

ifm electronic



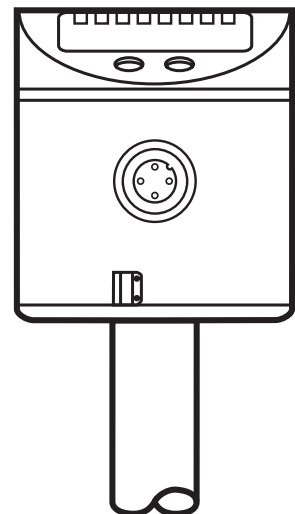
Operating instructions
Electronic
level sensor

efector160[®]

LK10

UK

704045 / 00 01 / 2008



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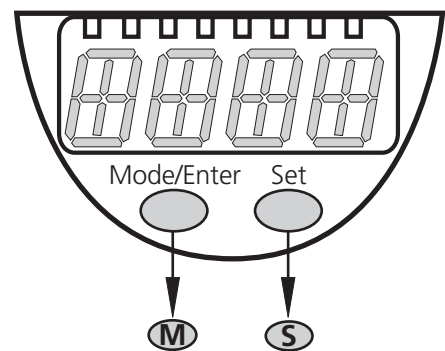
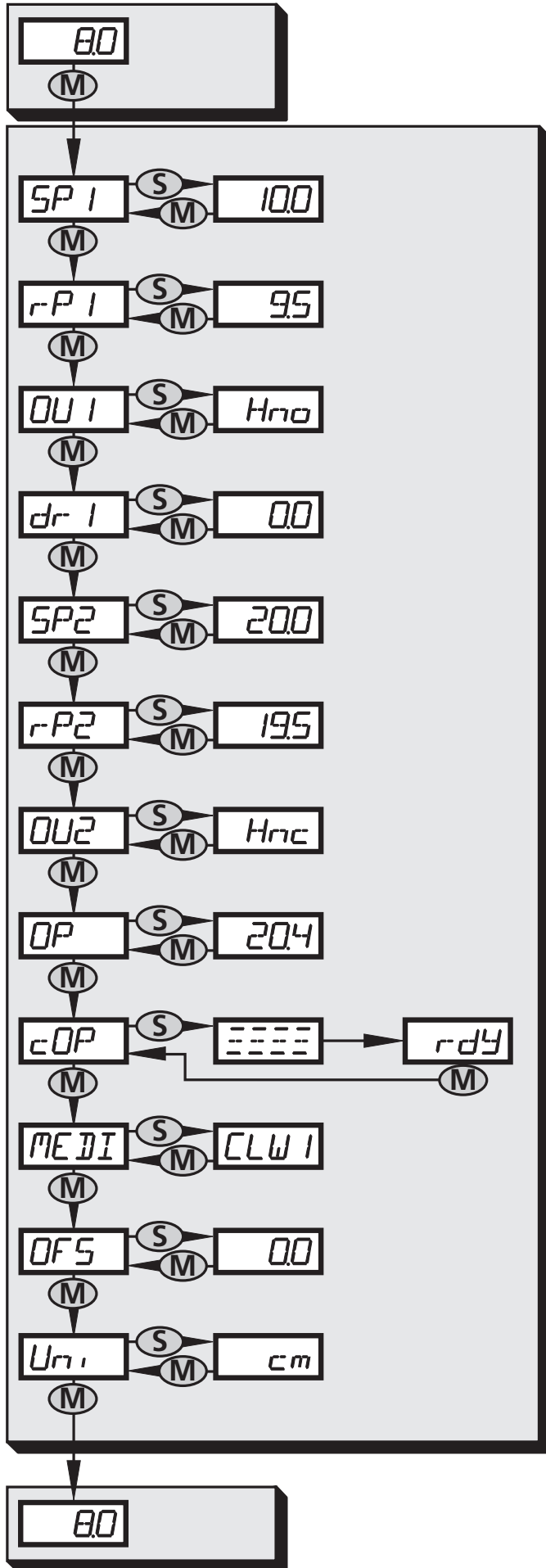
1 Important notes for the user of these instructions

- These operating instructions are a part of the product. Carefully read them before using the product.
- Keep the operating instructions for later use.
- Pass the operating instructions on to future owners or users of the product.
- Whenever you receive a supplement to these operating instructions enclose it to them.

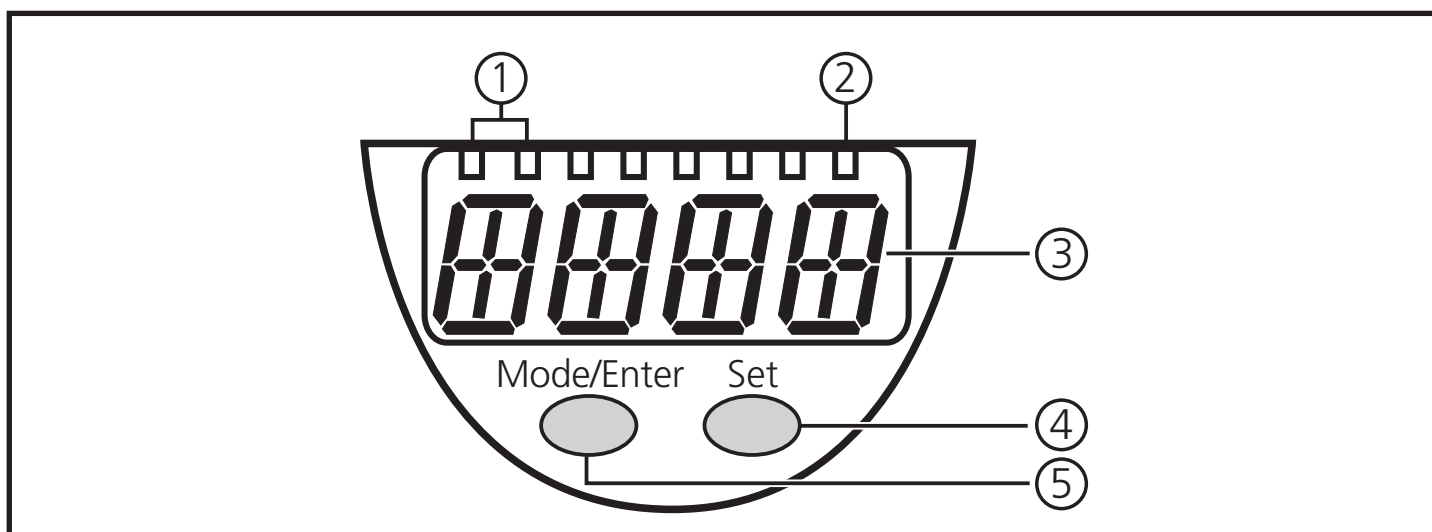
2 Safety instructions

- The unit must be connected by a qualified electrician.
- The national and international regulations for the installation of electrical equipment must be adhered to.
- Voltage supply to EN 50178, SELV, PELV.
- The unit conforms to the relevant regulations and EC directives. Improper or non-intended use may lead to malfunctions of the unit or to unwanted effects in your application. That is why installation, electrical connection, set-up, operation and maintenance of the unit must only be carried out by qualified personnel authorised by the machine operator.
- The unit conforms to the standard EN 6100-6-4. The unit may cause radio interference in domestic areas. If interference occur, the user must take appropriate remedial actions.

3 Menu overview



4 Operating and display elements



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1	2 x LED green	Lighting LED = set display unit: - LED 1 = level indication in cm. - LED 2 = level indication in inch.
2	2 x LED yellow	Indication of the switching state; lights, if the respective output is switched. - LED 1 = OUT1 (freely configurable output). - LED 2 = OUT2 (freely configurable output).
3	4-digit alphanumeric display	- Indication of the current level - Operating and fault indication - Indication of the parameters and parameter values.
4	Programming button Set	- Setting of the parameter values (scrolling by holding pressed; incrementally by pressing once).
5	Programming button Mode / Enter	Selection of the parameters and acknowledgement of the parameter values

5 Functions and features

Application

The level sensor LK10 was specially designed to meet the requirements of machine tool building. It is specially suitable for monitoring coolant emulsions (also dirty) as well as cutting and hydraulic oils.

Restriction of the application area

- The sensor is not suitable for extremely conductive and adhering media, granulates, bulk material, acids and alkalis; it is not suitable for food and electroplating applications.
- The unit is not suitable for use in grinders.
- It is possible that foam of good conductivity is detected as level. Check the effects in your application.
- When used in hydrous media with temperatures $> 35^{\circ}\text{C}$ the unit must be installed in a climatic tube (order no. E43100, E43101, E43102).
- Not suited for outdoor operation and temperatures below 0°C .

6 Function description

Measuring principle

The sensor determines the level of fluids according to the capacitive measuring principle:

- An electrical field is generated and influenced by the medium to be detected. This change to the field causes a measurement signal that is electronically evaluated.
- The dielectric constant of a medium is important for its detection. Media with a high dielectric constant (e.g. water) generate a strong measurement signal, media with a low dielectric constant (e.g. oils) a correspondingly lower signal.
- The active measurement zone of the sensor probe is composed of 16 capacitive measuring segments. They generate measurement signals depending on the degree of coverage.

Functional overview

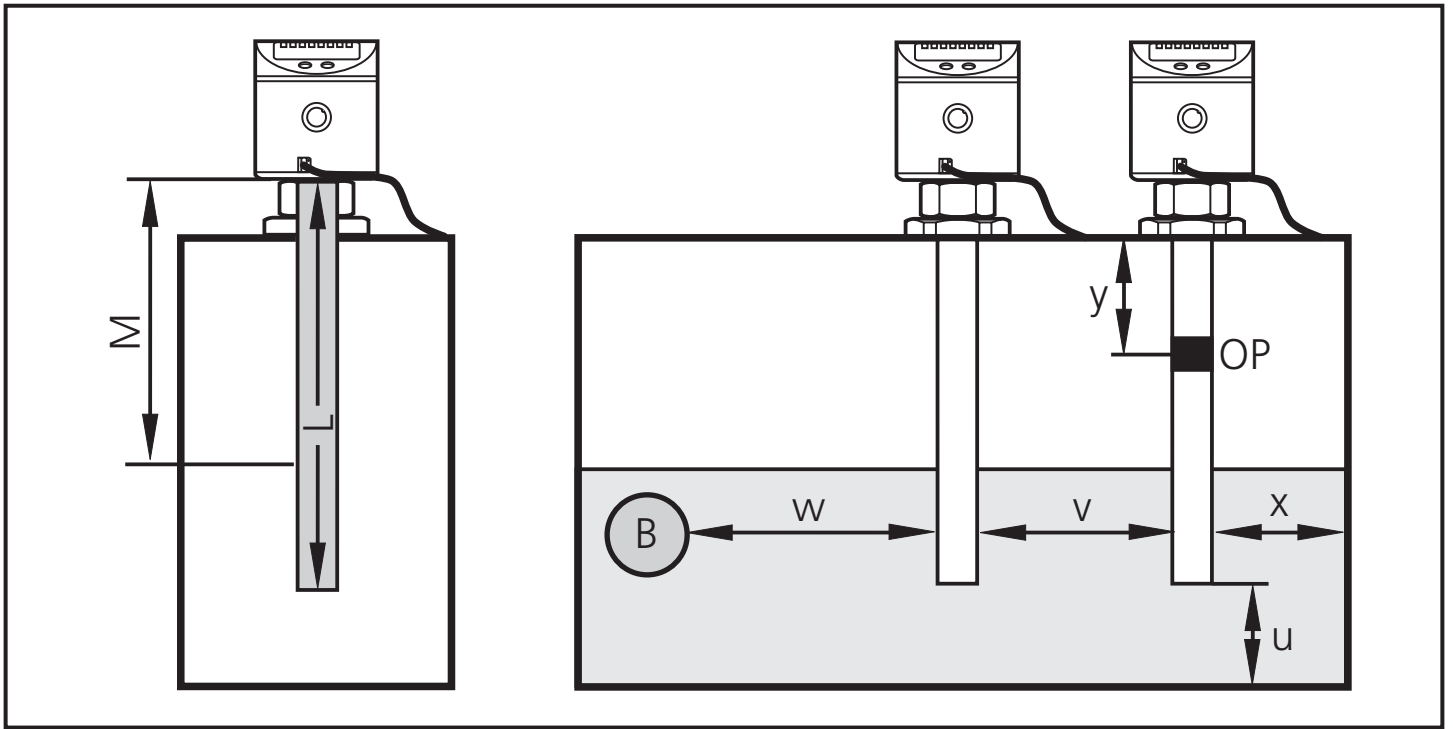
- The unit can be installed in tanks of different sizes. Mounting elements may also be placed in the active measurement zone. Please adhere to the installation instructions (→ 7 Installation).
- The sensitivity and the mode of detection of the unit can be set in order to adjust to different media. This allows reliable detection of media with a very low dielectric constant (e.g. oil).
- The automatic adjustment serves for easy and secure set-up. By means of the adjustment operation (→ 9 Programming, parameter cOP) the unit can be ideally adjusted to the tank being monitored.

Please note:

The adjustment operation is compulsory to ensure the reliable operation of the level sensor! Without adjustment, \equiv is displayed and the unit will not change into the operating mode!

- The unit features an integrated, independent overflow protection. The response level is adjustable: A measuring segment of the probe is defined via the user menu (measuring segment OP, OP = overflow protection). Notes on the operating principle of the overflow protection → 9 Programming, parameter OP.
The selected measuring segment is at the same time used for adjustment. Therefore, please adhere to the required minimum distances of this segment to the tank wall, tank cover and mounting adapter (→ 7 Installation).
- The unit displays the current level and signals via two switching outputs (OUT1, OUT2) that the set limits have been reached or that the level is below the set limit. The setpoint and reset point values and the switching function of the outputs can be set via the user menu.
- The zone between tank bottom and lower edge of the probe can be entered as offset value (OFS). So display and switch point refer to the actual level.
- Wave movements of the medium are smoothed.

7 Installation



	LK1022		LK1023		LK1024	
	cm	inch	cm	inch	cm	inch
L (probe length)	26.4	10.4	47.2	18.6	72.8	28.7
M (mounting zone)	14	5.5	23	9.1	36	14.2

- Fix the mounting elements within the "M" area.
- Mounting elements must be fixed above the measuring segment OP and at a minimum distance to OP (see value y, measured to the middle of the segment).
- Minimum distances between the probe and the tank wall, metallic objects in the tank (B), tank bottom and other level sensors must be adhered to. The distances x, y and w depend on the medium set (MEDI).

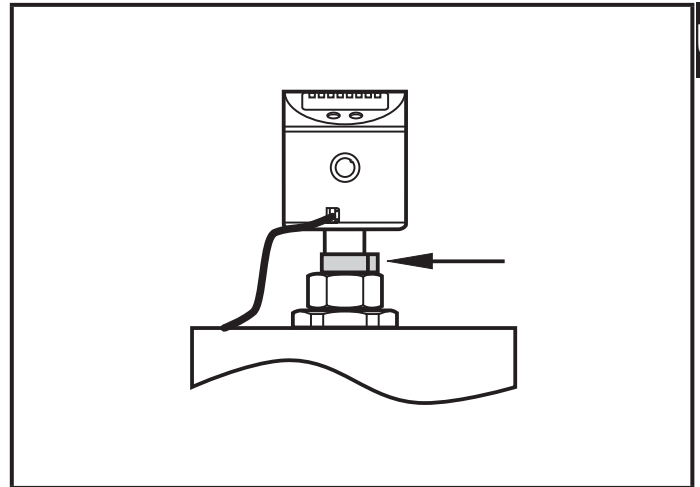
	MEDI = CLW1		MEDI = CLW2, OIL1		MEDI = OIL2	
	cm	inch	cm	inch	cm	inch
x	2.0	0.8	3.0	1.2	4.0	1.6
y (LK1022)	2.5	1.0	3.5	1.4	4.5	1.8
y (LK1023)	4.5	1.8	5.5	2.2	6.5	2.6
y (LK1024)	6.0	2.4	7.0	2.8	8.0	3.2
u	1.0	0.4	1.0	0.4	1.0	0.4
v	4.5	1.8	4.5	1.8	4.5	1.8
w	4.0	1.6	5.0	2.0	6.0	2.4

- For mounting in plastic pipes / plastic tanks the inside (pipe) diameter must be min. 12 cm (4.8 inch).
- For mounting in metal pipes the inside pipe diameter (d) must be at least:

	MEDI = CLW1		MEDI = CLW2, OIL1		MEDI = OIL2	
	cm	inch	cm	inch	cm	inch
d	4.0	1.6	6.0	2.4	12.0	4.8

Marking of the installation height:

Fix the set installation height with the supplied stainless steel tube clip. If the sensor is removed from the fixture for maintenance reasons, the clip serves as a limit stop when remounting the sensor. Thus an inadvertent maladjustment of the sensor is excluded. This is in particular necessary for the correct function of the overflow protection.



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The clip is fitted using common nipper pliers. Ensure a correct fit. To remove the clip, it must be destroyed.

Mounting accessories:

Mounting clamp Ø 16 mm, PP (polypropylene)	order no. E43000
Flange plate 73 - 90, aluminium / stainless steel	order no. E43001
Welding adapter, stainless steel	order no. E43002
Mounting adapter G3/4, stainless steel	order no. E43003
Mounting adapter G1, stainless steel	order no. E43004
Flange plate 100 - 125, aluminium / stainless steel	order no. E43005
Flange plate 65 - 80, aluminium / stainless steel	order no. E43006
Flange plate 54 - 52 x 52, aluminium / stainless steel	order no. E43007
Mounting set Ø 16 mm, PP (polypropylene) / steel	order no. E43016

8 Electrical connection

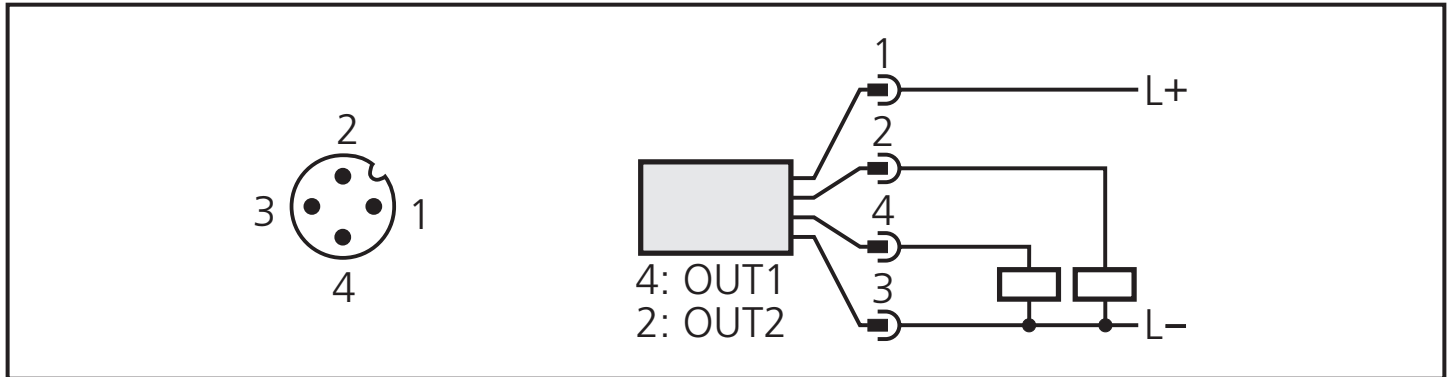


The unit must be connected by a qualified electrician.

The national and international regulations for the installation of electrical equipment must be adhered to.

Voltage supply according to EN 50178, SELV, PELV.

Disconnect the installation from power; connect the unit as follows:



Pin / connection	Core colours for ifm sockets
1 L+	brown
2 OUT2 (switching output 2)	white
3 L-	blue
4 OUT1 (switching output 1)	black

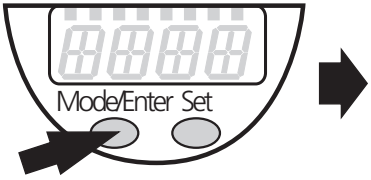

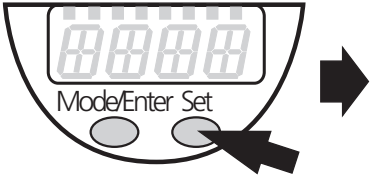
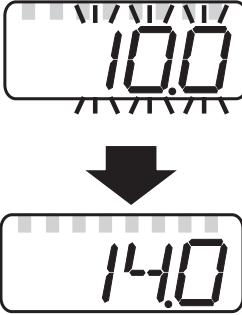
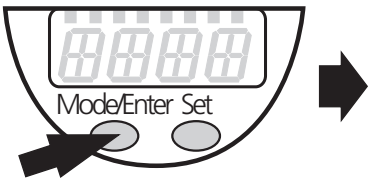



For safe function the sensor housing must be electrically connected to the vessel wall.

To do so, use the housing connection (see scale drawing) and a cable piece with a wire cross-section of min. 1.5 mm² that is as short as possible.

When using metal tanks the tank wall serves as the machine earth. When using plastic tanks an electrode has to be installed and connected to the sensor housing (e.g. sheet metal in the tank in parallel with the probe; min. distance to the probe: → 7 Installation, distance x)

9 Programming

1			<p>Press the Mode/Enter button until the requested parameter is displayed.</p>
2			<p>Press the Set button and keep it pressed. The indicated current parameter value flashes for 5 s, then it is increased* (incremental by pressing briefly or scrolling by holding pressed).</p>
3			<p>Press the Mode/Enter button briefly (= acknowledgement). The parameter is displayed again; the new parameter value is effective.</p>
4	<p>Change more parameters: Start again with step 1.</p>		<p>Finish programming: Wait for 15 s or press the Mode/Enter button until the current measured value is displayed again.</p>

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*Decrease the value: Let the display move to the maximum setting value. Then the cycle starts again at the minimum setting value.

Timeout: If no button is pressed for 15 s during programming, the unit returns to the operating mode with unchanged values (exception: cOP).

Locking / unlocking The unit can be locked electronically to prevent unintentional settings: Press the two programming buttons for 10 s in the Run mode (until *LOC* is displayed). For unlocking press the buttons for 10 s (until *uLOC* is displayed). On delivery: unlocked.

When the unit is locked, *LOC* is briefly displayed when you try to open the programming mode.

The unit can be programmed before or after installation. Exception: For the empty adjustment of the OP segment the unit must be installed in the tank.

For programming carry out the following steps in the indicated order.

	Programming	Parameter
<p>1</p>	<p>Selection of the display unit Set the requested display unit: cm /inch. Select the display unit before fixing the value for SPx, rPx, OP or offset value (OFS). This avoids rounding errors during internal conversion to the other unit and enables exact setting of the values. On delivery: Uni = cm.</p>	<p>Uni</p>
<p>2</p>	<p>Setting to the medium Set the appropriate sensitivity for the medium and the appropriate mode of detection. The following settings can be chosen:</p> <ul style="list-style-type: none"> • MEDI = CLW1 for water, hydrous media, coolant emulsions. • MEDI = CLW2 for hydrous media at temperatures > 35 °C (installation in climatic tube). • MEDI = OIL1 for synthetic oils / media with a medium dielectric constant. • MEDI = OIL2 for mineral oils (dielectric constant ≈ 2). <p>Also select the setting MEDI = OIL1 if the medium with the setting MEDI = OIL2 is detected but the overall sensor sensitivity is too high. In case of doubt ensure the correct function by performing a test in your application. Note: The settings CLW1 and CLW2 suppress deposits (e.g. metal chips). The settings OIL1 and OIL2 suppress a bottom layer of higher dielectric water or swarf which is a few cm high. If no oil layer is present (or if it is very thin), the bottom layer is detected.</p>	<p>MEDI</p>
<p>3</p>	<p>Setting of the offset value The zone between tank bottom and lower edge of the measuring probe can be entered as offset value. So display and switch point refer to the actual level. On delivery: OFS = 0. Setting range for OFS: → 9.1. Please note: Set OFS before setting the switch points (SPx, rPx, and OP). This avoids inadvertent maladjustment.</p>	<p>OFS</p>

	Programming	Parameter
4	<p>Overflow protection: With the parameter OP the response level of the overflow protection is defined (OP = overflow protection). The set value refers to the middle of the selected measuring segment. Typically, OP reacts when the OP segment is reached. Response time: typ. 450 ms, max. 720 ms. Please adhere to the minimum distances and installation instructions (→ 7 Installation). Setting range OP: → 9.2. Note: <ul style="list-style-type: none"> • Set OP before setting SPx. • If after setting SPx OP is reduced to a value \leq SPx, the SPx value moves downward. • If OP is increased, SPx is also increased if OP and SPx are close together (less than 1 x step increment). • OP is the maximum limit of the measuring range. The switch points (SPx) are always below OP. Note: OP is not assigned to a separate output! The OP function provides additional protection. It only triggers a switching operation if for a rising level, one of the outputs or both outputs have not switched although the corresponding switch point has been reached (e.g. because of application-related malfunctions). When operated properly the outputs switch when the set switching limits are reached. The response of the overflow protection is only indicated on the display ("Full" and indication of the current level change every second). If one of the switch points is at its maximum value (= lower edge of the OP segment), the response of the overflow protection immediately leads to a switching operation. The corresponding switch point then functions as a directly acting overflow switch point. On delivery SP2 and OP are set to the maximum value.</p>	<p style="text-align: center; font-size: 2em;">OP</p>

	Programming	Parameter
5	<p>Setting of the switching parameters</p> <ul style="list-style-type: none"> • SP1: set point 1 = upper limit value at which the switching output OUT1 changes its switching status. • rP1 reset point 1 = lower limit value at which the switching output OUT1 changes its switching status. • OU1 switching function for the switching output OUT1. 4 settings can be selected: hysteresis (H..) or window function (F..) as normally open (.NO) or normally closed (.NC). 	<p><i>SP 1</i></p> <p><i>r-P 1</i></p> <p><i>OU 1</i></p>
	<ul style="list-style-type: none"> • dr1: reset delay for OUT1 (e.g. for especially long pump cycles). Setting range: 0...5 s in steps of 0.2 s. dr1 is only active if OU1 = Hno or Hnc. On delivery: dr1 = 0.0 	<p><i>dr 1</i></p>
	<ul style="list-style-type: none"> • SP2: set point 2 = upper limit value at which the switching output OUT2 changes its switching status. • rP2: reset point 2 = lower limit value at which the switching output OUT2 changes its switching status. • OU2: switching function for the switching output OUT2. 4 settings can be selected: hysteresis (H..) or window function (F..); as normally open (.NO) or normally closed (.NC). <p>Setting ranges for SPx and rPx → 9.3.</p> <p>Note: If the upper switch point is used as an overflow switch point, the setting OUX = Hnc (NC function) is recommended. The principle of normally closed operation ensures that wire break or cable break is also detected. On delivery: SP2 = maximum value, OU2 = Hnc.</p>	<p><i>SP2</i></p> <p><i>r-P2</i></p> <p><i>OU2</i></p>

	Programming	Parameter
6	<p>Empty adjustment of the OP segment</p> <p>Carry out an empty adjustment of the OP segment after mounting of the unit at the intended mounting location. The tank may be partly filled. During the adjustment operation, the OP segment must however not be covered by the medium, otherwise malfunctions may occur. Minimum distance between OP and the medium during adjustment:</p> <ul style="list-style-type: none"> • LK1022: 2.0 cm / 0.8 inch • LK1023: 3.5 cm / 1.4 inch • LK1024: 5.0 cm / 2.0 inch <p>Adjustment operation</p> <ul style="list-style-type: none"> • Press Mode/Enter until cOP is displayed. • Press the Set button and keep it pressed. $\equiv \equiv \equiv \equiv$ flashes in the display. Release the button when the display stops flashing. • If adjustment is successful, rdy is indicated. <p>Return to the menu by pressing the button.</p> <p>During the adjustment the unit checks the installation conditions by evaluating the measured signal generated by the OP element. If the measured signal is invalid (if for example the mounting situation is below the minimum distance), an error message is displayed (→ 10 Set-up / operation, operating and error messages). When an OP adjustment is not possible please check the position of the OP. OP may be too close to the mounting adapter or to other metal objects, or OP may be covered by the medium. If the tank is very full, empty it a little or (if possible) increase the OP value.</p>	<p>cOP</p>



The sensor can start its operation only after empty adjustment. If it is not carried out, the unit will not change into the operating mode, $\equiv \equiv \equiv \equiv$ is displayed.

Furthermore, OP adjustment must be carried out each time when changing a sensitive parameter (setting to the medium, OP value). If the unit detects relevant changes $\equiv \equiv \equiv \equiv$ is displayed.

If the mounting situation (height, position) or the connection between the sensor and the tank ground (e.g. length of the connection cable) is changed, it is also absolutely necessary to make a new OP adjustment to ensure correct function of the overflow protection. Note: In this case empty adjustment is not required by displaying $\equiv \equiv \equiv \equiv$!

In the following tables you can find the setting ranges for OFS, the setting ranges for SPx, rPx and the setting values for OP.

Please note: The OP, SPx, rPx values of the tables apply to OFS = 0; if OFS > 0 they increase by the set OFS value.

9.1 Setting values for OFS

	LK1022		LK1023		LK1024	
	cm	inch	cm	inch	cm	inch
Setting range	0...78	0...30.8	0...57	0...22.4	0...186	0...73
Step increment	0.5	0.2	0.5	0.2	1	0.5

9.2 Setting values for OP

LK1022		LK1023		LK1024	
cm	inch	cm	inch	cm	inch
6.9	2.7	13.9	5.5	20	8.0
8.2	3.2	16.3	6.4	24	9.5
9.4	3.7	18.8	7.4	28	10.9
10.6	4.2	21.2	8.3	31	12.3
11.8	4.7	23.6	9.3	35	13.8
13.0	5.1	26.1	10.3	39	15.2
14.3	5.6	28.5	11.2	42	16.7
15.5	6.1	31.0	12.2	46	18.1
16.7	6.6	33.4	13.1	50	19.5
17.9	7.1	35.8	14.1	53	21.0
19.1	7.5	38.3	15.1	57	22.4
20.4	8.0	40.7	16.0	61	23.9

9.3 Setting range for SPx, rPx

	LK1022		LK1023		LK1024	
	cm	inch	cm	inch	cm	inch
SPx	2.5...20.0	1.0...7.8	4.0...39.5	1.6...15.6	6...59	2.5...23.0
rPx	2.0...19.5	0.8...7.6	3.5...39.0	1.4...15.4	5...58	2.0...22.5
ΔL^*	0.5	0.2	0.5	0.2	1	0.5

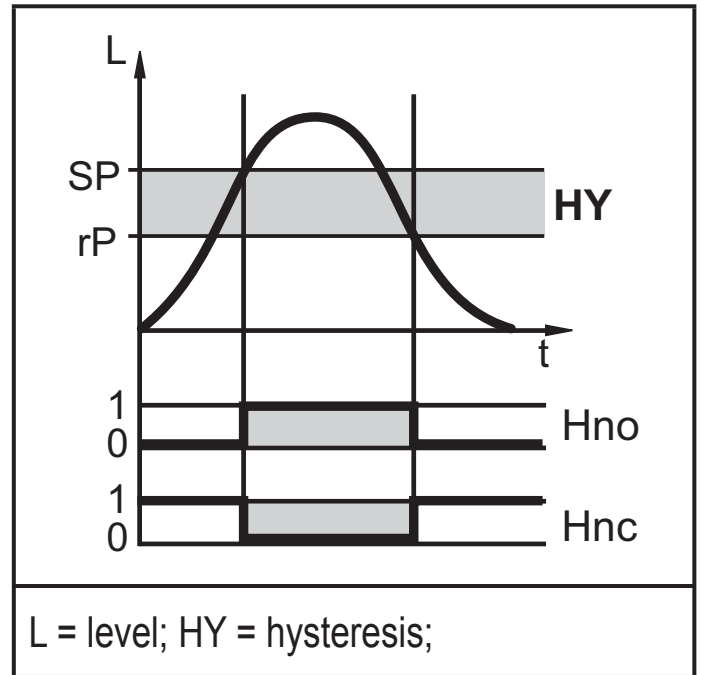
* ΔL = increments

- rPx is always smaller than SPx , SPx is always smaller than OP .
If the value for OP is reduced to a value $\leq SPx$, the position of SPx also shifts.
If the value for SPx is reduced to a value $\leq rPx$, the position of rPx also shifts.
- If OP is increased, SPx is also increased if OP and SPx are close together (less than 1 x step increment).
- If rPx and SPx are close together (about 3 x step increment), rPx is changed automatically when SPx is increased.
- If there is a greater difference between rPx and SPx , rPx maintains the set value even if SPx is increased.

Hysteresis function (Hno, Hnc):

The hysteresis keeps the switching state of the output stable if the process value varies about the preset value.

In case of process value increase the output switches when the switch point is reached (SPx / OP*). If the process value falls again, the output switches off as soon as the level is below the reset point rPx or below the hysteresis for OP.



The hysteresis for OP is fixed. It is a few millimetres.

The hysteresis SPx can be set: First the switch point is set, then the reset point with the requested difference.

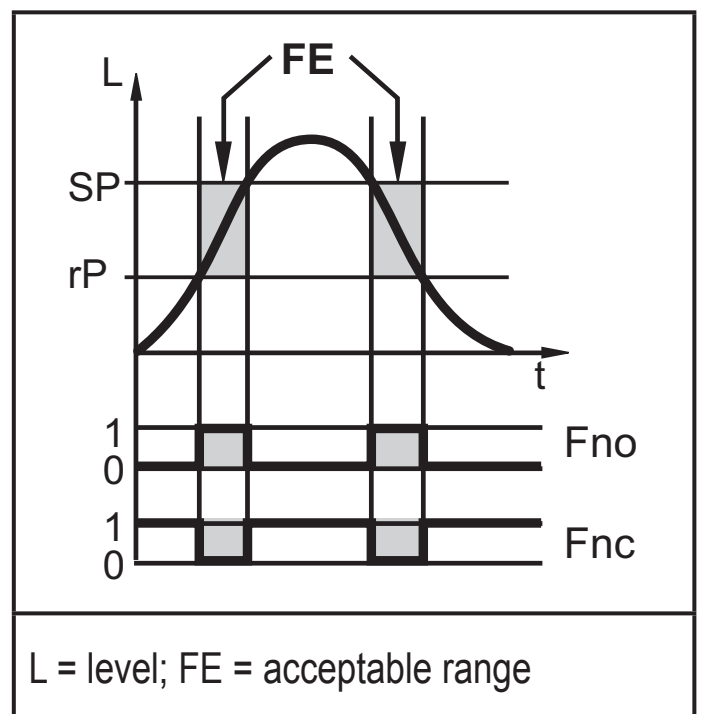
*Notes on the operating principle of the overflow protection → 9 Programming, parameter OP.

Window function (Fno, Fnc):

The window function enables the monitoring of a defined acceptable range.

When the process value varies between the switch point (SPx) and the reset point (rP1), the output is switched (window function / NO) or not switched (window function / NC).

The width of the window can be set by means of the difference between SPx and rPx. SPx = upper value, rPx = lower value.



10 Set-up / operation

After mounting, wiring and programming check whether the unit operates correctly.

Operation and fault indication

CAL	Initialisation after power on.
XX.X	Level indication.
----	Level below the active zone.
FULL XX.X	Overflow protection point OP reached. "FULL" and the indication of the current level alternate every second (= warning overflow).
≡≡≡≡	Adjustment of the OP segment required (→ 9 Programming, parameter cOP).
Err0, Err2 Err7, Err8	Faults in the electronics (the unit must be replaced).
Err1	- OP segment dirty (clean the probe and carry out a reset). Or: - OP segment faulty (the unit must be replaced).
Err3	Operational reliability not ensured (sources of interference, faulty wiring). Check the electrical connection, the connection between the sensor and the tank ground (→ 8 Electrical connection), and the mounting conditions (→ 7 Installation).
Err4	Error during OP adjustment: Distance between OP segment and mounting elements or medium too small. Please adhere to the installation instructions (→ 7 Installation) and to the minimum distances (→ 9 Programming, parameter cOP).
Err5	Error during OP adjustment: Mounting element detected below the OP segment. Please adhere to the installation instructions and to the minimum distances (→ 7 Installation).
Err6	Error during adjustment: Measured value not constant.
SC1, SC2	Flashing: Short circuit switching output OUT1 / OUT2.

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Reset (reset of the error messages): Carry out another OP adjustment or switch off and on the supply voltage.

Reading of the set parameters

- Press the Mode/Enter button briefly to scroll the parameters.
- Press the Set button briefly for a display of the corresponding parameter value for 15 s without changing it.

Output response in different operating states

	OUT1	OUT2
Initialisation	OFF	OFF
OP adjustment not carried out	OFF	OFF
OP adjustment carried out	according to the level and OU1 setting	according to the level and OU2 setting
Fault	OFF	OFF

11 Maintenance / cleaning / change of medium

- After removal of the unit from the tank for maintenance and cleaning purposes please note: When remounting, the unit must be mounted exactly in the same position and at the same installation height as before. Before removal, fix the set installation height with the supplied stainless steel tube clip (→ 7 Installation).
- If the connection between the sensor and the tank ground is changed, another OP adjustment must be carried out (→ 9 Programming, parameter OP).
- After a change of media with dielectric constants which differ greatly (e.g. oil / water) the unit must be adjusted to the new medium and another adjustment must be carried out (→ 9 Programming, parameters Medi und cOP).
- Keep the probe free from deposits, especially the area of the overflow protection (OP segment). Deposits in this area can lead to an incorrect response of the overflow protection.

12 Technical data

Operating voltage [V]	18...30 DC
Current rating [mA]	200
Short-circuit protection, pulsed; protected against reverse polarity and overload	
Voltage drop [V]	< 2.5
Current consumption [mA].....	< 60
Level monitoring	
Accuracy of switch point [% of value of measuring range]	± 5
Repeatability [% of value of measuring range]	± 2
Max. speed of the level change [mm/s]	
- LK1022	100
- LK1023	200
- LK1024	300
Dielectric constant medium	
Max. tank pressure [bar] (when mounted using ifm mounting accessories)	0.5
Housing materials..... stainless steel (304S15); FKM; NBR; PBT; PC; PEI; PP; TPE-V	
Materials (wetted parts)..... PP	
Protection	IP 67, III
Operating temperature [°C]	0...60
Medium temperature	
- oil (permanent / peak) [°C]	0...70 / 0...90
- Hydrous coolants, water and media similar to water*	
- LK1022 [°C].....	0...65
- LK1023 [°C].....	0...60
- LK1024 [°C].....	0...55
Storage temperature [°C].....	-25...80
Shock resistance [g]	15 (DIN EN 60068-2-29, 11 ms)
Vibration resistance [g]	5 (DIN EN 60068-2-6, 10...2000 Hz)
EMC EN 61000-4-2 ESD:	4 / 8 kV
EN 61000-4-3 HF radiated:	10 V/m
EN 61000-4-4 Burst:	2 kV
EN 61000-4-6 HF conducted:	10 V

*) for water and hydrous media with temperatures > 35° C install the unit in a climatic tube (order no. E43100, E43101, E43102)

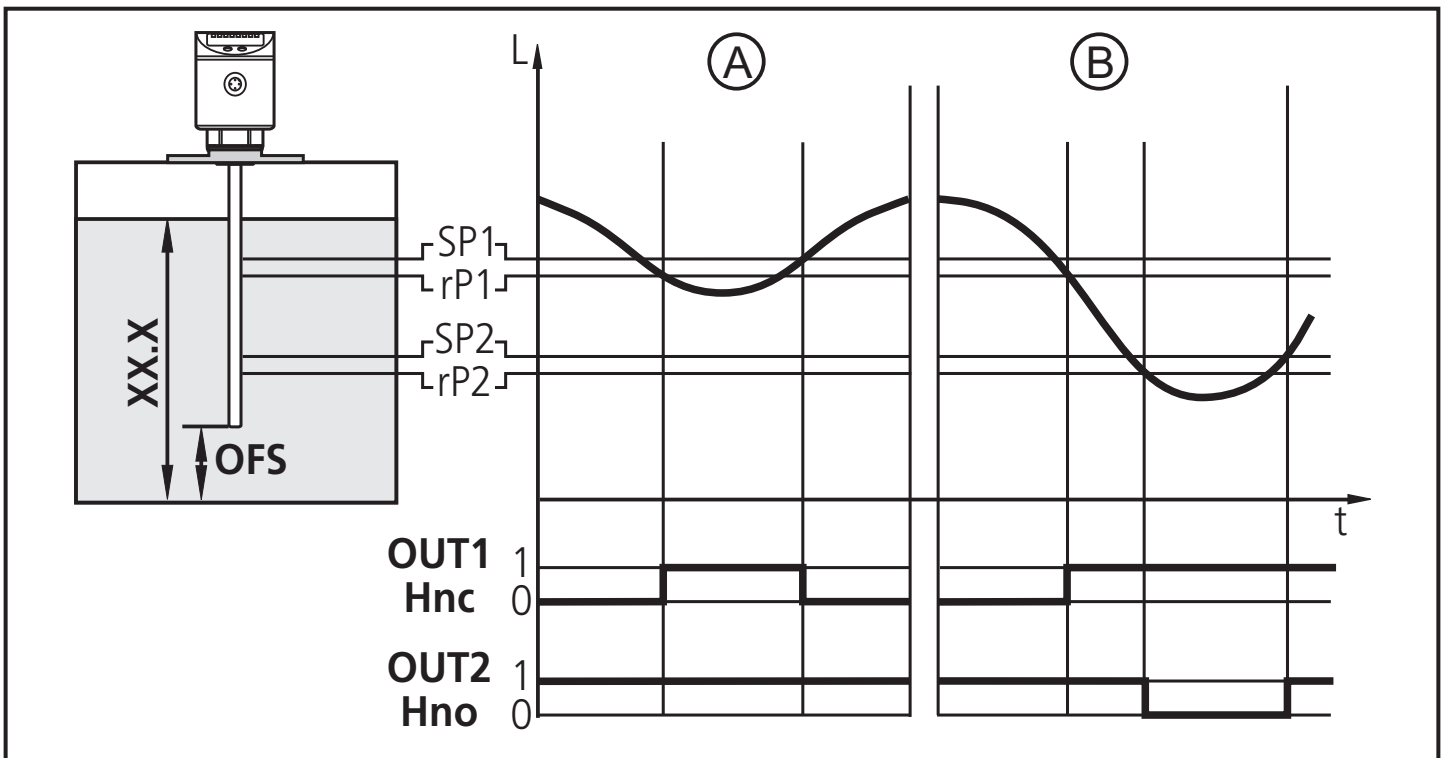
UK

13 Applications

13.1 Hydraulic tank

15.1 Minimum level monitoring with early warning and alarm

Switching output 1: early warning	
SP1	slightly above rP1 (to suppress wave movements)
rP1	below preset level → early warning, start refilling
OU1	hysteresis function, normally closed (Hnc)
Switching output 2 Alarm	
SP2	min. value reached again → alarm reset
rP2	below min. value → alarm
OU2	Hysteresis function, normally open (Hno)



XX.X = display value, A = early warning, B = alarm

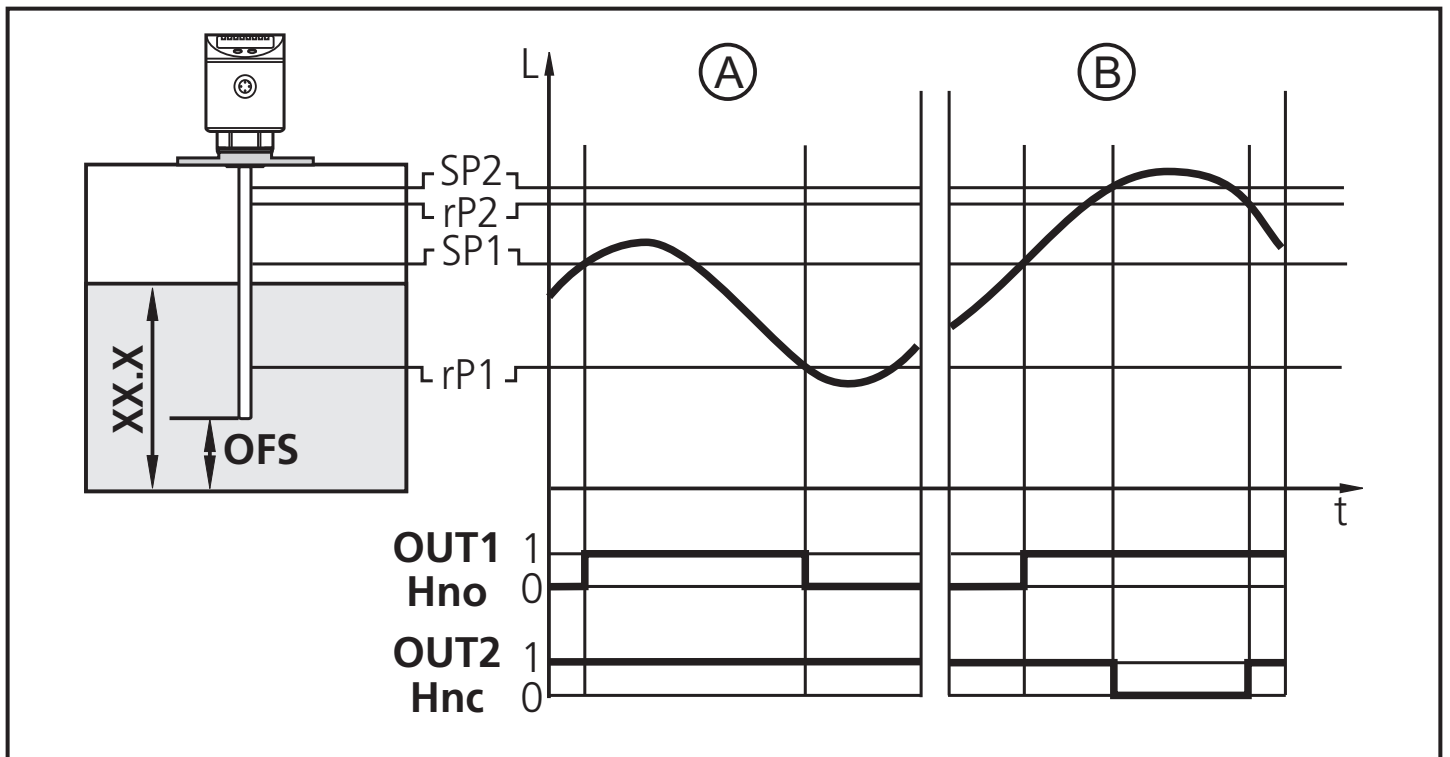
- If the level is below rP1, output 1 switches until liquid is refilled. If SP1 is reached again, output 1 switches off.
- If the level is above SP2, output 2 switches. If the level falls below rP2 or if there is a wire break, output 2 switches off.
- By setting SP1 the maximum level can be controlled / monitored: The value of SP1 determines up to which level (max) is to be refilled. When the maximum level is reached, this is signalled by the LED OUT1 going out and output 1 switching off.

13.2 Pumping station

Empty the tank with overflow protection

Switching output 1: control to empty tank	
SP1	upper value exceeded → submersible pump ON
rP1	lower value reached → submersible pump OFF
OU1	hysteresis function, normally open (Hno)
Switching output 2: Overflow protection:	
SP2	maximum value exceeded → alarm
rP2	slightly below SP2 (to suppress wave movements)
OU2	hysteresis function, normally closed (Hnc)

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XX.X = display value

A = empty

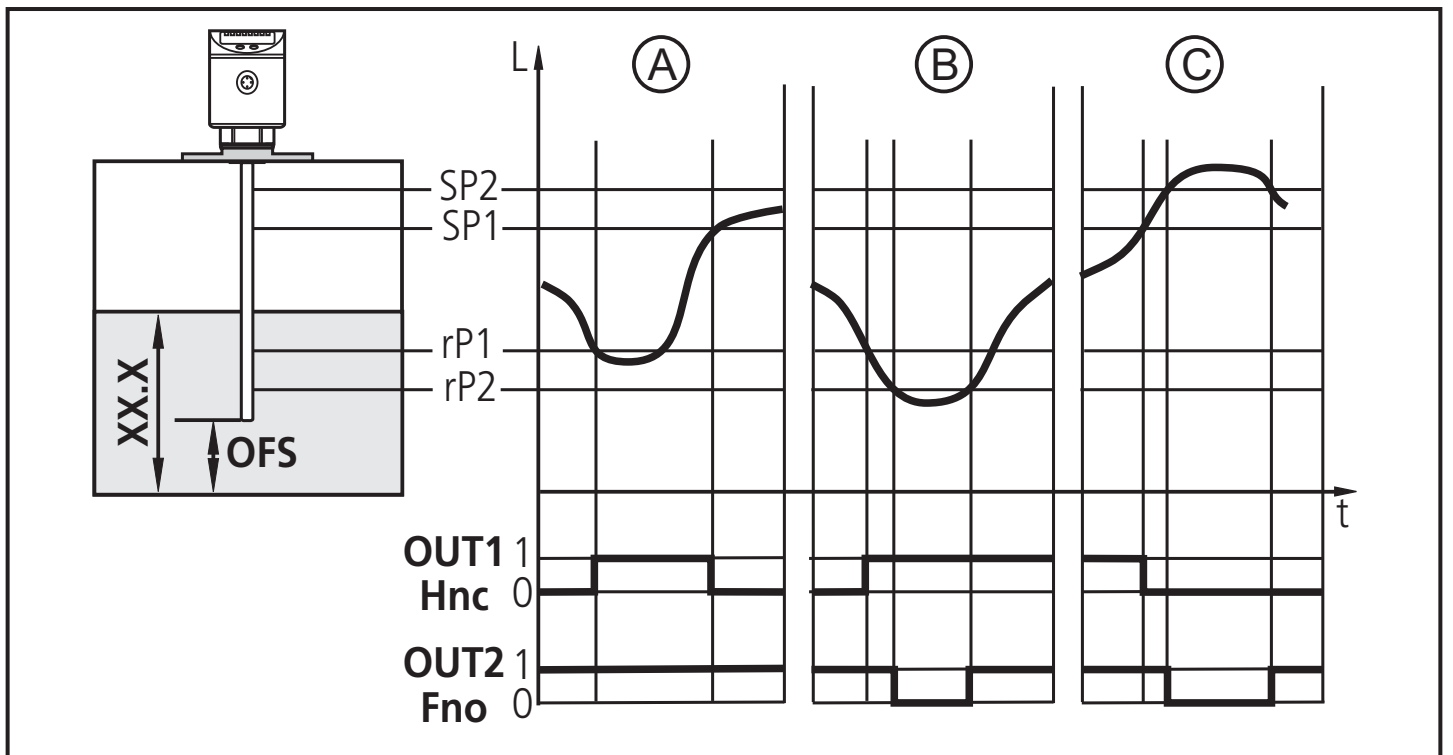
B = overflow protection

- If SP1 is exceeded, output 1 switches (submersible pump ON). If the level is below rP1, output 1 switches off (submersible pump OFF).
- If SP2 is exceeded or if there is a wire break, output 2 switches off.

13.3 Storage tank

Monitoring of the acceptable range (alarm) and level control

Switching output 1: refilling	
SP1	upper preset value reached → finish refilling
rP1	below lower preset value → start refilling
OU1	hysteresis function, normally closed (Hnc)
Switching output 2: safety function min - max	
SP2	max. value exceeded → alarm
rP2	below min. value → alarm
OU2	window function, normally open (Fno)

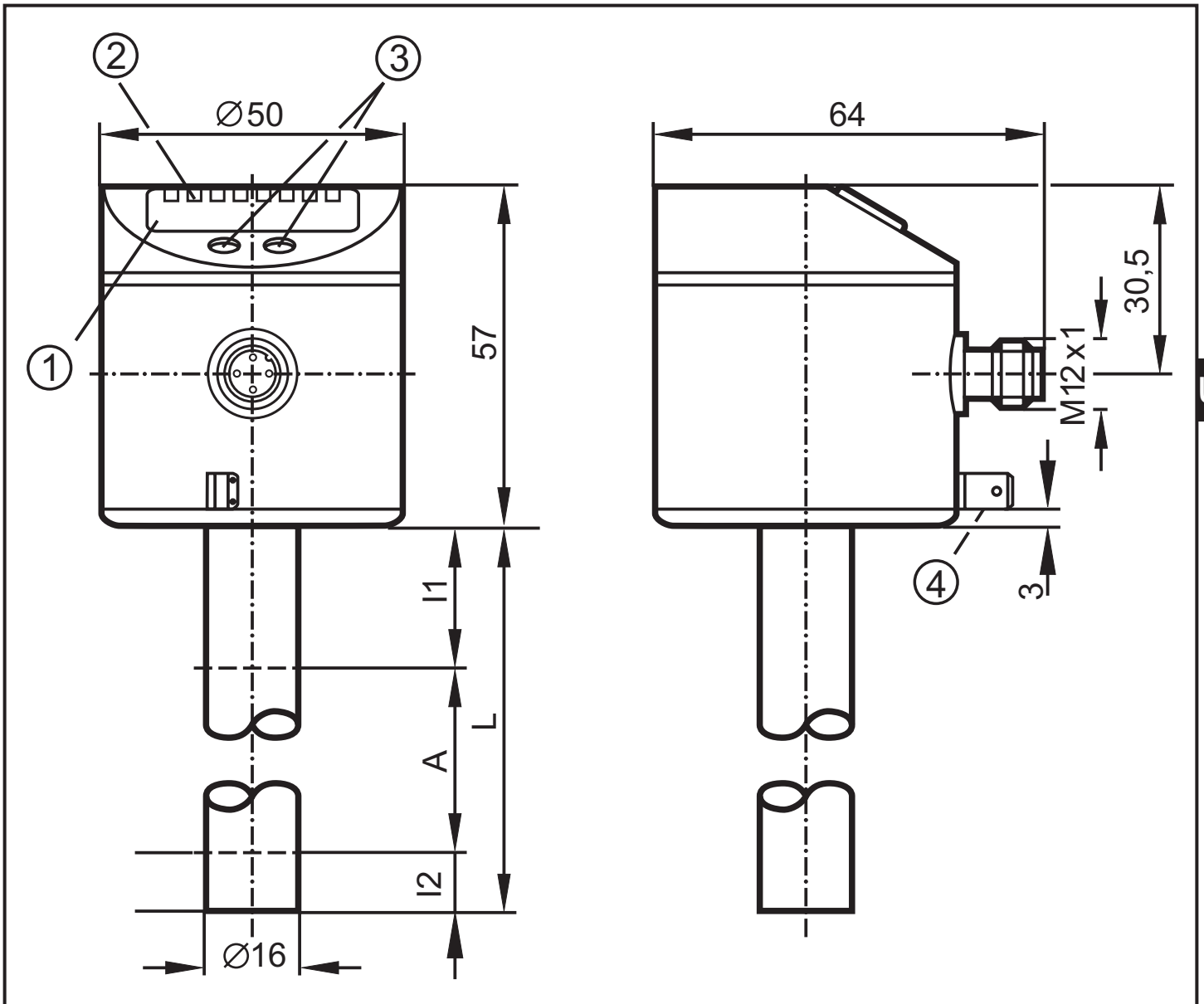


XX.X = display value

A = refill; B = min. monitoring; C = max. monitoring

- If the level is below rP1, output 1 switches until liquid is refilled. If SP1 is reached again, output 1 switches off.
- If the level is below rP2 or above SP2 or if there is a wire break, output 2 switches OFF (→ alarm).
- The logical operation between the outputs 1 and 2 indicates whether there is overflow or the actual level is below the minimum level.
 - Overflow: output 1 and output 2 switched off.
 - Below min. value: output 1 switched on and output 2 switched off.

14 Scale drawing



	LK1022		LK1023		LK1024	
	cm	inch	cm	inch	cm	inch
L (probe length)	26.4	10.4	47.2	18.6	72.8	28.7
A (active zone)	19.5	7.7	39.0	15.4	58.5	23.0
I1 (inactive zone 1)	5.3	2.0	5.3	2.0	10.2	4.0
I2 (inactive zone 2)	1.5	0.6	3.0	1.2	4.0	1.6
1	4-digit alphanumeric display					
2	status LEDs					
3	programming buttons					
4	housing connection (flat-pin connector 6.3 mm following DIN 46244)					