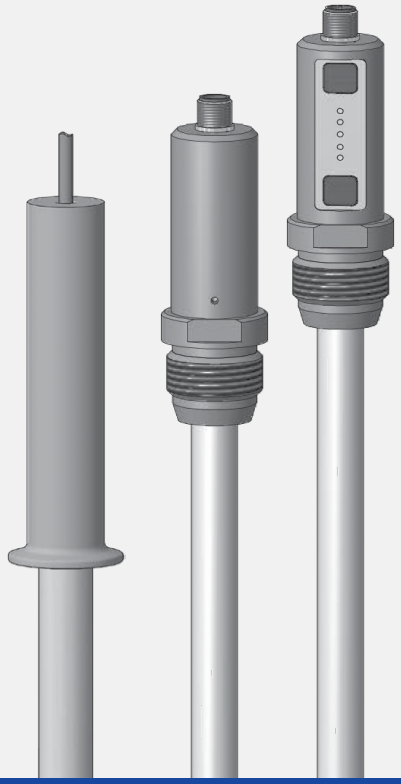

i-LEVEL

CAPACITIVE
LEVEL MEASURING SYSTEMS

RECHNER
SENSORS

For all transactions the newest version of „General Conditions of Sale and Delivery for Products and Services of the Electrical Industry ZVEI“ shall apply, with the supplementary condition „extended reservation of proprietary rights“, together with the supplements listed on our confirmations and / or invoices. All specifications are subject to change without notice. Reprint, even in parts, only with our consent.

Edition January 2020
With publication of this catalogue all former printed catalogues about RECHNER capacitive filling level systems of i-Level series are invalid.

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CAPACITIVE FILLING LEVEL MEASURING SYSTEM

i-LEVEL

i-LEVEL+

TECHNOLOGY

Capacitive Level Probe for level control of liquids and bulk material.

This rod probe with integrated evaluation electronics is based on our patented 3-electrode measuring principle.

The i-Level Product family consists of the following series:

i-LEVEL

A metal container or an additional electrode serve as counter electrode for the measurement. The measurement is made between the measuring electrode in the probe and the metal container wall (or additional electrode).
= Very large measuring volume

- **Metal container or additional electrode required.**

The following variants are available

- **Analogue Level Probe** with 2 additional switching points and EasyTeach function (ET) **KFI-12-...**
- **Analogue Level Probe** with EasyTeach by Wire (ETW) **KFI-1-...**
  - with connection head, process connection G1“
  - without process connection
- **Limit value level probe** with 1 switching point and EasyTeach by Wire (ETW) **KFI-51-...**
  - with connection head, process connection G1“
  - without process connection
- **Limit value level probe** with 2 switching points and EasyTeach by Wire (ETW) **KFI-52-...**
  - with connection head, process connection G1“
  - without process connection

i-LEVEL+

With the Level+ Probe the 3rd electrode is integrated in the probe and therefore it allows the use in a plastic container. The measurement is made in the immediate area surrounding the probe.
= Large measuring volume.

- **For plastic container.**

The following variants are available

- **Analogue Level Probe** with 2 additional switching points and EasyTeach function (ET) **KFW-12-...**
- **Analogue Level Probe** with EasyTeach by Wire (ETW) **KFW-1-...**
  - with connection head, process connection G1“
  - without process connection
- **Limit value level probe** with 1 switching point and EasyTeach by Wire (ETW) **KFW-51-...**
  - with connection head, process connection G1“
  - without process connection
- **Limit value level probe** with 2 switching points and EasyTeach by Wire (ETW) **KFW-52-...**
  - with connection head, process connection G1“
  - without process connection

For further technical details please see the different chapters of the product series.

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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 Industrie-Elektronik GmbH 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:

Abbreviation	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
PC	Polycarbonate	FDA 21 CFR 177.1580	Yes	No
PEEK	Polyetheretherketone	FDA 21 CFR 177.2415	Yes	Yes
PP	Polypropylene	FDA 21 CFR 177.1520	Yes	No
PTFE	Polytetrafluoroethylene	FDA 21 CFR 177.1550	Yes	Yes
PVC	Polyvinylchloride	No	No	No
PVDF	Polyvinylidene fluoride	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 conform	Yes	No

Connection cable

For the standard models PVC- or PUR-cable are used. One has to take into consideration that the cable should not be moved with ambient temperatures below –5°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 x Ø.

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TECHNICAL INFORMATION

Degree of protection according to IEC 60529

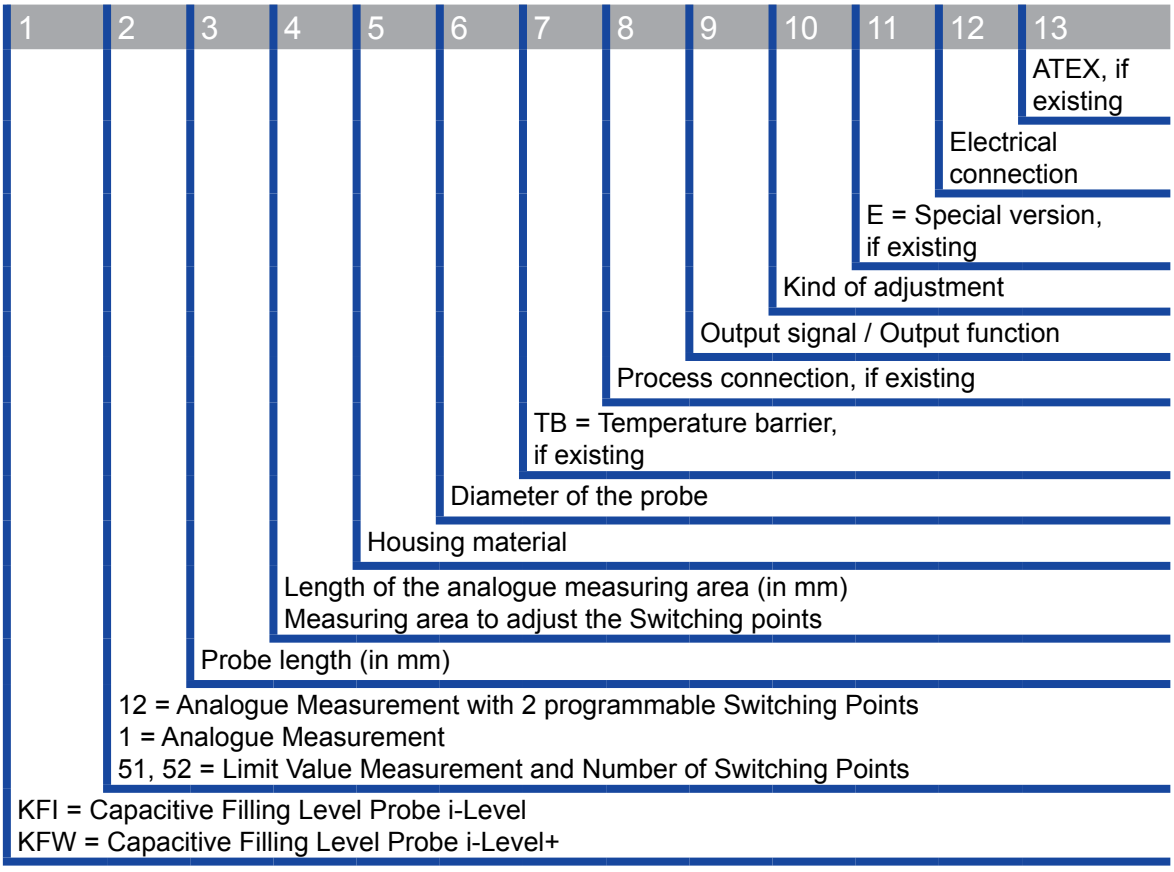
	1. Digit: Protection against solids		2. Digit: Protection against water	
IP	0	No protection	0	No protection against water
IP	1	Protection against solid foreign bodies Ø > 50 mm	1	Protection against vertical water drops
IP	2	Protection against solid foreign bodies Ø > 12.5 mm	2	Protection against diagonal water drops (up to a 15° angle)
IP	3	Protection against solid foreign bodies Ø > 2.5 mm	3	Protection against spray water
IP	4	Protection against solid foreign bodies Ø > 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

TYPE CODE PROBE

Example: Capacitive level probe for analogue measurement
KFI/KFW- 12 - 585 - 500 -GFK/VAa- D16 - TB80 - G1 - IL - ETF - E - Z02 - 3G3D

Example: Capacitive level probe for analogue measurement
KFI/KFW- 1 - 500 - 370 -GFK/VAa- D16 - TB80 - G1 - UL - ETW - E - Z02

Example: Capacitive level probe for limit value measurement
KFI/KFW- 52 - 500 - 370 -GFK/VAa- D16 - TB80 - G1 - S - ETW - E - Z02



Position 1

Value	Measuring principle
KFI	Measurement with external 3. electrode / counter electrode
KFW	Measurement with internal 3. electrode / counter electrode

Position 2

Value	Measuring principle
12	Analogue with 2 programmable switching points
1	Analogue
51	1 Switching Point
52	2 Switching Points

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TYPE CODE PROBE

Position 3

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

Position 4

Length of the analogue measuring area „M“ (in mm)

Position 5 housing material

Material	Probe	Housing / Process connection
GFK	Glass fibre reinforced plastic	Glass fibre reinforced plastic
GFK/VAa	Glass fibre reinforced plastic	Stainless steel No. 1.4301 (AISI 304)
GFK/VAb	Glass fibre reinforced plastic	Stainless steel No. 1.4305 (AISI 303)
GFK/VAc	Glass fibre reinforced plastic	Stainless steel No. 1.4404 (AISI 316L)
GFK/AL	Glass fibre reinforced plastic	Aluminum
PEEK	Polyetheretherketone FDA 21 CFR 177.2415	Polyetheretherketone
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)
VAa/PEEK	Polyetheretherketone FDA 21 CFR 177.2415 and Stainless steel No. 1.4301 (AISI 304)	Stainless steel No. 1.4301 (AISI 304)
VAb/PEEK	Polyetheretherketone FDA 21 CFR 177.2415 and Stainless steel No. 1.4305 (AISI 303)	Stainless steel No. 1.4305 (AISI 303)
VAc/PEEK	Polyetheretherketone FDA 21 CFR 177.2415 and Stainless steel No. 1.4404 (AISI 316L) FDA conform	Stainless steel No. 1.4404 (AISI 316L)
PTFE	Polytetrafluoroethylene FDA 21 CFR 177.1550	Polytetrafluoroethylene
PTFE/MS	Polytetrafluoroethylene FDA 21 CFR 177.1550	Brass nickel
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/AL	Polytetrafluoroethylene FDA 21 CFR 177.1550	Aluminum
VAa/PTFE	Polytetrafluoroethylene FDA 21 CFR 177.1550 and Stainless steel No. 1.4301 (AISI 304)	Stainless steel No. 1.4301 (AISI 304)
VAb/PTFE	Polytetrafluoroethylene FDA 21 CFR 177.1550 and Stainless steel No. 1.4305 (AISI 303)	Stainless steel No. 1.4305 (AISI 303)
VAc/PTFE	Polytetrafluoroethylene FDA 21 CFR 177.1550 and Stainless steel No. 1.4404 (AISI 316L)	Stainless steel No. 1.4404 (AISI 316L)
PVC	Polyvinylchloride	Polyvinylchloride
PVDF	Polyvinylidene fluoride	Polyvinylidene fluoride

TYPE CODE PROBE

Position 6

Value	Diameter of the probe
D8	8 mm
D13	13 mm
D10	10 mm
D16	16 mm

Position 7

Value	Temperature barrier
No indication	Without temperature barrier
TB20	20 mm
TB50	50 mm
TB80	80 mm
TB100	100 mm

Position 8

Value	Process connection
No indication	No process connection
G1/8	G 1/8“
G1/4	G 1/4“
G1/2	G 1/2“
G3/4	G 3/4“
G1	G 1“
G11/2	G 1 1/2“
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“
PHG1	G 1“ Connection head
W	Angle

Position 9

Value	Output function / Output signal
UL0	Analogue voltage output 0...10 V
UL10	Analogue voltage output 10...0 V
IL4	Analogue current output 4...20 mA
IL20	Analogue current output 20...4 mA
S	Normally open (NO)
Ö	Normally closed (NC)

Position 10

Value	Kind of adjustment
ETM	EasyTeach by Magnet
ETW	EasyTeach by Wire
ETF	Keypad
CAN	CAN-Bus

Position 11

Value	Special version
No indication	Standard version
E	Special version

Position 12

Value	Length of the cable
Z0E	Special length
Z01	1 m
Z02	2 m
Z03	3 m
Z05	5 m
Z10	10 m
Y5	Flange connector M12 x 1, DC, 4 pin
Y10	Flange connector M12 x 1, DC, 5 pin
Y15	Flange connector M8 x 1, DC, 5 pin
Y18	Flange connector M12 x 1, DC, 8 pin
Y5C	Coupling plug M12 x 1, DC, 4 pin
Y10C	Coupling plug M12 x 1, DC, 5 pin
Y18C	Coupling plug M12 x 1, DC, 8 pin

Position 13

Value	ATEX
3G3D	With manufacturer declaration for ATEX zone 2 (gas) and ATEX zone 22 (Dust)
StEx	For ATEX zone for ATEX zone 1 (Gas) and ATEX zone 20 (Dust)

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CAPACITIVE FILLING LEVEL MEASURING PROBES, ANALOGUE WITH 2 PROGRAMMABLE SWITCHING POINTS

i-LEVEL

GENERAL DESCRIPTION

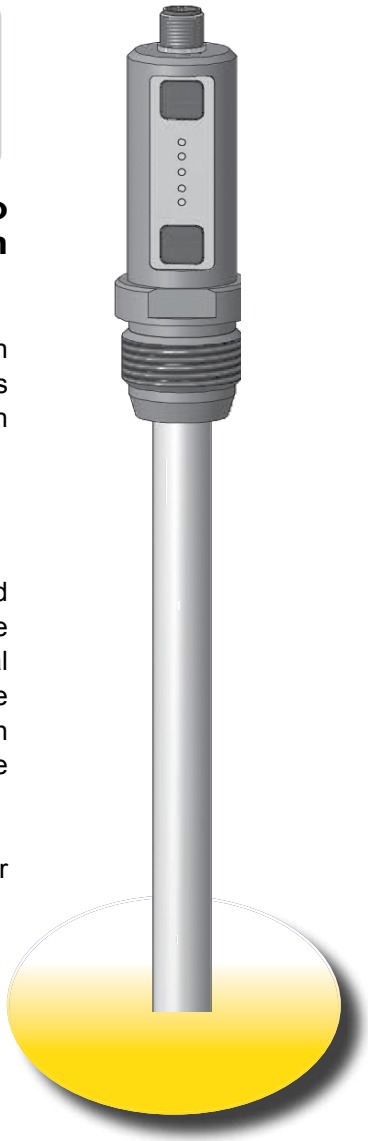
i-LEVEL

CAPACITIVE LEVEL PROBE FOR ANALOGUE LEVEL MEASUREMENT WITH 2 ADDITIONAL SWITCHING POINTS.

In this section we describe a variant of the i-Level probe which is designed for analogue measurement including two free programmable switching points. The adjustment of the switching points is made by RECHNER's Easy-Teach by Wire function. The following options are available:

Analogue measurement
- **4...20 mA, 20...4 mA**
- **0...10 V, 10...0 V**

+ 2 switching points



The analogue measuring range and the two switching points can be set at any position within the measuring area.

The position of the analogue measuring range and the switching points can be positioned at any place within the measuring range. The adjustment is made by EasyTeach via the Keypad (ETF) and it can be changed again with the EasyTeach function (ETF)

Maximum probe length 2000 mm.

This rod probe with integrated evaluation electronics is based on our patented 3-electrode measuring principle. The measurement is made between the measuring electrode in the probe and the metal container wall (or additional electrode). The measuring area is defined by means of inactive areas that are placed on its top and end. A defined empty adjustment can be made in which it is not necessary to fill the container up to the probe or even to know the material that should be detected.

It is not necessary to make a manual pre-selection of the capacity range or of a basic capacity. This is automatically done from the intelligent probe during the initial operation.

Application areas:

Limit value and analogue Level control of liquids or bulk materials

The probes are suitable for the level control of liquids or bulk materials with a dielectric constant (DC) ε_r between 2 and 80.

Measurement possible with product temperature of up to 100°C

The product temperature at the probe rod can be up to 100 provided, that at the same time it is guaranteed that the temperature at the sensor head, where the evaluation electronics is placed does not exceed a value of +55°C. Even with the compact design of the probe it is possible to realise measurements in high temperature ranges. In this case we offer variants of the level probes with temperature barriers in order to protect the integrated evaluation electronics.

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TECHNOLOGY

i-LEVEL

Linear measurement 4...20 mA / 20...4 mA or 0...10 V / 10...0 V

The analogue measurement in a vertically conducting area in a metal container is linear. The use of a jacket tube is not necessary, as is the case for other sensors on the market.

Within the cone of the container the deviation is basically defined by the container geometry that means by the distance between sensor and container wall. Because of the highly increasing or decreasing distance a direct linear measurement is not possible in this area. However the good repeatability of the measurement makes it possible to apply a corrective curve in the control system in order to achieve a linear measuring signal. Alternatively it is also possible to use a jacket tube or another suitable counter electrode, parallel to the probe rod.

i-LEVEL

Advantages:

- Analogue measuring range user selectable within the analogue measuring area
- 2 additional switching points which can be set at any place within or outside of the analogue area
- With intelligent PNP / NPN recognition, normally open or normally closed function programmable
- Analogue outputs available are 4...20 mA / 20...4 mA or 0...10 V / 10...0 V
- Supply voltage 18...30 V DC
- On request Unit also available with fixed programming of analogue range and switching points: „Mount and Go“
- Electronic lock - prevents undesired changes of the programmed adjustment

Adjustment

i-LEVEL

EasyTeach Adjustment

The adjustment of the switching points and of the analogue measuring range is made over the keypad on the stainless steel head. This is supported by a variant of the well-poven EasyTeach technology.

The operation of both the buttons, set and mode, is intuitive and very easy. The built-in LED‘s reflect each adjustment action and display during normal operation, the switching states of the outputs, or are warning the user in case of a failure.

For applications with difficult access to the sensor there are models available which can be adjusted by RECHNER‘a EasyTeach by wire (ETW) or direct via CAN-Bus.

The general interaction of sensor and control system can be checked with the test mode. With the reset function the sensor can be re-adjusted to the factory setting at any time.

- **simple and easy adjustment with EasyTeach function**
- **no additional tool needed**
- **adjustable by hand**
- **LED‘s provide visual feedback of the outputs.**

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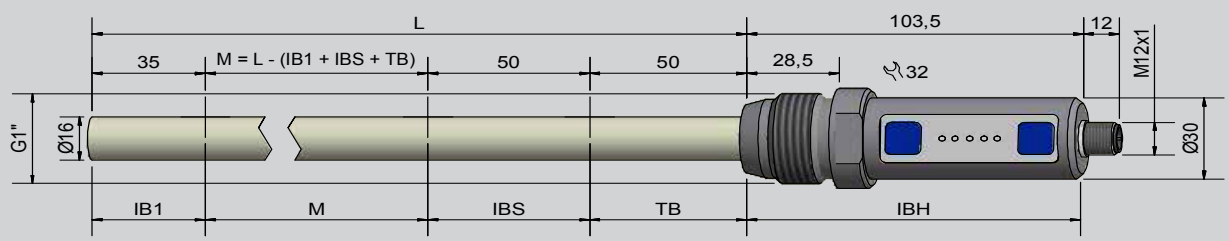
MOUNTING

i-LEVEL



The **non-active range (IB1)** is as standard 35 mm.

The non-active range (IB1) does not require a constant cross section of the container. Thus it can project into the cone of the container.

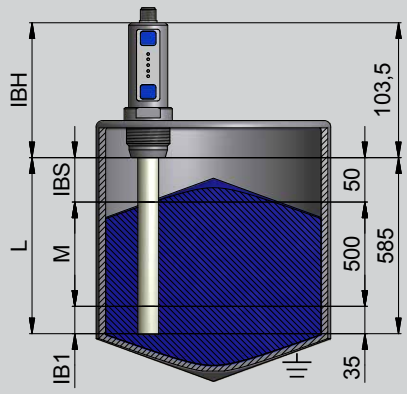
The length of the **analogue measuring range (M)** is dependent on the total length of the probe that has been ordered (L = max. 2 m).

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 analogue output signal. Changes in cross section lead to non-linearity,

The **non-active range (IBS)** from the measuring range to the top of the container (if metal) should be 1/3 of the container diameter or not less than 50 mm in order to prevent non-linearity

The **non-active range TB** (if existing) serves as temperature barrier and must be placed outside of the hot area.

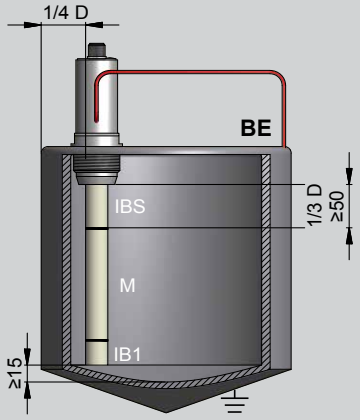
The **non-active range (IBH)** serves for mounting of the probe.



Example calculation for an analogue probe with PTFE body and G1“ process connection (VA), Total probe length L = 585 mm. The IBS is calculated with the min. distance of 50 mm. That results in an available measuring range M = 500 mm. The calculation is as follows:

M = L - (IB1 + IBS)
M = 585 - (35 + 50)
M = 500

→ KFI-12-585-500-PTFE/VAb-D16-G1-IL4-ETF-Y10



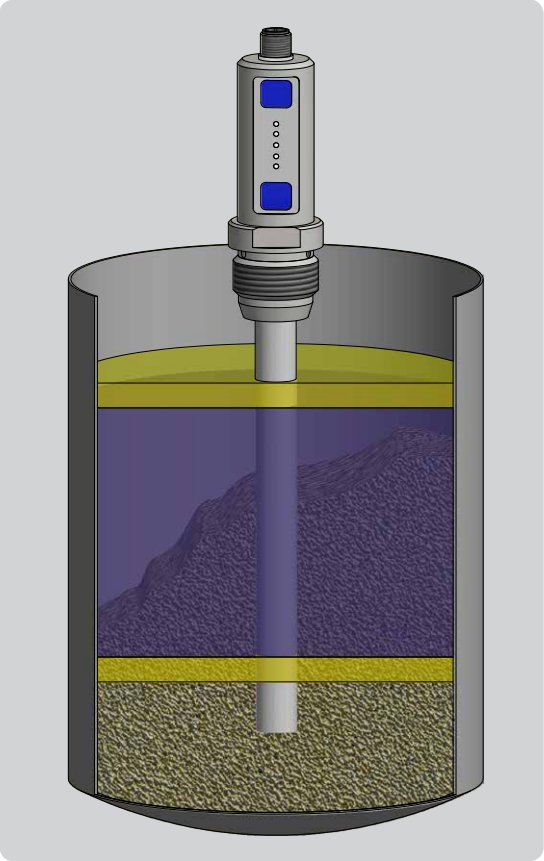
The probe can be mounted centrically or eccentrically. For a measurement independent of the filling cone, we recommend that the probe be mounted at a ¼ of the diameter. The minimum distance between the end of the measuring range and the conductive lid of the container is 50 mm.

Connect the BE using the process connection or by means of the rear screw connection.

APPLICATIONS

i-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 > 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 possible analogue measuring range of a i-Level probe of the KFi-12-… series. You see the maximum possible measuring range between the inactive areas at the probe tip and the top and the measuring field that reaches in this case up to the container wall.

ADJUSTMENT BY MEANS OF THE KEYPAD AND EASYTEACH

The user adjusts the desired analogue measuring range „Analogue Min. and Analogue Max.”. By means of the membrane keypad additionally 2 further switching points can be adjusted. These 2 switching points can be placed at any position over the possible measuring area, inside or outside of the adjusted analogue measuring range. This means for example, one can make an analogue measurement and with the same probe one can realize an overfill protection and a dry running protection.

These level probes are designed for level control of liquids, pastes and bulk materials with a dielectric constant εr between 2 and 80.

Level control of bulk material, pastes, or liquids in storage or dosing systems. These analogue probes are applied in various industries, thanks to the different housing materials that are available, so for instance:

FOOD OR PHARMACEUTICAL INDUSTRY, CHEMICAL INDUSTRY, RECYCLING TECHNOLOGY, AUTOMOTIVE TECHNOLOGY, PACKAGING INDUSTRY, PRINTING TECHNOLOGY.

With the same probe: Analogue measurement and overfill protection and dry running protection.

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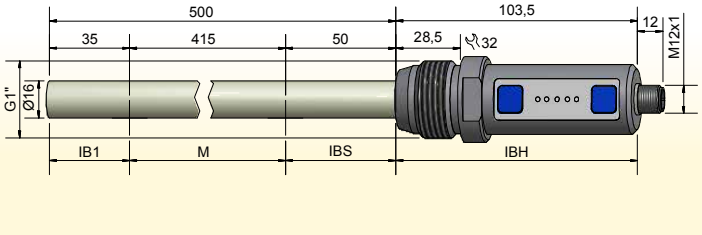
i-LEVEL Capacitive Filling Level Probe - KFI

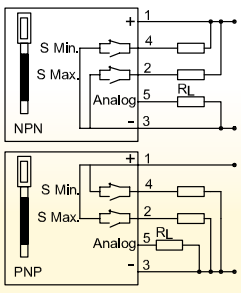
Analogue current output 4...20 mA
2 programmable limit value switching points

- Integrated evaluation electronics
- Housing material: GFK, Ø 16 mm
- Connection head and process connection stainless steel VA no. 1.4305 / AISI 303
- Process connection G1”
- Multifunction probe: Automatic identification of NPN- / PNP function
- Normally open / normally closed function switchable
- Electronic lock

Technical data	
Active zone [mm]	415 mm
Electrical version	5 - pin DC
Output function	Analogue, 2 limit value switching points, Normally open / normally closed switchable
Type	**KFI-12-500-415-GFK/VAb-D16-G1-IL4-ETF-Y10**
Art.-No.	**KI 0139**
Operating voltage (U_B)	18...30 V DC
Permitted residual max.	5 %
Load resistance (R_L)	≤ 400 Ohm
Output current	100 mA
Power consumption (outputs no-load)	0,8 W
Analogue output	4...20 mA
Switching frequency max.	1 Hz
Permitted ambient temperature	-25...+55 °C
Permitted ambient temperature (for active zone)	-25...+100 °C
Pressure	10 bar
LED-Display	Green / yellow
Protective circuit	Built-in
Degree of protection IEC 60529	IP 67
Norm	EN 60947-5-2*
Connection	Flange connector M 12 x 1
Housing material	VA No. 1.4305 / AISI 303 / polyester
Active zone	GFK
For matching connectors please see our selection of accessories.	

*Where applicable





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

Made in Germany

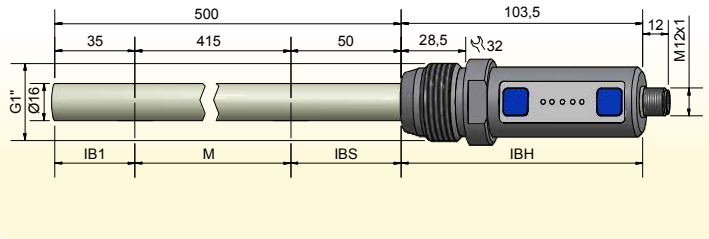
i-LEVEL Capacitive Filling Level Probe - KFI

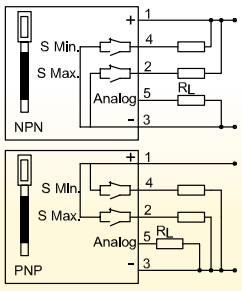
Analogue current output 4...20 mA
2 programmable limit value switching points

- Integrated evaluation electronics
- Housing material: PTFE, Ø 16 mm
- Connection head and process connection stainless steel VA no. 1.4305 / AISI 303
- Process connection G1”
- Multifunction probe: Automatic identification of NPN- / PNP function
- Normally open / normally closed function switchable
- Electronic lock

Technical data	
Active zone [mm]	415 mm
Electrical version	5 - pin DC
Output function	Analogue, 2 limit value switching points, Normally open / normally closed switchable
Type	**KFI-12-500-415-PTFE/VAb-D16-G1-IL4-ETF-Y10**
Art.-No.	**KI 0140**
Operating voltage (U_B)	18...30 V DC
Permitted residual max.	5 %
Load resistance (R_L)	≤ 400 Ohm
Output current	100 mA
Power consumption (outputs no-load)	0,8 W
Analogue output	4...20 mA
Switching frequency max.	1 Hz
Permitted ambient temperature	-25...+55 °C
Permitted ambient temperature (for active zone)	-25...+100 °C
Pressure	1 bar
LED-Display	Green / yellow
Protective circuit	Built-in
Degree of protection IEC 60529	IP 67
Norm	EN 60947-5-2*
Connection	Flange connector M 12 x 1
Housing material	VA No. 1.4305 / AISI 303 / polyester
Active zone	PTFE (FDA 21 CFR 177.1550)
For matching connectors please see our selection of accessories.	

*Where applicable





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

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

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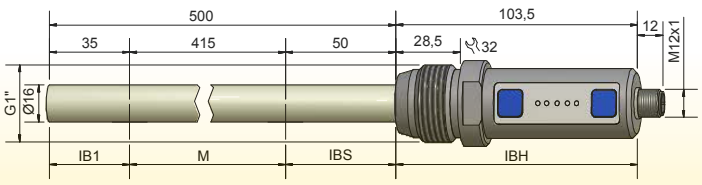
i-LEVEL Capacitive Filling Level Probe - KFI

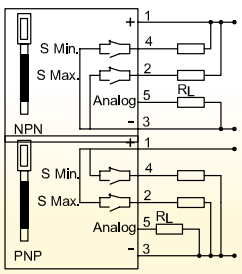
Analogue voltage output 0...10 V
2 programmable limit value switching points

- Integrated evaluation electronics
- Housing material: GFK, Ø 16 mm
- Connection head and process connection stainless steel VA no. 1.4305 / AISI 303
- Process connection G1”
- Multifunction probe: Automatic identification of NPN- / PNP function
- Normally open / normally closed function switchable
- Electronic lock

Technical data	
Active zone [mm]	415 mm
Electrical version	5 - pin DC
Output function	Analogue, 2 limit value switching points, Normally open / normally closed switchable
Type	**KFI-12-500-415-GFK/VAb-D16-G1-UL0-ETF-Y10**
Art.-No.	**KI 0141**
Operating voltage (U_B)	18...30 V DC
Permitted residual max.	5 %
Load resistance (R_L)	≥ 2 K Ohm
Output current	100 mA
Power consumption (outputs no-load)	0,8 W
Analogue output	0...10 V
Switching frequency max.	1 Hz
Permitted ambient temperature	-25...+55 °C
Permitted ambient temperature (for active zone)	-25...+100 °C
Pressure	10 bar
LED-Display	Green / yellow
Protective circuit	Built-in
Degree of protection IEC 60529	IP 67
Norm	EN 60947-5-2*
Connection	Flange connector M 12 x 1
Housing material	VA No. 1.4305 / AISI 303 / polyester
Active zone	GFK
For matching connectors please see our selection of accessories.	

*Where applicable





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

Made in Germany

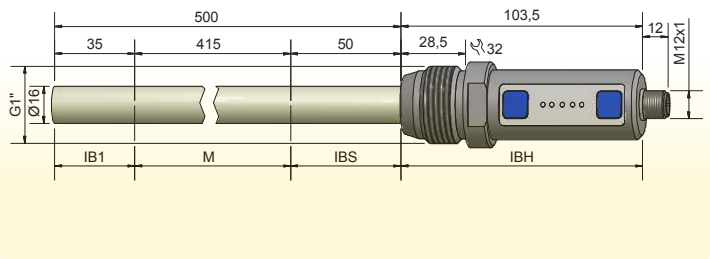
i-LEVEL Capacitive Filling Level Probe - KFI

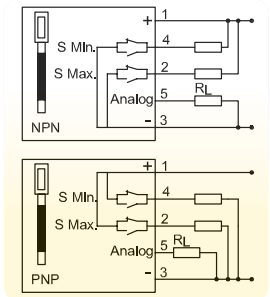
Analogue voltage output 0...10 V
2 programmable limit value switching points

- Integrated evaluation electronics
- Housing material: PTFE, Ø 16 mm
- Connection head and process connection stainless steel VA no. 1.4305 / AISI 303
- Process connection G1”
- Multifunction probe: Automatic identification of NPN- / PNP function
- Normally open / normally closed function switchable
- Electronic lock

Technical data	
Active zone [mm]	415 mm
Electrical version	5 - pin DC
Output function	Analogue, 2 limit value switching points, Normally open / normally closed switchable
Typ	**KFI-12-500-415-PTFE/VAb-D16-G1-UL0-ETF-Y10**
Art.-Nr.	**KI 0142**
Operating voltage (U_B)	18...30 V DC
Permitted residual max.	5 %
Load resistance (R_L)	≥ 2 K Ohm
Output current	100 mA
Power consumption (outputs no-load)	0,8 W
Analogue output	0...10 V
Switching frequency max.	1 Hz
Permitted ambient temperature	-25...+55 °C
Permitted ambient temperature (for active zone)	-25...+100 °C
Pressure	1 bar
LED-Display	Green / yellow
Protective circuit	Built-in
Degree of protection IEC 60529	IP 67
Norm	EN 60947-5-2*
Connection	Flange connector M 12 x 1
Housing material	VA No. 1.4305 / AISI 303 / polyester
Active zone	PTFE (FDA 21 CFR 177.1550)
For matching connectors please see our selection of accessories.	

*Where applicable





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

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CAPACITIVE FILLING LEVEL PROBES, ANALOGUE

GENERAL DESCRIPTION

i-LEVEL

CAPACITIVE LEVEL PROBE FOR ANALOGUE MEASUREMENT

In this section we describe variants of the i-Level probe which are designed for the analogue level measurement. The adjustment of the measuring area is made by RECHNER's EasyTeach by Wire (ETW). The following options are available:

Analogue Measurement:
- **4...20 mA, 20...4 mA,**
- **0...10 V or 10...0 V**

The Analogue measuring range can be set at any position within the measuring area

The position of the analogue measurement can be positioned at any place within the measuring range. The adjustment is made by EasyTeach by wire and it can be changed again with the EasyTeach by Wire function

Maximum probe length 2000 mm

This rod probe with integrated evaluation electronics is based on our patented 3-electrode measuring principle. The measurement is made between the measuring electrode in the probe and the metal container wall (or additional electrode). The measuring area is defined by means of inactive areas that are placed on its top and end.

It is not necessary to make a manual pre-selection of the capacity range or of a basic capacity. This is automatically done from the intelligent probe during the initial operation.

Application areas:

Level control of liquids or bulk materials

The probes are suitable for the level control of liquids or bulk materials with a dielectric constant (DC) ε_r between 2 and 80.

Measurement possible with product temperature of up to 100°C

Even with the compact design of the probe it is possible to realise measurements in high temperature ranges. In this case we offer variants of the level probes with temperature barriers in order to protect the integrated evaluation electronics. The product temperature at the probe rod can be up to 100 provided, that at the same time it is guaranteed that the temperature at the sensor head, where the evaluation electronics is placed does not exceed a value of +70°C.

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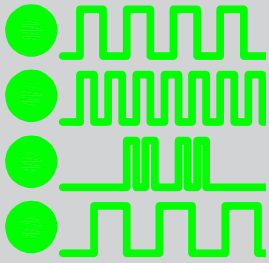
TECHNOLOGY

i-LEVEL

i-LEVEL

- Analogue measuring range user selectable within the analogue measuring area
- Analogue outputs available are 4...20 mA / 20...4 mA or 0...10 V / 10...0 V
- Supply voltage 18...30 V DC
- EasyTeach Function

ADJUSTMENT



EasyTeach Adjustment:

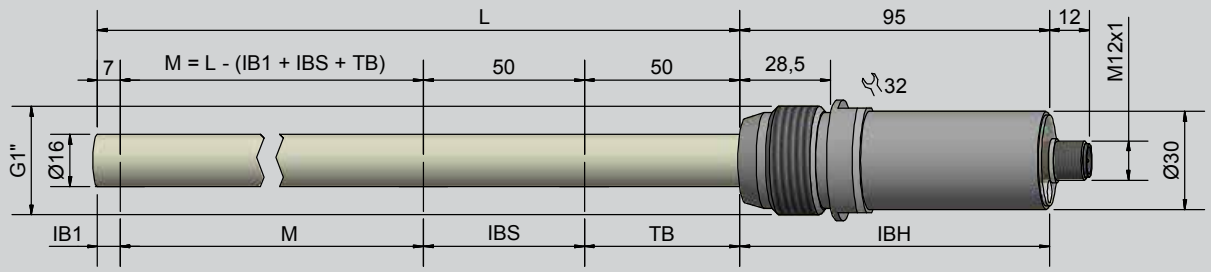
The adjustment of the analogue measuring area is made by means of the teach wire. This is supported by a variant of the well-poven EasyTeach technology. As control signal the supply voltage (+) is used.

The Adjustment is made by disconnection of the ETW-wire from the supply voltage (+) at the desired menu point.

The LED display is an adjustment aid with its flashing sequences for each menu point.

The general interaction of sensor and control system can be checked with the test mode. With the reset function the sensor can be re-adjusted to the factory setting at any time.

MOUNTING



The **inactive area (IB1)** is 7 mm as standard.

The non-active range (IB1) does not require a constant cross section of the container. Thus it can project into the cone of the container.

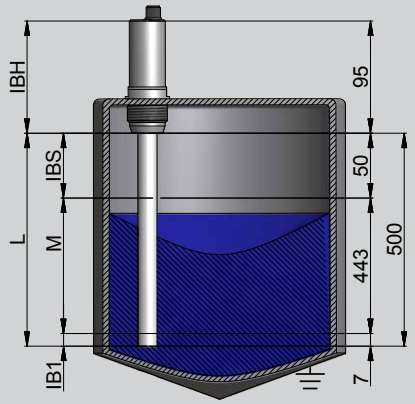
The length of the **analogue measuring range (M)** is dependent on the total length of the probe that has been ordered (L = max. 2 m).

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 analogue output signal. Changes in cross section lead to non-linearity,

The **non-active range (IBS)** from the measuring range to the top of the container (if metal) should be 1/3 of the container diameter or not less than 50 mm in order to prevent non-linearity

The **non-active range TB** (if existing) serves as temperature barrier and must be placed outside of the hot area.

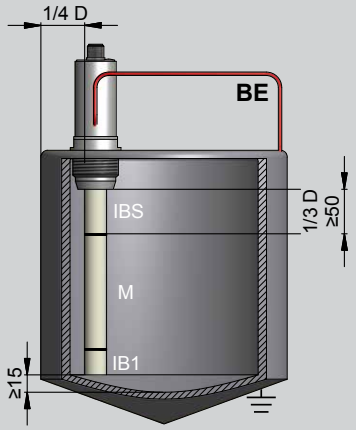
The **non-active range (IBH)** serves for mounting of the probe.



Example calculation for an analogue probe with PTFE body and G1“ process connection (VA), Total probe length L = 500 mm. The IBS is calculated with the min. distance of 50 mm. That results in an available measuring range M = 443 mm. The calculation is as follows:

M = L - (IB1 + IBS)
M = 500 - (7 + 50)
M = 443

→ KFI-1-500-443-PTFE/VAb-D16-G1-IL4-ETW-Y10



The probe can be mounted centrically or eccentrically. For a measurement independent of the filling cone, we recommend that the probe be mounted at a ¼ of the diameter. The minimum distance between the end of the measuring range and the conductive lid of the container is 50 mm.

Connect the BE using the process connection or by means of the rear screw connection.

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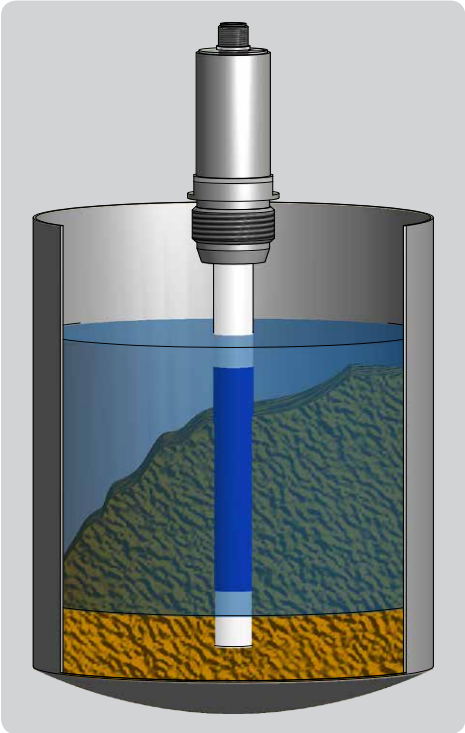
APPLICATIONS

i-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 > 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 possible analogue measuring range of an i-Level probe of the KFi-1-… series. You see the maximum possible measuring range between the inactive areas at the probe tip and the top and the measuring field that reaches in this case up to the container wall.

ADJUSTMENT BY MEANS OF EASYTEACH BY WIRE

The user adjusts the desired analogue measuring area „Analogue Min. and Analogue Max.". By means of the teach wire. With this variant of the i-Level probe it is also possible to make the adjustment with an empty container.

This level probes are designed for level control of liquids, pastes and bulk materials with a dielectric constant εr between 2 and 80.

Level control of bulk material, pastes, or liquids in storage or dosing systems. These analogue probes are applied in various industries, thanks to the different housing materials that are available, so for instance:

FOOD OR PHARMACEUTICAL INDUSTRY, CHEMICAL INDUSTRY, RECYCLING TECHNOLOGY, AUTOMOTIVE TECHNOLOGY, PACKAGING INDUSTRY, PRINTING TECHNOLOGY.

i-Level Probes

Small sensor body designs - great for applications in small dosing systems

Analogue Measurement over a few mm possible.

i-LEVEL Capacitive Filling Level Probe - KFI

Analogue current output 4...20 mA

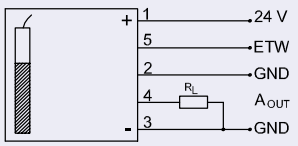
- Integrated evaluation electronics
- Easy Teach by wire
- Housing material: GFK, Ø 16 mm
- Connection head and process connection stainless steel VA no. 1.4305 / AISI 303
- Process connection G1”
- Probe length max. 2000 mm
- With flange connector M 12 x 1 (5-pin Teach function included)

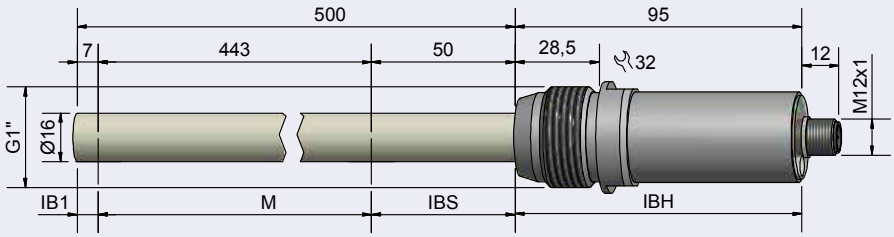
Technical data	
Active zones [M]	443 mm
Electrical version	4 - pin DC
Output function	Analogue
Type	**KFI-1-500-443-GFK/VAb-D16-G1-IL4-ETW-Y10**
Art.-No.	**KI 0058**
Operating voltage (U_B)	15...30 V DC
Permitted residual ripple max.	5 %
Load resistance (R_L)	≤ 200 Ω
Power consumption (outputs no-load)	0,9 W
Analogue output	4...20 mA
Permitted ambient temperature	-25...+70 °C
LED-Display	Green
Protective circuit	Built-in
Degree of protection IEC 60529	IP 67
Norm	EN 60947-5-2*
Connection	Flange connector M 12 x 1
Housing material	VA No. 1.4305 / AISI 303
Active zone	GFK
Lid	PC (FDA 21 CFR 177.1580)
For matching connectors please see our selection of accessories.	

*Where applicable

EasyTeach chart:
LED green / Adjustment function

Adjustment Min.
Adjustment Max.
Factory set
Test





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

Made in Germany

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i-LEVEL Capacitive Filling Level Probe - KFI

Analogue current output 4...20 mA

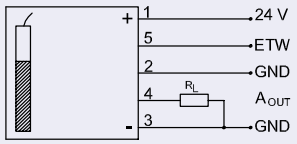
- Integrated evaluation electronics
- Easy Teach by wire
- Housing material: PTFE, Ø 16 mm
- Connection head and process connection stainless steel VA no. 1.4305 / AISI 303
- Process connection G1”
- With flange connector M 12 x 1 (5-pin Teach function included)

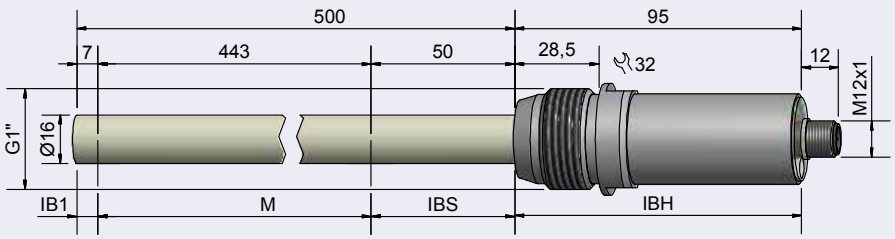
Technical data	
Active zones [M]	443 mm
Electrical version	4 - pin DC
Output function	Analogue
Type	**KFI-1-500-443-PTFE/VAb-D16-G1-IL4-ETW-Y10**
Art.-No.	**KI 0075**
Operating voltage (U_B)	15...30 V DC
Permitted residual ripple max.	5 %
Load resistance (R_L)	≤ 200 Ω
Power consumption (outputs no-load)	0,9 W
Analogue output	4...20 mA
Permitted ambient temperature	-25...+70 °C
LED-Display	Green
Protective circuit	Built-in
Degree of protection IEC 60529	IP 67
Norm	EN 60947-5-2*
Connection	Flange connector M 12 x 1 (5-pin)
Housing material	VA No. 1.4305 / AISI 303
Active zone	PTFE (FDA 21 CFR 177.1550)
Lid	PC (FDA 21 CFR 177.1580)
For matching connectors please see our selection of accessories.	

*Where applicable

EasyTeach chart:
LED green / Adjustment function

- Adjustment Min.
- Adjustment Max.
- Factory set
- Test





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

Made in Germany

i-LEVEL Capacitive Filling Level Probe - KFI

Analogue current output 4...20 mA

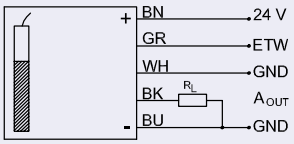
- Integrated evaluation electronics
- Easy Teach by wire
- Housing material: GFK, Ø 16 mm

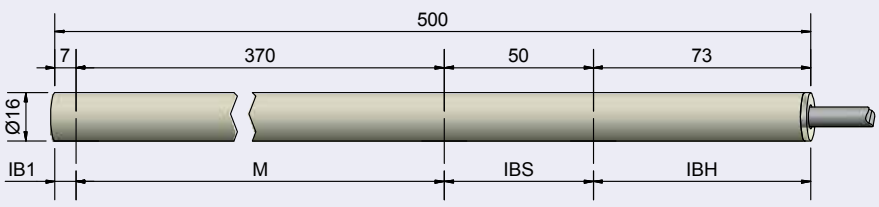
Technical data	
Active zones [M]	370 mm
Electrical version	4 - wire DC
Output function	Analogue
Type	**KFI-1-500-370-GFK-D16-IL4-ETW-Z02**
Art.-No.	**KI 0023**
Operating voltage (U_B)	15...30 V DC
Permitted residual ripple max.	5 %
Load resistance (R_L)	≤ 200 Ω
Power consumption (outputs no-load)	0,9 W
Analogue output	4...20 mA
Permitted ambient temperature	-25...+70 °C
LED-Display	Green
Protective circuit	Built-in
Degree of protection IEC 60529	IP 67
Norm	EN 60947-5-2*
Connection cable	2 m, PVC, 5 x 0.34 mm²
Housing material	GFK
Active zone	GFK
Lid	PC (FDA 21 CFR 177.1580)
Accessories for mounting (not delivered with the probe) please see our selection of accessories.	

*Where applicable

EasyTeach chart:
LED green / Adjustment function

Adjustment Min.
Adjustment Max.
Factory set
Test





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

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i-LEVEL Capacitive Filling Level Probe - KFI

Analogue current output 4...20 mA

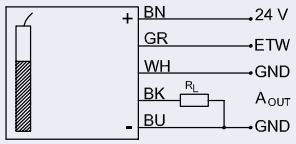
- Integrated evaluation electronics
- Easy Teach by wire
- Housing material: PTFE, Ø 16 mm

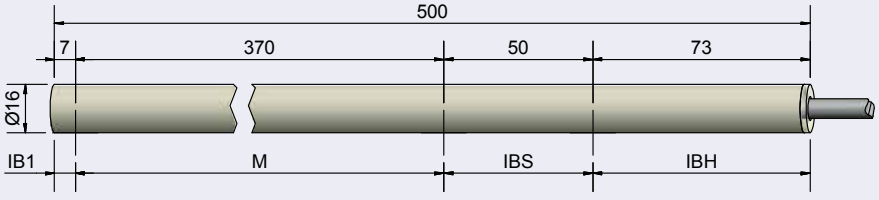
Technical data	
Active zones [M]	370 mm
Electrical version	4 - wire DC
Output function	Analogue
Type	**KFI-1-500-370-PTFE-D16-IL4-ETW-Z02**
Art.-No.	**KI 0074**
Operating voltage (U_B)	15...30 V DC
Permitted residual ripple max.	5 %
Load resistance (R_L)	≤ 200 Ω
Power consumption (outputs no-load)	0,9 W
Analogue output	4...20 mA
Permitted ambient temperature	-25...+70 °C
LED-Display	Green
Protective circuit	Built-in
Degree of protection IEC 60529	IP 67
Norm	EN 60947-5-2*
Connection cable	2 m, PVC, 5 x 0.34 mm²
Housing material	PTFE (FDA 21 CFR 177.1550)
Active zone	PTFE (FDA 21 CFR 177.1550)
Lid	PC (FDA 21 CFR 177.1580)
Accessories for mounting (not delivered with the probe) please see our selection of accessories.	

*Where applicable

EasyTeach chart:
LED green / Adjustment function

Adjustment Min.
Adjustment Max.
Factory set
Test





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

Made in Germany

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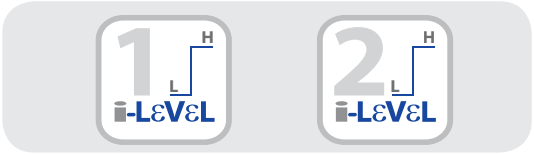
CAPACITIVE FILLING LEVEL PROBES, SYSTEM, BINARY



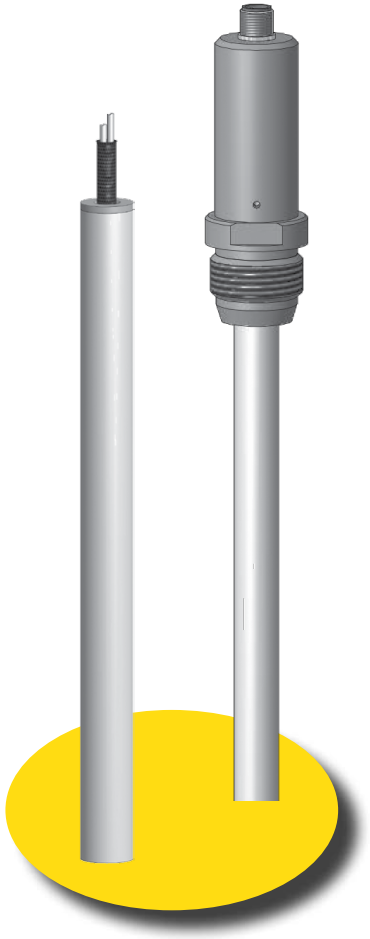
GENERAL DESCRIPTION

i-LEVEL

CAPACITIVE PROBE FOR LEVEL CONTROL OF 1 OR 2 LIMIT VALUES

In this section we describe a variant of the i-Level probe which is designed for binary measurement of 1 or 2 limit values. The adjustment of the switching points is made by RECHNER's Easy-Teach by Wire function. The following options are available:

Probe with
- **1 switching point - KFI-51-...**
- **2 switching points - KFI-52-...**



The switching points can be set at any position within the measuring range.

The position of the switching points can be positioned at any place within the measuring range. The adjustment is made by EasyTeach by wire and it can be can be changed again with the EasyTeach by Wire function

Maximum probe length 2000 mm.

This rod probe with integrated evaluation electronics is based on our patented 3-electrode measuring principle. The measurement is made between the measuring electrode in the probe and the metal container wall (or additional electrode). The measuring area is defined by means of inactive areas that are placed on its top and end.

A defined empty adjustment can be made in which it is not necessary to fill the container up to the probe or even to know the material that should be detected.

Application areas:

Level control of liquids or bulk materials.

The probes are suitable for the level control of liquids or bulk materials with a dielectric constant (DC) ε_r between 2 and 80.

Measurement possible with product temperature of up to 100°C

Even with the compact design of the probe it is possible to realise measurements in high temperature ranges. In this case we offer variants of the level probes with temperature barriers in order to protect the integrated evaluation electronics. The product temperature at the probe rod can be up to 100 provided, that at the same time it is guaranteed that the temperature at the sensor head, where the evaluation electronics is placed does not exceed a value of +70°C.

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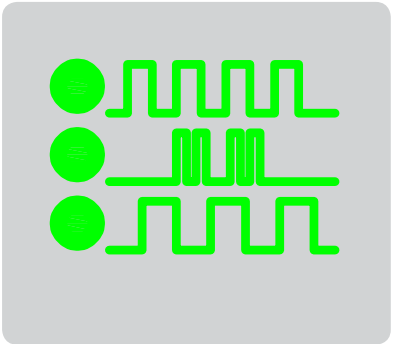
TECHNOLOGY

i-LEVEL

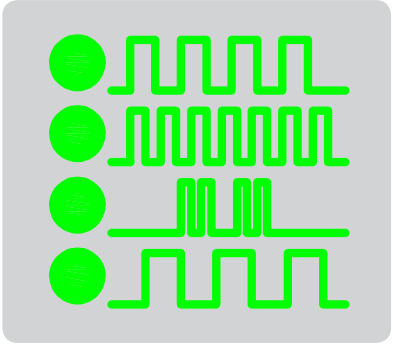
i-LEVEL

- Position of the switching points can be set at any position within the measuring range.
- With intelligent PNP /NPN recognition
- Supply voltage 18...30 V DC
- EasyTeach by Wire function

Adjustment



ETW Chart 1-Point probe



ETW Chart 2-Point probe

EasyTeach Adjustment:

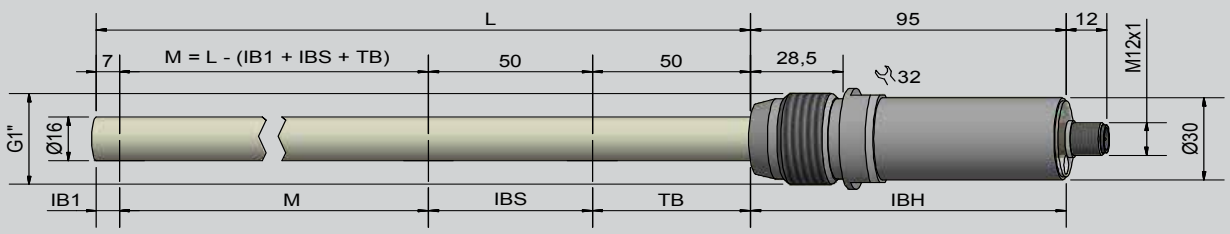
The adjustment of the analogue measuring area is made by means of the teach wire. This is supported by a variant of the well-proven EasyTeach technology.

The Adjustment is made by disconnection of the ETW wire from the supply voltage (+) at the desired menu point.

The LED display is an adjustment aid with its flashing sequences for each menu point.

The general interaction of sensor and control system can be checked with the test mode. With the reset function the sensor can be re-adjusted to the factory setting at any time.

MOUNTING



The **inactive area (IB1)** is 7 mm as standard.

The non-active range (IB1) does not require a constant cross section of the container. Thus it can project into the cone of the container.

The length of the **measuring range (M)** is dependent on the total length of the probe that has been ordered (L = max. 2 m).

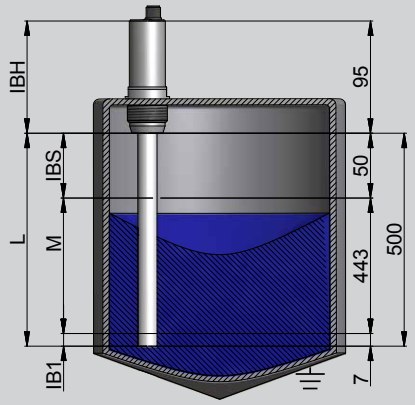
The measuring range (M) of the probe must be mounted in a range of the container without change in diameter of the cross section.

The position of the switching points S1 and S2 (depending on type) can be set with the EasyTeach by Wire function.

The **non-active range (IBS)** from the measuring range to the top of the container (if metal) should be 1/3 of the container diameter or not less than 50 mm in order to prevent non-linearity

The **non-active range TB** (if existing) serves as temperature barrier and must be placed outside of the hot area.

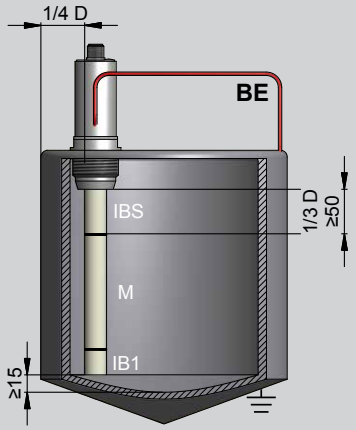
The **non-active range (IBH)** serves for mounting of the probe.



Example for a sensor with 1 switching point, PTFE-body and G1“ connection head (VA), sensor length L = 500 mm. For IBS the minimum of 50 mm is determined. This results in an available measuring area of M = 443 mm. The calculation is as follows:

M = L - (IB1 + IBS)
M = 500 - (7 + 50)
M = 443

→ KFI-51-500-435-PTFE/VAb-D16-G1-S-ETW-Y10



The probe can be mounted centrically or eccentrically. For a measurement independent of the filling cone, we recommend that the probe be mounted at a ¼ of the diameter. The minimum distance between the end of the measuring range and the conductive lid of the container is 50 mm.

Connect the BE using the process connection or by means of the rear screw connection.

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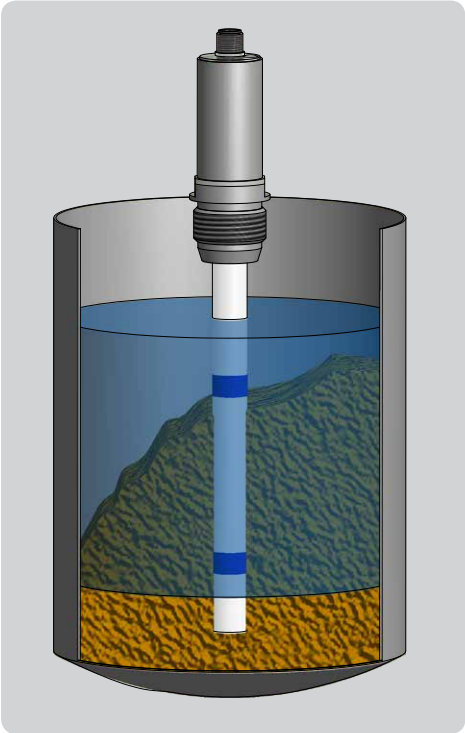
APPLICATIONS

i-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 > 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 possible measuring range of an i-Level probe of the KFI-52 series. You see the maximum possible measuring range between the inactive areas at the probe tip and the top and the measuring field of the switching points that reaches in this case up to the container wall.

ADJUSTMENT BY MEANS OF EASYTEACH BY WIRE

The user adjusts the desired switching point S1 for the KFI-51 or S1 and S2 for KFI-52- by means of the teach wire. The switching points can be placed at any position, but with the 2 point variant one has to consider a minimum distance between the 2 switching points of 50 mm.

These level probes are designed for level control of liquids, pastes and bulk materials with a dielectric constant εr between 2 and 80.

Level control of bulk material, pastes, or liquids in storage or dosing systems. These analogue probes are applied in various industries, thanks to the different housing materials that are available, so for instance:

FOOD OR PHARMACEUTICAL INDUSTRY, CHEMICAL INDUSTRY, RECYCLING TECHNOLOGY, AUTOMOTIVE TECHNOLOGY, PACKAGING INDUSTRY, PRINTING TECHNOLOGY.

i-Level Probes

Small sensor body designs - great for applications in small dosing systems

Measurement of 1 switching point

i-LEVEL Capacitive Filling Level Probe - KFI

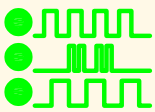
1 Limit value switching point

- Integrated evaluation electronics
- Easy Teach by wire
- Housing material: GFK, Ø 16 mm
- Connection head and process connection stainless steel VA no. 1.4305 / AISI 303
- Process connection G1”
- Automatic identification of NPN / PNP function
- With flange connector M 12 x 1 (5-pin Teach function included)

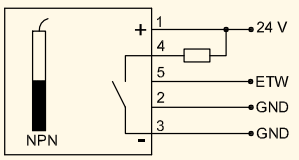
Technical data	
Active zones [M]	443 mm
Electrical version	4 - pin DC
Output function	1 limit value switching point, normally open
Type	**KFI-51-500-443-GFK/VAb-D16-G1-S-ETW-Y10**
Art.-No.	**KI 0059**
Operating voltage (U_B)	15...30 V DC
Permitted residual ripple max.	5 %
Output current max.	100 mA
Power consumption (outputs no-load)	0,9 W
Frequency of operating cycles max.	1 Hz
Permitted ambient temperature	-25...+70 °C
LED-Display	Green
Protective circuit	Built-in
Degree of protection IEC 60529	IP 67
Norm	EN 60947-5-2*
Connection	Flange connector M 12 x 1 (5-pin)
Housing material	VA No. 1.4305 / AISI 303
Active zone	GFK
Lid	PC (FDA 21 CFR 177.1580)
For matching connectors please see our selection of accessories.	

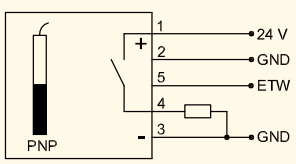
*Where applicable

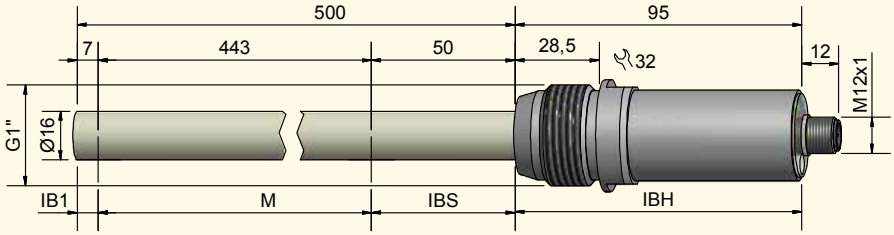
EasyTeach chart:
LED green / Adjustment function



Adjustment
Factory set
Test







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

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i-LEVEL Capacitive Filling Level Probe - KFI

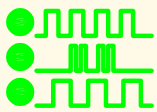
1 Limit value switching point

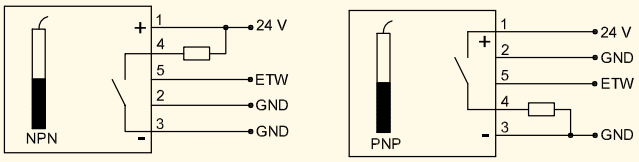
- Integrated evaluation electronics
- Easy Teach by wire
- Housing material: PTFE, Ø 16 mm
- Connection head and process connection stainless steel VA no. 1.4305 / AISI 303
- Process connection G1”
- Automatic identification of NPN / PNP function
- With flange connector M 12 x 1 (5-pin Teach function included)

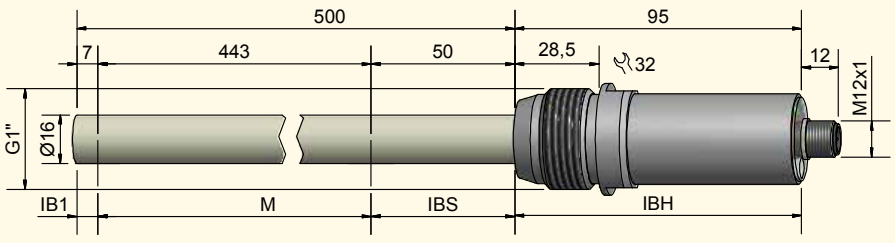
Technical data	
Active zones [M]	443 mm
Electrical version	4 - pin DC
Output function	1 limit value switching point, normally open
Type	**KFI-51-500-443-PTFE/VAb-D16-G1-S-ETW-Y10**
Art.-No.	**KI 0076**
Operating voltage (U_B)	15...30 V DC
Permitted residual ripple max.	5 %
Output current max.	100 mA
Power consumption (outputs no-load)	0,9 W
Frequency of operating cycles max.	1 Hz
Permitted ambient temperature	-25...+70 °C
LED-Display	Green
Protective circuit	Built-in
Degree of protection IEC 60529	IP 67
Norm	EN 60947-5-2*
Connection	Flange connector M 12 x 1 (5-pin)
Housing material	VA No. 1.4305 / AISI 303
Active zone	PTFE (FDA 21 CFR 177.1550)
Lid	PC (FDA 21 CFR 177.1580)
For matching connectors please see our selection of accessories.	

*Where applicable

EasyTeach chart:
LED green / Adjustment function







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

Made in Germany

i-LEVEL Capacitive Filling Level Probe - KFI

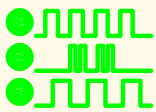
1 Limit value switching point

- Integrated evaluation electronics
- Easy Teach by wire
- Housing material: GFK, Ø 16 mm
- Automatic identification of NPN / PNP function

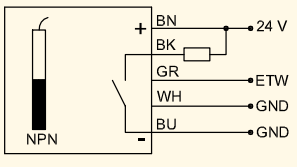
Technical data	
Active zones [M]	370 mm
Electrical version	4 - wire DC
Output function	1 limit value switching point, normally open
Type	**KFI-51-500-370-GFK-D16-S-ETW-Z02**
Art.-No.	**KI 0021**
Operating voltage (U_B)	15...30 V DC
Permitted residual ripple max.	5 %
Output current max.	100 mA
Power consumption (outputs no-load)	0,9 W
Frequency of operating cycles max.	1 Hz
Permitted ambient temperature	-25...+70 °C
LED-Display	Green
Protective circuit	Built-in
Degree of protection IEC 60529	IP 67
Norm	EN 60947-5-2*
Connection cable	2 m, PVC, 5 x 0.34 mm²
Housing material	GFK
Active zone	GFK
Lid	PC (FDA 21 CFR 177.1580)
Accessories for mounting (not delivered with the probe) please see our selection of accessories.	

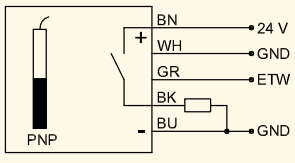
*Where applicable

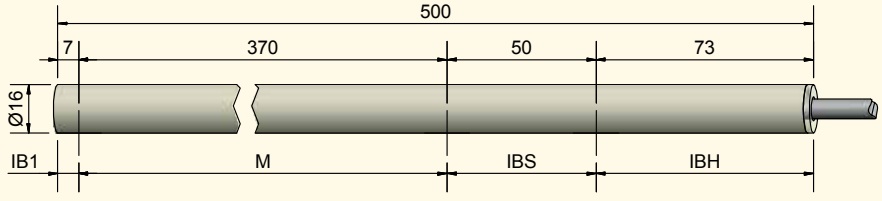
EasyTeach chart:
LED green / Adjustment function



Adjustment
Factory set
Test







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

Made in Germany

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i-LEVEL Capacitive Filling Level Probe - KFI

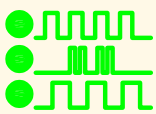
1 Limit value switching point

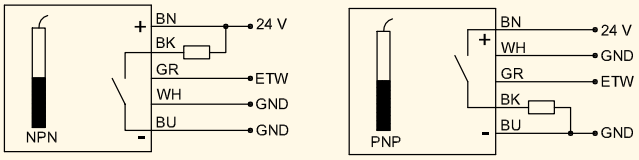
- Integrated evaluation electronics
- Easy Teach by wire
- Housing material: PTFE, Ø 16 mm
- Automatic identification of NPN / PNP function

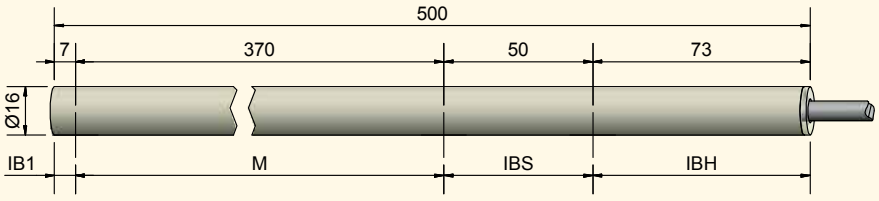
Technical data	
Active zones [M]	370 mm
Electrical version	4 - wire DC
Output function	1 limit value switching point, normally open
Type	**KFI-51-500-370-PTFE-D16-S-ETW-Z02**
Art.-No.	**KI 0072**
Operating voltage (U_B)	15...30 V DC
Permitted residual ripple max.	5 %
Output current max.	100 mA
Power consumption (outputs no-load)	0,9 W
Frequency of operating cycles max.	1 Hz
Permitted ambient temperature	-25...+70 °C
LED-Display	Green
Protective circuit	Built-in
Degree of protection IEC 60529	IP 67
Norm	EN 60947-5-2*
Connection cable	2 m, PVC, 5 x 0.34 mm²
Housing material	PTFE (FDA 21 CFR 177.1550)
Active zone	PTFE (FDA 21 CFR 177.1550)
Lid	PC (FDA 21 CFR 177.1580)
Accessories for mounting (not delivered with the probe) please see our selection of accessories.	

*Where applicable

EasyTeach chart:
LED green / Adjustment function







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

Made in Germany

i-LEVEL Capacitive Filling Level Probe - KFI

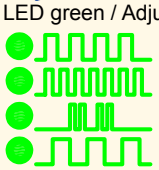
2 Limit value switching points

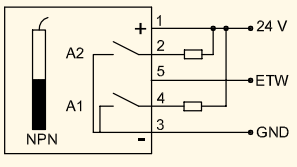
- Integrated evaluation electronics
- Easy Teach by wire
- Housing material: GFK, Ø 16 mm
- Connection head and process connection stainless steel VA no. 1.4305 / AISI 303
- Process connection G1”
- Automatic identification of NPN / PNP function
- With flange connector M 12 x 1 (5-pin Teach function included)

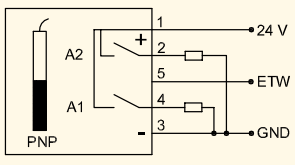
Technical data	
Active zones [M]	443 mm
Electrical version	4 - pin DC
Output function	2 limit value switching points, normally open
Type	**KFI-52-500-443-GFK/VAb-D16-G1-S-ETW-Y10**
Art.-No.	**KI 0060**
Operating voltage (U_B)	15...30 V DC
Permitted residual ripple max.	5 %
Output current max.	100 mA
Power consumption (outputs no-load)	0,9 W
Frequency of operating cycles max.	1 Hz
Permitted ambient temperature	-25...+70 °C
LED-Display	Green
Protective circuit	Built-in
Degree of protection IEC 60529	IP 67
Norm	EN 60947-5-2*
Connection	Flange connector M 12 x 1 (5-pin)
Housing material	VA No. 1.4305 / AISI 303
Active zone	GFK
Lid	PA / PPO
For matching connectors please see our selection of accessories.	

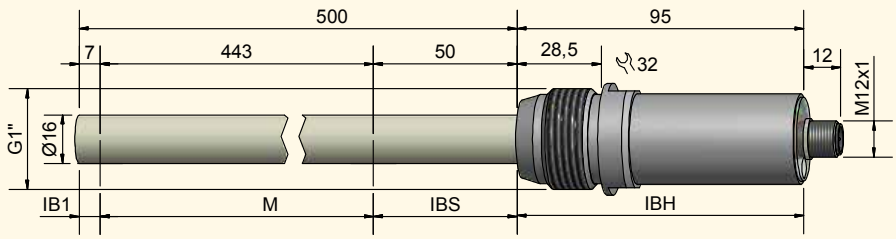
*Where applicable

EasyTeach chart:
LED green / Adjustment function









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

Made in Germany

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i-LEVEL Capacitive Filling Level Probe - KFI

2 Limit value switching points

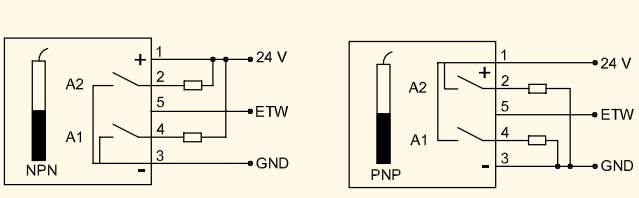
- Integrated evaluation electronics
- Easy Teach by wire
- Housing material: PTFE, Ø 16 mm
- Connection head and process connection stainless steel VA no. 1.4305 / AISI 303
- Process connection G1”
- Automatic identification of NPN / PNP function
- With flange connector M 12 x 1 (5-pin Teach function included)

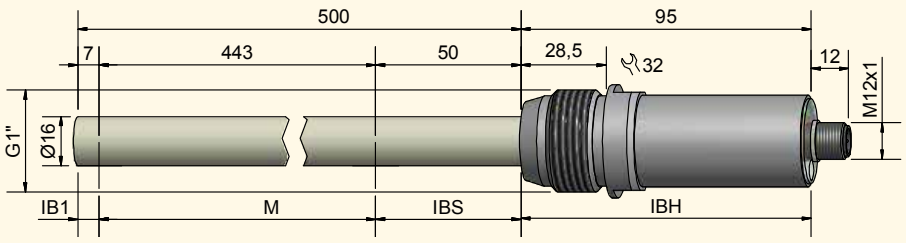
Technical data	
Active zones [M]	443 mm
Electrical version	4 - pin DC
Output function	2 limit value switching points, normally open
Type	**KFI-52-500-443-PTFE/VAb-D16-G1-S-ETW-Y10**
Art.-No.	**KI 0078**
Operating voltage (U_B)	15...30 V DC
Permitted residual ripple max.	5 %
Output current max.	100 mA
Power consumption (outputs no-load)	0,9 W
Frequency of operating cycles max.	1 Hz
Permitted ambient temperature	-25...+70 °C
LED-Display	Green
Protective circuit	Built-in
Degree of protection IEC 60529	IP 67
Norm	EN 60947-5-2*
Connection	Flange connector M 12 x 1 (5-pin)
Housing material	VA No. 1.4305 / AISI 303
Active zone	PTFE (FDA 21 CFR 177.1550)
Lid	PA / PPO
For matching connectors please see our selection of accessories.	

*Where applicable

EasyTeach chart:
LED green / Adjustment function

- Adjustment S1
- Adjustment S2
- Factory set
- Test





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

Made in Germany

i-LEVEL Capacitive Filling Level Probe - KFI

2 Limit value switching points

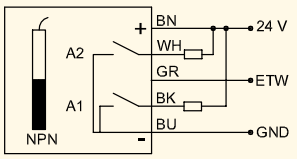
- Integrated evaluation electronics
- Easy Teach by wire
- Housing material: GFK, Ø 16 mm
- Automatic identification of NPN / PNP function

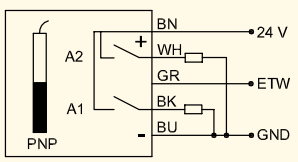
Technical data	
Active zones [M]	370 mm
Electrical version	4 - wire DC
Output function	2 limit value switching points, normally open
Type	**KFI-52-500-370-GFK-D16-S-ETW-Z02**
Art.-No.	**KI 0022**
Operating voltage (U_B)	15...30 V DC
Permitted residual ripple max.	5 %
Output current max.	100 mA
Power consumption (outputs no-load)	0,9 W
Frequency of operating cycles max.	1 Hz
Permitted ambient temperature	-25...+70 °C
LED-Display	Green
Protective circuit	Built-in
Degree of protection IEC 60529	IP 67
Norm	EN 60947-5-2*
Connection cable	2 m, PVC, 5 x 0.34 mm²
Housing material	GFK
Active zone	GFK
Lid	PC (FDA 21 CFR 177.1580)
Accessories for mounting (not delivered with the probe) please see our selection of accessories.	

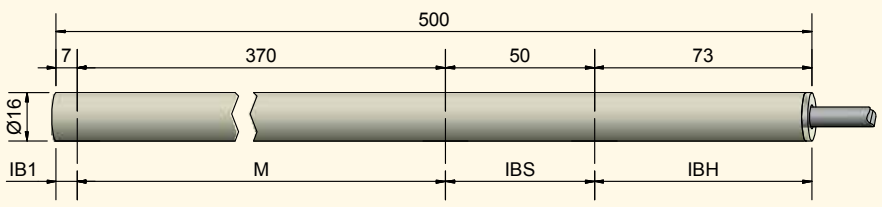
*Where applicable

EasyTeach chart:
LED green / Adjustment function

- Adjustment S1
- Adjustment S2
- Factory set
- Test







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

Made in Germany

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i-LEVEL Capacitive Filling Level Probe - KFI

2 Limit value switching points

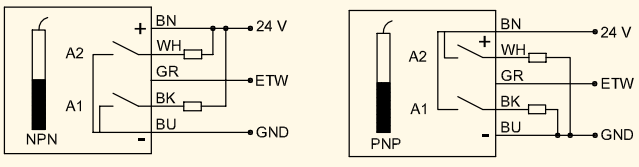
- Integrated evaluation electronics
- Easy Teach by wire
- Housing material: PTFE, Ø 16 mm
- Automatic identification of NPN / PNP function

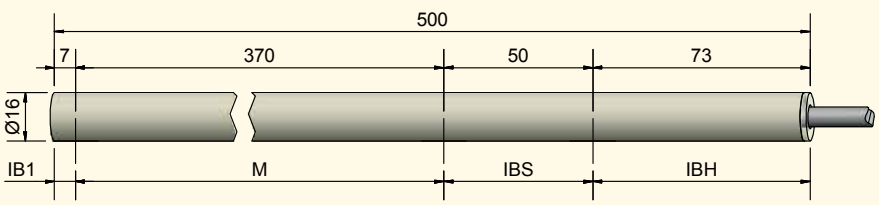
Technical data	
Active zones [M]	370 mm
Electrical version	4 - wire DC
Output function	2 limit value switching points, normally open
Type	**KFI-52-500-370-PTFE-D16-S-ETW-Z02**
Art.-No.	**KI 0073**
Operating voltage (U_B)	15...30 V DC
Permitted residual ripple max.	5 %
Output current max.	100 mA
Power consumption (outputs no-load)	0,9 W
Frequency of operating cycles max.	1 Hz
Permitted ambient temperature	-25...+70 °C
LED-Display	Green
Protective circuit	Built-in
Degree of protection IEC 60529	IP 67
Norm	EN 60947-5-2*
Connection cable	2 m, PVC, 5 x 0.34 mm²
Housing material	PTFE (FDA 21 CFR 177.1550)
Active zone	PTFE (FDA 21 CFR 177.1550)
Lid	PC (FDA 21 CFR 177.1580)
Accessories for mounting (not delivered with the probe) please see our selection of accessories.	

*Where applicable

EasyTeach chart:
LED green / Adjustment function

- Adjustment S1
- Adjustment S2
- Factory set
- Test





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

Made in Germany

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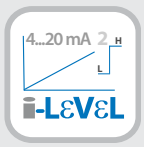
CAPACITIVE PROBES, ANALOGUE WITH 2 PROGRAMMABLE SWITCHING POINTS

i-LEVEL+



GENERAL DESCRIPTION

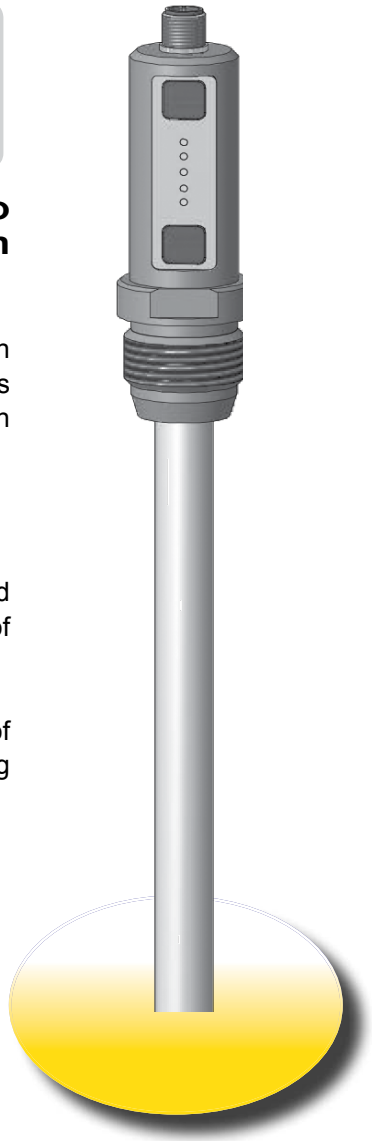
i-LEVEL

CAPACITIVE LEVEL PROBE FOR ANALOGUE LEVEL MEASUREMENT IN PLASTIC CONTAINERS WITH 2 ADDITIONAL SWITCHING POINTS.

In this section we describe a variant of the i-Level probe which is designed for analogue measurement including two free programmable switching points. The adjustment of the switching points is made by RECHNER's Easy-Teach by Wire function. The following options are available:

Analogue measurement
- **4...20 mA, 20...4 mA**
- **0...10 V, 10...0 V**

+ 2 switching points



The analogue measuring range and the two switching points can be set at any position within the measuring area.

The position of the analogue measuring range and the switching points can be positioned at any place within the measuring range. The adjustment is made by EasyTeach via the Keypad (ETF) and it can be changed again with the EasyTeach function (ETF)

Maximum probe length 2000 mm.

This rod probe with integrated evaluation electronics is based on our patented 3-electrode measuring principle. The measuring area is defined by means of inactive areas that are placed on its top and end.

It is not necessary to make a manual pre-selection of the capacity range or of a basic capacity. This is automatically done from the intelligent probe during the initial operation.

Application areas:

Limit value and analogue Level control of liquids or bulk materials

The probes are suitable for the level control of liquids or bulk materials with a dielectric constant (DC) ε_r between 2 and 80.

Measurement possible with product temperature of up to 100°C

The product temperature at the probe rod can be up to 100 provided, that at the same time it is guaranteed that the temperature at the sensor head, where the evaluation electronics is placed does not exceed a value of +55°C. Even with the compact design of the probe it is possible to realise measurements in high temperature ranges. In this case we offer variants of the level probes with temperature barriers in order to protect the integrated evaluation electronics.

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TECHNOLOGY

i-LEVEL+

Advantages:

- Analogue measuring range user selectable within the analogue measuring area
- 2 additional switching points which can be set at any place within or outside of the analogue area
- With intelligent PNP / NPN recognition, normally open or normally closed function programmable
- Analogue outputs available are 4...20 mA / 20...4 mA or 0...10 V / 10...0 V
- Supply voltage 18...30 V DC
- On request Unit also available with fixed programming of analogue range and switching points: „Mount and Go“
- Electronic lock - prevents undesired changes of the programmed adjustment

ADJUSTMENT

i-LEVEL

EasyTeach Adjustment

The adjustment of the switching points and of the analogue measuring range is made over the keypad on the stainless steel head. This is supported by a variant of the well-poven EasyTeach technology.

The operation of both the buttons, set and mode, is intuitive and very easy. The built-in LED‘s reflect each adjustment action and display during normal operation, the switching states of the outputs, or are warning the user in case of a failure.

For applications with difficult access to the sensor there are models available which can be adjusted by RECHNER‘a EasyTeach by wire (ETW) or direct via CAN-Bus.

The general interaction of sensor and control system can be checked with the test mode. With the reset function the sensor can be re-adjusted to the factory setting at any time.

- **Simple and easy adjustment with EasyTeach function**
- **No additional tool needed**
- **Adjustable by hand**
- **LED‘s provide visual feedback of the outputs.**

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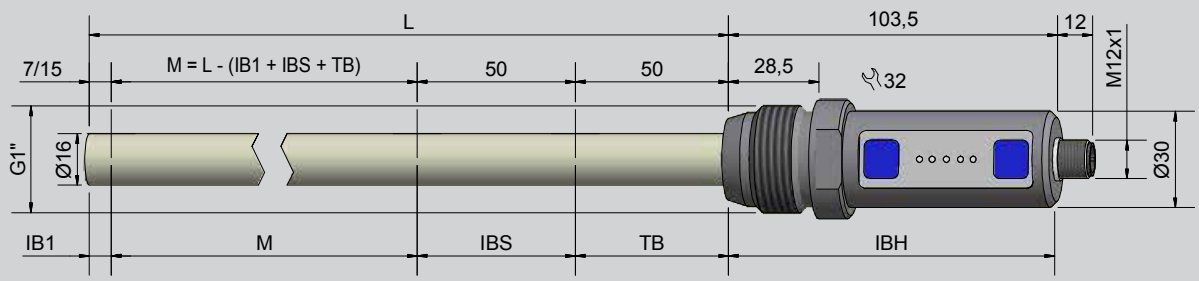
MOUNTING

i-LEVEL



The **non-active range (IB1)** is as standard 7 (GFK) / 15 (PTFE) mm.

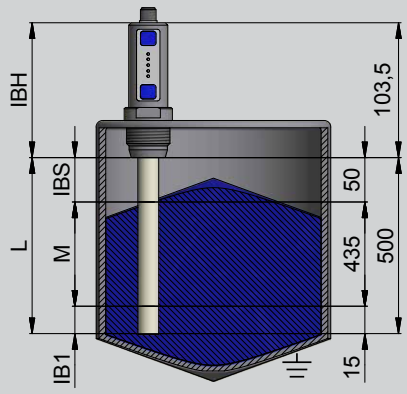
The non-active range (IB1) does not require a constant cross section of the container. Thus it can project into the cone of the container.

The length of the **analogue measuring range (M)** is dependent on the total length of the probe that has been ordered (L = max. 2 m).

The **non-active range (IBS)** from the measuring range to the top of the container (if metal) should be 1/3 of the container diameter or not less than 50 mm in order to prevent non-linearity

The **non-active range TB** (if existing) serves as temperature barrier and must be placed outside of the hot area.

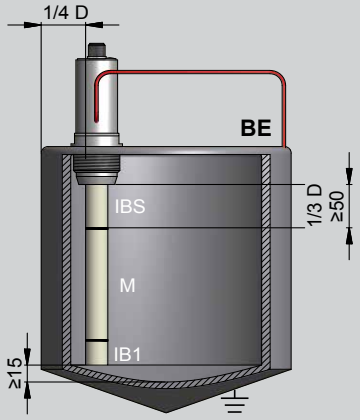
The **non-active range (IBH)** serves for mounting of the probe.



Example calculation for an analogue probe with PTFE body and G1“ process connection (VA), Total probe length L = 500 mm. The IBS is calculated with the min. distance of 50 mm. That results in an available measuring range M = 435 mm. The calculation is as follows:

M = L - (IB1 + IBS)
M = 500 - (15 + 50)
M = 435

→ KFW-12-500-435-PTFE/VAb-D16-G1-IL4-ETF-Y10



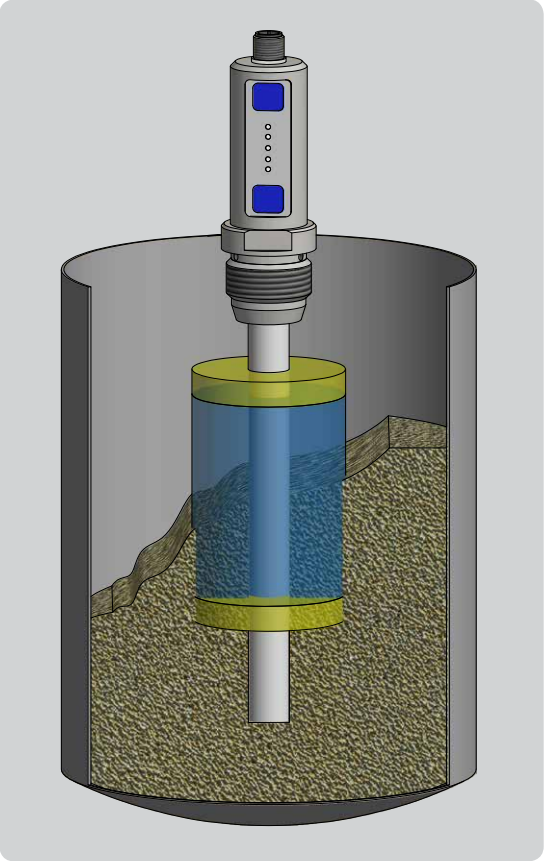
The probe can be mounted centrically or eccentrically. For a measurement independent of the filling cone, we recommend that the probe be mounted at a ¼ of the diameter. The minimum distance between the end of the measuring range and the conductive lid of the container is 50 mm.

Connect the BE using the process connection or by means of the rear screw connection.

APPLICATIONS

i-LEVEL+

The i-Level+ probes are designed for level control in plastic container. This is possible because the 3rd electrode is integrated in the probe. In this case the container does not belong to the measurement. Therefore the measuring field is close to the sensor surface and the i-Level+ probe is more like a classic capacitive sensor.



On the left you see a schematic drawing of the possible analogue measuring range of a i-level+ probe of the KFW-12-… series. You see the maximum possible measuring range between the inactive areas at the probe tip and the top. The measuring area is in the near area around the level probe.

ADJUSTMENT BY MEANS OF THE KEYPAD AND EASYTEACH

The user adjusts the desired analogue measuring range „Analogue Min. and Analogue Max.”. By means of the membrane keypad additionally 2 further switching points can be adjusted. These 2 switching points can be placed at any position over the possible measuring area, inside or outside of the adjusted analogue measuring range. This means for example, one can make an analogue measurement and with the same probe one can realize an overfill protection and a dry running protection.

These level probes are designed for level control of liquids, pastes and bulk materials with a dielectric constant εr between 2 and 80.

Level control of bulk material or liquids in storage or dosing systems. These analogue probes are applied in various industries, thanks to the different housing materials that are available, so for instance:

FOOD OR PHARMACEUTICAL INDUSTRY, CHEMICAL INDUSTRY, RECYCLING TECHNOLOGY, AUTOMOTIVE TECHNOLOGY, PACKAGING INDUSTRY, PRINTING TECHNOLOGY.

Due to of the smaller measuring field / measuring volume deposits are to be avoided on the surface of the i-Level+ probe.

For applications with pastes and liquids that tend to stick on the sensor surface we recommend our i-Level probes or the PerLevel and TrueLevel systems.

With the same probe: Analogue measurement and overfill protection and dry running protection.

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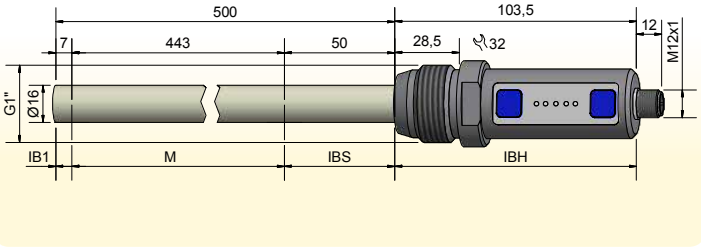
i-LEVEL Capacitive Filling Level Probe - KFW

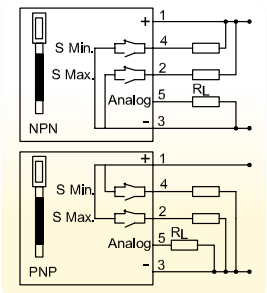
Analogue current output 4...20 mA
2 programmable limit value switching points

- Integrated evaluation electronics
- Housing material: GFK, Ø 16 mm
- Connection head and process connection stainless steel VA no. 1.4305 / AISI 303
- Process connection G1”
- Multifunction probe: Automatic identification of NPN- / PNP function
- Normally open / normally closed function switchable
- Electronic lock

Technical data	
Active zone [mm]	443 mm
Electrical version	5 - pin DC
Output function	Analogue, 2 limit value switching points, Normally open / normally closed switchable
Type	**KFW-12-500-443-GFK/VAb-D16-G1-IL4-ETF-Y10**
Art.-No.	**KW 0102**
Operating voltage (U_B)	18...30 V DC
Permitted residual max.	5 %
Load resistance (R_L)	≤ 400 Ohm
Output current	100 mA
Power consumption (outputs no-load)	0,8 W
Analogue output	4...20 mA
Switching frequency max.	1 Hz
Permitted ambient temperature	-25...+55 °C
Permitted ambient temperature (for active zone)	-25...+100 °C
Pressure	10 bar
LED-Display	Green / yellow
Protective circuit	Built-in
Degree of protection IEC 60529	IP 67
Norm	EN 60947-5-2*
Connection	Flange connector M 12 x 1
Housing material	VA No. 1.4305 / AISI 303 / polyester
Active zone	GFK
For matching connectors please see our selection of accessories.	

*Where applicable





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

Made in Germany

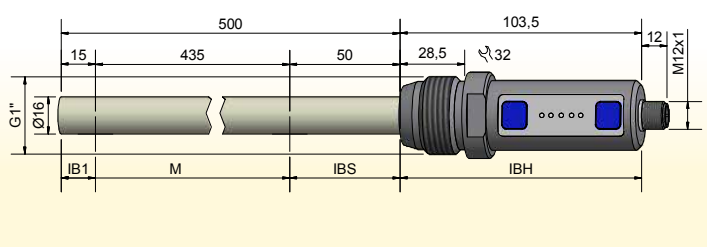
i-LεVεL Capacitive Filling Level Probe - KFW

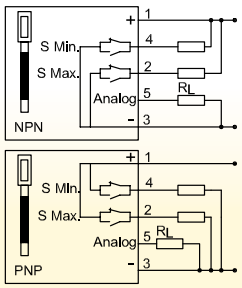
Analogue current output 4...20 mA
2 programmable limit value switching points

- Integrated evaluation electronics
- Housing material: PTFE, Ø 16 mm
- Connection head and process connection stainless steel VA no. 1.4305 / AISI 303
- Process connection G1”
- Multifunction probe: Automatic identification of NPN- / PNP function
- Normally open / normally closed function switchable
- Electronic lock

Technical data	
Active zone [mm]	435 mm
Electrical version	5 - pin DC
Output function	Analogue, 2 limit value switching points, Normally open / normally closed switchable
Type	**KFW-12-500-435-PTFE/VAb-D16-G1-IL4-ETF-Y10**
Art.-No.	**KW 0025**
Operating voltage (U_B)	18...30 V DC
Permitted residual max.	5 %
Load resistance (R_L)	≤ 400 Ohm
Output current	100 mA
Power consumption (outputs no-load)	0,8 W
Analogue output	4...20 mA
Switching frequency max.	1 Hz
Permitted ambient temperature	-25...+55 °C
Permitted ambient temperature (for active zone)	-25...+100 °C
Pressure	1 bar
LED-Display	Green / yellow
Protective circuit	Built-in
Degree of protection IEC 60529	IP 67
Norm	EN 60947-5-2*
Connection	Flange connector M 12 x 1
Housing material	VA No. 1.4305 / AISI 303 / polyester
Active zone	PTFE (FDA 21 CFR 177.1550)
For matching connectors please see our selection of accessories.	

*Where applicable





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

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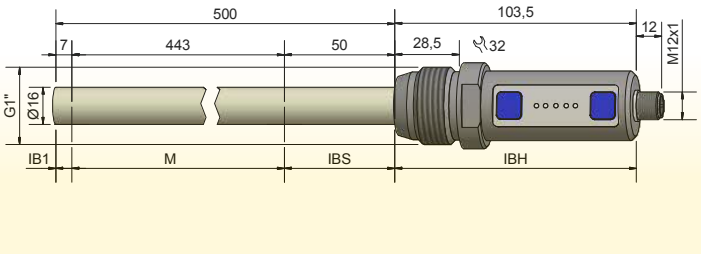
i-LEVEL Capacitive Filling Level Probe - KFW

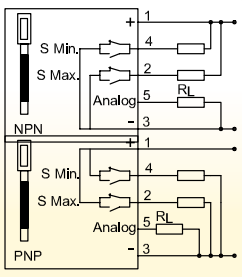
Analogue voltage output 0...10 V
2 programmable limit value switching points

- Integrated evaluation electronics
- Housing material: GFK, Ø 16 mm
- Connection head and process connection stainless steel VA no. 1.4305 / AISI 303
- Process connection G1”
- Multifunction probe: Automatic identification of NPN- / PNP function
- Normally open / normally closed function switchable
- Electronic lock

Technical data	
Active zone [mm]	443 mm
Electrical version	5 - pin DC
Output function	Analogue, 2 limit value switching points, Normally open / normally closed switchable
Type	**KFW-12-500-443-GFK/VAb-D16-G1-UL0-ETF-Y10**
Art.-No.	**KW 0026**
Operating voltage (U_B)	18...30 V DC
Permitted residual max.	5 %
Load resistance (R_L)	≥ 2 K Ohm
Output current	100 mA
Power consumption (outputs no-load)	0,8 W
Analogue output	0...10 V
Switching frequency max.	1 Hz
Permitted ambient temperature	-25...+55 °C
Permitted ambient temperature (for active zone)	-25...+100 °C
Pressure	10 bar
LED-Display	Green / yellow
Protective circuit	Built-in
Degree of protection IEC 60529	IP 67
Norm	EN 60947-5-2*
Connection	Flange connector M 12 x 1
Housing material	VA No. 1.4305 / AISI 303 / polyester
Active zone	GFK
For matching connectors please see our selection of accessories.	

*Where applicable





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

Made in Germany

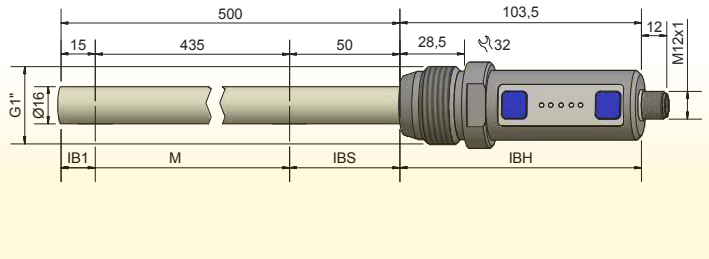
i-LεVεL Capacitive Filling Level Probe - KFW

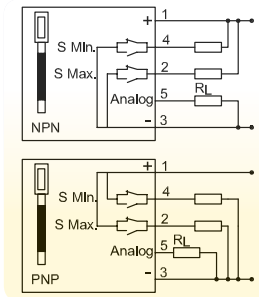
Analogue voltage output 0...10 V
2 programmable limit value switching points

- Integrated evaluation electronics
- Housing material: PTFE, Ø 16 mm
- Connection head and process connection stainless steel VA no. 1.4305 / AISI 303
- Process connection G1”
- Multifunction probe: Automatic identification of NPN- / PNP function
- Normally open / normally closed function switchable
- Electronic lock

Technical data	
Active zone [mm]	435 mm
Electrical version	5 - pin DC
Output function	Analogue, 2 limit value switching points, Normally open / normally closed switchable
Typ	**KFW-12-500-435-PTFE/VAb-D16-G1-UL0-ETF-Y10**
Art.-Nr.	**KW 0027**
Operating voltage (U_B)	18...30 V DC
Permitted residual max.	5 %
Load resistance (R_L)	≥ 2 K Ohm
Output current	100 mA
Power consumption (outputs no-load)	0,8 W
Analogue output	0...10 V
Switching frequency max.	1 Hz
Permitted ambient temperature	-25...+55 °C
Permitted ambient temperature (for active zone)	-25...+100 °C
Pressure	1 bar
LED-Display	Green / yellow
Protective circuit	Built-in
Degree of protection IEC 60529	IP 67
Norm	EN 60947-5-2*
Connection	Flange connector M 12 x 1
Housing material	VA No. 1.4305 / AISI 303 / polyester
Active zone	PTFE (FDA 21 CFR 177.1550)
For matching connectors please see our selection of accessories.	

*Where applicable





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

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CAPACITIVE FILLING LEVEL MEASURING PROBE, ANALOGUE

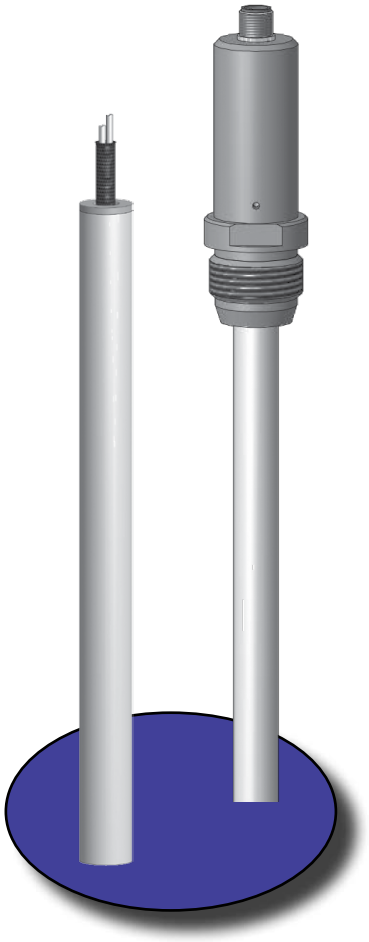
GENERAL DESCRIPTION

i-LεVεL+

CAPACITIVE LEVEL PROBE FOR ANALOGUE MEASUREMENT IN PLASTIC CONTAINERS

In this section we describe variants of the i-Level+ probe which are designed for the analogue level measurement. The adjustment of the measuring area is made by RECHNER's EasyTeach by Wire (ETW). The following options are available:

Analogue Measurement:
- **4...20 mA, 20...4 mA,**
- **0...10 V or 10...0 V**



The Analogue measuring range can be set at any position within the measuring area

The position of the analogue measurement can be positioned at any place within the measuring range. The adjustment is made by EasyTeach by wire and it can be can be changed again with the EasyTeach by Wire function

Maximum probe length 2000 mm

This rod probe with integrated evaluation electronics is based on our patented 3-electrode measuring principle. The measuring area is defined by means of inactive areas that are placed on its top and end.

It is not necessary to make a manual pre-selection of the capacity range or of a basic capacity. This is automatically done from the intelligent probe during the initial operation.

Application areas:

Level control of liquids or bulk materials

The probes are suitable for the level control of liquids or bulk materials with a dielectric constant (DC) ε_r between 2 and 80.

Measurement possible with product temperature of up to 100°C

Even with the compact design of the probe it is possible to realise measurements in high temperature ranges. In this case we offer variants of the level probes with temperature barriers in order to protect the integrated evaluation electronics. The product temperature at the probe rod can be up to 100 provided, that at the same time it is guaranteed that the temperature at the sensor head, where the evaluation electronics is placed does not exceed a value of +70°C.

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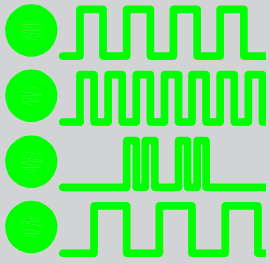
TECHNOLOGY

i-LEVEL+

- Analogue measuring range user selectable within the analogue measuring area
- Analogue outputs available are 4...20 mA / 20...4 mA or 0...10 V / 10...0 V
- Supply voltage 18...30 V DC
- EasyTeach Function

ADJUSTMENT



EasyTeach Adjustment:

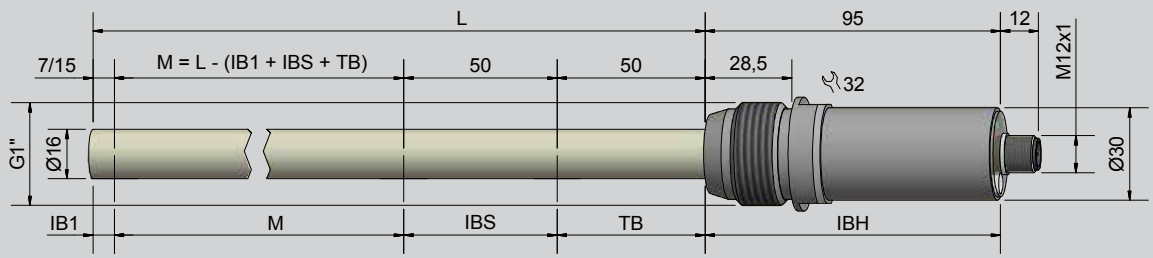
The adjustment of the analogue measuring area is made by means of the teach wire. This is supported by a variant of the well-poven EasyTeach technology. As control signal the supply voltage (+) is used.

The Adjustment is made by disconnection of the ETW-wire from the supply voltage (+) at the desired menu point.

The LED display is an adjustment aid with its flashing sequences for each menu point.

The general interaction of sensor and control system can be checked with the test mode. With the reset function the sensor can be re-adjusted to the factory setting at any time.

MOUNTING



The **inactive area (IB1)** is 7 (GFK) / 15 (PTFE) mm as standard.

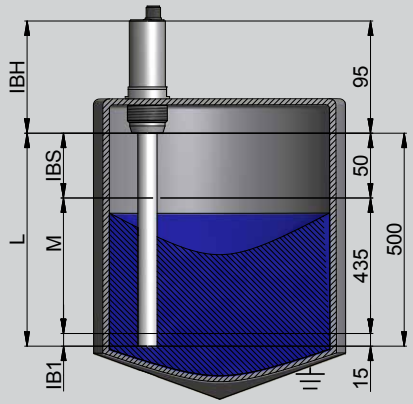
The non-active range (IB1) does not require a constant cross section of the container. Thus it can project into the cone of the container.

The length of the **analogue measuring range (M)** is dependent on the total length of the probe that has been ordered (L = max. 2 m).

The **non-active range (IBS)** from the measuring range to the top of the container (if metal) should be 1/3 of the container diameter or not less than 50 mm in order to prevent non-linearity

The **non-active range TB** (if existing) serves as temperature barrier and must be placed outside of the hot area.

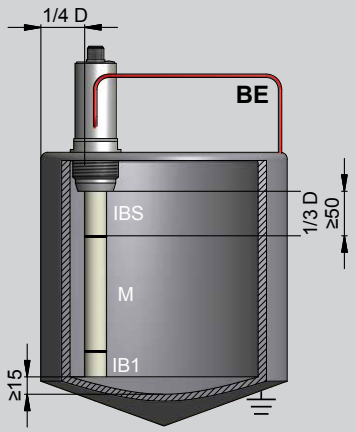
The **non-active range (IBH)** serves for mounting of the probe.



Example calculation for an analogue probe with PTFE body and G1“ process connection (VA), Total probe length L = 500 mm. The IBS is calculated with the min. distance of 50 mm. That results in an available measuring range M = 435 mm. The calculation is as follows:

M = L - (IB1 + IBS)
M = 500 - (15 + 50)
M = 435

→ KFW-1-500-435-PTFE/VAb-D16-G1-IL4-ETW-Y10



The probe can be mounted centrically or eccentrically. For a measurement independent of the filling cone, we recommend that the probe be mounted at a ¼ of the diameter. The minimum distance between the end of the measuring range and the conductive lid of the container is 50 mm.

Connect the BE using the process connection or by means of the rear screw connection.

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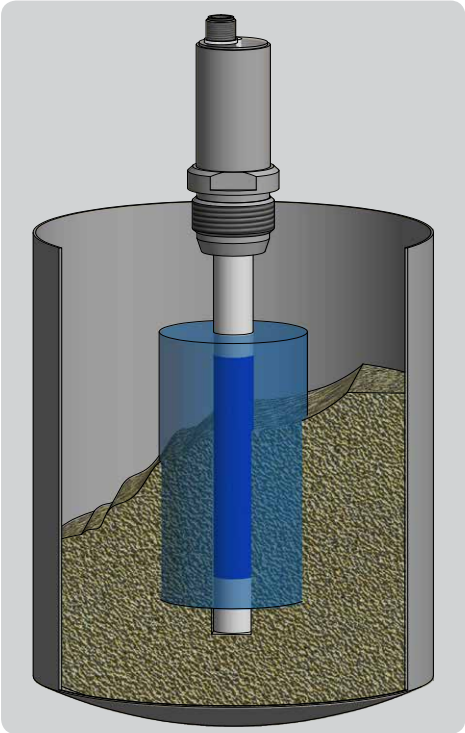
APPLICATIONS

i-LEVEL+

The i-Level+ probes are designed for level control in plastic container. This is possible because the 3rd electrode is integrated in the probe. In this case the container does not belong to the measurement. Therefore the measuring field is close to the sensor surface and the i-Level+ probe is more like a classic capacitive sensor.



On the left you see a schematic drawing of the possible analogue measuring range of a i-level+ probe of the KFW-1-… series. You see the maximum possible measuring range between the inactive areas at the probe tip and the top. The measuring area is in the near area around the level probe.

ADJUSTMENT BY MEANS OF EASYTEACH BY WIRE

The user adjusts the desired analogue measuring area „Analogue Min. and Analogue Max.". By means of the teach wire.

These level probes are designed for level control of liquids, pastes and bulk materials with a dielectric constant εr between 2 and 80.

Level control of bulk material, pastes, or liquids in storage or dosing systems. These analogue probes are applied in various industries, thanks to the different housing materials that are available, so for instance:

FOOD OR PHARMACEUTICAL INDUSTRY, CHEMICAL INDUSTRY, RECYCLING TECHNOLOGY, AUTOMOTIVE TECHNOLOGY, PACKAGING INDUSTRY, PRINTING TECHNOLOGY.

Due to of the smaller measuring field / measuring volume deposits are to be avoided on the surface of the i-Level+ probe.

For applications with pastes and liquids that tend to stick on the sensor surface we recommend our i-Level probes or the PerLevel and TrueLevel systems.

i-LEVEL Capacitive Filling Level Probe - KFW

Analogue current output 4...20 mA

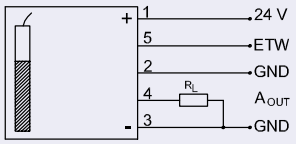
- Integrated evaluation electronics
- Easy Teach by wire
- Housing material: GFK, Ø 16 mm
- Connection head and process connection stainless steel VA no. 1.4305 / AISI 303
- Process connection G1”
- Probe length max. 2000 mm
- With flange connector M 12 x 1

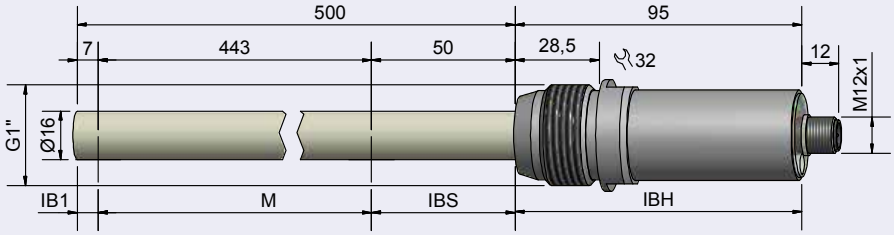
Technical data	
Active zones [M]	443 mm
Electrical version	5 - pin DC
Output function	Analogue
Type	**KFW-1-500-443-GFK/VAb-D16-G1-IL4-ETW-Y10**
Art.-No.	**KW 0028**
Operating voltage (U_B)	15...30 V DC
Permitted residual ripple max.	5 %
Load resistance (R_L)	≤ 200 Ω
Power consumption (outputs no-load)	0,9 W
Analogue output	4...20 mA
Permitted ambient temperature	-25...+70 °C
LED-Display	Green
Protective circuit	Built-in
Degree of protection IEC 60529	IP 67
Norm	EN 60947-5-2*
Connection	Flange connector M 12 x 1
Housing material	VA No. 1.4305 / AISI 303
Active zone	GFK
Lid	PC (FDA 21 CFR 177.1580)
For matching connectors please see our selection of accessories.	

*Where applicable

EasyTeach chart:
LED green / Adjustment function

Adjustment Min.
Adjustment Max.
Factory set
Test





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

Made in Germany

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i-LEVEL Capacitive Filling Level Probe - KFW

Analogue current output 4...20 mA

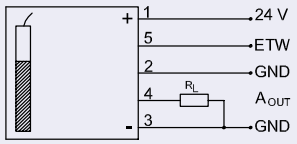
- Integrated evaluation electronics
- Easy Teach by wire
- Housing material: PTFE, Ø 16 mm
- Connection head and process connection stainless steel VA no. 1.4305 / AISI 303
- Process connection G1”
- With flange connector M 12 x 1 (5-pin Teach function included)

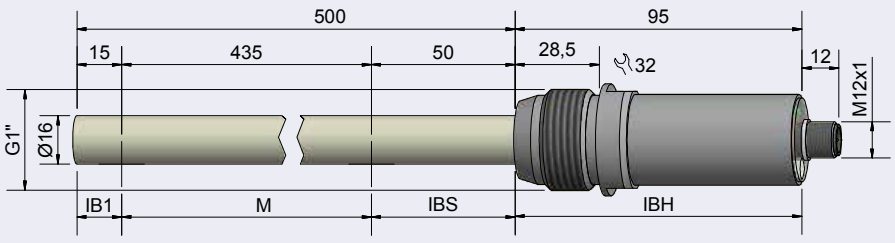
Technical data	
Active zones [M]	435 mm
Electrical version	4 - pin DC
Output function	Analogue
Type	**KFW-1-500-435-PTFE/VAb-D16-G1-IL4-ETW-Y10**
Art.-No.	**KW 0029**
Operating voltage (U_B)	15...30 V DC
Permitted residual ripple max.	5 %
Load resistance (R_L)	≤ 200 Ω
Power consumption (outputs no-load)	0,9 W
Analogue output	4...20 mA
Permitted ambient temperature	-25...+70 °C
LED-Display	Green
Protective circuit	Built-in
Degree of protection IEC 60529	IP 67
Norm	EN 60947-5-2*
Connection	Flange connector M 12 x 1 (5-pin)
Housing material	VA No. 1.4305 / AISI 303
Active zone	PTFE (FDA 21 CFR 177.1550)
Lid	PC (FDA 21 CFR 177.1580)
For matching connectors please see our selection of accessories.	

*Where applicable

EasyTeach chart:
LED green / Adjustment function

- Adjustment Min.
- Adjustment Max.
- Factory set
- Test





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

Made in Germany

i-LEVEL Capacitive Filling Level Probe - KFW

Analogue current output 4...20 mA

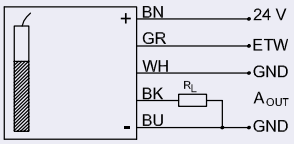
- Integrated evaluation electronics
- Easy Teach by wire
- Housing material: GFK, Ø 16 mm

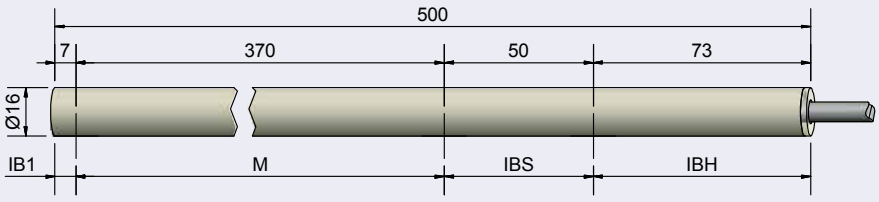
Technical data	
Active zones [M]	370 mm
Electrical version	4 - wire DC
Output function	Analogue
Type	**KFW-1-500-370-GFK-D16-IL4-ETW-Z02**
Art.-No.	**KW 0030**
Operating voltage (U_B)	15...30 V DC
Permitted residual ripple max.	5 %
Load resistance (R_L)	≤ 200 Ω
Power consumption (outputs no-load)	0,9 W
Analogue output	4...20 mA
Permitted ambient temperature	-25...+70 °C
LED-Display	Green
Protective circuit	Built-in
Degree of protection IEC 60529	IP 67
Norm	EN 60947-5-2*
Connection cable	2 m, PVC, 5 x 0.34 mm²
Housing material	GFK
Active zone	GFK
Lid	PC (FDA 21 CFR 177.1580)
Accessories for mounting (not delivered with the probe) please see our selection of accessories.	

*Where applicable

EasyTeach chart:
LED green / Adjustment function

Adjustment Min.
Adjustment Max.
Factory set
Test





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

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i-LEVEL Capacitive Filling Level Probe - KFW

Analogue current output 4...20 mA

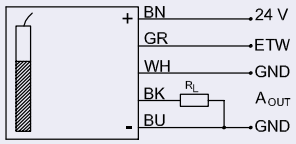
- Integrated evaluation electronics
- Easy Teach by wire
- Housing material: PTFE, Ø 16 mm

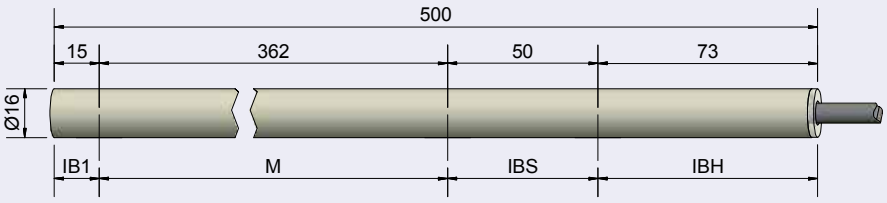
Technical data	
Active zones [M]	362 mm
Electrical version	4 - wire DC
Output function	Analogue
Type	**KFW-1-500-362-PTFE-D16-IL4-ETW-Z02**
Art.-No.	**KW 0031**
Operating voltage (U_B)	15...30 V DC
Permitted residual ripple max.	5 %
Load resistance (R_L)	≤ 200 Ω
Power consumption (outputs no-load)	0,9 W
Analogue output	4...20 mA
Permitted ambient temperature	-25...+70 °C
LED-Display	Green
Protective circuit	Built-in
Degree of protection IEC 60529	IP 67
Norm	EN 60947-5-2*
Connection cable	2 m, PVC, 5 x 0.34 mm²
Housing material	PTFE (FDA 21 CFR 177.1550)
Active zone	PTFE (FDA 21 CFR 177.1550)
Lid	PC (FDA 21 CFR 177.1580)
Accessories for mounting (not delivered with the probe) please see our selection of accessories.	

*Where applicable

EasyTeach chart:
LED green / Adjustment function

- Adjustment Min.
- Adjustment Max.
- Factory set
- Test





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

Made in Germany

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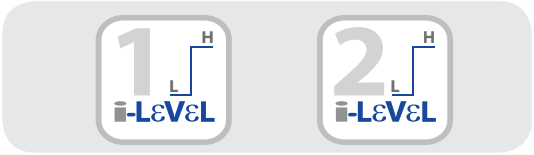
CAPACITIVE FILLING LEVEL PROBE, BINARY



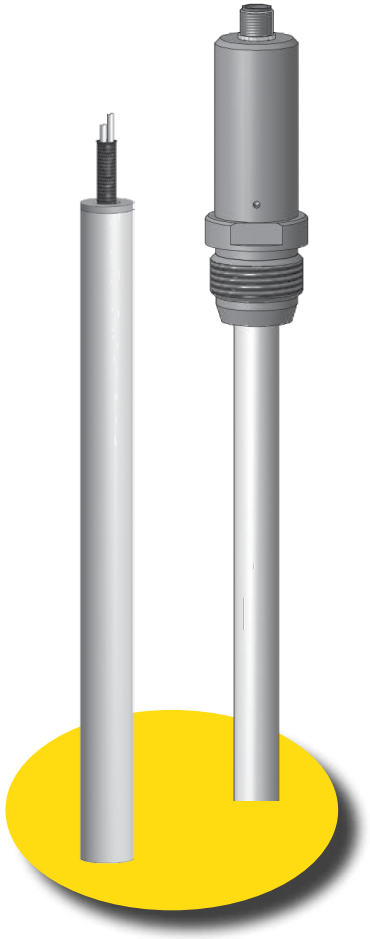
GENERAL DESCRIPTION KFW-5...

i-LEVEL+

CAPACITIVE PROBE FOR LEVEL CONTROL OF 1 OR 2 LIMIT VALUES IN PLASTIC CONTAINERS

In this section we describe a variant of the i-level+ probe which is designed for binary measurement of 1 or 2 limit values. The adjustment of the switching points is made by RECHNER's Easy-Teach by Wire function. The following options are available:

Probe with
- **1 switching point - KFW-51-...**
- **2 switching points - KFW-52-...**



The switching points can be set at any position within the measuring range.

The position of the switching points can be positioned at any place within the measuring range. The adjustment is made by EasyTeach by wire and it can be can be changed again with the EasyTeach by Wire function

Maximum probe length 2000 mm.

This rod probe with integrated evaluation electronics is based on our patented 3-electrode measuring principle. The measuring area is defined by means of inactive areas that are placed on its top and end.

It is not necessary to make a manual pre-selection of the capacity range or of a basic capacity. This is automatically done from the intelligent probe during the initial operation.

Application areas:

Level control of liquids or bulk materials.

The probes are suitable for the level control of liquids or bulk materials with a dielectric constant (DC) ε_r between 2 and 80.

Measurement possible with product temperature of up to 100°C

Even with the compact design of the probe it is possible to realise measurements in high temperature ranges. In this case we offer variants of the level probes with temperature barriers in order to protect the integrated evaluation electronics. The product temperature at the probe rod can be up to 100 provided, that at the same time it is guaranteed that the temperature at the sensor head, where the evaluation electronics is placed does not exceed a value of +70°C.

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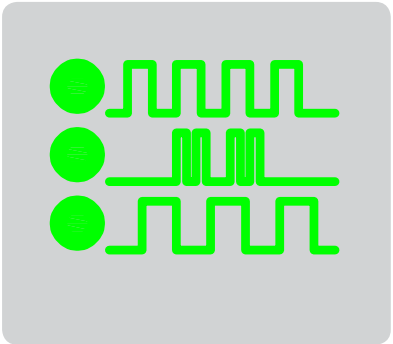
GENERAL DESCRIPTION KFW-5...

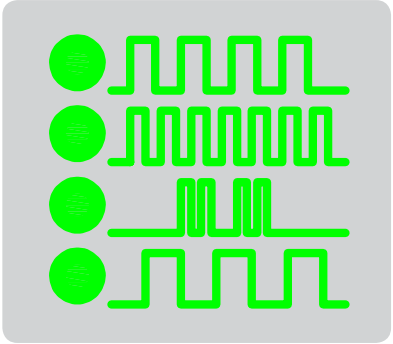
i-LEVEL+

- Position of the switching points can be set at any position within the measuring range.
- With intelligent PNP /NPN recognition
- Supply voltage 18...30 V DC
- EasyTeach by Wire function

Adjustment



ETW Chart 1-Point probe



ETW Chart 2-Point probe

EasyTeach Adjustment:

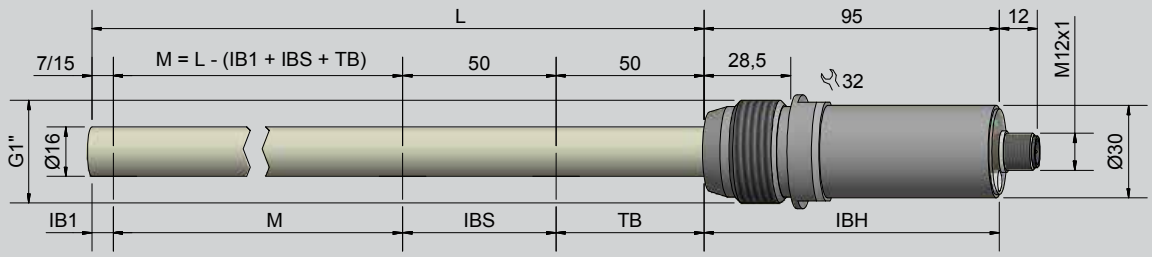
The adjustment of the analogue measuring area is made by means of the teach wire. This is supported by a variant of the well-poven EasyTeach technology.

The Adjustment is made by disconnection of the ETW wire from the supply voltage (+) at the desired menu point.

The LED display is an adjustment aid with its flashing sequences for each menu point.

The general interaction of sensor and control system can be checked with the test mode. With the reset function the sensor can be re-adjusted to the factory setting at any time.

MOUNTING



The **inactive area (IB1)** is 7 (GFK) / 15 (PTFE) mm as standard.

The non-active range (IB1) does not require a constant cross section of the container. Thus it can project into the cone of the container.

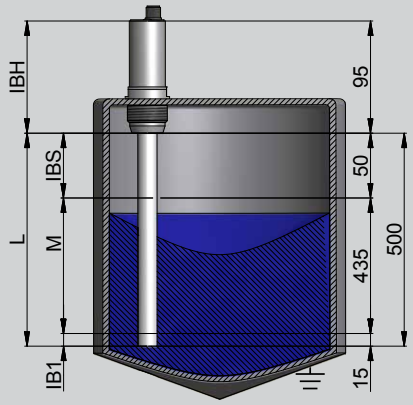
The length of the **measuring range (M)** is dependent on the total length of the probe that has been ordered (L = max. 2 m).

The position of the switching points S1 and S2 (depending on type) can be set with the EasyTeach by Wire function.

The **non-active range (IBS)** from the measuring range to the top of the container (if metal) should be 1/3 of the container diameter or not less than 50 mm in order to prevent non-linearity

The **non-active range TB** (if existing) serves as temperature barrier and must be placed outside of the hot area.

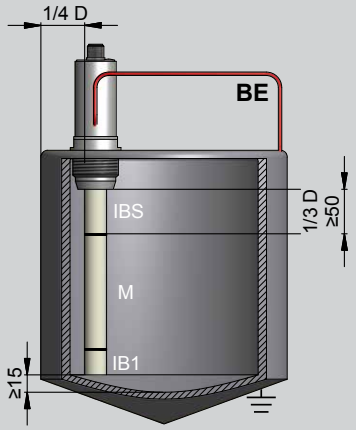
The **non-active range (IBH)** serves for mounting of the probe.



Example for a sensor with 1 switching point, PTFE-body and G1“ connection head (VA), sensor length L = 500 mm. For IBS the minimum of 50 mm is determined. This results in an available measuring area of M = 435 mm. The calculation is as follows:

M = L - (IB1 + IBS)
M = 500 - (15 + 50)
M = 435

→ KFW-51-500-435-PTFE/VAb-D16-G1-S-ETW-Y10



The probe can be mounted centrically or eccentrically. For a measurement independent of the filling cone, we recommend that the probe be mounted at a ¼ of the diameter. The minimum distance between the end of the measuring range and the conductive lid of the container is 50 mm.

Connect the BE using the process connection or by means of the rear screw connection.

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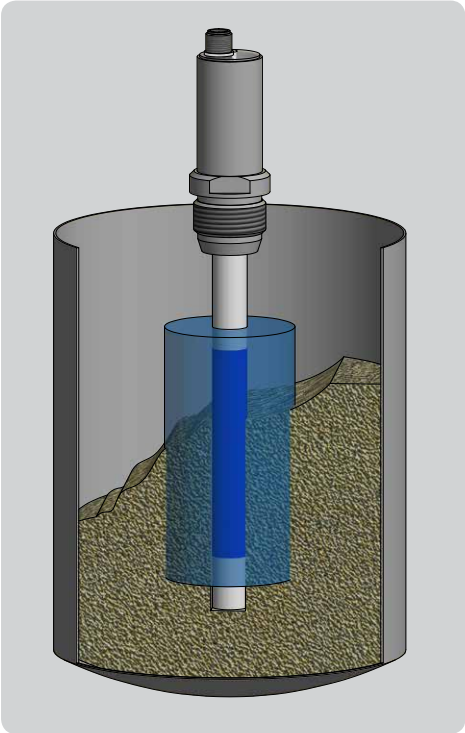
APPLICATIONS

i-LEVEL+

The i-Level+ probes are designed for level control in plastic container. This is possible because the 3rd electrode is integrated in the probe. In this case the container does not belong to the measurement. Therefore the measuring field is close to the sensor surface and the i-Level+ probe is more like a classic capacitive sensor.



On the left you see a schematic drawing of the possible measuring range of an i-level+ probe of the KFW-52 series. You see the maximum possible measuring range between the inactive areas at the probe tip and the top and the measuring field of the switching points. The measuring area is in the near area around the level probe.

ADJUSTMENT BY MEANS OF EASYTEACH BY WIRE

The user adjusts the desired switching point S1 for the KFW-51 or S1 and S2 for KFW-52- by means of the teach wire. The switching points can be placed at any position, whereas with the 2 point variant one has to consider a minimum distance between the 2 switching points of 50 mm.

These level probes are designed for level control of liquids, pastes and bulk materials with a dielectric constant εr between 2 and 80.

Level control of bulk material, pastes, or liquids in storage or dosing systems. These analogue probes are applied in various industries, thanks to the different housing materials that are available, so for instance:

FOOD OR PHARMACEUTICAL INDUSTRY, CHEMICAL INDUSTRY, RECYCLING TECHNOLOGY, AUTOMOTIVE TECHNOLOGY, PACKAGING INDUSTRY, PRINTING TECHNOLOGY.

Due to of the smaller measuring field / measuring volume deposits are to be avoided on the surface of the i-Level+ probe.

For applications with pastes and liquids that tend to stick on the sensor surface we recommend our i-Level probes or the PerLevel and TrueLevel systems.

i-LεVεL Capacitive Filling Level Probe - KFW

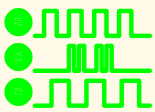
1 Limit value switching point

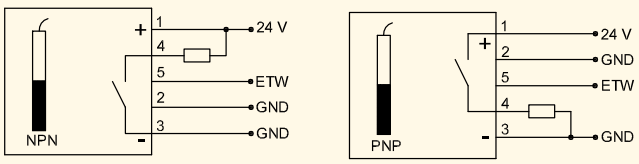
- Integrated evaluation electronics
- Easy Teach by wire
- Housing material: GFK, Ø 16 mm
- Connection head and process connection stainless steel VA no. 1.4305 / AISI 303
- Process connection G1”
- Automatic identification of NPN / PNP function
- With flange connector M 12 x 1 (5-pin Teach function included)

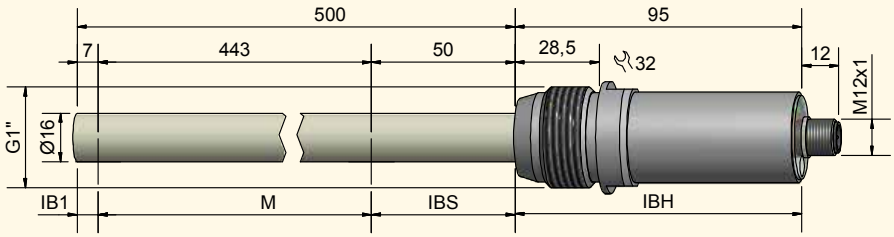
Technical data	
Active zones [M]	443 mm
Electrical version	4 - pin DC
Output function	1 limit value switching point, normally open
Type	**KFW-51-500-443-GFK/VAb-D16-G1-S-ETW-Y10**
Art.-No.	**KW 0032**
Operating voltage (U_B)	15...30 V DC
Permitted residual ripple max.	5 %
Output current max.	100 mA
Power consumption (outputs no-load)	0,9 W
Frequency of operating cycles max.	1 Hz
Permitted ambient temperature	-25...+70 °C
LED-Display	Green
Protective circuit	Built-in
Degree of protection IEC 60529	IP 67
Norm	EN 60947-5-2*
Connection	Flange connector M 12 x 1 (5-pin)
Housing material	VA No. 1.4305 / AISI 303
Active zone	GFK
Lid	PC (FDA 21 CFR 177.1580)
For matching connectors please see our selection of accessories.	

*Where applicable

EasyTeach chart:
LED green / Adjustment function







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

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i-LEVEL Capacitive Filling Level Probe - KFW

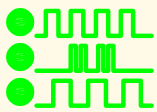
1 Limit value switching point

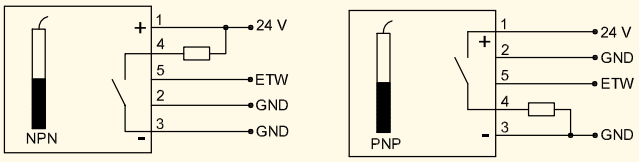
- Integrated evaluation electronics
- Easy Teach by wire
- Housing material: PTFE, Ø 16 mm
- Connection head and process connection stainless steel VA no. 1.4305 / AISI 303
- Process connection G1”
- Automatic identification of NPN / PNP function
- With flange connector M 12 x 1 (5-pin Teach function included)

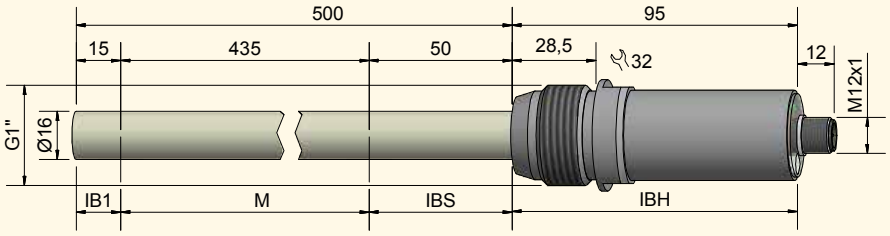
Technical data	
Active zones [M]	435 mm
Electrical version	4 - pin DC
Output function	1 limit value switching point, normally open
Type	**KFW-51-500-435-PTFE/VAb-D16-G1-S-ETW-Y10**
Art.-No.	**KW 0033**
Operating voltage (U_B)	15...30 V DC
Permitted residual ripple max.	5 %
Output current max.	100 mA
Power consumption (outputs no-load)	0,9 W
Frequency of operating cycles max.	1 Hz
Permitted ambient temperature	-25...+70 °C
LED-Display	Green
Protective circuit	Built-in
Degree of protection IEC 60529	IP 67
Norm	EN 60947-5-2*
Connection	Flange connector M 12 x 1 (5-pin)
Housing material	VA No. 1.4305 / AISI 303
Active zone	PTFE (FDA 21 CFR 177.1550)
Lid	PC (FDA 21 CFR 177.1580)
For matching connectors please see our selection of accessories.	

*Where applicable

EasyTeach chart:
LED green / Adjustment function







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

Made in Germany

i-LεVεL Capacitive Filling Level Probe - KFW

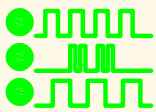
1 Limit value switching point

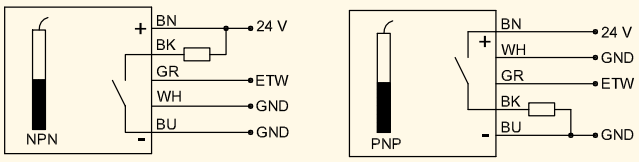
- Integrated evaluation electronics
- Easy Teach by wire
- Housing material: GFK, Ø 16 mm
- Automatic identification of NPN / PNP function

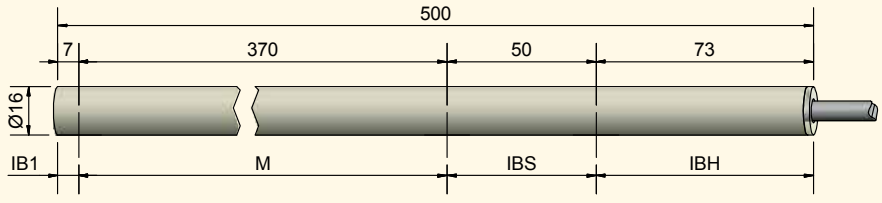
Technical data	
Active zones [M]	370 mm
Electrical version	4 - wire DC
Output function	1 limit value switching point, normally open
Type	**KFW-51-500-370-GFK-D16-S-ETW-Z02**
Art.-No.	**KW 0034**
Operating voltage (U_B)	15...30 V DC
Permitted residual ripple max.	5 %
Output current max.	100 mA
Power consumption (outputs no-load)	0,9 W
Frequency of operating cycles max.	1 Hz
Permitted ambient temperature	-25...+70 °C
LED-Display	Green
Protective circuit	Built-in
Degree of protection IEC 60529	IP 67
Norm	EN 60947-5-2*
Connection cable	2 m, PVC, 5 x 0.34 mm²
Housing material	GFK
Active zone	GFK
Lid	PC (FDA 21 CFR 177.1580)
Accessories for mounting (not delivered with the probe) please see our selection of accessories.	

*Where applicable

EasyTeach chart:
LED green / Adjustment function







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

Made in Germany

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

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i-LEVEL Capacitive Filling Level Probe - KFW

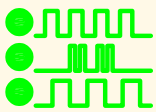
1 Limit value switching point

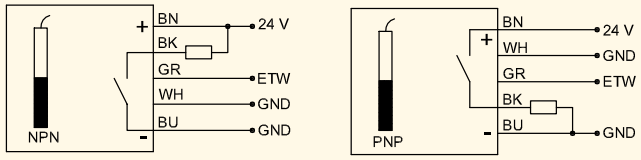
- Integrated evaluation electronics
- Easy Teach by wire
- Housing material: PTFE, Ø 16 mm
- Automatic identification of NPN / PNP function

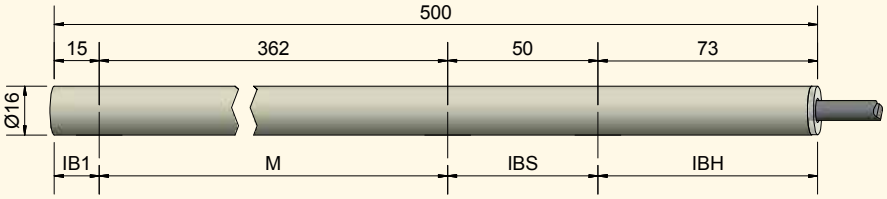
Technical data	
Active zones [M]	362 mm
Electrical version	4 - wire DC
Output function	1 limit value switching point, normally open
Type	**KFW-51-500-362-PTFE-D16-S-ETW-Z02**
Art.-No.	**KW 0035**
Operating voltage (U_B)	15...30 V DC
Permitted residual ripple max.	5 %
Output current max.	100 mA
Power consumption (outputs no-load)	0,9 W
Frequency of operating cycles max.	1 Hz
Permitted ambient temperature	-25...+70 °C
LED-Display	Green
Protective circuit	Built-in
Degree of protection IEC 60529	IP 67
Norm	EN 60947-5-2*
Connection cable	2 m, PVC, 5 x 0.34 mm²
Housing material	PTFE (FDA 21 CFR 177.1550)
Active zone	PTFE (FDA 21 CFR 177.1550)
Lid	PC (FDA 21 CFR 177.1580)
Accessories for mounting (not delivered with the probe) please see our selection of accessories.	

*Where applicable

EasyTeach chart:
LED green / Adjustment function







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

Made in Germany

i-LEVEL Capacitive Filling Level Probe - KFW

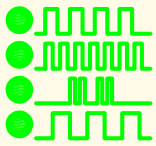
2 Limit value switching points

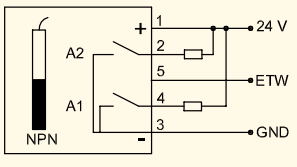
- Integrated evaluation electronics
- Easy Teach by wire
- Housing material: GFK, Ø 16 mm
- Connection head and process connection stainless steel VA no. 1.4305 / AISI 303
- Process connection G1”
- Automatic identification of NPN / PNP function
- With flange connector M 12 x 1 (5-pin Teach function included)

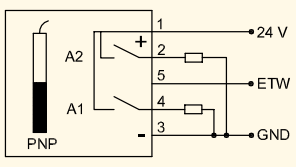
Technical data	
Active zones [M]	443 mm
Electrical version	4 - pin DC
Output function	2 limit value switching points, normally open
Type	**KFW-52-500-443-GFK/VAb-D16-G1-S-ETW-Y10**
Art.-No.	**KW 0036**
Operating voltage (U_B)	15...30 V DC
Permitted residual ripple max.	5 %
Output current max.	100 mA
Power consumption (outputs no-load)	0,9 W
Frequency of operating cycles max.	1 Hz
Permitted ambient temperature	-25...+70 °C
LED-Display	Green
Protective circuit	Built-in
Degree of protection IEC 60529	IP 67
Norm	EN 60947-5-2*
Connection	Flange connector M 12 x 1 (5-pin)
Housing material	VA No. 1.4305 / AISI 303
Active zone	GFK
Lid	PA / PPO
For matching connectors please see our selection of accessories.	

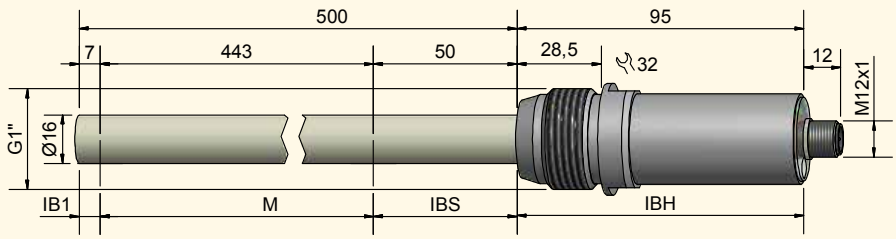
*Where applicable

EasyTeach chart:
LED green / Adjustment function









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

Made in Germany

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i-LEVEL Capacitive Filling Level Probe - KFW

2 Limit value switching points

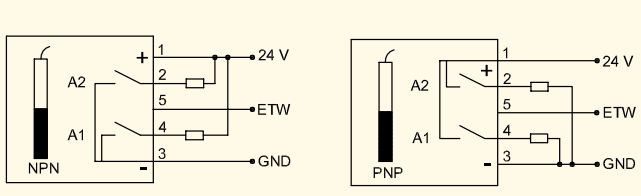
- Integrated evaluation electronics
- Easy Teach by wire
- Housing material: PTFE, Ø 16 mm
- Connection head and process connection stainless steel VA no. 1.4305 / AISI 303
- Process connection G1”
- Automatic identification of NPN / PNP function
- With flange connector M 12 x 1 (5-pin Teach function included)

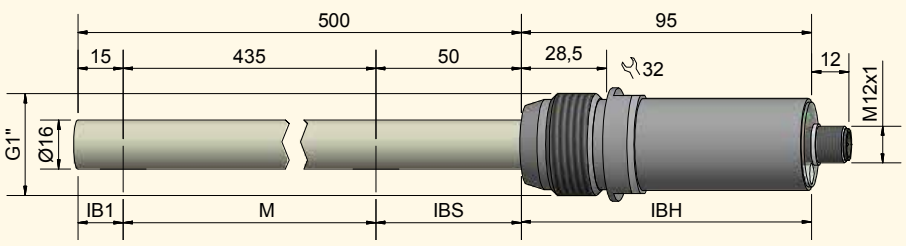
Technical data	
Active zones [M]	435 mm
Electrical version	4 - pin DC
Output function	2 limit value switching points, normally open
Type	**KFW-52-500-435-PTFE/VAb-D16-G1-S-ETW-Y10**
Art.-No.	**KW 0037**
Operating voltage (U_B)	15...30 V DC
Permitted residual ripple max.	5 %
Output current max.	100 mA
Power consumption (outputs no-load)	0,9 W
Frequency of operating cycles max.	1 Hz
Permitted ambient temperature	-25...+70 °C
LED-Display	Green
Protective circuit	Built-in
Degree of protection IEC 60529	IP 67
Norm	EN 60947-5-2*
Connection	Flange connector M 12 x 1 (5-pin)
Housing material	VA No. 1.4305 / AISI 303
Active zone	PTFE (FDA 21 CFR 177.1550)
Lid	PC (FDA 21 CFR 177.1580)
For matching connectors please see our selection of accessories.	

*Where applicable

EasyTeach chart:
LED green / Adjustment function

- Adjustment S1
- Adjustment S2
- Factory set
- Test





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

Made in Germany

i-LEVEL Capacitive Filling Level Probe - KFW

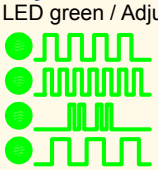
2 Limit value switching points

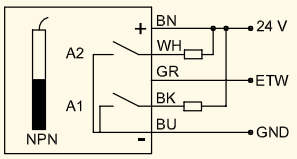
- Integrated evaluation electronics
- Easy Teach by wire
- Housing material: GFK, Ø 16 mm
- Automatic identification of NPN / PNP function

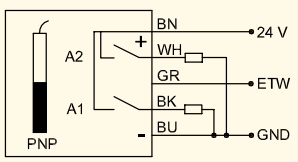
Technical data	
Active zones [M]	370 mm
Electrical version	4 - wire DC
Output function	2 limit value switching points, normally open
Type	**KFW-52-500-370-GFK-D16-S-ETW-Z02**
Art.-No.	**KW 0038**
Operating voltage (U_B)	15...30 V DC
Permitted residual ripple max.	5 %
Output current max.	100 mA
Power consumption (outputs no-load)	0,9 W
Frequency of operating cycles max.	1 Hz
Permitted ambient temperature	-25...+70 °C
LED-Display	Green
Protective circuit	Built-in
Degree of protection IEC 60529	IP 67
Norm	EN 60947-5-2*
Connection cable	2 m, PVC, 5 x 0.34 mm²
Housing material	GFK
Active zone	GFK
Lid	PC (FDA 21 CFR 177.1580)
Accessories for mounting (not delivered with the probe) please see our selection of accessories.	

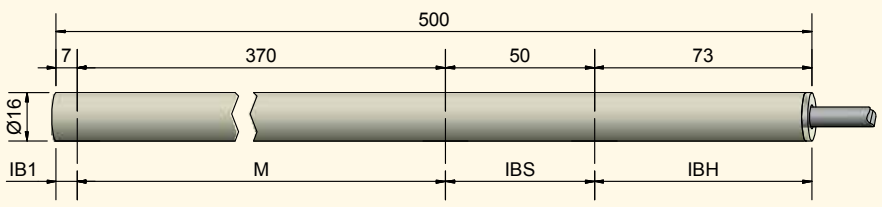
*Where applicable

EasyTeach chart:
LED green / Adjustment function









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

Made in Germany

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i-LEVEL Capacitive Filling Level Probe - KFW

2 Limit value switching points

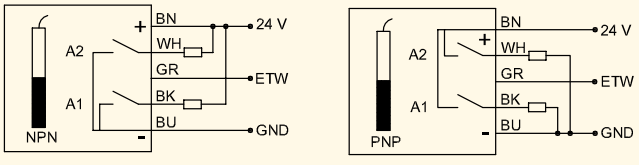
- Integrated evaluation electronics
- Easy Teach by wire
- Housing material: PTFE, Ø 16 mm
- Automatic identification of NPN / PNP function

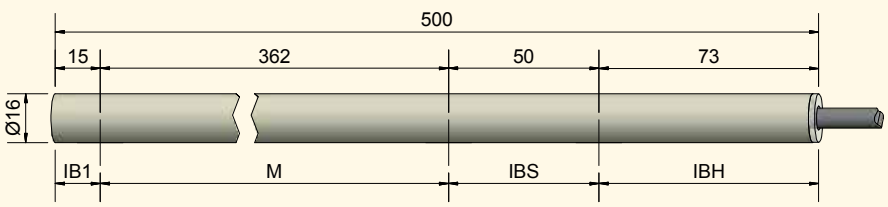
Technical data	
Active zones [M]	362 mm
Electrical version	4 - wire DC
Output function	2 limit value switching points, normally open
Type	**KFW-52-500-362-PTFE-D16-S-ETW-Z02**
Art.-No.	**KW 0039**
Operating voltage (U_B)	15...30 V DC
Permitted residual ripple max.	5 %
Output current max.	100 mA
Power consumption (outputs no-load)	0,9 W
Frequency of operating cycles max.	1 Hz
Permitted ambient temperature	-25...+70 °C
LED-Display	Green
Protective circuit	Built-in
Degree of protection IEC 60529	IP 67
Norm	EN 60947-5-2*
Connection cable	2 m, PVC, 5 x 0.34 mm²
Housing material	PTFE (FDA 21 CFR 177.1550)
Active zone	PTFE (FDA 21 CFR 177.1550)
Lid	PC (FDA 21 CFR 177.1580)
Accessories for mounting (not delivered with the probe) please see our selection of accessories.	

*Where applicable

EasyTeach chart:
LED green / Adjustment function

- Adjustment S1
- Adjustment S2
- Factory set
- Test





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

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