






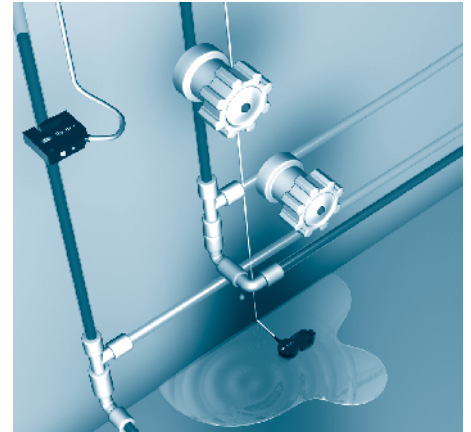


product family	FFAK 17	FFAK 17	FFAK 16	FFAM 17	FFAM 16	FFDK 16	FODK 23
							
type	liquid level sensor	liquid level sensor	liquid level sensor	liquid level sensor	liquid level sensor	liquid level sensor	Leakage sensor
width / diameter	30 mm	30 mm	30 mm	30 mm	30 mm	16 mm	23 mm
response time / release time						< 2 ms	< 1 ms
sensitivity adjustment	no	potentiometer, 15 turn	no	potentiometer, 15 turn	potentiometer, 15 turn	no	no
NPN	■	■	■				
PNP	■	■	■	■	■	■	■
cable	■	■	■	■	■	■	■
thread	G 3/8"	G 3/8"	M16x1 mm	G 3/8"	M16x1 mm		
housing material	plastic	plastic	plastic	metal	metal	plastic	plastic
page	188	189	190	191	192	193	194



General information

With photoelectric level monitoring and leak sensors, liquids can be easily and reliably detected without the need of an electrical connection or mechanical movement between the liquid and the sensor. There are two possible principles of detection: the sensor is in direct contact with the liquid or it is fastened to a hose or stand pipe to detect the level without contact. The available fiber optic versions permit level and leak control in constricted surroundings and even in hazardous zones.



Typical applications

The chemical resistance of the sensors permits versatile applications:

- Level monitoring of liquids such as
 - acetone
 - alkalis
 - milk
 - acids, e.g. hydrochloric, sulfuric or battery acid
 - mineral oil
 - all non-conductive liquids
- Contact free level detection in (semi) transparent hoses and stand pipes
- Detection of the minimum and maximum levels in trays and tanks
- Leak monitoring of oil trays or lubricant tanks
- Monitoring of leaked liquids in dispensers and other liquid handling systems

Characteristics and advantages of level monitoring sensors

Chemical resistance

The sensor housings are made of polysulfonide or stainless steel and are resistant to certain liquids.

Detectable media

As optical light is used to detect the liquid, various and non-conductive liquids can be detected.

Simple commissioning

It is unnecessary to adjust sensors with integrated electronics. With fiber optics, the adjustment is made via a fiber optic sensor.

Hazardous environments

The intrinsically safe fiber optic version with PFA coating can also be used in hazardous environments.

Characteristics and advantages of leak sensors

Detectable media

As optical light is used to detect the liquid, various and non-conductive liquids can be detected. Typically, 1ml of leaked liquid is sufficient to initiate an alarm.

Failsafe facility

The integrated failsafe facility triggers an alarm on leaks, cable rupture, detachment from the fastening or if the sensor is defective.

Hazardous environments

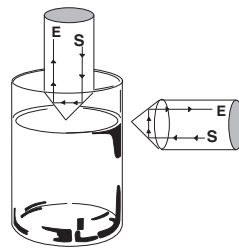
The intrinsically safe fiber optic version with PFA coating can also be used in hazardous environments.



Technology and operation

Level monitoring and leak sensors in contact with the liquid

The operating principles of both types of sensor are shown in the sketch below. The critical angle for total reflection changes depending on whether the sensor tip is surrounded by water or air. If the sensor tip is surrounded by a liquid, the light beam is refracted by the liquid and the sensor output changes its state. The liquid medium may be electrically conductive, turbid or clear. The same operating principle is employed for the leak sensors. Only the volume of the liquid is different. Typically, as little as 1ml of a liquid can be detected.



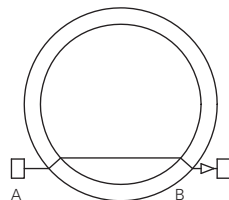
Level not reached



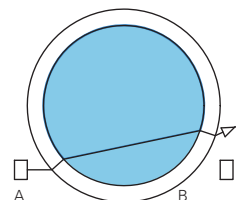
Level reached

Level monitoring sensors without contact with the liquid

The level monitoring sensors for hose or stand pipe mounting operate by a similar principle. For example, the FFDK 16 also exploits the refractive properties of liquids. In a state without the liquid, the emitted light (A) impinges directly on the receiver (B). If the liquid enters the detection range, a part of the emitted light is refracted, so that less light impinges on the receiver. This change in the light can be assessed by the sensor.

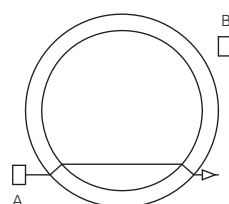


Level not reached

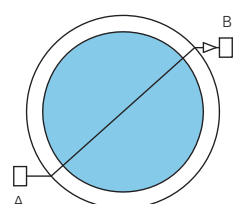


Level reached

With the fiber optic version FSL 500C6Y00, the principle is exactly the opposite. In a state without the liquid, no light impinges on the receiver (B). It is only when liquid enters the detection range of the array that a part of the emitted light (A) is diverted to the receiver (B). This change in the light can be assessed by the receiver. The advantage of the array configuration with a monitoring range of approx. 5 mm is that interference caused by foam and small air bubbles can be suppressed by a powerful fiber optic sensor.



Level not reached



Level reached



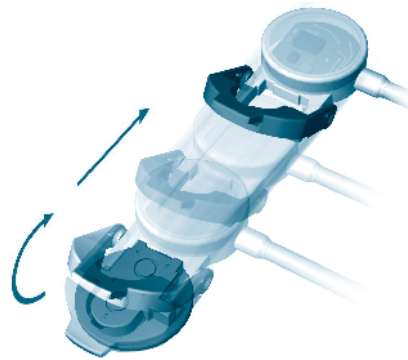
Mounting and adjustment

Level monitoring sensors for hose/stand pipe mounting:

The sensors can very easily be attached to a hose or stand pipe with cable ties. A separate bracket or other holder is unnecessary. No adjustments must be made to the FFDK 16 with integrated electronics. It is only necessary to choose between light and dark switching. With the fiber optic version FSL, the adjustment is made via a fiber optic sensor.

Leak sensors:

The leak sensors can be screwed directly to the floor or on a base. No adjustments must be made to the sensor FODK 23. With the fiber optic version FOC, the adjustment is made via a fiber optic sensor. The sensors can be very easily released from their holders for cleaning purposes move to beginning of sentence.





- chemical resistance
- up to 10 bar nominal pressure

general data

type	liquid level sensor
light source	pulsed infrared diode
nominal pressure (probe tip)	10 bar
output indicator	LED yellow
sensitivity adjustment	no
wave length	880 nm
measurement type	contact with medium

electrical data

voltage supply range +Vs	10 ... 30 VDC
current consumption max. (no load)	15 mA
voltage drop Vd	< 2 VDC
output function	normally open (NO)
output current	< 200 mA
short circuit protection	no
reverse polarity protection	yes, Vs to GND

mechanical data

width / diameter	30 mm
height / length	81 mm
thread	G 3/8"
type	cylindrical
material (sensing device)	polysulphone
housing material	polysulphone
connection types	cable 3 pin, 2 m

ambient conditions

operating temperature	0 ... +65 °C
protection class	IP 67

order reference

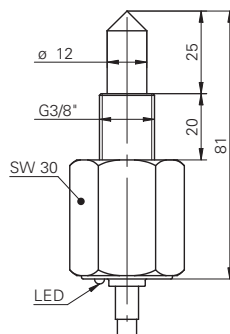
FFAK 17NTD1001/L
FFAK 17PTD1001/L

output circuit

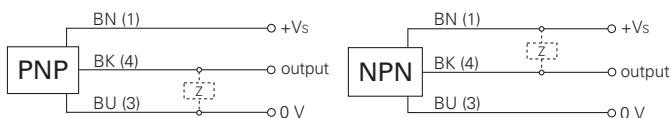
NPN
PNP

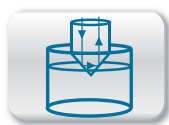


dimension drawing



connection diagrams





- sensitivity adjustable
- chemical resistance
- up to 10 bar nominal pressure



general data

type	liquid level sensor
light source	pulsed infrared diode
nominal pressure (probe tip)	10 bar
output indicator	LED yellow
sensitivity adjustment	potentiometer, 15 turn
wave length	880 nm
measurement type	contact with medium

electrical data

voltage supply range +Vs	10 ... 30 VDC
current consumption max. (no load)	15 mA
voltage drop Vd	< 2 VDC
output function	normally open (NO)
output current	< 200 mA
short circuit protection	no
reverse polarity protection	yes, Vs to GND

mechanical data

width / diameter	30 mm
height / length	81,5 mm
thread	G 3/8"
type	cylindrical
material (sensing device)	polysulphone
housing material	polysulphone
connection types	cable 3 pin, 2 m

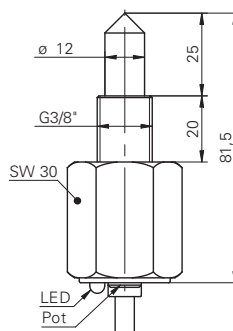
ambient conditions

operating temperature	0 ... +65 °C
protection class	IP 67

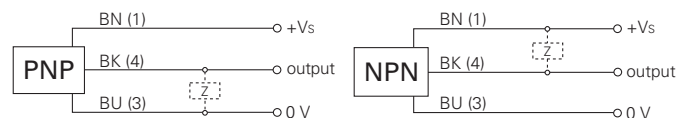
order reference	output circuit
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FFAK 17NTD1002/L	NPN
FFAK 17PTD1002/L	PNP

dimension drawing



connection diagrams





- with thread M16x1
- chemical resistance
- up to 10 bar nominal pressure

general data

type	liquid level sensor
light source	pulsed infrared diode
nominal pressure (probe tip)	10 bar
output indicator	LED yellow
sensitivity adjustment	no
wave length	880 nm
measurement type	contact with medium

electrical data

voltage supply range +Vs	10 ... 30 VDC
current consumption max. (no load)	15 mA
voltage drop Vd	< 2 VDC
output function	normally open (NO)
output current	< 200 mA
short circuit protection	no
reverse polarity protection	yes, Vs to GND

mechanical data

width / diameter	30 mm
height / length	81 mm
thread	M16x1 mm
type	cylindrical
material (sensing device)	polysulphone
housing material	polysulphone
connection types	cable 3 pin, 2 m

ambient conditions

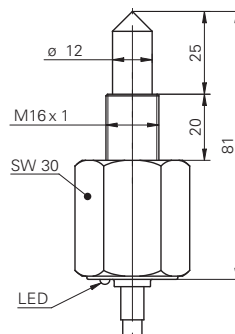
operating temperature	0 ... +65 °C
protection class	IP 67

order reference	output circuit
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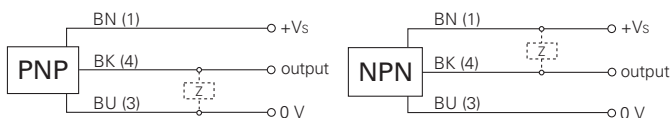
FFAK 16NTD1001/L	NPN
FFAK 16PTD1001/L	PNP

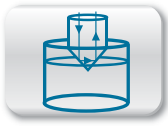


dimension drawing



connection diagrams





- rugged metal housing
- chemical resistance
- up to 40 bar nominal pressure



general data

type	liquid level sensor
light source	pulsed infrared diode
nominal pressure (probe tip)	40 bar
output indicator	LED yellow
sensitivity adjustment	potentiometer, 15 turn
wave length	880 nm
measurement type	contact with medium

electrical data

voltage supply range +Vs	10 ... 30 VDC
current consumption max. (no load)	15 mA
voltage drop Vd	< 2 VDC
output function	normally open (NO)
output circuit	PNP
output current	< 200 mA
short circuit protection	no
reverse polarity protection	yes, Vs to GND

mechanical data

width / diameter	30 mm
height / length	66,5 mm
thread	G 3/8"
type	cylindrical
material (sensing device)	glass (borosilicate)
housing material	stainless steel DIN 1.4305/AISI 303
connection types	cable 3 pin, 2 m

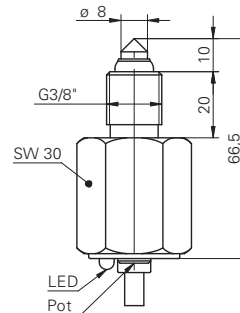
ambient conditions

operating temperature	0 ... +65 °C
protection class	IP 67

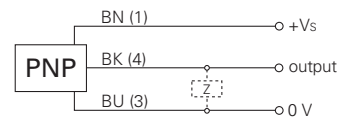
order reference

FFAM 17PTD1002/L

dimension drawing



connection diagram





- with thread M16x1
- rugged metal housing
- up to 40 bar nominal pressure

general data

type	liquid level sensor
light source	pulsed infrared diode
nominal pressure (probe tip)	40 bar
output indicator	LED yellow
sensitivity adjustment	potentiometer, 15 turn
wave length	880 nm
measurement type	contact with medium

electrical data

voltage supply range +Vs	10 ... 30 VDC
current consumption max. (no load)	15 mA
voltage drop Vd	< 2 VDC
output function	normally open (NO)
output circuit	PNP
output current	< 200 mA
short circuit protection	no
reverse polarity protection	yes, Vs to GND

mechanical data

width / diameter	30 mm
height / length	66,5 mm
thread	M16x1 mm
type	cylindrical
material (sensing device)	glass (borosilicate)
housing material	stainless steel DIN 1.4305/AISI 303
connection types	cable 3 pin, 2 m

ambient conditions

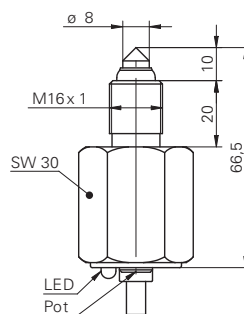
operating temperature	0 ... +65 °C
protection class	IP 67

order reference

FFAM 16PTD1002/L



dimension drawing



connection diagram



- liquid level sensor for pipe mounting
- pipe diameter from 3 ... 13 mm
- easy setup - no adjustment necessary



general data

type	liquid level sensor
light source	pulsed infrared diode
output indicator	LED red
sensitivity adjustment	no
wave length	950 nm
max. thickness of the pipe / tube	1 mm

electrical data

response time / release time	< 2 ms
current consumption max. (no load)	25 mA
voltage drop Vd	< 1 VDC
output function	light / dark operate switchable
output circuit	PNP
output current	< 100 mA
short circuit protection	yes
reverse polarity protection	yes

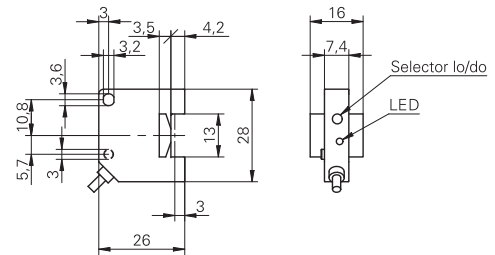
mechanical data

width / diameter	16 mm
height / length	28 mm
depth	26 mm
type	rectangular
housing material	PC
connection types	cable 3 pin, 2 m

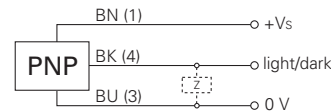
ambient conditions

operating temperature	-10 ... +55 °C
protection class	IP 50

dimension drawing



connection diagram



order reference	voltage supply range +Vs	max. outer diameter of the pipe / tube
FFDK 16P50Y0	9 ... 30,8 VDC	8 ... 13 mm
FFDK 16P50Y5	10 ... 30 VDC	3 ... 7 mm

- leakage sensor with integrated electronics
- detects liquid amounts of approx. 1 ml
- chemical resistance thanks to PFA sheath



general data

type	Leakage sensor
light source	pulsed red LED
output indicator	LED orange
light indicator	LED green
sensitivity adjustment	no
wave length	875 nm
measurement type	contact with medium

electrical data

response time / release time	< 1 ms
voltage supply range +Vs	12 ... 24 VDC
current consumption max. (no load)	30 mA
voltage drop Vd	< 1 VDC
output function	normally closed (NC)
output circuit	PNP
output current	< 50 mA
short circuit protection	yes
reverse polarity protection	yes

mechanical data

width / diameter	23 mm
height / length	10,5 mm
depth	37,2 mm
type	rectangular
material (sensing device)	PFA

ambient conditions

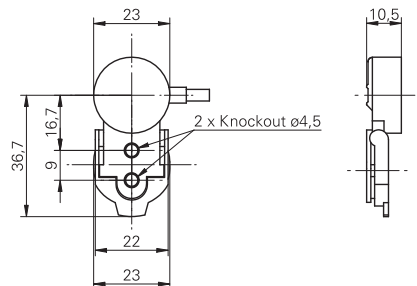
operating temperature	-25 ... +50 °C
protection class	IP 67

accessories

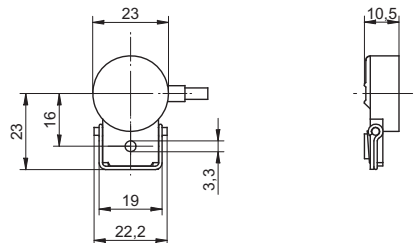
mounting clip PVC	
mounting clip PFA	
on request	

order reference	housing material	connection types
FODK 23P90Y0	PFA / PVC	cable 3 pin, 2 m
FODK 23P90Y0/0500	PFA / PVC	cable 3 pin, 5 m
FODK 23P90Y5	PFA	cable 3 pin, 2 m

dimension drawings

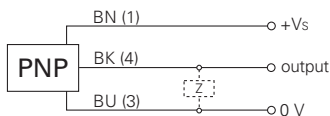


FODK 23P90Y0...



FODK 23P90Y5

connection diagram

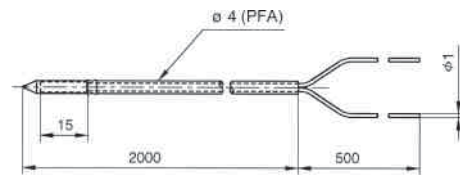


Fiber optic level sensor FUL

- the special sensor tip prevents drop formation
- high chemical resistance

general data	
type	liquid level sensor
optical fiber length	2 m / 5 m
mechanical data	
min. bending radius	30 mm
tensile strength	5 N
optical fiber material	PFA
ambient conditions	
operating temperature	-30 ... +105 °C
order reference	
FUL 200D2Y00	(use with fiber optic sensor FVDK 66 / FVDK 67)
FUL 500D2Y00	(use with fiber optic sensor FVDK 66 / FVDK 67)

dimension drawing



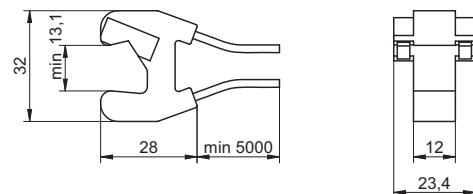
R = 15 mm / 30 mm tip to 40 mm length

Fiber optic level sensor for stand pipe mounting FSL

- fine light curtain suppresses foam/air bubbles
- diameter of the pipe/tube 3 ... 13 mm

general data	
type	liquid level sensor
optical fiber length	5 m
max. outer diameter of the pipe/tube	3 ... 13 mm
max. thickness of the pipe/tube	1 mm
mechanical data	
min. bending radius	4 mm
tensile strength	20 N
optical fiber material	PMMA, PFA coated
housing material	PEI / PC
ambient conditions	
operating temperature	-30 ... +70 °C
order reference	
FSL 500C6Y00	(use with fiber optic sensor FVDK 66 / FVDK 67)

dimension drawing

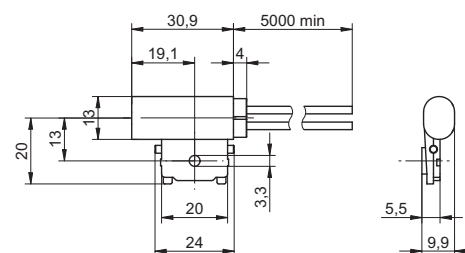


Fiber optic leak sensor FOC

- detects typical liquid volumes of 1 ml
- high chemical resistance

general data	
type	leakage sensor
optical fiber length	5 m
mechanical data	
min. bending radius	20 mm
tensile strength	10 N
optical fiber material	PE, PFA coated
housing material	PFA
ambient conditions	
operating temperature	-30 ... +70 °C
order reference	
FOC 500C6Y00	(use with fiber optic sensor FVDK 66 / FVDK 67)

dimension drawing



Level monitoring and leak detecting sensors FUL / FSL / FOC

