

**CATALOGUE**

**CAPACITIVE  
LEVEL  
MEASURING  
SYSTEMS**



**TRUE LEVEL®**  
**PER LEVEL®**



# TABLE OF CONTENTS

## CATALOGUE CAPACITIVE FILLING LEVEL MEASURING SYSTEMS

TRUE LEVEL®  
PER LEVEL®

	Pages
<b>TECHNOLOGY .....</b>	<b>4 - 5</b>
APPLICATION EXAMPLES .....	6
NORMS .....	7
TECHNICAL TERMS .....	7
ANALOGUE MEASUREMENT .....	8
LIMIT VALUE MEASUREMENT .....	9
MOUNTING ANALOGUE MEASUREMENT .....	10
MOUNTING LIMIT VALUE MEASUREMENT .....	11
TYPE SELECTION .....	12
 <b>TYPE CODE ANALOGUE MEASUREMENT KFS-1.../KFA-1... .....</b>	 <b>13</b>
DATA SHEET .....	14
..... KFS-1-“L“-“M“-Y75 .....	15
..... KFS-1-“L“-“M“-VA-1“ .....	16
..... KFA-1-...-FL-KL-Y70 .....	17
..... KFA-1-...-IL4-KL-Y70 .....	18
..... KFA-1-...-UL-KL-Y70 .....	18
 <b>TYPE CODE LIMIT VALUE MEASUREMENT KFS-5.../KFA-5... .....</b>	 <b>19</b>
DATA SHEET .....	20
..... KFA-5-1...Y50 .....	21
..... KFS-5-1-“L“-15-Y76 .....	22
..... KFS-5-2-“L“-15/X2-Y76 .....	23
..... KFS-5-3-“L“-15/X2/X3-Y76 .....	24
..... KFS-5-1-“L“-15-AL-1“ .....	25
..... KFS-5-2-“L“-15/X2-AL-1“ .....	26
..... KFS-5-1-“L“-15/X2/X3-AL-1“ .....	27
..... KFS-5-1-“L“-15-VA-1“ .....	28
..... KFS-5-2-“L“-15/X2-VA-1“ .....	29
..... KFS-5-1-“L“-15/X2/X3-VA-1“ .....	30
..... KFA-5-3-M-N-A .....	31
..... KFA-5-3-S-P-A .....	32
..... KFA-5-3-M-III .....	33
..... KFA-5-3-S-III .....	34
 <b>TYPE CODE LIMIT VALUE MEASUREMENT COMPACT - KFX-5.../KFX-4... .....</b>	 <b>35</b>
DATA SHEET .....	36
..... KFX-5-2-“L“-15/X2-...-AL-1“ .....	37-38
..... KFX-5-1-“L“-15-...-VA-1“ .....	39
..... KFX-5-2-“L“-15/X2-...-VA-1“ .....	40-41
..... KFX-5-2-“L“-15/X2-...-MM-VA-1“ .....	42
..... KFX-5-1-“L“-15/X2-...-TP100-VA-1“ .....	43
..... KFX-5-2-“L“-15/X2-...-TP100-VA-1“ .....	44-45
..... KFX-4-1-“L“-V10/xa-...-VA-1“ .....	46
..... KFX-4-2-“L“-V10/xa-Vxb/xc-...-VA-1“ .....	47-48
 <b>ACCESSORIES .....</b>	 <b>49-50</b>

All specifications are subject to change without notice. (05/2004)

## 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. This capacitive level 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 in to the desired output signals.

### Three-Electrode-Principle

The measurement systems now introduced all operate according to the three-electrode-principle. With the three-electrode-principle the container or an additional electrode serve as a counter-electrode to the probe electrodes. For this reason it is necessary with this system that the container is of a conductive material or a "substitute electrode" is fixed to the container wall, e.g. copper foil. This principle allows almost total elimination of the undesirable parasitic capacities and their effects, which inevitable appear in the practical operation, (e. g. generated via the probe connection cable – evaluation unit).

On the basis of the patented circuit principles, outstanding parameters are achieved and the solution of exceptional applications are possible, e. g. multiple measurements and the DC-compensating analogue measurement (DC = dielectric constant).

### The basis system

In principle the level measurement consists of

#### **Probe + Connection Cable + Electronic Evaluation Unit**

##### **Probe**

The probe is a passive component part with an insulating outer cover.

Standard housing: GFK (glassfibre reinforced plastic). Outer diameter 16 mm with outstanding mechanical properties. Recommended for use in applications with bulk materials or viscous materials.

Optional: Other plastic housings are available on request, such as PE, PVDF, PTFE. PEEK for use in the food industry, pharmaceutical and chemical industry. Also recommended for use in applications with non viscous fluids.

##### **Electronic Evaluation Units**

Available options

Limit value evaluation units	with 1; 3; 3+n•3 measuring positions. - with fixed limit value switching points. - or/and with variable limit value switching points.
Analogue evaluation units	with automatic DC-compensation

## TECHNOLOGY

On the basis of the evaluation principle we offer 2 distinct versions:

- **TRUE LEVEL<sup>®</sup>** for analogue measurements
- **PER LEVEL<sup>®</sup>** for limit value measurements

### Advantages for TRUE LEVEL<sup>®</sup>

- 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.
- Probe applicable in an ambient temperature range of  $-70^{\circ}\text{C}$  up to  $+250^{\circ}\text{C}$ .
- Insensitive to static electrification.
- Because of automatic compensation of the dielectric constants useable for different materials without re-adjustment.
- complete adjustment in the empty-condition, easily practicable with adjustment-aids.

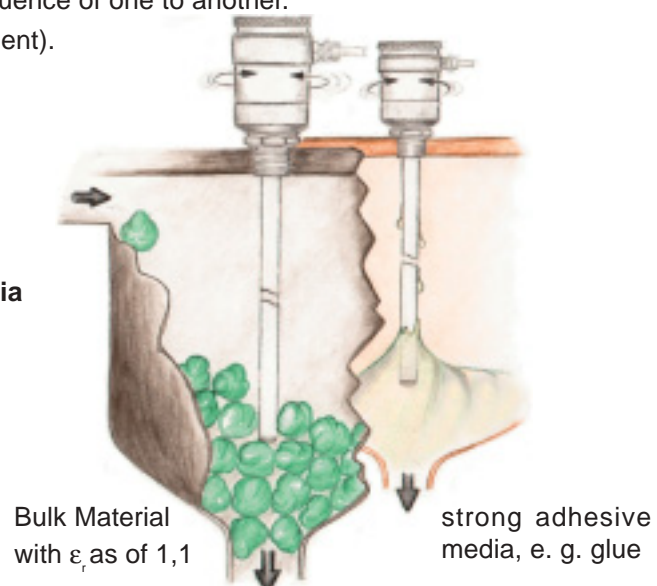
### Advantages for PER LEVEL<sup>®</sup>

In additions to the aforementioned advantages:

- Suitable for detection of highly viscous, adhesive products (glues or similar)
- Suitable for products as of  $\epsilon_r = 1,1$  – also for extremely small 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 measurements without influence of one to another.
- Simple adjustment („blind“-adjustment).

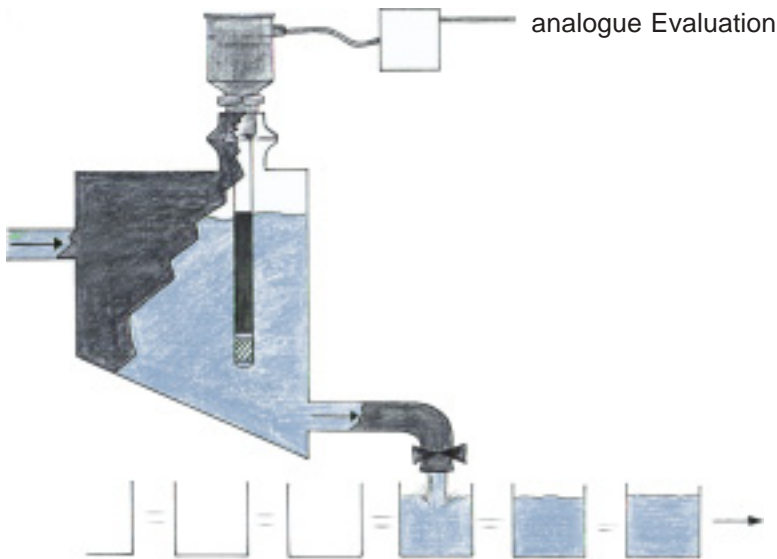
### Application Example:

**Level control of different media  
bulk material (left) and  
strong adhesive media (right)**



## APPLICATION EXAMPLES

KFS/KFA - analogue - Triclamp



### Level Control In The Food Industry

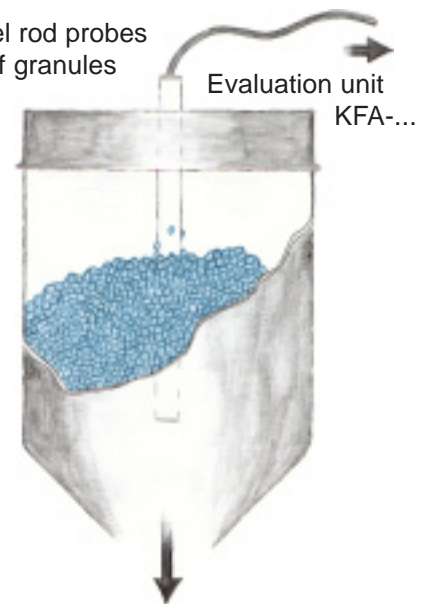
In this application an analogue level probe is used with stainless steel connection head and Triclamp process connection. The analogue probe indicates the exact filling level within the selected measuring range. The analogue model has automatic compensation for the change of the dielectric constant of the product to be detected. This is advantageous in applications with regularly changing materials (Oil, spice, sugar, flour, mineral water, juice, etc.)

### Level Control In The Plastics Industry

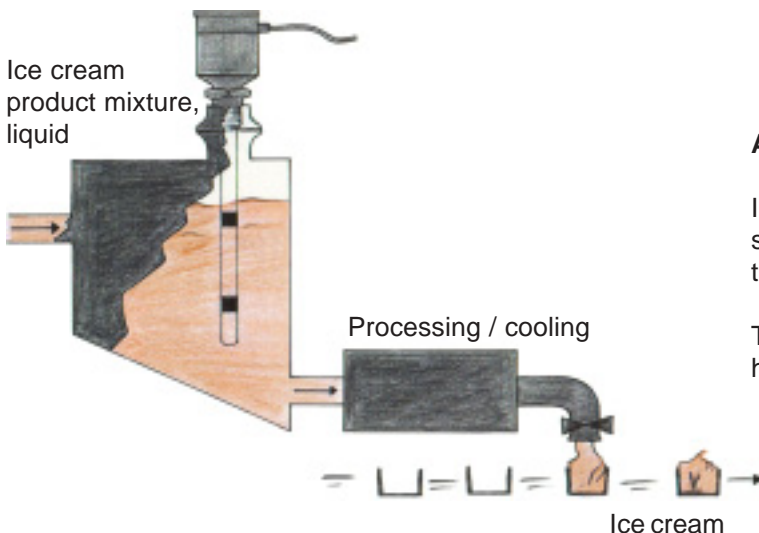
Dependent on the application and the desired information, analogue or digital probes can be used.

Suitable for products with a dielectric constant as of  $\epsilon_r$  1,1 ( $\geq 1,2$  analogue) - also for extremely small filling density (e.g. Polystyrene)

TRUE- or PER-Level rod probes used for detection of granules



KFX - PER-Level Probe - Triclamp



### Application In The Food Industry

In this case a PER-Level probe with two switching points is used in order to detect the minimum and maximum filling level.

The probe has a stainless steel connection head with triclamp process connection.

All specifications are subject to change without notice. (05/2004)

## 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.

*89/336/EWG*

EMC Directive (EN 60 947-5-2)

*73/23/EWG*

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. In addition RECHNER has a laboratory accredited by DATech for testings according to IEC/EN 60947-5-2 and also an accredited EMC laboratory.

## TECHNICAL TERMS

### *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.

### *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 destined for continuous movement/flexible use. When routing please consider the bending radius of minimum  $10 \times \varnothing$ .

### *Enclosure rating*

IP 20: Protection against ingress of medium size objects

IP 54: Protection against harmful dust deposits and splashing water

IP 65: Protection against contact with voltage-carrying parts, protection against ingress of dust and water jet.

IP 67: Protection against contact with voltage-carrying parts, protection against ingress of dust and protection against ingress of water when the equipment is immersed in water, up to 1 m depths and for a period of 30 minutes.

## **SERIES** • *Analogue Measurement*

### **TRUE LEVEL®**

#### **Level control systems for analogue measurements.**

The capacitive measurements systems of the True Level series are designed for analogue measurement. The system comprises:

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

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.

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 optimal matching of each application.

The available evaluation units are

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

The adjustment of the measurement can be made in the empty-condition and it is easy due to adjustment-aids. The effective direction of that output signal is programmable by means of a jumper, and with an adjustable damper slop motions can be eliminated. Additionally a safety relay output is available, which is activated as soon as the filling level falls below the reference-range at the probe tip, thus preventing a total emptying of the container.

In addition an overflow safety output is available on request, which also has a relay output and it works independently from the analogue measurement. In this case the probe contains a further measuring electrode at the desired limit area.

### **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**
- **Milk-tube-screwing**

For further information, please see the accessories chapter.

#### **The evaluation electronics remains separate.**

For the possible model variations please see the type code.

## SERIES • *Limit Value Measurement*

### PER LEVEL

#### Level control system for limit value measurements

The Per Level capacitive measuring systems are designed for limit value measurements of filling levels. The system comprises:

Models with *fixed* limit value switching points:

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

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

Models with *variable* limit value switching points:

- **Filling level probe KFS-4-...**
- **Evaluation electronics KFA-4-...**

With this model, by means of adjustment, the limit value switching points can be moved over the complete large-volume measuring range. The position and the width of the variable area is the customers choice. These systems are an advantage for applications with regularly varying filling levels. Please note: DC-changes after the adjustment will lead to changes of the switching point.

The probes **KFS-5(4)-...** are available from **100 mm** up to **2000 mm** in length. They are available with 1, 2 or 3 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 available evaluation units are:

- One point evaluation unit (KFA-5-1-.../KFA-4-1...)
- Three point evaluation unit **Master** (KFA-5-3-**M**-.../KFA-4-3-**M**-...)
- Master/Slave System for three switching points **Master** KFA-5(4)-3-**M**-...  
+ **Slave** KFA-5(4)-3-**S**-... Extension of 3 measuring points per slave

### Compact Probes KFX-

In addition, we offer compact-probes with process-connection-head KFX -... **The evaluation electronic is integrated into the connection-head.** Present variations available:

- KFX-5-... ➤ **with 1 or 2 fixed limit value switching points**
- KFX-4-... ➤ **with 1 or 2 variable limit value switching points**  
**(mix of 1 fixed and 1 variable limit value switching point is also possible)**

Process-connection with different adaptation possibilities:

- **Process connection G1“**
- **Triclamp**
- **Varivent**
- **Milk-tube-screwing**

For further information, please see the accessories chapter.

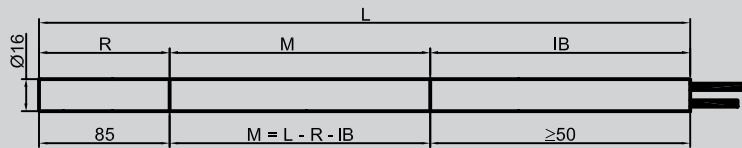
For the possible model variations please see the type code.

## MOUNTING • Analogue Measurement

### TRUE LEVEL®

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. Then follows the actual **analogue measuring range (M)** customer specified, but with regard to the total length ( $L = \max. 2 \text{ m}$ ). The **inactive range (IB)**, a minimum of 50 mm, serves to mount the probe. The mounting can also be a metallic holder (fig. 1).

Fig. 1

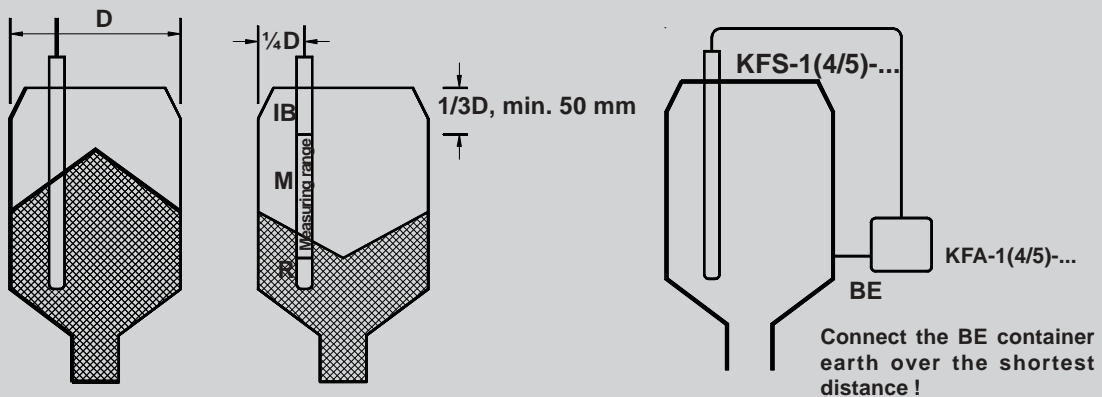


**The measuring range (M)** of the probe must be mounted in a range of the container without change in diameter of the cross section in order to guarantee the linearity of the output signal. Changes in cross section lead to non-linearity, due to conductive installations such as wipers for example.

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

**The non-active range (IB)** from the measuring range to the top of the container (if metal) should be not less than 50 mm in order to prevent non-linearity (Fig. 2)

Fig. 2



#### Measuring range (M) Reference range (R) non-active range (IB)

Do not mount the measuring range in the area of the container with changes in the cross section, like the cone range.

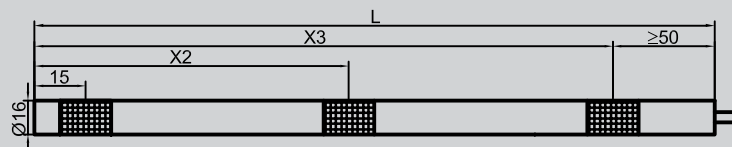
The probe can be mounted centrally or eccentrically. For a measurement independent of the filling cone, we recommend that the probe be mounted at a  $\frac{1}{4}$  of the diameter. The minimum distance between the upper switching point and the conductive lid of the container is 50 mm.

## MOUNTING • Limit Value Measurement

### PER LEVEL

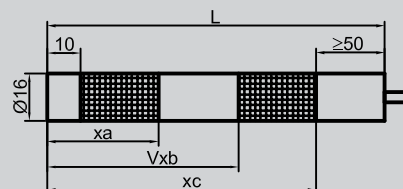
The limit probe can be equipped with one, two or three fixed or variable switching points. The first switching point is always placed 15 mm from the beginning of the probe. The position of the other switching points, X2 or X3, can be determined according to the customer's specifications, taking into account however that the minimum distance between each switching point should be 50 mm. The distance from the upper switching point of the probe should be increased by at least 80 mm for mounting purposes with for example a KB-PG 16 squeeze/clamp holder (fig. 3 / 4)

Fig. 3



KFS-5-... or KFX-5... probe with fixed limit value switching points

Fig. 4



KFS-4-... or KFX-4...probe with variable limit value switching points

**The lowest switching point is 15 mm** from the beginning of the probe, because of an internal screening of the probe's tip.

**A minimum distance of 50 mm between the switching points** has to be taken into consideration due to the internal screening ranges of the probe.



Smaller distances, depending on the medium and the geometrical form of the container, are possible on request.

**The total length (L)** is obtained by taking the position of the upper switching point and adding at least 80 mm for the internal screening range of the probe (ca. 50 mm) and mounting area.

The higher the relative dielectric permittivity, conductivity and/or degree of adhesiveness of the product to be detected, the larger the range of the probe's internal screening should be.

The parameters for the mounting position and minimum distance to the container wall, container earth and so on are the same as for the analogue measuring system, See fig. 2 on page 10.

# TYPE SELECTION

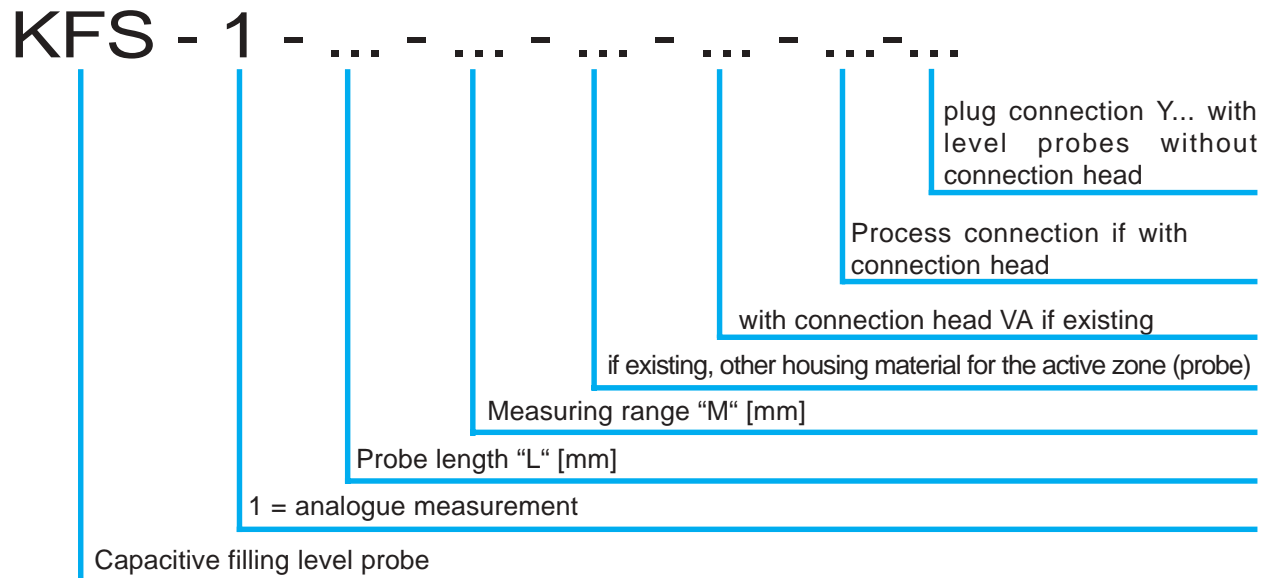
 <b>Probe Specific Data</b> <b>Analogue Filling level probes</b>		<b>Specific Data</b> <b>Analogue Evaluation unit</b>		
Probe length "L" possible from 400 to 2000 mm  analogue measuring range "M" dependent on probe length  Level probe with connection cable and SMB-connector <b>Y75</b> or with connection head (Process connection 1") made of stainless steel <b>VA</b>		<b>Operating voltage</b> $U_b = 18...36$ VDC  <b>Analogue output</b> <b>FL</b> = Frequency 0...10 kHz <b>IL4</b> = Current 4...20mA <b>UL</b> = Voltage 0...10 V  <b>200, 500,...</b> = for probe length  <b>KL/Y70</b> = with clamp terminals and SMB-sockets		
Analogue Level probe	Page	Analogue Evaluation unit	Page	
KFS-1-"L"-M"-Y75	14	KFA-1-200(500,1000,2000)-FL-KL/Y70	16	
KFS-1-"L"-M"-VA-1"	15	KFA-1-200(500,1000,2000)-IL4-KL/Y70	17	
		KFA-1-200(500,1000,2000)-UL-KL/Y70	18	
 <b>Probe specific Data</b> <b>Filling level probes with limit value switching points</b>		<b>Specific Data</b> <b>Evaluation unit with switching points</b>		
Probe length "L" possible from 100 to 2000 mm Filling level probe with connection cable and conector <b>Y55*</b> , <b>Y76</b> or with connection head (Process connection 1") made of aluminium <b>AL</b> or stainless steel <b>VA</b> *Connector <b>Y55</b> only with evaluation unit KFA-5-1-N(P)-A-Y50  First switching point is on position <b>15</b> mm related to probe tip  <b>X2/X3</b> with probes with 2 or 3 switching points application related defineable in dependence with the probe length and minimum distances  <b>V15/xa</b> (first) variable switching point (V15/ Beginning - and xa/ end of the variable switching point) <b>Vxb/xc</b> with probes with 2 variable switching points		Evaluation unit with transistor switching output <b>N</b> (NPN)/ <b>P</b> (PNP)- <b>A</b> (antivalent) <b>Operating voltage</b> $U_b = 18...36$ VDC <b>Y50*</b> with 1 antivalent switching point <b>M (S)</b> up to 3 antivalent switching points  * <b>Y50</b> only with probe KFS-5-1-"L"-Y55  Evaluation unit with relay output <b>III</b> (3 x potential-free change-over switch) <b>Operating voltage</b> $U_b = 110/230$ VAC <b>M (S)</b> up to 3 Switching points  <b>M</b> = Master (Evaluation unit up to 3 switching points) <b>S</b> = Slave (extension with further 3 switching points)		
Filling level probes with limit value switching points	Page	Evaluation units with switching points	Page	
KFS-5-1-"L"-15-Y55	20	KFA-5-1-N(P)-A-Y50	21	
KFS-5-1-"L"-15-Y76	22	KFA-5-3-M-N(P)-A	31	
KFS-5-2-"L"-15/X2-Y76	23	KFA-5-3-S-N(P)-A	32	
KFS-5-3-"L"-15/X2/X3-Y76	24	KFA-5-3-M-III	33	
KFS-5-1-"L"-15-AL-1"	25	KFA-5-3-S-III	34	
KFS-5-2-"L"-15/X2-AL-1"	26			
KFS-5-3-"L"-15/X2/X3-AL-1"	27			
KFS-5-1-"L"-15-VA-1"	28			
KFS-5-2-"L"-15/X2-VA-1"	29			
KFS-5-3-"L"-15/X2/X3-VA-1"	30			
Filling level probes with fixed switching points • COMPACT		Specific data	Page	
KFX-5-1-"L"-15-N(P)-A-AL-1"		<b>Operating voltage</b> $U_b = 18...36$ VDC  with transistor switching output <b>N</b> (NPN)/ <b>P</b> (PNP)- <b>A</b> (1 x antivalent) <b>S</b> (2 x NO) <b>Ö</b> (2 x NC)  <b>MM</b> = min./max. Function	36	
KFX-5-2-"L"-15/X2-N(P)-S-AL-1"			37	
KFX-5-2-"L"-15/X2-N(P)-Ö-AL-1"			38	
KFX-5-1-"L"-15-N(P)-A-VA-1"			39	
KFX-5-2-"L"-15/X2-N(P)-S-VA-1"			40	
KFX-5-2-"L"-15/X2-N(P)-Ö-VA-1"			41	
KFX-5-2-"L"-15/X2-N(P)-A-MM-VA-1"			42	
KFX-5-1-"L"-15-N(P)-A-TP100-VA-1"	with temperature buffer TP 100		43	
KFX-5-2-"L"-15/X2-N(P)-S-TP100-VA-1"	with temperature buffer TP 100		44	
KFX-5-2-"L"-15/X2-N(P)-Ö-TP100-VA-1"	with temperature buffer TP 100		45	
Filling level probes with variable switching points • COMPACT				
KFX-4-1-"L"-V10/xa-N(P)-A-VA-1"				46
KFX-4-2-"L"-V10/xa-Vxb/xc-N(P)-S-VA-1"				47
KFX-4-2-"L"-V10/xa-Vxb/xc-N(P)-Ö-VA-1"				48

All specifications are subject to change without notice. (05/2004)

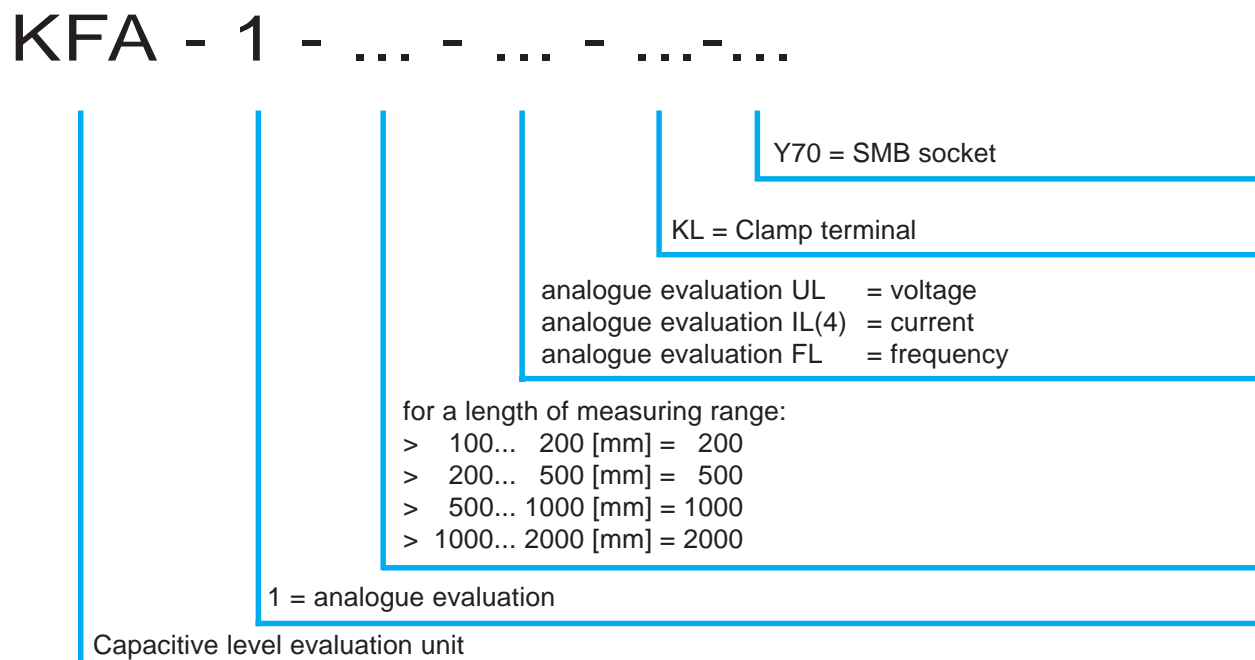
## TYPE CODE

TRUE LEVEL®

### Capacitive Level Probe - Analogue



### Capacitive evaluation unit - analogue



All specifications are subject to change without notice. (05/2004)



**Capacitive Filling Level Probe - KFS**

Series: **TRUE LEVEL**

**With analogue measuring range**

- For connection to the capacitive amplifier KFA-1-...-...-KL-Y70
- Housing material: GFK, 16 mm Ø
- Probe length max. 2000 mm
- Automatic compensation of changes of the dielectric constant.

Zulassungen:

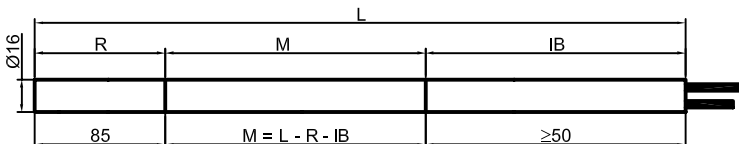


**Technical data**

Active Zone [mm]	Measuring range begins from 85, related on the probe tip
Type	KFS-1-"L"- "M"-Y75
Connection diagram No.	-
Permitted ambient temperature (for active zone)	-70...+250°C
Degree of protection IEC 529 (probe)	IP 67
Connection cable to the evaluation unit KFA-1-...-...-KL-Y70	2 m coax-cable with SMB-connectors
Housing material	-
Active zone	GFK
Pressure	-

A connection device for the probe is available as an accessory (KB-PG 16): see page 49

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



All specifications are subject to change without notice. (05/2004)



## Capacitive Filling Level Probe - KFS

Series: **TRUE LEVEL**

With analogue measuring range

- For connection to the capacitive amplifier KFA-1-...-...-KL-Y70
- Housing material: GFK, 16 mm Ø
- Connection head and process connection made of stainless steel VA
- Probe length max. 2000 mm
- Automatic compensation of changes of the dielectric constant.

Certificate:



### Technical data

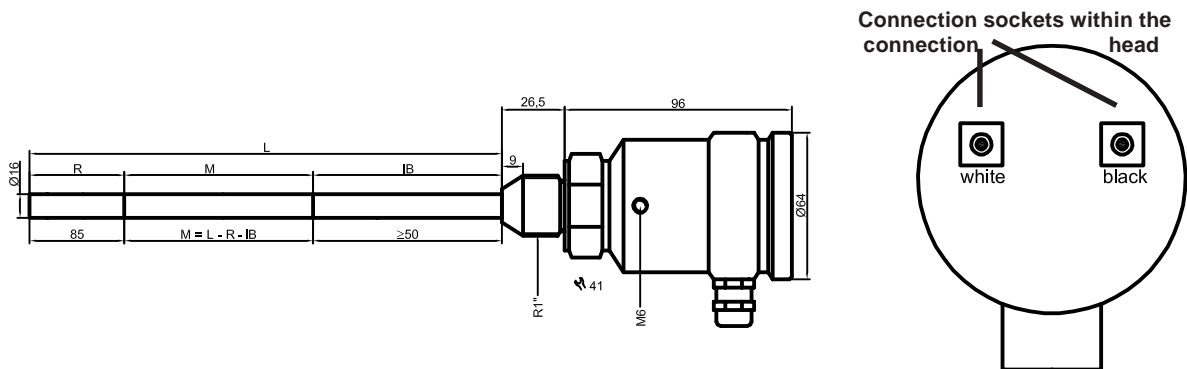
Active Zone [mm]	Measuring range begins from 85, related on the probe tip
<b>Type</b>	<b>KFS-1-"L"- "M"-VA-1"</b>
<b>Connection diagram No.</b>	<b>see below</b>
Permitted ambient temperature	-25...+100°C
Permitted ambient temperature (for active zone)	-25...+150°C
Degree of protection IEC 529 (Housing)	IP 67
Degree of protection IEC 529 (Screwing* Cable connection)	IP 54
Connection to the evaluation unit KFA-1-...-...-KL-Y70	SMB-sockets within the connection head
Housing material	VA Nr. 1.4571
Active zone	GFK
Pressure	25 bar

**Connection cable (with Y75/Y75 SMB connector) is not delivered with the probe**

**Order specifications: see page 50**

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

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



All specifications are subject to change without notice. (05/2004)



## Capacitive Evaluation Unit - KFA

Series: **TRUE LEVEL**

Analogue frequency output 0...10 kHz

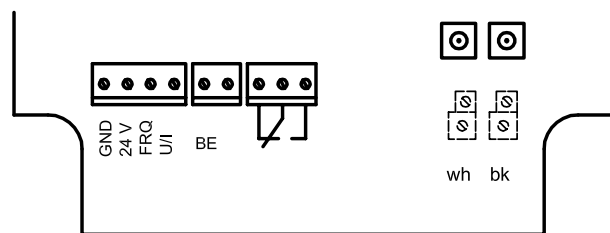
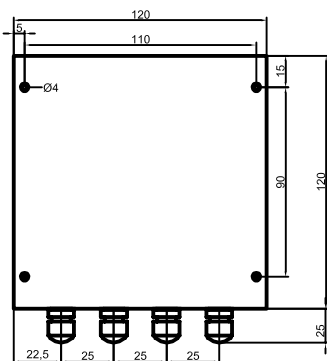
- For capacitive level probes with analogue measuring range KFS-1-...
- Operating voltage 18...36 V DC
- Potential-free changeover contact as signal output
- For materials with  $\epsilon_r$  1, 2...30

Certificate:



### Technical Data

Output function	analogue
Type Analogue	KFA-1-200-FL-KL-Y70
Art.-No.	AF0010
Type Analogue	KFA-1-500-FL-KL-Y70
Art.-No.	AF0011
Typ Analogue	KFA-1-1000-FL-KL-Y70
Art.-No.	AF0012
Typ Analogue	KFA-1-2000-FL-KL-Y70
Art.-No.	AF0013
Connection diagram No.	see below
Operating voltage ( $U_B$ )	18...36 V DC
Analogue output	0...10 kHz/ TTL-pegel
Permitted residual ripple max.	40 %
Power consumption ( outputs no-load)	typ. 3.5 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 529	IP 54
Connection	Screwing clamp terminals and SMB sockets
Housing material	ABS



All specifications are subject to change without notice. (05/2004)



**Capacitive Evaluation Unit - KFA**  
**Series: TRUE LEVEL**  
**Analogue current output 4...20 mA**

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

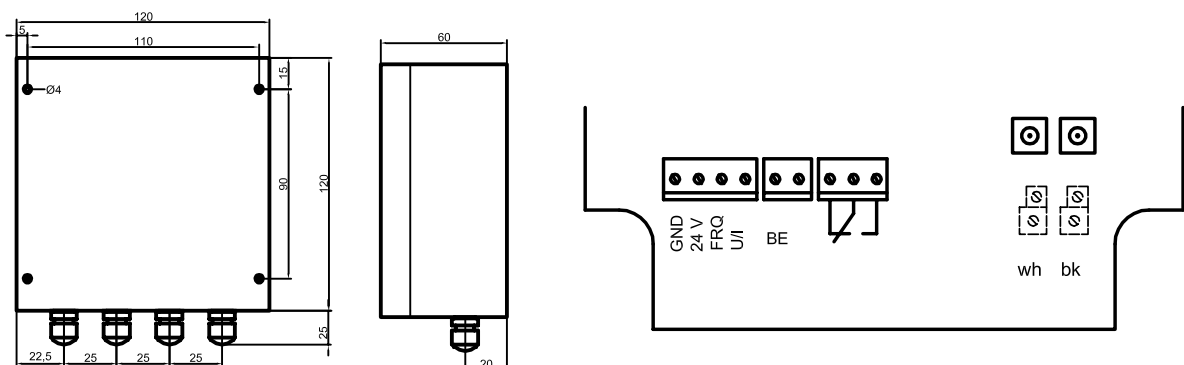
Certificate:



**Technical Data**

Output function	analogue
<b>Type Analogue</b>	<b>KFA-1-200-IL4-KL-Y70</b>
<b>Art.-No.</b>	<b>AF0014</b>
<b>Type Analogue</b>	<b>KFA-1-500-IL4-KL-Y70</b>
<b>Art.-No.</b>	<b>AF0015</b>
<b>Typ Analogue</b>	<b>KFA-1-1000-IL4-KL-Y70</b>
<b>Art.-No.</b>	<b>AF0016</b>
<b>Typ Analogue</b>	<b>KFA-1-2000-IL4-KL-Y70</b>
<b>Art.-No.</b>	<b>AF0017</b>
<b>Connection diagram No.</b>	<b>see below</b>
Operating voltage ( $U_B$ )	18...36 V DC
Analogue output	4...20mA
Permitted residual ripple max.	40 %
Power consumption ( outputs no-load)	typ. 3.5 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 529	IP 54
Connection	Screwing clamp terminals and SMB sockets
Housing material	ABS

All specifications are subject to change without notice. (05/2004)





## Capacitive Evaluation Unit - KFA Series: **TRUE LEVEL®** Analogue voltage output 0...10 V

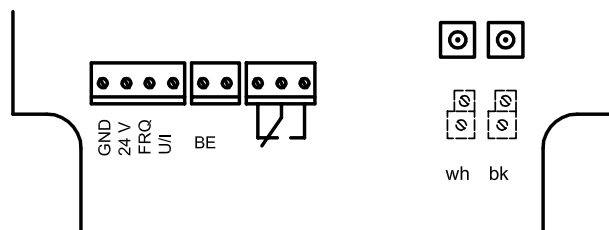
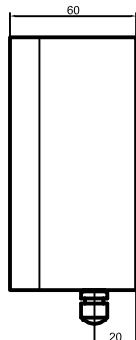
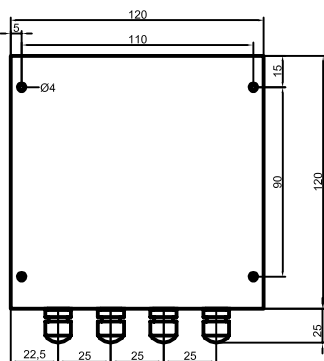
- For capacitive level probes with analogue measuring range KFS-1-...
- Operating voltage 18...36 V DC
- Potential-free changeover contact as signal output
- For materials with  $\epsilon_r$  1, 2...30

Certificate:



### Technical Data

Output function	analogue
<b>Type Analogue</b>	<b>KFA-1-200-UL-KL-Y70</b>
<b>Art.-No.</b>	<b>AF0018</b>
<b>Type Analogue</b>	<b>KFA-1-500-UL-KL-Y70</b>
<b>Art.-No.</b>	<b>AF0019</b>
<b>Typ Analogue</b>	<b>KFA-1-1000-UL-KL-Y70</b>
<b>Art.-No.</b>	<b>AF0020</b>
<b>Typ Analogue</b>	<b>KFA-1-2000-UL-KL-Y70</b>
<b>Art.-No.</b>	<b>AF0021</b>
<b>Connection diagram No.</b>	<b>see below</b>
Operating voltage ( $U_B$ )	18...36 V DC
Analogue output	0...10 V
Permitted residual ripple max.	40 %
Power consumption (outputs no-load)	typ. 3.5 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 529	IP 54
Connection	Screwing clamp terminals and SMB sockets
Housing material	ABS



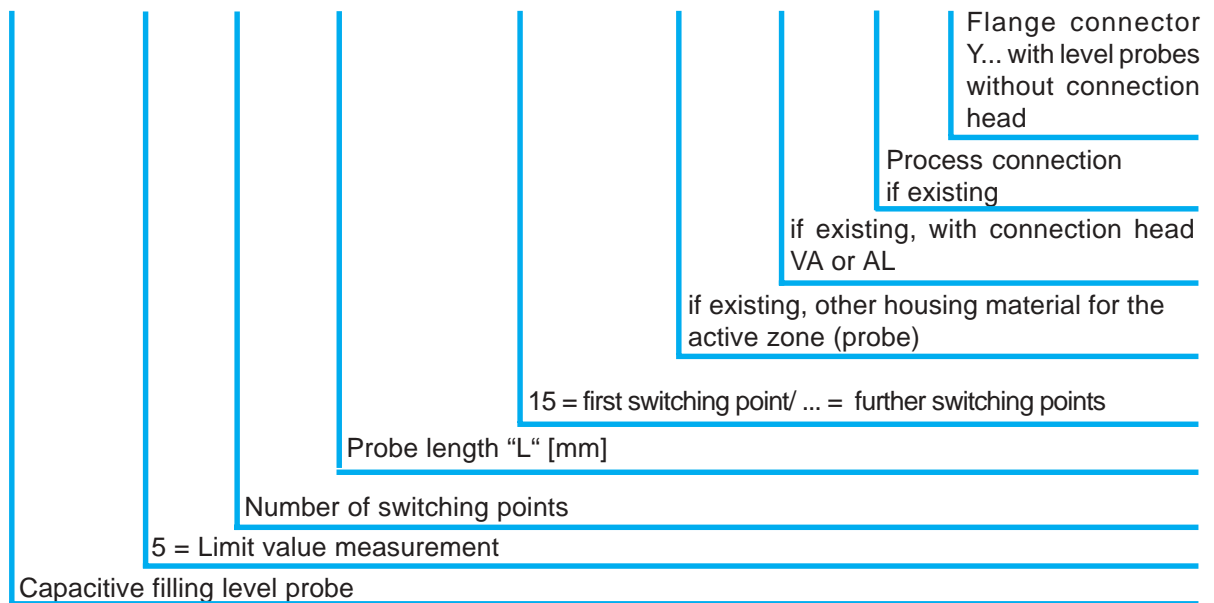
All specifications are subject to change without notice. (05/2004)

## TYPE CODE

PER LEVEL®

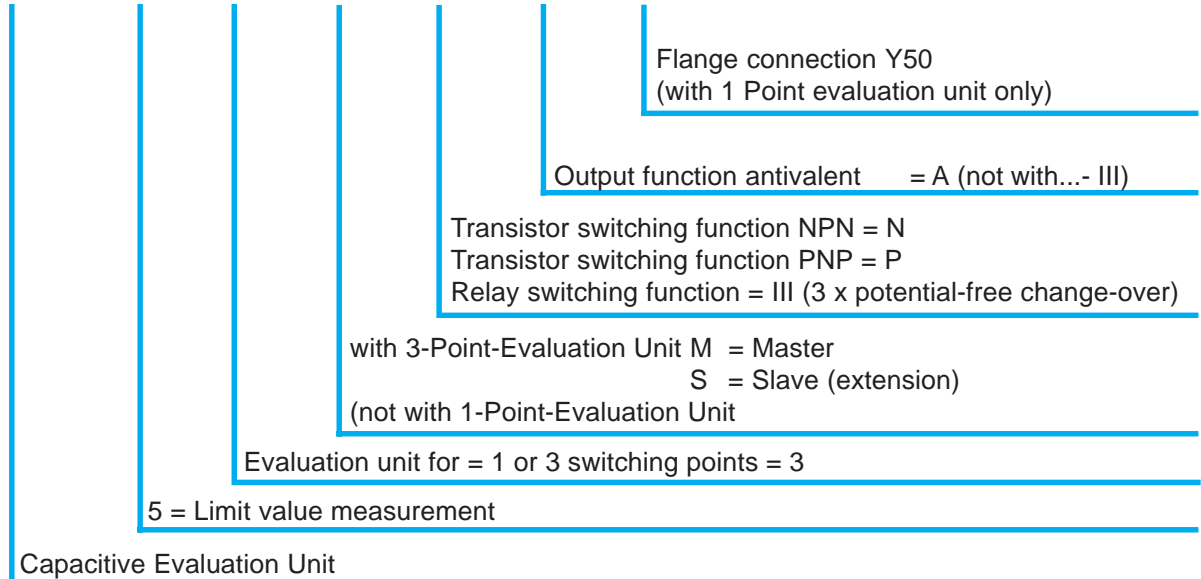
Capacitive Filling level probe with limit value switching point

**KFS - 5 - ... - ... - 15/.../... - ... - ... - ... - ...**



Capacitive evaluation unit for level probes with limit value switching points

**KFA - 5 - ... - ... - ... - ... - ...**



All specifications are subject to change without notice. (05/2004)



**Capacitive Filling Level Probe - KFS**

Series: **PER LEVEL**

**1 Limit value switching point**

- For connection to the capacitive amplifier KFA-5-1...-A-Y50
- Housing material: GFK, 16 mm Ø
- Probe length max. 2000 mm

Certificate:



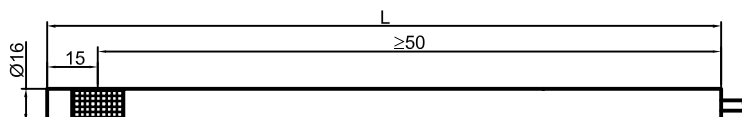
**Technical data**

Active zone [mm]	10... 25, related to probe tip
<b>Type</b>	<b>KFS-5-1-"L"-15-Y55</b>
<b>Connection diagram No.</b>	-
Permitted ambient temperature (for active zone)	-70...+250°C
Degree of protection IEC 529 (Probe)	IP 67
Connection cable to the evaluation unit KFA-5-1-...-A-Y50	2m coax-cable with coax-connector
Housing material	-
Active zone	GFK
Pressure	-

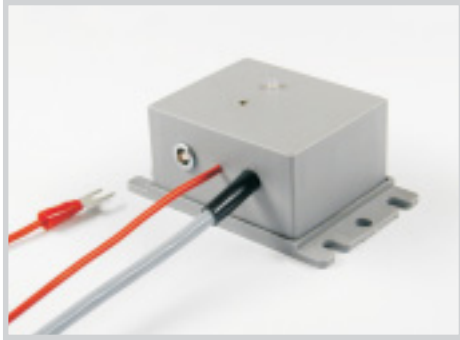
**A mounting device for the probe is available as an accessory (KB PG 16)**

**Order details: see page 49**

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



All specifications are subject to change without notice. (05/2004)



## Capacitive evaluation unit - KFA

Series <sup>PER</sup> LEVEL

NPN output

PNP output

- For capacitive filling level probes with 1 limit value switching point:  
KFS-5-1-"L"-15-Y55  
KFS-5-1-"L"-15-AL-1" with plug connection Art.-No. 66101213  
KFS 5-1-"L"-15-VA-1" with plug connection Art.-No. 66101213
- Operating voltage 18...36 V DC

Certificate:



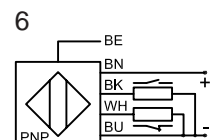
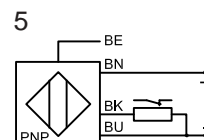
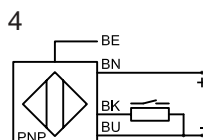
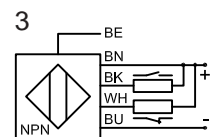
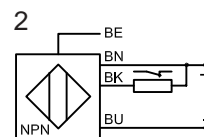
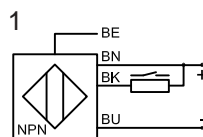
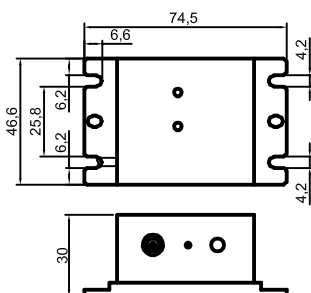
### Technical Data

Electrical version	4wire DC
Output function	antivalent
<b>Type NPN</b>	<b>KFA-5-1-N-A-Y50</b>
<b>Art.-No.</b>	<b>AF0005</b>
<b>Connection diagram No.</b>	<b>3</b>

<b>Type PNP</b>	<b>KFA-5-1-P-A-Y50</b>
<b>Art.-No.</b>	<b>AF0004</b>
<b>Connection diagram No.</b>	<b>6</b>

Operating voltage ( $U_B$ )	18...36 V DC
Output current max. ( $I_B$ )	2 x 250 mA
Voltage drop max. ( $U_d$ )	$\leq 2,5$ V
Permitted residual ripple max.	40 %
No-load current ( $I_0$ )	typ. 50 mA
Frequency of operating cycles max.	4 Hz
Permitted ambient temperature	-25...+55°C
LED-Display	green/yellow

Protective circuit	built-in
Degree of protection IEC 529	IP 65
Connection cable	2 m 4 x 0.14 mm <sup>2</sup>
Housing material	PA



All specifications are subject to change without notice. (05/2004)



## Capacitive Filling Level Probe - KFS

Series:

1 Limit value switching point

- For connection to the capacitive amplifier KFA-5-3-...
- Housing material: GFK, 16 mm Ø
- Probe length max. 2000 mm

Certificate:

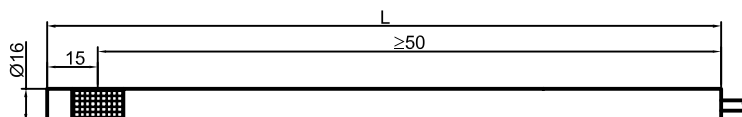
### Technical data

Active zone (mm)	10... 25, related to probe tip
Type	KFS-5-1-L*-15-Y76
Connection diagram No.	-
Permitted ambient temperature (for active zone)	-70... +250°C
Degree of protection IEC 529 (Probe)	IP 67
Connection cable to the evaluation unit KFA-5-1-...-A-Y50	2m coax-cable with angled SMB-connector
Housing material	-
Active zone	GFK
Pressure	-

A mounting device for the probe is available as an accessory (KB PG 16)

Order details: See page 49

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



All specifications are subject to change without notice. (10/2004)



## Capacitive Filling Level Probe - KFS

Series: **PER LEVEL**

### 2 Limit value switching points

- For connection to the capacitive amplifier KFA-5-3-...
- Housing material: GFK, 16 mm Ø
- Probe length max. 2000 mm

Certificate:



#### Technical data

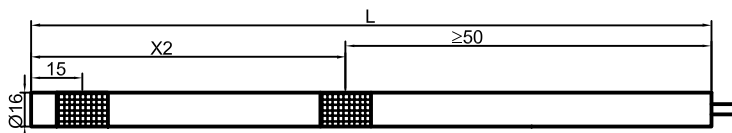
Active Zones [mm]	10... 25, related to probe tip + 1 x type specific X2
Type	KFS-5-2-"L"-15/X2-Y76
Connection diagram	-
Permitted ambient temperature (for active zone)	-70...+250°C
Degree of protection IEC 529 (Probe)	IP 67
Connection cable to the evaluation unit KFA-5-3-...	2m coax-cable with angled SMB-connector
Housing material	-
Active zone	GFK
Pressure	-

**A mounting device for the probe is available as an accessory (KB PG 16)**

**Order details: See page 49**

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

Please determine the position of the second switching point "X2" when ordering.



All specifications are subject to change without notice. (05/2004)



**Capacitive Filling Level Probe - KFS**

**Series:** PER **LEVEL**

**3 Limit value switching points**

- For connection to the capacitive amplifier KFA-5-3-...
- Housing material: GFK, 16 mm Ø
- Probe length max. 2000 mm

Certificate:



**Technical data**

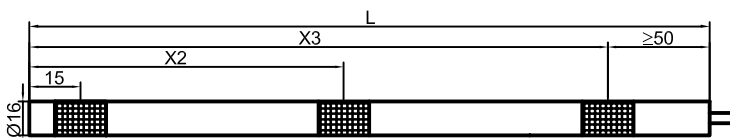
Active Zones [mm]	10... 25, related to the probe tip + 2 x type specific <b>X2/X3</b>
Type	KFS-5-3-"L"-15/X2/X3-Y76
Connection diagram	-
Permitted ambient temperature (for active zone)	-70...+250°C
Degree of protection IEC 529 (Probe)	IP 67
Connection cable to the evaluation unit KFA-5-3-...	2m coax-cable with angled SMB-connectors
Housing material	-
Active zone	GFK
Pressure	-

**A mounting device for the probe is available as an accessory (KB PG 16)**

**Order details: see page 49**

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

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



All specifications are subject to change without notice. (05/2004)



## Capacitive Filling Level Probe - KFS

Series: **PER LEVEL®**

### 1 Limit value switching point

- For connection to the capacitive amplifier:  
KFA-5-1-...-Y50 with plug connection Art.-No. 66101213  
KFA-5-3-... with plug connection Art.-No. 66101203
- Housing material: GFK, 16 mm Ø
- Connection head and process connection aluminium die cast
- Process connection 1"
- Probe length max. 2000 mm

Certificate:



#### Technical data

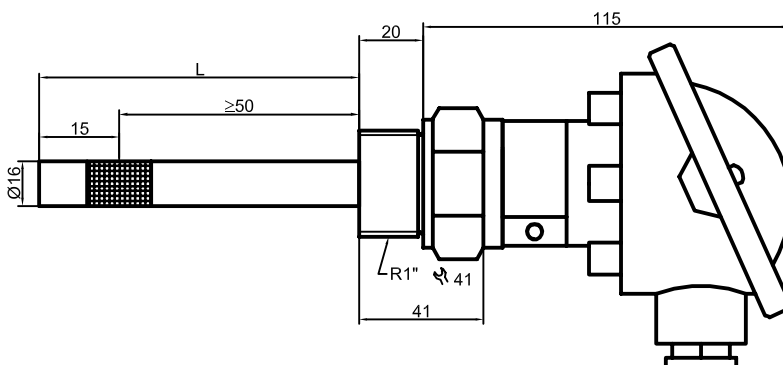
Active zone [mm] 10... 25, related to the probe tip

<b>Type</b>	<b>KFS-5-1-"L"-15-AL-1"</b>
<b>Connection diagram No.</b>	<b>see below</b>
Permitted ambient temperature	-25...+100°C
Permitted ambient temperature (for active zone)	-25...+150°C
Degree of protection IEC 529 (housing)	IP 67
Degree of protection IEC 529 (screwing*cable connection)	IP 54
Connection to the evaluation unit KFA-5-3-...	SMB- sockets within the connection head
Housing material	AL
Active zone	GFK
Pressure	6 bar

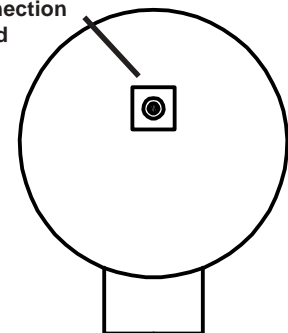
**Connection cable (with Y75/Y55 or Y75/Y75 SMB connector) is not delivered with the probe**  
**Order specifications: see page 50.**

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

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



Connection socket within connection head



All specifications are subject to change without notice. (05/2004)



**Capacitive Filling Level Probe - KFS**

Series: **PER LEVEL**

**2 Limit value switching points**

- For connection to the capacitive amplifier KFA-5-3-...
- Housing material: GFK, 16 mm Ø
- Connection head and process connection aluminium die cast
- Process connection 1"
- Probe length max. 2000 mm

Certificate:



**Technical data**

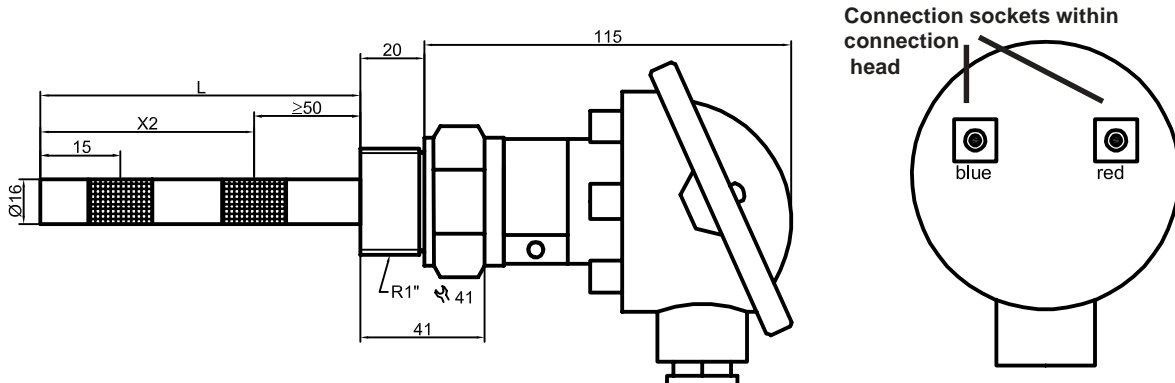
Active Zone [mm]	10... 25, related to probe tip + 1 x type specific X2
Type	KFS-5-2-"L"-15/X2-AL-1"
Connection diagram	see below
Permitted ambient temperature	-25...+100°C
Permitted ambient temperature (for active zone)	-25...+150°C
Degree of protection IEC 529 (Housing)	IP 67
Degree of protection IEC 529 (screwing*cable connection)	IP 54
Connection to the evaluation unit KFA-5-3-...	SMB-sockets within the connection head
Housing material	AL
Active zone	GFK
Pressure	6 bar

**Connection cable (with Y75/Y75 SMB connector) is not delivered with the probe  
Order specifications: see page 50.**

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

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

Please determine the position of the second switching point "X2" when ordering.



All specifications are subject to change without notice. (05/2004)



## Capacitive Filling Level Probe - KFS

Series: **PER LEVEL®**

### 3 Limit value switching points

- For connection to the capacitive amplifier KFA-5-3-...
- Housing material: GFK, 16 mm Ø
- Connection head and process connection aluminium die cast
- Process connection 1"
- Probe length max. 2000 mm

Certificate:



#### Technical data

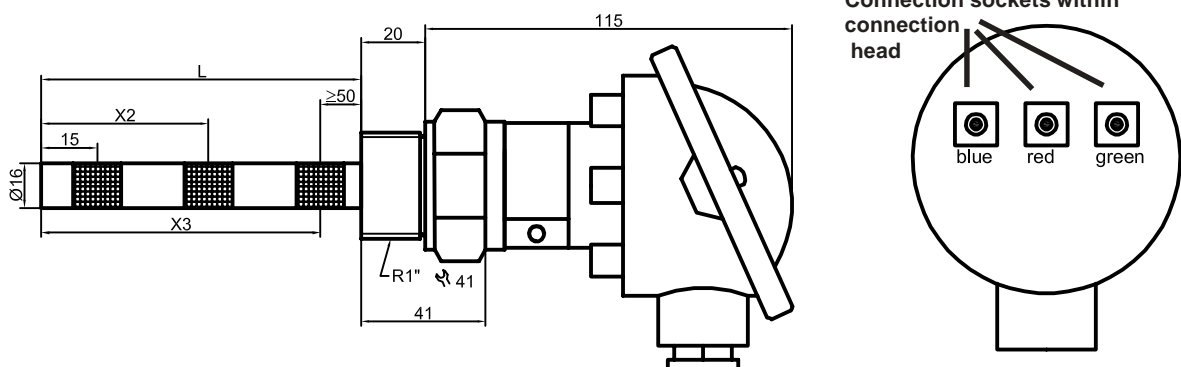
Active Zone [mm]	10... 25, related to probe tip + 2 x type specific <b>X2/X3</b>
<b>Type</b>	<b>KFS-5-3-"L"-15/X2/X3-AL-1"</b>
<b>Connection diagram</b>	<b>see below</b>
Permitted ambient temperature	-25...+100°C
Permitted ambient temperature (for active zone)	-25...+150°C
Degree of protection IEC 529 (Housing)	IP 67
Degree of protection IEC 529 (screwing*cable connection)	IP 54
Connection to the evaluation unit KFA-5-3-...	SMB-Sockets within the connection head
Housing material	AL
Active zone	GFK
Pressure	6 bar

**Connection cable (with Y75/Y75 SMB connector) is not delivered with the probe**  
**Order specifications: see page 50**

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

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

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



All specifications are subject to change without notice. (05/2004)



**Capacitive Filling Level Probe - KFS**

Series: **PER LEVEL**

**1 Limit value switching point**

- For connection to the capacitive amplifier:  
KFA-5-1-...-Y50 with plug connection Art.-No. 66101213  
KFA-5-3-... with plug connection Art.-No. 66101203
- Housing material: GFK, 16 mm Ø
- Connection head and process connection stainless steel VA
- Process connection 1"
- Probe length max. 2000 mm

Certificate:



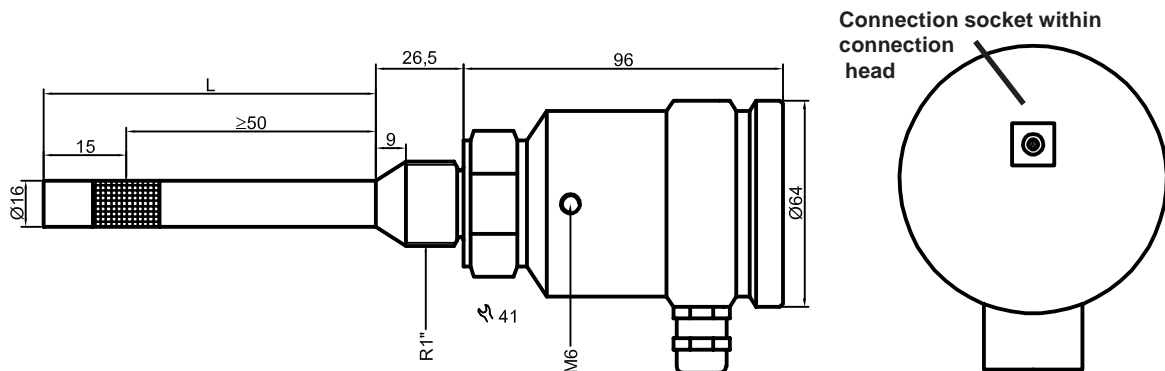
**Technical data**

Active zone [mm]	10... 25, related to the probe tip
<b>Type</b>	<b>KFS-5-1-"L"-15-VA-1"</b>
<b>Connection diagram No.</b>	<b>see below</b>
Permitted ambient temperature	-25...+100°C
Permitted ambient temperature (for active zone)	-25...+150°C
Degree of protection IEC 529 (housing)	IP 67
Degree of protection IEC 529 (screwing*cable connection)	IP 54
Connection to the evaluation unit KFA-5-3-...	SMB- sockets within the connection head
Housing material	VA Nr. 1.4571
Active zone	GFK
Pressure	25 bar

**Connection cable (with Y75/Y55 or Y75/Y75 SMB connector) is not delivered with the probe**  
**Order specifications: see page 50.**

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

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



All specifications are subject to change without notice. (05/2004)



## Capacitive Filling Level Probe - KFS

Series: **PER LEVEL**

### 2 Limit value switching points

- For connection to the capacitive amplifier KFA-5-3-...
- Housing material: GFK, 16 mm Ø
- Connection head and process connection stainless steel VA
- Process connection 1"
- Probe length max. 2000 mm

Certificate:



#### Technical data

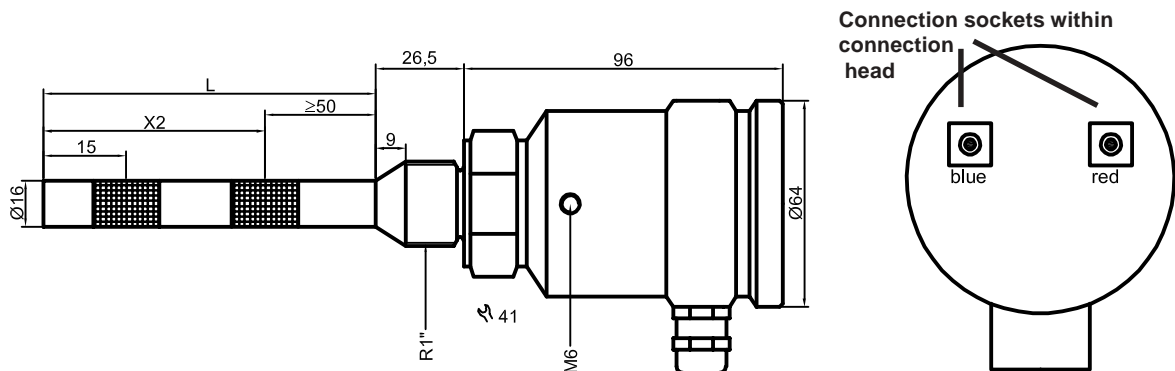
Active Zone [mm]	10... 25, related to the probe tip + 1 x type specific X2
<b>Type</b>	<b>KFS-5-2-"L"-15/X2-VA-1"</b>
<b>Connection diagram</b>	<b>see below</b>
Permitted ambient temperature	-25...+100°C
Permitted ambient temperature (for active zone)	-25...+150°C
Degree of protection IEC 529 (Housing)	IP 67
Degree of protection IEC 529 (screwing cable connection)	IP 54
Connection to the evaluation unit KFA-5-3-...	SMB-sockets within the connection head
Housing material	VA Nr. 1.4571
Active zone	GFK
Pressure	25 bar

**Connection cable (with Y75/Y75 SMB connector) is not delivered with the probe**  
**Order specifications: see page 50.**

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

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

Please determine the position of the second switching point "X2" when ordering.



All specifications are subject to change without notice. (05/2004)



**Capacitive Filling Level Probe - KFS**

Series: **PER LEVEL**

**3 Limit value switching points**

- For connection to the capacitive amplifier KFA-5-3-...
- Housing material: GFK, 16 mm Ø
- Connection head and process connection stainless steel VA
- Process connection 1"
- Probe length max. 2000 mm

Certificate:



**Technical data**

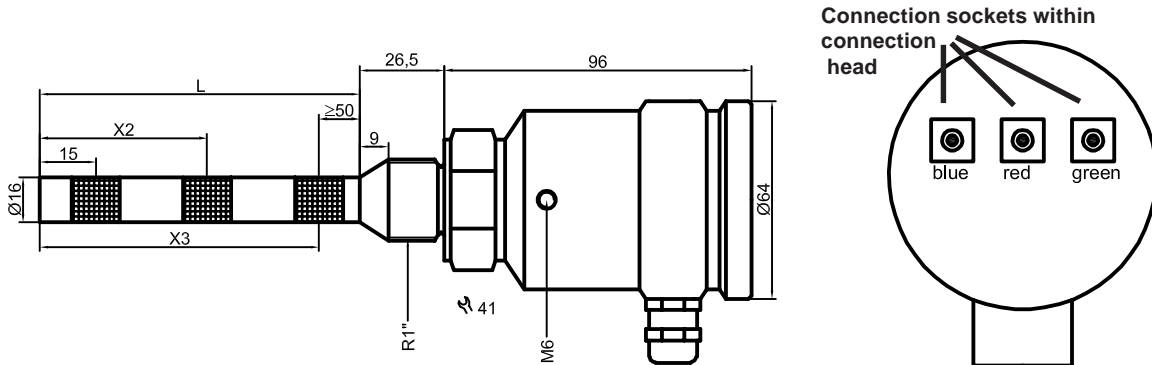
Active Zone [mm]	10... 25, related to probe tip + 2 x type specific X2/X3
<b>Type</b>	<b>KFS-5-3-"L"-15/X2/X3-VA-1"</b>
<b>Connection diagram</b>	<b>see below</b>
Permitted ambient temperature	-25...+100°C
Permitted ambient temperature (for active zone)	-25...+150°C
Degree of protection IEC 529 (Housing)	IP 67
Degree of protection IEC 529 (screwing*cable connection)	IP 54
Connection to the evaluation unit KFA-5-3-...	SMB-sockets within the connection head
Housing material	VA Nr. 14571
Active zone	GFK
Pressure	25 bar

**Connection cable (with Y75/Y75 SMB connector) is not delivered with the probe  
Order specifications: see page 50.**

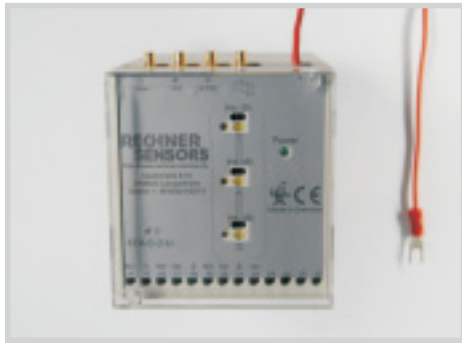
\* The degree of protection may be increased by means of special measures at mounting (e. g. injection of silicone mixture).

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

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



All specifications are subject to change without notice. (05/2004)



**Capacitive evaluation unit - KFA - Master**  
**Series PER LEVEL®**  
**NPN output**  
**PNP output**

- For capacitive filling level probes with 1, 2 or 3 limit value switching points KFS-5-...-Y76
- Operating voltage 18...36 V DC

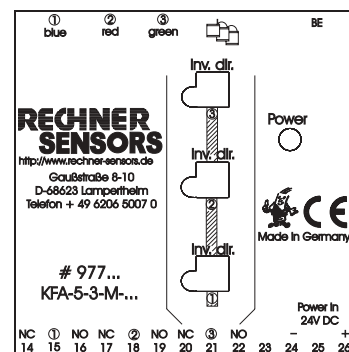
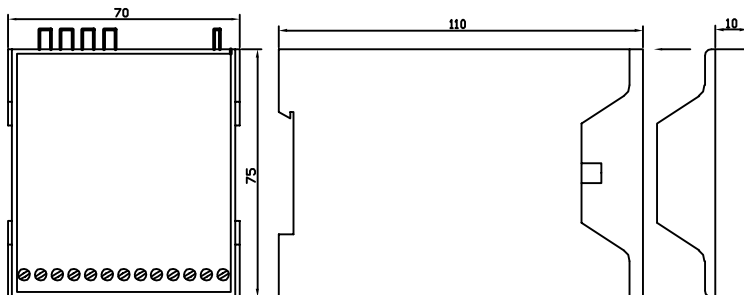
Certificate:



**Technical Data**

Output function	3 x antivalent
<b>Type NPN</b>	<b>KFA-5-3-M-N-A</b>
<b>Art.-No.</b>	<b>977 160</b>
<b>Connection diagram No.</b>	<b>see below</b>
<b>Type PNP</b>	<b>KFA-5-3-M-P-A</b>
<b>Art.-No.</b>	<b>977 110</b>
<b>Connection diagram No.</b>	<b>see below</b>
Operating voltage ( $U_B$ )	18...36 V DC
Output current max. ( $I_o$ )	400 mA each output
Permitted residual ripple max.	40 %
Power consumption (outputs no-load)	typ. 3.5 W
Permitted ambient temperature	-25...+55°C
LED - Display	green / $U_B$ standby
LED - Display	3 x yellow / filling level
Protective circuit	built-in
Degree of protection IEC 529	IP 20
Connection	screwing clamp terminals and SMB-sockets
Housing material	ABS

All specifications are subject to change without notice. (05/2004)





## Capacitive evaluation unit - KFA - Slave Series PER LEVEL<sup>®</sup> NPN output PNP output

- For capacitive filling level probes with 1, 2 or 3 limit value switching points KFS-5-...-Y76
- Operating voltage 18...36 V DC
- Extension for 3 limit value switching points

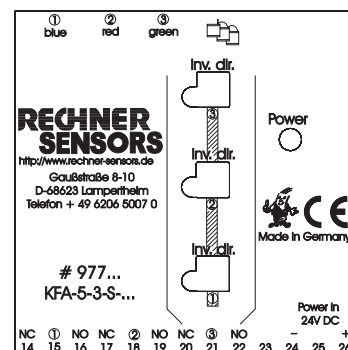
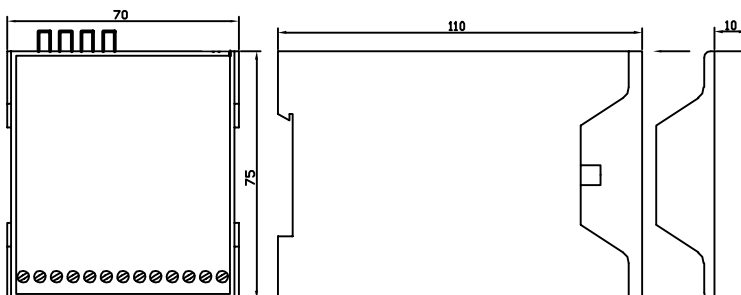
Certificate:



### Technical Data

Output function	3 x antivalent
Type NPN	KFA-5-3-S-N-A
Art.-No.	977 1601
Connection diagram No.	see below
Type PNP	KFA-5-3-S-P-A
Art.-No.	977 1101
Connection diagram No.	see below
Operating voltage ( $U_B$ )	18...36 V DC
Output current max. ( $I_o$ )	400 mA each output
Permitted residual ripple max.	40 %
Power consumption (outputs no-load)	typ. 3.5 W
Permitted ambient temperature	-25...+55°C
LED - Display	green / $U_B$ standby
LED - Display	3 x yellow / filling level
Protective circuit	built-in
Degree of protection IEC 529	IP 20
Connection	screwing clamp terminals and SMB-sockets
Housing material	ABS

A T-connection device with SMB sockets for the extension of several slaves is available as accessory (see page 49).



All specifications are subject to change without notice. (05/2004)





## Capacitive evaluation unit - KFA - Slave Series PER LEVEL<sup>®</sup> Relay output

- For capacitive filling level probes with 1, 2 or 3 limit value switching points KFS-5-...-Y76
- Operating voltage 115 / 230 V AC
- Extension for 3 limit value switching points

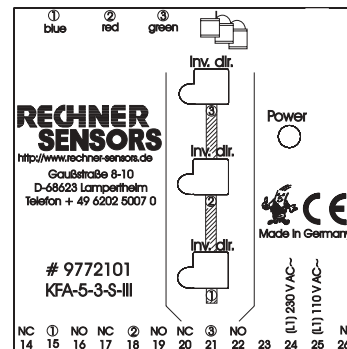
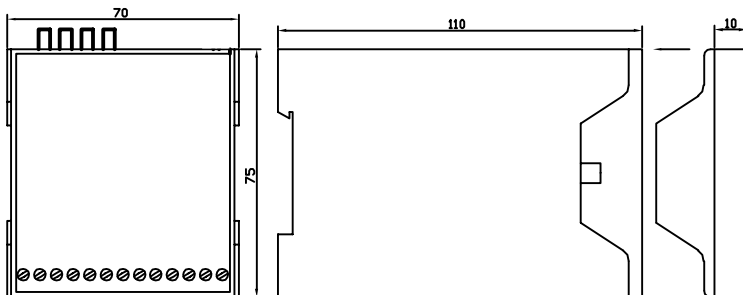
Certificate:



### Technical Data

Output function	3 x change-over contact
Type	KFA-5-3-S-III
Art.-No.	977 2101
Connection diagram No.	see below
Operating voltage ( $U_B$ )	105...125/207...253 V AC 50/60 Hz
Output current max. ( $I_B$ )	max. 120 V DC/1A-250 V AC/4A
Permitted residual ripple max.	-
Power consumption	typ. 3 VA
Permitted ambient temperature	-25...+55°C
LED - Display	green / $U_B$ standby
LED - Display	3 x yellow / filling level
Protective circuit	-
Degree of protection IEC 529	IP 20
Connection	screwing clamp terminals and SMB-sockets
Housing material	ABS

A T-connection device with SMB sockets for the extension of several slaves is available as accessory (see page 49).



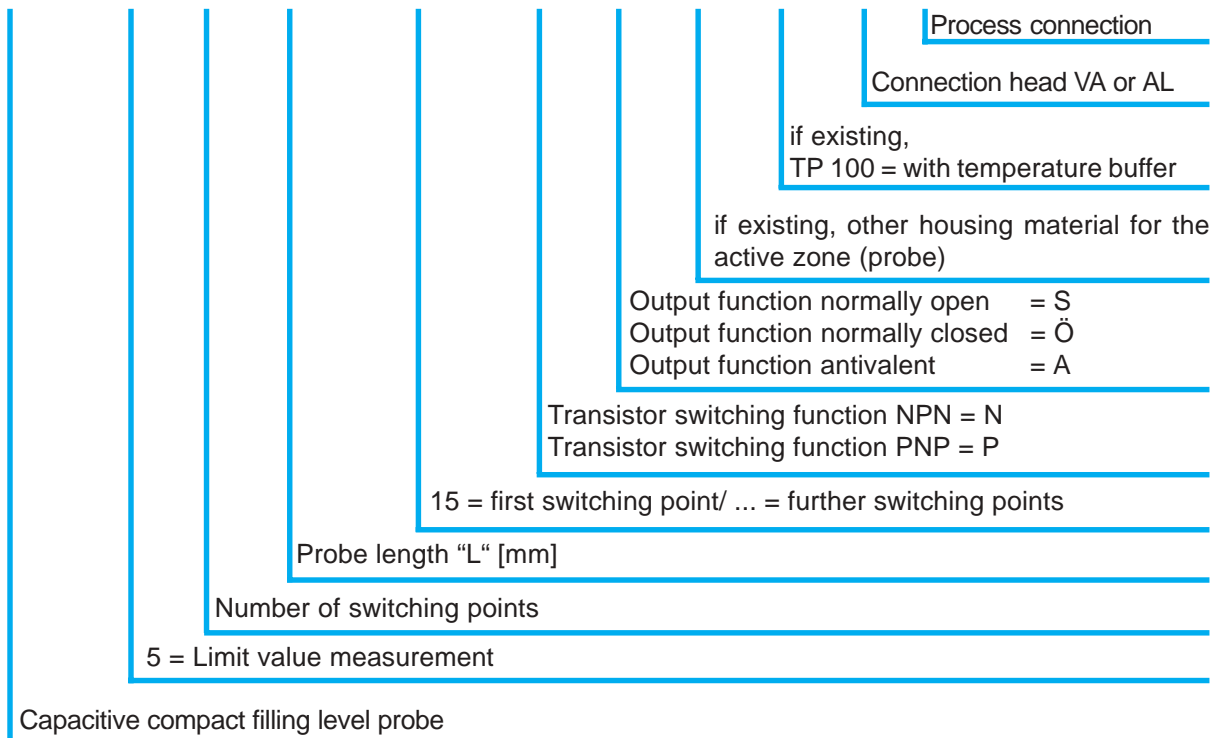
All specifications are subject to change without notice. (05/2004)

## TYPE CODE • COMPACT

PER LEVEL®

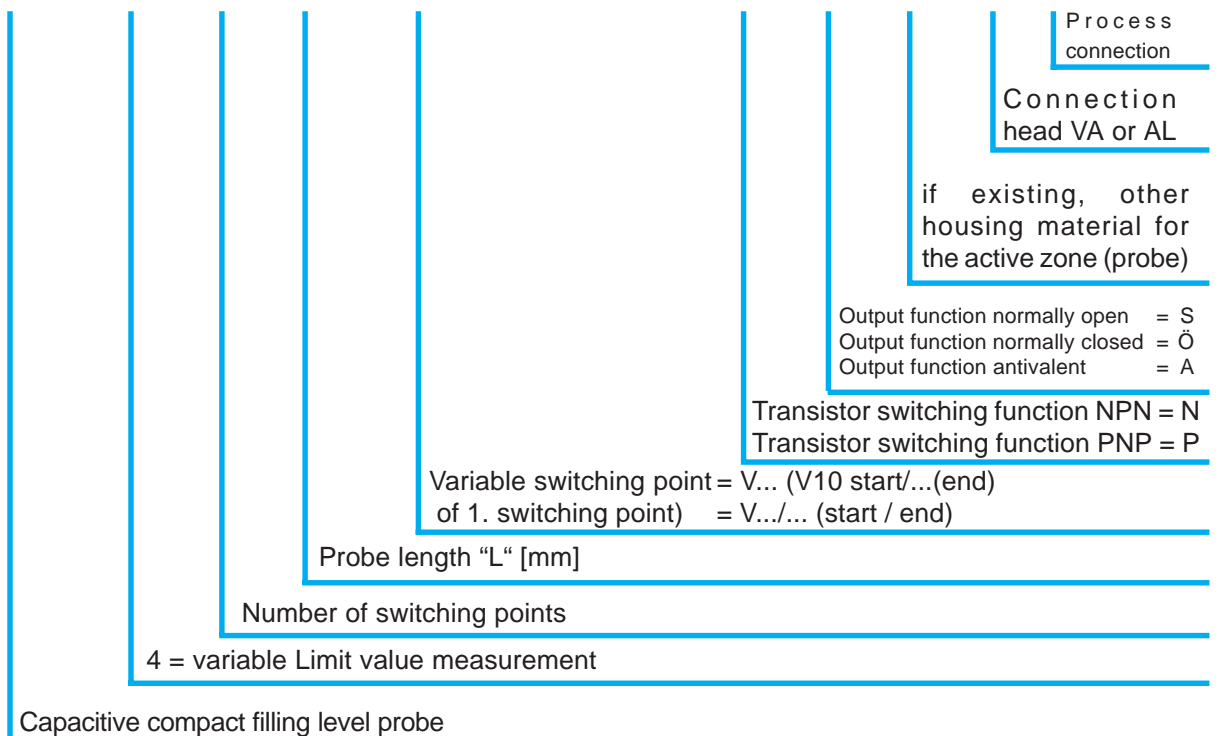
Capacitive Limit Value Level Probe - COMPACT - with integrated evaluation unit  
Probes with fixed limit value switching points

KFX - 5 - ... - ... - 15/... - ... - ... - ... - ... - ... - ...

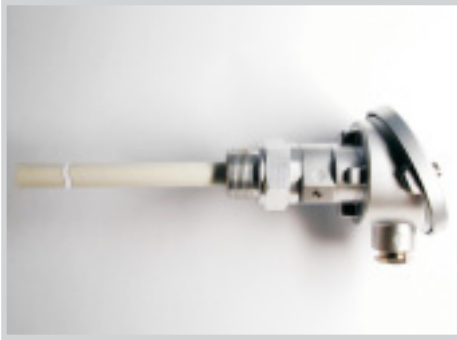


Capacitive Limit Value Level Probe - COMPACT - with integrated evaluation unit Probes with variable limit value switching points

KFX - 4 - ... - ... - V10/... - V.../... - ... - ... - ... - ... - ...



All specifications are subject to change without notice. (05/2004)



## Capacitive Filling Level Probe - KFX

Series: **PER LEVEL COMPACT**

**NPN Output - Antivalent**

**PNP Output - Antivalent**

**1 Limit value switching point**

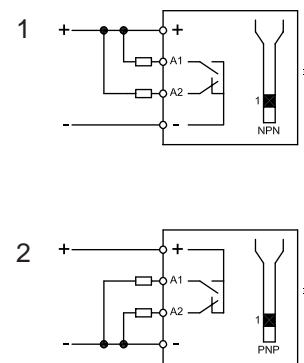
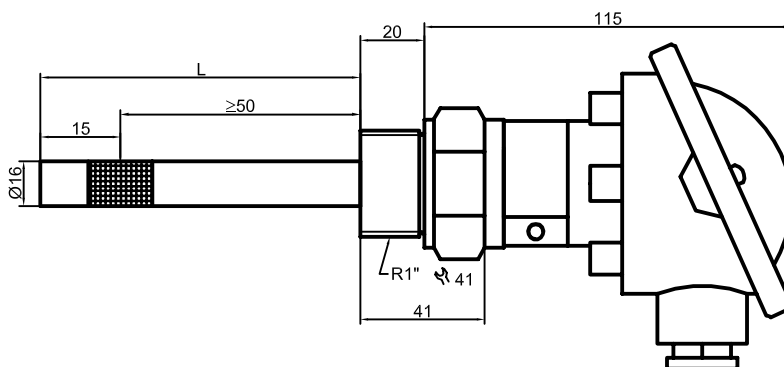
- Integrated evaluation electronics
- Housing material: GFK, 16 mm Ø
- Connection head and process connection aluminium die cast
- Process connection 1"
- Probe length max. 2000 mm

Certificate:



### Technical data

Active zone [mm]	10...25, related to probe tip
Electrical version	4 connections DC
Output function	antivalent
Type NPN	KFX-5-1-"L"-15-N-A-AL-1"
Connection diagram No.	1
Type PNP	KFX-5-1-"L"-15-P-A-AL-1"
Connection diagram No.	2
Operating voltage ( $U_B$ )	18...36 V DC
Output current max. ( $I_o$ )	2 x 250 mA
Voltage drop max. ( $U_d$ )	$\leq 2.5$ V
Permitted residual ripple max.	40 %
No-load current ( $I_o$ )	typ. 50 mA
Switching frequency max.	4 Hz
Permitted ambient temperature	- 25...+55°C
Permitted ambient temperature (for active zone)	-25...+100°C
Pressure	6 bar
LED-Display	green/yellow
Protective circuit	built-in
Degree of protection IEC 529	IP 67
Connection	Clamp terminal within the connection head
Housing material	AL
Active zone	GFK



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

All specifications are subject to change without notice. (05/2004)



**Capacitive Filling Level Probe - KFX**  
**Series: PER LEVEL COMPACT**  
**NPN Output - Normally Open**  
**PNP Output - Normally Open**  
**2 Limit value switching points**

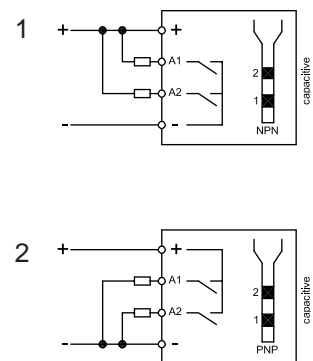
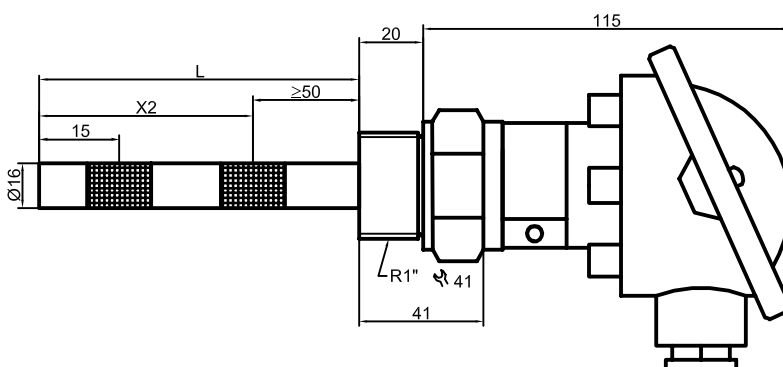
- Integrated evaluation electronics
- Housing material: GFK, 16 mm Ø
- Connection head and process connection aluminium die cast
- Process connection 1"
- Probe length max. 2000 mm

Certificate:



**Technical data**

Active zone [mm]	10... 25, related to the probe tip + 1 x type specific X2
Electrical version	4 connections DC
Output function	NO
<b>Type NPN</b>	<b>KFX-5-2-"L"-15/X2-N-S-AL-1"</b>
<b>Connection diagram No.</b>	<b>1</b>
<b>Type PNP</b>	<b>KFX-5-2-"L"-15/X2-P-S-AL-1"</b>
<b>Connection diagram No.</b>	<b>2</b>
Operating voltage ( $U_B$ )	18...36 V DC
Output current max. ( $I_o$ )	2 x 250 mA
Voltage drop max. ( $U_d$ )	≤ 2.5 V
Permitted residual ripple max.	40 %
No-load current ( $I_o$ )	typ. 50 mA
Switching frequency max.	4 Hz
Permitted ambient temperature	- 25...+55°C
Permitted ambient temperature (for active zone)	-25...+100°C
Pressure	6 bar
LED-Display	green/yellow
Protective circuit	built-in
Degree of protection IEC 529	IP 67
Connection	Clamp terminal within the connection head
Housing material	AL
Active zone	GFK



Other housing materials for the active zone (probe), like PE, PVDF or PEEK on request.  
 Please determine the position of the second switching point "X2" when ordering.

All specifications are subject to change without notice. (05/2004)



Certificate:

## Capacitive Filling Level Probe - KFX

Series: **PER LEVEL COMPACT**

**NPN Output - Normally Closed**

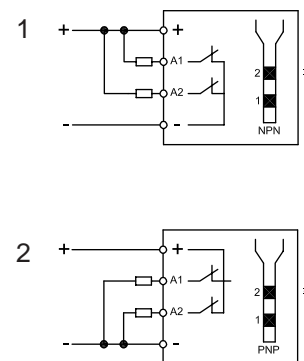
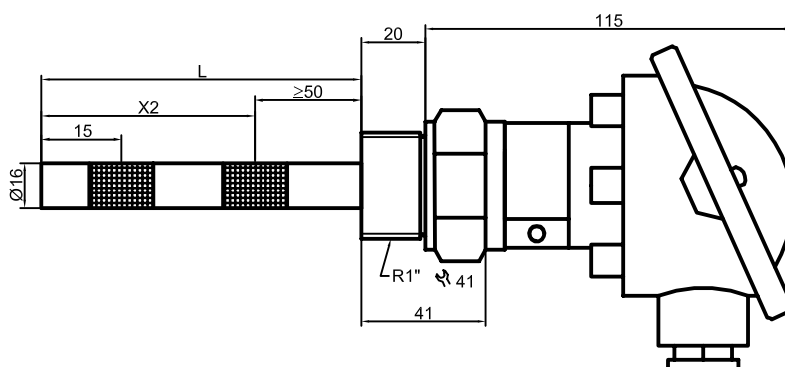
**PNP Output - Normally Closed**

**2 Limit value switching points**

- Integrated evaluation electronics
- Housing material: GFK, 16 mm Ø
- Connection head and process connection aluminium die cast
- Process connection 1"
- Probe length max. 2000 mm

### Technical data

Active zone [mm]	10... 25, related to probe tip + 1 x type specific X2
Electrical version	4 connections DC
Output function	NC
Type NPN	KFX-5-2-"L"-15/X2-N-Ö-AL-1"
Connection diagram No.	1
Type PNP	KFX-5-2-"L"-15/X2-P-Ö-AL-1"
Connection diagram No.	2
Operating voltage ( $U_B$ )	18...36 V DC
Output current max. ( $I_b$ )	2 x 250 mA
Voltage drop max. ( $U_d$ )	≤ 2.5 V
Permitted residual ripple max.	40 %
No-load current ( $I_o$ )	typ. 50 mA
Switching frequency max.	4 Hz
Permitted ambient temperature	- 25...+55°C
Permitted ambient temperature (for active zone)	-25...+100°C
Pressure	6 bar
LED-Display	green/yellow
Protective circuit	built-in
Degree of protection IEC 529	IP 67
Connection	Clamp terminal within the connection head
Housing material	AL
Active zone	GFK



Other housing materials for the active zone (probe), like PE, PVDF or PEEK on request.  
Please determine the position of the second switching point "X2" when ordering.

All specifications are subject to change without notice. (05/2004)



## Capacitive Filling Level Probe - KFX

Series: <sup>PER</sup>LEVEL<sup>®</sup> COMPACT

NPN Output - Antivalent

PNP Output - Antivalent

1 Limit value switching point

- Integrated evaluation electronics
- Housing material: GFK, 16 mm Ø
- Connection head and process connection stainless steel VA
- Process connection 1"
- Probe length max. 2000 mm

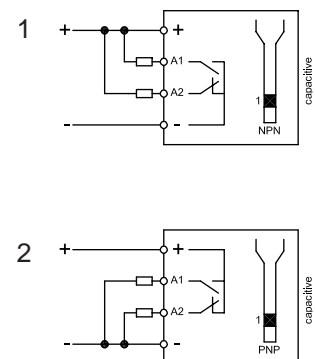
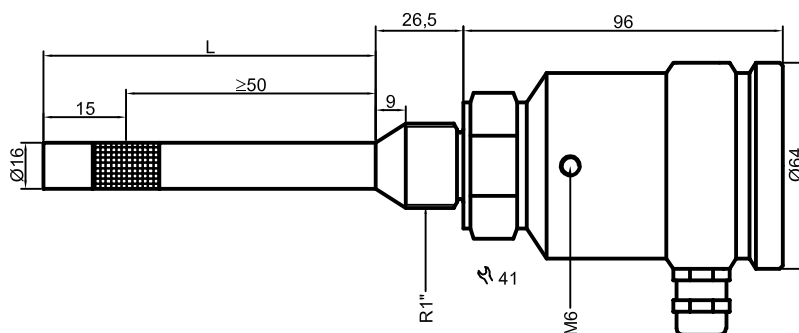
Certificate:



### Technical data

Active zone [mm]	10...25, related to probe tip
Electrical version	4 connections DC
Output function	antivalent
Type NPN	KFX-5-1-"L"-15-N-A-VA-1"
Connection diagram No.	1
Type PNP	KFX-5-1-"L"-15-P-A-VA-1"
Connection diagram No.	2
Operating voltage ( $U_B$ )	18...36 V DC
Output current max. ( $I_o$ )	2 x 250 mA
Voltage drop max. ( $U_d$ )	≤ 2.5 V
Permitted residual ripple max.	40 %
No-load current ( $I_o$ )	typ. 50 mA
Switching frequency max.	4 Hz
Permitted ambient temperature	- 25...+55°C
Permitted ambient temperature (for active zone)	-25...+100°C
Pressure	25 bar
LED-Display	green yellow
Protective circuit	built-in
Degree of protection IEC 529	IP 67
Connection	Clamp terminals within the connection head
Housing material	VA No. 1.4571
Active zone	GFK

All specifications are subject to change without notice. (05/2004)



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



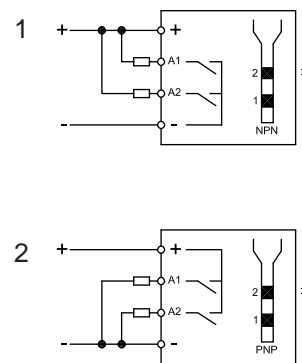
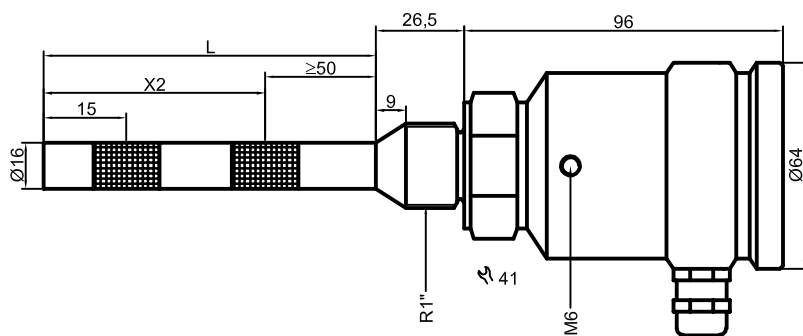
Certificate:

**Capacitive Filling Level Probe - KFX**  
**Series: <sup>PER</sup>LEVEL COMPACT**  
**NPN Output - Normally Open**  
**PNP Output - Normally Open**  
**2 Limit value switching points**

- Integrated evaluation electronics
- Housing material: GFK, 16 mm Ø
- Connection head and process connection stainless steel VA
- Process connection 1"
- Probe length max. 2000 mm

**Technical data**

Active zone [mm]	10... 25, related to the probe tip + 1 x type specific X2
Electrical version	4 connections DC
Output function	NO
Type NPN	KFX-5-2-"L"-15/X2-N-S-VA-1"
Connection diagram No.	1
Type PNP	KFX-5-2-"L"-15/X2-P-S-VA-1"
Connection diagram No.	2
Operating voltage (U <sub>B</sub> )	18...36 V DC
Output current max. (I <sub>O</sub> )	2 x 250 mA
Voltage drop max. (U <sub>d</sub> )	≤ 2.5 V
Permitted residual ripple max.	40 %
No-load current (I <sub>o</sub> )	typ. 50 mA
Switching frequency max.	4 Hz
Permitted ambient temperature	- 25...+55°C
Permitted ambient temperature (for active zone)	-25...+100°C
Pressure	25 bar
LED-Display	green/yellow
Protective circuit	built-in
Degree of protection IEC 529	IP 67
Connection	Clamp terminal within the connection head
Housing material	VA No. 1.4571
Active zone	GFK



Other housing materials for the active zone (probe), like PE, PVDF or PEEK on request.  
 Please determine the position of the second switching point "X2" when ordering.

All specifications are subject to change without notice. (05/2004)



**Capacitive Filling Level Probe - KFX**  
**Series: PER LEVEL COMPACT**  
**NPN Output - Normally Closed**  
**PNP Output - Normally Closed**  
**2 Limit value switching points**

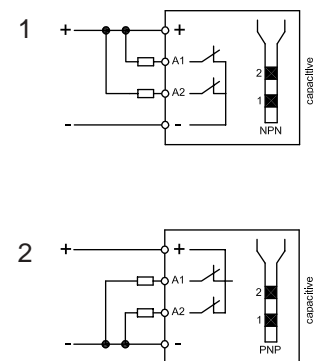
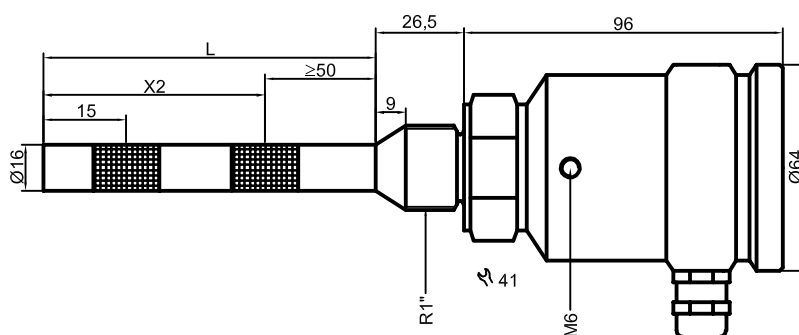
- Integrated evaluation electronics
- Housing material: GFK, 16 mm Ø
- Connection head and process connection stainless steel VA
- Process connection 1"
- Probe length max. 2000 mm

Certificate:



**Technical data**

Active zone [mm]	10... 25, related to probe tip + 1 x type specific X2
Electrical version	4 connections DC
Output function	NC
<b>Type NPN</b>	<b>KFX-5-2-"L"-15/X2-N-Ö-VA-1"</b>
<b>Connection diagram No.</b>	<b>1</b>
<b>Type PNP</b>	<b>KFX-5-2-"L"-15/X2-P-Ö-VA-1"</b>
<b>Connection diagram No.</b>	<b>2</b>
Operating voltage ( $U_B$ )	18...36 V DC
Output current max. ( $I_e$ )	2 x 250 mA
Voltage drop max. ( $U_d$ )	≤ 2.5 V
Permitted residual ripple max.	40 %
No-load current ( $I_0$ )	typ. 50 mA
Switching frequency max.	4 Hz
Permitted ambient temperature	- 25...+55°C
Permitted ambient temperature (for active zone)	-25...+100°C
Pressure	25 bar
LED-Display	green yellow
Protective circuit	built-in
Degree of protection IEC 529	IP 67
Connection	Clamp terminal within the connection head
Housing material	VA No. 1.4571
Active zone	GFK



Other housing materials for the active zone (probe) like PE, PVDF or PEEK on request.  
 Please determine the position of the second switching point "X2" when ordering.

All specifications are subject to change without notice. (05/2004)



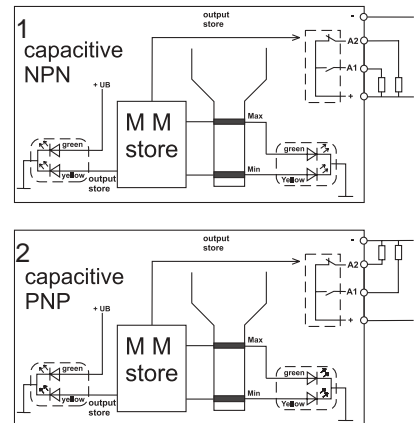
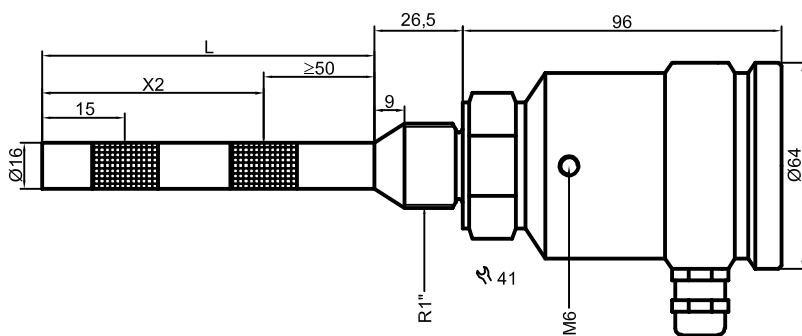
Certificate:

**Capacitive Filling Level Probe - KFX**  
**Series: <sup>PER</sup>LEVEL COMPACT**  
**NPN Output - Antivalent**  
**PNP Output - Antivalent**  
**2 Limit value switching points / MIN/MAX-Control**

- Integrated evaluation electronics
- Housing material: GFK, 16 mm Ø
- Connection head and process connection stainless steel VA
- Process connection 1"
- Probe length max. 2000 mm

**Technical data**

Active zone [mm]	10... 25, related to probe tip + 1 x type specific X2
Electrical version	4 connections DC
Output function	antivalent
Type NPN	KFX-5-2-"L"-15/X2-N-A-MM-VA-1"
Connection diagram No.	1
Type PNP	KFX-5-2-"L"-15/X2-P-A-MM-VA-1"
Connection diagram No.	2
Operating voltage (U <sub>B</sub> )	18...36 V DC
Output current max. (I <sub>O</sub> )	2 x 250 mA
Voltage drop max. (U <sub>d</sub> )	≤ 2,5 V
Permitted residual ripple max.	40 %
No-load current (I <sub>0</sub> )	typ. 50 mA
Switching frequency max.	4 Hz
Permitted ambient temperature	- 25...+55°C
Permitted ambient temperature (for active zone)	-25...+100°C
Pressure	25 bar
LED-Display	green/yellow
Protective circuit	built-in
Degree of protection IEC 529	IP 67
Connection	Clamp terminal within the connection head
Housing material	VA No. 1.4571
Active zone	GFK



Other housing materials for the active zone (probe), like PE, PVDF or PEEK on request. Please determine the position of the second switching point "X2" when ordering.

All specifications are subject to change without notice. (05/2004)



### Capacitive Filling Level Probe - KFX

Series: <sup>PER</sup>LEVEL<sup>®</sup> COMPACT

With temperature buffer TP100

NPN Output - Antivalent

PNP Output - Antivalent

1 Limit value switching point

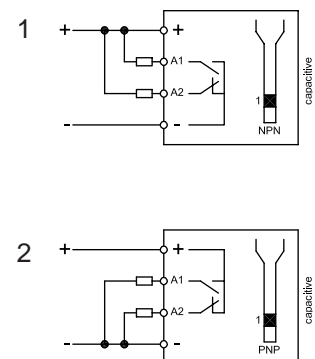
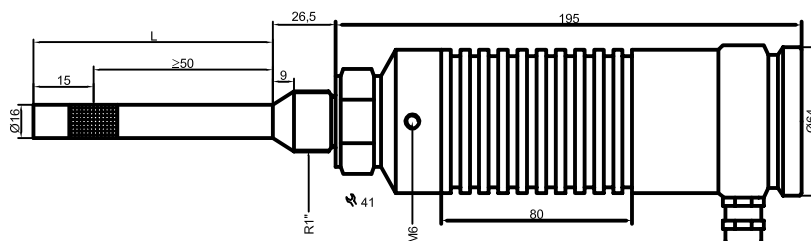
- Integrated evaluation electronics
- Housing material: GFK, 16 mm Ø
- Connection head and process connection stainless steel VA
- Process connection 1"
- Probe length max. 2000 mm

Certificate:



#### Technical data

Active zone [mm]	10...25, related to probe tip
Electrical version	4 connections DC
Output function	antivalent
Type NPN	KFX-5-1-"L"-15-N-A-TP100-VA-1"
Connection diagram No.	1
Type PNP	KFX-5-1-"L"-15-P-A-TP100-VA-1"
Connection diagram No.	2
Operating voltage ( $U_B$ )	18...36 V DC
Output current max. ( $I_o$ )	2 x 250 mA
Voltage drop max. ( $U_d$ )	≤ 2.5 V
Permitted residual ripple max.	40 %
No-load current ( $I_o$ )	typ. 50 mA
Switching frequency max.	4 Hz
Permitted ambient temperature	- 25...+55°C
Permitted ambient temperature (for active zone)	-70...+200°C
Pressure	25 bar
LED-Display	green/yellow
Protective circuit	built-in
Degree of protection IEC 529	IP 67
Connection	Clamp terminal within the connection head
Housing material	VA Nr. 1.4571
Active zone	GFK



All specifications are subject to change without notice. (05/2004)

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



**Capacitive Filling Level Probe - KFX**  
**Series: <sup>PER</sup>LEVEL<sup>®</sup> COMPACT**  
**With temperature buffer TP100**  
**NPN Output - Normally Open**  
**PNP Output - Normally Open**  
**2 Limit value switching points**

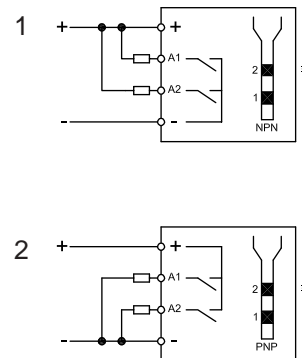
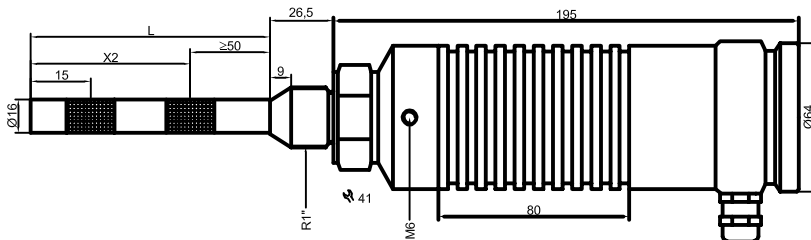
- Integrated evaluation electronics
- Housing material: GFK, 16 mm Ø
- Connection head and process connection stainless steel VA
- Process connection 1"
- Probe length max. 2000 mm

Certificate:



**Technical data**

Active zone [mm]	10... 25, related to the probe tip + 1 x type specific X2
Electrical version	4 connections DC
Output function	NO
Type NPN	KFX-5-2-"L"-15/X2-N-S-TP100-VA-1"
Connection diagram No.	1
Type PNP	KFX-5-2-"L"-15/X2-P-S-TP100-VA-1"
Connection diagram No.	2
Operating voltage (U <sub>B</sub> )	18...36 V DC
Output current max. (I <sub>O</sub> )	2 x 250 mA
Voltage drop max. (U <sub>d</sub> )	≤ 2.5 V
Permitted residual ripple max.	40 %
No-load current (I <sub>0</sub> )	typ. 50 mA
Switching frequency max.	4 Hz
Permitted ambient temperature	- 25...+55°C
Permitted ambient temperature (for active zone)	-70...+200°C
Pressure	25 bar
LED-Display	green/yellow
Protective circuit	built-in
Degree of protection IEC 529	IP 67
Connection	Clamp terminal within the connection head
Housing material	VA No. 1.4571
Active zone	GFK



Other housing materials for the active zone (probe), like PE, PVDF or PEEK on request.  
 Please determine the position of the second switching point "X2" when ordering.

All specifications are subject to change without notice. (05/2004)



### Capacitive Filling Level Probe - KFX

Series: <sup>PER</sup>LEVEL<sup>®</sup> COMPACT

With temperature buffer TP100

NPN Output - Normally Closed

PNP Output - Normally Closed

2 Limit value switching points

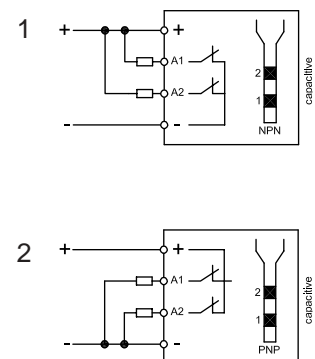
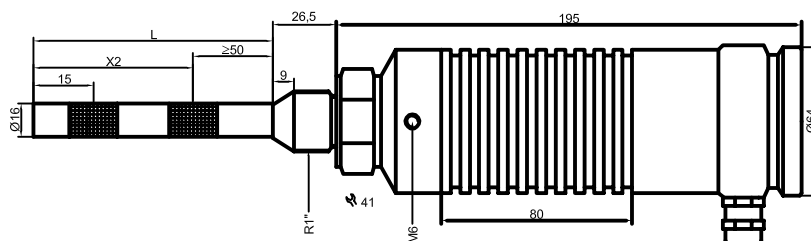
- Integrated evaluation electronics
- Housing material: GFK, 16 mm Ø
- Connection head and process connection stainless steel VA
- Process connection 1"
- Probe length max. 2000 mm

Certificate:



#### Technical data

Active zone [mm]	10... 25, related to probe tip + 1 xtype specific X2
Electrical version	4 connections DC
Output function	NC
Type NPN	KFX-5-2-"L"-15/X2-N-Ö-TP100-VA-1"
Connection diagram No.	1
Type PNP	KFX-5-2-"L"-15/X2-P-Ö-TP100-VA-1"
Connection diagram No.	2
Operating voltage ( $U_B$ )	18...36 V DC
Output current max. ( $I_o$ )	2 x 250 mA
Voltage drop max. ( $U_d$ )	≤ 2.5 V
Permitted residual ripple max.	40 %
No-load current ( $I_o$ )	typ. 50 mA
Switching frequency max.	4 Hz
Permitted ambient temperature	- 25...+55°C
Permitted ambient temperature (for active zone)	-70...+200°C
Pressure	25 bar
LED-Display	green/yellow
Protective circuit	built-in
Degree of protection IEC 529	IP 67
Connection	Clamp terminals within the connection head
Housing material	VA No. 1.4571
Active zone	GFK



Other housing materials for the active zone (probe), like PE, PVDF or PEEK on request.  
Please determine the position of the second switching point "X2" when ordering.

All specifications are subject to change without notice. (05/2004)



**Capacitive Filling Level Probe - KFX**  
**Series: <sup>PER</sup>LEVEL COMPACT**  
**NPN Output - Antivalent**  
**PNP Output - Antivalent**  
**1 Variable limit value switching point**

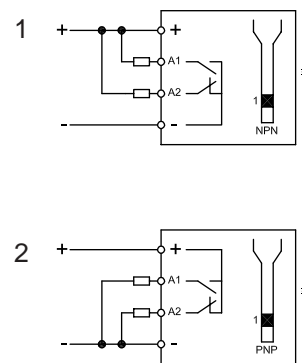
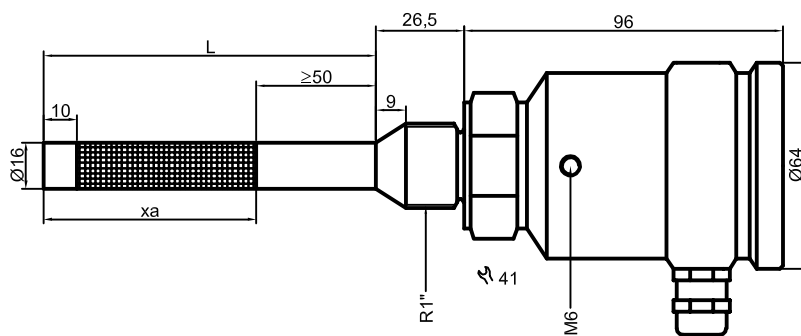
- Integrated evaluation electronics
- Housing material: GFK, 16 mm Ø
- Connection head and process connection stainless steel VA
- Process connection 1"
- Probe length max. 2000 mm

Certificate:



**Technical data**

Active zone [mm]	10...25, related to the probe tip + 1 x type specific xa
Electrical version	4 connections DC
Output function	antivalent
Type NPN	KFX-4-1-"L"-V10/xa-N-A-VA-1"
Connection diagram No.	1
Type PNP	KFX-4-1-"L"-V10/xa-P-A-VA-1"
Connection diagram No.	2
Operating voltage (U <sub>B</sub> )	18...36 V DC
Output current max. (I <sub>O</sub> )	2 x 250 mA
Voltage drop max. (U <sub>d</sub> )	≤ 2.5 V
Permitted residual ripple max.	40 %
No-load current (I <sub>0</sub> )	typ. 50 mA
Switching frequency max.	4 Hz
Permitted ambient temperature	- 25...+55°C
Permitted ambient temperature (for active zone)	-25...+100°C
Pressure	25 bar
LED-Display	green/yellow
Protective circuit	built-in
Degree of protection IEC 529	IP 67
Connection	Clamp terminal within the connection head
Housing material	VA No. 1.4571
Active zone	GFK



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

All specifications are subject to change without notice. (05/2004)



**Capacitive Filling Level Probe - KFX**  
**Series: PER LEVEL COMPACT**  
**NPN Output - Normally Open**  
**PNP Output - Normally Open**  
**2 Variable limit value switching points**

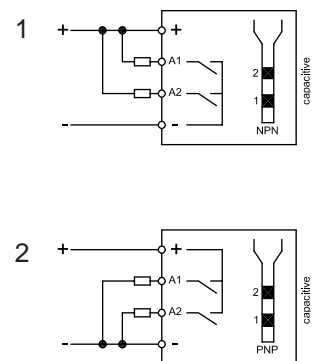
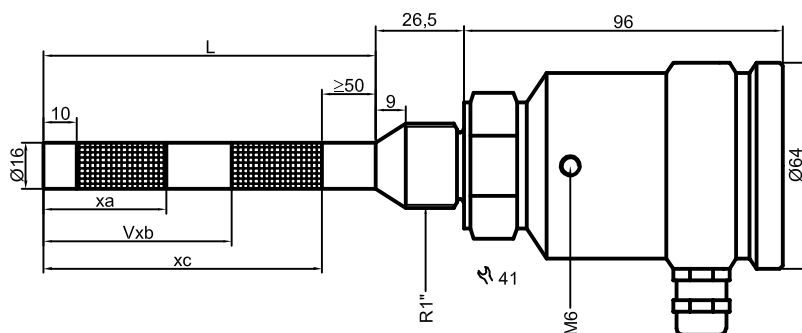
- Integrated evaluation electronics
- Housing material: GFK, 16 mm Ø
- Connection head and process connection stainless steel VA
- Process connection 1"
- Probe length max. 2000 mm

Certificate:



**Technical data**

Active zone [mm]	10...25, related to the probe tip + 2 x type specific xa-Vxb/xc
Electrical version	4 connections DC
Output function	NO
Type NPN	KFX-4-2-"L"-V10/xa-Vxb/xc-N-S-VA-1"
Connection diagram No.	1
Type PNP	KFX-4-2-"L"-V10/xa-Vxb/xc-P-S-VA-1"
Connection diagram No.	2
Operating voltage ( $U_B$ )	18...36 V DC
Output current max. ( $I_o$ )	2 x 250 mA
Voltage drop max. ( $U_d$ )	≤ 2.5 V
Permitted residual ripple max.	40 %
No-load current ( $I_o$ )	typ. 50 mA
Switching frequency max.	4 Hz
Permitted ambient temperature	- 25...+55°C
Permitted ambient temperature (for active zone)	-25...+100°C
Pressure	25 bar
LED-Display	green/yellow
Protective circuit	built-in
Degree of protection IEC 529	IP 67
Connection	Clamp terminal within the connection head
Housing material	VA No. 1.4571
Active zone	GFK



Other housing materials for the active zone (probe), like PE, PVDF or PEEK on request.  
 Please determine the position of the second switching points "V10/xa and Vxb/xc" when ordering.

All specifications are subject to change without notice. (05/2004)



**Capacitive Filling Level Probe - KFX**  
**Series: <sup>PER</sup>LEVEL COMPACT**  
**NPN Output - Normally Closed**  
**PNP Output - Normally Closed**  
**2 Variable limit value switching points**

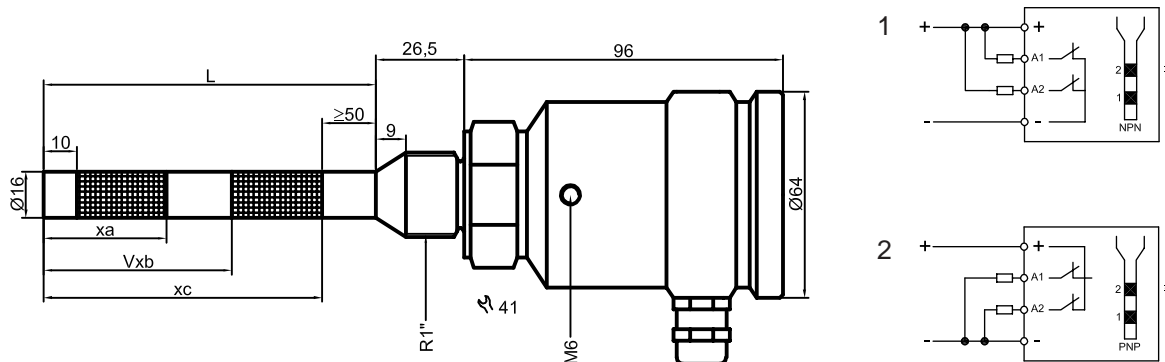
- Integrated evaluation electronics
- Housing material: GFK, 16 mm Ø
- Connection head and process connection stainless steel VA
- Process connection 1"
- Probe length max. 2000 mm

Certificate:



**Technical data**

Active zone [mm]	10...25, related to the probe tip + 2 x type specific xa-Vxb/xc
Electrical version	4 Connections DC
Output function	NC
Type NPN	KFX-4-2-"L"-V10/xa-Vxb/xc-N-Ö-VA-1"
Connection diagram No.	1
Type PNP	KFX-4-2-"L"-V10/xa-Vxb/xc-P-Ö-VA-1"
Connection diagram No.	2
Operating voltage (U <sub>B</sub> )	18...36 V DC
Output current max. (I <sub>O</sub> )	2 x 250 mA
Voltage drop max. (U <sub>d</sub> )	≤ 2.5 V
Permitted residual ripple max.	40 %
No-load current (I <sub>o</sub> )	typ. 50 mA
Switching frequency max.	4 Hz
Permitted ambient temperature	- 25...+55°C
Permitted ambient temperature (for active zone)	-25...+100°C
Pressure	25 bar
LED-Display	green/yellow
Protective circuit	built-in
Degree of protection IEC 529	IP 67
Connection	Clamp terminal within the connection head
Housing material	VA or 1.4571
Active zone	GFK



Other housing materials for the active zone (probe), like PE, PVDF or PEEK on request.  
 Please determine the position of the second switching points "V10/xa and Vxb/xc" when ordering.

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## ACCESSORIES

**Fig.1**

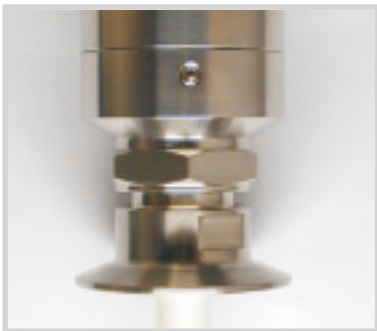


Milk pipe screwing  
according to DIN 11851  
**(Fig.1 and 2)**  
Art.-No.: 75002900

**Fig. 2**

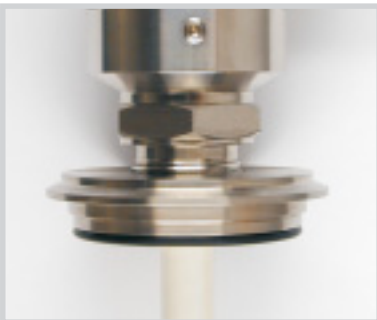


**Fig. 3**



Tri-Clamp Connection  
according to DIN 32676, DN 50 and ISO 2852 **(Fig. 3)**  
Art.-No.: 75003050

**Fig. 4**



Varivent flange Type N  
DN 50 (50/40), according to Factory norm Tuchenhagen **(Fig. 4)**  
Art.-No.: 75002800

**Fig. 5**



KB PG 16 Mounting device for probes without connection head  
**(Fig. 5)** Art.- No.: 194000

**Fig. 6**



SMB T-Connection device for extension of several slave  
evaluation units **(Fig. 6)**  
Art. No.: 67004100

All specifications are subject to change without notice. (05/2004)

## CONNECTION CABLE WITH CONNECTORS

Plug connection Y75/Y75 for KFS-KFA **TRUE LEVEL®** for analogue sensors (**Fig. 7**)

Cable length 2 m Art.-No.: 66101201

Cable length 5 m Art.-No.: 66101202

**Fig. 7**



Plug connection Y75/Y55 for KFS-KFA-...-Y50) **PER LEVEL®** with 1 limit value switching point (**Fig. 8**)

Cable length 2 m Art.-No. 66101213

**Fig. 8**



Plug connection Y75/Y75 for KFS-KFA **PER LEVEL®** with 1 limit value switching point (**Fig. 9**)

Cable length 2 m Art.-No.: 66101203

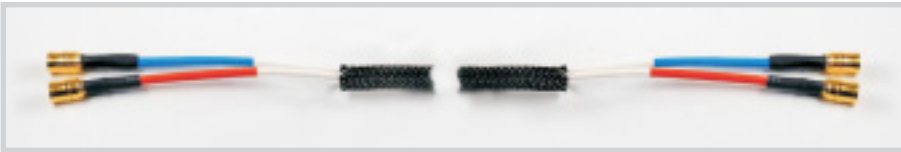
**Fig. 9**



Plug connection Y75/Y75 für KFS-KFA **PER LEVEL®** with 2 limit value switching points (**Fig. 10**)

Cable length 2 m Art.-No.: 66101204

**Fig. 10**



Plug connection Y75/Y75 für KFS-KFA **PER LEVEL®** with 3 limit value switching points (**Fig. 11**)

Cable length 2 m Art.-No.:66101205

**Fig. 11**



## SKETCHES AND NOTES

All specifications are subject to change without notice. (05/2004)

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