

**CAPACITIVE LEVEL  
MEASURING SYSTEMS**

**RECHNER  
SENSORS**





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#### **Edition January 2020**

With publication of this catalogue all former printed catalogues about RECHNER capacitive filling level systems are invalid.

All specifications are subject to change without notice. (14.01.2020)

## CAPACITIVE FILLING LEVEL MEASURING SYSTEM



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## TECHNOLOGY

Capacitive level measurement has proven itself as one of the most universal level measurement principles. The reason for this is the possibility of the measurement of almost all products, no matter if liquids, bulk materials or pastes.

In these days, increasingly the floating switches, rotating switches and vibrating forks are replaced by more reliable capacitive sensors and capacitive level measuring systems. The electronic systems operate without mechanical activation thus they are not subject to contact bounce. There is no maintenance and the service life is independent of the switching frequency.

For capacitive level measuring systems we distinguish different measuring principles. The classic capacitive sensors are based on the 2 - electrode measuring principle. The measurement systems in this catalogue all operate according to RECHNER's patented three-electrode-principle.

### The Three Electrode Measuring Principle

The core technology of our capacitive Triple-E Systems is based on innovative and patented capacitive circuit principles at which the capacity between the sensor electrode and a counter electrode „BE“ outside of the sensor is evaluated.

For a correct function and utilization of the capacity of the sensor system it is mandatory that the „BE“ evaluation electronic is connected to the container earth (PE) in close proximity of the measuring place.

This essential „BE“-connection is advantageous for the measurement and easy to establish because all metal parts of a process plant (e. g. container wall, or an additional copper foil) can be used as counter electrode.



### Based on the evaluation principle we distinguish 3 variants:

**TRUE L&VEL®**  
FOR ANALOGUE MEASUREMENTS

**PER L&VEL®**  
FOR LIMIT VALUE MEASUREMENTS

**i-L&VEL\***  
FOR ANALOGUE AND  
BINARY MEASUREMENTS

### Process connections:

The application areas are manifold and wide spread and so are the possibilities of how our capacitive sensors can be designed mechanically so that they can be optimally integrated in to your process. We offer for instance:

- Thread M12, M18, M30, G1/4", G1/2" G1", as well as NPT thread
- Triclamp, Milk tube fittings,
- Stainless steel process adapter
- Squeeze clamps

## NORMS

The products of Rechner Industrie-Elektronik GmbH are designed and checked in accordance with the latest standards and specifications, DIN - VDE - IEC, for electric and electronic instruments. For new and revised products the newest standards are always used.

### **CE** - Marking

The CE marking represents the manufacturer's confirmation that the identified product conforms to applicable standards and directives throughout Europe. The following regulations apply to the RECHNER products.

*2014/30/EU*

EMC Directive (EN 60 947-5-2)

*2014/35/EU*

Low-voltage Directive (compare with VDE 0160, product standard EN 60947-5-2)

RECHNER Industrie-Elektronik GmbH certifies the conformity of its products with each of the applicable directives in a Manufacturer's Declaration.

## TECHNICAL INFORMATION

### Housing materials

The application of the housing materials used is based on the technical specifications of the material and of the manufacturer. Even though RECHNER Sensors have far-reaching application experience concerning the use of different housing materials, the customer is responsible for checking in each case that the housing material is suitable for the application.

The following housing materials are used:

The following housing materials are used:				
Short description	Material	FDA - No.	Contact with food permitted	Traceability according to EU 1935/2004
ABS	Acrylnitril-Butadien-Styrole	No	No	No
GFK	Glass fibre reinforced plastic	No	No	No
PEEK	Polyetheretherketonee	FDA 21 CFR 177.2415	Yes	Yes
PP	Polypropylene	FDA 21 CFR 177.1520	Yes	No
PTFE	Polytetrafluoroethylenee	FDA 21 CFR 177.1550	Yes	Yes
PVC	Polyvinylchloridee	No	No	No
PVDF	Polyvinylidene fluoridee	FDA 21 CFR 177.2510	Yes	No
AL	Aluminum	No	No	No
MS	Brass / chrome or nickel plated	No	No	No
VAa	Stainless steel VA, material No. 1.4301 (AISI 304)	No	No	No
VAb	Stainless steel VA, material No. 1.4305 (AISI 303)	No	No	No
VAc	Stainless steel VA, material No. 1.4404 (AISI 316L)	FDA konform	Yes	No

### Cable

For the standard models COAX-, TRIAX-, PVC- or PUR-cable are used. One has to take into consideration that the cable should not be moved with ambient temperatures below  $-5^{\circ}\text{C}$ . PVC is not suitable for use in applications with oil-based liquids or with UV-radiation. PUR is not suitable for continuous contact with water. For special application areas silicone or PTFE cables are available. COAX- and TRIAX-Cable are not designed for continuous movement/flexible use. When routing please consider the bending radius of minimum  $10 \times \varnothing$ .

## TECHNICAL INFORMATION

### Degree of protection according to IEC 60529

	1. Digit: Protection against solids		2. Digit: Protection against water	
IP	0	No protection	0	No protection against water
IP	1	Protection against solid foreign bodies $\varnothing > 50$ mm	1	Protection against vertical water drops
IP	2	Protection against solid foreign bodies $\varnothing > 12,5$ mm	2	Protection against diagonal water drops (up to a 15° angle)
IP	3	Protection against solid foreign bodies $\varnothing > 2,5$ mm	3	Protection against spray water
IP	4	Protection against solid foreign bodies $\varnothing > 1$ mm	4	Protection against splashing water
IP	5	Protection against harmful dust deposits, dust protected	5	Protection against water jet
IP	6	Protection against contact with voltage-carrying parts. Protection against penetration of dust	6	Protection against strong water jet
			7	Protection against ingress of water when the equipment is immersed in water, up to 1 m depths and for a period of 30 minutes
			8	Protection against ingress of water when the equipment is immersed in water, under conditions determined from the manufacturer.
			9	Protection against ingress of water during high pressure or steam cleaning under defined conditions

### Temperature sensors

Optional additional temperature measuring sensors can be integrated in the probe (PT 100, variants of thermo elements on request).

All specifications are subject to change without notice. (14.01.2020)

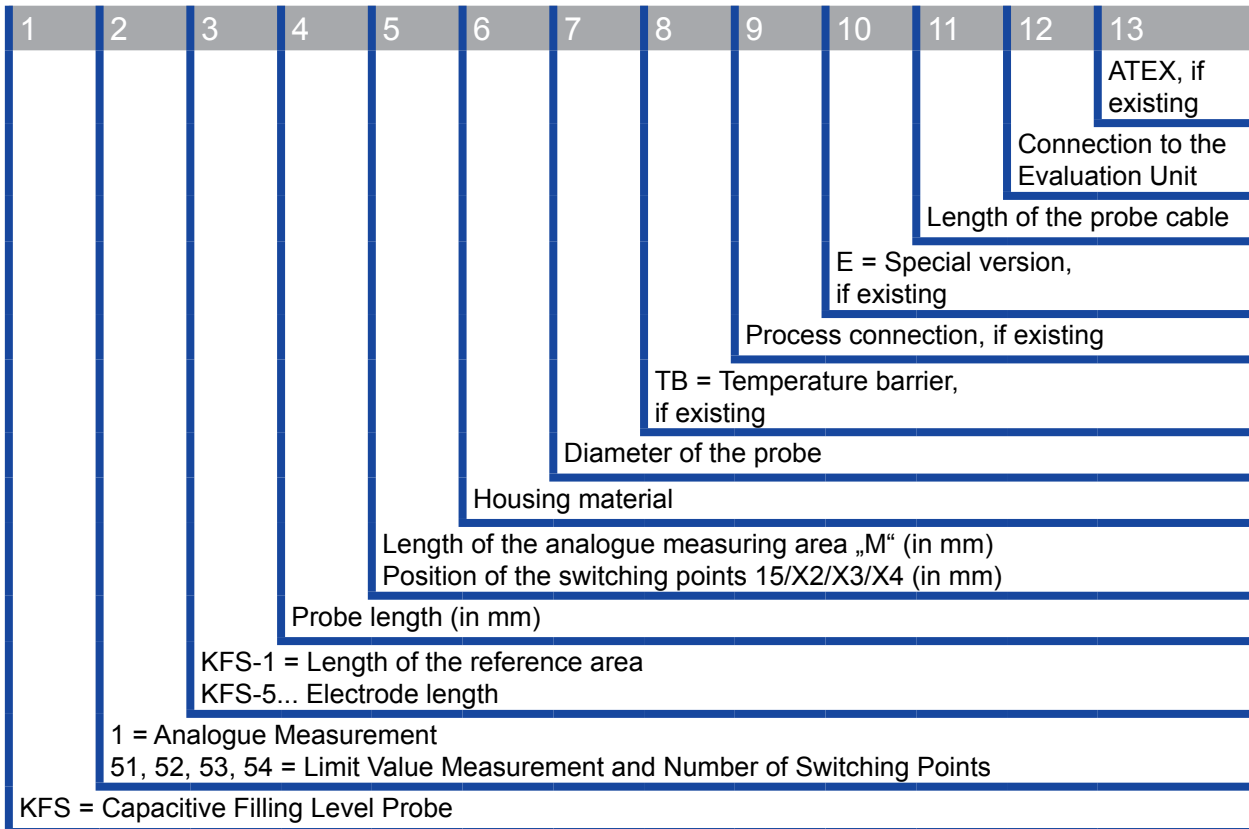
## TYPE CODE PROBE

Example: Capacitive level probe for analogue measurement

**KFS - 1 - 85 - 1500 - 1200 - GFK/VA - D16 - TB80 - G1 - E - X02 - Y75**

Example: Capacitive level probe for limit value measurement

**KFS - 54 - 15 - 1500 - 15/500/1000/1200 - GFK/VA - D16 - TB80 - G1 - E - X02 - Y75**



### Position 2

Value	Measuring principle
1	Analogue
51	1 Switching Point
52	2 Switching Points
53	3 Switching Points
54	4 Switching Points
55	5 Switching Points

### Position 3

	Analogue	Application recommendation
KFS-1	40	For materials with very high dielectric constant (DC) and/or small body sizes
	50	For materials with high DC
	60	For materials with high DC
	85	Version for universal use, for materials with low DC and/or low density
	Electrode length	
KFS-5	5	For adhesive products, like glue or pastes
	15	Version for universal use
	30	For materials with low DC or materials with low density

All specifications are subject to change without notice. (14.01.2020)



## TYPE CODE PROBE

### Position 4

Value	Probe length
Material	Max. length
GFK	2000 mm
PTFE	2000 mm
PEEK	400 mm
PVDF	2000 mm
PVC	2000 mm

### Position 5

Length of the measuring area or position of the switching points (depends on the model).

### Position 6 housing material

Material	Probe	Housing / Process connection
GFK	Fiberglass reinforced plastic	Fiberglass reinforced plastic
GFK/VAa	Fiberglass reinforced plastic	Stainless steel No. 1.4301 (AISI 304)
GFK/VAb	Fiberglass reinforced plastic	Stainless steel No. 1.4305 (AISI 303)
GFK/VAc	Fiberglass reinforced plastic	Stainless steel No. 1.4404 (AISI 316L)
GFK/AL	Fiberglass reinforced plastic	Aluminum
PE	Polyethylene	Polyethylene
PEEK	Polyetheretherketone FDA 21 CFR 177.2415	Polyetheretherketone
PEEK/Ms	Polyetheretherketone FDA 21 CFR 177.2415	Brass nickel
PEEK/VAa	Polyetheretherketone FDA 21 CFR 177.2415	Stainless steel No. 1.4301 (AISI 304)
PEEK/VAb	Polyetheretherketone FDA 21 CFR 177.2415	Stainless steel No. 1.4305 (AISI 303)
PEEK/VAc	Polyetheretherketone FDA 21 CFR 177.2415	Stainless steel No. 1.4404 (AISI 316L)
POM	Polyoxymethylene	Polyoxymethylene
PTFE	Polytetrafluoroethylene FDA 21 CFR 177.1550	Polytetrafluoroethylene
PTFE/AL	Polytetrafluoroethylene FDA 21 CFR 177.1550	Aluminum
PTFE/VAa	Polytetrafluoroethylene FDA 21 CFR 177.1550	Stainless steel No. 1.4301 (AISI 304)
PTFE/VAb	Polytetrafluoroethylene FDA 21 CFR 177.1550	Stainless steel No. 1.4305 (AISI 303)
PTFE/VAc	Polytetrafluoroethylene FDA 21 CFR 177.1550	Stainless steel No. 1.4404 (AISI 316L)
PTFE/MS	Polytetrafluoroethylene FDA 21 CFR 177.1550	Brass nickel
PVC	Polyvinylchloride	Polyvinylchloride
PVDF	Polyvinylidene fluoride	Polyvinylidene fluoride
PVDF/AL	Polyvinylidene fluoride	Aluminum
PVDF/VAb	Polyvinylidene fluoride	Stainless steel No. 1.4305 (AISI 303)
PFA	Perfluoralkoxy-Polymere	Perfluoralkoxy-Polymere
PP	Polypropylene	Polypropylene

All specifications are subject to change without notice. (14.01.2020)

## TYPE CODE PROBE

### Position 7

Value	Diameter of the probe
D08	8 mm
D10	10 mm
D12	12 mm
D13	13 mm
D16	16 mm
D20	20 mm

### Position 8

Value	Temperature barrier
No indication	Without temperature barrier
TB50	50 mm
TB80	80 mm
TB100	100 mm

### Position 9

Value	Process connection
No indication	No process connection
G1	G 1"
PHG1	G 1" Connection head
G11/2	G 1 1/2"
G1/4	G 1/4"
G3/4	G 3/4"
M12	M 12 x 1
M14	M 14 x 1
M18	M 18 x 1
M20	M 20 x 1.5
M22	M 22 x 1.5
M30	M 30 x 1.5
NPT1	NPT 1"
W	Angle
WN	Angle
HN	Holder

### Position 10

Value	Special version
No indication	Standard version
E	Special version

### Position 11

Value	Length of the cable
X0E	Special version
X00	Without cable
X01	1 m
X02	2 m
X03	3 m
X05	5 m
X10	10 m

### Position 12

Value	Connection to the evaluation unit
Y50	Y55
Y55	Y50
Y70	Y70
Y75	Y70
Y76	Y70
Y95	Y90
Y55K	Y50K

### Position 13

Value	ATEX
StEx	For ATEX zone 20 (Dust), for ATEX zone 1 (Gas)
3D	With manufacturer declaration for ATEX zone 22 (Dust)

All specifications are subject to change without notice. (14.01.2020)

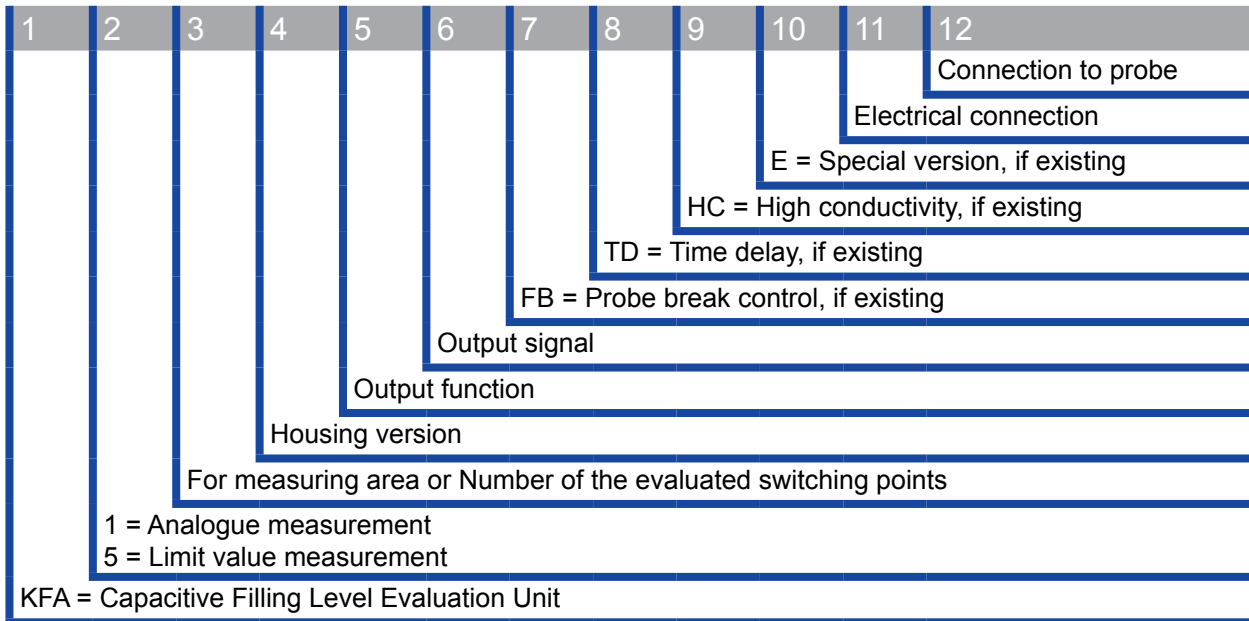
## TYPE CODE EVALUATION UNIT

Example: Capacitive evaluation unit for analogue measurement

KFA - 1 - 1000 - XXL - IL - 4 - - - - - KL - Y70

Example: Capacitive evaluation unit for limit value measurement

KFA - 5 - 4 - XXL - P - A - FB - - - - - KL - Y50



### Position 3

Value	Measuring area or Number of evaluated switching points
200	Measuring area $\geq 100 \dots 200$ mm
500	Measuring area $\geq 201 \dots 500$ mm
1000	Measuring area $\geq 501 \dots 1000$ mm
2000	Measuring area $\geq 1001 \dots 2000$ mm
1	1 Switching point
2	2 Switching points
3	3 Switching points
4	4 Switching points

### Position 4

Value	Housing version in mm
B	46,6 x 74,5 x 30
L	55 x 96 x 25
XL	80 x 120 x 55
XXL	120 x 120 x 60

All specifications are subject to change without notice. (14.01.2020)

## TYPE CODE EVALUATION UNIT

### Position 5

Value	Output function
UL	Analogue voltage output
IL	Analogue current output
FL	Analogue frequency, TTL-Pegel
P	PNP transistor output
N	NPN transistor output
I	Relay output, 1 potential-free changeover contact
II	Relay output, 2 potential-free changeover contacts

### Position 6

Value	Output Signal
0	0...10 V
10	10...0 V
4	4...20 mA
20	20...4 mA
TTL	Analogue frequency output, TTL-Level
S	Normally open (NO)
Ö	Normally closed (NC)
A	Antivalent (NO + NC)
1CO	1 Change-over contact
2CO	2 Change-over contacts

### Position 7

Value	Wire break control
No indication	No wire break control
FB	Wire break control
1FB	Wire break control for 1 canal
2FB	Wire break control for 2 canals
3FB	Wire break control for 3 canals
4FB	Wire break control for 4 canals

### Position 8

Value	Time delay (switch-on delay / switch-off delay)
No indication	No time delay
TD	Time delay
1TD	Time delay for 1 canal
2TD	Time delay for 2 canals
3TD	Time delay for 3 canals
4TD	Time delay for 4 canals

### Position 9

Value	More properties
HC	Products with a high dielectric constant or conductivity

### Position 10

Value	Special version
No indication	Standard version
E	Special version

### Position 11

Value	Electrical connection
No indication	Connection cable
Z0E	Special cable length
Z01	1 m connection cable
Z02	2 m connection cable
Z05	5 m connection cable
KL	Screw terminals

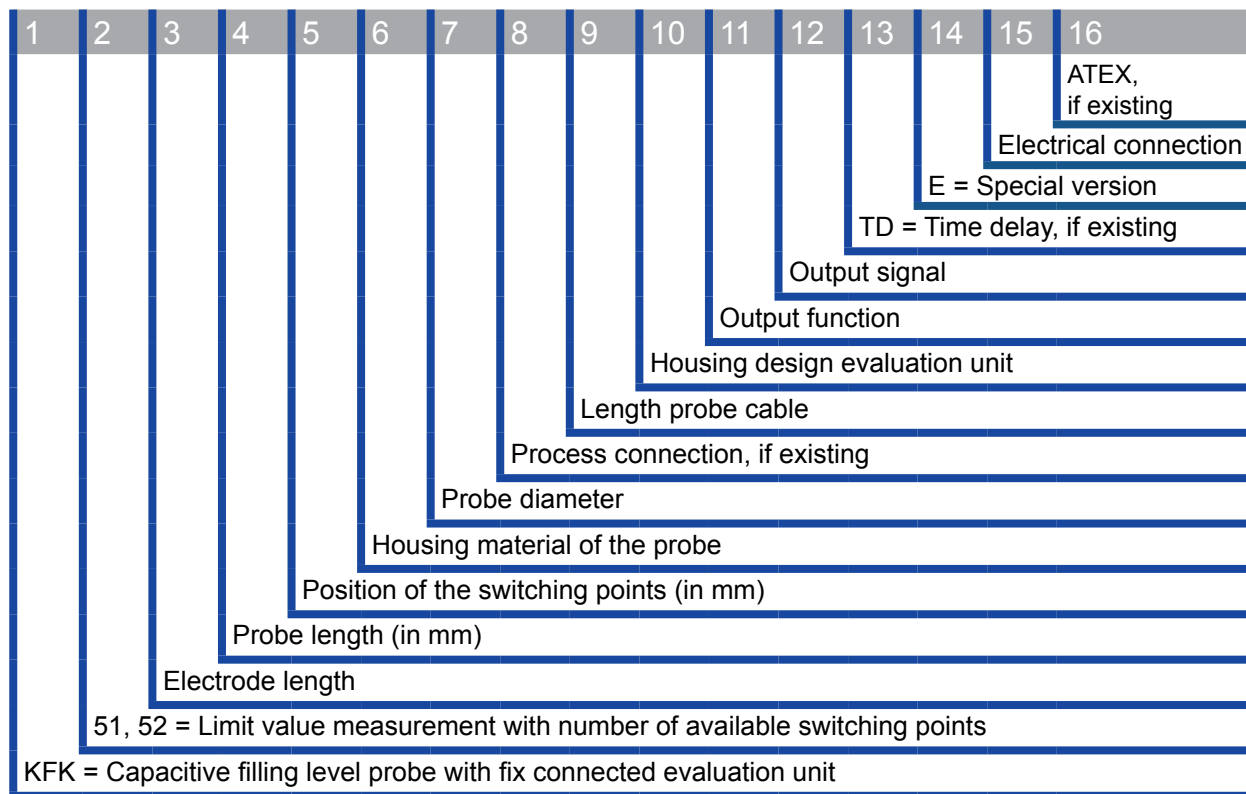
### Position 12

Value	Probe connection
Y50	Y55
Y50	Y55K
Y50K	Y55
Y50K	Y55K
Y55	Y50
Y70	Y75
Y70	Y76
Y90	Y95

All specifications are subject to change without notice. (14.01.2020)

## TYPE CODE KFK-SYSTEMS

Example: Capacitive level probe for limit value measurement with fix connected evaluation unit  
**KFK - 51 - 15 - 300 - 15 - GFK - D16 - X0E - L - P - A - Z02**



### Position 2

Value	Measuring principle
51	1 Switching point
52	2 Switching points

### Position 3

	Electrode length	Application recommendation
KFS-5	5	For very adhesive products, like glue or pastes
	15	Version for universal use
	30	For materials with low dielectric constant (DC), bulk materials with low density

### Position 4

Value	Probe length
Material	Max. length
GFK	2000 mm
PTFE	2000 mm
PEEK	400 mm
PVDF	2000 mm
PVC	2000 mm

### Position 5

Length of the measuring area or position of the switching points (depends on the model).

All specifications are subject to change without notice. (14.01.2020)

## TYPE CODE KFK-SYSTEMS

### Position 6 Housing material

Material	Probe	Housing / process connection
No indication	Fiberglass reinforced plastic (GFK)	Fiberglass reinforced plastic (GFK)
GFK	Fiberglass reinforced plastic	Fiberglass reinforced plastic
GFK/VAa	Fiberglass reinforced plastic	Stainless steel No. 1.4301 (AISI 304)
GFK/VAb	Fiberglass reinforced plastic	Stainless steel No. 1.4305 (AISI 303)
GFK/VAc	Fiberglass reinforced plastic	Stainless steel No. 1.4404 (AISI 316L)
GFK/AL	Fiberglass reinforced plastic	Aluminum
PE	Polyethylene	Polyethylene
PEEK	Polyetheretherketone FDA 21 CFR 177.2415	Polyetheretherketone
PEEK/Ms	Polyetheretherketone FDA 21 CFR 177.2415	Brass chrome or nickel
PEEK/VAa	Polyetheretherketone FDA 21 CFR 177.2415	Stainless steel No. 1.4301 (AISI 304)
PEEK/VAb	Polyetheretherketone FDA 21 CFR 177.2415	Stainless steel No. 1.4305 (AISI 303)
PEEK/VAc	Polyetheretherketone FDA 21 CFR 177.2415	Stainless steel No. 1.4404 (AISI 316L)
POM	Polyoxymethylene	Polyoxymethylene
PTFE	Polytetrafluoroethylene FDA 21 CFR 177.1550	Polytetrafluoroethylene
PTFE/AL	Polytetrafluoroethylene FDA 21 CFR 177.1550	Aluminum
PTFE/VAa	Polytetrafluoroethylene FDA 21 CFR 177.1550	Stainless steel No. 1.4301 (AISI 304)
PTFE/VAb	Polytetrafluoroethylene FDA 21 CFR 177.1550	Stainless steel No. 1.4305 (AISI 303)
PTFE/VAc	Polytetrafluoroethylene FDA 21 CFR 177.1550	Stainless steel No. 1.4404 (AISI 316L)
PTFE/MS	Polytetrafluoroethylene FDA 21 CFR 177.1550	Brass chrome or nickel
PVC	Polyvinylchloride	Polyvinylchloride
PVDF	Polyvinylidene fluoride	Polyvinylidene fluoride
PVDF/AL	Polyvinylidene fluoride	Aluminum

### Position 7

Value	Probe diameter
D08	8 mm
D10	10 mm
D12	12 mm
D13	13 mm
D16	16 mm

### Position 8

Value	Process connection
No indication	No Process connection
D18	D = 18 mm
G1	G 1"
M12	M 12 x 1
M14	M 14 x 1
M18	M 18 x 1
M20	M 20 x 1,5
M30	M 30 x 1,5
NPT1	NPT 1"
W	Angle
FL	Flange

### Position 9

Value	Length of the probe cable
X0E	Special length
X01	1 m
X02	2 m
X03	3 m
X05	5 m
X10	10 m

### Position 10

Value	Housing version in mm
B	46,6 x 74,5 x 30
L	55 x 96 x 25

All specifications are subject to change without notice. (14.01.2020)

## TYPE CODE KFK-SYSTEMS

### Position 11

Value	Output function
P	PNP Transistor output
N	NPN Transistor output

### Position 12

Value	Output signal
S	Normally open (NO)
Ö	Normally closed (NC)
A	Antivalent (NO + NC)
SÖ	1 canal normally open (NO) + 1 canal normally closed (NC)

### Position 13

Value	Time delay (switch-on delay / switch-off delay)
No indication	No time delay
TD	Time delay

### Position 14

Value	Special version
No indication	Standard version
E	Special version

### Position 15

Value	Electrical connection
Z0E	Special cable length
Z01	1 m connection cable
Z02	2 m connection cable
Z05	5 m connection cable

### Position 16

Value	ATEX
3D	With manufacturer declaration for ATEX zone 22 (Dust)



All specifications are subject to change without notice. (14.01.2020)

## TYPE CODE KFX-5...

Example: Capacitive filling level probe with integrated evaluation unit in the connection head

**KFX - 52 - 15 - 1000 -15/700-GFK/VAa-D16 - PHG1 - P - S - KL**

1	2	3	4	5	6	7	8	9	10	11	12	13
												ATEX, if existing
												Electrical connection
												E = Special version, if existing
												Output signal
												Output function
												Process connection
												Probe diameter
												Housing material
												Position of the switching points (in mm)
												Probe length (in mm)
												Electrode length
												51, 52 = Limit value measurement with number of switching points
KFX = Capacitive filling level probe with integrated evaluation unit in the connection head												

### Position 2

Value	Measuring principle
51	1 Switching point
52	2 Switching points

### Position 3

	Electrode length	Application recommendation
KFS-5	5	For very adhesive products, like glue or pastes
	15	Version for universal use
	30	For materials with low dielectric constant (DC), bulk materials with low density

### Position 4

Value	Probe length
Material	Max. length
GFK	2000 mm
PTFE	2000 mm
PEEK	400 mm
PVDF	2000 mm
PVC	2000 mm

### Position 5

Position of the switching points (depends on the model).

All specifications are subject to change without notice. (14.01.2020)

## TYPE CODE KFX-5...

### Position 6 Housing material

Material	Probe	Housing / Process connection
No indication	Fiberglass reinforced plastic (GFK)	Fiberglass reinforced plastic (GFK)
GFK	Fiberglass reinforced plastic	Fiberglass reinforced plastic
GFK/VAa	Fiberglass reinforced plastic	Stainless steel No. 1.4301 (AISI 304)
GFK/VAb	Fiberglass reinforced plastic	Stainless steel No. 1.4305 (AISI 303)
GFK/VAc	Fiberglass reinforced plastic	Stainless steel No. 1.4404 (AISI 316L)
GFK/AL	Fiberglass reinforced plastic	Aluminum
PTFE	Polytetrafluoroethylene FDA 21 CFR 177.1550	Polytetrafluoroethylene
PTFE/AL	Polytetrafluoroethylene FDA 21 CFR 177.1550	Aluminum
PTFE/VAa	Polytetrafluoroethylene FDA 21 CFR 177.1550	Stainless steel No. 1.4301 (AISI 304)
PTFE/VAb	Polytetrafluoroethylene FDA 21 CFR 177.1550	Stainless steel No. 1.4305 (AISI 303)
PTFE/VAc	Polytetrafluoroethylene FDA 21 CFR 177.1550	Stainless steel No. 1.4404 (AISI 316L)
PTFE/MS	Polytetrafluoroethylene FDA 21 CFR 177.1550	Brass chrome or nickel

### Position 7

Value	Probe diameter
D08	8 mm
D10	10 mm
D12	12 mm
D13	13 mm
D16	16 mm

### Position 8

Value	Process connection
PHG1	G 1" Connection head
PHG3/4	G 3/4" Connection head

### Position 9

Value	Output function
P	PNP Transistor output
N	NPN Transistor output

### Position 10

Value	Output signal
S	Normally open (NO)
Ö	Normally closed (NC)
A	Antivalent (NO + NC)
SÖ	1 canal normally open (NO) + 1 canal normally closed (NC)

### Position 11

Value	Special version
No indication	Standard version
E	Special version

### Position 12

Value	Electrical connection
Z10	10 m Cable
Z15	15 m Cable
KL	Screw terminals

### Position 13

Value	ATEX
StEx	For ATEX Zone 20 (Dust), for ATEX Zone 1 (Gas)
3D	With manufacturer declaration for ATEX Zone 22 (Dust)

All specifications are subject to change without notice. (14.01.2020)



**CAPACITIVE, ANALOGUE  
LEVEL MEASUREMENT SYSTEM**

**TRUE LEVEL®**

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All specifications are subject to change without notice. (14.01.2020)

## GENERAL DESCRIPTION

TRUE **LεVεL**®

### Level control systems for analogue measurements

The capacitive measurements systems of the <sup>TRUE</sup>LεVεL series are designed for analogue measurement. The system comprises:

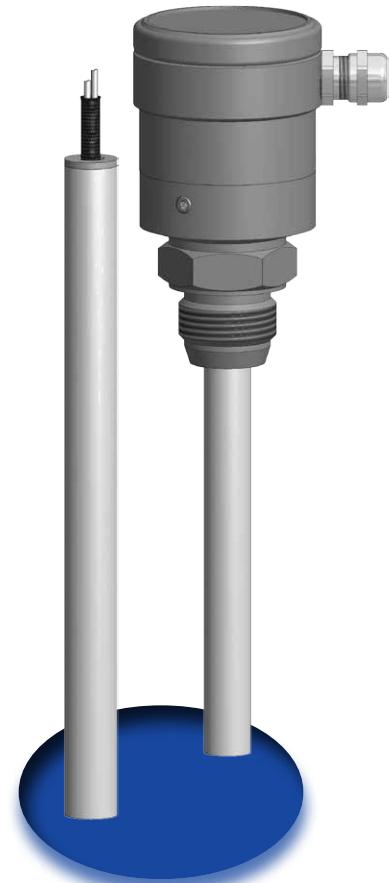
- Filling level probe KFS-1-...
- Evaluation unit KFA-1-...

### Automatic compensation for changes in dielectric constant

The analogue level measurement automatically makes a compensation for the changes in the dielectric constant of the filling material, which is very advantageous for applications with changing products. For the DC-compensation (DC = dielectric constant) a reference measurement is made. For that reason a reference area is in the tip of the probe.

### Probe length up to 2000 mm

The probes. **KFS-1-.../** are available from **400 mm** up to **2000 mm** in length. The position and the length of the measuring area are user-definable within the possible effective range and therefore it can be determined for optimising each application.



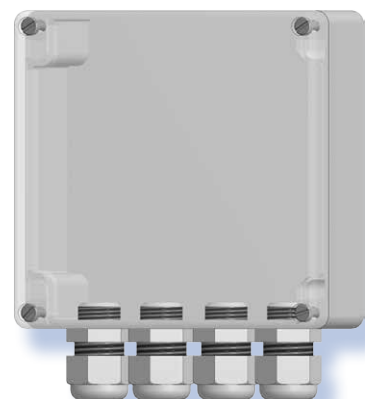
### The available evaluation units are:

- Analogue output KFA-1-...-UL-Y70 = Voltage 0...10 V DC
- Analogue output KFA-1-...-IL4-Y70 = Current 4...20 mA
- Analogue output KFA-1-...-FL-Y70 = Frequency 0...10 kHz

### Adjustment of the measurement with empty container

The adjustment of the measurement can be made in the empty-condition. The effective direction of the output signals and LED display can be defined by means of DIP switches. With an adjustable time delay (damper) slop motions can be suppressed.

Additionally a relay output is available, that is related to the reference area. This relay output can be used to prevent a total emptying of the container.



All specifications are subject to change without notice. (14.01.2020)

## GENERAL DESCRIPTION

**TRUE LEVEL®**

### Probes with process connection:

The analogue rod-probes series is completed with probes with process-connection with different adaptation possibilities:

- **Process connection G1“**
- **Triclamp**
- **Varivent**
- **And many more**

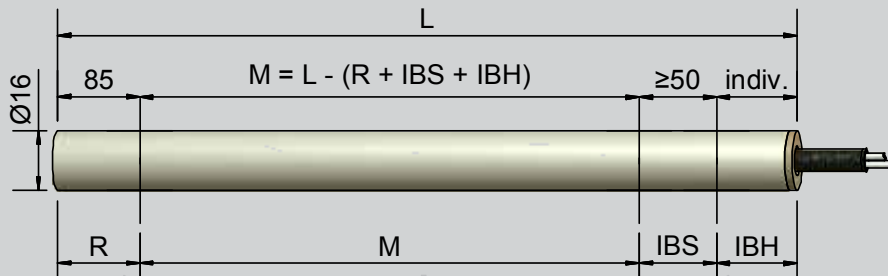
For further information, please see the accessories chapter.

For the possible model variations please see the type code.

### Advantages for

**TRUE LEVEL®**

- Filling level measurements in containers and tubes up to approximately 5 m in diameter
- For liquids and bulk materials  $\epsilon_r \geq 1,2$
- Due to its large measuring capacity it is also suitable for non-homogenous media
- With suitable mounting, virtually independent of the discharge cone.
- Probe applicable in an ambient temperature range of  $-70\text{ °C}$  up to  $+250\text{ °C}$
- Insensitive to static discharge
- Because of automatic compensation of the dielectric constants useable for different materials without re-adjustment
- complete adjustment in the empty-condition



The **analogue probe** consists of a **reference system (R)** at the top of the probe to determine the existing material characteristics. This reference range stretches over 85 mm independent of type.

The **reference system (R)** does not require a constant cross section of the container. Thus it can project into the cone of the container.

Then follows the **analogue measuring range (M)**. It is customer specified, but with regard to the total length ( $L = \text{max. } 2000 \text{ mm}$ )

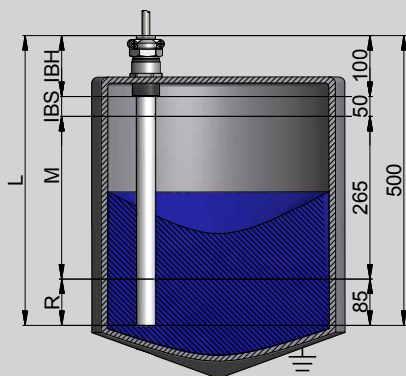
The **analogue measuring range** of the probe must be mounted in a range of the container without change in diameter of the cross section in order to guarantee the linearity of the output signal.

Changes in cross section lead to non-linearity, due to conical sections for example.

The **inactive range (IBH)**, a minimum of 50 mm, serves to mount the probe.

The **non-active range (IBS)** from the measuring range to the top of the container (if metal) should be a minimum of 50 mm in order to prevent non-linearity.

With use of a metallic holder the minimum free area between the end of the measuring range and the metallic holder of min. 50 mm should be considered.



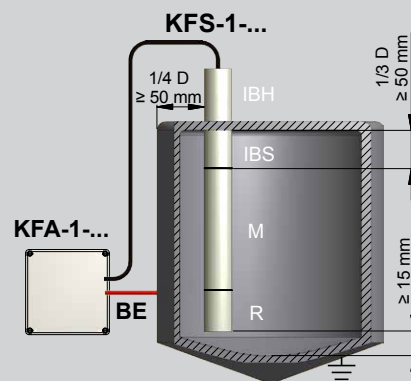
Example for a probe with PTFE body and a total length of  $L = 500 \text{ mm}$  with a holder (Art. Nr. 194 000)  $IBH = 100 \text{ mm}$ . For IBS the min. distance of 50 mm has been applied. This results in an available measuring range  $M = 265 \text{ mm}$ . The calculation is as follows:

$$M = L - (IBH + IBS + R)$$

$$M = 500 - (100 + 50 + 85)$$

$$M = 265$$

→ KFS-1-85-500-265-PTFE-D16-X02-Y75



The probe can be mounted **centrally or eccentrically**. For a measurement independent of the filling cone, we recommend that the probe be mounted at a  $\frac{1}{4}$  of the diameter. The minimum distance between the upper switching point and the conductive lid of the container is 50 mm.

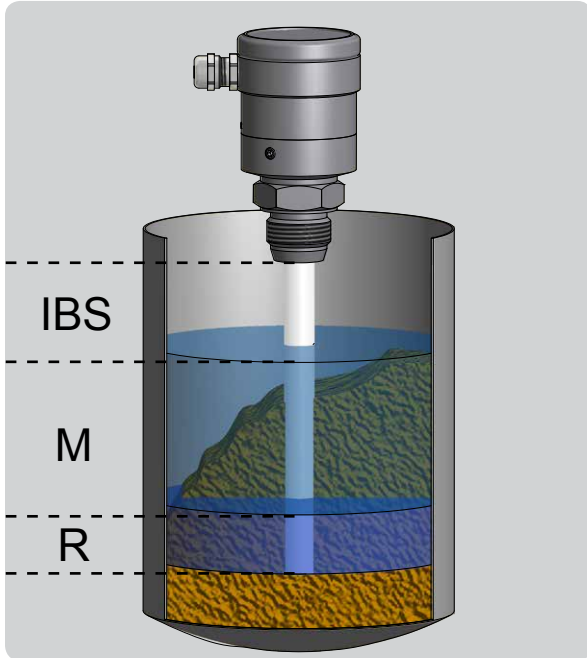
Connect the BE container earth over the shortest distance!



## APPLICATION EXAMPLE

TRUE LEVEL®

We use for these analogue level systems our patented three electrode measuring principle. With this measuring principle the container is part of the measurement. The container must be metal or a metal foil has to be fixed on the container (foil length  $\geq$  probe length). The resulting large measuring volume is the reason why material depositions on the probe surface are irrelevant for the measurement.



On the left you see a schematic drawing of the measuring ranges of a filling level probe with two measuring points. You see, that the probe measures a range that is like a disc and not just a small area around the probe.

At the tip of the probe there is the reference range, which measures the measuring conditions at the application. This is important for the automatic compensation of changes in the dielectric constant of the material to be detected.

The reference range of the probe can be placed within the cone of a container.

For the measuring range the container diameter must be the same over the whole measuring range. This is important to guarantee the linearity of the measurement.

These analogue level systems are used for a large number of different applications. They indicate the actual level control of bulk material or liquids. They are applied in various industries, so for instance:

**FOOD INDUSTRY, CHEMICAL INDUSTRY, PHARMACEUTICAL INDUSTRY, IN PACKAGING INDUSTRY, AUTOMOMOTIVE TECHNOLOGY AND MUCH MORE.**

They measure the level in glue containers or in the correspondent storage tanks. They are used for level control in dosing systems which for example dispense glue or ink or fill-in products in packaging units.

All specifications are subject to change without notice. (14.01.2020)





**CAPACITIVE, ANALOGUE  
LEVEL MEASUREMENT SYSTEM****TRUE LEVEL®**

Probe, analogue (KFS-1-...)	28
Probe with process-connection-head, analogue (KFS-1-...-PHG1-...)	29



Y75

## TRUE L&V&L® Capacitive Filling Level Probe - KFS With analogue measuring range

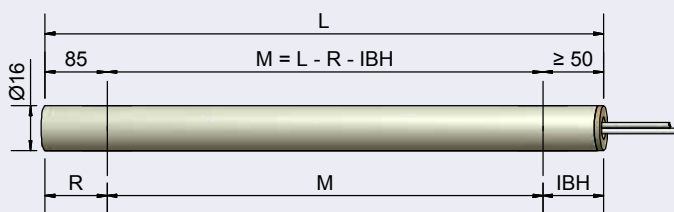
- For connection to the capacitive amplifier KFA-1-...-Y70
- Housing material: See below, Ø 16 mm
- Probe length max. 2000 mm, version with PEEK body max. 400 mm.
- Automatic compensation of changes of the dielectric constant



### Technical data

Active Zone [M]	Type dependent	Type dependent	Type dependent
<b>Type for evaluation unit Y70</b>	<b>KFS-1-85-”L”-”M”-GFK-D16-X02-Y75</b>	<b>KFS-1-85-”L”-”M”-PTFE-D16-X02-Y75</b>	<b>KFS-1-85-”L”-”M”-PEEK-D16-X02-Y75</b>
Permitted ambient temperature (for active zone)	-70...+200 °C	-70...+250 °C	-70...+250 °C
Degree of protection IEC 60529 (probe)	IP 67	IP 67	IP 67
Norm	EN 60947-5-2	EN 60947-5-2	EN 60947-5-2
Connection cable to the evaluation unit KFA-1-...-Y70	2 m coax-cable with connectors	2 m coax-cable with connectors	2 m coax-cable with connectors
Housing material	GFK	PTFE (FDA 21 CFR 177.1550)	PEEK (FDA 21 CFR 177.2415)
Housing material active zone	GFK	PTFE (FDA 21 CFR 177.1550)	PEEK (FDA 21 CFR 177.2415)

**Accessories** for mounting (not delivered with the probe) please see our selection of accessories.



Technical data for connectors on request.

Please determine the total length "L" and the measuring range "M" when ordering.

Other housing materials for the active zone (probe), like PVDF or PE on request.

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**TRUE L&V&L Capacitive Filling Level Probe - KFS**  
With analogue measuring range

- For connection to the capacitive amplifier KFA-1-...-Y70
- Housing material (active zone): See below, Ø 16 mm
- Connection head and process connection made of stainless steel VA
- Process connection G 1"
- Probe length max. 1900 mm
- Automatic compensation of changes of the dielectric constant



**Technical data**

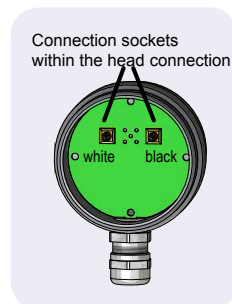
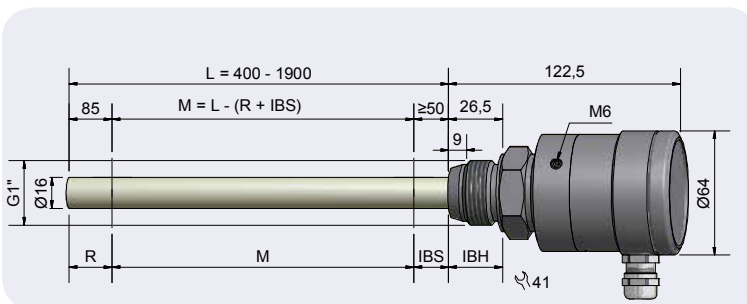
Active Zone [M]	Type dependent	Type dependent
<b>Type</b>	<b>KFS-1-85-"L"- "M"-GFK/VAc-D16-PHG1-X00-Y70</b>	<b>KFS-1-85-"L"- "M"-PTFE/VAc-D16-PHG1-X00-Y70</b>
Permitted ambient temperature	-25...+100 °C	-25...+100 °C
Permitted ambient temperature (for active zone)	-25...+150 °C	-25...+150 °C
Degree of protection IEC 60529 (housing)	IP 67	IP 67
Degree of protection IEC 60529 (connection cable)	IP 54	IP 54
Norm	EN 60947-5-2	EN 60947-5-2
Connection to the evaluation unit KFA-1-...-Y70	Sockets within the connection head	Sockets within the connection head
Housing material	VA n. 1.4404 / AISI 316L (FDA conform)	VA n. 1.4404 / AISI 316L (FDA conform)
Housing material active zone	GFK	PTFE (FDA 21 CFR 177.1550)
Pressure	25 bar	2 bar

**Accessories:**

- For evaluation unit KFA-1-...-Y70: Plug connection Y75 / Y75, 2 m cable length, # 66101201, is not delivered with the probe
- For evaluation unit KFA-1-...-Y70: Plug connection Y75 / Y75, 5 m cable length, # 66101202, is not delivered with the probe
- For matching accessories please see our selection of accessories.

\* The degree of protection may be increased by means of special measures at mounting (e. g. injection of silicone mixture).

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Connection sockets within the head connection

Please determine the total length "L" and the measuring range "M" when ordering.

Other housing materials for the active zone (probe), like PVDF, PEEK or PE on request.

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**CAPACITIVE, ANALOGUE  
LEVEL MEASUREMENT SYSTEM**

**TRUE LEVEL®**

Evaluation unit, analogue with frequency output (KFA-1-...-FL-...)	32
Evaluation unit, analogue with current output (KFA-1-...-IL-...)	33
Evaluation unit, analogue with voltage output (KFA-1-...-UL-...)	34



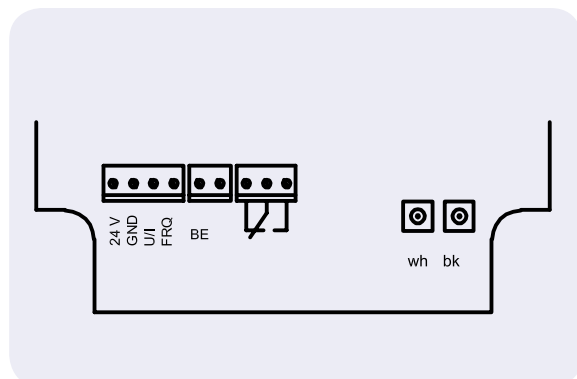
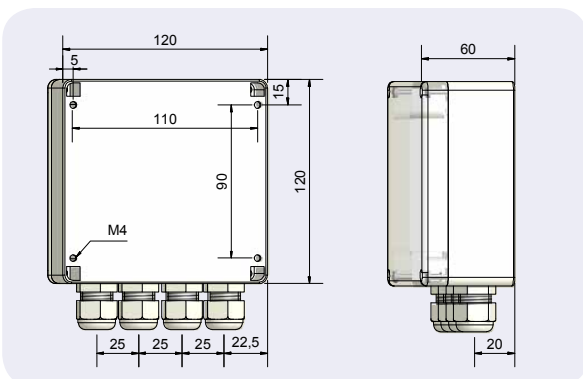
## TRUE L&V&L Capacitive Evaluation Unit Analogue frequency output 0...10 kHz

- For capacitive level probes with analogue measuring range KFS-1-...-Y75
- Operating voltage 18...36 V DC
- Potential-free change over contact as signal output
- For materials with  $\epsilon_r$  1,2...30



Technical data	
Output function	Analogue
Type Analogue	KFA-1-200-XXL-FL-Y70
Art.- No.	AF 0125
Type Analogue	KFA-1-500-XXL-FL-Y70
Art.-No.	AF 0126
Type Analogue	KFA-1-1000-XXL-FL-Y70
Art.-No.	AF 0127
Type Analogue	KFA-1-2000-XXL-FL-Y70
Art.-No.	AF 0128
Operating voltage ( $U_B$ )	18...36 V DC
Permitted residual ripple max.	25 %
Analogue output	0...10 kHz / TTL-level
Power consumption (outputs no-load)	Typ. 3 W
Permitted ambient temperature	-25...+55 °C
LED-Display	Green / $U_B$ standby
LED-Display	Green-yellow / filling level-tendency
Protective circuit	Built-in
Degree of protection IEC 60529	IP 54
Norm	EN 60947-5-2*
Connection	Sockets
Housing material	ABS

\*Where applicable



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## TRUE L&V&L Capacitive Evaluation Unit Analogue current output 0...10 V

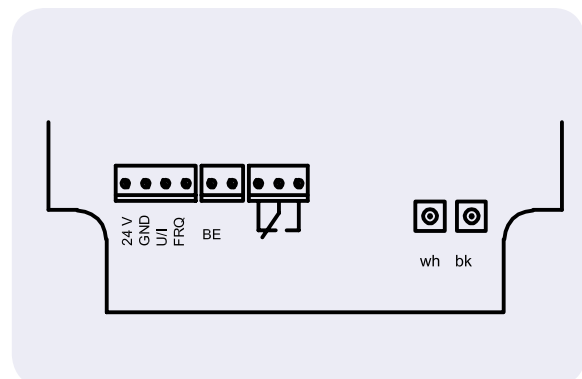
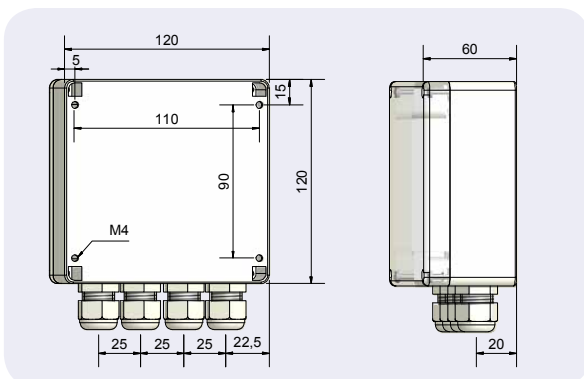
- For capacitive level probes with analogue measuring range KFS-1-...-Y75
- Operating voltage 18...36 V DC
- Potential-free change over contact as signal output
- For materials with  $\epsilon_r$  1,2...30



### Technical data

Output function	Analogue
Type Analogue	KFA-1-200-XXL-IL-4-Y70
Art.-No.	AF 0129
Type Analogue	KFA-1-500-XXL-IL-4-Y70
Art.-No.	AF 0130
Type Analogue	KFA-1-1000-XXL-IL-4-Y70
Art.-No.	AF 0131
Type Analogue	KFA-1-2000-XXL-IL-4-Y70
Art.-No.	AF 0132
Operating voltage ( $U_B$ )	18...36 V DC
Permitted residual ripple max.	25 %
Analogue output	0...10 V
Load resistance ( $R_L$ )	$\leq 600 \Omega$
Power consumption (outputs no-load)	Typ. 3 W
Permitted ambient temperature	-25...+55 °C
LED-Display	Green / $U_B$ standby
LED-Display	Green-yellow / filling level
Protective circuit	Built-in
Degree of protection IEC 60529	IP 54
Norm	EN 60947-5-2*
Connection	Sockets
Housing material	ABS

\*Where applicable



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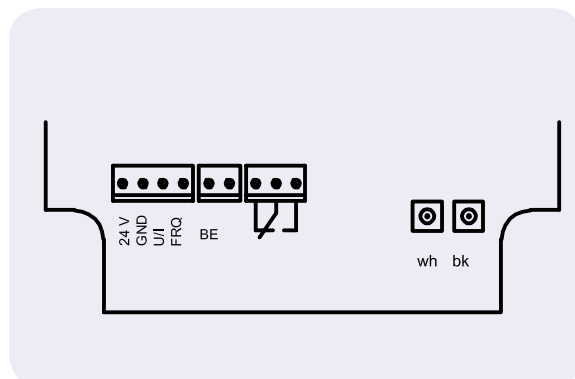
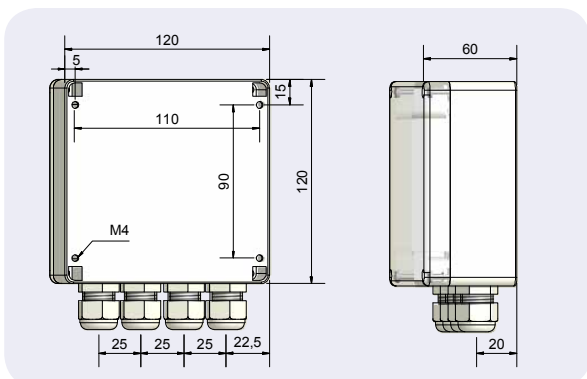
## TRUE L&V&L Capacitive Evaluation Unit Analogue voltage output 0...10 V

- For capacitive level probes with analogue measuring range KFS-1-...-Y75
- Operating voltage 18...36 V DC
- Potential-free change over contact as signal output
- For materials with  $\epsilon_r$  1,2...30



Technical data	
Output function	Analogue
Type Analogue	KFA-1-200-XXL-UL-0-Y70
Art.- No.	AF 0133
Type Analogue	KFA-1-500-XXL-UL-0-Y70
Art.-No.	AF 0134
Type Analogue	KFA-1-1000-XXL-UL-0-Y70
Art.-No.	AF 0135
Type Analogue	KFA-1-2000-XXL-UL-0-Y70
Art.-No.	AF 0136
Operating voltage ( $U_B$ )	18...36 V DC
Permitted residual ripple max.	25 %
Analogue output	0...10 V
Load resistance ( $R_L$ )	$\geq 2$ k $\Omega$
Power consumption (outputs no-load)	Typ. 3 W
Permitted ambient temperature	-25...+55 °C
LED-Display	Green / $U_B$ standby
LED-Display	Green-yellow / filling level
Protective circuit	Built-in
Degree of protection IEC 60529	IP 54
Norm	EN 60947-5-2*
Connection	Sockets
Housing material	ABS

\*Where applicable



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**CAPACITIVE, ANALOGUE  
LEVEL MEASUREMENT SYSTEM**

**TRUE LEVEL®**



Pages

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Probes analogue, with ATEX-certification	37

All specifications are subject to change without notice. (14.01.2020)

## GENERAL DESCRIPTION - ATEX

TRUE **LeV&L**®

This capacitive measurement is based on the generation of an electric field between Container and probe. Herewith a "measuring capacitor" is formed. Within this measuring capacitor the filling material works as a dielectric that changes its capacity. These capacity changes are electronically evaluated and are converted into the desired output signals.

### Basic configuration of the Analogue Measuring System:

- Probe + Connection Cable + Electronic Evaluation Unit

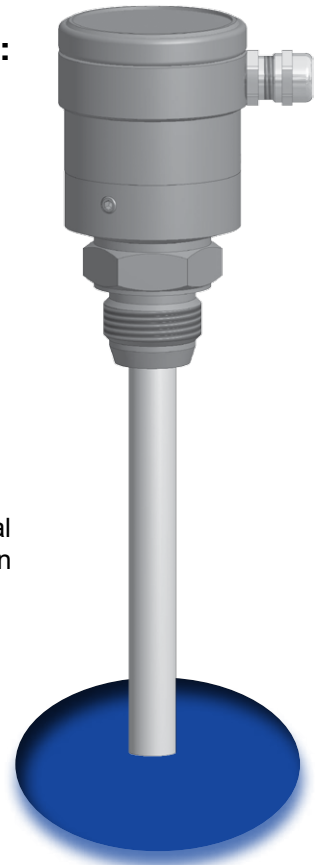
### System with separate evaluation unit:

#### Probe

The probe is a passive component. With the ATEX certified version the housing material of the probe must be PTFE and stainless steel for the connection head. The connection head provides a 1" process connection.

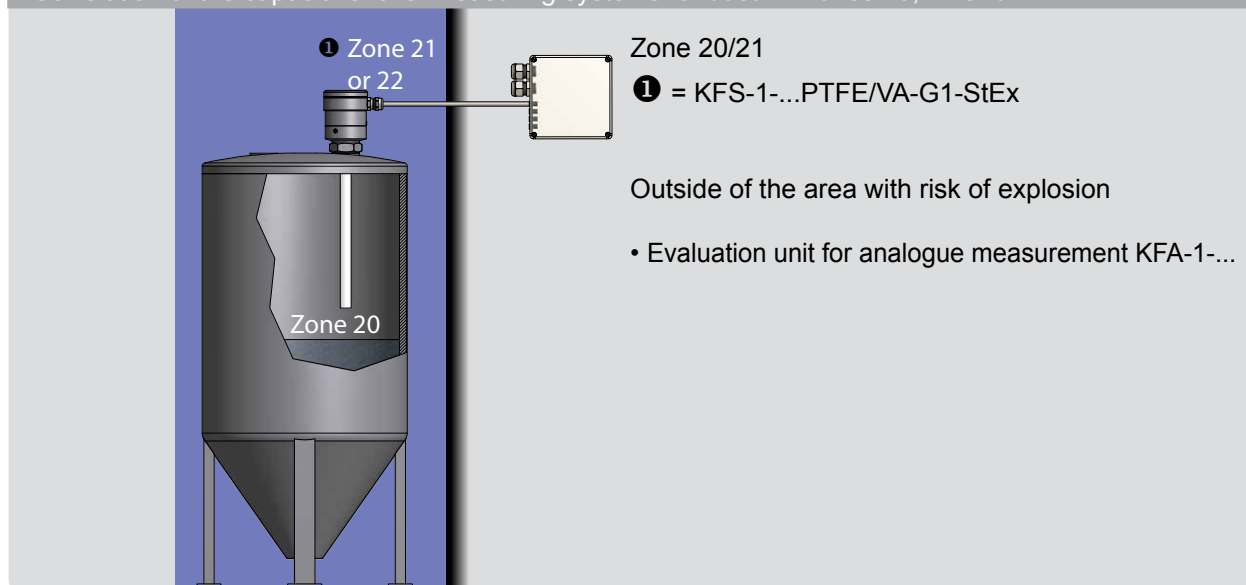
#### Electronic Evaluation Unit

The Electronic Evaluation Unit is separate and must be installed outside of the area with risk of explosion.



### Schematic illustration of how to mount the system:

Correlation of the capacitive level measuring systems for dust Ex zones 20, 21 and 22



All specifications are subject to change without notice. (14.01.2020)



**TRUE LeVeL Capacitive Filling Level Probe - KFS - ATEX**  
With analogue measuring range

- For connection to the capacitive amplifier KFA-1...-Y70
- For use in areas with the risk of dust explosion, zone 20
- For use in areas with the risk of gas explosion, zone 1
- Housing material (active zone): PTFE, Ø 16 mm
- Connection head and process connection stainless steel VA
- Process connection G 1"
- Probe length max. 1900 mm
- Automatic compensation of changes of the dielectric constant

BVS 05 ATEX E 185	IECEX BVS 07.0032
II 2G Ex mb II T4	Ex mb II T4
II 1/2 D IP 67 T 110°C	Ex tD A20/21 IP 67 T 110°C

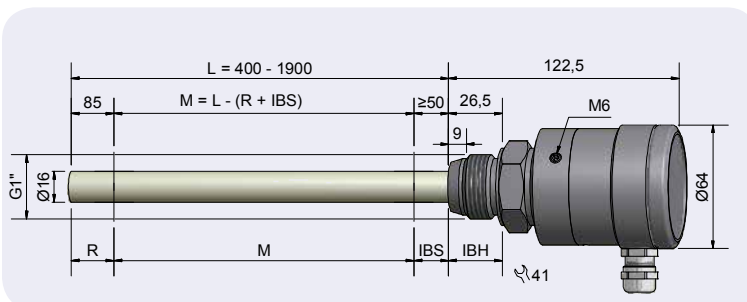


**Technical data**

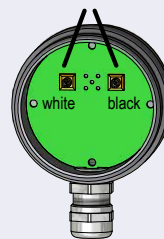
Active zone [M]	Type dependent
<b>Type</b>	<b>KFS-1-“L“-“M“-PTFE/VA-1”-StEx</b>
Permitted ambient temperature	-20...+100 °C
Degree of protection IEC 60529	IP 67*
Norm	EN 60947-5-2
Connection to the evaluation unit KFA-1...-Y70	Sockets within the connection head
Housing material	VA No. 1.4404 / AISI 316L (FDA conform)
Housing material (active Zone)	PTFE (FDA 21 CFR 177.1550)
Pressure	3 bar
<b>Accessories:</b>	
For evaluation unit KFA-1...-Y70:	Plug connection Y75 / Y75, 2 m cable length, # 66101201, is not delivered with the probe
For evaluation unit KFA-1...-Y70:	Plug connection Y75 / Y75, 5 m cable length, # 66101202, is not delivered with the probe
For matching accessories please see our selection of accessories.	

\* The degree of protection may be increased by means of special measures at mounting (e. g. injection of silicone mixture).

All specifications are subject to change without notice. (14.01.2020)



Connection sockets within the head connection



Please determine the total length „L“ and the measuring range „M“ when ordering.

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**CAPACITIVE, BINARY  
LEVEL MEASUREMENT SYSTEM**

**PER L&V&L®**

**Pages:**

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Technology	41
Mounting	42
Application example	43 - 44
Probes binary with 1, 2, 3 or 4 switching points	45 - 49
Probes binary with process-connection-head	50 - 52
Probes binary with special design	53 - 60
Evaluation Unit binary for probes with 1, 2, 3 or 4 switching points	61 - 72
Probes binary with permanently linked evaluation Unit, KFK	73 - 78
Probes binary with process-connection-head, KFX	79 - 84
Probes binary with ATEX-certification	85 - 92

All specifications are subject to change without notice. (14.01.2020)

## GENERAL DESCRIPTION

### Level control system for limit value measurements

The <sup>PER</sup>LεVεL capacitive measuring systems are designed for limit value measurements of filling levels. The system comprises:

- Filling level probe KFS-5...-
- Evaluation electronics KFA-5-...

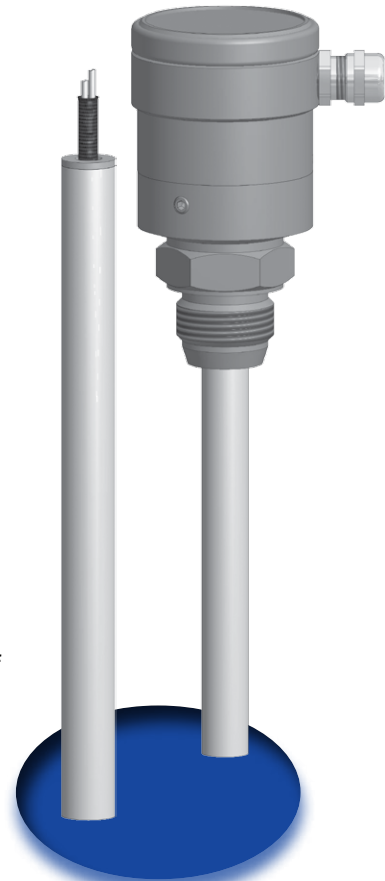
### Probes with 1, 2, 3 or 4 limit value switching points

The probes KFS-5-... are available from 100 mm up to 2000 mm in length. They are available with 1, 2, 3 or 4 fixed or variable switching points. The position of the fixed and the variable limit value switching points are user-definable within the possible area and therefore they can be determined for optimal matching of each application.

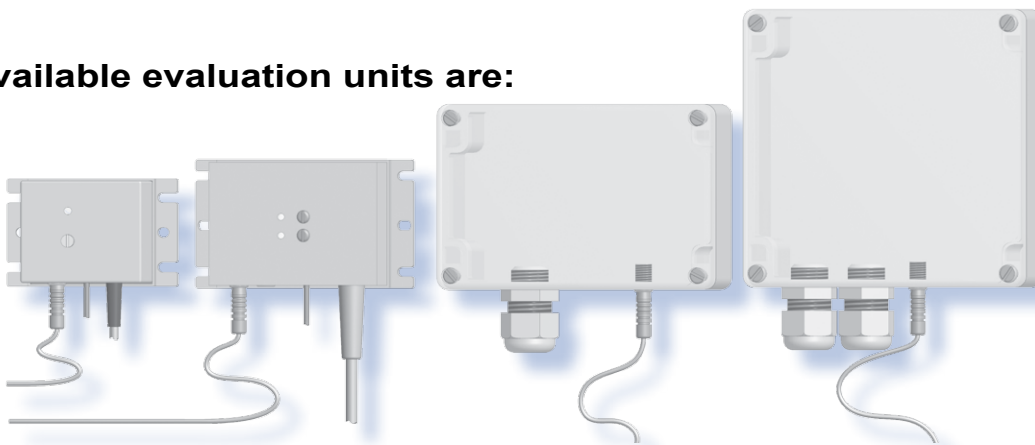
The fixed limit values are determined by means of the defined measuring ranges. The limit value signals are practically independent of changes of the dielectric constant of the filling material.

### Probe length up to 2000 mm max.

The probes KFS-5-... are available from 100 mm up to 2000 mm in length



### The available evaluation units are:



- One point evaluation unit: KFA-5-1-...
- Two point evaluation unit: KFA-5-2-...
- Four point evaluation unit: KFA-5-4-...



## Master/Slave Function

The evaluation units with 4 switching points can be extended for further switching points by use of the Master/Slave principle. The models are the same. The coding for the master and slave mode operation can easily be made by the user. Each slave unit provides 4 further switching points.

## Compact Level probes with 1 or 2 fixed limit value switching points KFX-5...

In addition, we offer compact-probes with process-connection-head KFX -... The evaluation electronics are integrated into the connection-head. Current variations available:

- KFX-5...- with 1 or 2 fixed limit value switching points

## Process-connection with different adaptation possibilities:

The level probes are available with different process connections and there is a choice of adapters, for instance:

- Process connection G1“
- Triclamp
- Varivent

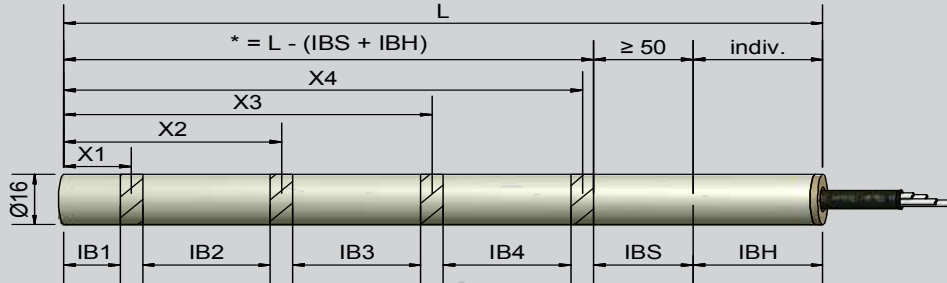
For further information, please see the accessories chapter.

### Advantages:

PER **L&VEL**®

- Filling level measurements in containers and tubes up to approximately 5 m in diameter
- For liquids and bulk materials  $\epsilon_r \geq 1,2$
- Due to its large measuring capacity it is also suitable for non-homogenous media
- With the suitable mounting, virtually independent of the discharge cone
- Probes suitable for ambient temperature ranges of  $-70\text{ °C}$  up to  $+250\text{ °C}$
- Insensitive to static discharge
- Suitable for detection of highly viscous, adhesive products (glues or similar)
- Suitable for products from  $\epsilon_r = 1,2$  – also for extremely low filling density (e. g. polystyrene)
- Negligible influence on the measurement from deposits on the sensor
- Suitable for all container sizes
- Fixed limit values independent from changes in the dielectric constant
- Multiple measurement points without influence from one to another
- Simple adjustment („blind“-adjustment)

KFS-5... or KFX-5... probe with fixed switching points (KFX-5... 2 switching points max.)



The limit probe can be equipped with one, two, three or four fixed switching points.

The first switching point is normally placed 15 mm from the tip of the probe.

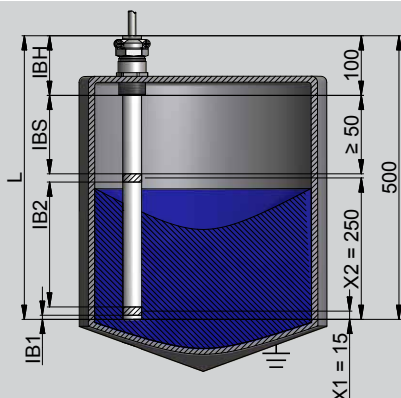
Dependent on the selected model KFS-51(2; 3 or 4) The position of the switching points, X2, X3 or X4, can be determined according to the customer's specifications. This value is defined within the probe order which makes the probe ideal for the client's application.

**A minimum distance of 50 mm between the switching points has to be taken into consideration (IB<sup>n</sup>).**

The **inactive range (IBH)**, a minimum of 50 mm, allows for the mounting of the probe.

The **non-active range (IBS)** from the last switching point to the top of the container (if metal) should be not less than 50 mm in order to prevent measuring failures.

With use of a metallic holder the minimum free area between the end of the last switching point and the metallic holder is a min. 50 mm which should be taken into account..



Example for a probe with 2 switching points, PTFE body and a total length  $L = 500$  mm with a holder (Art. Nr. 194 000)  $IBH = 100$  mm. For  $IBS = 150$  mm, the min. distance of 50 mm has been applied. The first switching point X1 is normally at 15 mm measured from the tip and the second switching point has been selected at 250 mm.

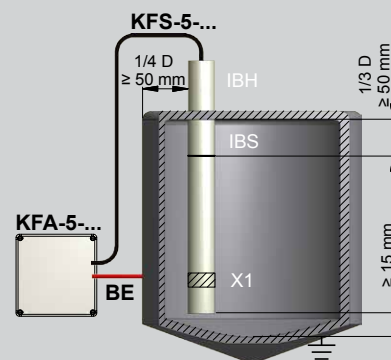
The calculation is as follows:

$$L = X2 + IBS + IBH$$

$$L = 250 + 150 + 100$$

$$L = 500$$

→ KFS-52-15-500-15/250-PTFE-D16-X02-Y75



The probe can be mounted centrally or eccentrically. For a measurement independent of the filling cone, we recommend that the probe be mounted at a  $\frac{1}{4}$  of the diameter. The minimum distance between the upper switching point and the conductive lid of the container is 50 mm.

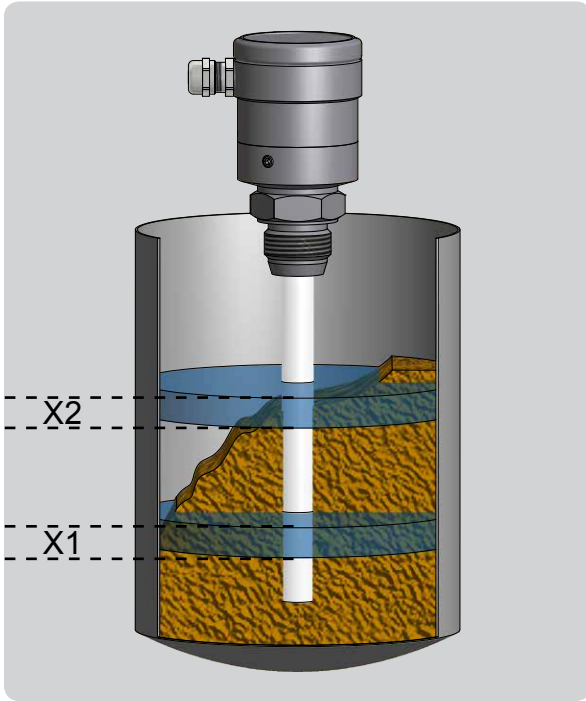
Connect the BE container earth over the shortest distance!

All specifications are subject to change without notice. (14.01.2020)

## APPLICATION EXAMPLE

PER **L&V&L**®

This measurement system can be used in many applications. For example in the the Food, Pharmaceutical, Chemical or Packaging Industry and many more. It measures levels in containers for glue or their related storage container. Moreover they are used for level controls in container for dosing systems



with varied tasks, like applying glue or ink, further for the dosing in packaging units. We use for these analogue level systems our patented three electrode measuring principle. With this measuring principle the container is part of the measurement. The container must be metal or a metal foil has to be fixed on the container (foil length  $\geq$  probe length). The resulting large measuring volume is the reason why material depositions on the probe surface are irrelevant for the measurement.

On the left you see a schematic drawing of the measuring ranges of a filling level probe with two measuring points. You see, that the probe measures a range that is like a disc and not just a small area around the probe.

With application that have a grid at the container bottom the measurement with binary level probes can be made directly at the top edge of the grid. This means measured on- or off switching point of the probe is the level at the grid top edge.



*Also some cm deposition of glue do not influence the measurement. Switching point displacement max.  $\pm 0,5$  cm.*



**Measurement directly at grid top edge possible!**

All specifications are subject to change without notice. (14.01.2020)

**APPLICATION EXAMPLE**

PER **L&V&L**<sup>®</sup>



Example hot melt glue

The capacitive filling level probes measure the levels of hot glue reliable whatever the state of the materials within the container. It does not matter if the glue is in a molten, partly molten or granulate form or in a mixed state within the container.



The probe also switch off reliably even if there is still a glue thread connection between probe and the residual glue at the bottom of the empty container.

**Reliable level Measurement whatever the state of the material is.**

**Reliable switch-off even of residual glue thread.**

Our patented measuring method allows temperature and filling measurement with the same probe. This function is available on request.



*Glue Coating System*

All specifications are subject to change without notice. (14.01.2020)

**CAPACITIVE, BINARY  
LEVEL MEASUREMENT SYSTEM**

**PER L&V&L®**

Seiten

Probes binary without process-connection-head	44 - 47
Probes binary with process-connection-head	48 - 50

All specifications are subject to change without notice. (14.01.2020)



Y55



Y75



Y76



Y95

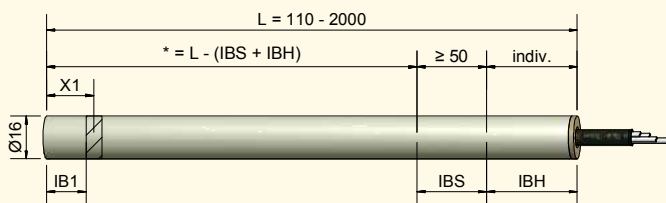
## PER **LeVeL**® Capacitive Filling Level Probe - KFS 1 Limit value switching point

- For connection to the capacitive amplifier KFA-5-...-Y...
- Housing material: See below, Ø 16 mm
- Probe length max. 2000 mm



### Technical data

Active Zone [mm]	10...25, related to probe tip	10...25, related to probe tip
Type for evaluation unit Y50	KFS-51-15-"L"-15-GFK-D16-X02-Y55	KFS-51-15-"L"-15-PTFE-D16-X02-Y55
Type for evaluation unit Y70	KFS-51-15-"L"-15-GFK-D16-X02-Y75	KFS-51-15-"L"-15-PTFE-D16-X02-Y75
Type for evaluation unit Y70	KFS-51-15-"L"-15-GFK-D16-X02-Y76	KFS-51-15-"L"-15-PTFE-D16-X02-Y76
Type for evaluation unit Y90	KFS-51-15-"L"-15-GFK-D16-X02-Y95	KFS-51-15-"L"-15-PTFE-D16-X02-Y95
Permitted ambient temperature (for active zone)	-70...+200 °C	-70...+250 °C
Degree of protection IEC 60529 (probe)	IP 67	IP 67
Norm	EN 60947-5-2	EN 60947-5-2
Connection cable to the evaluation unit KFA-5-...-Y...	2 m coax-cable with connectors	2 m coax-cable with connectors
Housing material	GFK	PTFE (FDA 21 CFR 177.1550)
Housing material active zone	GFK	PTFE (FDA 21 CFR 177.1550)
Accessories for mounting (not delivered with the probe) please see our selection of accessories.		



Technical data for connectors on request.  
Please determine the total length "L" when ordering.

Other housing materials for the active zone (probe), like PVDF, PEEK or PE on request.

Made in Germany

All specifications are subject to change without notice. (14.01.2020)



Y55



Y75



Y76



Y95

## PER LeVeL® Capacitive Filling Level Probe - KFS 2 Limit value switching points

- For connection to the capacitive amplifier KFA-5-...-Y...
- Housing material: See below, Ø 16 mm
- Probe length max. 2000 mm

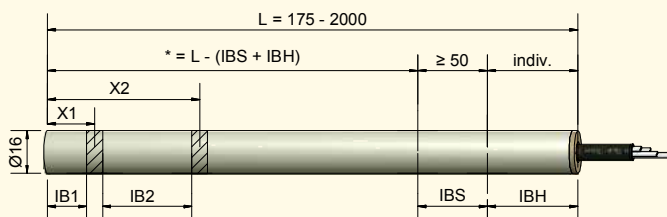


### Technical data

Active Zone [mm]	10...25, related to probe tip + 1 x type specific X2	10...25, related to probe tip + 1 x type specific X2
Type for evaluation unit Y50	KFS-52-15-”L”-15/X2-GFK-D16-X02-Y55	KFS-52-15-”L”-15/X2-PTFE-D16-X02-Y55
Type for evaluation unit Y70	KFS-52-15-”L”-15/X2-GFK-D16-X02-Y75	KFS-52-15-”L”-15/X2-PTFE-D16-X02-Y75
Type for evaluation unit Y70	KFS-52-15-”L”-15/X2-GFK-D16-X02-Y76	KFS-52-15-”L”-15/X2-PTFE-D16-X02-Y76
Type for evaluation unit Y90	KFS-52-15-”L”-15/X2-GFK-D16-X02-Y95	KFS-52-15-”L”-15/X2-PTFE-D16-X02-Y95
Permitted ambient temperature (for active zone)	-70...+200 °C	-70...+250 °C
Degree of protection IEC 60529 (probe)	IP 67	IP 67
Norm	EN 60947-5-2	EN 60947-5-2
Connection cable to the evaluation unit KFA-5-...-Y...	2 m coax-cable with connectors	2 m coax-cable with connectors
Housing material	GFK	PTFE (FDA 21 CFR 177.1550)
Housing material active zone	GFK	PTFE (FDA 21 CFR 177.1550)

Accessories for mounting (not delivered with the probe) please see our selection of accessories.

All specifications are subject to change without notice. (14.01.2020)



Technical data for connectors on request.

Please determine the total length "L" and the position of the second switching point "X2" when ordering.

Other housing materials for the active zone (probe), like PVDF, PEEK or PE on request.

Made in Germany



Y55



Y75



Y76



Y95

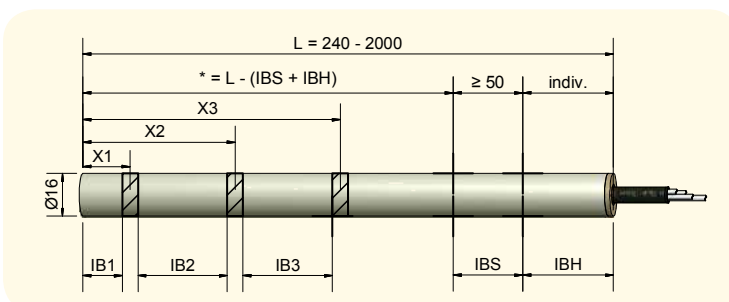
## PER **LeVeL**® Capacitive Filling Level Probe - KFS 3 Limit value switching points

- For connection to the capacitive amplifier KFA-5-...-Y...
- Housing material: See below, Ø 16 mm
- Probe length max. 2000 mm



### Technical data

Active Zone [mm]	10...25, related to the probe tip + 2 x type specific X2 / X3	10...25, related to the probe tip + 2 x type specific X2 / X3
Type for evaluation unit Y50	KFS-53-15-"L"-15/X2/X3-GFK-D16-X02-Y55	KFS-53-15-"L"-15/X2/X3-PTFE-D16-X02-Y55
Type for evaluation unit Y70	KFS-53-15-"L"-15/X2/X3-GFK-D16-X02-Y75	KFS-53-15-"L"-15/X2/X3-PTFE-D16-X02-Y75
Type for evaluation unit Y70	KFS-53-15-"L"-15/X2/X3-GFK-D16-X02-Y76	KFS-53-15-"L"-15/X2/X3-PTFE-D16-X02-Y76
Type for evaluation unit Y90	KFS-53-15-"L"-15/X2/X3-GFK-D16-X02-Y95	KFS-53-15-"L"-15/X2/X3-PTFE-D16-X02-Y95
Permitted ambient temperature (for active zone)	-70...+200 °C	-70...+250 °C
Degree of protection IEC 60529 (probe)	IP 67	IP 67
Norm	EN 60947-5-2	EN 60947-5-2
Connection cable to the evaluation unit KFA-5-...-Y...	2 m coax-cable with connectors	2 m coax-cable with connectors
Housing material	GFK	PTFE (FDA 21 CFR 177.1550)
Housing material active zone	GFK	PTFE (FDA 21 CFR 177.1550)
Accessories for mounting (not delivered with the probe) please see our selection of accessories.		



Technical data for connectors on request.

Please determine the total length "L" and the position of the second and third switching point "X2 / X3" when ordering.

Other housing materials for the active zone (probe), like PVDF, PEEK or PE on request.

Made in Germany

All specifications are subject to change without notice. (14.01.2020)





Y55



Y75



Y76



Y95

## PER LeVeL® Capacitive Filling Level Probe - KFS 4 Limit value switching points

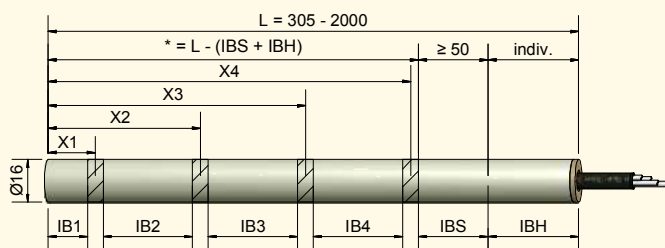
- For connection to the capacitive amplifier KFA-5-...-Y...
- Housing material: See below, Ø 16 mm
- Probe length max. 2000 mm



### Technical data

Active Zone [mm]	10...25, related to the probe tip + 3 x type specific X2 / X3 / X4	10...25, related to the probe tip + 3 x type specific X2 / X3 / X4
Type for evaluation unit Y50	KFS-54-15-"L"-15/X2/X3/X4-GFK-D16-X02-Y55	KFS-54-15-"L"-15/X2/X3/X4-PTFE-D16-X02-Y55
Type for evaluation unit Y70	KFS-54-15-"L"-15/X2/X3/X4-GFK-D16-X02-Y75	KFS-54-15-"L"-15/X2/X3/X4-PTFE-D16-X02-Y75
Type for evaluation unit Y76	KFS-54-15-"L"-15/X2/X3/X4-GFK-D16-X02-Y76	KFS-54-15-"L"-15/X2/X3/X4-PTFE-D16-X02-Y76
Type for evaluation unit Y90	KFS-54-15-"L"-15/X2/X3/X4-GFK-D16-X02-Y95	KFS-54-15-"L"-15/X2/X3/X4-PTFE-D16-X02-Y95
Permitted ambient temperature (for active zone)	-70...+200 °C	-70...+250 °C
Degree of protection IEC 60529 (probe)	IP 67	IP 67
Norm	EN 60947-5-2	EN 60947-5-2
Connection cable to the evaluation unit KFA-5-...-Y...	2 m coax-cable with connectors	2 m coax-cable with connectors
Housing material	GFK	PTFE (FDA 21 CFR 177.1550)
Housing material active zone	GFK	PTFE (FDA 21 CFR 177.1550)
Accessories for mounting (not delivered with the probe) please see our selection of accessories.		

All specifications are subject to change without notice. (14.01.2020)



Technical data for connectors on request.

Please determine the total length "L" and the position of the second, third and fourth switching point "X2 / X3 / X4" when ordering.

Other housing materials for the active zone (probe), like PVDF, PEEK or PE on request.

Made in Germany



PER **LeVeL** Capacitive Filling Level Probe - KFS  
1 Limit value switching point

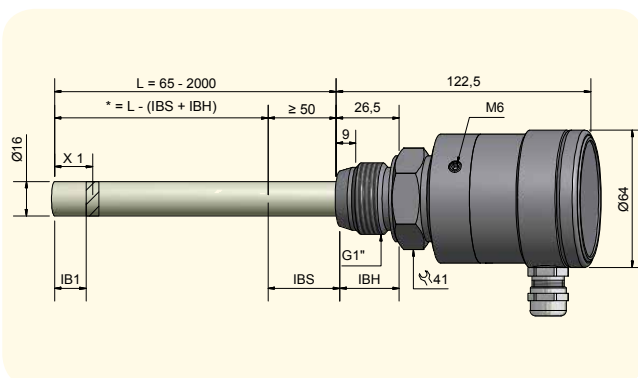
- For connection to the capacitive amplifier KFA-5-...
- Housing material (active zone): See below, 16 mm Ø
- Connection head and process connection stainless steel VA
- Process connection G1"
- Probe length max. GFK - 2000 mm, PTFE - 1900 mm



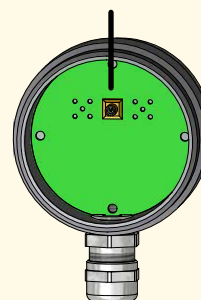
### Technical data

Active Zone [mm]	10...25, related to the probe tip	10...25, related to the probe tip
Type	<b>KFS-51-15-"L"-15-GFK/VAc-D16-PHG1-X00-Y70</b>	<b>KFS-51-15-"L"-15-PTFE/VAc-D16-PHG1-X00-Y70</b>
Permitted ambient temperature	-25...+100 °C	-25...+100 °C
Permitted ambient temperature (for active zone)	-25...+150 °C	-25...+150 °C
Degree of protection IEC 60529 (Housing)	IP 67	IP 67
Degree of protection IEC 60529 (Screwing* Cable connection)	IP 54	IP 54
Norm	EN 60947-5-2	EN 60947-5-2
Connection to the evaluation unit KFA-5-..	Sockets within the connection head	Sockets within the connection head
Housing material	VA No. 1.4404 / AISI 316L (FDA conform)	VA No. 1.4404 / AISI 316L (FDA conform)
Housing material (active zone)	GFK	PTFE (FDA 21 CFR 177.1550)
Pressure	25 bar	2 bar
<b>Accessories:</b>		
For evaluation unit KFA-5-...-Y50:	Plug connection Y75 / Y55, 2 m cable length, # 66101213, is not delivered with the probe	
For evaluation unit KFA-5-...-Y70:	Plug connection Y75 / Y75, 2 m cable length, # 66101203, is not delivered with the probe.	
For matching accessories please see our selection of accessories.		

\* The degree of protection may be increased by means of special measures at mounting (e. g. injection of silicone mixture).



### Connection socket within connection head



Please determine the total length "L" when ordering.

Other housing materials for the active zone (probe), like PVDF, PEEK or PE on request.

Made in Germany

All specifications are subject to change without notice. (14.01.2020)



**PER LeVeL Capacitive Filling Level Probe - KFS**  
**2 Limit value switching points**

- For connection to the capacitive amplifier KFA-5-...
- Housing material (active zone): See below, Ø 16 mm
- Connection head and process connection stainless steel VA
- Process connection G1"
- Probe length max. GFK - 2000 mm, PTFE - 1900 mm

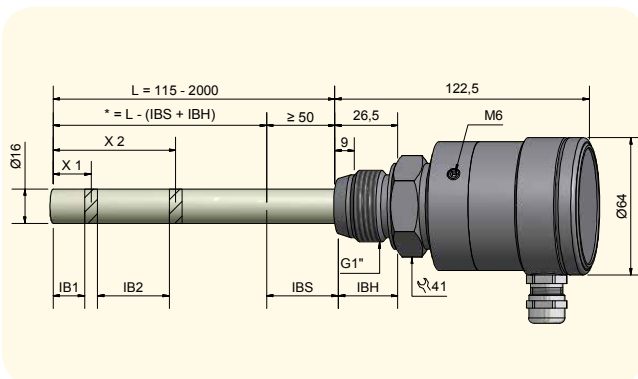


**Technical data**

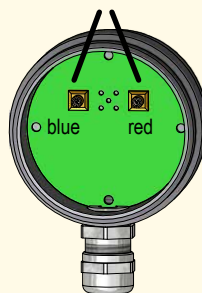
Active Zone [mm]	10...25, related to the probe tip + 1 x type specific X2	10...25, related to the probe tip + 1 x type specific X2
<b>Type</b>	<b>KFS-52-15-"L"-15/X2-GFK/VAc-D16-PHG1-X00-Y70</b>	<b>KFS-52-15-"L"-15/X2-PTFE/VAc-D16-PHG1-X00-Y70</b>
Permitted ambient temperature	-25...+100 °C	-25...+100 °C
Permitted ambient temperature (for active zone)	-25...+150 °C	-25...+150 °C
Degree of protection IEC 60529 (Housing)	IP 67	IP 67
Degree of protection IEC 60529 (Screwing* Cable connection)	IP 54	IP 54
Norm	EN 60947-5-2	EN 60947-5-2
Connection to the evaluation unit KFA-5-...	Sockets within the connection head	Sockets within the connection head
Housing material	VA No. 1.4404 / AISI 316L (FDA conform)	VA No. 1.4404 / AISI 316L (FDA conform)
Housing material (active zone)	GFK	PTFE (FDA 21 CFR 177.1550)
Pressure	25 bar	2 bar
<b>Accessories:</b>		
For evaluation unit KFA-5-...-Y50:	Plug connection Y75 / Y55, 2 m cable length, # 66101242, is not delivered with the probe	
For evaluation unit KFA-5-...-Y70:	Plug connection Y75 / Y75, 2 m cable length, # 66101204, is not delivered with the probe.	
For matching accessories please see our selection of accessories.		

\* The degree of protection may be increased by means of special measures at mounting (e. g. injection of silicone mixture).

All specifications are subject to change without notice. (14.01.2020)



**Connection sockets within connection head**



Please determine the total length "L" and the position of the second switching point "X2" when ordering.

Other housing materials for the active zone (probe), like PVDF, PEEK or PE on request.

Made in Germany



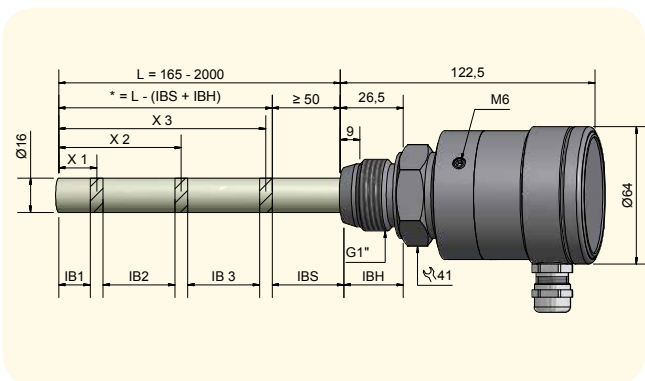
**PER LeVeL® Capacitive Filling Level Probe - KFS**  
**3 Limit value switching points**

- For connection to the capacitive amplifier KFA-5-...
- Housing material (active zone): See below, Ø 16 mm
- Connection head and process connection stainless steel VA
- Process connection G1"
- Probe length max. GFK - 2000 mm, PTFE - 1900 mm



Technical data		
Active Zone [mm]	10...25, related to probe tip + 2 x type specific X2 / X3	10...25, related to probe tip + 2 x type specific X2 / X3
Type	<b>KFS-53-15-“L“-15/X2/X3-GFK/VAc-D16- PHG1-X00-Y70</b>	<b>KFS-53-15-“L“-15/X2/X3-PTFE/VAc-D16- PHG1-X00-Y70</b>
Permitted ambient temperature	-25...+100 °C	-25...+100 °C
Permitted ambient temperature (for active zone)	-25...+150 °C	-25...+150 °C
Degree of protection IEC 60529 (Housing)	IP 67	IP 67
Degree of protection IEC 60529 (Screwing* Cable connection)	IP 54	IP 54
Norm	EN 60947-5-2	EN 60947-5-2
Connection to the evaluation unit KFA-5-..	Sockets within the connection head	Sockets within the connection head
Housing material	VA No. 1.4404 / AISI 316L (FDA conform)	VA No. 1.4404 / AISI 316L (FDA conform)
Housing material (active zone)	GFK	PTFE (FDA 21 CFR 177.1550)
Pressure	25 bar	2 bar
<b>Accessories:</b>		
For evaluation unit KFA-5-...-Y70:	Plug connection Y75 / Y75, 2 m cable length, # 66101205, is not delivered with the probe.	
For matching accessories please see our selection of accessories.		

\* The degree of protection may be increased by means of special measures at mounting (e. g. injection of silicone mixture).



**Connection sockets within connection head**



Please determine the total length "L" and the position of the second and third switching point "X2 / X3" when ordering.

Other housing materials for the active zone (probe), like PVDF, PEEK or PE on request.

Made in Germany

All specifications are subject to change without notice. (14.01.2020)

**CAPACITIVE, BINARY  
LEVEL MEASUREMENT SYSTEM**

*PER* **L&VEL®**

	Pages
General description	52
Probes with special designs	53 - 57

All specifications are subject to change without notice. (14.01.2020)

## GENERAL INFORMATION

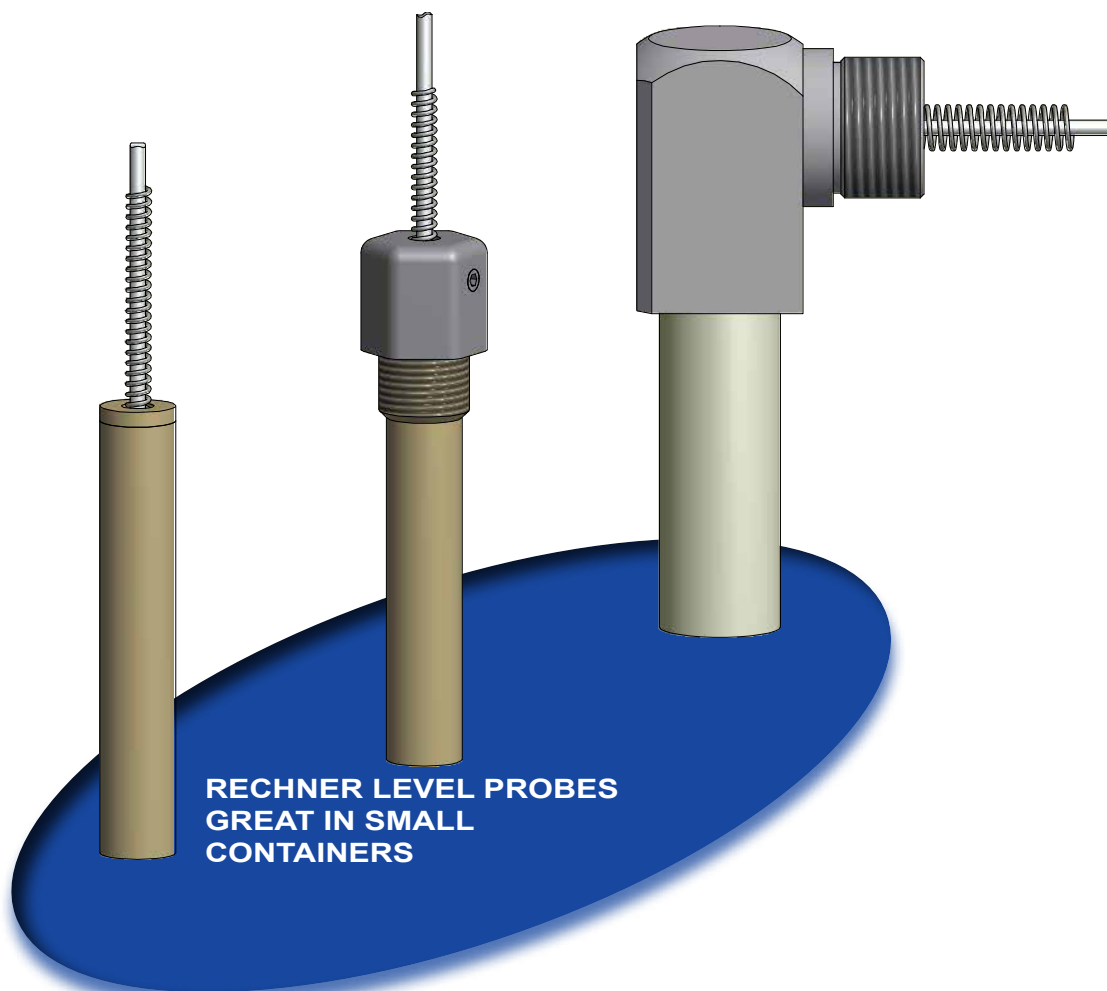
### SPECIAL DESIGNS

In this section we describe variants of the capacitive PerLevel System which are distinguished by special housing design.

The details about function and mounting are mentioned in the general information about PerLevel Systems.

The strength of these models are especially relevant with relatively small dosing systems or storage containers. They need little space in the plant and measure the level very precise. The measuring electrodes are optimized for small containers and it is guaranteed, that the outstanding characteristics of these filling level systems are preserved, for instance with regard to the insensitivity with product layers or adhesion at the probe surface as well as with regard to the temperature stability.

**These systems are available with 1 or 2 switching points.**



All specifications are subject to change without notice. (14.01.2020)



Y55



Y75

## PERLeVeL® Capacitive Filling Level Probe - KFS

### 1 Limit value switching point

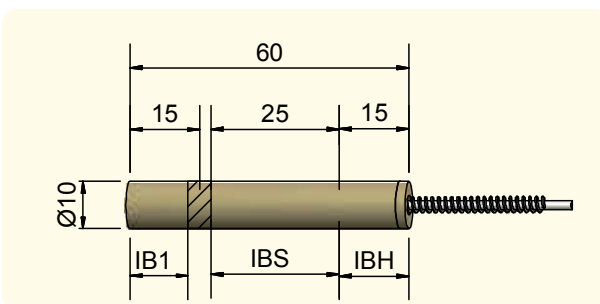
- For connection to capacitive amplifiers KFA-5-...-Y50 / Y70
- Housing material: PEEK, Ø 10 mm
- Probe length 60 mm



#### Technical data

Active zone	15 mm, related to probe tip	15 mm, related to probe tip
Type	KFS-51-15-60-15-PEEK-D10-X01-Y55	KFS-51-15-60-15-PEEK-D10-X02-Y75
Art.-No.	KF 0331	KF 0277
Permitted ambient temperature	-70...+250 °C	-70...+250 °C
Degree of protection IEC 60529 (Probe)	IP 67	IP 67
Connection cable to the evaluation unit KFA-5-...Y50	1 m FEP, coax-cable with coax-connector	2 m FEP, coax-cable with SMB-connector
Housing material	PEEK (FDA 21 CFR 177.2415)	PEEK (FDA 21 CFR 177.2415)
Housing material active zone	PEEK (FDA 21 CFR 177.2415)	PEEK (FDA 21 CFR 177.2415)

All specifications are subject to change without notice. (14.01.2020)



Technical data for connectors on request.



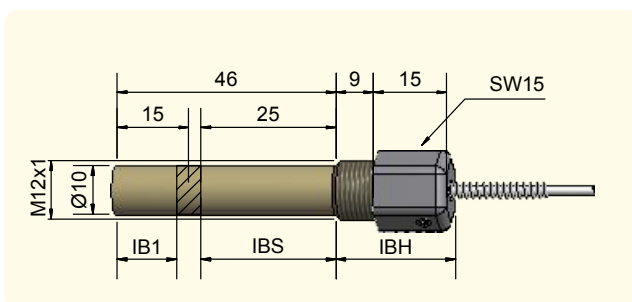
Y55

**PER LeVeL® Capacitive Filling Level Probe - KFS  
1 Limit value switching point**

- For connection to capacitive amplifiers KFA-5-...-Y50
- Housing material: PEEK, Ø 10 mm / M 12 x 1
- Probe length 60 mm



Technical data	
Active zone	15 mm, related to probe tip
Type	<b>KFS-51-15-60-15-PEEK-D10-M12-X0E-Y55</b>
Art.-No.	<b>KF 0284</b>
Permitted ambient temperature	-70...+250 °C
Degree of protection IEC 60529	IP 67
Norm	EN 60947-5-2
Connection cable to the evaluation unit KFA-5-...-Y50	0,7 m coax-cable with coax-connector
Housing material	Stainless steel VA No. 1.4305 / AISI 303
Active zone	PEEK



Technical data for connectors on request.

All specifications are subject to change without notice. (14.01.2020)





Y75

**PERLeVeL® Capacitive Filling Level Probe - KFS**  
**1 Limit value switching point**

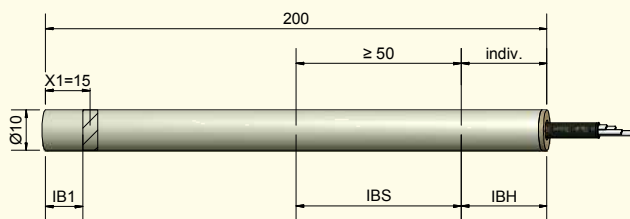
- For connection to capacitive amplifiers KFA-5-...-Y70
- Housing material: GFK, Ø 10 mm
- Probe length 200 mm



Technical data

Active zone	15 mm, related to probe tip
Type	<b>KFS-51-15-200-15-GFK-D10-X02-Y75</b>
Art.-No.	<b>KF 0285</b>
Permitted ambient temperature	-70...+200° C
Degree of protection IEC 60529 (Probe)	IP 67
Norm	EN 60947-5-2
Connection cable to the evaluation unit KFA-5-...Y70	2 m FEP, coax-cable with SMB-connector
Housing material	GFK
Housing material active zone	GFK

All specifications are subject to change without notice. (14.01.2020)



Technical data for connectors on request.



Y55

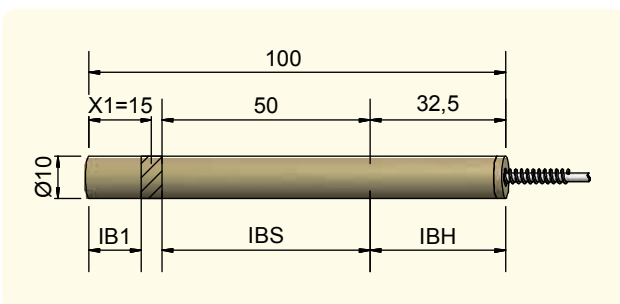
**PER LeVeL® Capacitive Filling Level Probe - KFS  
1 Limit value switching point**

- For connection to capacitive amplifiers KFA-5-...-Y50
- Housing material: PEEK, Ø 10 mm
- Probe length 100 mm



**Technical data**

Active zone	15 mm, related to probe tip
<b>Type</b>	<b>KFS-51-15-100-15-PEEK-D10-X02-Y55</b>
<b>Art.-No.</b>	<b>KF 0304</b>
Permitted ambient temperature	-70...+250 °C
Degree of protection IEC 60529 (Probe)	IP 67
Norm	EN 60947-5-2
Connection cable to the evaluation unit KFA-5-...-Y50	2 m FEP, coax-cable with coax-connector
Housing material	PEEK (FDA 21 CFR 177.2415)
Housing material active zone	PEEK (FDA 21 CFR 177.2415)



Technical data for connectors on request.

All specifications are subject to change without notice. (14.01.2020)



Y55

## PERLeVeL® Capacitive Filling Level Probe - KFS

### 1 Limit value switching point

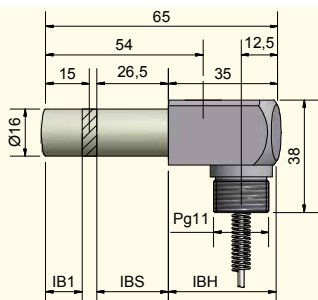
- For connection to capacitive amplifiers KFA-5-1-...-Y50
- Housing material: GFK, Ø 16 mm
- Probe length 50 mm
- With angled aluminium mounting bracket



#### Technical data

Active zone	5 mm, related to probe tip
Type	<b>KFS-51-5-54-15-GFK/AL-D16-W-X02-Y55</b>
Art.-No.	<b>KF 0314</b>
Permitted ambient temperature	-70...+200 °C
Degree of protection IEC 60529 (Probe)	IP 67
Norm	EN 60947-5-2
Connection cable to the evaluation unit KFA-5-...Y50	2 m FEP, coax-cable with connector
Housing material mounting bracket	Aluminium
Housing material active zone	GFK

All specifications are subject to change without notice. (14.01.2020)



Technical data for connectors on request.

Other housing materials for the active zone (probe), like GFK, PVDF, PEEK or PE on request.

All specifications are subject to change without notice. (14.01.2020)

**CAPACITIVE, BINARY  
LEVEL MEASUREMENT SYSTEM**

**PER LEVEL®**

Capacitive evaluation Unit KFA-5...-B-...,	1 switching point	60
Capacitive evaluation Unit KFA-5...-L-...,	1 (2) switching points	61 - 62
Capacitive evaluation Unit KFA-5...-XL-...,	1 (2) switching points	63 - 64
Capacitive evaluation Unit KFA-5...-XXL-...,	4 switching points	65 - 70

All specifications are subject to change without notice. (14.01.2020)



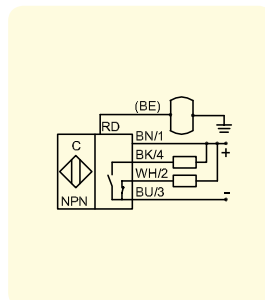
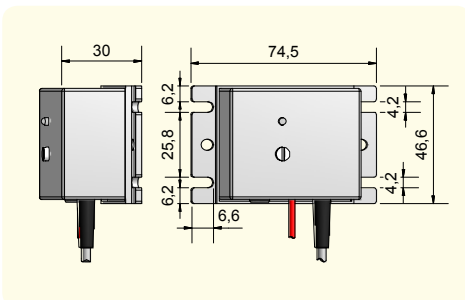
## PER LeVeL Capacitive filling level evaluation unit - KFA NPN output

- For capacitive filling level probes with 1 limit value switching point: KFS-51-“L“-15-Y55
- Operating voltage: 18...36 V DC



### Technical data

Electrical version	4-wire DC
Output function	Antivalent
<b>Type NPN</b>	<b>KFA-5-1-B-N-A-Z02-Y50</b>
<b>Art. No</b>	<b>AF 0005</b>
Operating voltage ( $U_B$ )	18...36 V DC
Voltage drop max. ( $U_D$ )	$\leq 2,5$ V
Permitted residual ripple max.	25 %
Operating current ( $I_a$ )	2 x 0...250 mA
No-load current ( $I_0$ )	Typ. 50 mA
Switching frequency max.	4 Hz
Permitted ambient temperature	-25...+55 °C
LED-Display	Green / yellow
Protective circuit	Built-in
Degree of protection IEC 60529	IP 54
Norm	EN 60947-5-2
Connection cable	2 m, PUR, 4 x 0.14 mm <sup>2</sup>
Housing material	PA



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All specifications are subject to change without notice. (14.01.2020)



**PER LeVeL Capacitive filling level evaluation unit - KFA**  
**NPN output**  
**PNP output**

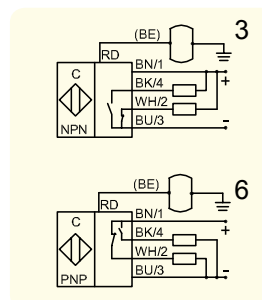
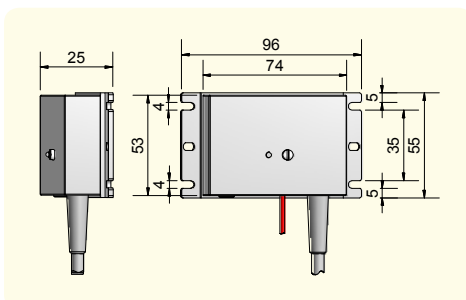
- For capacitive filling level probes with 1 limit value switching point: KFS-51-"L"-15-Y55
- Operating voltage: 18...36 V DC



**Technical data**

Electrical version	4 wire DC
Output function	Antivalent
<b>Type NPN</b>	<b>KFA-5-1-L-N-A-Z02-Y50</b>
<b>Art. No</b>	<b>AF 0068</b>
Connection diagram No.	3
<b>Type PNP</b>	<b>KFA-5-1-L-P-A-Z02-Y50</b>
<b>Art. No.</b>	<b>AF 0064</b>
Connection diagram No.	6
Operating voltage ( $U_b$ )	18...36 V DC
Voltage drop max. ( $U_d$ )	$\leq 2.5$ V
Permitted ripple max.	25 %
Operating current ( $I_o$ )	2 x 0...250 mA
No-load current ( $I_o$ )	Typ. 75 mA
Switching frequency max.	4 Hz
Permitted ambient temperature	-25...+70 °C
LED display	Green / yellow
Protection circuit	Built-in
Degree of protection IEC 60529	IP 54
Norm	EN 60947-5-2
Connection cable	2 m, PVC, 4 x 0.34 mm <sup>2</sup>
Housing material	PA

All specifications are subject to change without notice. (14.01.2020)



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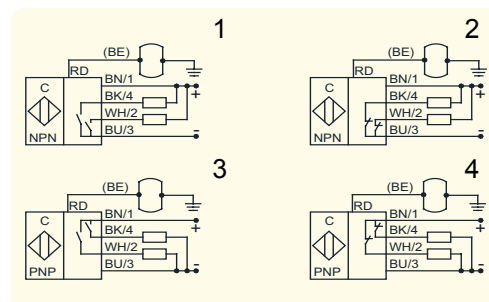
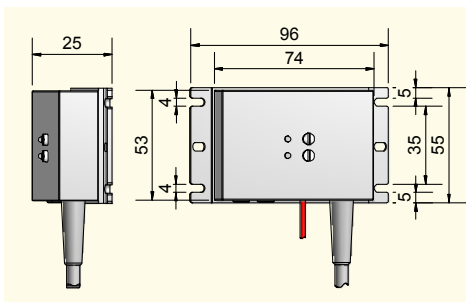


**PER Level Capacitive filling level evaluation unit - KFA**  
**NPN output**  
**PNP output**

- For 2 capacitive filling level probes with 1 limit value switching point: KFS-51-"L"-15-Y55
- For 1 capacitive filling level probe with 2 limit value switching points KFS-52-"L"-15-X2-Y55
- Operating voltage: 18...36 V DC



Technical data		
Electrical version	4 wire DC	4 wire DC
Output function	Normally open	Normally closed
<b>Type NPN</b>	<b>KFA-5-2-L-N-S-Z02-Y50</b>	<b>KFA-5-2-L-N-Ö-Z02-Y50</b>
<b>Art. No</b>	<b>AF 0066</b>	<b>AF 0067</b>
Connection diagram No.	1	2
<b>Type PNP</b>	<b>KFA-5-2-L-P-S-Z02-Y50</b>	<b>KFA-5-2-L-P-Ö-Z02-Y50</b>
<b>Art. No.</b>	<b>AF 0065</b>	<b>AF 0062</b>
Connection diagram No.	3	4
Operating voltage (U <sub>B</sub> )	18...36 V DC	18...36 V DC
Voltage drop max. (U <sub>d</sub> )	≤ 2.5 V	≤ 2.5 V
Permitted ripple max.	25 %	25 %
Operating current (I <sub>B</sub> )	2 x 0...250 mA	2 x 0...250 mA
No-load current (I <sub>0</sub> )	Typ. 75 mA	Typ. 75 mA
Switching frequency max.	4 Hz	4 Hz
Permitted ambient temperature	-25...+70 °C	-25...+70 °C
LED display	Green / yellow	Green / yellow
Protection circuit	Built-in	Built-in
Degree of protection IEC 60529	IP 54	IP 54
Norm	EN 60947-5-2	EN 60947-5-2
Connection cable	2 m, PVC, 4 x 0.34 mm <sup>2</sup>	2 m, PVC, 4 x 0.34 mm <sup>2</sup>
Housing material	PA	PA



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**PER LeVeL Capacitive filling level evaluation unit - KFA**  
**Relay output**

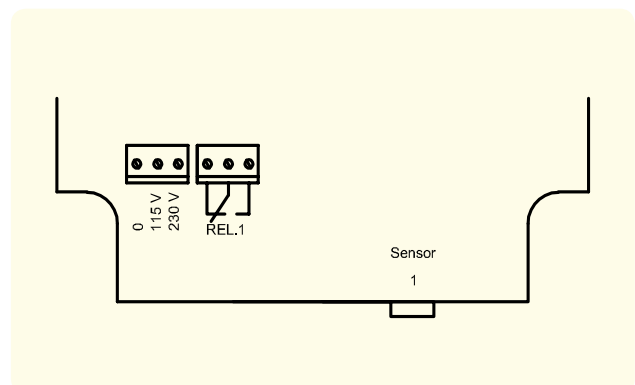
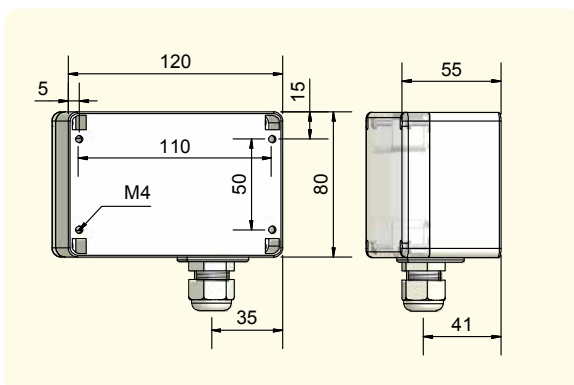
- For connection of one capacitive level probes with 1 limit value switching point KFS-51-...-Y55
- Operating voltage 115 / 230 V AC
- With Combicon connection



**Technical data**

Output function	1 x change-over contact
<b>Type</b>	<b>KFA-5-1-XL-I-CC-Y50</b>
<b>Art.-No.</b>	<b>AF 0101</b>
Operating voltage ( $U_B$ )	105...125 / 207...253 AC 50 / 60 Hz
Contact rating each relay max.	Max. 120 V DC / 1 A-250 V AC / 4 A
Power consumption	Typ. 3 VA
Permitted ambient temperature	-25...+55 °C
LED-display LED-display	Green ( $U_B$ stand by) Static: green / red (full / empty)
Norm	EN 60947-5-2
Degree of protection IEC 60529	IP 54
Connection	Screwing clamp terminals and sockets
Housing material	ABS

All specifications are subject to change without notice. (14.01.2020)



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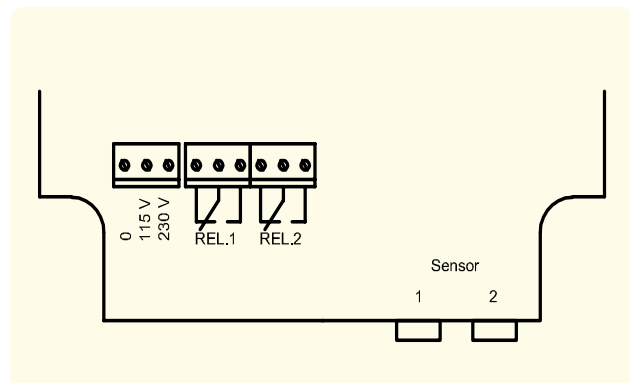
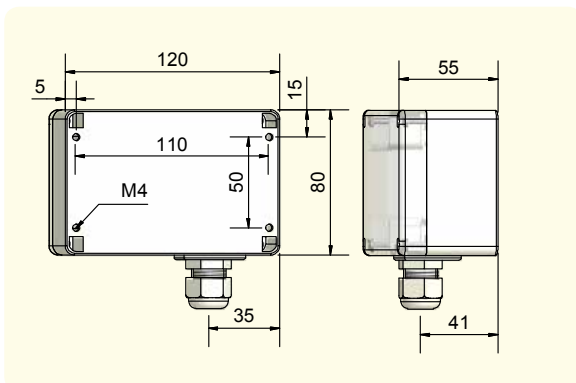


PER **LeVeL** Capacitive filling level evaluation unit - KFA  
Relay output

- For capacitive filling level probes with 2 limit value switching points  
KFS-52-...-Y55 or 2 probes with 1 limit value switching point  
KFS-51-...-Y55
- Operating voltage 115 / 230 V AC
- With Combicon connection



Technical data	
Output function	2 x change-over contact each channel
Type	<b>KFA-5-2-XL-II-CC-Y50</b>
Art.-No.	<b>AF 0102</b>
Operating voltage ( $U_B$ )	105...125 / 207...253 AC 50 / 60 Hz
Contact rating each relay max.	Max. 120 V DC / 1 A - 250 V AC / 4 A
Power consumption	Typ. 3 VA
Permitted ambient temperature	-25...+55 °C
LED-display LED-display	Green ( $U_B$ stand by) Static: green / red (full / empty)
Norm	EN 60947-5-2
Degree of protection IEC 60529	IP 54
Connection	Screwing clamp terminals and sockets
Housing material	ABS



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All specifications are subject to change without notice. (14.01.2020)



**PER LeVeL Capacitive filling level evaluation unit - KFA**  
**NPN output**  
**PNP output**

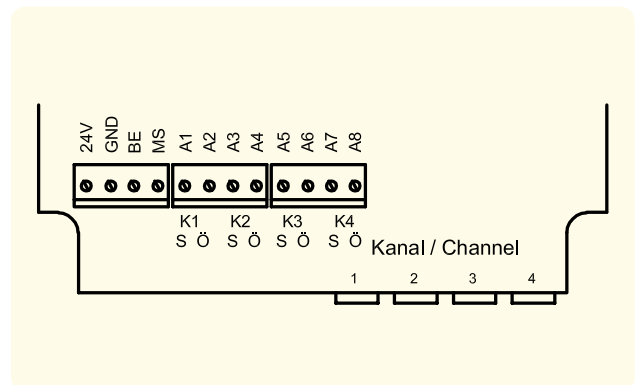
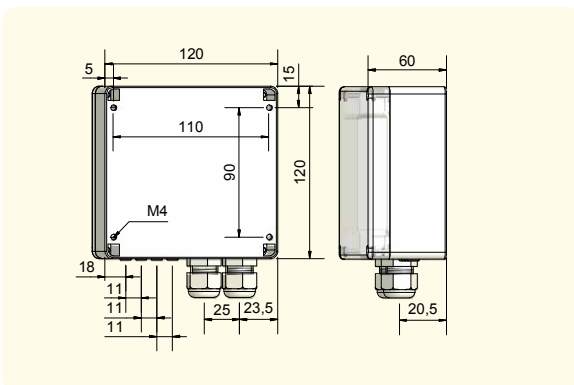
- For capacitive filling level probes with 1, 2 3 or 4 limit value switching points KFS-5...-Y55
- Operating voltage 18...36 V DC
- With Combicon connection



**Technical data**

Output function	4 x antivalent
<b>Type NPN</b>	<b>KFA-5-4-XXL-N-A-CC-Y50</b>
<b>Art. No</b>	<b>AF 0086</b>
<b>Type PNP</b>	<b>KFA-5-4-XXL-P-A-CC-Y50</b>
<b>Art. No.</b>	<b>AF 0063</b>
Operating voltage ( $U_B$ )	18...36 V DC
Voltage drop max. ( $U_d$ )	$\leq 2.5$ V
Permitted residual ripple max.	25 %
Operating current ( $I_B$ )	0...250 mA each channel
No-load current ( $I_0$ )	Typ. 120 mA
Switching frequency max.	4 Hz
Permitted ambient temperature	-25... +55 °C
LED-Display	Green / yellow
Protective circuit	Built-in
Degree of protection IEC 60529	IP 54
Norm	EN 60947-5-2
Connection	Screwing clamp terminals and sockets
Housing material	ABS

All specifications are subject to change without notice. (14.01.2020)



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## PER LEVEL Capacitive filling level evaluation unit - KFA

**NPN Output**

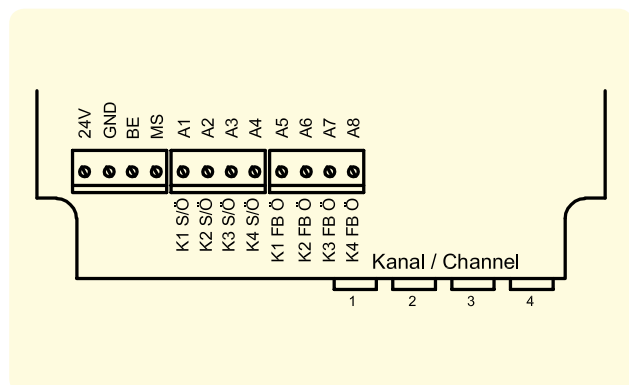
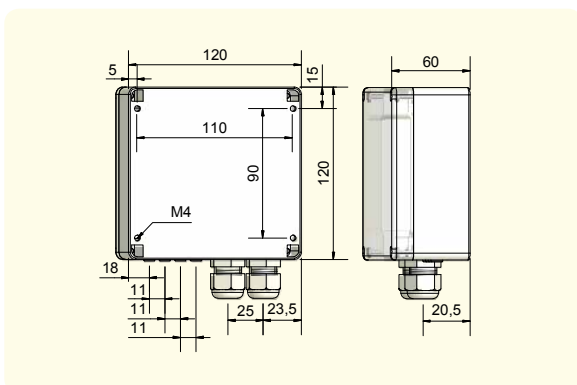
**PNP Output**

- For capacitive filling level probes with 1, 2 3 or 4 limit value switching points KFS-5...-Y55
- With sensor break control
- Operating voltage 18...36 V DC
- With Combicon connection



### Technical data

Output function	4 x Normally open	4 x Normally closed
<b>Type NPN</b>	<b>KFA-5-4-XXL-N-S-4FB-CC-Y50</b>	<b>KFA-5-4-XXL-N-Ö-4FB-CC-Y50</b>
<b>Art. No</b>	<b>AF 0091</b>	<b>AF 0090</b>
<b>Type PNP</b>	<b>KFA-5-4-XXL-P-S-4FB-CC-Y50</b>	<b>KFA-5-4-XXL-P-Ö-4FB-CC-Y50</b>
<b>Art. No.</b>	<b>AF 0046</b>	<b>AF 0089</b>
Operating voltage ( $U_B$ )	18...36 V DC	18...36 V DC
Voltage drop max. ( $U_d$ )	$\leq 2.5$ V	$\leq 2.5$ V
Permitted residual ripple max.	25 %	25 %
Operating current ( $I_o$ )	0...250 mA each channel	0...250 mA each channel
No-load current ( $I_o$ )	Typ. 130 mA	Typ. 130 mA
Switching frequency max.	4 Hz	4 Hz
Permitted ambient temperature	-25...+55 °C	-25...+55 °C
LED-Display	Green / yellow	Green / yellow
Protective circuit	Built-in	Built-in
Degree of protection IEC 60529	IP 54	IP 54
Norm	EN 60947-5-2	EN 60947-5-2
Connection	Screwing clamp terminals and sockets	Screwing clamp terminals and sockets
Housing material	ABS	ABS



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## PER LeVeL Capacitive filling level evaluation unit - KFA

NPN Output

PNP Output

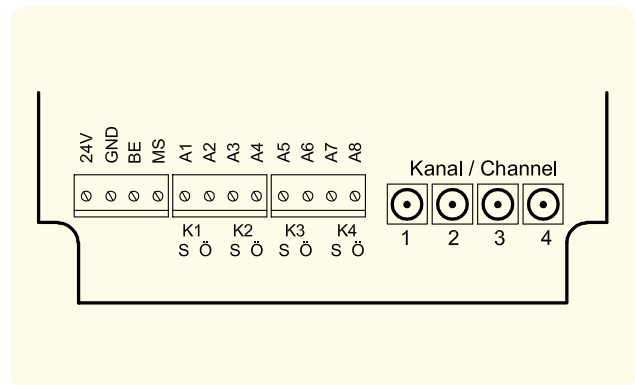
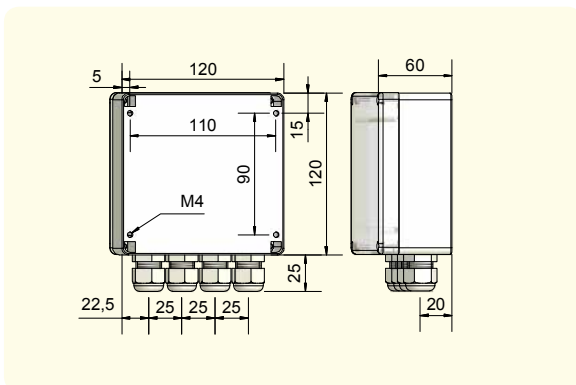
- For capacitive filling level probes with 1, 2 3 or 4 limit value switching points KFS-5...-Y75
- Operating voltage 18...36 V DC
- With Combicon connection



### Technical data

Output function	4 x antivalent
Type NPN	KFA-5-4-XXL-N-A-CC-Y70
Art. No	AF 0096
Type PNP	KFA-5-4-XXL-P-A-CC-Y70
Art. No.	AF 0080
Operating voltage ( $U_B$ )	18...36 V DC
Voltage drop max. ( $U_d$ )	$\leq 2.5$ V
Permitted residual ripple max.	25 %
Operating current ( $I_o$ )	0...250 mA each channel
No-load current ( $I_o$ )	Typ. 120 mA
Switching frequency max.	4 Hz
Permitted ambient temperature	-25... +55 °C
LED-Display	Green / yellow
Protective circuit	Built-in
Degree of protection IEC 60529	IP 54
Norm	EN 60947-5-2
Connection	Screwing clamp terminals and sockets
Housing material	ABS

All specifications are subject to change without notice. (14.01.2020)



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## PER LEVEL Capacitive filling level evaluation unit - KFA

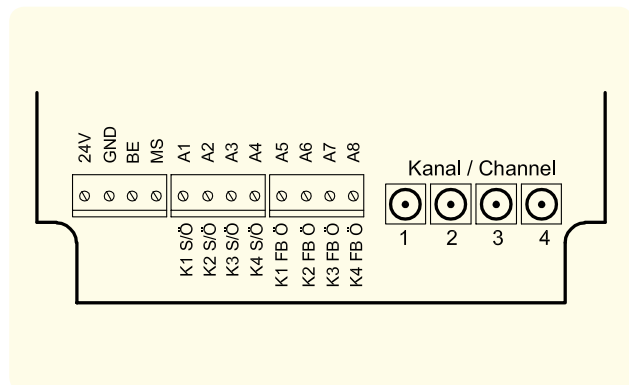
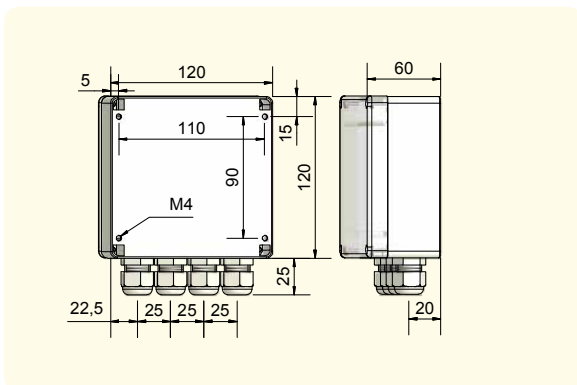
**NPN Output**

**PNP Output**

- For capacitive filling level probes with 1, 2, 3 or 4 limit value switching points KFS-5...-Y75
- With sensor break control
- Operating voltage 18...36 V DC
- With Combicon connection



Technical data		
Output function	4 x normally open	4 x normally closed
Type NPN	KFA-5-4-XXL-N-S-4FB-CC-Y70	KFA-5-4-XXL-N-Ö-4FB-CC-Y70
Art. No	AF 0097	AF 0098
Type PNP	KFA-5-4-XXL-P-S-4FB-CC-Y70	KFA-5-4-XXL-P-Ö-4FB-CC-Y70
Art. No.	AF 0099	AF 0100
Operating voltage ( $U_B$ )	18...36 V DC	18...36 V DC
Voltage drop max. ( $U_d$ )	$\leq 2.5$ V	$\leq 2.5$ V
Permitted residual ripple max.	25 %	25 %
Operating current ( $I_o$ )	0...250 mA each channel	0...250 mA each channel
No-load current ( $I_o$ )	Typ. 130 mA	Typ. 130 mA
Switching frequency max.	4 Hz	4 Hz
Permitted ambient temperature	-25...+55 °C	-25...+55 °C
LED-Display	Green / yellow	Green / yellow
Protective circuit	Built-in	Built-in
Degree of protection IEC 60529	IP 54	IP 54
Norm	EN 60947-5-2	EN 60947-5-2
Connection	Screwing clamp terminals and sockets	Screwing clamp terminals and sockets
Housing material	ABS	ABS



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PER **LeV&L** Capacitive filling level evaluation unit - KFA  
Relay output

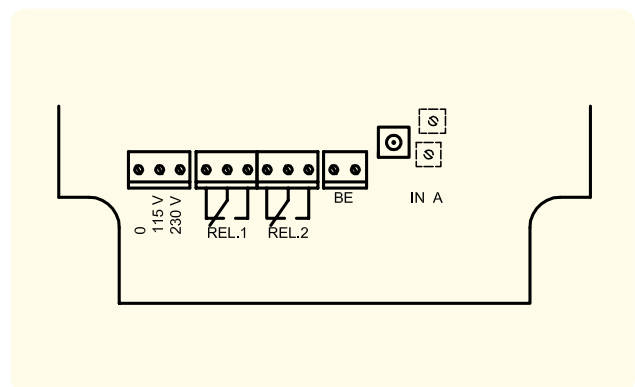
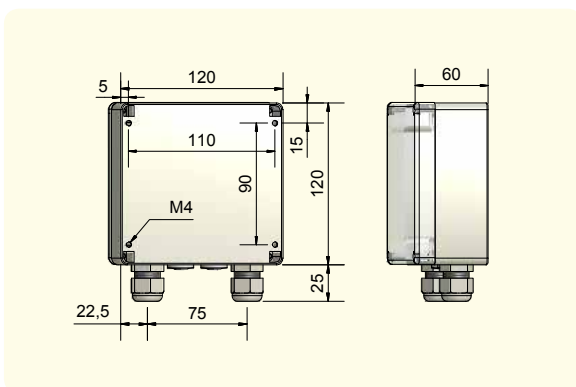
- For connection of one capacitive level probes with 1 limit value switching point KFS-51-...-Y75
- Operating voltage 115 / 230 V AC
- With wire break control



### Technical data

Output function	2 x change-over contact
Type	<b>KFA-5-1-XXL-I-FB-KL-PG9</b>
Art.-No.	<b>972 210</b>
Operating voltage (U <sub>B</sub> )	105...125 / 207...253 AC 50 / 60 Hz
Contact rating each relay max.	Max. 120 V DC / 1 A - 250 V AC / 4 A
Power consumption	Typ. 3 VA
Permitted ambient temperature	-25...+55 °C
LED-display	Green (U <sub>B</sub> stand by)
LED-display	Static: green / red (full / empty)
Wire break control	Green (flashing)
Norm	EN 60947-5-2
Degree of protection IEC 60529	IP 54
Connection	Screwing clamp terminals and sockets
Housing material	ABS

All specifications are subject to change without notice. (14.01.2020)



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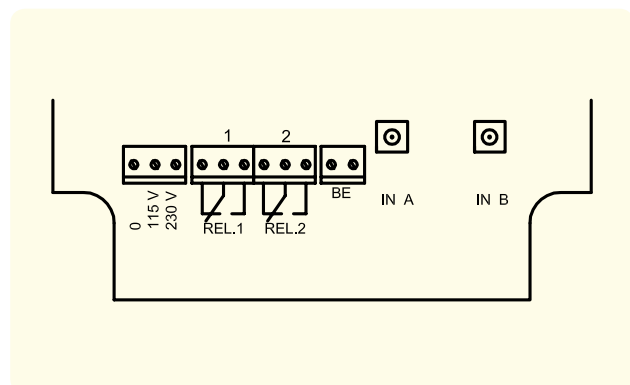
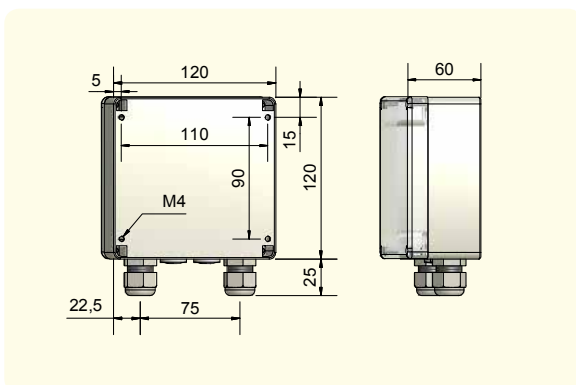


## PER LeVeL Capacitive filling level evaluation unit - KFA Relay output

- For capacitive filling level probes with 2 limit value switching points KFS-52-...-Y75 or 2 probes with 1 limit value switching point
- Operating voltage 115 / 230 V AC



Technical data	
Output function	1 x change-over contact each channel
Type	<b>KFA-5-2-XXL-II-KL-PG9</b>
Art.-No.	<b>AF 0049</b>
Operating voltage (U <sub>B</sub> )	105...125 / 207...253 AC 50 / 60 Hz
Contact rating each relay max.	Max. 120 V DC / 1 A - 250 V AC / 4 A
Power consumption	Typ. 3 VA
Permitted ambient temperature	-25...+55 °C
LED-display	Green (U <sub>B</sub> stand by)
LED-display	Static: green / red (full / empty)
Protective circuit (over temperature)	Built-in
Norm	EN 60947-5-2
Degree of protection IEC 60529	IP 54
Connection	Screwing clamp terminals and sockets
Housing material	ABS



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**CAPACITIVE, BINARY  
LEVEL MEASUREMENT SYSTEM**

*PER* **L&V&L**<sup>®</sup>

**Pages:**

General Description	72
Probe with 1 or 2 switching points (evaluation unit and probe permanently linked) KFK-5...-...-	73 - 75

All specifications are subject to change without notice. (14.01.2020)

## GENERAL DESCRIPTION

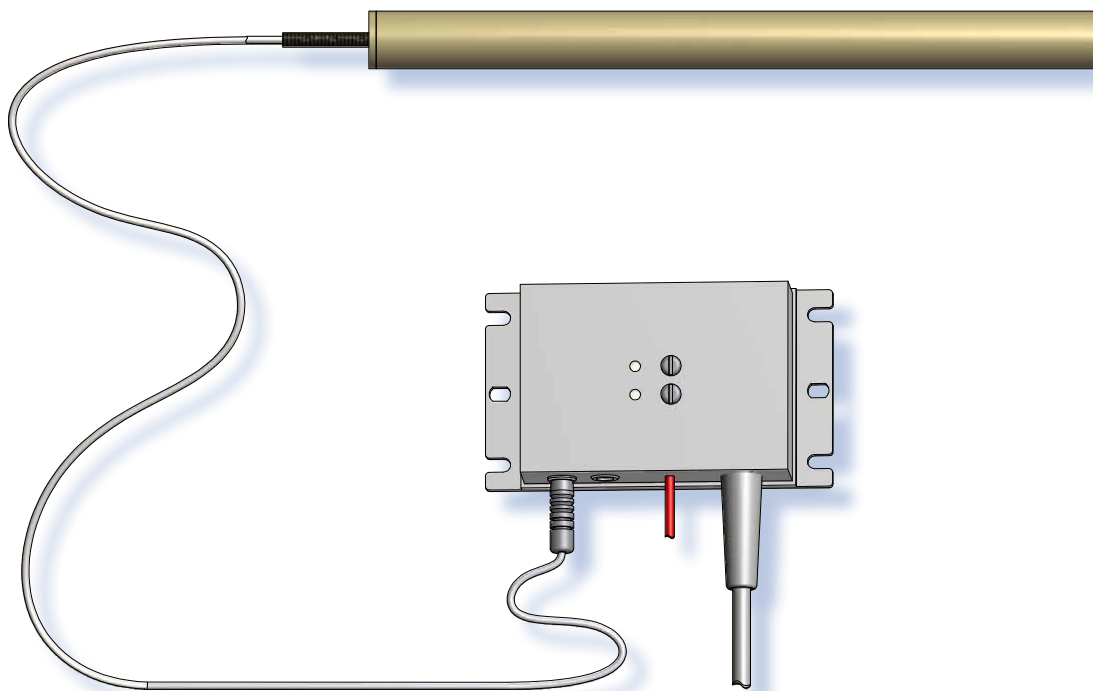
### LEVEL PROBE AND EVALUATION UNIT PERMANENTLY LINKED TOGETHER KFK-...

In this section we report about a Variant of the PerLevel Systems, where the level probe and the evaluation unit are permanently linked together by means of a cable.

All characteristic features of the PerLevel Systems remain the same, as mentioned under general information. The only difference is the fixed connection.

The omission of the plug connection provides a price advantage.

**These systems are available with 1 or 2 switching points.**





## PER LeVeL Capacitive Level Probe + Evaluation Unit PNP output

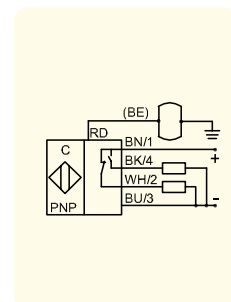
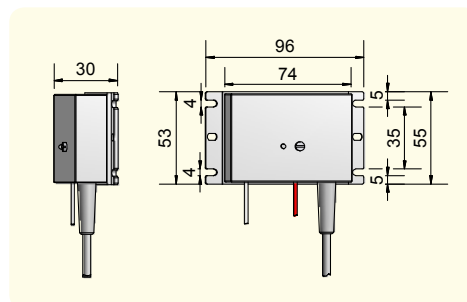
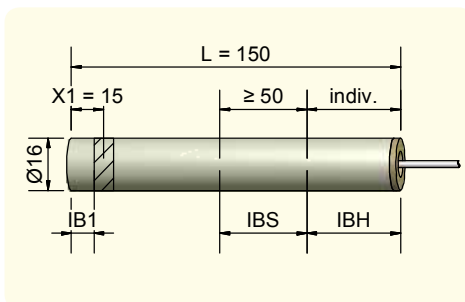
- Capacitive level probe with 1 switching point
- Sensor and evaluation unit fix connected together. Cable length between sensor and evaluation unit 0,6 m.
- BE - cable length 0.2 m
- Particularly suitable for level control of strong adhesive products, like hot melt, glue etc.



### Technical Data

Electrical version	4 wire DC
Output function	Antivalent
<b>Type PNP</b>	<b>KFK-51-15-150-15-GFK-D16-X0E-L-P-A-Z0E</b>
<b>Art. No.</b>	<b>KFK 009</b>
Operating voltage ( $U_B$ )	18...36 V DC
Voltage drop max. ( $U_d$ )	$\leq 2.5$ V
Permitted residual ripple max.	25 %
Operating current ( $I_e$ )	0...250 mA
No-load current ( $I_o$ )	Typ. 75 mA
Frequency of operating cycles max.	4 Hz
Permitted ambient temperature (Evaluation unit)	-25...+55 °C
Permitted ambient temperature (Probe)	-70...+200 °C
LED-display	Green / yellow
Protective circuit	Built-in
Norm	EN 60947-5-2
Degree of protection IEC 60529 (Evaluation unit)	IP 54
Degree of protection IEC 60529 (Probe)	IP 67
Connection cable	0.30 m, PVC 4 x 0.34 mm <sup>2</sup>
Housing material (Evaluation unit)	PA
Housing material (Probe)	GFK

All specifications are subject to change without notice. (14.01.2020)





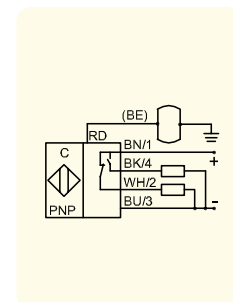
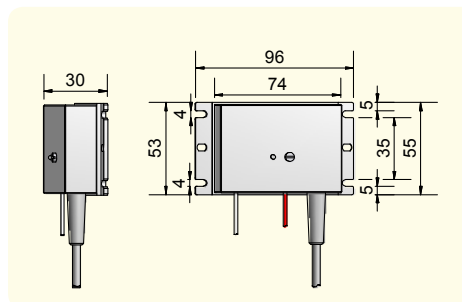
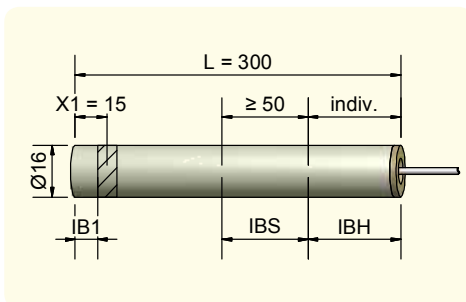
## PER LeVeL® Capacitive Level Probe + Evaluation Unit PNP output

- Capacitive level probe with 1 switching point
- Sensor and evaluation unit fix connected together. Cable length between sensor and evaluation unit 0,7 m.
- BE - cable length 0.15 m
- Particularly suitable for level control of strong adhesive products, like hot melt, glue etc.



### Technical Data

Electrical version	4 wire DC
Output function	Antivalent
<b>Type PNP</b>	<b>KFK-51-15-300-15-GFK-D16-X0E-L-P-A-Z0E</b>
<b>Art. No.</b>	<b>KFK 025</b>
Operating voltage ( $U_B$ )	18...36 V DC
Voltage drop max. ( $U_d$ )	$\leq 2.5$ V
Permitted residual ripple max.	25 %
Operating current ( $I_a$ )	0...250 mA
No-load current ( $I_0$ )	Typ. 75 mA
Frequency of operating cycles max.	4 Hz
Permitted ambient temperature (Evaluation unit)	-25...+55 °C
Permitted ambient temperature (Probe)	-70...+200 °C
LED-display	Green / yellow
Protective circuit	Built-in
Norm	EN 60947-5-2
Degree of protection IEC 60529 (Evaluation unit)	IP 54
Degree of protection IEC 60529 (Probe)	IP 67
Connection cable	0.76 m, PVC 4 x 0.34 mm <sup>2</sup>
Housing material (Evaluation unit)	PA
Housing material (Probe)	GFK



All specifications are subject to change without notice. (14.01.2020)



## PER **LeVeL** Capacitive Level Probe + Evaluation Unit PNP output

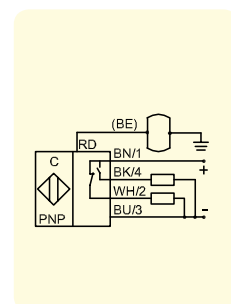
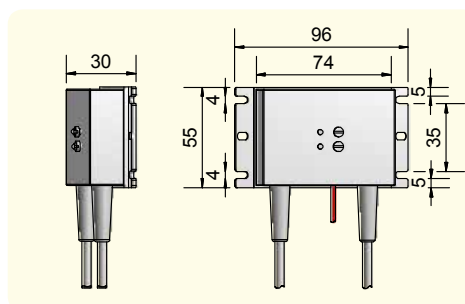
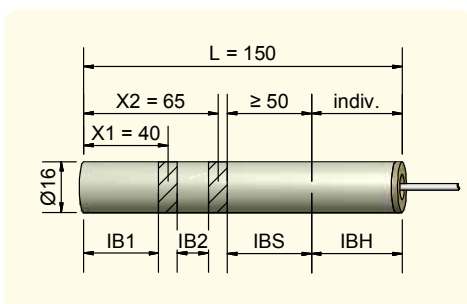
- Capacitive level probe with 2 switching points
- Sensor and evaluation unit fix connected together. Cable length between sensor and evaluation unit 0.25 m.
- BE - cable length 0.15 m
- Particularly suitable for level control of strong adhesive products, like hot melt, glue etc.



### Technical Data

Electrical version	4 wire DC
Output function	Normally open
<b>Type PNP</b>	<b>KFK-52-15-150-40/65-PTFE-D16-X0E-L-P-S-Z0E</b>
<b>Art. No.</b>	<b>KFK 031</b>
Operating voltage ( $U_b$ )	18...36 V DC
Voltage drop max. ( $U_d$ )	≤ 2.5 V
Permitted residual ripple max.	25 %
Operating current ( $I_e$ )	2 x 0...250 mA
No-load current ( $I_o$ )	Typ. 75 mA
Frequency of operating cycles max.	4 Hz
Permitted ambient temperature (Evaluation unit)	-25...+55 °C
Permitted ambient temperature (Probe)	-70...+250 °C
LED-display	Green / yellow
Protective circuit	Built-in
Norm	EN 60947-5-2
Degree of protection IEC 60529 (Evaluation unit)	IP 54
Degree of protection IEC 60529 (Probe)	IP 67
Connection cable	Flange connector M 12 x 1 with 110 mm in cable length
Housing material (Evaluation unit)	PA
Housing material (Probe)	PTFE (FDA 21 CFR 177.1550)

All specifications are subject to change without notice. (14.01.2020)



All specifications are subject to change without notice. (14.01.2020)

**CAPACITIVE, BINARY  
LEVEL MEASUREMENT SYSTEM**

**PER L&V&L®**

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Probes compact with 1 or 2 switching points KFX-5...	79 - 81
Probes compact with min/max control	82

All specifications are subject to change without notice. (14.01.2020)

## Capacitive level measuring system for limit value measurement Compact design: KFX-5...

In this section we describe a Variant of the PerLevel Systems, where the evaluation unit is integrated in the connection head.

All characteristic features of the PerLevel Systems remain the same, as mentioned under general information.

A difference to the version with remote evaluation unit is the permitted ambient temperature. With the integrated evaluation unit in the connection head the permitted ambient temperature is lower. With integration of a temperature barrier and with use of a temperature buffer, this value can be increased.

**Compact, space saving level measuring system.**

**Process connection G1"**

**Different process connection adapters are available, like Varivent DN 50, Triclamp, etc.**

**These systems are available with 1 or 2 switching points.**







## PER LeVeL Capacitive Filling Level Probe - KFX

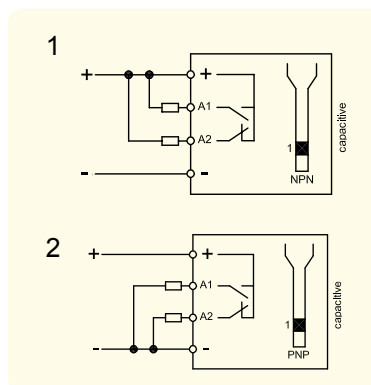
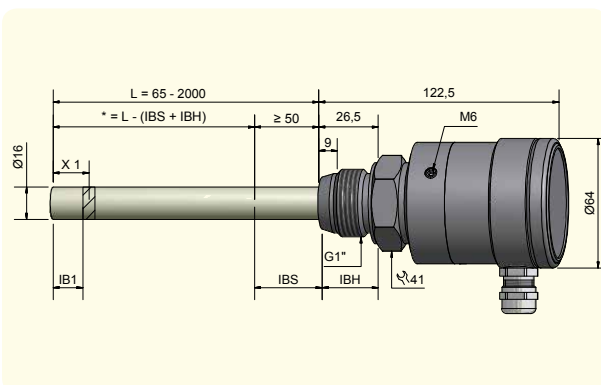
**NPN Output - Antivalent (NO + NC)**  
**PNP Output - Antivalent (NO + NC)**  
**1 Limit value switching point**

- Integrated evaluation electronics
- Housing material (active zone): See below, Ø 16 mm
- Connection head and process connection stainless steel VA
- Process connection G1"
- Probe length max. 2000 mm



Technical data		
Active zones, related to probe tip	10...25 mm	10...25 mm
Electrical version	4 connections DC	4 connections DC
Output function	Antivalent	Antivalent
<b>Type NPN</b>	<b>KFX-51-15-"L"-15-GFK/VAc-D16-PHG1-N-A-KL</b>	<b>KFX-51-15-"L"-15-PTFE/VAc-D16-PHG1-N-A-KL</b>
Connection diagram No.	1	1
<b>Type PNP</b>	<b>KFX-51-15-"L"-15-GFK/VAc-D16-PHG1-P-A-KL</b>	<b>KFX-51-15-"L"-15-PTFE/VAc-D16-PHG1-P-A-KL</b>
Connection diagram No.	2	2
Operating voltage ( $U_B$ )	18...36 V DC	18...36 V DC
Voltage drop max. ( $U_D$ )	≤ 2.5 V	≤ 2.5 V
Permitted residual ripple max.	25 %	25 %
Operating current ( $I_e$ )	2 x 0...250	2 x 0...250
No-load current ( $I_0$ )	Typ. 50 mA	Typ. 50 mA
Switching frequency max.	4 Hz	4 Hz
Permitted ambient temperature	-25...+55 °C	-25...+55 °C
Permitted ambient temperature (for active zone)	-25...+100 °C	-25...+100 °C
Pressure	25 bar	2 bar
LED-Display	Green / yellow	Green / yellow
Protective circuit	Built-in	Built-in
Degree of protection IEC 60529	IP 67	IP 67
Norm	EN 60947-5-2	EN 60947-5-2
Connection	Clamp terminal within the connection head	Clamp terminal within the connection head
Housing material	VA No. 1.4404 / AISI 316 L (FDA conform)	VA No. 1.4404 / AISI 316 L (FDA conform)
Active zone	GFK	PTFE (FDA 21 CFR 177.1550)
For matching accessories please see our selection of accessories.		

All specifications are subject to change without notice. (14.01.2020)



Please determine the total length „L“ when ordering.

Other housing materials for the active zone (probe), like PEEK, PVDF or PE on request.

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## PER LeVeL Capacitive Filling Level Probe - KFX

**NPN Output - Normally Open (NO)**

**PNP Output - Normally Open (NO)**

**2 Limit value switching points**

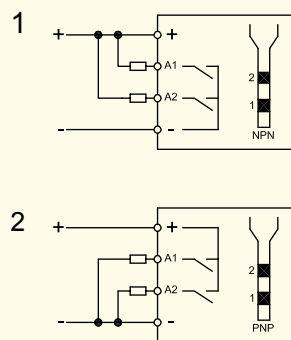
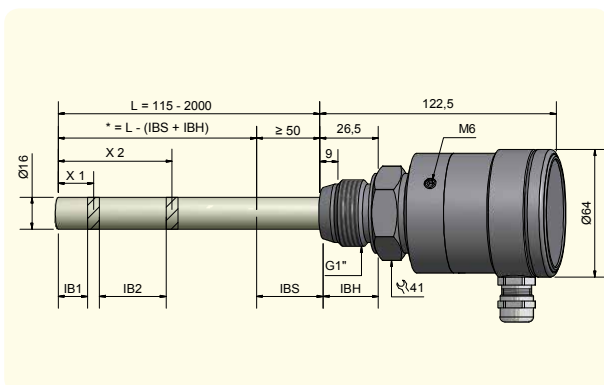
- Integrated evaluation electronics
- Housing material (active zone): See below, Ø 16 mm
- Connection head and process connection stainless steel VA
- Process connection G1"
- Probe length max. 2000 mm



### Technical data

Active zones, related to probe tip	10...25 mm + 1 x type specific X2	10...25 mm + 1 x type specific X2
Electrical version	4 connections DC	4 connections DC
Output function	Normally open	Normally open
<b>Type NPN</b>	<b>KFX-52-15-"L"-15/X2-GFK/VAc-D16-PHG1-N-S-KL</b>	<b>KFX-52-15-"L"-15/X2-PTFE/VAc-D16-PHG1-N-S-KL</b>
Connection diagram No.	1	1
<b>Type PNP</b>	<b>KFX-52-15-"L"-15/X2-GFK/VAc-D16-PHG1-P-S-KL</b>	<b>KFX-52-15-"L"-15/X2-PTFE/VAc-D16-PHG1-P-S-KL</b>
Connection diagram No.	2	2
Operating voltage (U <sub>B</sub> )	18...36 V DC	18...36 V DC
Voltage drop max. (U <sub>d</sub> )	≤ 2.5 V	≤ 2.5 V
Permitted residual ripple max.	25 %	25 %
Operating current (I <sub>e</sub> )	2 x 0...250	2 x 0...250
No-load current (I <sub>0</sub> )	Typ. 50 mA	Typ. 50 mA
Switching frequency max.	4 Hz	4 Hz
Permitted ambient temperature	-25...+55 °C	-25...+55 °C
Permitted ambient temperature (for active zone)	-25...+100 °C	-25...+100 °C
Pressure	25 bar	2 bar
LED-Display	Green / yellow	Green / yellow
Protective circuit	Built-in	Built-in
Degree of protection IEC 60529	IP 67	IP 67
Norm	EN 60947-5-2	EN 60947-5-2
Connection	Clamp terminal within the connection head	Clamp terminal within the connection head
Housing material	VA No. 1.4404 / AISI 316 L (FDA conform)	VA No. 1.4404 / AISI 316 L (FDA conform)
Active zone	GFK	PTFE (FDA 21 CFR 177.1550)

For matching accessories please see our selection of accessories.



Please determine the total length „L“ and the position of the second switching point „X2“ when ordering.

Other housing materials for the active zone (probe), like PEEK, PVDF or PE on request.

Made in Germany

All specifications are subject to change without notice. (14.01.2020)



## PER LeVeL Capacitive Filling Level Probe - KFX

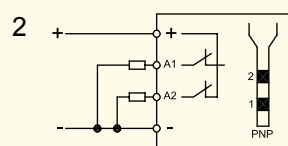
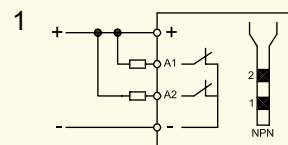
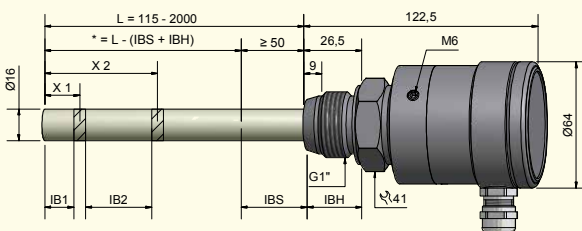
**NPN Output - Normally Closed (NC)**  
**PNP Output - Normally Closed (NC)**  
**2 Limit value switching points**

- Integrated evaluation electronics
- Housing material (active zone): See below, Ø 16 mm
- Connection head and process connection stainless steel VA
- Process connection G1"
- Probe length max. 2000 mm



Technical data		
Active zones, related to probe tip	10...25 mm + 1 x type specific X2	10...25 mm + 1 x type specific X2
Electrical version	4 connections DC	4 connections DC
Output function	Normally closed	Normally closed
<b>Type NPN</b>	<b>KFX-52-15-“L“-15/X2-GFK/VAc-D16-PHG1-N-Ö-KL</b>	<b>KFX-52-15-“L“-15/X2-PTFE/VAc-D16-PHG1-N-Ö-KL</b>
Connection diagram No.	1	1
<b>Type PNP</b>	<b>KFX-52-15-“L“-15/X2-GFK/VAc-D16-PHG1-P-Ö-KL</b>	<b>KFX-52-15-“L“-15/X2-PTFE/VAc-D16-PHG1-P-Ö-KL</b>
Connection diagram No.	2	2
Operating voltage (U <sub>B</sub> )	18...36 V DC	18...36 V DC
Voltage drop max. (U <sub>d</sub> )	≤ 2.5 V	≤ 2.5 V
Permitted residual ripple max.	25 %	25 %
Operating current (I <sub>e</sub> )	2 x 0...250	2 x 0...250
No-load current (I <sub>0</sub> )	Typ. 50 mA	Typ. 50 mA
Switching frequency max.	4 Hz	4 Hz
Permitted ambient temperature	-25...+55 °C	-25...+55 °C
Permitted ambient temperature (for active zone)	-25...+100 °C	-25...+100 °C
Pressure	25 bar	2 bar
LED-Display	Green / yellow	Green / yellow
Protective circuit	Built-in	Built-in
Degree of protection IEC 60529	IP 67	IP 67
Norm	EN 60947-5-2	EN 60947-5-2
Connection	Clamp terminal within the connection head	Clamp terminal within the connection head
Housing material	VA No. 1.4404 / AISI 316 L (FDA conform)	VA No. 1.4404 / AISI 316 L (FDA conform)
Active zone	GFK	PTFE (FDA 21 CFR 177.1550)
For matching accessories please see our selection of accessories.		

All specifications are subject to change without notice. (14.01.2020)



Please determine the total length „L“ and the position of the second switching point “X2” when ordering.

Other housing materials for the active zone (probe), like PEEK, PVDF or PE on request.

Made in Germany



## PER LeVeL Capacitive Filling Level Probe - KFX

**NPN Output - Antivalent (NO + NC)**  
**PNP Output - Antivalent (NO + NC)**  
**2 Limit value switching points / MIN/MAX-Control**

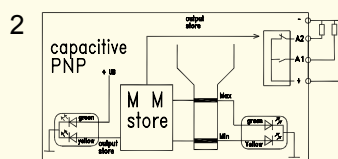
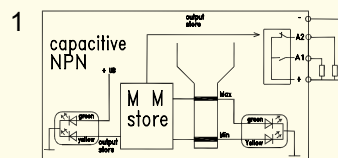
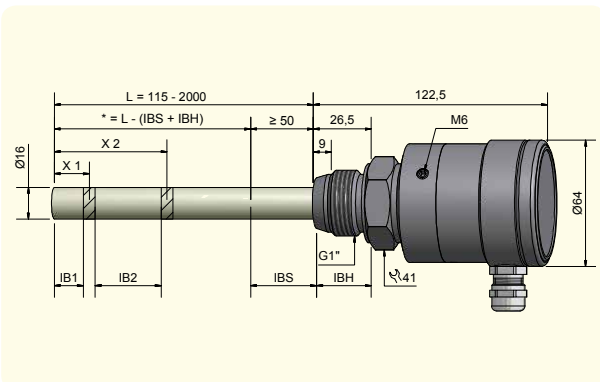
- Integrated evaluation electronics
- Housing material (active zone): See below, Ø 16 mm
- Connection head and process connection stainless steel VA
- Process connection G1"
- Probe length max. 2000 mm



### Technical data

Active zones, related to probe tip	10...25 mm + 1 x type specific X2	10...25 mm + 1 x type specific X2
Electrical version	4 connections DC	4 connections DC
Output function	Antivalent	Antivalent
<b>Type NPN</b>	<b>KFX-52-15-"L"-15/X2-GFK/VAc-D16-PHG1-N-A-KL-E</b>	<b>KFX-52-15-"L"-15/X2-PTFE/VAc-D16-PHG1-N-A-KL-E</b>
Connection diagram No.	1	1
<b>Type PNP</b>	<b>KFX-52-15-"L"-15/X2-GFK/VAc-D16-PHG1-P-A-KL-E</b>	<b>KFX-52-15-"L"-15/X2-PTFE/VAc-D16-PHG1-P-A-KL-E</b>
Connection diagram No.	2	2
Operating voltage (U <sub>B</sub> )	18...36 V DC	18...36 V DC
Voltage drop max. (U <sub>d</sub> )	≤ 2.5 V	≤ 2.5 V
Permitted residual ripple max.	25 %	25 %
Operating current (I <sub>e</sub> )	2 x 0...250	2 x 0...250
No-load current (I <sub>0</sub> )	Typ. 50 mA	Typ. 50 mA
Switching frequency max.	4 Hz	4 Hz
Permitted ambient temperature	-25...+55 °C	-25...+55 °C
Permitted ambient temperature (for active zone)	-25...+100 °C	-25...+100 °C
Pressure	25 bar	2 bar
LED-Display	Green / yellow	Green / yellow
Protective circuit	Built-in	Built-in
Degree of protection IEC 60529	IP 67	IP 67
Norm	EN 60947-5-2	EN 60947-5-2
Connection	Clamp terminal within the connection head	Clamp terminal within the connection head
Housing material	VA No. 1.4404 / AISI 316 L (FDA conform)	VA No. 1.4404 / AISI 316 L (FDA conform)
Active zone	GFK	PTFE (FDA 21 CFR 177.1550)

For matching accessories please see our selection of accessories.



Please determine the total length „L“ and the position of the second switching point „X2“ when ordering.

Other housing materials for the active zone (probe), like PEEK, PVDF or PE on request.

Made in Germany

All specifications are subject to change without notice. (14.01.2020)

**CAPACITIVE, BINARY  
LEVEL MEASUREMENT SYSTEM**

*PER* **LEVEL**<sup>®</sup>



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Probes compact with 1 or 2 switching points (KFX-5-...-STEX)	87 - 89

All specifications are subject to change without notice. (14.01.2020)

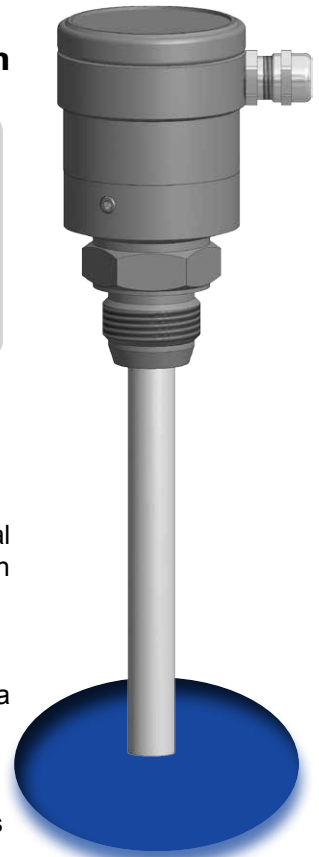
## GENERAL DESCRIPTION - ATEX

PER **LEVEL**®

This capacitive measurement is based on the generation of an electric field between Container and probe. Herewith a "measuring capacitor" is formed. Within this measuring capacitor the filling material works as a dielectric that changes its capacity. These capacity changes are electronically evaluated and are converted into the desired output signals.

### Basic configuration of the Limit Value Measuring System

- System with separate Evaluation Unit  
Probe + Connection cable + Electronic Evaluation Unit
- Probe with evaluation electronics integrated in the connection head



### System with separate Evaluation Unit:

#### Probe

The probe is a passive component. With the ATEX certified version the housing material of the probe must be PTFE and stainless steel for the connection head. The connection head provides a 1" process connection.

#### Electronic Evaluation Unit

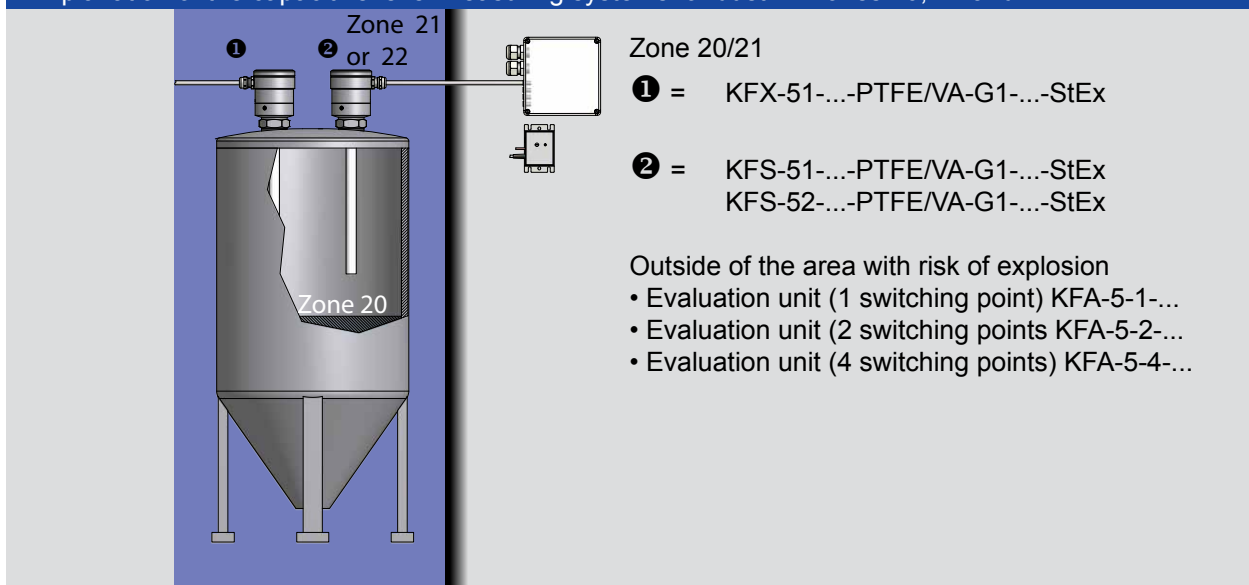
The Electronic Evaluation Unit is separate and must be installed outside of the area with risk of explosion.

#### Compact version

Probe with evaluation unit integrated in the connection head for 1 or 2 measuring points

### Schematic illustration of how to mount the system:

Explanation of the capacitive level measuring systems for dust Ex zones 20, 21 and 22



All specifications are subject to change without notice. (14.01.2020)



**PER LeVeL Capacitive Filling Level Probe - KFS - ATEX**  
**1 Limit value switching point**

- For connection to the capacitive amplifier KFA-5-...
- For use in areas with the risk of dust explosion, zone 20
- For use in areas with the risk of gas explosion, zone 1
- Housing material (active zone): PTFE, Ø 16 mm
- Connection head and process connection stainless steel VA
- Process connection G 1"
- Probe length max. 1900 mm

BVS 05 ATEX E 185	IECEX BVS 07.0032
II 2G Ex mb II T4	Ex mb II T4
II 1/2 D IP 67 T 110°C	Ex tD A20/21 IP 67 T 110°C



**Technical data**

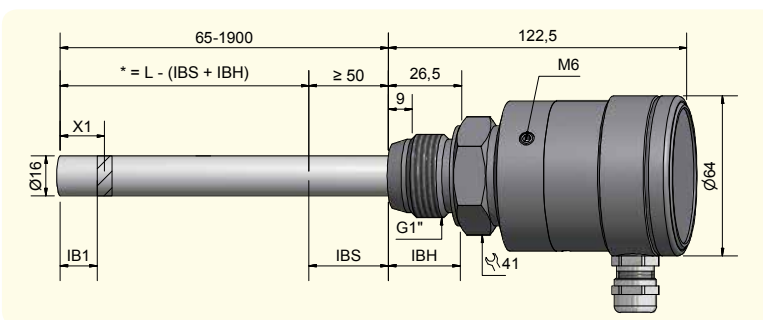
Active zone	10...25 mm, related to the probe tip
<b>Type</b>	<b>KFS-5-1-“L“-15-PTFE/VA-1”-StEx</b>
Permitted ambient temperature	-20...+100 °C
Permitted ambient temperature (active zone)	-20...+100 °C
Degree of protection IEC 60529	IP 67*
Norm	EN 60947-5-2
Connection to the evaluation unit KFA-5-...	Sockets within the connection head
Housing material	VA No. 1.4404 / AISI 316 L (FDA conform)
Housing material (active zone)	PTFE (FDA 21 CFR 177.1550)

**Accessories:**

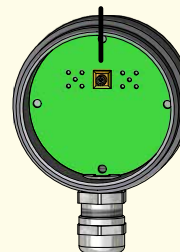
For evaluation unit KFA-5-...-Y50:	Plug connection Y75 / Y55, 2 m cable length, # 66101213, is not delivered with the probe
For evaluation unit KFA-5-...-Y70:	Plug connection Y75 / Y75, 2 m cable length, # 66101203, is not delivered with the probe
For matching accessories please see our selection of accessories.	

\* The degree of protection may be increased by means of special measures at mounting (e. g. injection of silicone mixture).

All specifications are subject to change without notice. (14.01.2020)



**Connection socket within connection head**



Please determine the total length „L“ when ordering.

**Made in Germany**



## PER LeVeL Capacitive Filling Level Probe - KFS - ATEX 2 Limit value switching points

- For connection to the capacitive amplifier KFA-5-...
- For use in areas with the risk of dust explosion, zone 20
- For use in areas with the risk of gas explosion, zone 1
- Housing material (active zone): PTFE, Ø 16 mm
- Connection head and process connection stainless steel VA
- Process connection G 1"
- Probe length max. 1900 mm

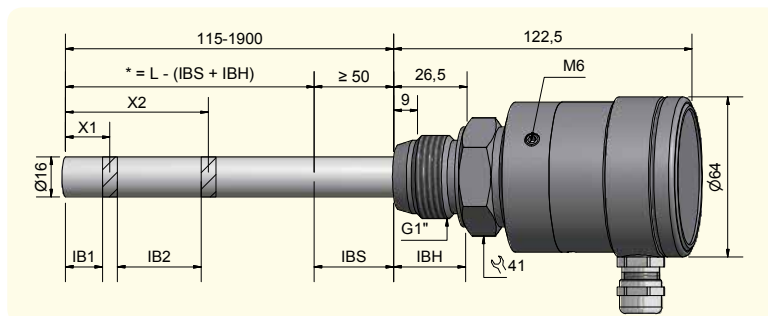
BVS 05 ATEX E 185	IECEX BVS 07.0032
II 2G Ex mb II T4	Ex mb II T4
II 1/2 D IP 67 T 110°C	Ex tD A20/21 IP 67 T 110°C



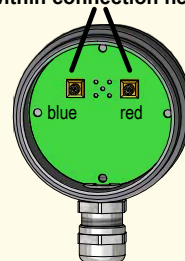
### Technical data

Active zone	10...25 mm, related to the probe tip + 1 x type specific X2
Type	<b>KFS-5-2-“L“-15/X2-PTFE/VA-1”-StEx</b>
Permitted ambient temperature	-20...+100 °C
Permitted ambient temperature (active zone)	-20...+100 °C
Degree of protection IEC 60529	IP 67*
Norm	EN 60947-5-2
Connection to the evaluation unit KFA-5-...	Sockets within the connection head
Housing material	VA No. 1.4404 / AISI 316 L (FDA conform)
Housing material (active zone)	PTFE (FDA 21 CFR 177.1550)
<b>Accessories:</b>	
For evaluation unit KFA-5-...-Y50:	Plug connection Y75 / Y55, 2 m cable length, # 66101242, is not delivered with the probe
For evaluation unit KFA-5-...-Y70:	Plug connection Y75 / Y75, 2 m cable length, # 66101204, is not delivered with the probe
For matching accessories please see our selection of accessories.	

\* The degree of protection may be increased by means of special measures at mounting (e. g. injection of silicone mixture).



### Connection sockets within connection head



Please determine the total length „L“ and the position of the second switching point “X2” when ordering.

**Made in Germany**





## PER LeVeL Capacitive Filling Level Probe - KFX - ATEX

NPN Output - Antivalent (NO + NC)

PNP Output - Antivalent (NO + NC)

1 Limit value switching point

- Integrated evaluation electronics
- For use in areas with the risk of dust explosion, zone 20
- For use in areas with the risk of gas explosion, zone 1
- Housing material (active zone): PTFE, Ø 16 mm
- Connection head and process connection stainless steel VA
- Process connection G 1"
- Probe length max. 1900 mm

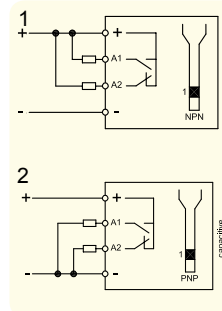
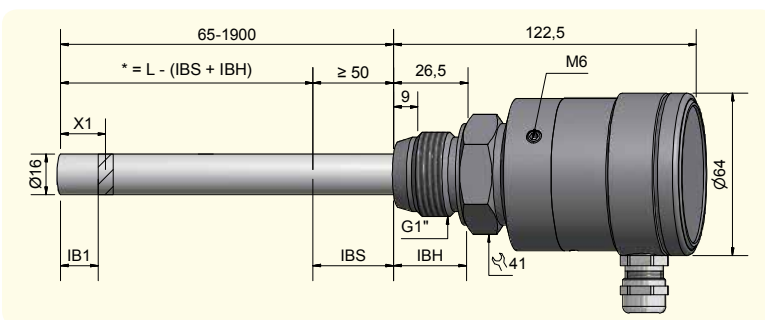
BVS 05 ATEX E 185	IECEX BVS 07.0032
II 2G Ex mb II T4	Ex mb II T4
II 1/2 D IP 67 T 110°C	Ex tD A20/21 IP 67 T 110°C



### Technical data

Active zone, related to probe tip	10...25 mm
Electrical version	4 connections DC
Output function	Antivalent
<b>Type</b>	<b>KFX-5-1-"L"-15-N-A-PTFE/VA-1"-StEx</b>
Connection diagram No.	1
<b>Type</b>	<b>KFX-5-1-"L"-15-P-A-PTFE/VA-1"-StEx</b>
Connection diagram No.	2
Operating voltage (U <sub>B</sub> )	18...30 V DC
Voltage drop max. (U <sub>d</sub> )	≤ 2,5 V
Permitted residual ripple max.	25 %
No-load current (I <sub>0</sub> )	Typ. 50 mA
Switching frequency max.	4 Hz
Operating current (I <sub>e</sub> )	2 x 0...100 mA
Permitted ambient temperature	-20...+55 °C
Permitted ambient temperature (for active zone)	-20...+100 °C
LED-display	Green / yellow
Protective circuit	Build-in
Degree of protection IEC 60529	IP 67
Norm	EN 60947-5-2
Connection cable	10 m, PVC, 4 x 0.5 mm <sup>2</sup>
Housing material	VA No. 1.4404
Housing material (active zone)	PTFE (FDA 21 CFR 177.1550)
For matching accessories please see our selection of accessories.	

All specifications are subject to change without notice. (14.01.2020)



Please determine the total length „L“ when ordering.

**Made in Germany**



**PER Level Capacitive Filling Level Probe - KFX - ATEX**  
**NPN Output - Normally Closed (NC)**  
**PNP Output - Normally Closed (NC)**  
**2 Limit value switching points**

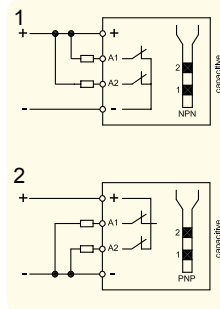
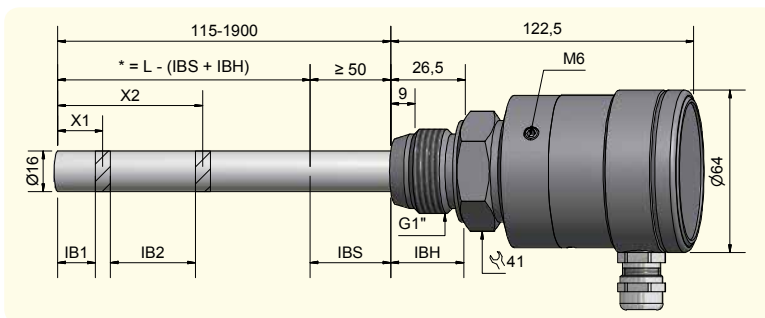
- Integrated evaluation electronics
- For use in areas with the risk of dust explosion, zone 20
- For use in areas with the risk of gas explosion, zone 1
- Housing material (active zone): PTFE, Ø 16 mm
- Connection head and process connection stainless steel VA
- Process connection G 1"
- Probe length max. 1900 mm

BVS 05 ATEX E 185	IECEX BVS 07.0032
⊕ II 2G Ex mb II T4	Ex mb II T4
⊕ II 1/2 D IP 67 T 110°C	Ex tD A20/21 IP 67 T 110°C



### Technical data

Active zone, related to probe tip	10...25 mm, + 1 x type specific X2
Electrical version	4 connections DC
Output function	Normally closed
<b>Type</b>	<b>KFX-5-2-"L"-15/X2-N-Ö-PTFE/VA-1"-StEx</b>
Connection diagram No.	1
<b>Type</b>	<b>KFX-5-2-"L"-15/X2-P-Ö-PTFE/VA-1"-StEx</b>
Connection diagram No.	2
Operating voltage (U <sub>B</sub> )	18...30 V DC
Voltage drop max. (U <sub>d</sub> )	≤ 2,5 V
Permitted residual ripple max.	25 %
Operating current (I <sub>a</sub> )	2 x 0...100 mA
No-load current (I <sub>o</sub> )	Typ. 50 mA
Switching frequency max.	4 Hz
Permitted ambient temperature	-20...+55 °C
Permitted ambient temperature (for active zone)	-20...+100 °C
LED-display	Green / yellow
Protective circuit	Build-in
Degree of protection IEC 60529	IP 67
Norm	EN 60947-5-2
Connection cable	10 m, PVC, 4 x 0.5 mm <sup>2</sup>
Housing material	VA No. 1.4404
Housing material (active zone)	PTFE (FDA 21 CFR 177.1550)
For matching accessories please see our selection of accessories.	



Please determine the total length „L“ and the position of the second switching point „X2“ when ordering.

**Made in Germany**

All specifications are subject to change without notice. (14.01.2020)



**PER LeVeL Capacitive Filling Level Probe - KFX - ATEX**  
**NPN Output - Normally Open (NO)**  
**PNP Output - Normally Open (NO)**  
**2 Limit value switching points**

- Integrated evaluation electronics
- For use in areas with the risk of dust explosion, zone 20
- For use in areas with the risk of gas explosion, zone 1
- Housing material (active zone): PTFE, Ø 16 mm
- Connection head and process connection stainless steel VA
- Process connection G 1"
- Probe length max. 1900 mm

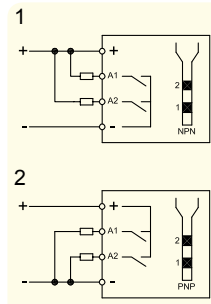
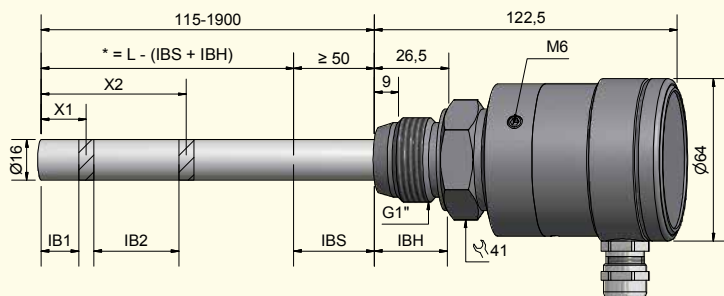
BVS 05 ATEX E 185	IECEX BVS 07.0032
II 2G Ex mb II T4	Ex mb II T4
II 1/2 D IP 67 T 110°C	Ex tD A20/21 IP 67 T 110°C



### Technical data

Active zone, related to probe tip	10...25 mm + 1 x type specific X2
Electrical version	4 connections DC
Output function	Normally open
<b>Type</b>	<b>KFX-5-2-"L"-15/X2-N-S-PTFE/VA-1"-StEx</b>
Connection diagram No.	1
<b>Type</b>	<b>KFX-5-2-"L"-15/X2-P-S-PTFE/VA-1"-StEx</b>
Connection diagram No.	2
Operating voltage ( $U_B$ )	18...30 V DC
Voltage drop max. ( $U_d$ )	≤ 2,5 V
Permitted residual ripple max.	25 %
Operating current ( $I_e$ )	2 x 0...100 mA
No-load current ( $I_o$ )	Typ. 50 mA
Switching frequency max.	4 Hz
Permitted ambient temperature	-20...+55 °C
Permitted ambient temperature (for active zone)	-20...+100 °C
LED-display	Green / yellow
Protective circuit	Build-in
Degree of protection IEC 60529	IP 67
Norm	EN 60947-5-2
Connection cable	10 m, PVC, 4 x 0.5 mm <sup>2</sup>
Housing material	VA No. 1.4404
Housing material (active zone)	PTFE (FDA 21 CFR 177.1550)
For matching accessories please see our selection of accessories.	

All specifications are subject to change without notice. (14.01.2020)



Please determine the total length „L“ and the position of the second switching point „X2“ when ordering.

**Made in Germany**



**ACCESSORIES**

Pages:

Probe holder	92 - 97
Squeeze clamps	98 - 99
Varivent	100
Triclamp adapter	101 - 102
Connection cable with connectors	103

All specifications are subject to change without notice. (14.01.2020)



## Squeeze clamps for capacitive filling level systems with 16 mm in diameter

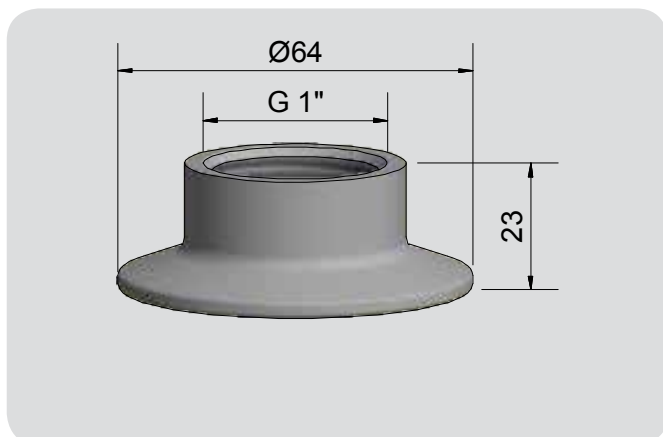
Process connection: PG16

- Mounting device for probes (Ø 16mm) without connection head
- Housing material: Brass
- With NBR O-rings



### Technical Data

Process connection	PG16
Applicable for capacitive level probes with diameter	16 mm
<b>Type</b>	<b>A-KLV-D16-PG16-MS/NBR</b>
<b>Art. No.</b>	<b>194 000</b>
Housing material	Brass
Surface quality Ra, part in contact with the medium	0,4 µm
<b>Accessories</b> (delivered with the unit)	1 nut





### Squeeze clamps for capacitive filling level systems with 16 mm in diameter

Process connection: PG16

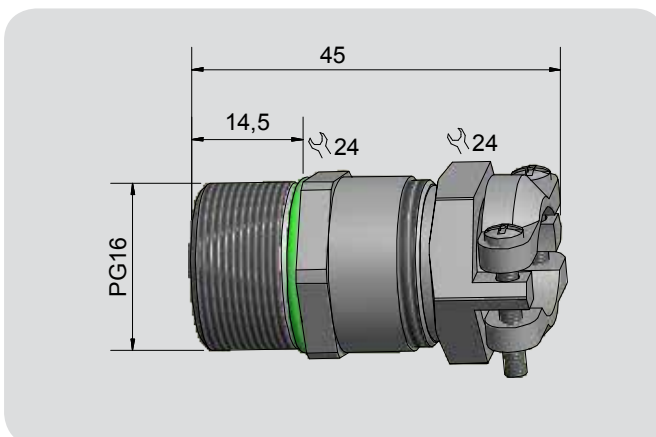
- Mounting device for probes (Ø 16mm) without connection head
- Housing material: Brass
- With Viton O-ring
- Useable for an ambient temperature up to +200 °C



#### Technical Data

Process connection	PG16
Applicable for capacitive level probes with diameter:	16 mm
<b>Type</b>	<b>A-KLV-D16-PG16-MS/Viton</b>
<b>Art. No.</b>	<b>194 001</b>
Housing material	Brass
Surface quality Ra, part in contact with the medium	0,4 µm
<b>Accessories</b> (delivered with the unit)	1 nut

All specifications are subject to change without notice. (14.01.2020)





## Squeeze clamps for capacitive filling level systems with 16 mm in diameter

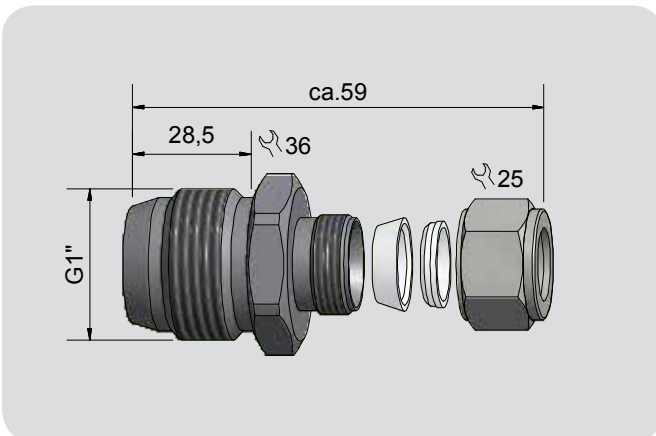
Process connection: G 1"

- Mounting device for probes (Ø 16mm) without connection head
- Housing material: Stainless steel VA No. 1.4404 / AISI 316L
- With PTFE O-rings
- Thanks to the PTFE O-rings the squeeze clamp can be opened and closed if necessary.



### Technical Data

Process connection	G 1"
Applicable for capacitive level probes with diameter:	16 mm
<b>Type</b>	<b>A-KLV-D16-G1-VAc/PTFE</b>
<b>Art. No.</b>	<b>194 011</b>
Housing material	VA, No. 1.4404 / AISI 316L, FDA-conforming
Surface quality Ra, part in contact with the medium	0,4 µm
<b>Accessories</b> (delivered with the unit)	2 PTFE O-rings







### Squeeze clamps for capacitive filling level systems with 16 mm in diameter

Process connection: G 1"

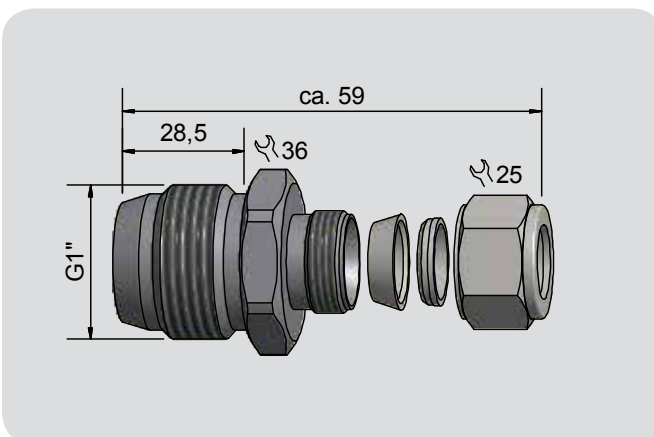
- Mounting device for probes (Ø 16mm) without connection head
- Housing material: Stainless steel VA No. 1.4404 / AISI 316L
- With stainless steel O-rings
- When the squeeze clamp has been locked for the first time, the stainless steel O-rings are bonded with the body of the level probe and they cannot be removed to another position.



#### Technical Data

Process connection	G 1"
Applicable for capacitive level probes with diameter:	16 mm
<b>Type</b>	<b>A-KLV-D16-G1-VAc/VAc</b>
<b>Art. No.</b>	<b>194 012</b>
Housing material	VA, No. 1.4404 / AISI 316L, FDA-conforming
Surface quality Ra, part in contact with the medium	0,4 µm
<b>Accessories</b> (delivered with the unit)	2 stainless steel O-rings

All specifications are subject to change without notice. (14.01.2020)





## Squeeze clamps for capacitive filling level systems with 16 mm in diameter

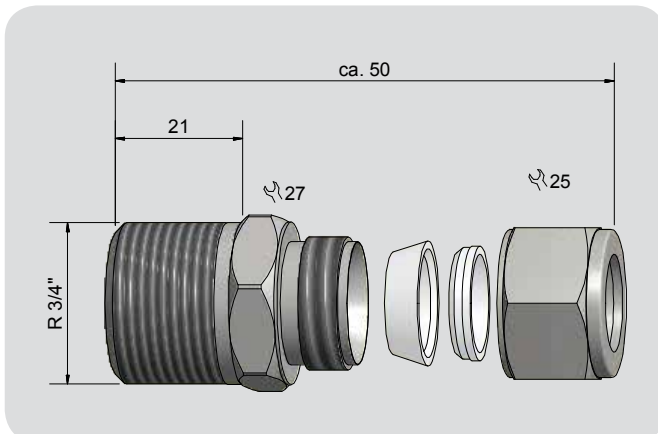
Process connection: G 3/4"

- Mounting device for probes (Ø 16mm) without connection head
- Housing material: Stainless steel VA No. 1.4404 / AISI 316L
- With PTFE O-rings
- Thanks to the PTFE O-rings the squeeze clamp can be opened and closed if necessary.



### Technical Data

Process connection	G 3/4"
Applicable for capacitive level probes with diameter:	16 mm
<b>Type</b>	<b>A-KLV-D16-G3/4-VAc/PTFE</b>
<b>Art. No.</b>	<b>194 201</b>
Housing material	VA, No. 1.4404 / AISI 316L, FDA-conforming
Surface quality Ra, part in contact with the medium	0,4 µm
<b>Accessories</b> (delivered with the unit)	2 PTFE O-rings





### Squeeze clamps for capacitive filling level systems with 16 mm in diameter

Process connection: G 3/4"

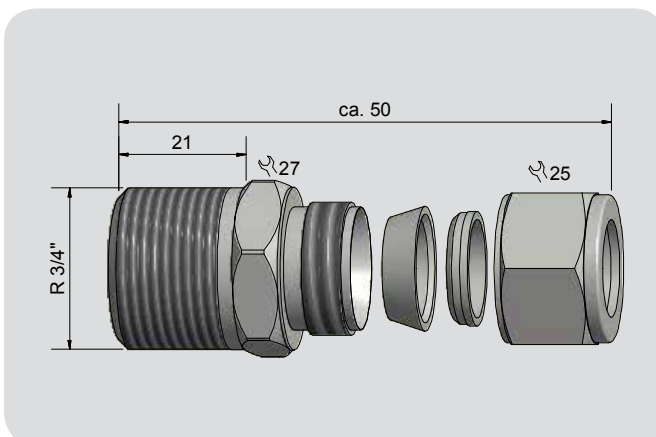
- Mounting device for probes (Ø 16mm) without connection head
- Housing material: Stainless steel VA No. 1.4404 / AISI 316L
- With stainless steel O-rings
- When the squeeze clamp has been locked for the first time, the stainless steel O-rings are bonded with the body of the level probe and they cannot be removed to another position.



#### Technical Data

Process connection	G 3/4"
Applicable for capacitive level probes with diameter:	16 mm
<b>Type</b>	<b>A-KLV-D16-G3/4-VAc/VAc</b>
<b>Art. No.</b>	<b>194 202</b>
Housing material	VA, No. 1.4404 / AISI 316L, FDA-conforming
Surface quality Ra, part in contact with the medium	0,4 µm
<b>Accessories</b> (delivered with the unit)	2 stainless steel O-rings

All specifications are subject to change without notice. (14.01.2020)





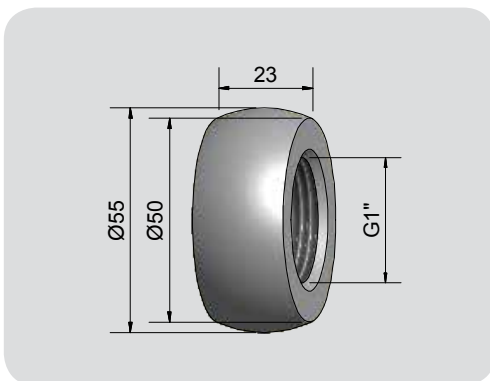
## Spherical welding socket

- For containers and pipes
- Housing material: Stainless steel VA No. 1.4404 / AISI 316L
- Suitable for our probes with a process connection G 1"



### Technical Data

Type	A-ESM-G1-D55-VAc
Art. No.	196 368
Housing material	VA, No. 1.4404 / AISI 316L
Surface quality Ra, part in contact with the medium	0,4 µm





**Cylindrical welding socket**

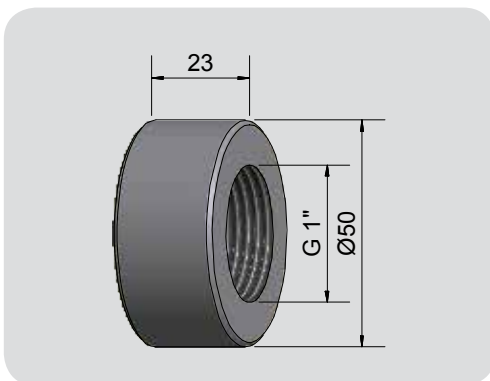
- For containers and pipes
- Housing material: Stainless steel VA No. 1.4404 / AISI 316L
- Suitable for our probes with a process connection G 1"



**Technical Data**

<b>Type</b>	<b>A-ESM-G1-D50-VAc</b>
<b>Art. No.</b>	<b>196 369</b>
Housing material	VA, No. 1.4404 / AISI 316L
Surface quality Ra, part in contact with the medium	0,4 µm

All specifications are subject to change without notice. (14.01.2020)





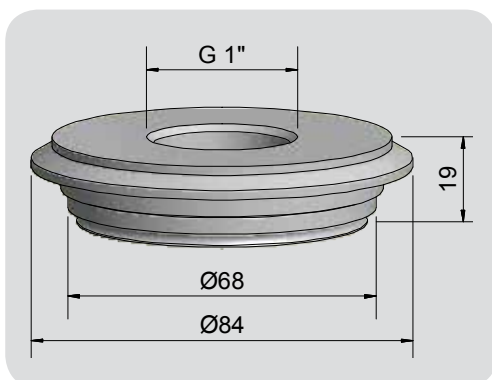
## Varivent N

- Model: Varivent N DN50
- Housing material: Stainless steel VA No. 1.4404 / AISI 316L
- Suitable for our probes with a process connection G 1"



### Technical Data

Type	A-VAR-G1-D84-VAc
Art. No.	196 377
Housing material	VA, No. 1.4404 / AISI 316L
Surface quality Ra, part in contact with the medium	0,4 µm





**Triclamp**

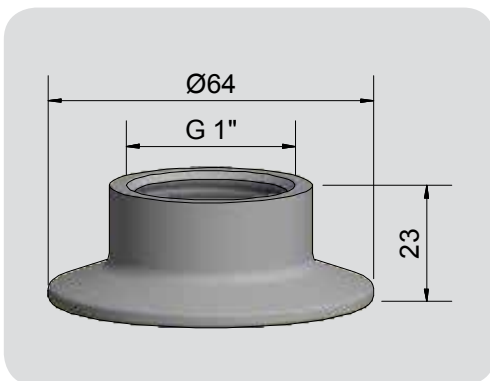
- Housing: Stainless steel VA No. 1.4404 / AISI 316L
- Suitable for our probes with a process connection G 1"



**Technical Data**

<b>Type</b>	<b>A-Tri-G1-D64-VAc</b>
<b>Art. No.</b>	<b>196 379</b>
Housing material	VA, No. 1.4404 / AISI 316L
Surface quality Ra, part in contact with the medium	0,4 µm

All specifications are subject to change without notice. (14.01.2020)





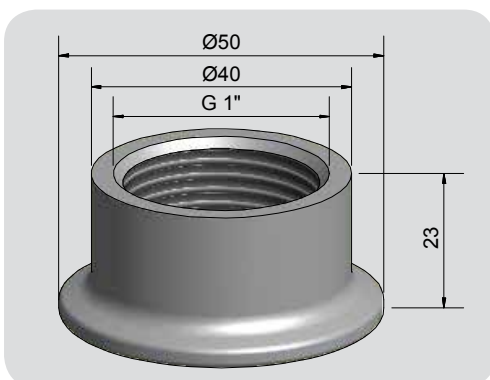
## Triclamp

- Housing material: Stainless steel VA No. 1.4404 / AISI 316L
- Suitable for our probes with a process connection G 1"



### Technical Data

Type	A-Tri-G1-D50-VAc
Art. No.	196 396
Housing material	VA, No. 1.4404 / AISI 316L
Surface quality Ra, part in contact with the medium	0,4 µm





## CONNECTION CABLE WITH CONNECTORS



Technical data	TRUE <b>LeVEL</b> <sup>®</sup>	TRUE <b>LeVEL</b> <sup>®</sup>
Type	S-Y75/Y75-1-2-Z02	S-Y75/Y75-1-2-Z05
Art.-No.	66101201	66101202
Cable length	2 m	5 m
Plug connection	Y75 / Y75	Y75 / Y75
For measurement system	KFS-1-...-Y70	KFS-1-...-Y70



Technical data	PER <b>LeVEL</b> <sup>®</sup>
Type	S-Y75/Y55-1-1-Z02
Art.-No.	66101213
Cable length	2 m
Plug connection	Y75 / Y55
For measurement system	KFS-5-...-Y70 / KFA-5-...-Y50



Technical data	PER <b>LeVEL</b> <sup>®</sup>
Type	S-Y75/Y75-1-1-Z02
Art.-No.	66101203
Cable length	2 m
Plug connection	Y75 / Y75
For measurement system	KFS-5-...-Y70 / KFA-5-...-Y70



Technical data	PER <b>LeVEL</b> <sup>®</sup>
Type	S-Y75/Y55-1-2-Z02
Art.-No.	66101242
Cable length	2 m
Plug connection	Y75 / Y55
For measurement system	KFS-5-...-Y70 / KFA-5-...-Y50



Technical data	PER <b>LeVEL</b> <sup>®</sup>
Type	S-Y75/Y75-1-2-Z02
Art.-No.	66101204
Cable length	2 m
Plug connection	Y75 / Y75
For measurement system	KFS-5-...-Y70 / KFA-5-...-Y70



Technical data	PER <b>LeVEL</b> <sup>®</sup>
Type	S-Y75/Y75-1-3-Z02
Art.-No.	66101205
Cable length	2 m
Plug connection	Y75 / Y75
For measurement system	KFS-53-...-Y70 / KFA-5-4-...-Y70

All specifications are subject to change without notice. (14.01.2020)

## TYPE SELECTION IN ARTICLE NUMBER ORDER

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Y75 / Y75 KFS-1-... 5m	66101202	103
Y75 / Y75 KFS-5-2(4)-...	66101203	103
Y75 / Y75 KFS-5-2(4)-... 2m	66101204	103
Y75 / Y75KFS-5-4-... 2m	66101205	103
Y75 / Y55 KFS-5-1-... 2m	66101213	103
Y75 / Y55 KFS-5-2-... 2m	66101242	103
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A-KLV-D16-PG16-MS/Viton	194 001	93
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A-KLV-D16-G3/4-VAc/PTFE	194 201	96
A-KLV-D16-G3/4-VAc/VAc	194 202	97
A-ESM-G1-D55-VAc	196 368	98
A-ESM-G1-D50-VAc	196 369	99
A-VAR-G1-D84-VAc	196 377	100
A-Tri-G1-D64-VAc	196 379	101
A-Tri-G1-D50-VAc	196 396	102
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KFA-5-1-B-N-A-Z02-Y50	AF 0005	60
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KFA-5-4-XXL-P-A-CC-Y50	AF 0063	65
KFA-5-1-L-P-A-Z02-Y50	AF 0064	61
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KFA-5-4-XXL-N-Ö-4FB-CC-Y50	AF 0090	66
KFA-5-4-XXL-N-S-4FB-CC-Y50	AF 0091	66
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KFA-5-1-XL-I-CC-Y50	AF 0101	63
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KFA-1-1000-XXL-FL-Y70	AF 0127	30
KFA-1-2000-XXL-FL-Y70	AF 0128	30
KFA-1-200-XXL-IL-4-Y70	AF 0129	31
KFA-1-500-XXL-IL-4-Y70	AF 0130	31
KFA-1-1000-XXL-IL-4-Y70	AF 0131	31
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KFX-52-15-“L”-15/X2-GFK/VAc-D16-PHG1-P-S-KL		80
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