KROHNE

Operating Instructions

Indicating/adjustment module for OPTISOUND sensors

- Variable area flowmeters
- Vortex flowmeters
- Flow controllers
- Electromagnetic flowmeters
- Ultrasonic flowmeters
- Mass flowmeters
- **Level measuring instruments**
- Communications engineering
- Engineering systems & solutions
- Switches, counters, displays and recorders
- Heat metering
- Pressure and temperature

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1 About this document

1.1 Contents

This operating instructions manual has all the information you need for quick setup and safe operation of the indicating/adjustment module. Please read this manual before you start setup.

1.2 Target group

This operating instructions manual is directed to trained personnel. The contents of this manual should be made available to these personnel and put into practice by them.

1.3 Symbolism used

Information, tip, note
This symbol indicates helpful additional information.

Caution, warning, danger
This symbol informs you of a dangerous situation that could occur. Ignoring this cautionary note can impair the person and/or the instrument.

Ex applications
This symbol indicates special instructions for Ex applications.

- **List**
  The dot set in front indicates a list with no implied sequence.

→ **Action**
This arrow indicates a single action.

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1 **Sequence**
Numbers set in front indicate successive steps in a procedure.

2 For your safety

2.1 Authorised personnel

All operations described in this operating instructions manual must be carried out only by trained and specialist personnel authorised by the operator. For safety and warranty reasons, any internal work on the instruments must be carried out only by personnel authorised by the manufacturer.

2.2 Appropriate use

The indicating and adjustment module is a pluggable unit for OPTISOUND level sensors.

2.3 Warning about misuse

Inappropriate or incorrect use of the instrument can give rise to application-specific hazards, e.g. vessel overfill or damage to system components through incorrect mounting or adjustment.

2.4 General safety instructions

The indicating/adjustment module is a high-tech instrument requiring the strict observance of standard regulations and guidelines. The user must take note of the safety instructions in this operating instructions manual, the country-specific installation standards (e.g. the VDE regulations in Germany) as well as all prevailing safety regulations and accident prevention rules.

2.5 CE conformity

The indicating and adjustment module is in CE conformity to EMC (89/336/EWG) and NSR (73/23/EWG).

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Conformity has been judged acc. to the following standards:

- EMC:
  - Emission EN 61326: 1997
  - Susceptibility EN 61326: 1997 + A1:1998
- NSR: EN 61010-1: 2001

2.6 Compatibility acc. to NAMUR NE 53

The indicating/adjustment module meets NAMUR recommendation NE 53.

The parameter adjustment of the basic sensor functions is independent of the software version. The available functions depend on the appropriate software version of the single components.

2.7 Safety information for Ex areas

Please note the Ex-specific safety information for installation and operation in Ex areas. These safety instructions are part of the operating instructions manual and come with the Ex-approved instruments.

3 Product description

3.1 Configuration

Scope of delivery

The scope of delivery encompasses:

- Indicating/adjustment module
- Documentation
  - this operating instructions manual.

Configuration

The indicating/adjustment module consists of a display with full dot matrix as well as four keys for adjustment.

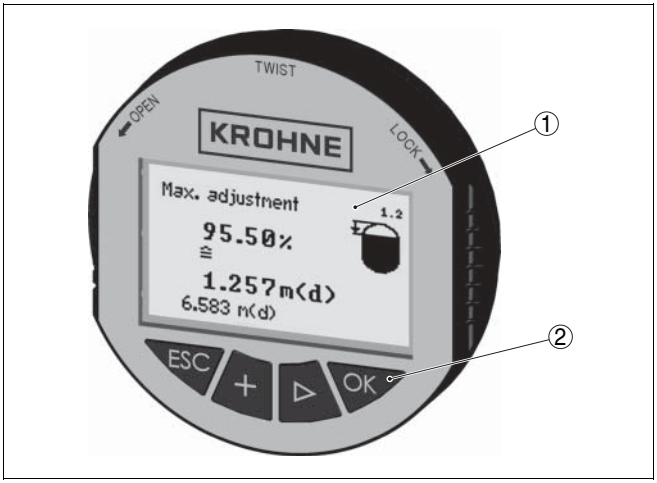


Fig. 1: Indicating/adjustment module

1 Display
2 Keys

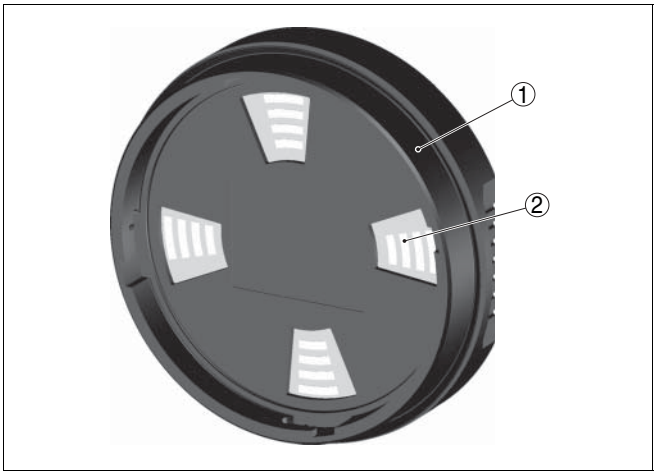


Fig. 2: Rear of the indicating/adjustment module

1 integrated seal ring
2 gold-plated contact path

3.2 Principle of operation

Area of application

The indicating/adjustment module is used for measured value indication, adjustment and diagnosis for the following OPTISOUND sensors:

- OPTISOUND 3010 C
- OPTISOUND 3020 C
- OPTISOUND 3030 C
- OPTISOUND 3040 C
- OPTISOUND 3050 C

The indicating/adjustment module is integrated into the respective sensor housing. After installation, sensor as well as module without housing cover are splash-proof.

Power supply

Power supply directly by the respective sensor. An additional connection is not necessary.

3.3 Adjustment

Adjustment is carried out via the integrated keys. The entered parameters are generally saved in the respective sensor. With a copy function, parameters can be loaded into the indicating/adjustment module.

3.4 Storage and transport

Packaging

Your instrument was protected by packaging during transport. Its capacity to handle normal loads during transport is assured by a test acc. to DIN EN 24180.

The packaging of standard instruments consists of environment-friendly, recyclable cardboard. For special versions PE foam or PE foil is also used. Dispose of the packaging material via specialised recycling companies.

Storage and transport temperature

- Storage and transport temperature see "*Supplement – Technical data – Ambient conditions*"
- Relative humidity 20 … 85 %

4 Mounting

4.1 Mounting procedure

Mounting/dismounting the indicating/adjustment module

The indicating/adjustment module can be mounted or dismounted at any time. An interruption of the power supply is not necessary.

Proceed as follows:

1 Unscrew the housing cover

2 Place the indicating/adjustment module to the requested position on the electronics

Information:
Four different positions are possible, each displaced by 90°.

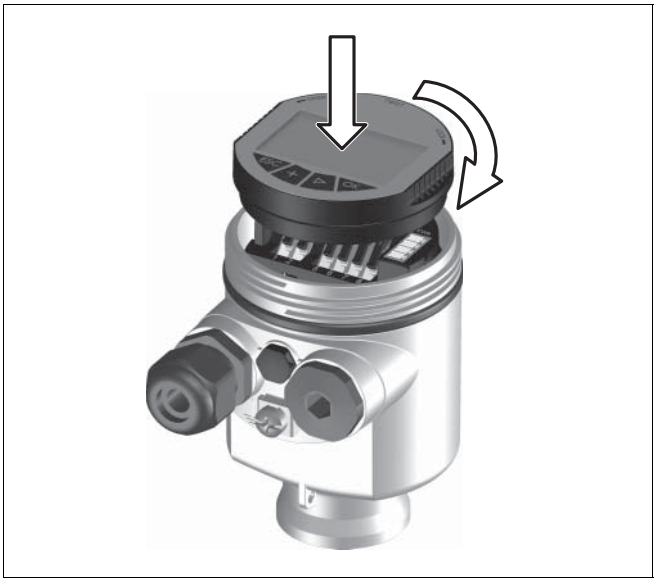


Fig. 3: Installation of the indicating/adjustment module

3 Press the indicating/adjustment module lightly onto the electronics and turn it to the right until it snaps in

4 Screw housing cover with inspection window tightly back on

Note:
If you intend to retrofit OPTISOUND with an indicating/ adjustment module for continuous measured value indication, a higher cover with an inspection glass is required.

Dismounting is carried out in reverse order.

5 Set up

5.1 Adjustment system

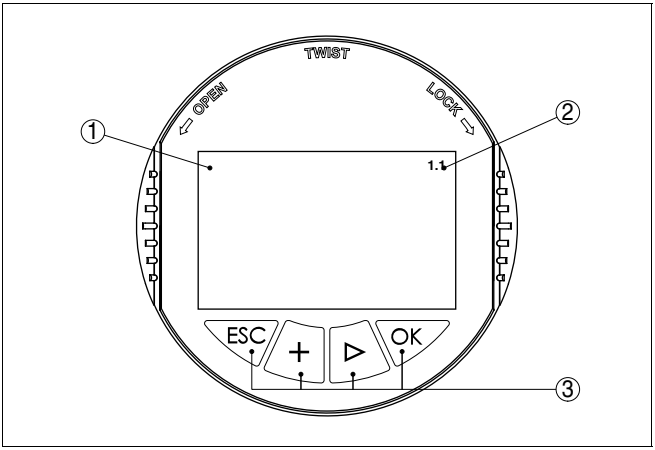


Fig. 4: Indicating and adjustment elements

1 LC display
2 Indication of the menu item number
3 Adjustment keys

Key functions

- ***[OK]*** key:
  - move to the menu overview
  - confirm selected menu
  - edit parameter
  - save value
- ***[–>]*** key to select:
  - menu change
  - list entry
  - editing position
- ***[+]*** key:
  - modify value of a parameter
- ***[ESC]*** key:
  - interrupt input
  - jump to the next higher menu

Adjustment system

The sensor is adjusted via the four keys of the indicating and adjustment module. The LC display indicates the individual menu items. The functions of the individual

keys are shown in the above illustration. Approx. 10 minutes after the last pressing of a key, an automatic reset to measured value indication is triggered. Any values not confirmed with ***[OK]*** will not be saved.

5.2 General functions

Introduction

OPTISOUND ultrasonic sensors have various functions. Therefore they can be adapted perfectly to the respective application. These functions are structured in menu form. Some of the functions are sensor-specific. These are described in the operating instructions manual of the respective sensor. Other functions, however, have general character, i.e. they are available in sensors with different measuring principles.

The general functions are described in this paragraph. The functions of the indicating/adjustment module are determined by the sensor and correspond to the respective software version of the sensor.

Information:
The respective menu item number differs depending on the sensor type and signal output.

Measured value indication

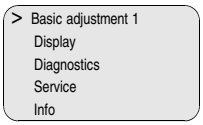
The following presentations are available in the measured value display:

- Level as digital value, sensor TAG
- Level as digital value and bar graph, sensor TAG

With ***[–>]*** you select the different presentations of the measured value. From all presentations you reach the menu overview with ***[OK]***. With ***[ESC]*** you return from the menu overview to the measured value display.

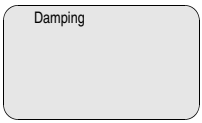
Menu overview

In the menu overview you select the respective menu with ***[–>]*** and finally reach it with ***[OK]***. Then the individual menu items are available.



Damping

To damp process-dependent measured value fluctuations, you have to set an integration time of 0 … 999 s in this menu item.



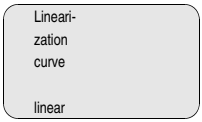
Linearization curve

In this menu item you select the linearization curve:

- linear
- Cylindrical tank
- Spherical tank
- User programmable

User programmable means: Switching on a linearization curve programmed via PC and PACTware™

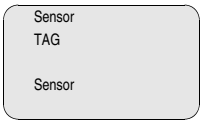
The linearization curve relates height and volume. It takes the vessel geometry for the measured value display and the current output into account.



Edit senor TAG

In the menu item "*Sensor TAG*" you edit a 12-digit measurement loop character. The character set comprises:

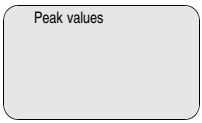
- Letters from A … Z
- Numbers from 0 … 9
- Special characters +, -, /, –



Peak values

Min. and max. measured values are saved in the sensor. The values are displayed in the menu item "*Peak values*".

- Min. and max. distance in m(d)
- Min. and max. temperature

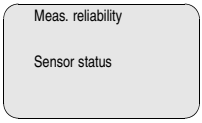


Meas. reliability

When using sensors working acc. to the non-contact measuring principle, the measurement can be influenced by the respective process conditions. In this menu item, the reliability of the level echo is displayed in dB. The reliability is signal strength minus noise. The higher the value, the more reliable the measurement.

Sensor status

Indication "OK" or flashing error message, e.g. "E013". In addition, the error appears in clear text in the measured value display.



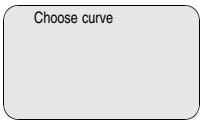
Choose curve

The signal curves enable a first rough evaluation of the measurement. The following curves are available:

- Echo curve
- False echo curve
- Trend curve.

The echo curve shows the echoes with signal strength in db over the distance.

The false echo curve shows the saved false echoes (see menu "Service") of the empty vessel with signal strength in "dB" over the measuring range.



Curve presentation

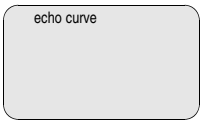
With a comparison of echo and false echo curve a more detailed statement of the reliability can be made. The selected curve is updated permanently. With the ***[OK]*** key, a submenu with zoom functions is opened.

Available with the echo and false echo curve:

- "X-Zoom": Zoom function for the meas. distance
- "Y-Zoom": 2, 5 and 10-times magnification of the signal in "dB"
- "Unzoom": Resetting the presentation to the nominal measuring range with single magnification

Available with the trend curve:

- "X-Zoom": Splitting in minutes, hours or days
- "Stop/Start": Interruption of a recording or start of a new recording
- "Unzoom": Resetting the splitting to minutes



Simulation of measured values

In this menu item you simulate individual level values via the current output. Then the signal path can be tested, e. g. via connected indicating instruments or the input card of the processing system.

The following simulation factors are available:

- Percent
- Current
- Distance.

How to start the simulation:

1 Push ***[OK]***

2 Select the requested simulation factor with ***[–>]*** and confirm with ***[OK]***

3 Set the requested value with ***[+]*** and ***[–>]***.

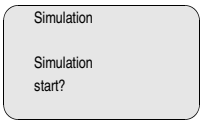
4 Push ***[OK]***

The simulation is activated and a respective current of 4 … 20 mA is outputted.

How to interrupt the simulation:

→ Push ***[ESC]***

Information:
The simulation is interrupted automatically 10 minutes after the last key has been pushed.



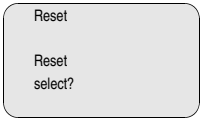
Reset

With the reset function, modified values are reset. Three subfunctions are available:

- Basic adjustment
  - Reset of the values modified with the indicating/adjustment module to the sensor-specific basic setting (see chart)
- Factory setting
  - Like basic setting, but also reset of special parameters modified with PACTware™ to delivery status
- Peak values measured value and temperature
  - Reset of the min./max. values of level and temperature to the current values

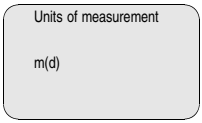
Reset values basic setting

Menu	Menu item	Ultrasonic
Basic setting	Units of measurement	deleted
	Min. adjustment	upper dead zone depending on instrument
	Max. adjustment	end nominal measuring range
	Linearization curve	linear
	Sensor-TAG	Sensor
Display	Displayed value 1	Distance
	Scaling	0% = 0.0, 100% = 100.0
Service	Current output	Output mode: 4-20mA Failure mode: < 3.6 mA min. current3.8 mA



Units of measurement

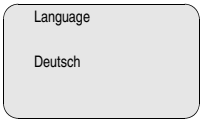
In this menu item you select the internal calculating unit of the sensor: m(d) or ft(d).



Language

The sensor is already set to the ordered national language. In this menu item you can change the language. The following languages are available:

- Deutsch
- English
- Français
- Espanõl
- Pycckuu.

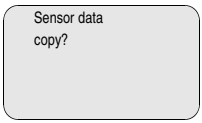


Copy sensor data

With this function

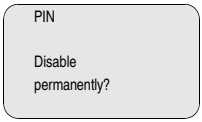
- data are read from the sensor
- data are written into the sensor.

The data are permanently saved in an EEPROM memory in the indicating/adjustment module and remain there even in case of voltage failure. From there, they can be written in one or several sensors and kept as a backup for a possible sensor exchange. When writing the data into the sensor, the instrument type from which the data originate as well as the TAG no. of that sensor are displayed.



PIN

In this menu item, the PIN is activated/deactivated permanently. Entering a 4-digit PIN protects the sensor data against unauthorized access and unintentional modifications. If the PIN is activated permanently, it can be deactivated temporarily (i.e. for approx. 60 min.) in any menu item. The instrument is delivered with the PIN set to 0000.



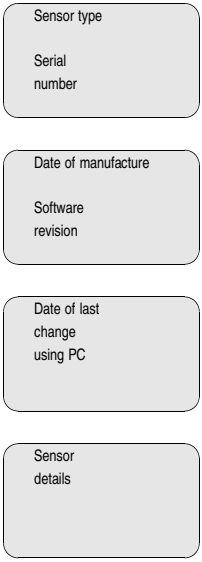
Only the following functions are permitted with activated PIN:

- Select menu items and show data
- Read data from the sensor into the indicating/ adjustment module.

Info

In this menu item the most important sensor information can be displayed:

- Instrument type, e.g. OPTISOUND 3010 C
- Serial number: 8-digit number, e.g. 12345678
- Date of manufacture: Date of the factory calibration, e.g. 26. September 2004
- Software version: Edition of the sensor software, e.g. 3.22.00
- Date of last change using PC: Date of the last change of sensor parameters via PC, e.g. 26. September 2004
- Sensor details, e.g. approval, process fitting, seal, meas. range, electronics, housing, cable entry, plug, cable length etc.



5.3 Special functions – 4 … 20 mA/HART

Introduction

The 4 … 20 mA/HART special functions are briefly described in this paragraph. The respective range of functions of the indicating and adjustment module is determined by the sensor and the sensor software revision.

Display

In the menu item "*Display*" you can define how the measured value should be presented on the display.

The following indication values are available:

- Height
- Distance
- Current
- Scaled
- Percent
- Lin. percent

The selection "*scaled*" opens the menu items "*Display unit*" and "*Scaling*". In "*Display unit*" there are the following options:

- Height

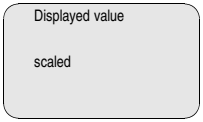
- Mass
- Flow
- Volume
- Without unit.

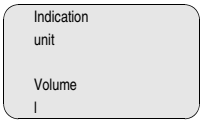
Depending on the selection, the different units will be available.

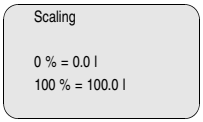
In the menu item "*Scaling*", the requested numerical value with decimal point is entered for 0 % and 100 % of the measured value.

There is the following relation between the indication value in the menu "*Display*" and the adjustment unit in the menu "*Basic adjustment*":

- With ultrasonics, the indication value "*Distance*" means: Presentation of the measured value in the selected adjustment unit, e.g. m(d).







Current output

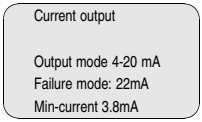
In the menu item "*Current output*" you determine the behaviour of the current output during operation and in case of failure. The following options are available:

Current output

Output mode	**4 … 20 mA** 20 … 4 mA
Failure mode[1]	Hold value 20.5 mA 22.0 mA **<3.6 mA**
Min. current[2]	**3.8 mA** 4 mA

The values in bolt font represent the data of the factory setting.

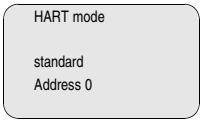
In HART multidrop mode, the current is constantly 4 mA. This value does not change even in case of failure.



HART mode

HART offers standard and multidrop mode[3]. In multidrop mode up to 15 sensors can be operated on one two-wire cable.

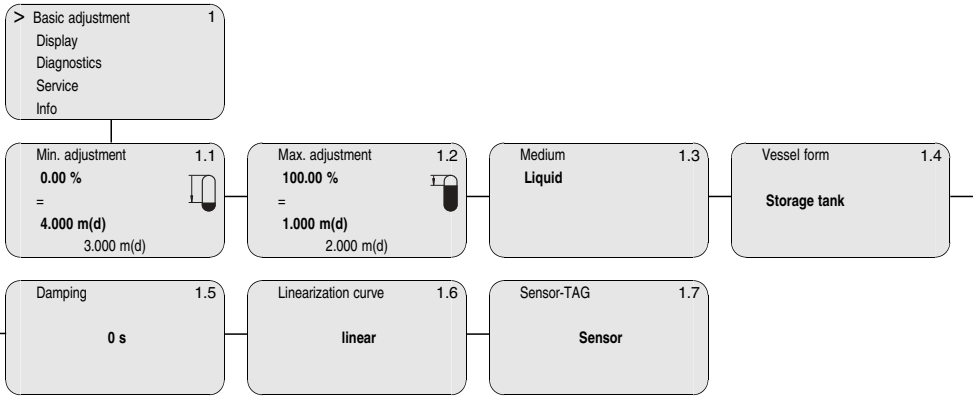
In this menu item you determine the HART mode and enter the address with multidrop.



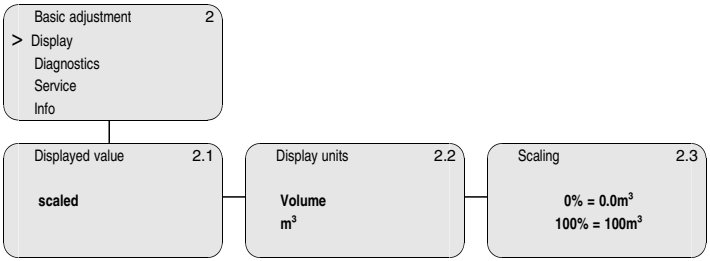
1) Value of the current output in case of failure, e.g. if no valid measured value is delivered.
2) The current never falls below this value during operation.
3) In multidrop mode, the 4 … 20 mA signal of the HART sensor is switched off. The sensor consumes a constant current of 4 mA. The meas. signal is only transmitted as digital HART signal.

5.4 Menu schematic

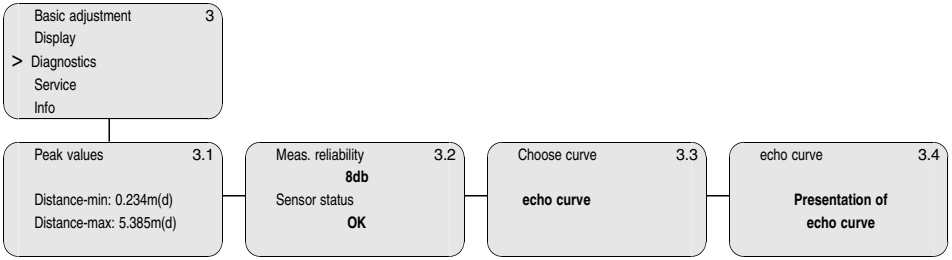
Basic adjustment



Display



Diagnostics



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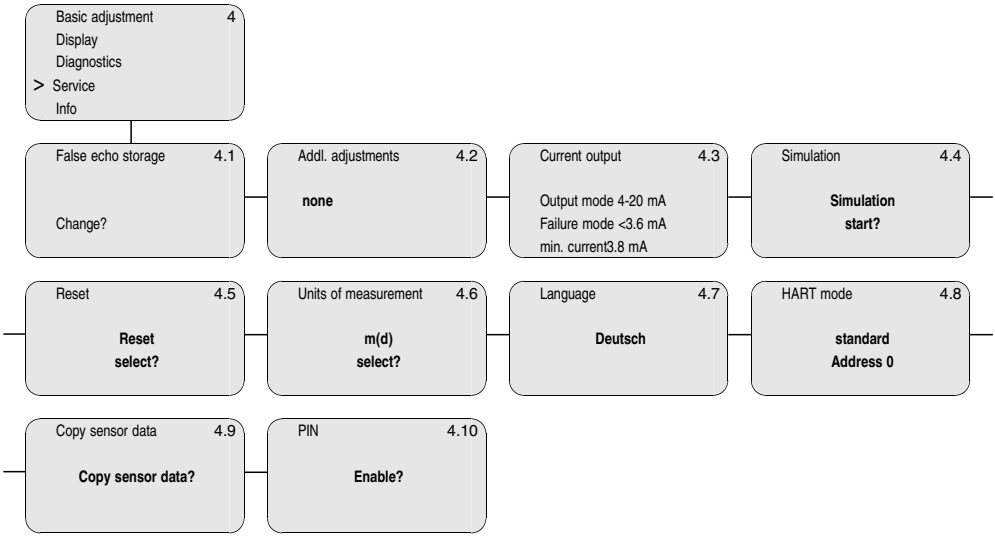
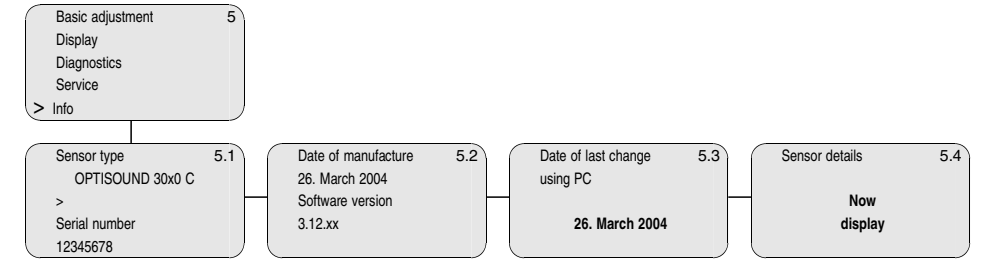
Service



Info



6 Maintenance and fault rectification

6.1 Maintenance

When used appropriately under normal condition, the indicating and adjustment module is maintenance-free.

6.2 Instrument repair

If it is necessary to repair, please proceed as follows:

You can download a return form from our Internet homepage http://www.krohne-mar.com/fileadmin/media-lounge/PDF-Download/Specimen_e.pdf.

By doing this you help us carry out the repair quickly and without having to call for additional information.

- Print and fill out one form per instrument
- Clean the instrument and pack it damage-proof
- Attach the completed form and possibly also a safety data sheet to the instrument.

7 Dismounting

7.1 Dismounting procedure

Warning:
Before dismounting, be aware of dangerous process conditions such as e.g. pressure in the vessel, high temperatures, corrosive or toxic products etc.

Take note of chapters "*Mounting*" and "*Connecting to power supply*" and carry out the listed steps in reverse order.

7.2 Disposal

The indicating and adjustment module consists of materials which can be recycled by specialised recycling companies. We have purposely designed the components to be easily separable. Mark the instrument as scrap and dispose of it according to government regulations (electronic scrap ordinance, …).

Materials: see "*Technical data*"

If you cannot dispose of the instrument properly, please contact us about disposal methods or return.

8 Supplement

8.1 Technical data

General data

Weight	150 g

Ambient conditions

Ambient temperature	-20 … +70°C
Storage and transport temperature	-40 … +80°C

Indicating and adjustment module

Power supply and data transmission	through sensor via gold-plated sliding contacts (I^2C bus)
Indication	LC display in dot matrix
Adjustment elements	4 keys
Protection	
– unassembled	IP 20
– mounted into the sensor without cover	IP 40
Materials	
– housing	ABS
– inspection window	Polyester foil

8.2 Dimensions

Indicating/adjustment module

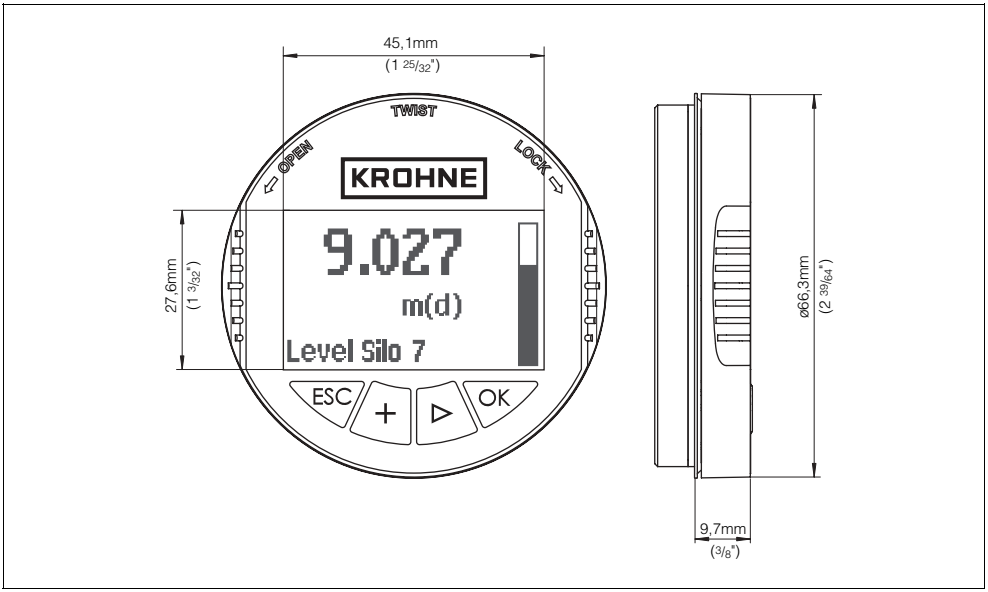


Fig. 5: Indicating/adjustment module

Subject to change without notice