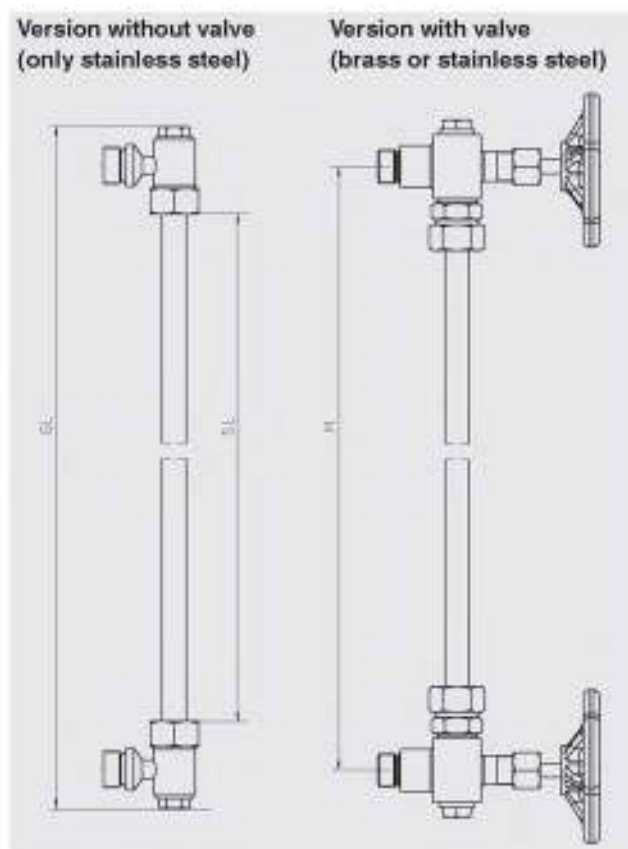


Specifications	Steel version	Stainless steel version
Material	Steel 1.0570	Stainless steel 1.4404 (316L)
Body	40 x 40 mm, machined	
Cover	40 x 40 mm, machined	
Sight glass	Borosilicate, transparent per DIN 7051 (option: Mica design)	
Max. operating pressure	40 bar <sup>1)</sup> (display must be included in the pressure test for the vessel)	
Temperature range	-10 ... +243 °C (steam, without mica design) -10 ... +300 °C (steam, with mica design) -10 ... +300 °C	-196 ... +243 °C (steam, without mica design) -196 ... +300 °C (steam, with mica design) -196 ... +300 °C
Overall length GL	Visible length GL + 43 mm	
Glass size	2 ... 9 (larger on request)	
Number of segments	1	

<sup>1)</sup> Depending on the temperature, the material properties must be observed

Other materials on request

## Sight glass level indicator, glass tube, standard Model LGG-GA

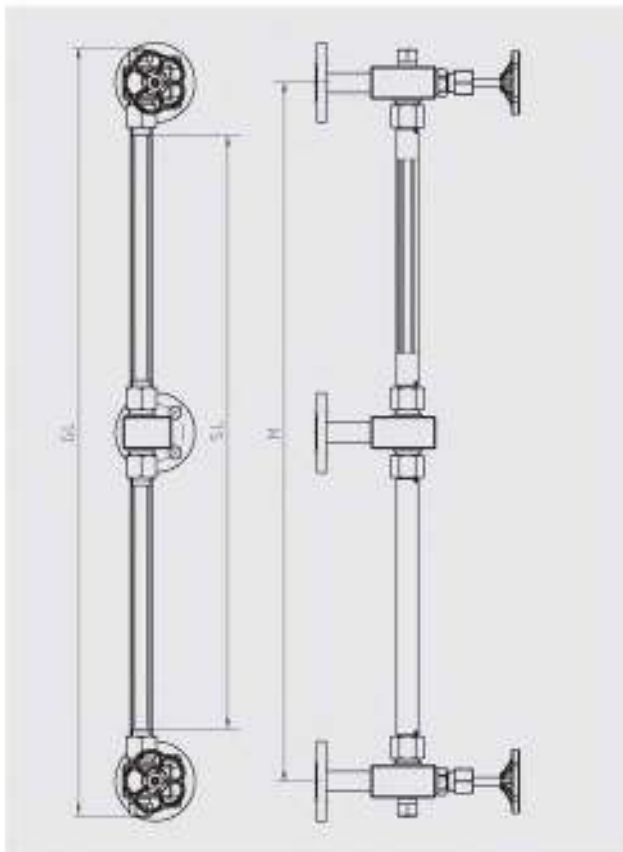


Specifications	Version without valve	Version with valve
Material	Stainless steel 1.4571	Stainless steel 1.4571 or brass 2.0401
Sight glass	Glass tube, borosilicate, diameter 13 mm	
Max. operating pressure	10 bar <sup>1)</sup>	
Temperature range	-10 ... +80 °C (with glass protective cover) -10 ... +150 °C (with stainless steel protection)	-10 ... +200 °C
Process connections	<ul style="list-style-type: none"> <li>■ Male thread G 1/2</li> <li>■ Flange DIN/EN DN 15 ... 25, PN 10</li> </ul>	
Centre-to-centre distance M	110 ... 1,200 mm, visible length SL + 70 mm	150 ... 1,200 mm, visible length SL + 110 mm
Vent	Plug G 3/8	Plug G 1/2
Drain	Plug G 3/8	Plug G 1/2
Glass size	Centre-to-centre distance M - 20 mm	Centre-to-centre distance M - 65 mm
Number of segments	1	
Suitable valve heads		
Glass tube fitting	Model LGV-04	Model LGV-05

1) Depending on the temperature, the material properties must be observed

Other materials on request

**Sight glass level indicator, glass tube, for large lengths with interposing glass-holder  
Model LGG-GB**

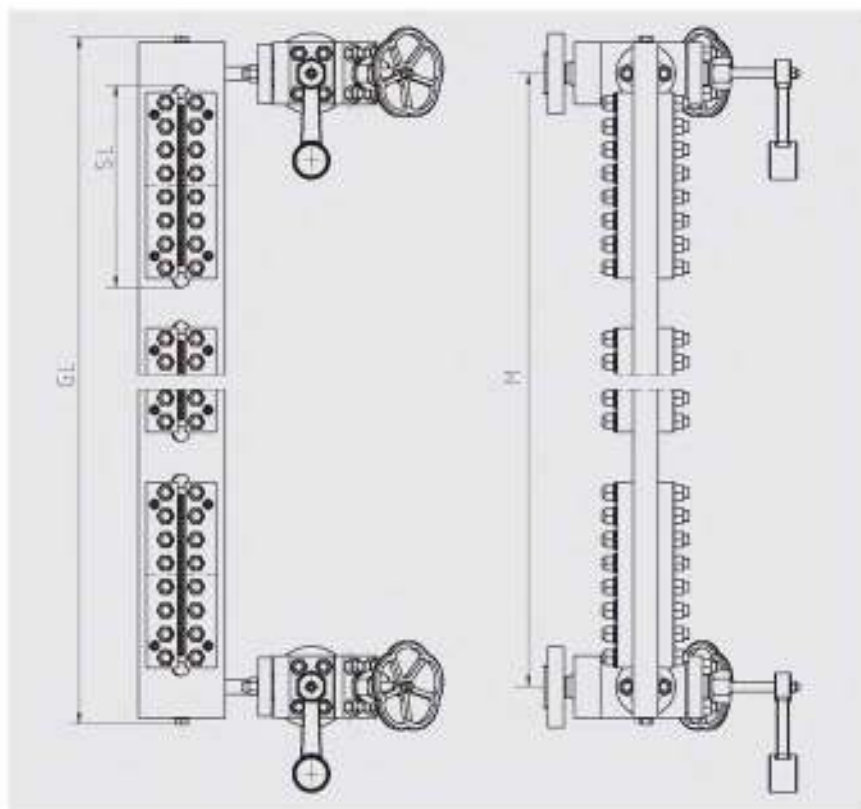


Specifications	
Material	Stainless steel 1.4404 (316L)
Sight glass	Glass tube, borosilicate, diameter 16 mm
Max. operating pressure	25 bar 1)
Temperature range	-10 ... +200 °C
Process connections	<ul style="list-style-type: none"> <li>■ Male thread G 1/2</li> <li>■ Flange DIN EN DN 15 ... 25, PN 25</li> </ul>
Centre-to-centre distance M	150 ... 4,500 mm, visible length SL + 130 mm
Vent	Plug
Drain	Plug
Glass size	150 ... 4,500 mm (use interposing glass-holder from 1,500 mm)
Number of segments	1 ... 3
Suitable valve heads	
Handwheel	Model LGV-01
Quick closing lever	Model LGV-03

1) Depending on the temperature, the material properties must be observed

Other materials on request

## Sight glass level indicator, refraction, highest-pressure version Model LGG-M



### Specifications

Material	Steel 1.5415 (15Mo3)
Body	140 x 40 mm, machined
Cover	Pressure frame
Sight glass	Mica package (sight glass distance 120 mm)
Max. operating pressure	250 bar <sup>1)</sup>
Temperature range	-10 ... +374 °C
Process connections	<ul style="list-style-type: none"> <li>■ Flange DIN/EN DN 15 ... 50, PN 16 ... 250</li> <li>■ Flange ANSI 1/2 ... 2", class 150 ... 2,500</li> </ul>
Centre-to-centre distance M	freely selectable, min. visible length SL + 80 mm
Vent	Plug G 3/8 (option: Weld stub, flange, valve or ball cock)
Drain	Plug G 3/8 (option: Weld stub, flange, valve or ball cock)
Glass size	2 ... 11
Number of segments	1 ... 9
Suitable valve heads	
<ul style="list-style-type: none"> <li>■ Handwheel and quick closing lever</li> </ul>	<ul style="list-style-type: none"> <li>Model LGV-19 (PN 250)</li> <li>Model LGV-18 (PN 160)</li> </ul>

<sup>1)</sup> Depending on the temperature, the material properties must be observed

Other materials on request

### Valve arrangement Model LGV-18, LGV-19



ELL

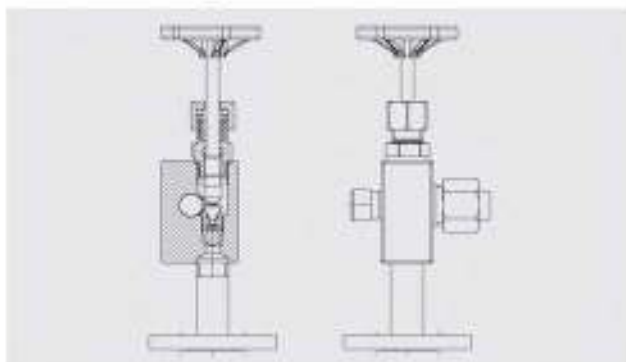
ERR



## Valve heads

### Model LGV-01

#### Glass tube fitting with handwheel

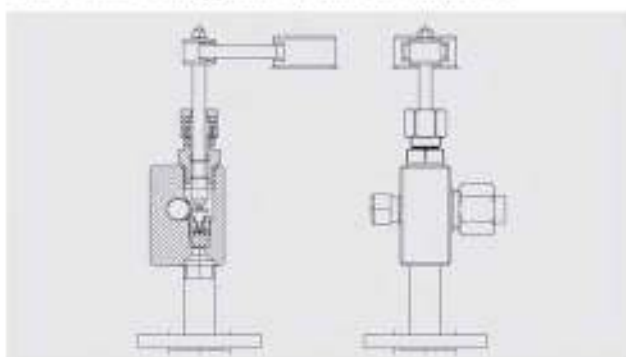


#### Specifications

<b>Materials</b>	
■ Body	Stainless steel
■ Head piece	Stainless steel
Construction	machined
Pressure range	PN 25
Operation	Handwheel
Mount	top/bottom
Connection to body	Glass tube 16
Rotatable	yes
Thru-way	offset
Seat position	inline
Valve stem thread	internal
Drain	yes
Ball-check valve	yes

### Model LGV-03

#### Glass tube fitting with quick closing lever

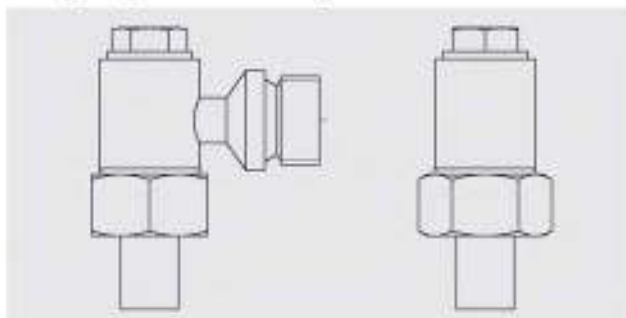


#### Specifications

<b>Materials</b>	
■ Body	Stainless steel
■ Head piece	Stainless steel
Construction	machined
Pressure range	PN 25
Operation	Quick closing lever
Mount	top/bottom
Connection to body	Glass tube 16
Rotatable	yes
Thru-way	offset
Seat position	inline
Valve stem thread	internal
Drain	no
Ball-check valve	yes

### Model LGV-04

#### Compact glass tube fitting without valve

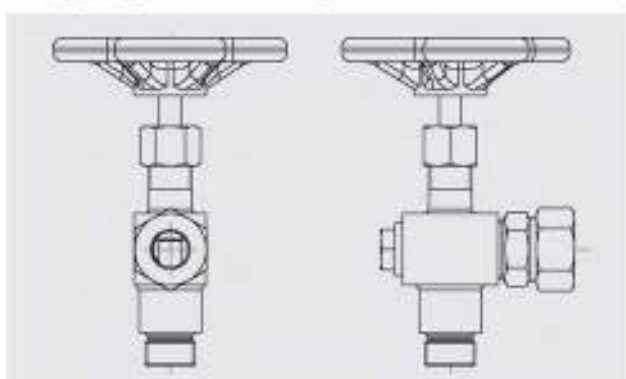


#### Specifications

Body material	Stainless steel 1.4571
Construction	cast
Pressure range	PN 25
Operation	without
Mount	top/bottom
Connection to body	Glass tube 13.5
Rotatable	yes
Thru-way	angled
Seat position	without
Valve stem thread	without
Drain	yes, G 3/8
Ball-check valve	no

### Model LGV-05

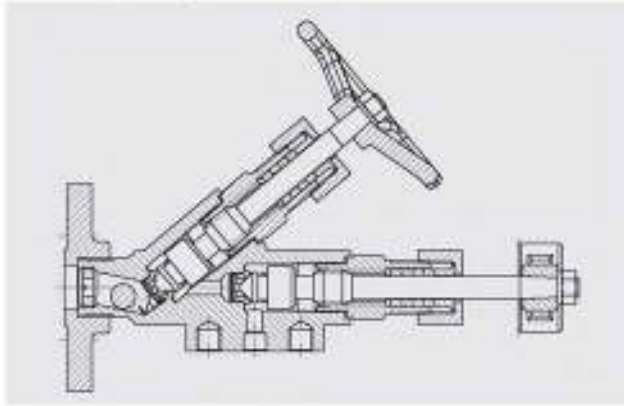
#### Compact glass tube fitting with handwheel



#### Specifications

<b>Materials</b>	
■ Body	Brass 2.0401 or stainless steel 1.4571
■ Head piece	Stainless steel
Construction	machined
Pressure range	PN 10
Operation	Handwheel
Mount	top/bottom
Connection to body	Glass tube 13.5
Rotatable	yes
Thru-way	angled
Seat position	inline
Valve stem thread	internal
Drain	yes, G 1/4
Ball-check valve	no

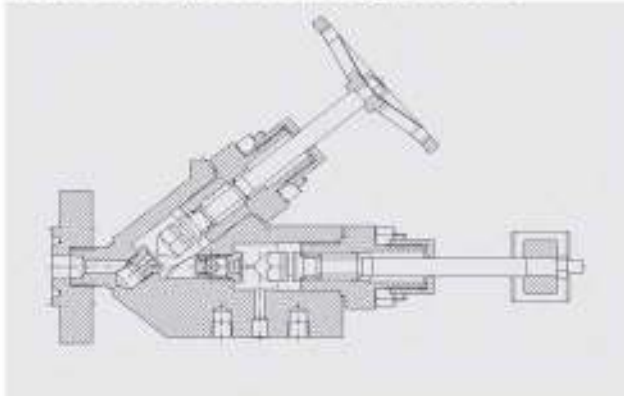
### Model LGV-18, double valve



#### Specifications

<b>Materials</b>	
■ Body	Steel 15Mo3
■ Head piece	Stainless steel
Construction	forged
Pressure range	PN 160
Operation	Double handwheel / lever
Mount	lateral
Connection to body	flanged
Rotatable	no
Thru-way	angled
Seat position	inline
Valve stem thread	internal
Drain	no
Ball-check valve	yes

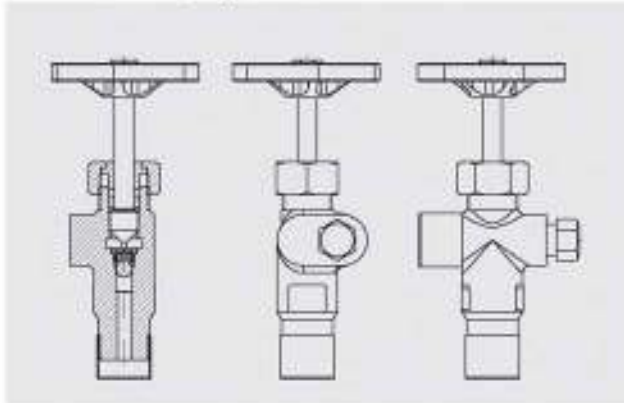
### Model LGV-19, double valve high pressure



#### Specifications

<b>Materials</b>	
■ Body	Steel 15Mo3
■ Head piece	Stainless steel
Construction	machined
Pressure range	PN 250
Operation	Double handwheel / lever
Mount	lateral
Connection to body	flanged
Rotatable	no
Thru-way	angled
Seat position	inline
Valve stem thread	internal
Drain	no
Ball-check valve	yes

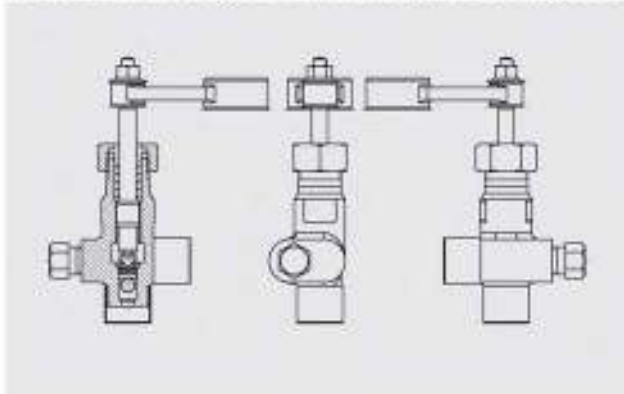
### Model LGV-33, forged valve with handwheel



#### Specifications

<b>Materials</b>	
■ Body	Steel A360 LF2
■ Head piece	Stainless steel
Construction	forged
Pressure range	PN 250
Operation	Handwheel
Mount	top/bottom
Connection to body	Screwed nipple
Rotatable	yes
Thru-way	offset
Seat position	inline
Valve stem thread	internal
Drain	yes, 1/2 NPT
Ball-check valve	yes

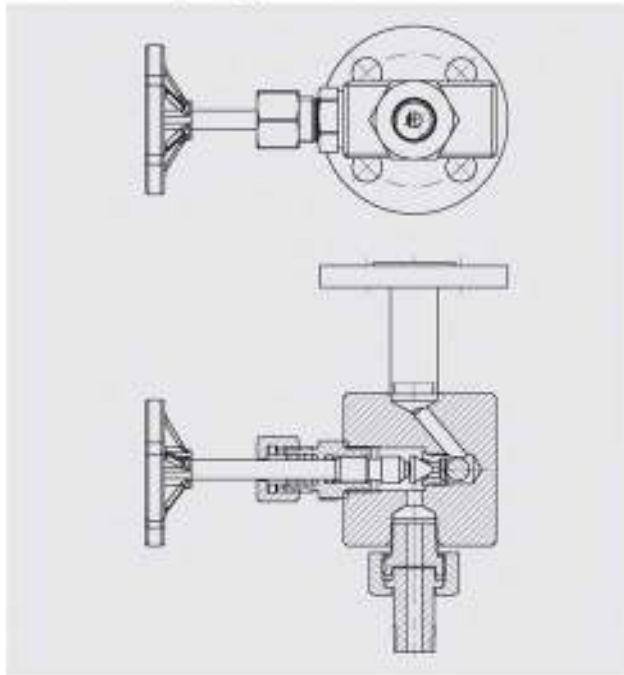
### Model LGV-38, forged valve with quick closing lever



#### Specifications

<b>Materials</b>	
■ Body	Steel A360 LF2
■ Head piece	Stainless steel
Construction	forged
Pressure range	PN 250
Operation	Quick closing lever
Mount	top/bottom
Connection to body	Screwed nipple
Rotatable	yes
Thru-way	offset
Seat position	inline
Valve stem thread	internal
Drain	yes, 1/2 NPT
Ball-check valve	yes

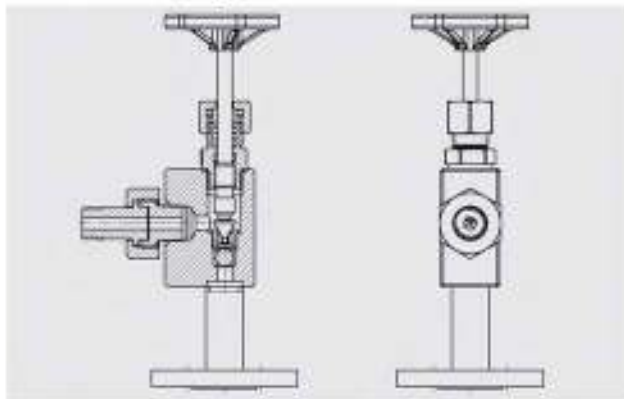
### Model LGV-51, straight valve with handwheel



#### Specifications

<b>Materials</b>	
■ Body	Steel, stainless steel
■ Head piece	Stainless steel
Construction	machined
Pressure range	PN 250
Operation	Handwheel
Mount	lateral/back
Connection to body	Screwed nipple
Rotatable	no
Thru-way	straight
Seat position	inline
Valve stem thread	internal
Drain	no
Ball-check valve	yes

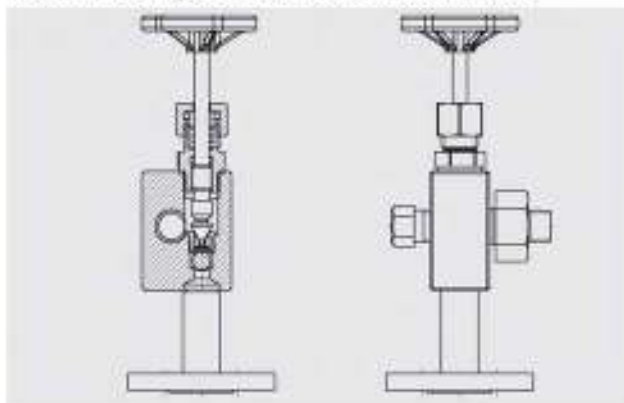
### Model LGV-52, angled valve with handwheel



#### Specifications

<b>Materials</b>	
■ Body	Steel, stainless steel
■ Head piece	Stainless steel
Construction	machined
Pressure range	PN 250
Operation	Handwheel
Mount	lateral
Connection to body	Screwed nipple
Rotatable	no
Thru-way	angled
Seat position	inline
Valve stem thread	internal
Drain	no
Ball-check valve	yes

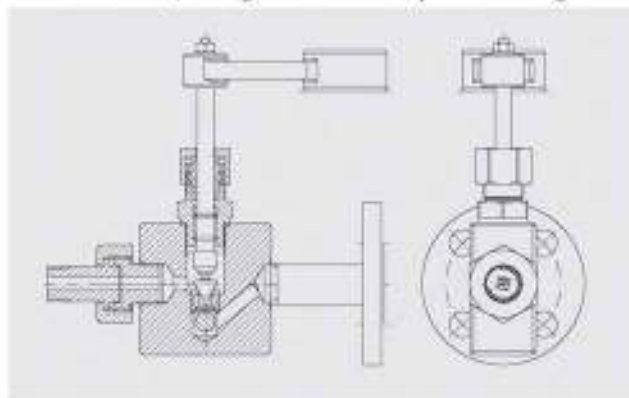
### Model LGV-53, offset valve with handwheel



#### Specifications

<b>Materials</b>	
■ Body	Steel, stainless steel
■ Head piece	Stainless steel
Construction	machined
Pressure range	PN 250
Operation	Handwheel
Mount	top/bottom
Connection to body	Screwed nipple
Rotatable	yes
Thru-way	offset
Seat position	inline
Valve stem thread	internal
Drain	yes
Ball-check valve	yes

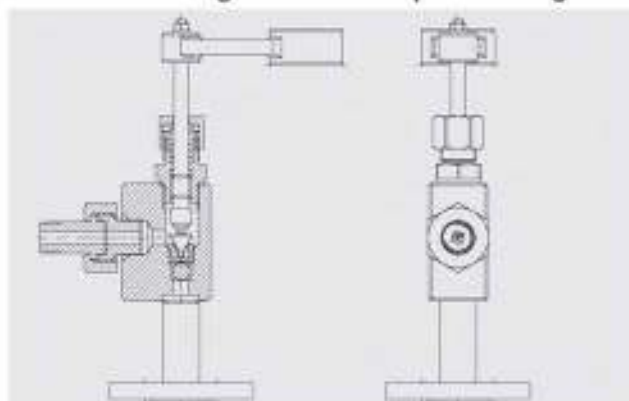
### Model LGV-56, straight valve with quick closing lever



#### Specifications

<b>Materials</b>	
■ Body	Steel, stainless steel
■ Head piece	Stainless steel
Construction	machined
Pressure range	PN 100
Operation	Quick closing lever
Mount	lateral/back
Connection to body	Screwed nipple
Rotatable	no
Thru-way	straight
Seat position	inline
Valve stem thread	internal
Drain	no
Ball-check valve	yes

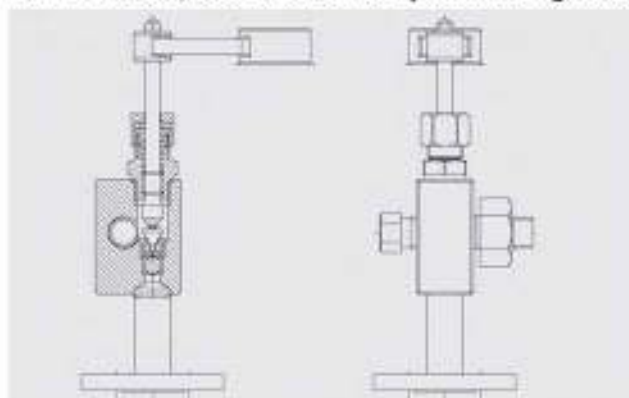
### Model LGV-57 Angled valve with quick closing lever



#### Specifications

<b>Materials</b>	
■ Body	Steel, stainless steel
■ Head piece	Stainless steel
Construction	machined
Pressure range	PN 100
Operation	Quick closing lever
Mount	lateral
Connection to body	Screwed nipple
Rotatable	no
Thru-way	angled
Seat position	inline
Valve stem thread	internal
Drain	no
Ball-check valve	yes

### Model LGV-58, offset valve with quick closing lever



#### Specifications

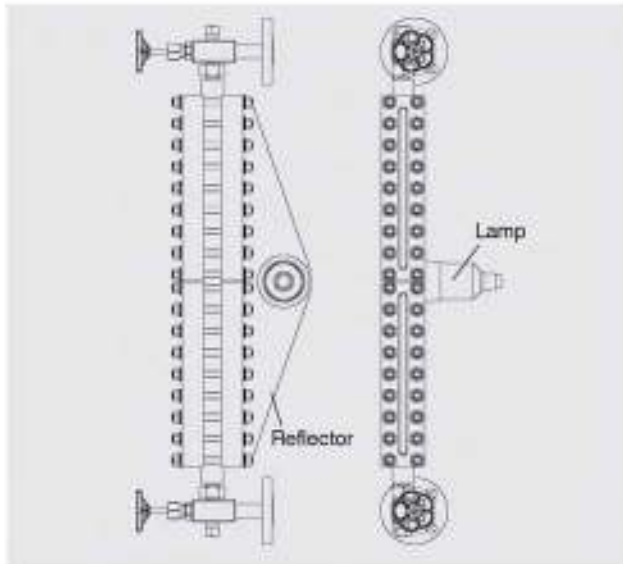
<b>Materials</b>	
■ Body	Steel, stainless steel
■ Head piece	Stainless steel
Construction	machined
Pressure range	PN 100
Operation	Quick closing lever
Mount	top/bottom
Connection to body	Screwed nipple
Rotatable	yes
Thru-way	offset
Seat position	inline
Valve stem thread	internal
Drain	yes
Ball-check valve	yes



## Accessories

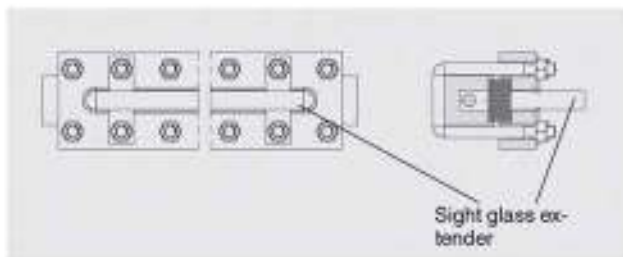
### Illumination

The illumination is designed for backlighting of viewing slots in accordance with DIN 7081 and of viewing slots of mica indicators. Through the variation in the segment length and number, and also in the lighting strength, the illumination can be matched to the application. Versions for hazardous areas are also available.



### Sight glass extender

Using the acrylic glass extender, the sight glass can be insulated from low temperatures. The window is thus maintained through the insulation.



### Indicator for low-water level

This low-water mark serves as a warning indicator for the operator. Form, size and lettering vary depending on the design of the water-level indicator.

The position of the low-water mark is always specified from the centre of the lower process connection.



## Spare parts

Name	Description	Order number
<b>Glass set Rx</b>	<ul style="list-style-type: none"> <li>■ 1x sight glass reflex borosilicate size x</li> <li>■ 1x flat gasket size x</li> <li>■ 1x cushion size x</li> </ul>	
Glass set R2	Size 2 (140 x 34 x 17 mm)	119442
Glass set R3	Size 3 (165 x 34 x 17 mm)	119444
Glass set R4	Size 4 (190 x 34 x 17 mm)	119446
Glass set R5	Size 5 (220 x 34 x 17 mm)	119447
Glass set R6	Size 6 (250 x 34 x 17 mm)	119448
Glass set R7	Size 7 (280 x 34 x 17 mm)	119450
Glass set R8	Size 8 (320 x 34 x 17 mm)	119451
Glass set R9	Size 9 (340 x 34 x 17 mm)	119452
Glass set R10	Size 10 (370 x 34 x 17 mm)	119453
Glass set R11	Size 11 (400 x 34 x 17 mm)	119454
<b>Glass set Tx</b>	<ul style="list-style-type: none"> <li>■ 1x sight glass transparent borosilicate size x</li> <li>■ 1x flat gasket size x</li> <li>■ 1x cushion size x</li> </ul>	
Glass set T2	Size 2 (140 x 34 x 17 mm)	119477
Glass set T3	Size 3 (165 x 34 x 17 mm)	119476
Glass set T4	Size 4 (190 x 34 x 17 mm)	119475
Glass set T5	Size 5 (220 x 34 x 17 mm)	119473
Glass set T6	Size 6 (250 x 34 x 17 mm)	119472
Glass set T7	Size 7 (280 x 34 x 17 mm)	119467
Glass set T8	Size 8 (320 x 34 x 17 mm)	119465
Glass set T9	Size 9 (340 x 34 x 17 mm)	119462
Glass set T10	Size 10 (370 x 34 x 17 mm)	119456
Glass set T11	Size 11 (400 x 34 x 17 mm)	119455
<b>Glass protection</b>		
Glass protection M2	1x mica shield size 2	501577
Glass protection M3	1x mica shield size 3	501578
Glass protection M4	1x mica shield size 4	501579
Glass protection M5	1x mica shield size 5	501580
Glass protection M6	1x mica shield size 6	501581
Glass protection M7	1x mica shield size 7	501582
Glass protection M8	1x mica shield size 8	501583
Glass protection M9	1x mica shield size 9	501585
Glass protection M10	1x mica shield size 10	501587
Glass protection M11	1x mica shield size 11	501588
<b>Head piece</b>		
Head piece KS1	1x head piece for LGG-E	503765
Head piece KS2	1x head piece for valve model LGV-01, LGV-51, LGV-52, LGV-53	503923
Head piece KS3	1x head piece for valve model LGV-03, LGV-56, LGV-57, LGV-58	503924
Head piece KS4	1x head piece for valve model LGV-16 (handwheel)	503819
Head piece KS5	1x head piece for valve model LGV-16 (lever, ball)	503820
Head piece KS6	1x head piece for valve model LGV-19 (handwheel)	503821
Head piece KS7	1x head piece for valve model LGV-19 (lever, ball)	503822

**Ordering information**

To order the described product the order number (if available) is sufficient.

Alternatively:

Model / Version / Process connection / Centre-to-centre distance / Valve type / Valve head arrangement / Process specifications (operating temperature and pressure) / Options





## KSR – Your Partner for the Pharmaceutical Industry and Biotechnology

In view of the higher demands on quality and product safety from pharmaceutical production, sterile process engineering plays a significant part in the cost-effectiveness and safety of the production processes, in both upstream and downstream areas. Even in the further course of the process chain, up to cleaning and sterilisation, contamination-free processing is a crucial quality factor.

From measuring instruments, this demands a combination of the most up-to-date hygienic design and, at the same time, a high measuring accuracy.

For toxic, bioactive substances or very sensitive substances, special instrumentation options are available in order to integrate the measuring instruments into the plant without elastomers.



## Optoelectronic level switch Model OLS-S, standard version Model OLS-H, high-pressure version

KSR data sheet OLS-S



### Applications

- Chemical, petrochemical, natural gas, offshore industries
- Shipbuilding, machine building, refrigerator units
- Power generating equipment, power plants
- Process and drinking water treatment
- Wastewater and environmental engineering

### Special features

- Temperature ranges from -269 ... +400 °C
- Versions for pressure ranges from vacuum to 500 bar
- Special versions: High pressure, interface measurement
- Explosion-protected versions
- Signal processing is made using a separate model OSA-S switching amplifier

### Description

The model OLS optoelectronic level switches are used for the detection of limit levels in liquids. This is widely independent of physical characteristics such as refractive index, colour, density, dielectric constant and conductivity. Measurement is also done in small volumes.

The switches consist of an infrared LED and a phototransistor. The light of the LED is directed into a prism. So long as the sensor tip of the prism is in the gas phase, the light is reflected within the prism to the receiver. When the liquid in the vessel rises and wets approximately 2/3 of the glass tip, the infrared lightbeam into the liquid is interrupted and only a small portion reaches the receiver. This difference is evaluated by the electronics and triggers a switching operation.



Fig. left: Optoelectronic level switch, model OLS-H  
Fig. centre: Switching amplifier, model OSA-S, 19" plug-in card  
Fig. right: Switching amplifier, model OSA-S, polycarbonate add-on case

The model OLS optoelectronic level switch is also available as an explosion-protected version (zone 0 and zone 1). Together with the model OSA-S switching amplifier the sensor can be used as overflow control. The instruments are very robust and designed for rough operating conditions.

The cable to the switching amplifier does not need any shield, enabling easy and economic cabling. The model OSA-S switching amplifier is operated with an intrinsically safe signal circuit. For the 19" plug-in card version, all operating elements, except for the switch for changing the alarm direction and the potentiometers for the time delay, can be accessed from the front. If incorporated in an add-on case, a transparent cover allows seeing the switching statuses.

## Model overview

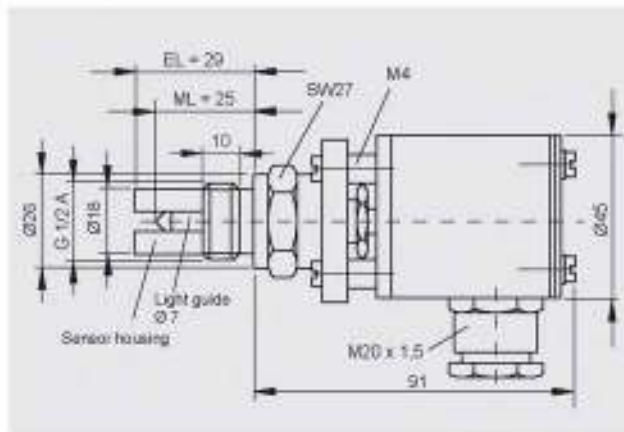
Model	Description	Approval			without Ex i + overflow control	Max. pressure in bar	Medium temperature in °C	Ambient temperature in °C
		without Ex i	Ex i	Ex i + overflow control				
OLS-S	Optoelectronic level switch, standard version	x	x	x	x	250	-269 ... +400	-65 ... +95
OLS-H	Optoelectronic level switch, high-pressure version	x	x	x	x	500	-269 ... +400	-65 ... +95
OSA-S	Switching amplifier for models OLS-S, OLS-H	x	x	x	x	-	-	-40 ... +60

## Approvals

Explosion protection	Ignition protection type	Model	Zone	Approval number
ATEX	Ex i	OLS-S, OLS-H	Zone 0/1, gas	II 1/2 G Ex ib IIC T5, T6 ZELM 06 ATEX 0299
	Ex i	OSA-S	Zone 1, gas	II (2) G [Ex ib] IIC, ZELM 06 ATEX 0300

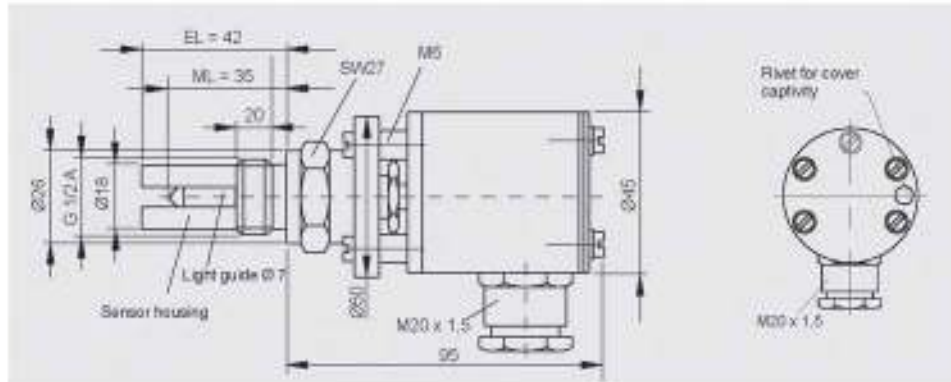
Type approval	Model	Approval number
GOST-R	OLS-S, OLS-H, OSA-S	0959333
Overflow control per WHG §19	OLS-S, OLS-H, OSA-S	Z-65.14-485
SIL rating per IEC 61508	OLS-S, OLS-H, OSA-S	SIL 1 in a combination of both instruments

## Optoelectronic level switch, standard version, model OLS-S



Specifications	
Switch point ML	Standard: 25 mm, max. 960 mm
Insertion length EL	Standard: 29 mm (switch point + 4 mm)
Medium temperature	-65 ... +250 °C
Ambient temperature	-65 ... +95 °C
Pressure range	0 ... 250 bar
Measurement type	Level measurement with glass tip shape V, option: Interface layer
Glass protection	Guard finger
Process connection	G 1/2", NPT 1/2", option: Flange
Material	Stainless steel 1.4571 Option: Hastelloy, other materials on request
Light guide	Clad core glass Option: quartz (ML: max. 200 mm) sapphire (ML: max. 60 mm)
Mounting position	As required
Measuring accuracy	±0.5 mm
Repeat accuracy	±0.1 mm
Light source	IR light 930 nm
Ambient light	Max. 100 Lux
Cable gland	M20 x 1.5, Ex: blue
Terminal connection	3 x 2.5 mm <sup>2</sup>
Ingress protection	IP 65
Approval	Ex i (previous model designation KSR-OPTO.06XX)

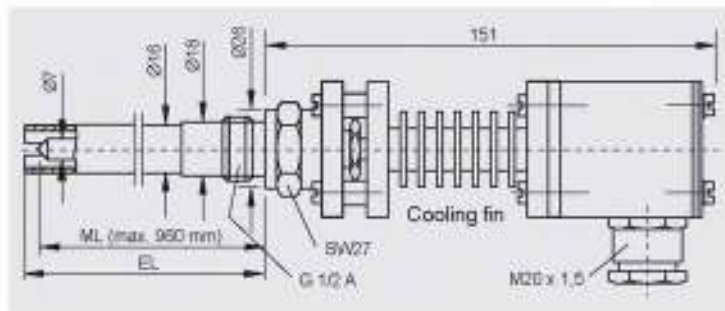
## Optoelectronic level switch, high-pressure version, model OLS-H



Specifications	
Switch point ML	Standard: 35 mm, max. 960 mm
Insertion length EL	Standard: 42 mm (switch point + 7 mm)
Medium temperature	-65 ... +250 °C
Ambient temperature	-65 ... +95 °C
Pressure range	0 ... 500 bar
Measurement type	Level measurement with glass tip shape V, option: Interface layer
Glass protection	Guard finger
Process connection	G 1/2", NPT 1/2", option: Flange
Material	Stainless steel 1.4571 Option: Hastelloy, other materials on request
Light guide	Clad core glass Option: quartz (ML: max. 200 mm) sapphire (ML: max. 60 mm)
Mounting position	As required
Measuring accuracy	±0.5 mm
Repeat accuracy	±0.1 mm
Light source	IR light 930 nm
Ambient light	Max. 100 Lux
Cable gland	M20 x 1.5, Ex: blue
Terminal connection	3 x 2.5 mm <sup>2</sup>
Ingress protection	IP 65
Approval	Ex i (previous model designation KSR-OPTO.06XX)

## Options for models OLS-S and OLS-H

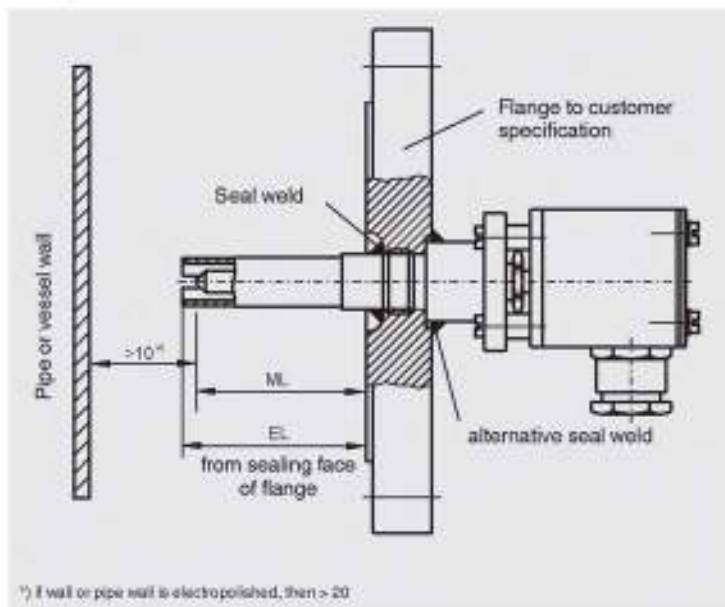
### Cooling fin for high- and low-temperature version



#### Specifications

Temperature range	-269 ... +400 °C
Ambient temperature	-65 ... +95 °C

### Flanged version



\*) If wall or pipe wall is electropolished, then > 20

Process connection	Nominal width	Pressure rating	Sealing face
Flange EN 1092-1	DN 20 ... DN 50	PN 16 ... PN 400	B1, B2, C, D, E
Flange DIN	DN 20 ... DN 50	PN 16 ... PN 400	C, F, N
Flange ANSI	1/2" ... 2"	Class 150 ... Class 2500	RF, RTJ, FF

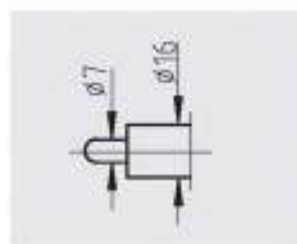
### Version with sieve

Protection from gas bubble formation at the glass tip

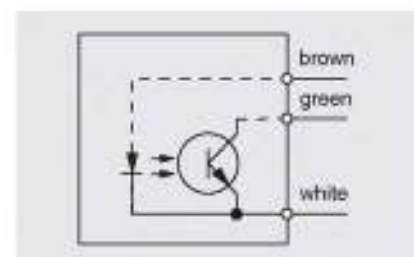


### Version for interface layer

Open glass tip, shape U



### Electrical connection diagram

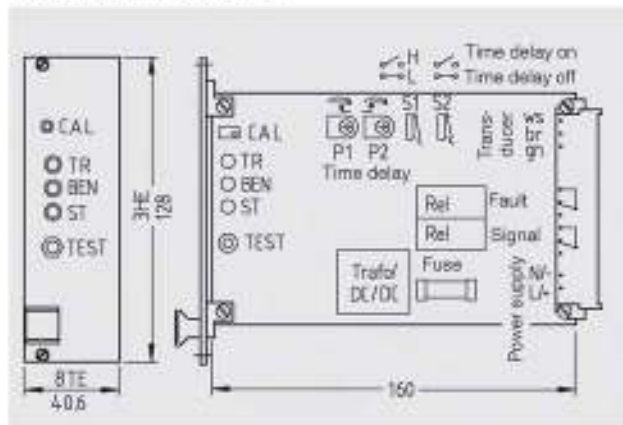




## Switching amplifier model OSA-S

For optoelectronic level switch models OLS-S and OLS-H

### Version 19" plug-in card



#### Specifications

Ambient temperature	-25 ... +60 °C
Power supply	AC 230 V, AC 15/120 V, AC 24 V, DC 24 V
Power consumption	2.8 VA, 3 W
Outputs	Signal relay, change-over contact, 250 V, 3 A, 100 VA Failure relay, change-over contact, 250 V, 3 A, 100 VA
Cable gland	-
Max. connection cross-section	2.5 mm <sup>2</sup>
Max. cable length	175 ... 600 m (with 0.5 ... 1.5 mm <sup>2</sup> )
Ingress protection	IP 20
Approval	Ex i (previous model designation KSR-OPTO.250X)

#### Application information

- 32-pin connector per DIN 41612, form F
- Operating elements accessible from the front
- Exceptions:
  - Switch for changing the alarm direction
  - Potentiometers for time delay

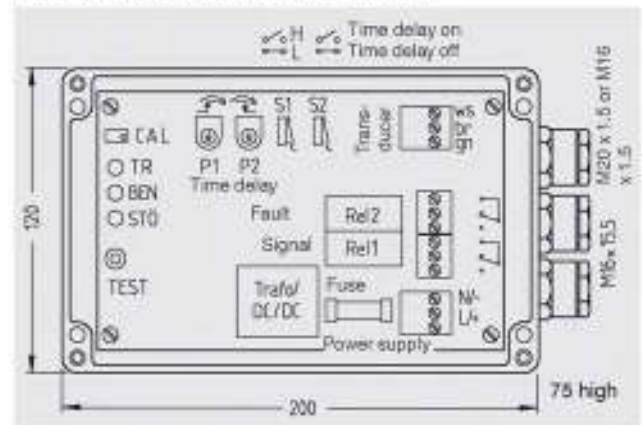
#### General data

- Functions**
- Alarm direction selectable
  - On-delay and drop-out delay for signal relay settable up to approx. 8 s
- Monitoring**
- Wire break signal circuit
  - Short-circuit signal circuit
  - Internal power supply, fail-safe

#### Design data

Max. external inductance $L_{max}$	0.5 mH
Max. external capacitance $C_{max}$	3 $\mu$ F
$U_0$	$\leq 9.5$ V
$I_0$	$\leq 149$ mA
$P_0$	$\leq 1.0$ W

### Version in polycarbonate add-on case



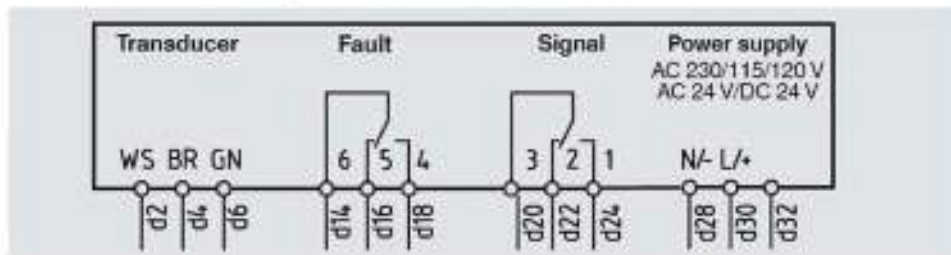
#### Specifications

Ambient temperature	-40 ... +40 °C
Power supply	AC 230 V, AC 15/120 V, AC 24 V, DC 24 V
Power consumption	2.8 VA, 3 W
Outputs	Signal relay, change-over contact, 250 V, 3 A, 100 VA Failure relay, change-over contact, 250 V, 3 A, 100 VA
Cable gland	M16 x 1.5 / M20 x 1.5 Ex: blue
Max. connection cross-section	2.5 mm <sup>2</sup>
Max. cable length	175 ... 600 m (with 0.5 ... 1.5 mm <sup>2</sup> )
Ingress protection	IP 65
Approval	Ex i (previous model designation KSR-OPTO.250X)

#### Application information

- Transparent cover, good readability of the LED displays for dry/wetted/fault
- Ingress protection IP 65, field use possible

## Electrical connection diagram



## Model overview

Switching amplifier model OSA-S	Power supply	Explosion protection	Order no.
Polycarbonate add-on case	DC 24 V with potential isolation	Ex i	500291
	DC 24 V with potential isolation	-	500281
	DC 24 V without potential isolation	-	500283
	AC 24 V	Ex i	500289
	AC 24 V	-	500279
	AC 115/120 V	Ex i	500287
	AC 115/120 V	-	on request
	AC 230 V	Ex i	500285
	AC 230 V	-	500275
19" plug-in card	DC 24 V with potential isolation	-	500282
	DC 24 V with potential isolation	Ex i	500292
	DC 24 V without potential isolation	-	500284
	AC 24 V	Ex i	500290
	AC 24 V	-	500280
	AC 115/120 V	Ex i	500288
	AC 115/120 V	-	500278
	AC 230 V	Ex i	500286
	AC 230 V	-	500277

## Ordering information

To order the described product the order number is sufficient.

Alternatively:

For models OLS-S or OLS-H: Model / Process connection / Approval / Measurement type / Switch point ML / Process specifications (operating temperature and pressure) / Material / Glass / Sieve

For model OSA-S: Model / Case / Power supply / Approval

# Appendix

## Cross Reference OLS-S/OLS-H

Replaced Type	Type
KSR-OPTO.06XX (KSR design)	OLS-S/OLS-H
LSQ.06 (WIKA design)	OLS-S/OLS-H
720.06XX (Phoenix design)	OLS-S/OLS-H

## Type Code KSR-OPTO.06XX

### Code

1	Basic type					
KSR-OPTO.	Optoelectrical level switch					
2	Approval					
11	None					
21	Ex i					
3	Measuring type					
1300	Level					
2300	Interface					
4	Switching point (ML) in mm *					
000	25	009	90	020	200	
005	50	010	100	030	300	
006	60	012	120	060	600	
008	80	015	150	080	800	
5	Elongation					
066	Standard - switching point 25 mm					
068	With elongation - switching point 50 - 960 mm					
6	Temperature					
0	Without dissipator -60...+250°C					
9	With dissipator -269...+400°C					
7	Housing					
S	Standard housing max. 250 bar / 50°C (type OLS-S)					
H	Heavy housing max. 500 bar / 50°C (type OLS-H)					
8	Material *					
1	Stainless steel 316Ti (DIN 1.4571)					
5	Hastelloy C-276 (DIN 2.4819)					
9	Glass					
K	Cladded core glass					
Q	Quartz glass					
S	Sapphire					
10	Option: sieve					
O	Without sieve					
S	With sieve					
11	Process connection					
	Size	Rating	Sealing face			
G	Mounting thread G 1/2"					
N	Mounting thread NPT 1/2"					
EN.../...	EN 1092 DN 20 - DN 60	PN 16 - PN 400	B1, B2, C, D, E			
DIN.../...	DIN DN 20 - DN 60	PN 16 - PN 400	C, F, N			
ANSI.../...	ANSI 1/2" - 2"	Class 150 - class 2500	RF, RTJ, FF			

\* Further switching points on demand.

\* Further materials on demand.

## Ordering Example

	Basic type	Approval	Measuring type	Switching point in mm	Elongation	Temperature	Housing	Material	Glass	Sieve	Process connection
Code	1	2	3	4	5	6	7	8	9	10	11
	KSR-OPTO.	21	1300	000	066	0	S	1	K	O	EN25M00/B1

## Cross Reference OSA-S

Replaced Type	Type
KSR-OPTO.250X (KSR design)	OSA-S
LSQ.25 (WKA design)	OSA-S
720.250X (Phoenix design)	OSA-S

## Type Code KSR-OPTO.250X

### Code

Code	Description
<b>1</b>	<b>Basic type</b>
KSR-OPTO.250	Switching amplifier
<b>2</b>	<b>Approval</b>
1	None
2	Ex i
<b>3</b>	<b>Power supply</b>
1	230 VAC
2	115/120 VAC
3	24 VAC
4	24 VDC potential-free
7	24 VDC none-potential-free
<b>4</b>	<b>Amplifier housing</b>
1	Plastic housing (polycarbonate)
7	19" plug-in module

## Ordering Example

	Basic type	Approval	Power supply	Amplifier housing
Code	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>
	KSR-OPTO.250	1	4	7



## Optoelectronic OEM level switch

### Compact design

### Model OLS-C01, standard version

KSR data sheet OLS-C01

#### Applications

- Machine tools
- Hydraulics
- Plant construction and machine building
- Pump technology
- For liquids, such as oils, water, distilled water, aqueous media

#### Special features

- Compact design, no moving components
- Mounting position as required
- Accuracy  $\pm 0.5$  mm
- Visual indication of the switching status
- Choice of electrical connections: PUR cable or circular connector M8



Optoelectronic OEM level switch, model OLS-C01, with circular connector M8

#### Description

The model OLS-C01 optoelectronic OEM level switch is used for monitoring the level of liquids. The optoelectronic sensor consists of an infrared LED and a light receptor.

The light from the LED is directed into a prism which forms the tip of the sensor. So long as the tip is not immersed in liquid, the light is reflected within the prism to the receptor.

When the liquid rises within the vessel and surrounds the tip, the light beam is interrupted by the liquid, so that the reactor is no longer or only weakly reached by the light and reacts to this change by triggering a switching operation.

The switching status can be read directly on the sensor (red LED).

## Specifications

General data	
Measuring accuracy	±0.5 mm
Minimum distance from the glass tip to an opposite surface	≥ 10 mm
Mounting position	as required
Visual indication of the switching status	1 LED
Process connection G	G 3/8", G 1/2" or M12 x 1 (male)

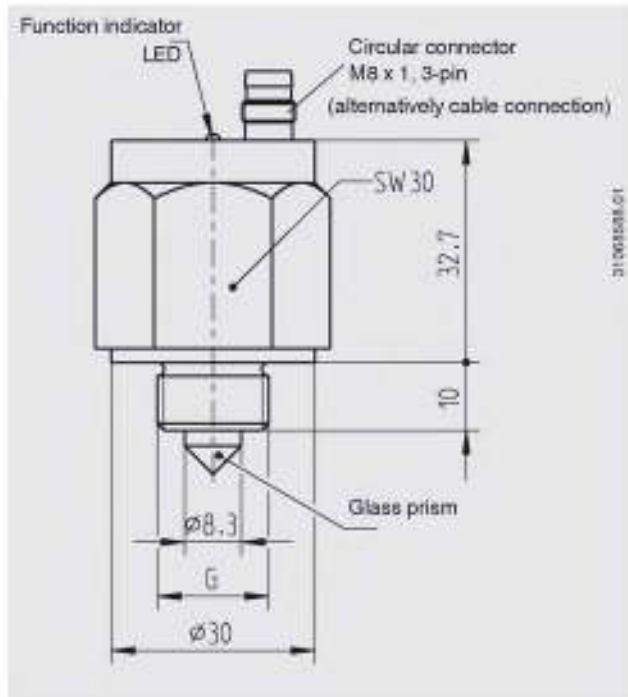
Design data	
Responsiveness	preset, please specify the medium
Medium temperature	-30 ... +100 °C
Ambient temperature	-25 ... +70 °C
Operating pressure	0 ... 2.5 MPa (0 ... 25 bar)
<b>Materials</b>	
■ Light guide	Borosilicate glass
■ Case and process connection G 3/8" and M12 x 1	Stainless steel 1.4305
■ Case and process connection G 1/2"	Stainless steel 1.4571

Electrical data	
Power supply	DC 12 ... 32 V
Max. current supply	40 mA
Output	PNP transistor, protected against reverse polarity
<b>Electrical connection</b>	
■ PUR cable	Standard lengths: 2 and 5 m Diameter: 3 x 0.25 mm <sup>2</sup> Cable end: cut to length
■ Circular connector	M8 x 1, 3-pin
Switching function	Normally open (closed in medium) or normally closed (open in medium)
Ingress protection	IP 65
Number of switch points	1

## Options

- Other versions on request
- Accessories: Circular connector M8 with cable

## Dimensions in mm



### Ordering information

Model / Process connection / Electrical connection / Switching function / Medium / Options







## Optoelectronic OEM level switch

### Compact design

### Model OLS-C02, with selectable switch length

KSR data sheet OLS-C02

#### Applications

- Machine tools
- Hydraulics
- Plant construction and machine building
- Pump technology
- For liquids, such as oils, water, distilled water, aqueous media

#### Special features

- Selectable switch length from 65 mm to 3,000 mm
- No moving components
- Mounting position as required
- Accuracy  $\pm 0.5$  mm
- Choice of electrical connections: PUR cable, circular connector M12 or angular connector EN 175301-803 A



Optoelectronic OEM level switch, model OLS-C02, with cable outlet

#### Description

The model OLS-C02 optoelectronic OEM level switch is used for monitoring the level of liquids. The optoelectronic sensor consists of an infrared LED and a light receptor.

The light from the LED is directed into a prism which forms the tip of the sensor. So long as the tip is not immersed in liquid, the light is reflected within the prism to the receptor.

When the liquid rises within the vessel and surrounds the tip, the light beam is interrupted by the liquid, so that the reactor is no longer or only weakly reached by the light and reacts to this change by triggering a switching operation.

The model OLS-C02 level switch offers the advantage that its switch length is selectable. This enables an optimal adaptation to the application-specific requirements.

## Specifications

General data	
Measuring accuracy	±0.5 mm
Minimum distance from the glass tip to an opposite surface	≥ 10 mm
Mounting position	as required
Switch length L	Standard lengths: 150, 300, 500, 750, 1,000 and 1,500 mm; other lengths on request  L <sub>min</sub> = 65 mm L <sub>max</sub> = 3,000 mm
Process connection	G 1/2" (male)

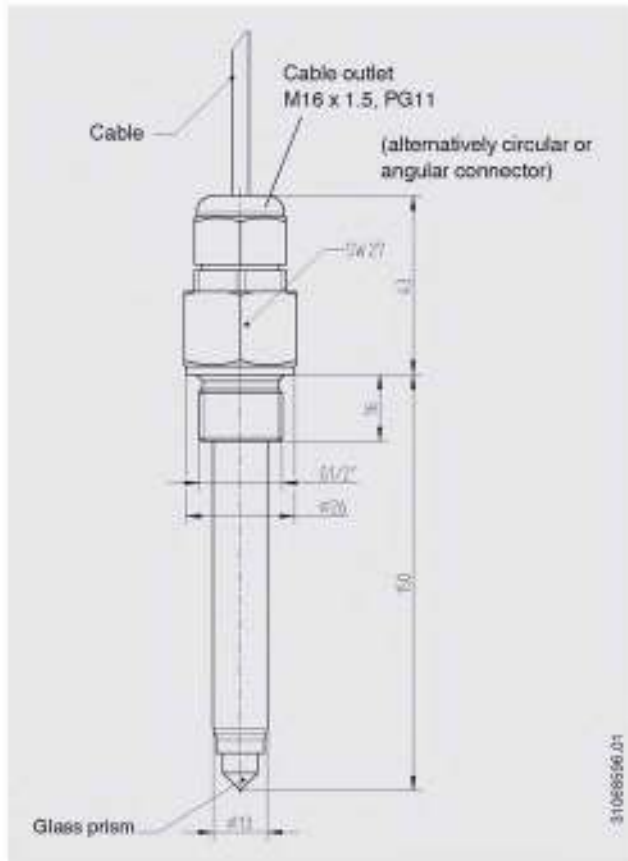
Design data	
Responsiveness	preset, please specify the medium
Medium temperature	-30 ... +100 °C
Ambient temperature	-25 ... +70 °C
Operating pressure	0 ... 2.5 MPa (0 ... 25 bar)
<b>Materials</b>	
■ Light guide	Borosilicate glass
■ Case and process connection	Stainless steel 1.4571

Electrical data	
Power supply	DC 12 ... 32 V
Max. current supply	40 mA
Output	PNP transistor, protected against reverse polarity
<b>Electrical connection</b>	
■ PUR cable	Standard lengths: 2 and 5 m Diameter: 3 x 0.25 mm <sup>2</sup> Cable end: cut to length
■ Circular connector	M12
■ Angular connector	per EN 175301-803 A
Switching function	Normally open (closed in medium) or normally closed (open in medium)
Ingress protection	IP 65
Number of switch points	1

## Options

- Other versions on request
- Accessories: Circular connector M8 with cable

## Dimensions in mm



### Ordering information

Model / Process connection / Electrical connection / Switching function / Medium / Switch length / Options





## KSR – Your Partner for Refrigeration

Within the refrigeration cycle and its periphery there are many points where level are measured and monitored. This serves to control the plant in order to guarantee a secure process run. In view of the increasing requirements on refrigeration plants due to new refrigerants or leak-free systems the quality requirements for measuring instruments are also increasing. Thus the right choice of materials is decisive in order to get the best possible instrument.

Closeness to customers is an essential part of our company philosophy. Individually tailored advice and proposals, to match solutions to your needs, supplement our extensive offering of products and services.



## Optoelectronic OEM level switch

### Compact design

### Model OLS-C04, refrigerant version with transistor output

KSR data sheet OLS-C04

#### Applications

- Level monitoring in refrigeration plants

#### Special features

- Application with refrigerants
- Mounting position as required
- Accuracy  $\pm 0.5$  mm
- Visual indication of the switching status
- Choice of electrical connections: PUR cable or connector M8



Optoelectronic OEM level switch, model OLS-C04, with cable outlet

#### Description

The model OLS-C04 optoelectronic OEM level switch is used for monitoring the level of liquids. The optoelectronic sensor consists of an infrared LED and a light receptor.

The light from the LED is directed into a prism which forms the tip of the sensor. So long as the tip is not immersed in liquid, the light is reflected within the prism to the receptor.

When the liquid rises within the vessel and surrounds the tip, the light beam is interrupted by the liquid, so that the reactor is no longer or only weakly reached by the light and reacts to this change by triggering a switching operation.

The switching status can be read directly on the sensor (red LED).

The model OLS-C04 level switch can be used in refrigeration plants, since the glass prism is fused within the steel case.

## Specifications

General data	
Measuring accuracy	±0.5 mm
Minimum distance from the glass tip to an opposite surface	≥ 10 mm
Mounting position	as required
Visual indication of the switching status	1 LED
Process connection	G 1/2" or 1/2" NPT (male)

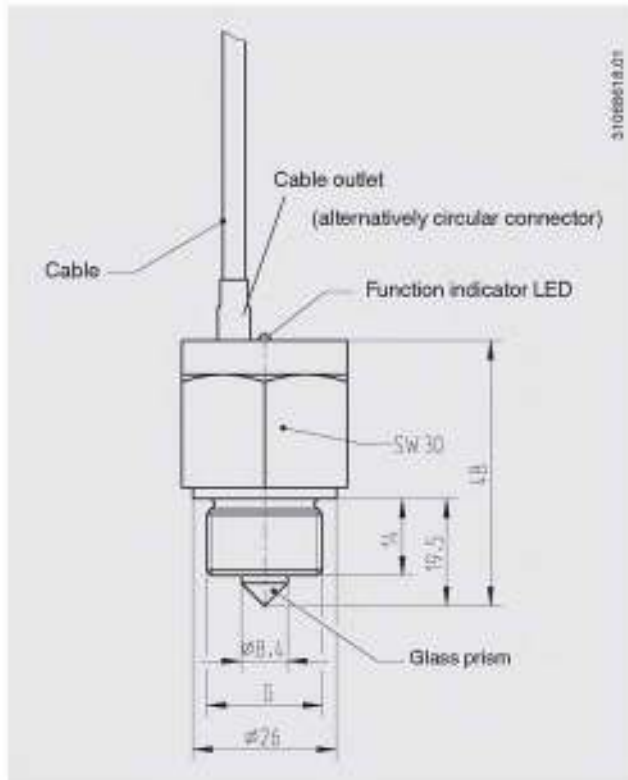
Design data	
Responsiveness	preset, please specify the medium
Medium temperature	-40 ... +100 °C
Ambient temperature	-30 ... +70 °C
Operating pressure	0 ... 4 MPa (0 ... 40 bar)
<b>Materials</b>	
■ Light guide	Glass, fused within the steel case (without sealing)
■ Case and process connection	Steel, nickel-plated

Electrical data	
Power supply	DC 12 ... 32 V
Max. current supply	40 mA
Output	PNP transistor, protected against reverse polarity
<b>Electrical connection</b>	
■ PUR cable	Standard lengths: 2 and 5 m Diameter: 3 x 0.25 mm <sup>2</sup> Cable end: cut to length
■ Circular connector	M8
Switching function	Normally open (closed in medium) or normally closed (open in medium)
Ingress protection	IP 65
Number of switch points	1

## Options

- Other versions on request
- Accessories: Circular connector M8 with cable

## Dimensions in mm



### Ordering information

Model / Process connection / Electrical connection / Switching function / Medium / Options







## Optoelectronic OEM level switch

### Compact design

### Model OLS-C05, high-temperature version

KSR data sheet OLS-C05

#### Applications

- Machine tools
- Hydraulics
- Plant construction and machine building
- Water technology
- For liquids, such as oils, water, distilled water, aqueous media

#### Special features

- Use at temperatures of up to +150 °C
- Mounting position as required
- Accuracy  $\pm 0.5$  mm
- Visual indication of the switching status
- Choice of electrical connections: PUR cable, circular connector M12 or angular connector EN 175301-803 A



Optoelectronic OEM level switch, model OLS-C05, with angular connector

#### Description

The model OLS-C05 optoelectronic OEM level switch is used for monitoring the level of liquids. The optoelectronic sensor consists of an infrared LED and a light receptor.

The light from the LED is directed into a prism which forms the tip of the sensor. So long as the tip is not immersed in liquid, the light is reflected within the prism to the receptor.

When the liquid rises within the vessel and surrounds the tip, the light beam is interrupted by the liquid, so that the reactor is no longer or only weakly reached by the light and reacts to this change by triggering a switching operation.

The switching status can be read directly on the sensor (red LED).

The model OLS-C05 level switch is designed for use with liquids at high temperatures of up to +150 °C.

## Specifications

General data	
Measuring accuracy	±0.5 mm
Minimum distance from the glass tip to an opposite surface	≥ 10 mm
Mounting position	as required
Visual indication of the switching status	1 LED
Process connection	G 1/2" (male)

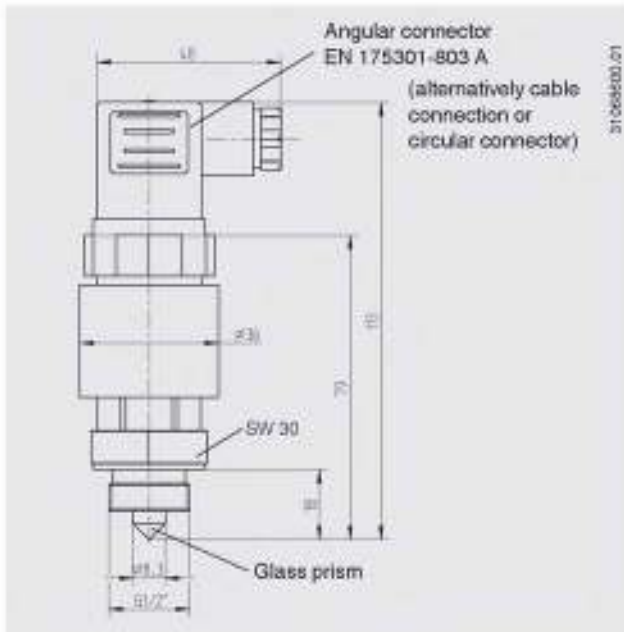
Design data	
Responsiveness	preset, please specify the medium
Medium temperature	-40 ... +150 °C
Ambient temperature	-30 ... +90 °C
Operating pressure	0 ... 2.5 MPa (0 ... 25 bar)
<b>Materials</b>	
■ Light guide	Borosilicate glass
■ Case	Stainless steel 1.4305 (non-wetted parts)
■ Process connection	Stainless steel 1.4571

Electrical data	
Power supply	DC 12 ... 32 V
Max. current supply	40 mA
Output	PNP transistor, protected against reverse polarity
<b>Electrical connection</b>	
■ PUR cable	Standard lengths: 2 and 5 m Diameter: 3 x 0.25 mm <sup>2</sup> Cable end: cut to length
■ Circular connector	M12
■ Angular connector	per EN 175301-803 A
Switching function	Normally open (closed in medium) or normally closed (open in medium)
Ingress protection	IP 65
Number of switch points	1

## Options

- Other versions on request
- Accessories: Circular connector M8 with cable

## Dimensions in mm



## Ordering information

Model / Process connection / Electrical connection / Switching function / Medium / Options







## Optoelectronic level switch Compact design Model OLS-C20, high-pressure version

KSR data sheet OLS-C20

### Applications

- Level measurement for liquid media
- Level control and monitoring of distinct filling levels
- Machine building
- Wastewater and environmental engineering

### Special features

- Compact design, no moving components
- Temperature ranges from -30 ... +135 °C
- Versions for pressure ranges from vacuum to 50 bar
- Mounting position as required
- Visual indication of the switching status



Optoelectronic level switch, model OLS-C20

### Description

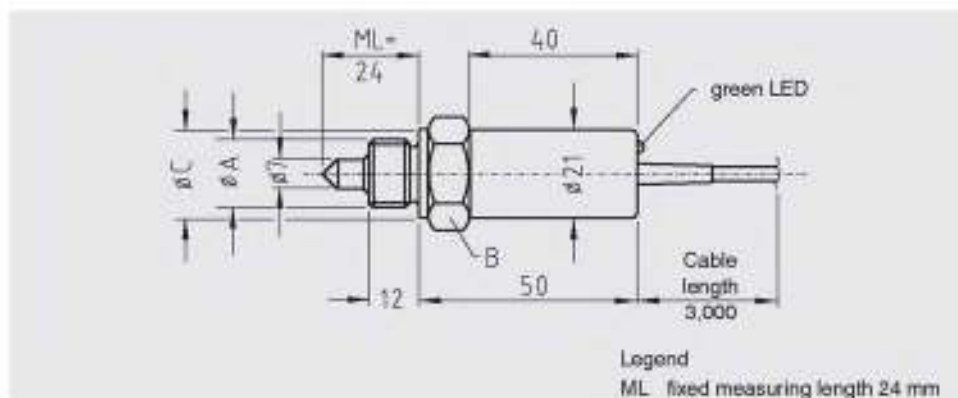
The model OLS-C20 optoelectronic level switches are used for the detection of limit levels in liquids. This is widely independent of physical characteristics such as refractive index, colour, density, dielectric constant and conductivity. Measurement is also done in small volumes.

The switches consist of an infrared LED and a phototransistor. The light of the LED is directed into a prism. So long as the sensor tip of the prism is in the gas phase, the light is reflected within the prism to the receiver. When the liquid in the vessel rises and wets approximately 2/3 of the glass tip, the infrared lightbeam into the liquid is interrupted and only a small portion reaches the receiver.

The O. C. pnp transistor output may be connected directly to the input of a control system or energise an external relay. The output is short-circuit proof and also current, voltage and power limited.

The switching status can be read directly on the sensor (green LED).

## Specifications, dimensions in mm

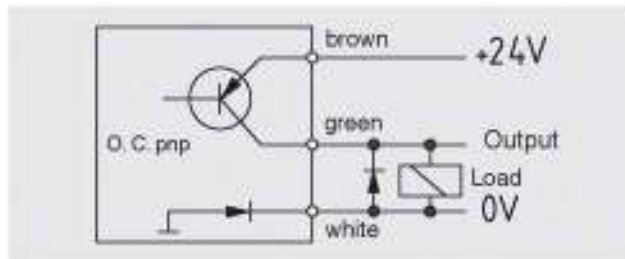


Process connection $\varnothing A$	Spanner width B	Sealing face $\varnothing C$
M16 x 1.5	SW 24	21
G 1/2	SW 30	26
1/2 NPT	SW 24	-

### Specifications

Measuring accuracy	$\pm 0.5$ mm
Light source	IR light 930 nm
Ambient light	max. 10,000 Lux
Minimum distance from the glass tip to an opposite surface	> 10 mm > 20 mm with electropolished surface
Mounting position	as required
Visual inspection	
■ Switching status	green LED
■ Switching direction	is factory-set
Medium temperature	-30 ... +135 °C
Ambient temperature	-25 ... +70 °C
Pressure range	0 ... 50 bar
Materials	
■ Sensor housing	Stainless steel
■ Light guide	Quartz glass
■ Packing	Graphite/PTFE
■ Case	Stainless steel
Power supply	DC 24 V, -25 ... +30 %
Max. current supply	40 mA
Output	O. C. pnp transistor, short-circuit proof, current, voltage and power limitation
Switching current ( $T_u = 70$ °C)	0.5 A
Electrical connection	
■ PVC cable	3 x 0.14 mm <sup>2</sup>
■ Connector	4-pin series 712, M12
Ingress protection	
■ With connector	IP 65 per EN 60529
■ With cable	IP 65 per EN 60529

## Electrical connection diagram



## Connector assignment



## Model overview

Process connection	Switching direction	Electr. connection	Cable length	Connector/ cable	Material	Order no.
M16 x 1.5	SE	Connector	-	M12	Stainless steel 1.4571	100256
	SA	Connector	-	M12	Stainless steel 1.4571	100255
	SE	Cable	3 m	PVC	Stainless steel 1.4571	500224
	SA	Cable	3 m	PVC	Stainless steel 1.4571	500222
G 1/2"	SE	Connector	-	M12	Stainless steel 1.4571	100259
	SA	Connector	-	M12	Stainless steel 1.4571	100258
	SE	Cable	3 m	PVC	Stainless steel 1.4571	500233
	SA	Cable	3 m	PVC	Stainless steel 1.4571	500231
NPT 1/2"	SE	Connector	-	M12	Stainless steel 1.4571	on request
	SA	Connector	-	M12	Stainless steel 1.4571	100257
	SE	Cable	3 m	PVC	Stainless steel 1.4571	500229
	SA	Cable	3 m	PVC	Stainless steel 1.4571	500227

SE = immersing when switching (normally open on rising level)

SA = emerging when switching (normally closed on rising level)

## Ordering information

To order the described product the order number (if available) is sufficient.

Alternatively:

OLS-C20 / Process connection / Switching direction / Electrical connection

# Appendix

## Cross Reference OLS-C20

Replaced Type	Type
KSR-OPTO.002X (KSR design)	OLS-C20
LSO.02 (WIKA design)	OLS-C20
720.002X (Phoenix design)	OLS-C20

## Type Code KSR-OPTO.002X

Code	
<b>1</b>	<b>Basic type</b>
KSR-OPTO.002	Optoelectrical level switch
<b>2</b>	<b>Process connection</b>
0	M18x1,5
1	NPT 1/2"
3	G1/2"
<b>3</b>	<b>Switch direction</b>
SE	Switching immersed - closing on rising level
SA	Switching dry - opening on rising level
<b>4</b>	<b>Electrical connection</b>
K	Cable
S	Plug
<b>5</b>	<b>Cable length</b>
3	3m
5	5m
<b>6</b>	<b>Cable/Plug</b>
B	Coupler plug M12 4 pin
P	Cable PVC

## Ordering Example

	Basic type	Process connection	Switch direction	Electrical connection	Cable length	Cable/plug
Code	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>
	KSR-OPTO.002	3	SE	K	3	P



## Optoelectronic level switch

### Compact design

### Model OLS-C29, refrigerant version with relay output

KSR data sheet OLS-C29

#### Applications

- Level measurement for liquid media
- Level control and monitoring of distinct filling levels
- Machine building
- Refrigerator units

#### Special features

- Temperature ranges from -30 ... +120 °C
- Exchange of the electronics without opening the vessel, the process connection with the glass prism remains at the vessel
- Operating states can be read via the LED
- Various switching delays selectable
- Relay output



Optoelectronic level switch, model OLS-C29

#### Description

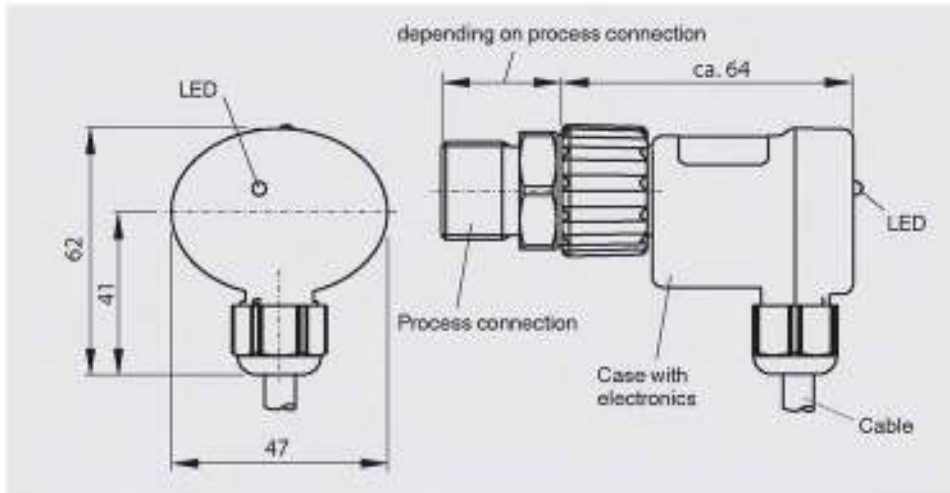
The model OLS-C29 optoelectronic level switches are used for the detection of limit levels in liquids. This is widely independent of physical characteristics such as refractive index, colour, density, dielectric constant and conductivity. Measurement is also done in small volumes.

The switches include an infrared LED and a phototransistor. The light of the LED is directed into a prism. So long as the sensor tip of the prism is in the gas phase, the light is reflected within the prism to the receptor. When the liquid in the vessel rises and wets approximately 2/3 of the glass tip, the infrared lightbeam into the liquid is interrupted and only a small portion reaches the receptor.

The switching status of the OLS-C29 can be read directly on the sensor.

The electronics can be exchanged without opening the vessel, while the glass prism remains within the vessel.

## Specifications, dimensions in mm

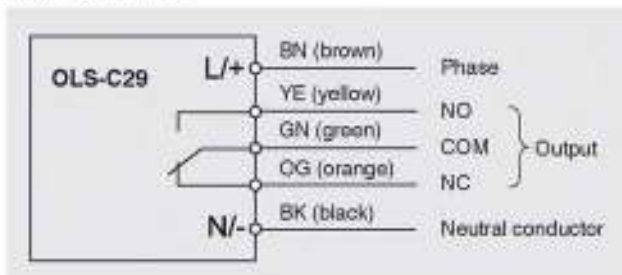


### Specifications

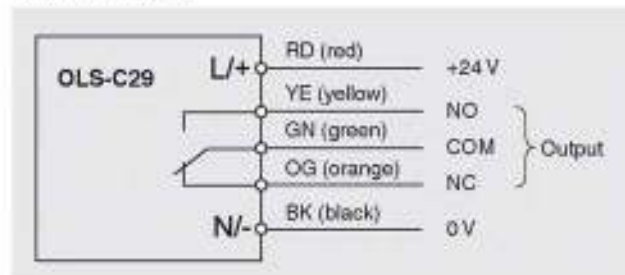
<b>Material</b>	
■ Electronic case	PA66, glass-fibre reinforced
■ Process connection	Steel, nickel-plated
■ Prism	Borosilicate glass
Mounting of case to process connection	Union nut
Light source	IR light 930 nm
Ambient light	max. 500 Lux
Medium temperature	-30 ... +120 °C
Ambient temperature	-30 ... +60 °C
Max. operating pressure	42 bar
Mounting position	horizontal
Minimum distance from the glass tip to an opposite surface	> 10 mm
Visual indication of the switching status	red LED
Switching delay (factory-set, fixed)	approx. 1 s, others up to 12 s on request
Power supply	AC 110 ... 230 V ±15 % or DC 24 V ±15 %
Current supply max.	approx. 22 mA
Output relay	Change-over contact
Switching voltage, current, power	AC 250 V, NC = 5 A, NO = 7 A, 1,750 VA
Connection cable	5 x 0.75 mm <sup>2</sup> , L = 2 m, colour-coded
Mech. service life	approx. 10 <sup>5</sup> switching cycles
Ingress protection	IP 54

### Electrical connection diagram

#### Power supply 230 V



#### Power supply 24 V



## Model overview

### ■ Switch

Process connection	Power supply	Switching delay	Cable length	Order no.
M20 x 1.5	DC 24 V	1 s	2 m	115733
	AC 230 V	1 s	2 m	115826
1 1/8 UNEF	DC 24 V	1 s	2 m	115839
	AC 230 V	1 s	2 m	115841
NPT 1/2"	DC 24 V	1 s	2 m	115842
	AC 230 V	1 s	2 m	115843
	DC 24 V	5 s	3 m	115914
G 1/2"	DC 24 V	1 s	2 m	115859
	DC 24 V	1 s	3 m	115875
	AC 230 V	1 s	2 m	115858

Other versions on request

### ■ Electronics

Power supply	Switching delay	Cable length	Order no.
DC 24 V	1 s	2 m	114690
AC 230 V	1 s	2 m	115824
DC 24 V	1 s	3 m	115874
DC 24 V	5 s	3 m	115913

Other versions on request

## Cross reference

Replaced Type	Type
KSR-OPTO.0029	OLS-C29

## Ordering information

To order the described product the order number (if available) is sufficient.

Alternatively:

OLS-C29 / Power supply / Process connection / Switching delay / Cable length





## KSR – Your Partner for Power Engineering

Level measuring instruments by KSR are used in all fields of power generation - from large-scale power plants (e.g. coal, gas, nuclear, hydro power) and peak-load electricity generation plants (e.g. gas turbine power plants) to decentralised systems (thermal power stations, wind power plants, biogas plants). At the same time measuring technology has to meet requirements which are as diverse as its application fields.

With our worldwide biggest standard product range of level measuring instruments we offer our customers a suitable solution for every measuring task. In close cooperation with development departments of our business partners special instrument versions are developed that can confidently meet required measuring criteria even under extreme conditions.



## Optoelectronic level switch Compact design Model OLS-C51, explosion-protected version

KSR data sheet OLS-C51



### Applications

- Machine tools
- Hydraulics
- Plant construction and machine building
- Water technology
- For liquids, such as oils, water, distilled water, aqueous media

### Special features

- Application at medium temperatures up to +135 °C
- Mounting position as required
- Accuracy  $\pm 0.5$  mm
- Explosion-protected version Ex I



Optoelectronic level switch, model OLS-C51

### Description

The model OLS-C51 optoelectronic level switch is used for monitoring the level of liquids. The optoelectronic sensor consists of an infrared LED and a light receiver.

The light from the LED is directed into a prism which forms the tip of the sensor. So long as the tip is not immersed in liquid, the light is reflected within the prism to the receiver.

When the liquid rises within the vessel and surrounds the tip, the light beam is interrupted by the liquid, so that the reactor is no longer or only weakly reached by the light and reacts to this change by triggering a switching operation.

As an explosion-protected version, the model OLS-C51 level switch is designed for medium temperatures up to 135 °C in zone 0 and 1.

## Specifications

General data	
Measuring accuracy	±0.5 mm
Minimum distance from the glass tip to an opposite surface	≥ 10 mm
Mounting position	as required
Process connection	G 1/2" (male)
Approval	Ex i (previous model designation OPG 051)

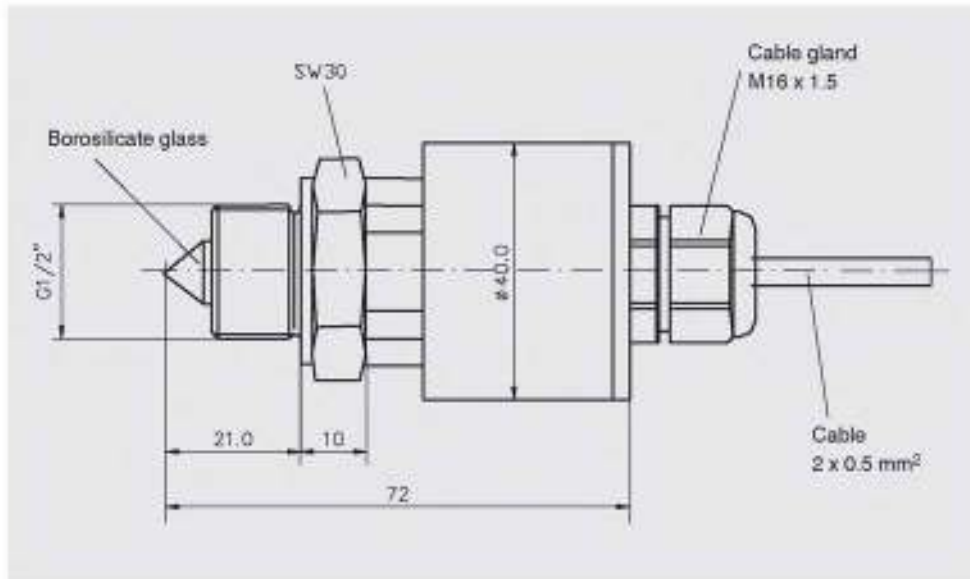
Design data	
Responsiveness	preset, please specify the medium
Medium temperature	-30 ... +135 °C
Ambient temperature	-30 ... +80 °C
Operating pressure	0 ... 2.0 MPa (0 ... 20 bar)
<b>Materials</b>	
■ Light guide	Borosilicate glass
■ Case	Stainless steel 1.4305 (non-wetted parts)
■ Process connection	Stainless steel 1.4571

Electrical data	
Power supply	DC 7.5 ... 30 V $I_0 = 100 \text{ mA}$ , $U_0 = 30 \text{ V}$ , $P = 1 \text{ W}$
Output	4 ... 20 mA, protected against reverse polarity Normally open: ≥ 4 mA to < 10 mA Normally closed: ≥ 12 mA to 18 mA Fault: < 4 mA, > 20 mA
<b>Electrical connection</b>	
■ PUR cable halogen-free	Standard lengths: 2 and 5 m Diameter: 3 x 0.25 mm <sup>2</sup>
Switching function	Normally open (closed in medium) or normally closed (open in medium)
Ingress protection	IP 65
Number of switch points	1

## Options

- Other versions on request

## Dimensions in mm



## Electrical connection diagram



## Ordering information

Model / Process connection / Electrical connection / Switching function / Medium / Options

# Appendix

## Cross Reference OLS-C51

Type	Model
OLS-C51	OPG 051

## Type Code OPG 051

Code	
<b>1</b>	<b>Basic type</b>
OPG 051	Optoelectrical level switch
<b>2</b>	<b>Process connection</b>
A	Mounting thread G 1/2"
X	Other process connections on demand
<b>3</b>	<b>Electrical connection</b>
2U	Cable outlet 2m PUR cable, standard
3U	Cable outlet 3m PUR cable
5U	Cable outlet 5m PUR cable
XU	Cable outlet Xm PUR cable
<b>4</b>	<b>Switching function</b>
S	SPST (Closing on rising level, High $\geq 12\text{mA}$ to $< 18\text{mA}$ )
O	SPDT (Opening on rising level, Low $> 4\text{mA}$ to $< 10\text{mA}$ ) (Fault $< 4\text{mA}$ , $> 20\text{mA}$ )
<b>5</b>	<b>Responsiveness</b>
A	Responsiveness not adjustable (please specify fluid)
<b>6</b>	<b>Approval</b>
Ex	Intrinsically safe version Ex I

## Ordering Example

	Basic type	Process Connection	Electrical Connection	Switching function	Responsiveness	Approval
Code	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>
	OPG 051	A	2U	S	A	Ex



## Flow monitor

### For monitoring the flow of liquid and gaseous media

#### Model FWS

KSR data sheet FWS



#### Applications

- Continuous flow indication without power supply
- Thirteen different versions and corrosion resistant materials make the products suitable for a broad range of applications
- Machine building, chemical industry, pharmaceutical industry, medical engineering
- Cooling systems and cooling circuits, transformers, central lubrication systems and recirculating oil lubrication systems
- Research and development

#### Special features

- High switching accuracy and functional safety
- Large switching range, low switch hysteresis
- Continuous switch point setting by the operator
- Viscosity compensated models available
- Explosion-protected versions

#### Description

The model FWS flow monitors are used for the display and monitoring of the flow of liquid and gaseous media, e.g. in cooling systems and cooling circuits of welding machinery, laser and piping systems, dosing systems, pumps, compressors, hydraulic systems, high-pressure plants and many more.

The flow monitors operate in accordance with the float-body measuring principle. A float body is guided within a cylindrical slotted nozzle or in a cylindrical measuring tube. A reed contact is mounted outside of the flow circuit.



Selection of different model FWS flow monitors

The reed contact is cast into a continuously adjustable case (switch case) and thus is protected from external influences.

The flowing medium moves the float body in the direction of the flow. When the float body, with its integrated magnet, reaches the position of the reed switch, this closes. When the flow rate rises, the float body moves further in the direction of the flow, maximally until it reaches a stop. This stop prevents the float body from being driven beyond the switching range of the reed switch (bistable characteristic).

## Switching ranges

All flow monitors are factory-fitted as standard with a normally open contact (option change-over contact). The switch point can be adjusted continuously within the switching range. Depending on the flow rate itself, the actual flow volume can be much larger than the maximum scale value (typically: double).

## Position dependance

The model FWS-DWG, FWS-DWMA, FWS-DWM and FWS-DWM-L flow monitors must be installed vertically, with the flow from bottom to top. For all other models, the mounting position is up to the user, however during installation, care must be taken to ensure the correct flow direction.

## Switch hysteresis

This refers to the travel of the float body between the switch-on and switch-off flow volume. The shorter the switch travel is, the lower the switch hysteresis. Through the selection of magnets and reed switches with small differences between response and drop-out excitation (close differential), a low switch hysteresis can be successfully maintained. A low switch hysteresis is always an advantage where precise control of the flow is required.

## Display

A local display is also possible. With models with sight-glasses, the upper edge of the float body is also the reading edge and displays the flow against the scale etched onto the sight-glass. Models with pointer scales can be read according to the scale. Please note that that the respective scales are matched to a specific medium.

## Voltage supply

A voltage supply is not required with the flow monitors as potential-free reed contacts are used.

## Maintenance information

The flow monitor has been specifically engineered to require minimal maintenance. With media containing magnetic particles, cleaning should be performed at regular intervals. These cleaning intervals can be significantly extended by using a filter with a magnetic separator. The flow monitors work on a flow-dependent rather than a pressure-dependent basis.

## Model overview

Flow monitor	Mounting position	Display	Viscosity compensation	Max. pressure in bar	Flow range l/min H <sub>2</sub> O	NI/min air
Vertical mounting position, sight-glass display, for water and similar media, model FWS-DWG	Vertical	Sight-glass	No	10	0.1 ... 50	-
Vertical mounting position, dial indicator, for water and similar media, model FWS-DWM/A		Dial indicator	No	300	0.1 ... 50	-
Vertical mounting position, without display, for water and similar media, model FWS-DWM		Without	No	300	0.1 ... 50	-
Vertical mounting position, without display, for gaseous media, model FWS-DWM-L		Without	No	300	-	1 ... 1,450
Mounting position as required, sight-glass display, for water and similar media, model FWS-DUG	As required	Sight-glass	No	10	0.2 ... 250	-
Mounting position as required, dial indicator, for water and similar media, model FWS-DUM/A		Dial indicator	No	300	0.2 ... 250	-
Mounting position as required, sight-glass display, for oil and similar media, model FWS-DKG		Sight-glass	Yes	10/16	0.10 ... 90	-
Mounting position as required, dial indicator, for oil and similar media, model FWS-DKM/A		Dial indicator	Yes	300	0.5 ... 110	-
Mounting position as required, without display, for oil and similar media, model FWS-DKM		Without	Yes	350	0.5 ... 110	-
Mounting position as required, sight-glass display, for water and similar media, several variants, model FWS-RVO/U		Sight-glass	No	10/16	0.005 ... 150	-
Mounting position as required, sight-glass display, for gaseous media, several variants, model FWS-RVO/U-L		Sight-glass	No	10/16	-	0.2 ... 625
Mounting position as required, without display, for water and similar media, several variants, model FWS-RVM/U		Without	No	350	0.005 ... 150	-
Mounting position as required, without display, for gaseous media, several variants, model FWS-RVM/U-L		Without	No	350	-	0.6 ... 650

## Materials

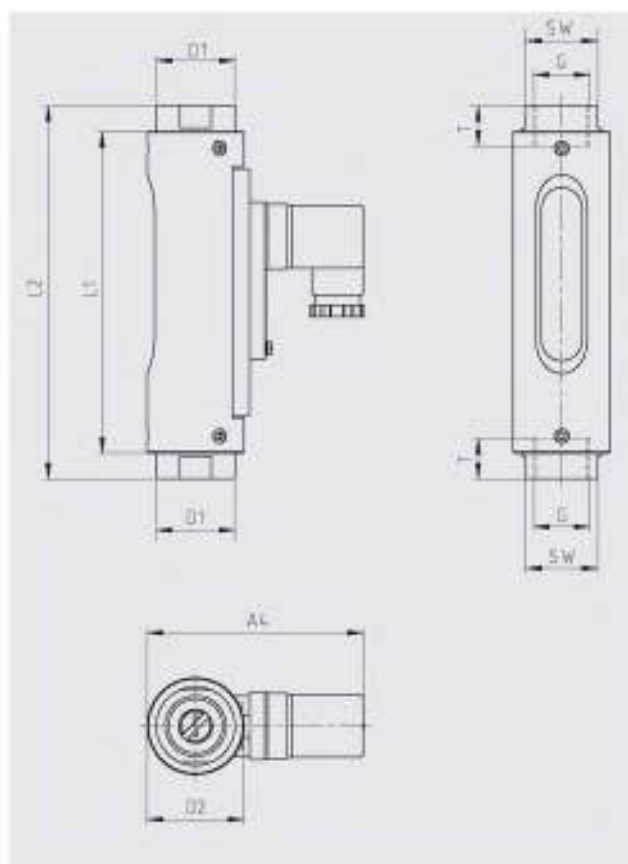
Two different material versions (brass or stainless steel version) can be supplied. Special materials on request (e.g. Hastelloy, Monel)

Component	Material	
	Brass version	Stainless steel version
<b>Wetted</b>		
Main body	Nickel-plated brass	Stainless steel 1.4571
Float body	Brass, nickel-plated brass	Stainless steel 1.4571
Slotted nozzle	Nickel-plated brass	Stainless steel 1.4571
Spring	Stainless steel 1.4571 (only models with mounting position as required)	
Compression fitting	Nickel-plated brass	Stainless steel 1.4571
Sight-glass	Duran 50	
Sealings	EPDM, NBR, FKM	
<b>Non-wetted</b>		
Exterior case	Anodised aluminium (only models with sight-glass)	



## Flow monitor, vertical mounting position, sight-glass display, for water and similar media, model FWS-DWG

Option: Explosion-protected version



### Specifications

Main body	Nickel-plated brass or stainless steel 1.4571 Exterior case from anodized aluminium
Mounting position	Vertical
Display	Sight-glass
Process connections	Female thread G 1/4 ... 1 or 1/4 ... 1 NPT
Max. operating pressure	10 bar
Pressure loss	0.01 ... 0.2 bar
Tolerance	±5 % of full scale value

Versions	Max. ambient temperature	Ingress protection
Instrument connector DIN 43650 form A	100 °C (option 160 °C)	IP 65
1 m cable	100 °C (option 160 °C)	IP 67
Instrument connector M12 x 1	85 °C	IP 67
Ex version (2 m cable)	75 °C	IP 67

Electrical data	Normally open	Change-over contact
Standard	250 V / 3 A / 100 VA	250 V / 1.5 A / 50 VA <sup>1)</sup>
Ex version	250 V / 2 A / 60 VA ATEX II 2G Ex mb II T6	250 V / 1 A / 30 VA <sup>1)</sup>

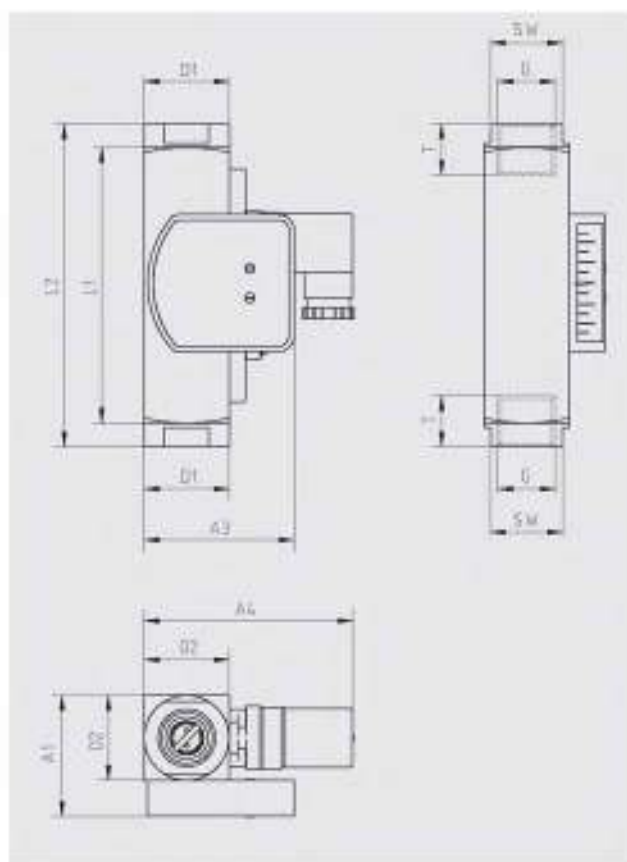
<sup>1)</sup> Minimum load 3 VA

Model	Switching ranges in l/min		Dimensions in mm					Weight in g			
	H <sub>2</sub> O at 20 °C	Air	D1	D2	A4	G	T		L1	L2	SW
FWS-DWG-1.5	0.1 ... 1.5	-	35	43	approx. 96	1/4"	10	121	132	32	625
						3/8"	11	121	135		
						1/2"	14	121	135		
FWS-DWG-3	0.2 ... 3	-	35	43	approx. 96	1/4"	10	121	132	32	625
						3/8"	11	121	135		
						1/2"	14	121	135		
FWS-DWG-8	0.3 ... 8	-	35	43	approx. 96	1/4"	10	121	132	32	625
						3/8"	11	121	135		
						1/2"	14	121	135		
FWS-DWG-12	1 ... 12	-	35	43	approx. 96	1/4"	10	121	132	32	625
						3/8"	11	121	135		
						1/2"	14	121	135		
FWS-DWG-18	2 ... 18	-	35	43	approx. 96	1/2"	14	143	163	32	650
						3/4"	15	143	163		
FWS-DWG-35	3 ... 35	-	45	50	approx. 104	3/4"	15	143	163	41	850
						1"	17	143	163		
FWS-DWG-50	4 ... 50	-	45	50	approx. 104	3/4"	15	143	163	41	850
						1"	17	143	163		



## Flow monitor, vertical mounting position, dial indicator, for water and similar media, model FWS-DWM/A

Option: Explosion-protected version



### Specifications

Main body	Nickel-plated brass or stainless steel 1.4571
Mounting position	Vertical
Display	Dial indicator
Process connections	Female thread G 1/4 ... 1 or 1/4 ... 1 NPT
Max. operating pressure	200 bar (stainless steel version 300 bar)
Pressure loss	0.02 ... 0.2 bar
Tolerance	±5 % of full scale value

Versions	Max. ambient temperature	Ingress protection
Instrument connector DIN 43650 form A	100 °C (option 160 °C)	IP 65
1 m cable	100 °C (option 160 °C)	IP 67
Instrument connector M12 x 1	85 °C	IP 67
Ex version (2 m cable)	75 °C	IP 67

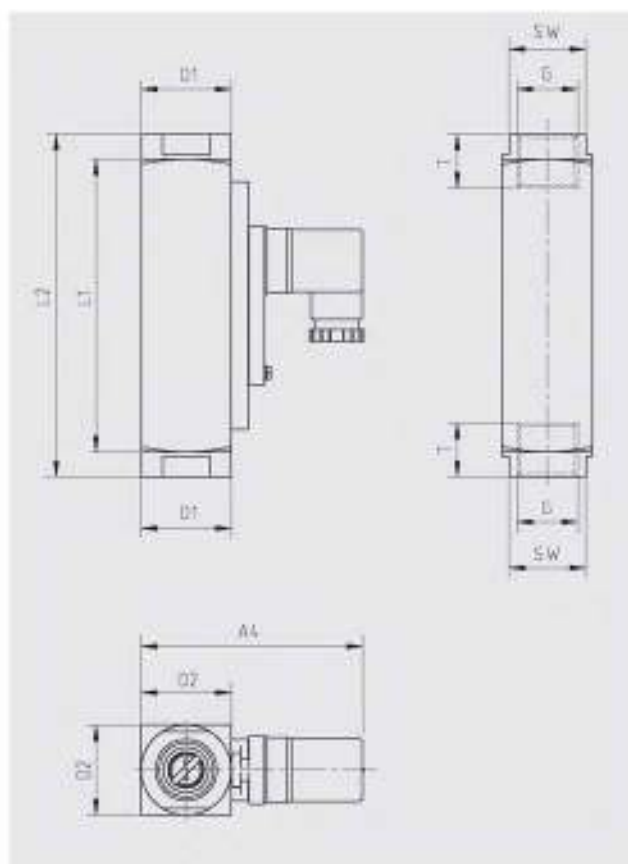
Electrical data	Normally open	Change-over contact
Standard	250 V / 3 A / 100 VA	250 V / 1.5 A / 50 VA <sup>1)</sup>
Ex version	250 V / 2 A / 60 VA ATEX II 2G Ex mb II T6	250 V / 1 A / 30 VA <sup>1)</sup>

<sup>1)</sup> Minimum load 3 VA.

Model	Switching ranges in l/min		Dimensions in mm						G	T	L1	L2	SW	Weight in g
	H <sub>2</sub> O at 20 °C	Air	D1	D2	A1	A3	A4							
FWS-DWM/A-1.5	0.1 ... 1.5	-	30	30	47	65.5	approx. 88	1/4"	10	117	131	27	850	
								3/8"	11					
FWS-DWM/A-3	0.2 ... 3	-	30	30	47	65.5	approx. 88	1/2"	14	117	131	27	850	
								3/8"	11					
FWS-DWM/A-8	0.3 ... 8	-	30	30	47	65.5	approx. 88	1/4"	10	117	131	27	850	
								3/8"	11					
FWS-DWM/A-12	1 ... 12	-	30	30	47	65.5	approx. 88	1/2"	14	117	131	27	850	
								3/8"	11					
FWS-DWM/A-18	2 ... 18	-	30	30	47	65.5	approx. 88	1/2"	14	132	146	27	800	
			35	30	47	65.5	approx. 88	3/4"	15	132	174	32	1,010	
FWS-DWM/A-35	3 ... 35	-	40	40	57	70.5	approx. 98	3/4"	15	130	152	34	1,500	
								1"	17	156	156	40	1,500	
FWS-DWM/A-60	4 ... 60	-	40	40	57	70.5	approx. 98	3/4"	15	130	152	34	1,500	
								1"	17	156	156	40	1,500	

## Flow monitor, vertical mounting position, without display, for water and similar media, model FWS-DWM

Option: Explosion-protected version



### Specifications

Main body	Nickel-plated brass or stainless steel 1.4571
Mounting position	Vertical
Display	Without
Process connections	Female thread G 1/4 ... 1 or 1/4 ... 1 NPT
Max. operating pressure	200 bar (stainless steel version 300 bar)
Pressure loss	0.02 ... 0.2 bar
Tolerance	±5 % of full scale value

Versions	Max. ambient temperature	Ingress protection
Instrument connector DIN 43650 form A	100 °C (option 160 °C)	IP 65
1 m cable	100 °C (option 160 °C)	IP 67
Instrument connector M12 x 1	85 °C	IP 67
Ex version (2 m cable)	75 °C	IP 67

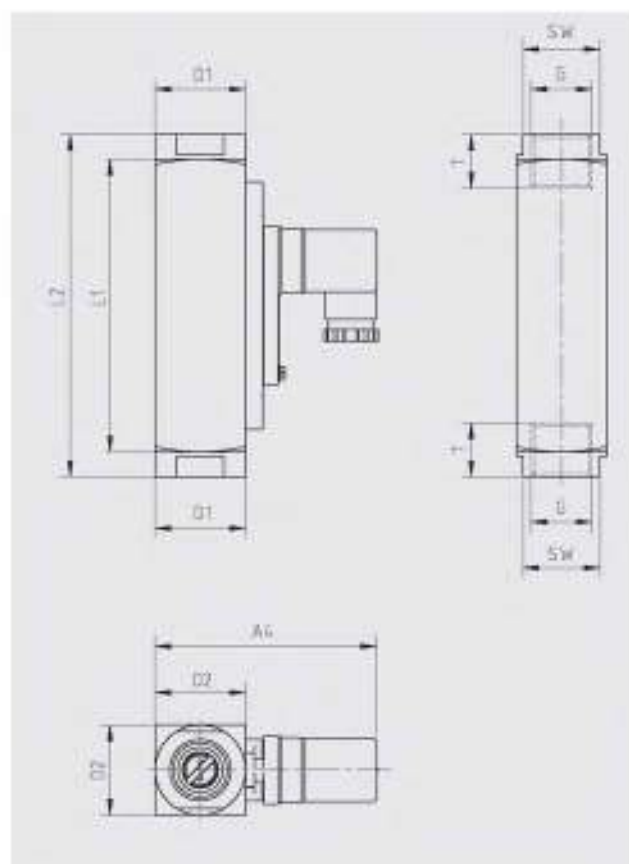
Electrical data	Normally open	Change-over contact
Standard	250 V / 3 A / 100 VA	250 V / 1.5 A / 50 VA <sup>1)</sup>
Ex version	250 V / 2 A / 60 VA ATEX II 2G Ex mb II T6	250 V / 1 A / 30 VA <sup>1)</sup>

1) Minimum load 3 VA

Model	Switching ranges in l/min		Dimensions in mm						Weight in g		
	H <sub>2</sub> O at 20 °C	Air	D1	D2	A4	G	T	L1		L2	SW
FWS-DWM-1.5	0.1 ... 1.5	-	30	30	approx. 66	1/4"	10	117	131	27	800
						3/8"	11				
						1/2"	14				
FWS-DWM-3	0.2 ... 3	-	30	30	approx. 66	1/4"	10	117	131	27	800
						3/8"	11				
						1/2"	14				
FWS-DWM-8	0.3 ... 8	-	30	30	approx. 66	1/4"	10	117	131	27	800
						3/8"	11				
						1/2"	14				
FWS-DWM-12	1 ... 12	-	30	30	approx. 66	1/4"	10	117	131	27	800
						3/8"	11				
						1/2"	14				
FWS-DWM-18	2 ... 18	-	30	30	approx. 66	1/2"	14	132	146	27	800
			35			15	132				
FWS-DWM-35	3 ... 35	-	40	40	approx. 98	3/4"	15	130	152	34	1,450
						1"	17				
FWS-DWM-60	4 ... 60	-	40	40	approx. 98	3/4"	15	130	152	34	1,450
						1"	17				

## Flow monitor, vertical mounting position, without display, for gaseous media, model FWS-DWM-L

Option: Explosion-protected version



### Specifications

Main body	Nickel-plated brass or stainless steel 1.4571
Mounting position	Vertical
Display	Without
Process connections	Female thread G 1/4 ... 1 or 1/4 ... 1 NPT
Max. operating pressure	200 bar (stainless steel version 300 bar)
Pressure loss	0.02 ... 0.4 bar
Tolerance	±10 % of full scale value

### Versions

Versions	Max. ambient temperature	Ingress protection
Instrument connector DIN 43650 form A	80 °C	IP 65
1 m cable	80 °C	IP 67
Instrument connector M12 x 1	80 °C	IP 67
Ex version (2 m cable)	75 °C	IP 67

### Electrical data

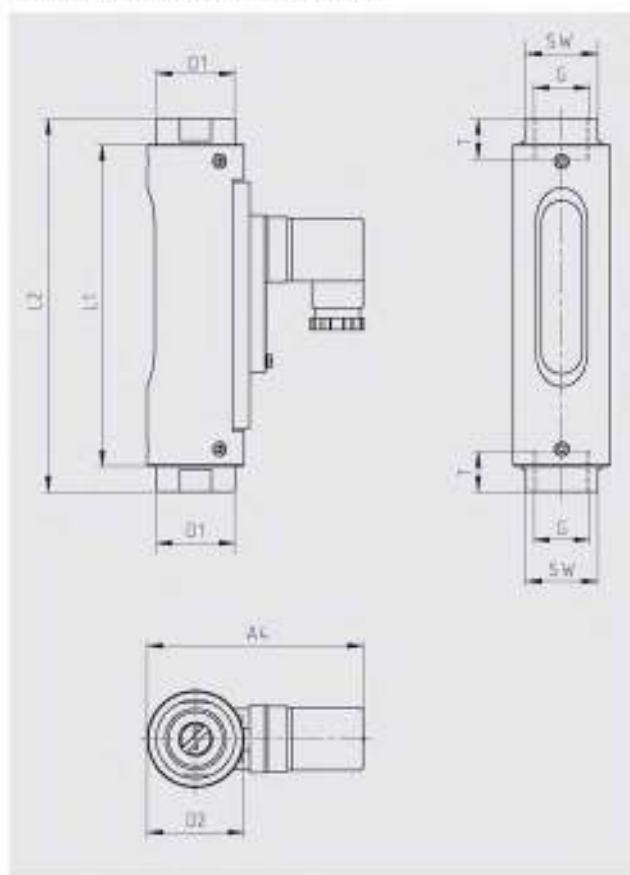
	Normally open	Change-over contact
Standard	250 V / 3 A / 100 VA	250 V / 1.5 A / 50 VA <sup>1)</sup>
Ex version	250 V / 2 A / 50 VA ATEX II 2G Ex mb II T8	250 V / 1 A / 30 VA <sup>1)</sup>

<sup>1)</sup> Minimum load 3 VA

Model	Switching ranges in l/min		Dimensions in mm					Weight in g			
	H <sub>2</sub> O	Air at 1 bar abs. and 20 °C	D1	D2	A4	G	T		L1	L2	SW
FWS-DWM-L-1.5	-	1 ... 28	30	30	approx. 88	1/4"	10	117	131	27	800
						3/8"	11				
FWS-DWM-L-3	-	4 ... 60	30	30	approx. 88	1/2"	14	117	131	27	800
						3/8"	11				
FWS-DWM-L-8	-	6 ... 160	30	30	approx. 88	1/4"	10	117	131	27	800
						3/8"	11				
FWS-DWM-L-12	-	20 ... 240	30	30	approx. 88	1/2"	14	117	131	27	800
						3/8"	11				
FWS-DWM-L-18	-	40 ... 360	30	30	approx. 88	1/2"	14	132	146	27	800
			35			3/4"	15	132	174	32	960
FWS-DWM-L-50	-	60 ... 700	40	40	approx. 98	3/4"	15	130	152	34	1,450
FWS-DWM-L-100	-	200 ... 1,450	40	40	approx. 98	1"	17	156	156	40	1,450

## Flow monitor, mounting position as required, sight-glass display, for water and similar media, model FWS-DUG

Option: Explosion-protected version



### Specifications

Main body	Nickel-plated brass or stainless steel 1.4571 Exterior case from anodised aluminium
Mounting position	As required
Display	Sight-glass
Process connections	Female thread G 1/4 ... 1 1/4 or 1/4 ... 1 1/4 NPT
Max. operating pressure	10 bar
Pressure loss	0.02 ... 0.8 bar
Tolerance	±5 % of full scale value

Versions	Max. ambient temperature	Ingress protection
Instrument connector DIN 43650 form A	100 °C (option 160 °C)	IP 65
1 m cable	100 °C (option 160 °C)	IP 67
Instrument connector M12 x 1	85 °C	IP 67
Ex version (2 m cable)	75 °C	IP 67

Electrical data	Normally open	Change-over contact
Standard	250 V / 3 A / 100 VA	250 V / 1.5 A / 50 VA <sup>1)</sup>
Ex version	250 V / 2 A / 60 VA ATEX II 2G Ex mb II T6	250 V / 1 A / 30 VA <sup>1)</sup>

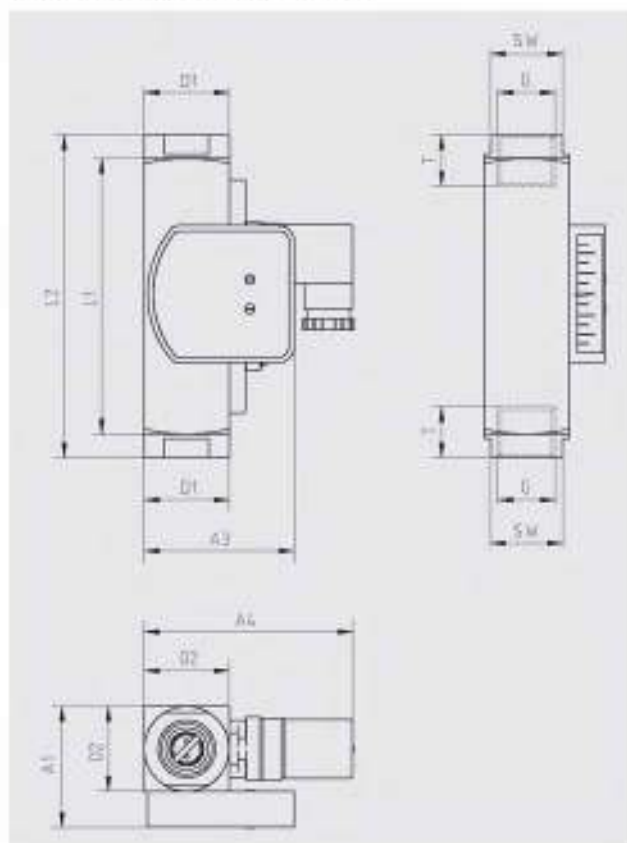
1) Minimum load 3 VA

Model	Switching ranges in l/min		Dimensions in mm						Weight in g		
	H <sub>2</sub> O at 20 °C	Air	D1	D2	A4	G	T	L1		L2	SW
FWS-DUG-4	0.2 ... 4	-	35	43	approx. 96	1/4"	10	121	132	32	625
						3/8"	11	121	136		
						1/2"	14	121	136		
FWS-DUG-6	0.5 ... 6	-	35	43	approx. 96	1/4"	10	121	132	32	625
						3/8"	11	121	136		
						1/2"	14	121	136		
FWS-DUG-8	0.5 ... 8	-	35	43	approx. 96	1/4"	10	121	132	32	625
						3/8"	11	121	136		
						1/2"	14	121	136		
FWS-DUG-14	0.5 ... 14	-	35	43	approx. 96	1/4"	10	121	132	32	625
						3/8"	11	121	136		
						1/2"	14	121	136		
FWS-DUG-22	2 ... 22	-	35	43	approx. 96	1/2"	14	121	136	32	650
FWS-DUG-28	1 ... 28	-	35	43	approx. 96	1/2"	14	121	136	32	650
FWS-DUG-45	1 ... 45	-	35	43	approx. 96	3/4"	15	143	166	32	650
FWS-DUG-60	2 ... 60	-	45	50	approx. 104	3/4"	15	143	163	41	1,000
						1"	17	143	181	41	1,000
FWS-DUG-90	6 ... 90	-	45	50	approx. 104	3/4"	15	143	163	41	1,000
						1"	17	143	181	41	1,000
FWS-DUG-110	6 ... 110	-	45	50	approx. 104	1"	17	143	181	41	1,000
FWS-DUG-150	15 ... 150	-	55	55	approx. 109	1 1/4"	20	174	122	50	1,300
FWS-DUG-220	50 ... 220	-	60	60	approx. 113	1 1/4"	20	169	209	55	1,700
FWS-DUG-250	50 ... 250	-	55	55	approx. 109	1 1/4"	20	174	222	50	1,400



## Flow monitor, mounting position as required, dial indicator, for water and similar media, model FWS-DUM/A

Option: Explosion-protected version



### Specifications

Main body	Nickel-plated brass or stainless steel 1.4571
Mounting position	As required
Display	Dial indicator
Process connections	Female thread G 1/4 ... 1 1/2 or 1/4 ... 1 1/2 NPT
Max. operating pressure	200 bar (stainless steel version 300 bar)
Pressure loss	0.02 ... 0.6 bar
Tolerance	±5 % of full scale value

Versions	Max. ambient temperature	Ingress protection
Instrument connector DIN 43850 form A	100 °C (option 160 °C)	IP 65
1 m cable	100 °C (option 160 °C)	IP 67
Instrument connector M12 x 1	85 °C	IP 67
Ex version (2 m cable)	75 °C	IP 67

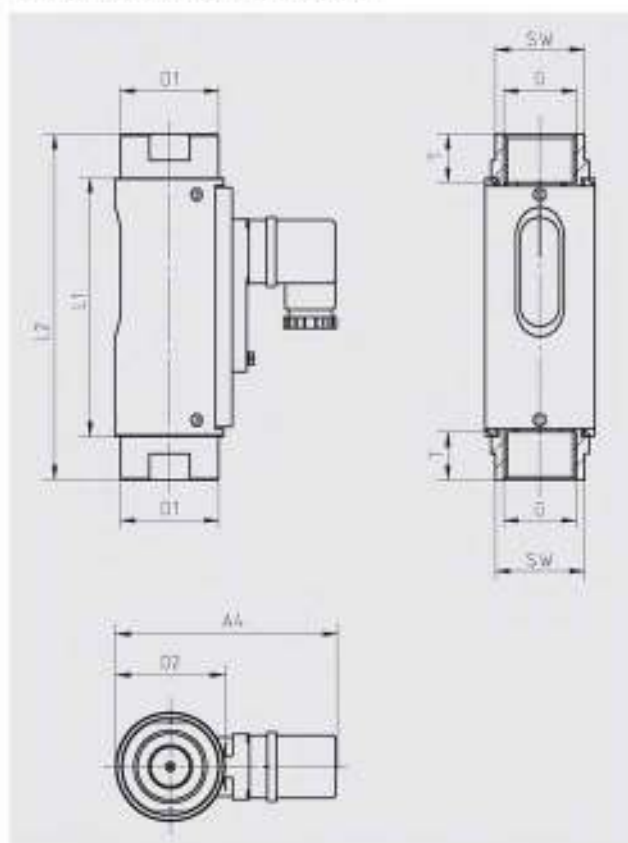
Electrical data	Normally open	Change-over contact
Standard	250 V / 3 A / 100 VA	250 V / 1.5 A / 50 VA <sup>1)</sup>
Ex version	250 V / 2 A / 60 VA	250 V / 1 A / 30 VA <sup>1)</sup>
	ATEX II 2G Ex mb II T6	

<sup>1)</sup> Minimum load 3 VA

Model	Switching ranges in l/min		Dimensions in mm						G	T	L1	L2	SW	Weight in g
	H <sub>2</sub> O at 20 °C	Air	D1	D2	A1	A3	A4							
FWS-DUM/A-4	0.2 ... 4	-	30	30	47	65.5	approx. 88	1/4"	10	117	131	27	900	
								3/8"	11					
FWS-DUM/A-5	0.6 ... 5	-	30	30	47	65.5	approx. 88	1/2"	14	117	131	27	900	
								1/4"	10					
FWS-DUM/A-8	0.5 ... 8	-	30	30	47	65.5	approx. 88	3/8"	11	117	131	27	900	
								1/2"	14					
FWS-DUM/A-14	1 ... 14	-	30	30	47	65.5	approx. 88	1/4"	10	117	131	27	900	
								3/8"	11					
FWS-DUM/A-28	1 ... 28	-	30	30	47	65.5	approx. 88	1/2"	14	117	131	27	900	
								1/4"	10					
FWS-DUM/A-40	2 ... 40	-	30	30	47	65.5	approx. 88	1/2"	14	132	146	27	950	
			35	30				3/4"	15					
FWS-DUM/A-55	4 ... 55	-	30	30	47	65.5	approx. 88	1/2"	14	132	146	27	950	
			35	30				3/4"	15					
FWS-DUM/A-70	1 ... 70	-	40	40	57	70.5	approx. 98	3/4"	15	130	152	34	1,450	
								1"	17					
FWS-DUM/A-90	8 ... 90	-	40	40	57	70.5	approx. 98	3/4"	15	130	152	34	1,450	
								1"	17					
FWS-DUM/A-110	5 ... 110	-	40	40	57	70.5	approx. 98	3/4"	15	130	152	34	1,450	
								1"	17					
FWS-DUM/A-150	10 ... 150	-	50	50	67	75.5	approx. 108	1 1/4"	20	200	200	50	2,800	
								1 1/4"	20					
FWS-DUM/A-220	35 ... 220	-	50	50	67	75.5	approx. 108	1 1/4"	20	200	200	60	1,150	
			60	60				1 1/2"	20					
FWS-DUM/A-250	35 ... 250	-	50	50	67	75.5	approx. 108	1 1/4"	20	200	200	60	1,450	
			60	60				1 1/2"	20					

## Flow monitor, mounting position as required, sight-glass display, for oil and similar media, model FWS-DKG-1

Option: Explosion-protected version



1) Minimum load 3 VA



### Specifications

Main body	Nickel-plated brass or stainless steel 1.4571 Exterior case from anodised aluminium
Mounting position	As required
Display	Sight-glass
Process connections	Female thread G 1/4 ... 1 or 1/4 ... 1 NPT
Max. operating pressure	10 bar
Pressure loss	0.02 ... 0.4 bar
Viscosity compensation	up to 600 mm <sup>2</sup> /s
Tolerance	±10 % of full scale value

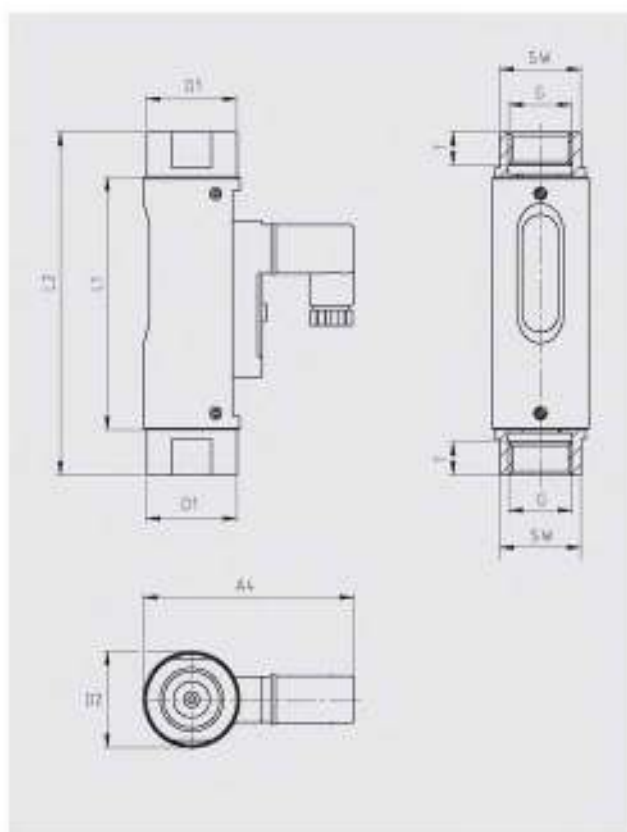
Versions	Max. ambient temperature	Ingress protection
Instrument connector DIN 43650 form A	120 °C (option 160 °C)	IP 65
1 m cable	120 °C (option 160 °C)	IP 67
Instrument connector M12 x 1	85 °C	IP 67
Ex version (2 m cable)	75 °C	IP 67

Electrical data	Normally open	Change-over contact
Standard	250 V / 3 A / 100 VA	250 V / 1.5 A / 50 VA <sup>1)</sup>
Ex version	250 V / 2 A / 60 VA	250 V / 1 A / 30 VA <sup>1)</sup>

ATEX II 2G Ex mb II T6

Model	Switching ranges in l/min		Dimensions in mm								Weight in g
	Oil, density 0.9 kg/m <sup>3</sup>	Air	D1	D2	A4	G	T	L1	L2	SW	
FWS-DKG-1/1	0.1 ... 0.8	-	41	50	approx. 99	1/4"	10	118.5	144.5	41	850
						1/2"	14	118.5	144.5		
						3/4"	15	118.5	138.5		
						1"	17	118.5	158.5		
FWS-DKG-1/2	0.5 ... 1.5	-	41	50	approx. 99	1/4"	10	118.5	144.5	41	850
						1/2"	14	118.5	144.5		
						3/4"	15	118.5	138.5		
						1"	17	118.5	158.5		
FWS-DKG-1/4	1 ... 4	-	41	50	approx. 99	1/4"	10	118.5	144.5	41	850
						1/2"	14	118.5	144.5		
						3/4"	15	118.5	138.5		
						1"	17	118.5	158.5		
FWS-DKG-1/8	2 ... 8	-	41	50	approx. 99	1/2"	14	118.5	144.5	41	850
						3/4"	15	118.5	138.5		
						1"	17	118.5	158.5		
						1 1/2"	18	118.5	158.5		
FWS-DKG-1/10	3 ... 10	-	41	50	approx. 99	1/2"	14	118.5	144.5	41	850
						3/4"	15	118.5	138.5		
						1"	17	118.5	158.5		
						1 1/2"	18	118.5	158.5		
FWS-DKG-1/15	5 ... 15	-	41	50	approx. 99	1/2"	14	118.5	144.5	41	850
						3/4"	15	118.5	138.5		
						1"	17	118.5	158.5		
						1 1/2"	18	118.5	158.5		
FWS-DKG-1/24	8 ... 24	-	41	50	approx. 99	1/2"	14	118.5	144.5	41	850
						3/4"	15	118.5	138.5		
						1"	17	118.5	158.5		
						1 1/2"	18	118.5	158.5		
FWS-DKG-1/30	10 ... 30	-	41	50	approx. 99	3/4"	15	118.5	138.5	41	850
						1"	17	118.5	158.5		
						1 1/2"	18	118.5	158.5		
						2"	19	118.5	158.5		
FWS-DKG-1/45	15 ... 45	-	41	50	approx. 99	3/4"	15	118.5	138.5	41	850
						1"	17	118.5	158.5		
						1 1/2"	18	118.5	158.5		
						2"	19	118.5	158.5		
FWS-DKG-1/60	20 ... 60	-	41	50	approx. 99	3/4"	15	118.5	138.5	41	850
						1"	17	118.5	158.5		
						1 1/2"	18	118.5	158.5		
						2"	19	118.5	158.5		
FWS-DKG-1/90	30 ... 90	-	41	50	approx. 99	3/4"	15	118.5	138.5	41	850
						1"	17	118.5	158.5		
						1 1/2"	18	118.5	158.5		
						2"	19	118.5	158.5		

**Flow monitor, mounting position as required, sight-glass display, for oil and similar media, model FWS-DKG-2**



**Specifications**

Main body	Nickel-plated brass or stainless steel 1.4571 Exterior case from anodised aluminium
Mounting position	As required
Display	Sight-glass
Process connections	Female thread G 1/2 or 1/2 NPT
Max. operating pressure	16 bar
Pressure loss	0.02 ... 0.2 bar
Viscosity compensation	up to 600 mm <sup>2</sup> /s
Tolerance	±10 % of full scale value

Versions	Max. ambient temperature	Ingress protection
Instrument connector DIN 43650 form C	120 °C (option 160 °C)	IP 65
1 m cable	120 °C (option 160 °C)	IP 67
Instrument connector M12 x 1	85 °C	IP 65

Electrical data	Normally open	Change-over contact
Standard	230 V / 3 A / 60 VA	250 V / 1.5 A / 50 VA <sup>1)2)</sup>

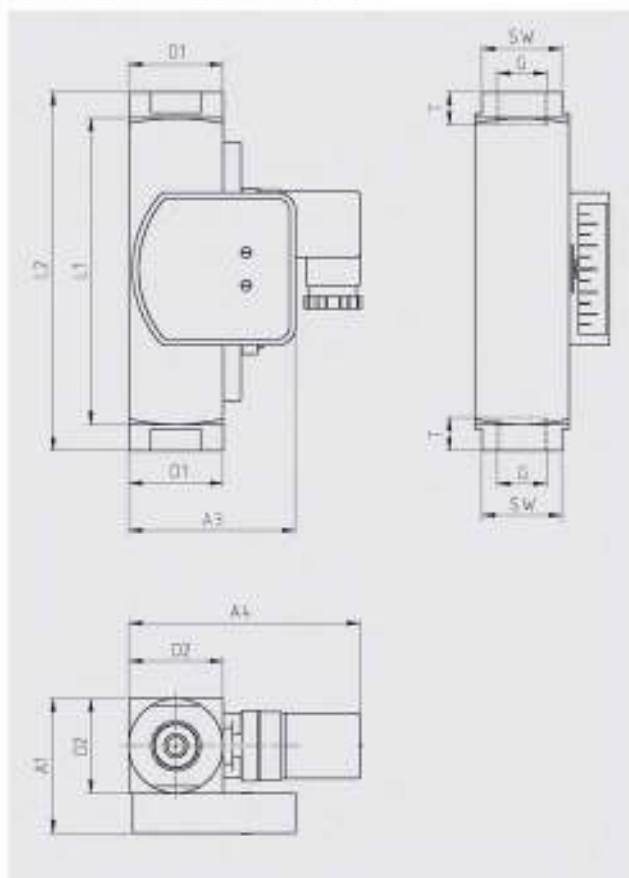
- 1) Minimum load 3 VA  
2) Only with instrument connector

Model	Switching ranges in l/min		Dimensions in mm							Weight in g	
	Oil, density 0.9 kg/m <sup>3</sup>	Air	D1	D2	A4	G	T	L1	L2		SW
FWS-DKG-2/2	0.5 ... 1.7	-	-	-	-	-	-	-	-	-	-
FWS-DKG-2/4	1.3 ... 4	-	30	32	approx. 70	1/2"	14	64	114	27	300
FWS-DKG-2/8	2.5 ... 8	-	-	-	-	-	-	-	-	-	-



## Flow monitor, mounting position as required, dial indicator, for oil and similar media, model FWS-DKM/A-1

Option: Explosion-protected version



### Specifications

Main body	Nickel-plated brass or stainless steel 1.4571
Mounting position	As required
Display	Dial indicator
Process connections	Female thread G 1/4 ... 1 or 1/4 ... 1 NPT
Max. operating pressure	200 bar (stainless steel version 300 bar)
Pressure loss	0.02 ... 0.4 bar
Viscosity compensation	up to 600 mm <sup>2</sup> /s
Tolerance	±10 % of full scale value

Versions	Max. ambient temperature	Ingress protection
Instrument connector DIN 43650 form A	120 °C (option 160 °C)	IP 65
1 m cable	120 °C (option 160 °C)	IP 67
Instrument connector M12 x 1	85 °C	IP 67
Ex version (2 m cable)	75 °C	IP 67

Electrical data	Normally open	Change-over contact
Standard	250 V / 3 A / 100 VA	250 V / 1.5 A / 50 VA <sup>1)</sup>
Ex version	250 V / 2 A / 60 VA	250 V / 1 A / 30 VA <sup>1)</sup>

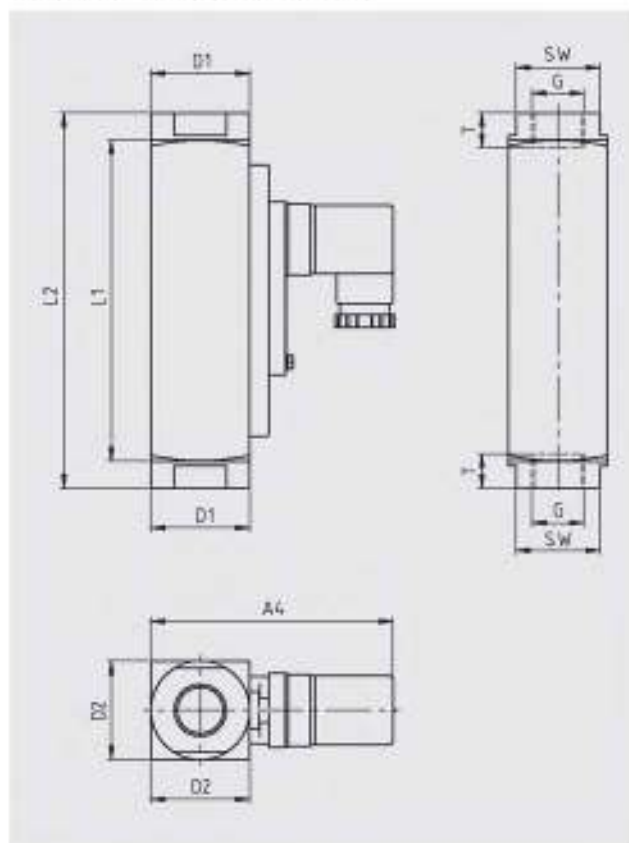
<sup>1)</sup> Minimum load 3 VA

Model	Switching ranges in l/min		Dimensions in mm						G	T	L1	L2	SW	Weight in g
	Oil, density 0.9 kg/m <sup>3</sup>	Air	D1	D2	A1	A3	A4							
FWS-DKM/A-1/2	0.5 ... 1.5	-	40	40	57	70.5	approx. 98	1/4"	10	130	152	34	1,590	
								1/2"	14	130	152	34	1,515	
								3/4"	15	130	152	34	1,430	
								1"	17	130	130	40	1,250	
FWS-DKM/A-1/4	1 ... 4	-	40	40	57	70.5	approx. 98	1/4"	10	130	152	34	1,590	
								1/2"	14	130	152	34	1,515	
								3/4"	15	130	152	34	1,430	
								1"	17	130	130	40	1,250	
FWS-DKM/A-1/8	2 ... 8	-	40	40	57	70.5	approx. 98	1/2"	14	130	152	34	1,515	
								3/4"	15	130	152	34	1,430	
								1"	17	130	130	40	1,250	
								1/2"	14	130	152	34	1,515	
FWS-DKM/A-1/10	3 ... 10	-	40	40	57	70.5	approx. 98	3/4"	15	130	152	34	1,430	
								1"	17	130	130	40	1,250	
								1/2"	14	130	152	34	1,515	
								3/4"	15	130	152	34	1,430	
FWS-DKM/A-1/15	5 ... 15	-	40	40	57	70.5	approx. 98	1"	17	130	130	40	1,250	
								1/2"	14	130	152	34	1,515	
								3/4"	15	130	152	34	1,430	
								1"	17	130	130	40	1,250	
FWS-DKM/A-1/24	8 ... 24	-	40	40	57	70.5	approx. 98	1/2"	14	130	152	34	1,515	
								3/4"	15	130	152	34	1,430	
								1"	17	130	130	40	1,250	
								3/4"	15	130	152	34	1,430	
FWS-DKM/A-1/30	10 ... 30	-	40	40	57	70.5	approx. 98	1"	17	130	130	40	1,250	
								3/4"	15	130	152	34	1,430	
FWS-DKM/A-1/45	15 ... 45	-	40	40	57	70.5	approx. 98	1"	17	130	130	40	1,250	
								3/4"	15	130	152	34	1,430	
FWS-DKM/A-1/60	20 ... 60	-	40	40	57	70.5	approx. 98	3/4"	15	130	152	34	1,430	
								1"	17	130	130	40	1,250	
FWS-DKM/A-1/90	30 ... 90	-	40	40	57	70.5	approx. 98	1"	17	130	130	40	1,250	
FWS-DKM/A-1/110	35 ... 110	-	40	40	57	70.5	approx. 98	1"	17	130	130	40	1,250	



## Flow monitor, mounting position as required, without display, for oil and similar media, model FWS-DKM-1

Option: Explosion-protected version



### Specifications

Main body	Nickel-plated brass or stainless steel 1.4571
Mounting position	As required
Display	Without
Process connections	Female thread G 1/4 ... 1 or 1/4 ... 1 NPT
Max. operating pressure	200 bar (stainless steel version 300 bar)
Pressure loss	0.02 ... 0.4 bar
Tolerance	±10 % of full scale value

### Versions

	Max. ambient temperature	Ingress protection
Instrument connector DIN 43650 form A	120 °C (option 160 °C)	IP 65
1 m cable	120 °C (option 160 °C)	IP 67
Instrument connector M12 x 1	85 °C	IP 67
Ex version (2 m cable)	75 °C	IP 67

### Electrical data

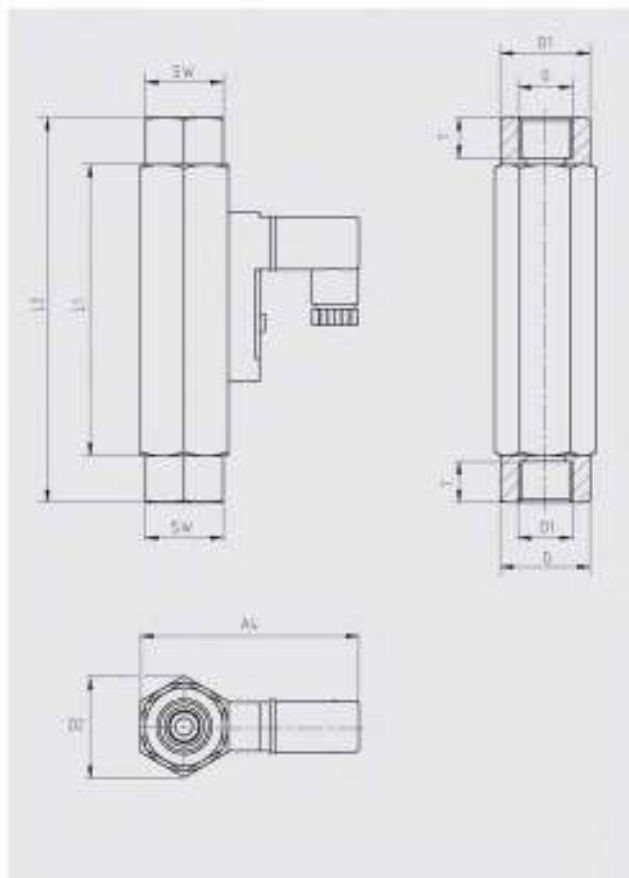
	Normally open	Change-over contact
Standard	250 V / 3 A / 100 VA	250 V / 1.5 A / 50 VA <sup>1)</sup>
Ex version	250 V / 2 A / 60 VA ATEX II 2G Ex mb II TB	250 V / 1 A / 30 VA <sup>1)</sup>

1) Minimum load 3 VA

Model	Switching ranges in l/min		Dimensions in mm							Weight in g	
	Oil, density 0.9 kg/m <sup>3</sup>	Air	D1	D2	A4	G	T	L1	L2		SW
FWS-DKM-1/2	0.5 ... 1.5	-	40	40	approx. 98	1/4"	10	130	152	34	1,500
						1/2"	14	130	152	34	1,425
						3/4"	15	130	152	34	1,340
						1"	17	130	130	40	1,160
FWS-DKM-1/4	1 ... 4	-	40	40	approx. 98	1/4"	10	130	152	34	1,500
						1/2"	14	130	152	34	1,425
						3/4"	15	130	152	34	1,340
						1"	17	130	130	40	1,160
FWS-DKM-1/8	2 ... 8	-	40	40	approx. 98	1/2"	14	130	152	34	1,425
						3/4"	15	130	152	34	1,340
						1"	17	130	130	40	1,160
FWS-DKM-1/10	3 ... 10	-	40	40	approx. 98	1/2"	14	130	152	34	1,425
						3/4"	15	130	152	34	1,340
						1"	17	130	130	40	1,160
FWS-DKM-1/15	5 ... 15	-	40	40	approx. 98	1/2"	14	130	152	34	1,425
						3/4"	15	130	152	34	1,340
						1"	17	130	130	40	1,160
FWS-DKM-1/24	8 ... 24	-	40	40	approx. 98	1/2"	14	130	152	34	1,425
						3/4"	15	130	152	34	1,340
						1"	17	130	130	40	1,160
FWS-DKM-1/30	10 ... 30	-	40	40	approx. 98	3/4"	15	130	152	34	1,340
						1"	17	130	130	40	1,160
FWS-DKM-1/45	15 ... 45	-	40	40	approx. 98	3/4"	15	130	152	34	1,340
						1"	17	130	130	40	1,160
FWS-DKM-1/60	20 ... 60	-	40	40	approx. 98	3/4"	15	130	152	34	1,340
						1"	17	130	130	40	1,160
FWS-DKM-1/90	30 ... 90	-	40	40	approx. 98	1"	17	130	130	40	1,160
FWS-DKM-1/110	35 ... 110	-	40	40	approx. 98	1"	17	130	130	40	1,160

## Flow monitor, mounting position as required, without display, for oil and similar media, model FWS-DKM-2

Option: Explosion-protected version



### Specifications

Main body	Nickel-plated brass or stainless steel 1.4571
Mounting position	As required
Display	Without
Process connections	Female thread G 1/4 ... 1/2 or 1/4 ... 1/2 NPT
Max. operating pressure	300 bar (stainless steel version 350 bar)
Pressure loss	0.02 ... 0.2 bar
Viscosity compensation	up to 600 mm <sup>2</sup> /s
Tolerance	±10 % of full scale value

Versions	Max. ambient temperature	Ingress protection
Instrument connector DIN 43550 form C	120 °C (option 160 °C)	IP 65
1 m cable	120 °C (option 160 °C)	IP 67
Instrument connector M12 x 1	85 °C	IP 65
Ex version (2 m cable)	75 °C	IP 67

Electrical data	Normally open	Change-over contact
Standard	230 V / 3 A / 60 VA	250 V / 1.5 A / 50 VA <sup>1) 2)</sup>
Ex version	250 V / 2 A / 60 VA	250 V / 1 A / 30 VA <sup>1)</sup>

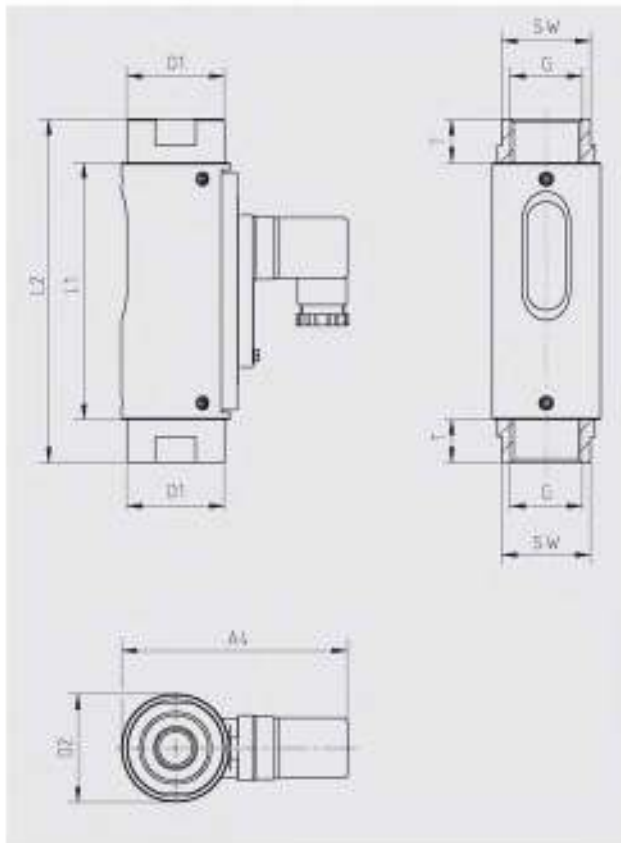
1) Minimum load 3 VA

2) Only with instrument connector

Model	Switching ranges in l/min		Dimensions in mm							Weight in g	
	Oil, density 0.9 kg/m <sup>3</sup>	Air	D1	D2	A4	G	T	L1	L2		SW
FWS-DKM-2/2	0.5 ... 1.6	-	27.5	31	approx. 68	1/4"	10	90	98	24	400
			27.5	31	approx. 68	3/8"	11	90	119	24	450
			31	31	approx. 68	1/2"	14	90	90	27	350
FWS-DKM-2/3	0.8 ... 3	-	31	31	approx. 68	1/2"	14	90	90	27	350
FWS-DKM-2/7	2 ... 7	-	31	31	approx. 68	1/2"	14	90	90	27	350

## Flow monitor, mounting position as required, sight-glass display, for water and similar media, model FWS-RVO/U-1

Option: Explosion-protected version



### Specifications

Main body	Nickel-plated brass or stainless steel 1.4571 Exterior case from anodised aluminium
Mounting position	As required
Display	Sight-glass
Process connections	Female thread G 3/4 ... 1 or 3/4 ... 1 NPT
Max. operating pressure	10 bar
Pressure loss	0.02 ... 0.4 bar
Tolerance	±10 % of full scale value

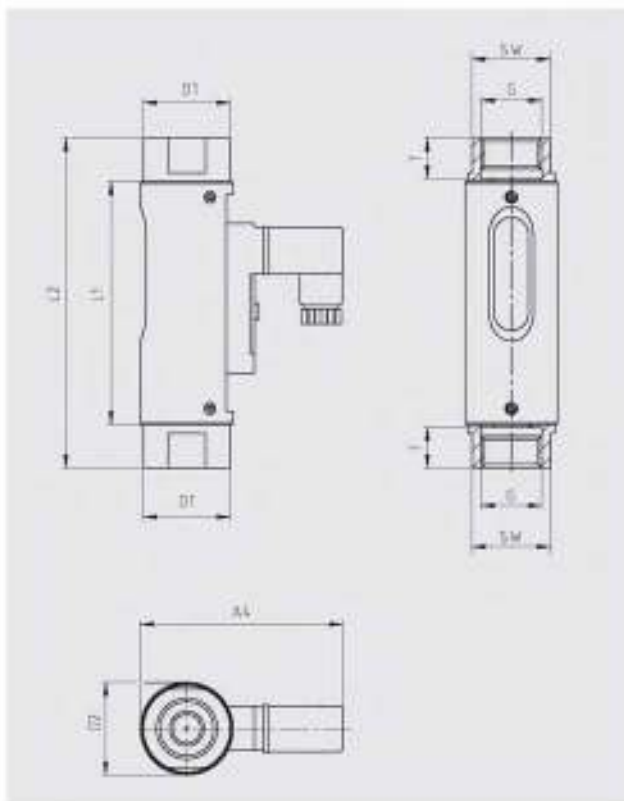
Versions	Max. ambient temperature	Ingress protection
Instrument connector DIN 43650 form A	100 °C [option 160 °C]	IP 65
1 m cable	100 °C [option 160 °C]	IP 67
Instrument connector M12 x 1	85 °C	IP 67
Ex version (2 m cable)	75 °C	IP 67

Electrical data	Normally open	Change-over contact
Standard	250 V / 3 A / 100 VA	250 V / 1.5 A / 50 VA <sup>1)</sup>
Ex version	250 V / 2 A / 80 VA ATEX II 2G Ex mb II T6	250 V / 1 A / 30 VA <sup>1)</sup>

1) Minimum load 3 W.

Model	Switching ranges in l/min		Dimensions in mm					G	T	L1	L2	SW	Weight in g
	H <sub>2</sub> O at 20 °C	Air	D1	D2	A4								
FWS-RVO/U-1/30	8 ... 30	-	45	50	approx. 105	3/4"	15	119	139	41	800		
						1"	17	119	159	41	900		
FWS-RVO/U-1/45	15 ... 45	-	45	50	approx. 105	3/4"	15	119	139	41	800		
						1"	17	119	159	41	900		
FWS-RVO/U-1/90	30 ... 90	-	45	50	approx. 105	3/4"	15	119	139	41	800		
						1"	17	119	159	41	900		
FWS-RVO/U-1/150	60 ... 150	-	45	50	approx. 105	1"	17	119	159	41	900		

**Flow monitor, mounting position as required, sight-glass display, for water and similar media, model FWS-RVO/U-2**



Specifications	
Main body	Nickel-plated brass or stainless steel 1.4571 Exterior case from anodized aluminium
Mounting position	As required
Display	Sight-glass
Process connections	Female thread G 1/2 or 1/2 NPT
Max. operating pressure	16 bar
Pressure loss	0.02 ... 0.3 bar
Tolerance	±10 % of full scale value

Versions	Max. ambient temperature	Ingress protection
Instrument connector DIN 43650 form C	100 °C (option 160 °C)	IP 65
1 m cable	100 °C (option 160 °C)	IP 67
Instrument connector M12 x 1	85 °C	IP 65

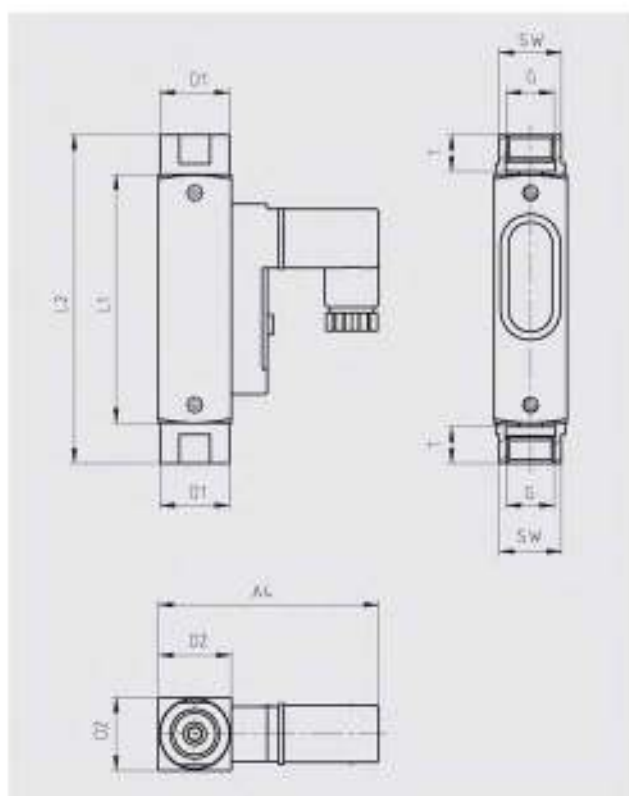
Electrical data	Normally open	Change-over contact
Standard	230 V / 3 A / 60 VA	250 V / 1.5 A / 50 VA <sup>1)2)</sup>

1) Minimum load 3 VA  
2) Only with instrument connector

Model	Switching ranges in l/min		Dimensions in mm								Weight in g	
	H <sub>2</sub> O at 20 °C	Air	D1	D2	A4	G	T	L1	L2	SW		
FWS-RVO/U-2/05	0.2 ... 0.5	-										
FWS-RVO/U-2/1	0.3 ... 1.0	-										
FWS-RVO/U-2/2	0.7 ... 2.0	-										
FWS-RVO/U-2/4	1.6 ... 4	-										
FWS-RVO/U-2/8	3 ... 8	-	30	32	approx. 69	1/2"	14	84	114	27	300	
FWS-RVO/U-2/15	6 ... 15	-										
FWS-RVO/U-2/20	6 ... 20	-										
FWS-RVO/U-2/28	12 ... 28	-										



**Flow monitor, mounting position as required, sight-glass display, for water and similar media, model FWS-RVO/U-4**



Specifications	
Main body	Nickel-plated brass or stainless steel 1.4571 Exterior case from anodised aluminium
Mounting position	As required
Display	Sight-glass
Process connections	Female thread G 1/2 or 1/2 NPT
Max. operating pressure	16 bar
Pressure loss	0.02 ... 0.2 bar
Tolerance	±10 % of full scale value

Versions	Max. ambient temperature	Ingress protection
Instrument connector DIN 43650 form C	100 °C (option 160 °C)	IP 65
1 m cable	100 °C (option 160 °C)	IP 67
Instrument connector M12 x 1	85 °C	IP 65

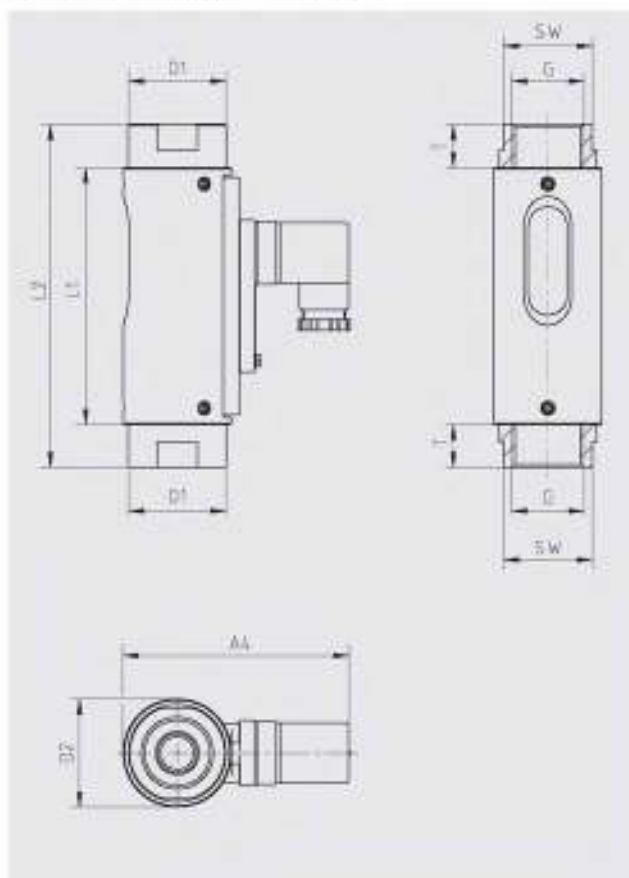
Electrical data	Normally open	Change-over contact
Standard	200 V / 1 A / 20 VA	200 V / 1 A / 20 VA <sup>1)</sup>

1) Only with instrument connector.

Model	Switching ranges in l/min		Dimensions in mm							Weight in g	
	H <sub>2</sub> O at 20 °C	Air	D1	D2	A4	G	T	L1	L2		SW
FWS-RVO/U-4/01	0.005 ... 0.05	-									
FWS-RVO/U-4/02	0.025 ... 0.13	-									
FWS-RVO/U-4/06	0.1 ... 0.6	-									
FWS-RVO/U-4/1	0.2 ... 1.2	-	19	20	approx. 60	1/2"	10	68	90	17	140
FWS-RVO/U-4/2	0.4 ... 2	-									
FWS-RVO/U-4/3	0.5 ... 3	-									
FWS-RVO/U-4/5	1 ... 5	-									

## Flow monitor, mounting position as required, sight-glass display, for gaseous media, model FWS-RVO/U-L1

Option: Explosion-protected version



### Specifications

Main body	Nickel-plated brass or stainless steel 1.4571 Exterior case from anodized aluminium
Mounting position	As required
Display	Sight-glass
Process connections	Female thread G 3/4 ... 1 or 3/4 ... 1 NPT
Max. operating pressure	10 bar
Pressure loss	0.02 ... 0.4 bar
Tolerance	±10 % of full scale value

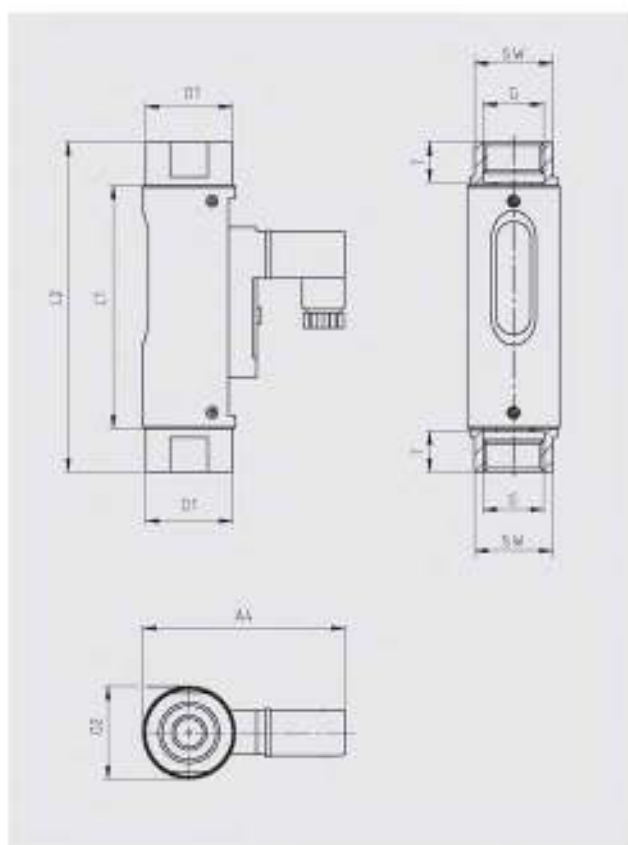
Versions	Max. ambient temperature	Ingress protection
Instrument connector DIN 43650 form A	100 °C (option 160 °C)	IP 65
1 m cable	100 °C (option 160 °C)	IP 67
Instrument connector M12 x 1	85 °C	IP 67
Ex version (2 m cable)	75 °C	IP 67

Electrical data	Normally open	Change-over contact
Standard	250 V / 3 A / 100 VA	250 V / 1.5 A / 50 VA <sup>1)</sup>
Ex version	250 V / 2 A / 60 VA ATEX II 2G Ex mb II T6	250 V / 1 A / 30 VA <sup>1)</sup>

1) Minimum load 3 VA

Model	Switching ranges in l/min		Dimensions in mm								Weight in g
	H <sub>2</sub> O	Air at 1 bar abs. and 20 °C	D1	D2	A4	G	T	L1	L2	SW	
FWS-RVO/U-L10080	-	22.5 ... 80	45	50	approx. 105	3/4"	15	119	139	41	800
						1"	17	119	159	41	900
FWS-RVO/U-L10130	+	50 ... 130	45	50	approx. 105	3/4"	15	119	139	41	800
						1"	17	119	159	41	900
FWS-RVO/U-L10420	-	130 ... 420	45	50	approx. 105	3/4"	15	119	139	41	800
						1"	17	119	159	41	900
FWS-RVO/U-L10625	-	200 ... 625	45	50	approx. 105	3/4"	15	119	139	41	800
						1"	17	119	159	41	900

**Flow monitor, mounting position as required, sight-glass display, for gaseous media, model FWS-RVO/U-L2**



Specifications	
Main body	Nickel-plated brass or stainless steel 1.4571 Exterior case from anodised aluminium
Mounting position	As required
Display	Sight-glass
Process connections	Female thread G 1/2 or 1/2 NPT
Max. operating pressure	16 bar
Pressure loss	0.02 ... 0.3 bar
Tolerance	±10 % of full scale value

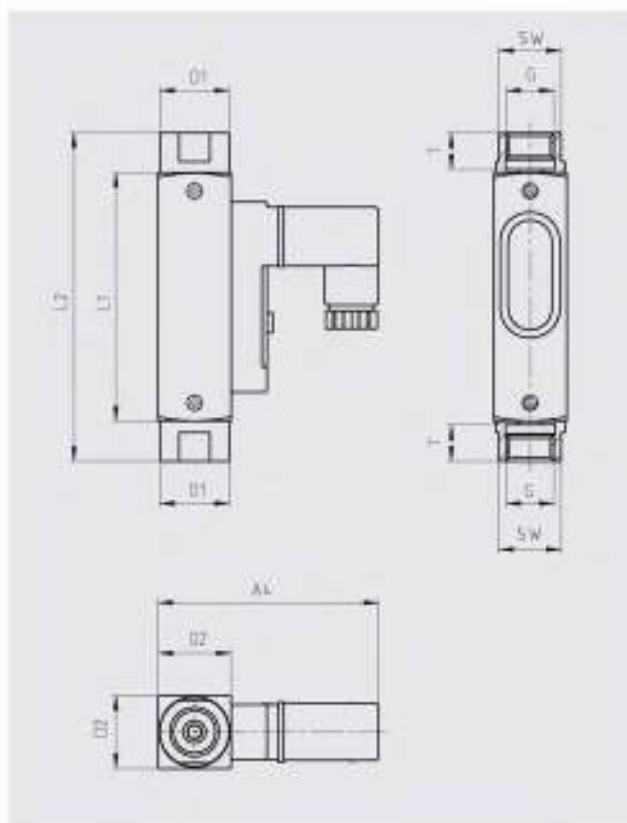
Versions	Max. ambient temperature	Ingress protection
Instrument connector DIN 43650 form C	100 °C (option 160 °C)	IP 65
1 m cable	100 °C (option 160 °C)	IP 67
Instrument connector M12 x 1	85 °C	IP 65

Electrical data	Normally open	Change-over contact
Standard	230 V / 3 A / 60 VA	250 V / 1.5 A / 50 VA <sup>1)2)</sup>

- 1) Minimum load 3 VA  
2) Only with instrument connector

Model	Switching ranges in l/min		Dimensions in mm							Weight in g	
	H <sub>2</sub> O	Air at 1 bar abs. and 20 °C	D1	D2	A4	G	T	L1	L2		SW
FWS-RVO/U-L20012	-	3 ... 12									
FWS-RVO/U-L20030	-	7 ... 30									
FWS-RVO/U-L20040	-	12 ... 40									
FWS-RVO/U-L20125	-	28 ... 125	30	32	approx. 70	1/2"	14	84	114	27	300
FWS-RVO/U-L20200	-	50 ... 200									
FWS-RVO/U-L2/15L	-	100 ... 420									
FWS-RVO/U-L2/20L	-	120 ... 480									

**Flow monitor, mounting position as required, sight-glass display, for gaseous media, model FWS-RVO/U-L4**



Specifications	
Main body	Nickel-plated brass or stainless steel 1.4571 Exterior case from anodized aluminium
Mounting position	As required
Display	Sight-glass
Process connections	Female thread G 1/4 or 1/4 NPT
Max. operating pressure	16 bar
Pressure loss	0.02 ... 0.2 bar
Tolerance	±10 % of full scale value

Versions	Max. ambient temperature	Ingress protection
Instrument connector DIN 43650 form C	100 °C (option 160 °C)	IP 65
1 m cable	100 °C (option 160 °C)	IP 67
Instrument connector M12 x 1	85 °C	IP 65

Electrical data	Normally open	Change-over contact
Standard	200 V / 1 A / 20 VA	200 V / 1 A / 20 VA <sup>1)</sup>

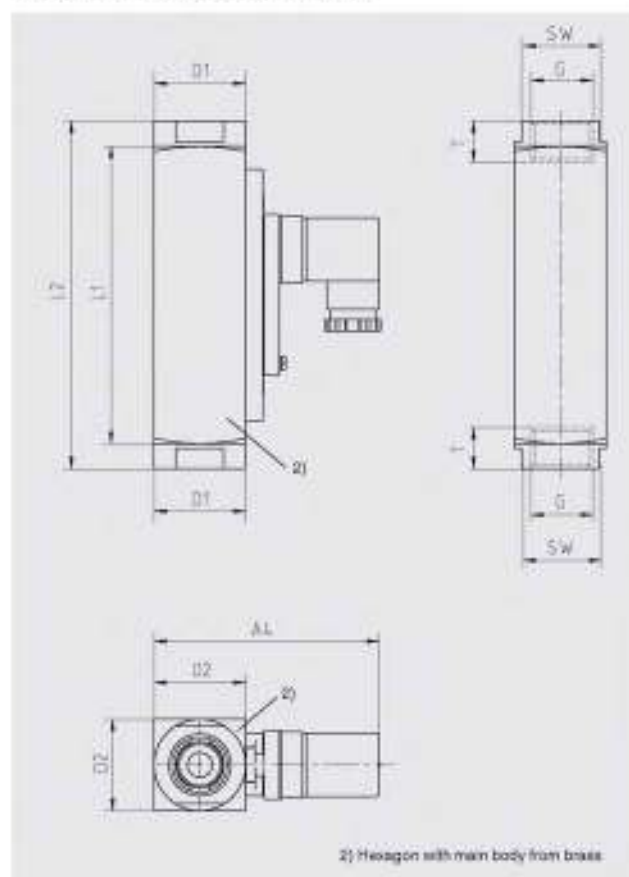
<sup>1)</sup> Only with instrument connector

Model	Switching ranges in l/min		Dimensions in mm								Weight in g
	H <sub>2</sub> O	Air at 1 bar abs. and 20 °C	D1	D2	A4	G	T	L1	L2	SW	
FWS-RVO/U-L40001	-	0.2 ... 1.3									
FWS-RVO/U-L40002	-	0.5 ... 2									
FWS-RVO/U-L40003	-	0.8 ... 3									
FWS-RVO/U-L40005	-	1.5 ... 5									
FWS-RVO/U-L40008	-	2 ... 6									
FWS-RVO/U-L40012	-	3 ... 12	19	20	approx. 60	1/4"	10	68	90	17	140
FWS-RVO/U-L40014	-	3.5 ... 14									
FWS-RVO/U-L40020	-	5.5 ... 20									
FWS-RVO/U-L40024	-	7 ... 24									
FWS-RVO/U-L40035	-	10 ... 35									
FWS-RVO/U-L40042	-	10 ... 42									



## Flow monitor, mounting position as required, without display, for water and similar media, model FWS-RVM/U-1

Option: Explosion-protected version



Specifications	
Main body	Nickel-plated brass or stainless steel 1.4571
Mounting position	As required
Display	Without
Process connections	Female thread G 3/4 ... 1 or 3/4 ... 1 NPT
Max. operating pressure	250 bar (stainless steel version 300 bar)
Pressure loss	0.02 ... 0.4 bar
Tolerance	±10 % of full scale value

Versions	Max. ambient temperature	Ingress protection
Instrument connector: DIN 43650 form A	100 °C (option 160 °C)	IP 65
1 m cable	100 °C (option 160 °C)	IP 67
Instrument connector: M12 x 1	85 °C	IP 67
Ex version (2 m cable)	75 °C	IP 67

Electrical data	Normally open	Change-over contact
Standard	250 V / 3 A / 100 VA	250 V / 1.5 A / 50 VA <sup>1)</sup>
Ex version	250 V / 2 A / 60 VA ATEX II 2G Ex mb II T6	250 V / 1 A / 30 VA <sup>1)</sup>

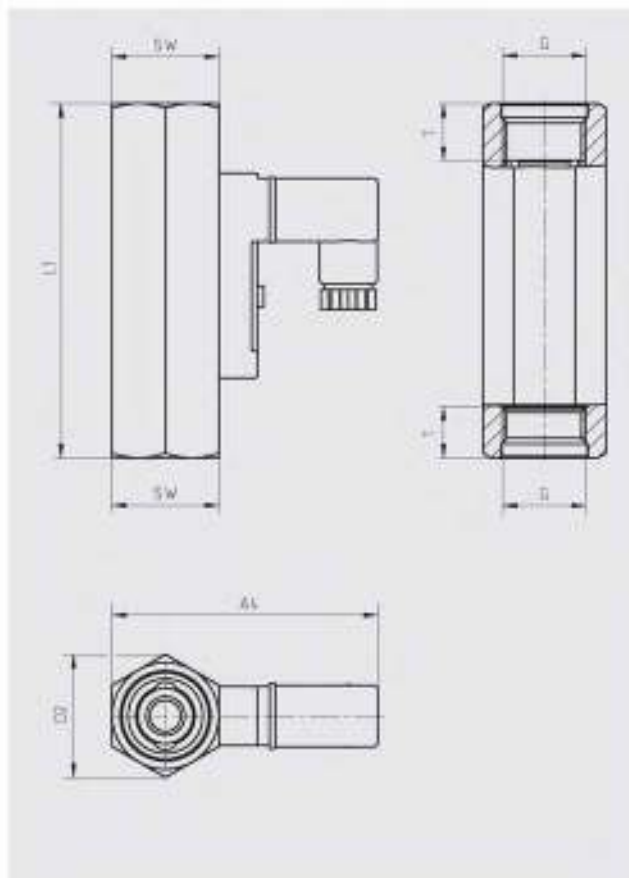
<sup>1)</sup> Minimum load 3 VA

Model	Switching ranges in l/min		Dimensions in mm								Weight in g
	H <sub>2</sub> O at 20 °C	Air	D1	D2	A4	G	T	L1	L2	SW	
FWS-RVM/U-1/30	10 ... 30	-	40	40 <sup>2)</sup>	approx. 98	3/4"	15	130	152	34	1,200
						1"	17	130	130	41	1,050
FWS-RVM/U-1/45	15 ... 45	-	40	40 <sup>2)</sup>	approx. 98	3/4"	15	130	152	34	1,200
						1"	17	130	130	41	1,050
FWS-RVM/U-1/60	20 ... 60	-	40	40 <sup>2)</sup>	approx. 98	3/4"	15	130	152	34	1,200
						1"	17	130	130	41	1,050
FWS-RVM/U-1/90	30 ... 90	-	40	40 <sup>2)</sup>	approx. 98	3/4"	15	130	152	34	1,200
						1"	17	130	130	41	1,050
FWS-RVO/U-1/150	60 ... 150	-	40	40 <sup>2)</sup>	approx. 98	1"	17	130	152	41	1,050

<sup>2)</sup> With main body from brass, hexagon: 47.3 mm

## Flow monitor, mounting position as required, without display, for water and similar media, model FWS-RVM/U-2

Option: Explosion-protected version



### Specifications

Main body	Nickel-plated brass or stainless steel 1.4571
Mounting position	As required
Display	Without
Process connections	Female thread G 1/2 or 1/2 NPT
Max. operating pressure	250 bar (stainless steel version 300 bar)
Pressure loss	0.02 ... 0.3 bar
Tolerance	±10 % of full scale value

Versions	Max. ambient temperature	Ingress protection
Instrument connector DIN 43650 form C	100 °C (option 160 °C)	IP 65
1 m cable	100 °C (option 160 °C)	IP 67
Instrument connector M12 x 1	85 °C	IP 65
Ex version (2 m cable)	75 °C	IP 67

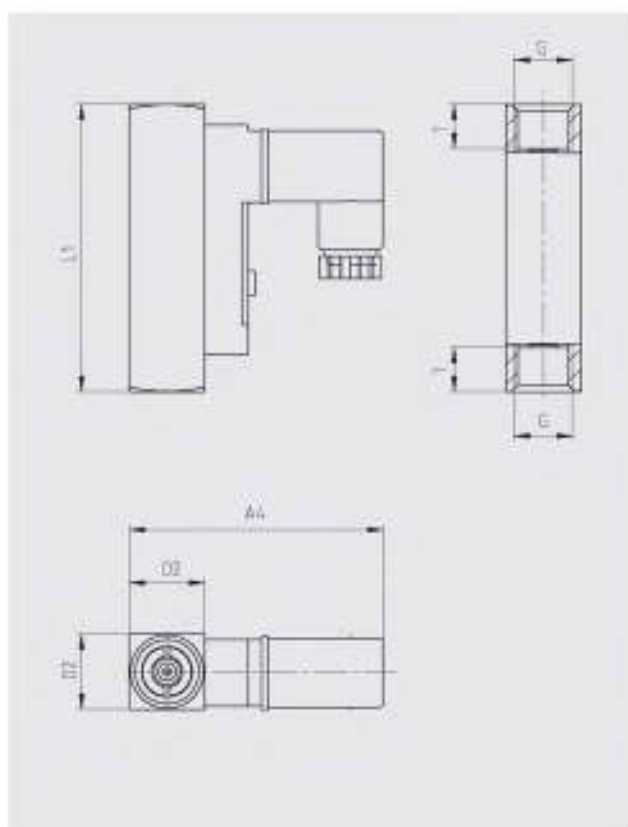
Electrical data	Normally open	Change-over contact
Standard	230 V / 3 A / 60 VA	250 V / 1.5 A / 50 VA <sup>1)2)</sup>
Ex version	250 V / 2 A / 60 VA	250 V / 1 A / 30 VA <sup>1)</sup>

1) Minimum load 3 VA

2) Only with instrument connector

Model	Switching ranges in l/min		Dimensions in mm						Weight in g
	H <sub>2</sub> O at 20 °C	Air	D2	A4	G	T	L1	SW	
FWS-RVM/U-2/02	0.02 ... 0.2	-	32	approx. 67	1/2"	14	90	27	350
FWS-RVM/U-2/06	0.2 ... 0.6	-							
FWS-RVM/U-2/1	0.4 ... 1.6	-							
FWS-RVM/U-2/3	0.8 ... 3.2	-							
FWS-RVM/U-2/7	2 ... 7	-							
FWS-RVM/U-2/13	3 ... 13	-							
FWS-RVM/U-2/20	4 ... 20	-							
FWS-RVM/U-2/30	8 ... 30	-							

**Flow monitor, mounting position as required, without display, for water and similar media, model FWS-RVM/U-4**



Specifications	
Main body	Nickel-plated brass or stainless steel 1.4571
Mounting position	As required
Display	Without
Process connections	Female thread G 1/4 or 1/4 NPT
Max. operating pressure	300 bar (stainless steel version 350 bar)
Pressure loss	0.02 ... 0.2 bar
Tolerance	±10 % of full scale value

Versions	Max. ambient temperature	Ingress protection
Instrument connector DIN 43650 form C	100 °C (option 160 °C)	IP 65
1 m cable	100 °C (option 160 °C)	IP 67
Instrument connector M12 x 1	85 °C	IP 65

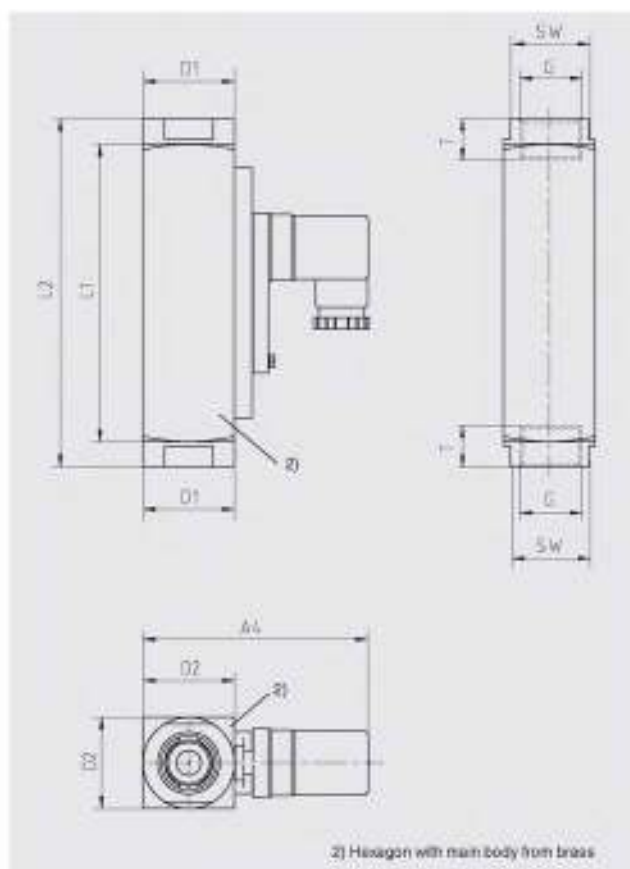
Electrical data	Normally open	Change-over contact
Standard	200 V / 1 A / 20 VA	200 V / 1 A / 20 VA <sup>1)</sup>

1) Only with instrument connector.

Model	Switching ranges in l/min		Dimensions in mm						Weight in g
	H <sub>2</sub> O at 20 °C	Air	D2	A4	G	T	L1	SW	
FWS-RVM/U-4/01	0.005 ... 0.05	-							
FWS-RVM/U-4/02	0.04 ... 0.13	-							
FWS-RVM/U-4/06	0.1 ... 0.6	-							
FWS-RVM/U-4/1	0.2 ... 1.2	-	17	approx. 57	14 <sup>*</sup>	10	65	17	140
FWS-RVM/U-4/2	0.4 ... 2	-							
FWS-RVM/U-4/3	0.5 ... 3	-							
FWS-RVM/U-4/5	1 ... 5	-							

## Flow monitor, mounting position as required, without display, for gaseous media, model FWS-RVM/U-L1

Option: Explosion-protected version



2) Hexagon with main body from brass

### Specifications

Main body	Nickel-plated brass or stainless steel 1.4571
Mounting position	As required
Display	Without
Process connections	Female thread G 3/4 ... 1 or 3/4 ... 1 NPT
Max. operating pressure	250 bar (stainless steel version 300 bar)
Pressure loss	0.02 ... 0.4 bar
Tolerance	±10 % of full scale value

Version	Max. ambient temperature	Ingress protection
Instrument connector DIN 43550 form A	100 °C (option 160 °C)	IP 65
1 m cable	100 °C (option 160 °C)	IP 67
Instrument connector M12 x 1	85 °C	IP 67
Ex version (2 m cable)	75 °C	IP 67

Electrical data	Normally open	Change-over contact
Standard	250 V / 3 A / 100 VA	250 V / 1.5 A / 50 VA <sup>1)</sup>
Ex version	250 V / 2 A / 60 VA ATEX II 2G Ex mb II T6	250 V / 1 A / 30 VA <sup>1)</sup>

1) Minimum load 3 VA

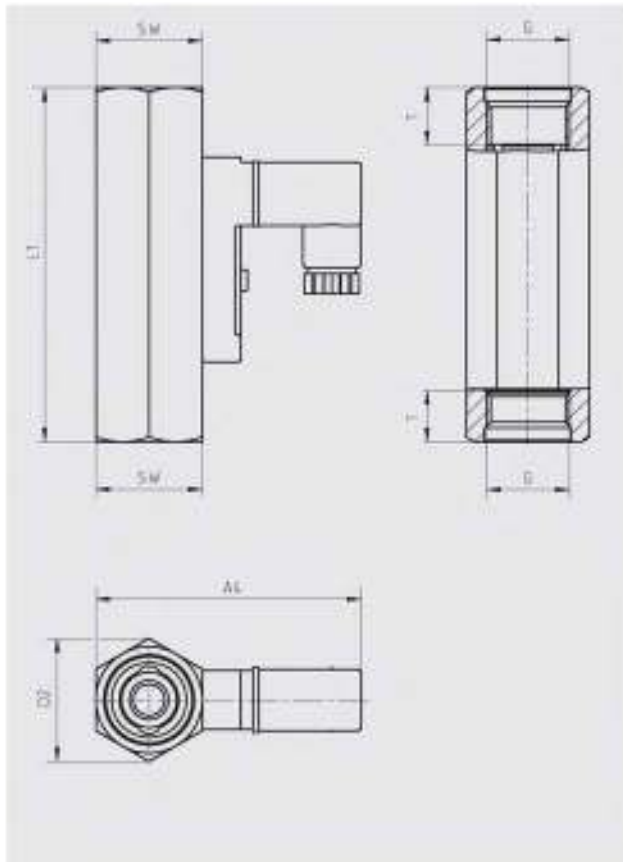
Model	Switching ranges in l/min		Dimensions in mm							Weight in g	
	H <sub>2</sub> O	Air at 1 bar abs. and 20 °C	D1	D2	A4	G	T	L1	L2		SW
FWS-RVM/U-L10180	-	60 ... 180	40	40 <sup>2)</sup>	approx. 98	3/4 <sup>1)</sup>	15	130	152	34	1,200
						1 <sup>*</sup>	17	130	130	41	1,050
FWS-RVM/U-L10180	-	100 ... 300	40	40 <sup>2)</sup>	approx. 98	3/4 <sup>1)</sup>	15	130	152	34	1,200
						1 <sup>*</sup>	17	130	130	41	1,050
FWS-RVM/U-L10650	-	200 ... 650	40	40 <sup>2)</sup>	approx. 98	3/4 <sup>1)</sup>	15	130	152	34	1,200
						1 <sup>*</sup>	17	130	130	41	1,050

3) With main body from brass, hexagon: 47.3 mm



## Flow monitor, mounting position as required, without display, for gaseous media, model FWS-RVM/U-L2

Option: Explosion-protected version



### Specifications

Main body	Nickel-plated brass or stainless steel 1.4571
Mounting position	As required
Display	Without
Process connections	Female thread G 1/2 or 1/2 NPT
Max. operating pressure	300 bar (stainless steel version 350 bar)
Pressure loss	0.02 ... 0.3 bar
Tolerance	±10 % of full scale value

Versions	Max. ambient temperature	Ingress protection
Instrument connector: DIN 43650 form C	120 °C (option 160 °C)	IP 65
1 m cable	120 °C (option 160 °C)	IP 67
Instrument connector: M12 x 1	85 °C	IP 65
Ex version (2 m cable)	75 °C	IP 67

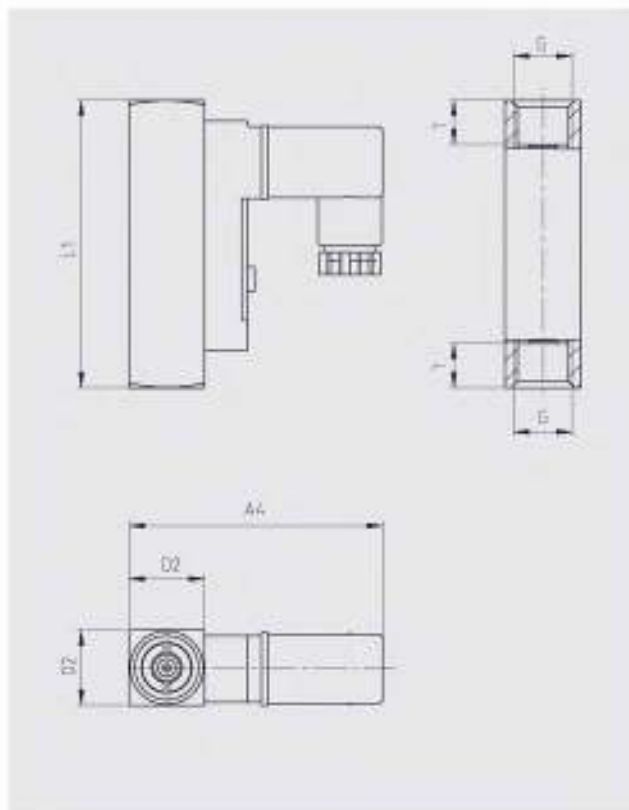
Electrical data	Normally open	Change-over contact
Standard	230 V / 3 A / 80 VA	250 V / 1.5 A / 50 VA 1) 2)
Ex version	250 V / 2 A / 80 VA ATEX II 2G Ex mb II T6	250 V / 1 A / 30 VA 1)

1) Minimum load 3 W

2) Only with instrument connector

Model	Switching ranges in l/min		Dimensions in mm						Weight in g
	H <sub>2</sub> O	Air at 1 bar abs. and 20 °C	D2	A4	G	T	L1	SW	
FWS-RVM/U-L20010	-	2.5 ... 10							
FWS-RVM/U-L20020	-	5.5 ... 20							
FWS-RVM/U-L20030	-	8 ... 30							
FWS-RVM/U-L20035	-	10 ... 35							
FWS-RVM/U-L2/3L	-	24 ... 90	32	approx. 67	1/2"	14	90	27	350
FWS-RVM/U-L20220	-	55 ... 220							
FWS-RVM/U-L20240	-	65 ... 240							
FWS-RVM/U-L20300	-	80 ... 300							
FWS-RVM/U-L20525	-	140 ... 525							

**Flow monitor, mounting position as required, without display, for gaseous media, model FWS-RVM/U-L4**



Specifications	
Main body	Nickel-plated brass or stainless steel 1.4571
Mounting position	As required
Display	Without
Process connections	Female thread G 1/4 or 1/4 NPT
Max. operating pressure	300 bar (stainless steel version 350 bar)
Pressure loss	0.02 ... 0.2 bar
Tolerance	±10 % of full scale value

Versions	Max. ambient temperature	Ingress protection
Instrument connector DIN 43650 form C	120 °C (option 160 °C)	IP 65
1 m cable	120 °C (option 160 °C)	IP 67
Instrument connector M12 x 1	85 °C	IP 65

Electrical data	Normally open	Change-over contact
Standard	200 V / 1 A / 20 VA	200 V / 1 A / 20 VA <sup>1)</sup>

1) Only with instrument connector

Model	Switching ranges in l/min		Dimensions in mm						Weight in g
	H <sub>2</sub> O	Air at 1 bar abs. and 20 °C	D2	A4	G	T	L1	SW	
FWS-RVM/U-L40002	-	0.6 ... 2.2							
FWS-RVM/U-L40006	-	1.7 ... 6							
FWS-RVM/U-L40008	-	2.5 ... 8							
FWS-RVM/U-L40012	-	3 ... 12							
FWS-RVM/U-L4/06L	-	3 ... 22	17	approx. 57	1/4"	10	65	17	140
FWS-RVM/U-L40024	-	7 ... 24							
FWS-RVM/U-L40034	-	12 ... 34							
FWS-RVM/U-L4/2L	-	16 ... 56							
FWS-RVM/U-L4/3L	-	20 ... 80							

## Contact protection measures

The reed contacts should be protected against any voltage or current spikes that might occur.

Depending on the different load types different protective circuits are used.

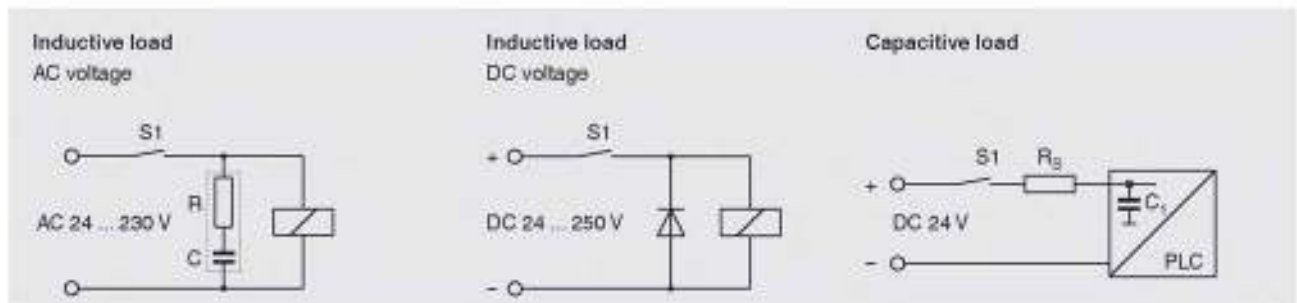


Model KR 24

RC module

Contact protection relays	Contacts	Input	Power supply	Approval number	Order no.
KR 24	1 x change-over AC 250 V, 2 A	2 x contacts	DC 20 ... 30 V		112941
KR 24-EX	2 x change-over AC 253 V, 2 A	2 x contacts	DC 20 ... 30 V	II 1 GD EEx ia IIC, PTB 02 ATEX 2073	112944
KR 230	1 x change-over AC 250 V, 2 A	2 x contacts	AC 230 V		112942
KR 230-EX	2 x change-over AC 253 V, 2 A	2 x contacts	AC 230 V	II 1 GD EEx ia IIC, PTB 02 ATEX 2073	112943

RC module	Capacitance	Resistance	Voltage	Order no.
B3/115	0.33 $\mu$ F	470 Ohm	AC 115 V	110448
B3/230	0.33 $\mu$ F	1,000 Ohm	AC 230 V	110460



**Ordering information**

To order the described product the order number (if available) is sufficient.

Alternatively:

Model / Medium / Process specifications (operating temperature and pressure) / Mounting position / Display / Switching range / Material / Thread size / Switch contact / Options (approvals)



# Manufacturing facilities - headquarter in Zwingenberg, Germany

Administration & Hall 1



Hall 2





# KSR - all over the world



## Further manufacturing facilities

<b>France</b>  KUBLER France SA	<b>China</b>  Shanghai KSR Kuebler Automation Instrument Co. Ltd.	<b>UK</b>  TC Fluid Control	<b>USA</b>  WIKA Instrument - Houston Facility
<b>India</b>  WIKA Instruments India Pvt. Ltd.	<b>Canada</b>  WIKA Instruments Ltd - Canada Headquarters	<b>Brazil</b>  WIKA DO BRASIL	<b>South Africa</b>  WIKA Instruments (Pty) Ltd.

## Bypass level indicator on low-pressure pre-heater or feedwater tank



In a communicating bypass chamber mounted to the side of a vessel a float moves with the level of the medium to be measured. The magnetic field of the radially symmetric magnetic system positioned in the float at submersion height activates the magnetic roller indicator attached to the outside of the bypass chamber as well as the switching and measuring elements.

This proven measurement system can be combined with further independent measurement principles such as a guided-wave radar system, a reed measurement chain or a limit switch. Thus for independent measurements, only two process connections are required, a full redundancy in the measurement is possible and a visual level measurement is permanently available.



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