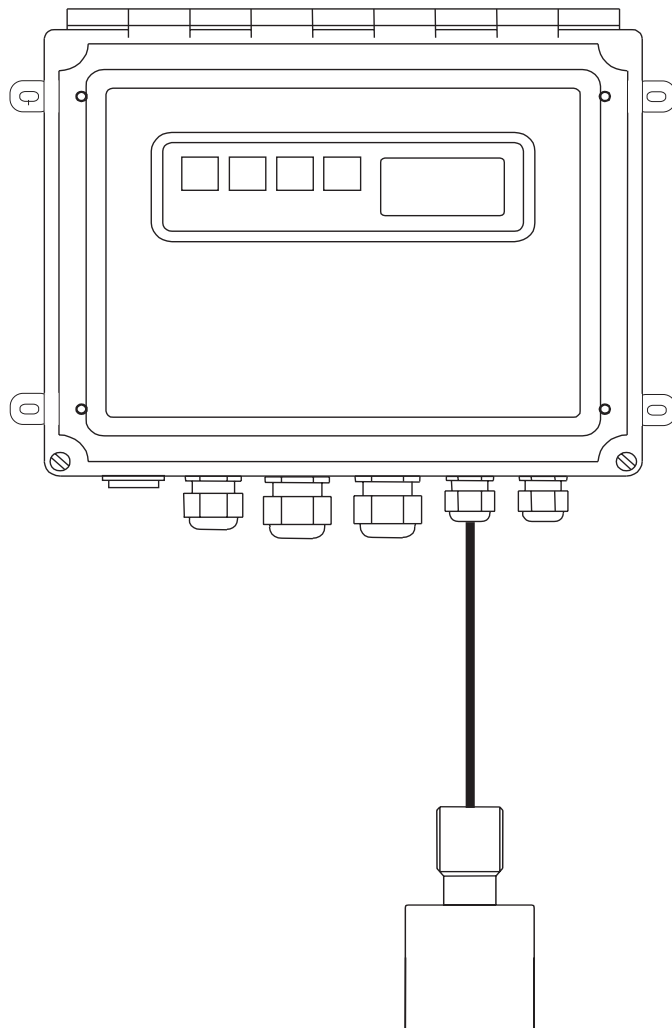


Operating Instructions

CUM750/CUS70

Ultrasonic measuring system for separation zone and sludge level detection



Brief operating instructions

This explains how to use these Operating Instructions to commission your transmitter quickly and safely:

	Safety instructions
Page 4 ff.	General safety instructions and explanations of the safety icons are provided in the section in question.
Page 5 ff.	Specific safety instructions are provided at the appropriate position. Their level of importance can be seen from the icon: ⚠ Warning, ⚡ Caution, 📌 Note.
	▼
	Installation
Page 9 ff.	The installation conditions, such as the dimensions of the device, are illustrated here.
Page 12 ff.	Here, you can find the sequence of all the important steps for installing the device.
	▼
	Wiring
Page 13 ff.	Here, you can find the wiring diagrams and steps needed for the electrical connection of the device.
	▼
	Display and operating elements
Page 19 ff.	Use this section to familiarise yourself with the operation of the device.
	▼
	Commissioning with the Quick Setup
Page 36 ff.	The Quick Setup helps you commission your device quickly and easily. Here, you can configure important basic functions such as measured variables, engineering units etc.
	▼
	Configuration
Page 23 ff.	Here, you can find all the important steps for configuring your measuring point.
	▼
	Maintenance
Page 40 ff.	Here, you can find information on all the important maintenance activities, for example, cleaning the device and the sensor or checking connections and cables.
Page 42	A list of the spare parts available.
	▼
	Accessories
Page 43	Here, you can find an overview of the accessories which can be supplied.
	▼
	Technical data
Page 10 ff.	Dimensions
Page 44	Ambient and process conditions, weight, materials etc.

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1 Safety instructions

1.1 Designated use

The Sludge Level Ultrasonic Measuring System CUM750/CUS70 has the task of determining the separation zone in sludge-water mixtures in settling basins and thickeners. The CUM750 transmitter allows the recording of separation zones at several points by connecting up to four sensors.

Any other use than the one described here compromises the safety of persons and the entire measuring system and is, therefore, not permitted.

The manufacturer is not liable for damage caused by improper or non-designated use.

1.2 Installation, commissioning and operation

Please note the following items:

- Installation, electrical connection, commissioning, operation and maintenance of the measuring system must only be carried out by trained technical personnel.
The technical personnel must be authorised for the specified activities by the system operator.
- Technical personnel must have read and understood these Operating Instructions and must adhere to them.
- Before commissioning the entire measuring point, check all the connections for correctness. Ensure that electrical cables and hose connections are not damaged.
- Do not operate damaged products and secure them against unintentional commissioning. Mark the damaged product as being defective.
- Measuring point faults may only be rectified by authorised and specially trained personnel.
- If faults can not be rectified, the products must be taken out of service and secured against unintentional commissioning.
- Repairs not described in these Operating Instructions may only be carried out at the manufacturer's or by the service organisation.

1.3 Operational safety

The transmitter has been designed and tested according to the state of the art and left the factory in perfect functioning order.

Relevant regulations and European standards have been met.

As the user, you are responsible for complying with the following safety conditions:

- Installation instructions
- Local prevailing standards and regulations.

Ex systems have an additional Ex documentation which is part of these Operating Instructions (see also chapter "Scope of delivery").

EMC

This instrument has been tested for electromagnetic compatibility in industrial use according to applicable European standards.

Protection against interference as specified above is valid only for an instrument connected according to the instructions in these Operating Instructions.

1.4 Return

If the device requires repair, please send it *cleaned* to the sales centre responsible. Please use the original packaging, if possible.

Please enclose the completed "Declaration of contamination" (copy the second last page of these Operating Instructions) with the packaging and the transportation documents.

No repair without completed "Declaration of contamination"!

1.5 Notes on safety icons and symbols

Safety icons



Warning!

This symbol alerts you to hazards. They can cause serious damage to the instrument or to persons if ignored.



Caution!

This symbol alerts you to possible faults which could arise from incorrect operation. They could cause damage to the instrument if ignored.



Note!

This symbol indicates important items of information.

Electrical symbols



Direct Current (DC)

A terminal at which DC is applied or through which DC flows.



Alternating Current (AC)

A terminal at which (sine-form) AC is applied or through which AC flows.



Ground connecting

A terminal, which, from the user's point of view, is already grounded using a grounding system.



Protective earth terminal

A terminal which must be grounded before other connections may be set up.



Equipotential connection

A connection which must be connected to the grounding system of the equipment. This can be, for example, a potential matching line of a star-shaped grounding system, depending on national or company practice.



Protective insulation

The equipment is protected by double insulation.



Alarm relay



Input



Output



DC voltage source



Temperature sensor

2 Identification

2.1 Device designation

2.1.1 Nameplate

Compare the order code on the nameplate (on the transmitter) with the product structure (see below) and your order.

The device version can be identified from the order code.

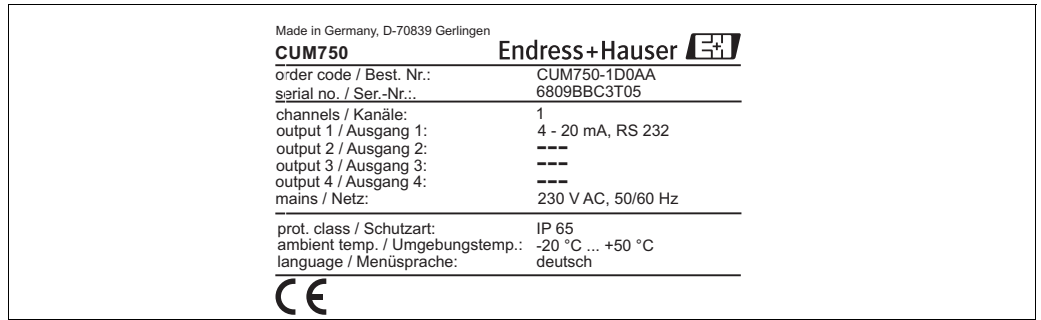


Fig. 1: CUM750 nameplate (example)

2.1.2 CUM750 product structure

Version	
1	One-channel version
2	Two-channel version
3	Three-channel version
4	Four-channel version
Language version	
D	German
E	English
Power supply	
0	Power supply 230 V AC, 50/60 Hz
1	Power supply 115 V AC, 50/60 Hz
Communication	
A	RS 232 and 4 ... 20 mA
B	RS 485 and 4 ... 20 mA
Additional equipment	
A	Basic version
CUM750-	complete order code

2.1.3 CUS70 product structure

Version	
1	Standard
Cable length	
A	13 m (42.65 ft) cable
Cleaning	
1	Without cleaning
2	With cleaning pump 230 V AC, mounting bracket
3	With cleaning pump 115 V AC, mounting bracket
Additional equipment	
A	Basic version
CUS70-	complete order code

2.2 Scope of delivery

The scope of delivery of the measuring system comprises:

- CUM750 transmitter
- Operating Instructions BA 225C/07/en

The CUS70 sensor is not contained in the scope of delivery and must be ordered separately.

If you have any questions, please contact your supplier or your sales centre responsible .

2.3 Certificates and approvals

Declaration of conformity

The product meets the legal requirements of the harmonised European standards.

The manufacturer confirms compliance with the standards by affixing the **CE** symbol.

3 Installation

3.1 Quick installation guide

Proceed as follows to completely install the measuring point:

- Install the transmitter and the sensor (see "Installation instructions" section).
- Connect the sensor to the transmitter as illustrated in the "Electrical connection" section.
- Connect the transmitter as illustrated in the "Electrical connection" section.
- Commission the transmitter as explained in the "Commissioning" section.

3.1.1 Measuring system

The complete measuring system consists of:

- The CUM750 transmitter
- The CUS70 ultrasonic sensor

It also consists optionally of the following elements which can be ordered as accessories:

- A CYY101 weather protection cover
- A railing bracket for CUS70
- An immersion tube
- A cleaning pump

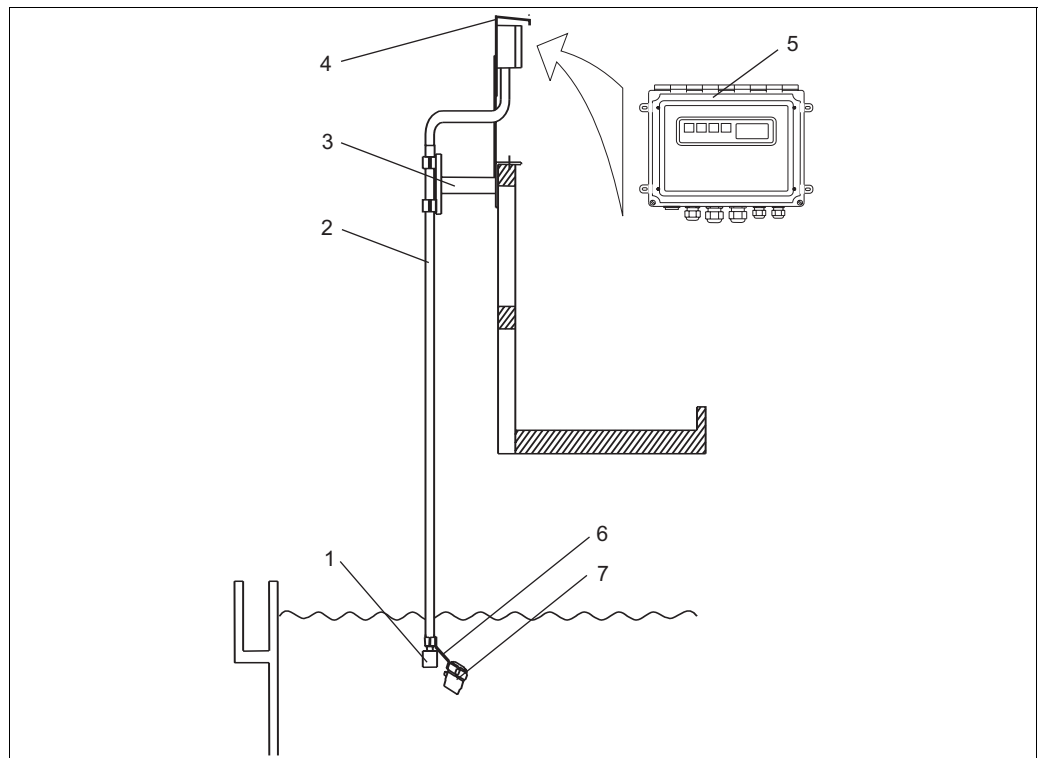


Fig. 2: Complete CUM750 measuring system

- | | | | |
|---|--------------------------------------|---|-------------------------------------|
| 1 | CUS70 ultrasonic sensor | 5 | CUM750 transmitter |
| 2 | Immersion tube (accessories) | 6 | Fixing bracket for pump (accessory) |
| 3 | Railing bracket (accessory) | 7 | Cleaning pump (optional) |
| 4 | Weather protection cover (accessory) | | |

3.2 Incoming acceptance, transport, storage

- Make sure the packaging is undamaged!
Inform the supplier about damage to the packaging.
Keep the damaged packaging until the matter has been settled.
- Make sure the contents are undamaged!
Inform the supplier about damage to the delivery contents.
Keep the damaged products until the matter has been settled.
- Check that the scope of delivery is complete and agrees with your order and the shipping documents.
- The packaging material used to store or to transport the product must provide shock protection and humidity protection. The original packaging offers the best protection. Also, keep to the approved ambient conditions (see "Technical data").
- If you have any questions, please contact your supplier or your sales centre responsible.

3.3 Installation conditions

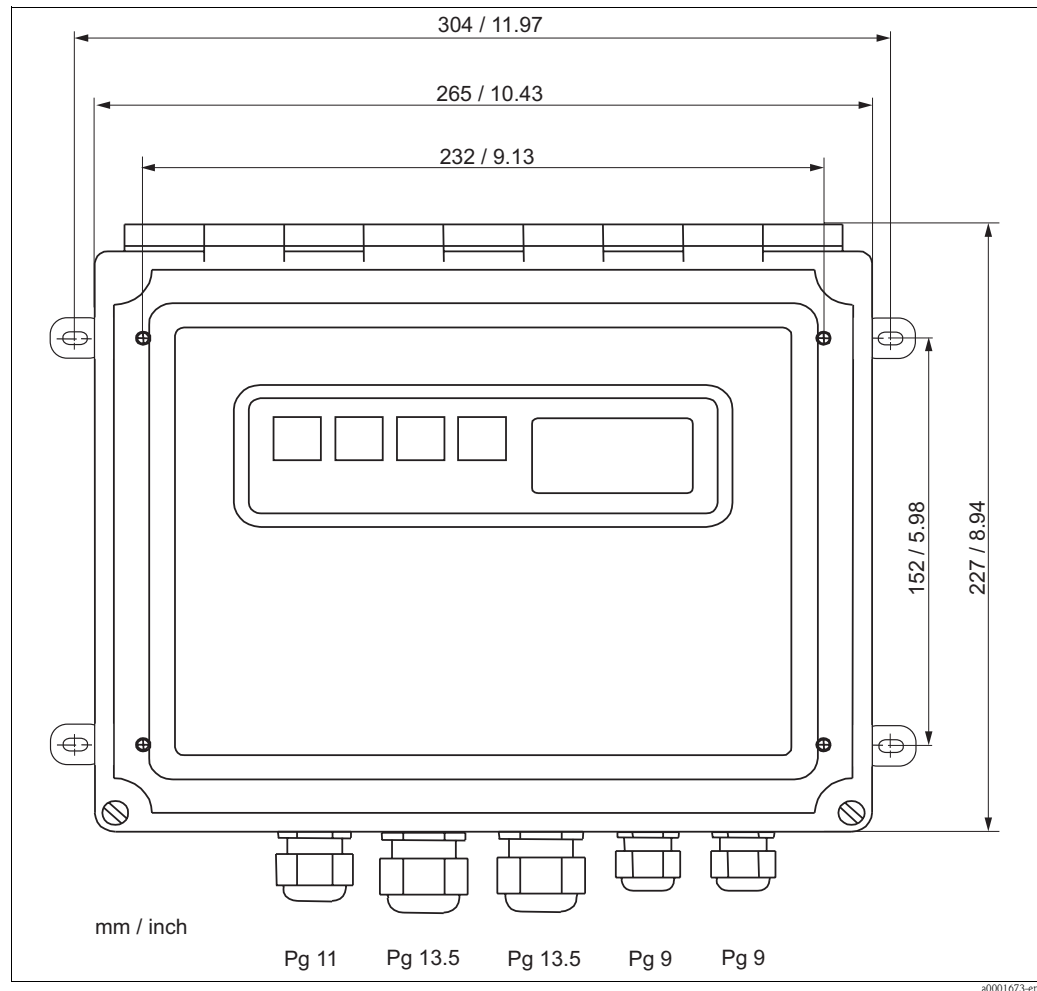


Fig. 3: Dimensions of CUM750 transmitter

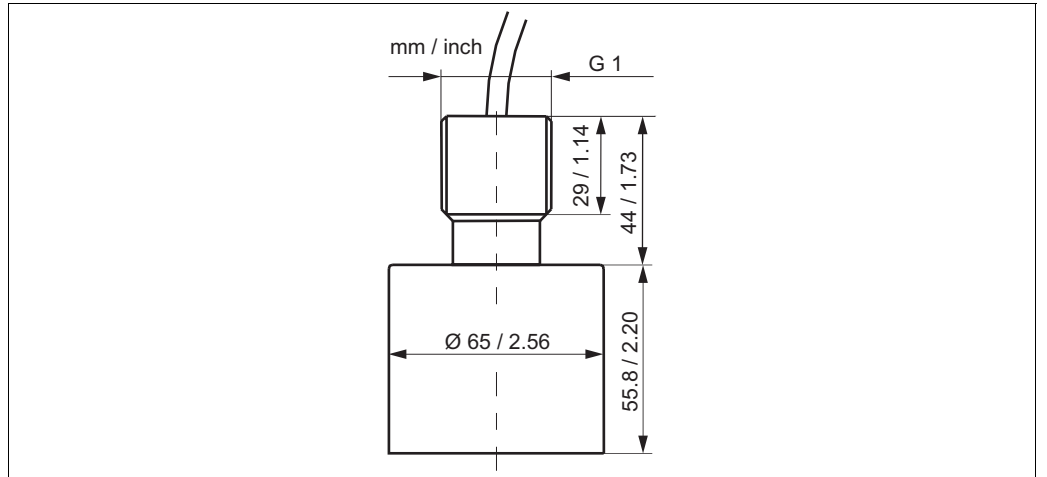


Fig. 4: Dimensions of CUS70 ultrasonic sensor

3.4 Installation instructions

Basin configuration

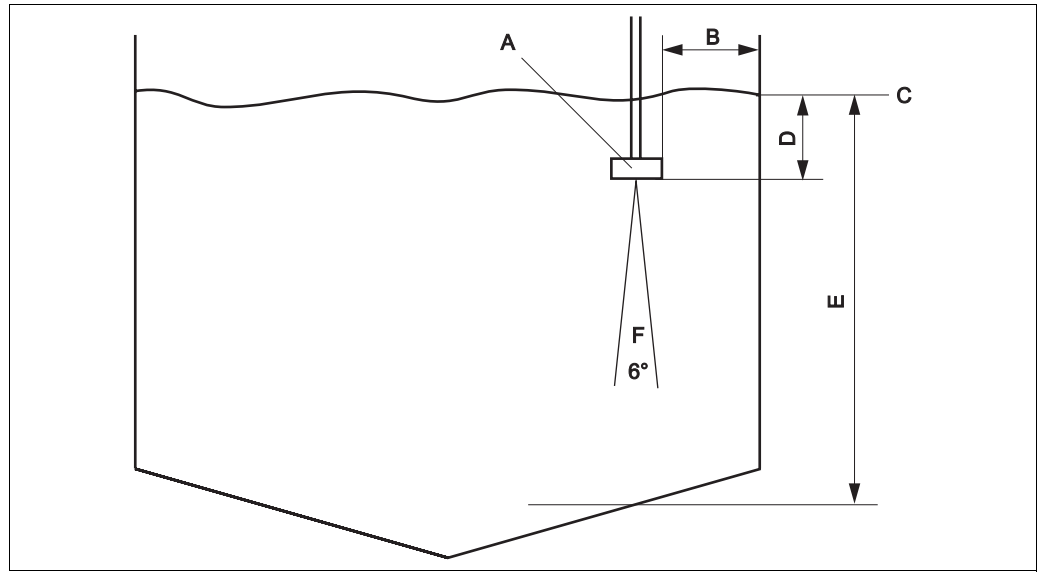


Fig. 5: Basin configuration

- A Sensor
- B Minimum distance of sensor to basin wall = 45 cm (1.48 ft.)
- C Reference point e.g. water surface
- D Zero point
- E Basin depth
- F Opening angle of ultrasonic cone, 6°

Installation instructions

Look at the construction drawing of the basin for a suitable position for the sensor. In doing so, you must take the following factors into account:

- The minimum distance between the basin wall and the sensor is 45 cm (1.48 ft.) (sensor emits ultrasound in conical form).
- There should not be any basin wall protrusions or piping in the measuring range below the sensor. Scrapers that are only temporarily in this area are permitted.
- Do not install the sensor in zones in which air bubbles, turbulence, high levels of turbid material or suspended matter or foam formation occur (e.g. inlet).
- Using an immersion tube, install the sensor 20 cm (0.66 ft.) beneath the surface of the water.
- The transmitter may not be installed in a second enclosure (heat accumulation).
- If possible, do not install the transmitter near high voltage sources. In addition, also avoid sources of magnetic fields, e.g. large transformers or frequency converters.
- The system can only detect a separation zone if there is a clear transition between the zones. Unclear transition from the liquid to the solid phase cannot be detected.

Use the four fitting brackets to mount the transmitter. The fitting brackets are located on the rear of the transmitter.

Release the fitting brackets, turn the brackets outwards and secure them again.

3.5 Post-installation check

- After installation, check the transmitter for damage.
- Check whether the transmitter is protected against moisture and direct sunlight.

4 Wiring

4.1 Electrical connection



Warning!

- The electrical connection must only be carried out by authorised technical personnel.
- Technical personnel must have read and understood the instructions in this manual and must adhere to them.
- Ensure that there is no voltage at the power cable before beginning the connection work.



Note!

For the one-channel and two-channel versions, the power supply and the pumps are connected in the transmitter.

For the three-channel and four-channel versions, a distribution box with a mains switch is connected to the transmitter. The power supply and the pumps are only connected in the distribution box.

4.1.1 Position of the terminals

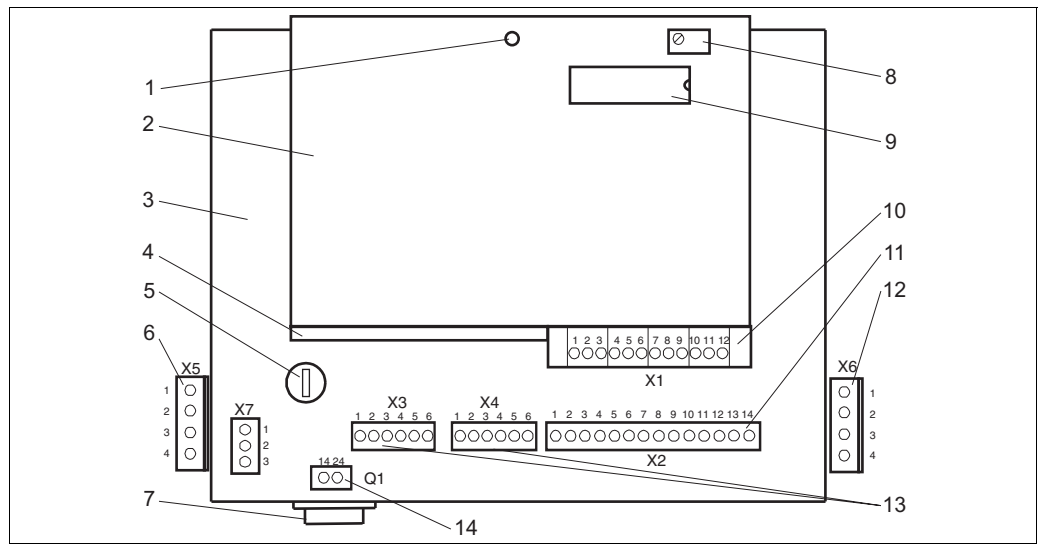
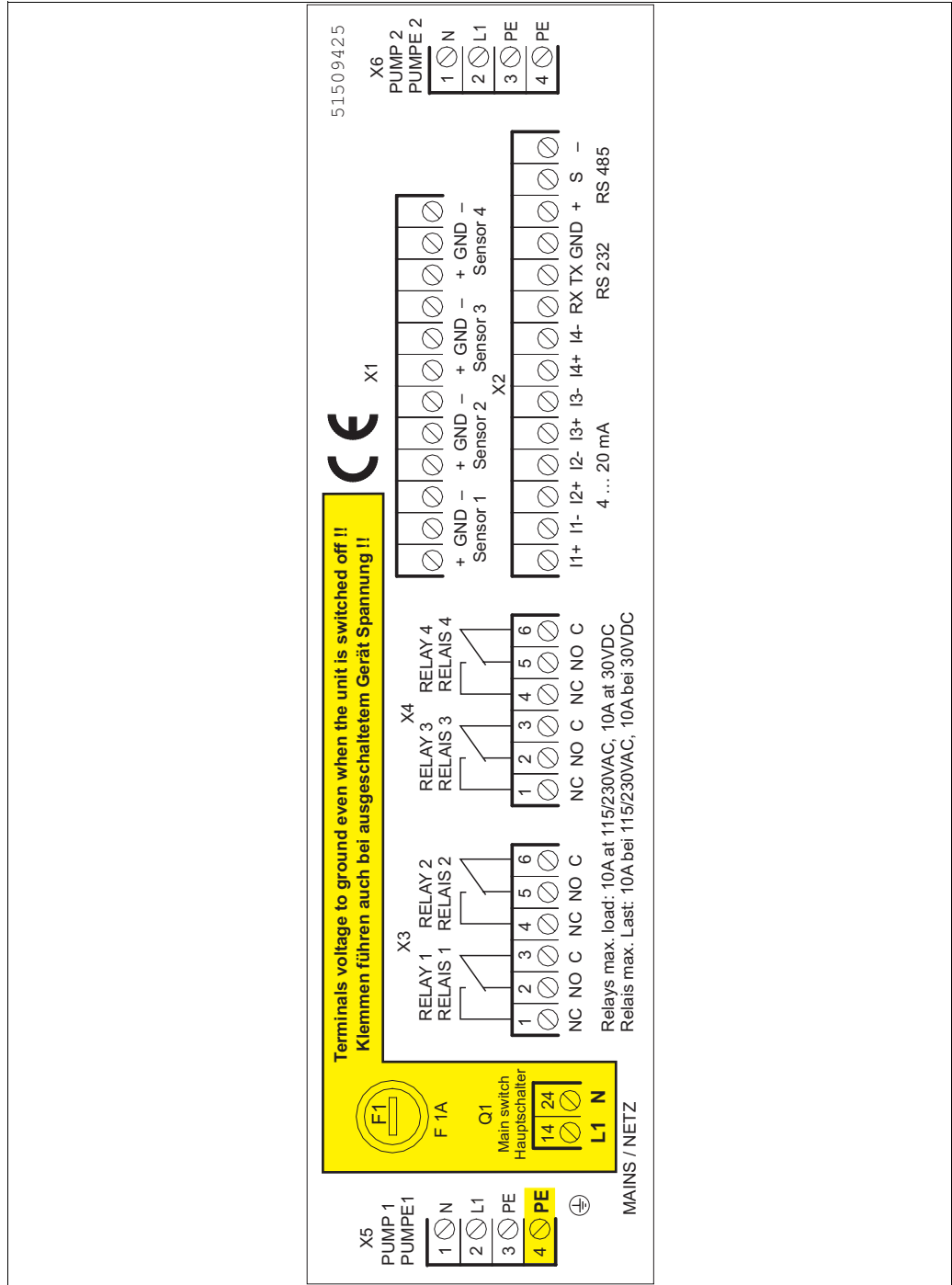


Fig. 6: Position of the terminals

- | | |
|--|--|
| <p>1 LED, flashes for perfect operating status</p> <p>2 Processor board (top)</p> <p>3 Board for power supply (bottom)</p> <p>4 TX/RX board (middle)</p> <p>5 Fine-wire fuse F 1 A</p> <p>6 Pump connection for sensor 1</p> <p>7 Mains switch</p> | <p>8 Contrast setting for LC display</p> <p>9 EPROM</p> <p>10 Sensor cable connection</p> <p>11 Connection 4 ... 20 mA, RS 232, RS 485</p> <p>12 Pump connection for sensor 2 (two-channel version)</p> <p>13 Status relay connection</p> <p>14 Mains connection</p> |
|--|--|

4.1.2 Terminal assignment



a0002218

Fig. 7: Connection compartment sticker

4.1.3 Connecting the power supply for single-channel and two-channel version

The measuring system needs a power supply of 115/230 V AC, 50/60 Hz. Connect the mains cable as follows:

Location	Pin No.	Name	Description
Mains switch Q1	14	L1	Phase conductor
Mains switch Q1	24	N	Neutral conductor
Pump terminal block X5	PE (4)	PE	Protective earth

4.1.4 Connecting the pumps for single-channel and two-channel version

For the one-channel and two-channel versions, the pumps are connected in the transmitter. Connect pump 1 to terminal X5 and pump 2 to terminal X6 as per the following diagram:

Pin assignment of terminals X5 and X6

Pin No.	Description for X5 (pump 1)	Description for X6 (pump 2)
1	N Neutral conductor	N Neutral conductor
2	L Phase conductor	L Phase conductor
3	PE earth	PE earth
4	PE transmitter protective earth	PE transmitter protective earth

4.1.5 Connecting the three-channel and four-channel version

In the three-channel and four-channel version, the transmitter is equipped with an additional distribution box. This distribution box houses the following functions:

- Mains switch
- Connection of power supply 115/230 V AC, 50/60 Hz
- Connection of pumps

Connect the power supply and the pumps as per the following diagram:

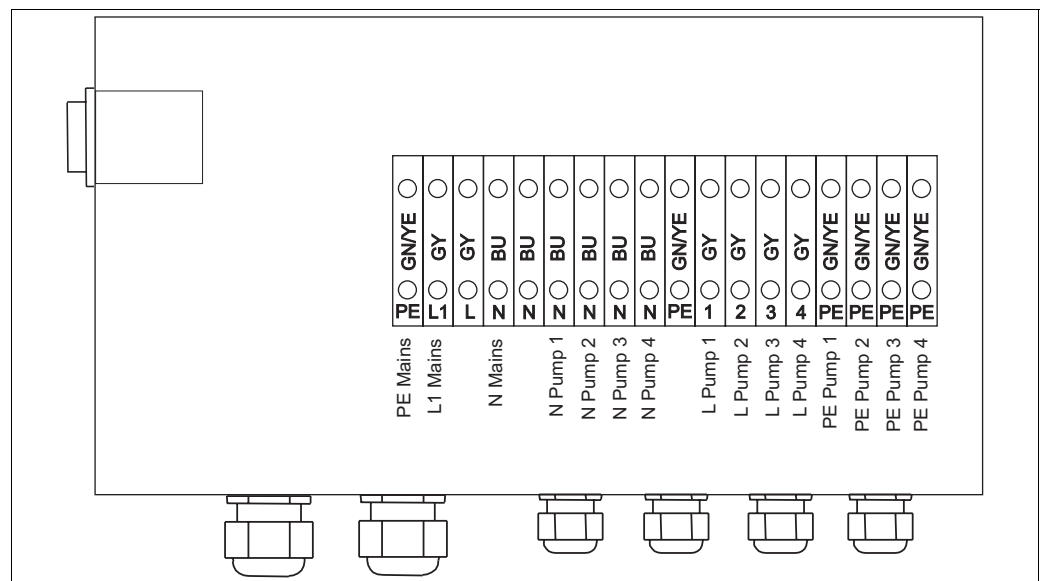


Fig. 8: Connection diagram of the three-channel and four-channel version

4.1.6 Measuring cables and sensor connection

Up to four sensors can be connected to the transmitter. To connect the sensors, use the 12-pin PHOENIX connector of terminal X1.

Pin assignment of terminal X1

Pin No.	Description	Pin No.	Description
1	Sensor 1 + (transparent)	7	Sensor 3 + (transparent)
2	Sensor 1 screen	8	Sensor 3 screen
3	Sensor 1 - (BU)	9	Sensor 3 - (BU)
4	Sensor 2 + (transparent)	10	Sensor 4 + (transparent)
5	Sensor 2 screen	11	Sensor 4 screen
6	Sensor 2 - (BU)	12	Sensor 4 - (BU)

The CUS70 sensor is supplied with a 13 m (42.65 ft.) sensor cable. To extend the cable between the sensor and transmitter, please use a screened 2-core cable and the RM junction box RM (see Accessories).



Note!

- The maximum permitted cable length is 100 m (328 ft.).
- The screen only be connected to the earth by means of the transmitter. Do not earth the screen at any other point to prevent error currents flowing into the screen and causing inductive coupling in the sensor line.
- Never route the sensor cables in the same jacket or in the same harness as power cables, relay coil drives, relay contact lines or other high voltage or high current lines.
- The jacket of the cable may not be damaged as otherwise water can penetrate the sensor.

4.1.7 Connecting the analog outputs and the serial interfaces

The transmitter has a 4 ... 20 mA analog output per sensor. Use the 14-pin PHOENIX connector of terminal X2 to connect the analog outputs and the serial interfaces RS 485 and RS 232.

Pin assignment of terminal X2

Pin No.	Name	Description
1	+ (1)	Analog output 1, 4 ... 20 mA
2	- (1)	
3	+ (2)	Analog output 2, 4 ... 20 mA
4	- (2)	
5	+ (3)	Analog output 3, 4 ... 20 mA
6	- (3)	
7	+ (4)	Analog output 4, 4 ... 20 mA
8	- (4)	
9	RS 232 RX	RS 232 received data (no galvanic isolation)
10	RS 232 TX	RS 232 sent data (no galvanic isolation)
11	RS 232 GND	RS 232 ground (no galvanic isolation)
12	RS 485 +	RS 485 positive
13	RS 485 S	RS 485 screen
14	RS 485 -	RS 485 negative

RS 485 interface

- Several systems can be connected in the Multidrop mode of RS 485.
- The galvanic separation voltage is 1600 V_{rms}/min and 2000 V_{rms}/s.
- The interface has transient protection through very quick voltage limitation.
- PTC thermistors provide constant overvoltage protection.

RS 232 interface

- The interface is designed for applications where there are only short connections between the transmitter and the computer.
- The interface has neither galvanic isolation nor transient protection.



Caution!

Route the RS 232 cables in an earthed cable duct.

4.1.8 Connecting the relay contacts

The transmitter has four status relays. To connect the relay contacts, use both 6-pin PHOENIX connectors of terminals X3 and X4.

Pin assignment of terminals X3 and X4

Pin No.	Description for X3	Description for X4
1	Relay 1, normally open contact (NC)	Relay 3, normally open contact (NC)
2	Relay 1, normally closed contact (NO)	Relay 3, normally closed contact (NO)
3	Relay 1, common (C)	Relay 3, common (C)
4	Relay 2, normally open contact (NC)	Relay 4, normally open contact (NC)
5	Relay 2, normally closed contact (NO)	Relay 4, normally closed contact (NO)
6	Relay 2, common (C)	Relay 4, common (C)

The switching capacity is 10 A at 115V/230V AC and 10 A at 30 V DC.

4.2 Post-connection check

After the electrical connection, carry out the following checks:





Device condition and specifications	Notes
Are the transmitter and cables damaged on the outside?	Visual inspection

Electrical connection	Notes
Are the mounted cables strain relieved?	
Cable run without loops and cross-overs?	
Are the signal lines correctly connected in accordance with the wiring diagram?	
Are all the screw terminals tightened?	
Are all the cable entries installed, tightened and sealed?	

5 Operation



5.1 Key assignment

You operate the device using the keyboard on the front. The keys are assigned the following functions:

	Scroll up the menu Increase numerical value
	Scroll down the menu Reduce numerical value
	Go to the particular function group
	Go back to previous menu level Save the setting (accept value)



Note!

- If you press the  key, the selected setting is confirmed or saved and you go back to the previous menu level. Press the  key as often as needed to return to the desired menu level.
- If no key is pressed in the menu within two minutes, the system returns to the DIGITAL display mode.
- No signals are processed while the transmitter is in the menu system. Changes entered only take effect once the transmitter has returned to the display mode.

5.2 Display mode

Three different information levels can be shown on the display: DIGITAL, GRAPHIC and OVERVIEW. The display is also used for menu-guided system configuration.

When you switch on the transmitter, the system first runs a self-test (approx. 4 minutes per measuring point). INITIALISATION appears on the display during this time. After this, the DIGITAL display mode appears.

Using the  and  keys, you can access the three display modes.

If you exit the menu settings, the display switches to the display you were using before entering the menu settings function.

If more than one sensor is operated with a transmitter, the graphic display selected automatically switches from sensor to sensor (sensor 1, sensor 2 etc.). You can set the dwell time per sensor in the DWELL TIME menu item.

5.2.1 DIGITAL display mode

The following values can be displayed in this display mode:

- The distance between the reference point selected and the separation zone (measuring mode = RANGE).
- The distance between the basin bottom and the separation zone (measuring mode = LEVEL).

The values are displayed in the unit selected (m, cm, ft, in).

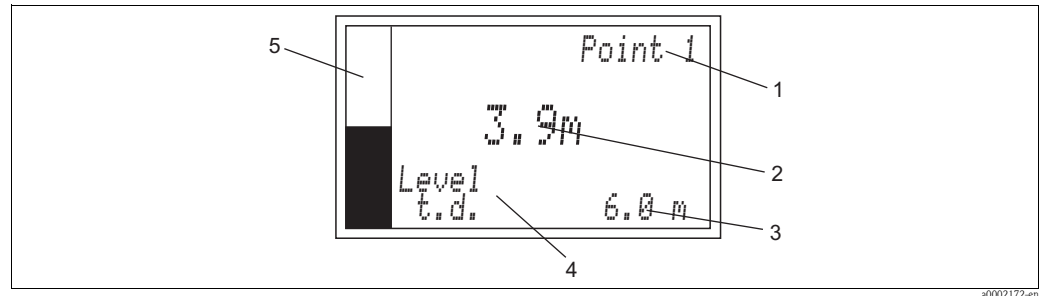


Fig. 9: DIGITAL display mode (example)

- 1 Measuring point (1 to 4)
- 2 Height of the separation zone
- 3 Basin depth (t.d. = tank depth)
- 4 Measuring mode
- 5 Bargraph: displays the height of the sludge level in relation to the basin depth

Example: sludge level measurement in the primary clarifier

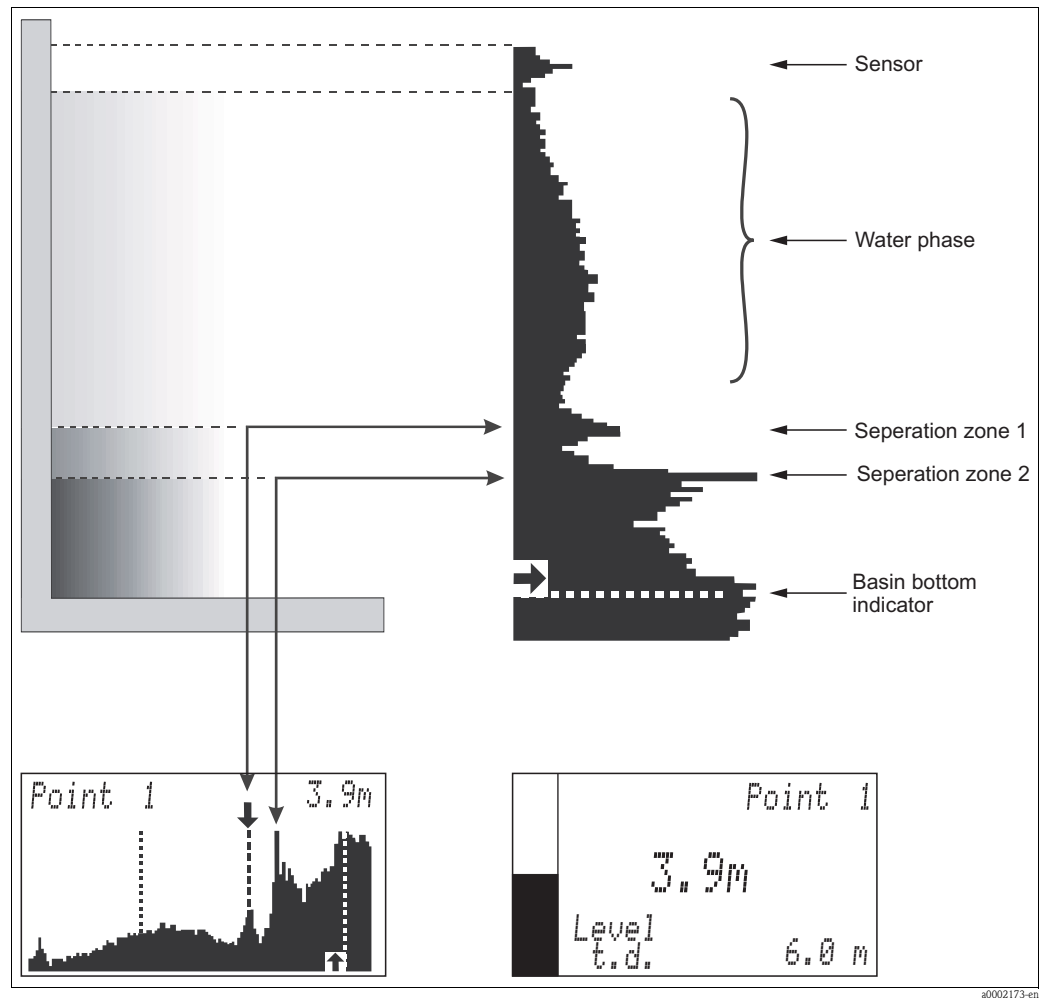


Fig. 10: Sludge level measurement in the primary clarifier (example)

5.2.2 GRAPHIC display mode

This display mode shows the strength of the feedback signal inside the basin. This display mode gives you a picture of the material stratification in the basin. The values are displayed in the unit selected (m, cm, ft, in). The display shows the raw sensor signal.

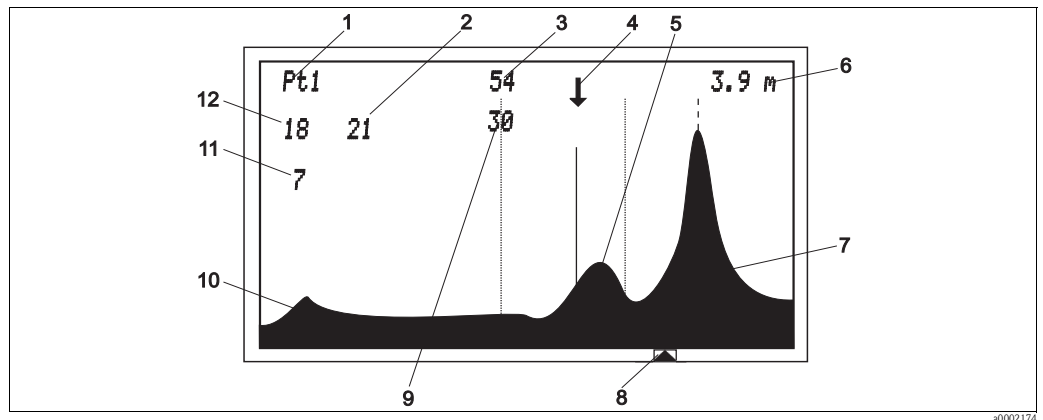


Fig. 11: GRAPHIC display mode (example)

1	Displayed measuring point	7	Basin bottom echo signal
2	Only for internal diagnosis purposes*	8	Basin bottom indicator
3	Current amplification value of the system in dB	9	Gain of the sensor signal / echo line intersection*
4	Indicator arrow for separation zone	10	Sensor signal
5	Sludge level echo signal	11	Represents the area that exceeds 75 % of the display height*
6	Height of the sludge level	12	Represents the area below the echo signal curve*

* Only with Advanced ON



Note!

The intersection of the separation zone line with the echo peak defines the height of the sludge level. If you have selected ON for Advanced, two additional views are available in the GRAPHIC mode. These two views are only used for diagnostic purposes.

The symbols on the graphics screen are explained in the following table.

Symbols on the graphics screen

!!	<p>Double exclamation mark</p> <p>The echo signal makes it impossible to locate the separation zone. The sensor is no longer immersed in the medium or the conditions (turbulence etc.) in the basin mean that the separation zone cannot be detected.</p>
→	<p>Indicator (arrow) to the right</p> <p>A new separation zone to the right of the search window has been found. The indicator moves in this direction. This only happens if the echo signal for this separation zone has been present for a sufficiently long period. Brief echo signals, like those of a scraper passing under the sensor, are not perceived as a separation zone.</p>
←	<p>Indicator (arrow) to the left</p> <p>A new separation zone to the left of the search window has been found. The indicator moves in this direction. This only happens if the echo signal for this separation zone has been present for a sufficiently long period. Brief echo signals, like those of a scraper passing under the sensor, are not perceived as a separation zone.</p>
↓	<p>Indicator (arrow) pointing downwards</p> <p>The sensor has found a separation zone at this point. The height of this separation zone is shown on the display in the engineering unit selected. The indicator is above the continuous line that intersects the echo signal of the separation zone at the point of the largest increase in signal (point with the greatest difference in density in the separation zone)</p>
▲	<p>Basin bottom indicator</p> <p>Displays the set basin depth.</p>
	<p>Separation zone line/echo line</p> <p>Cuts the echo signal of the separation zone at the point of the largest increase in signal (point with the greatest difference in density in the separation zone)</p>
 	<p>Maximum range</p> <p>It indicates the maximum distance from the selected reference point up to which the system should search for a separation zone.</p>
: : : :	<p>G min. and max.</p> <p>New separation zones occurring outside the window are not taken into account if they do not meet the selected criteria for displaying a separation zone.</p>

5.2.3 OVERVIEW display mode

This display mode provides an overview of between one and four basins:

- The number of basins displayed corresponds to the number of sensors (MEASURING POINTS) that were preconfigured at the factory in the system settings depending on the order version.
- The index marker indicates the basin in question with the associated separation zone.
- Depending on the measuring mode, the following distance is displayed in the unit selected (m, cm, ft, in):
 - Distance between the position of the sensor and the separation zone (measuring mode = RANGE)
 - Distance between the basin bottom and the separation zone (measuring mode = LEVEL).

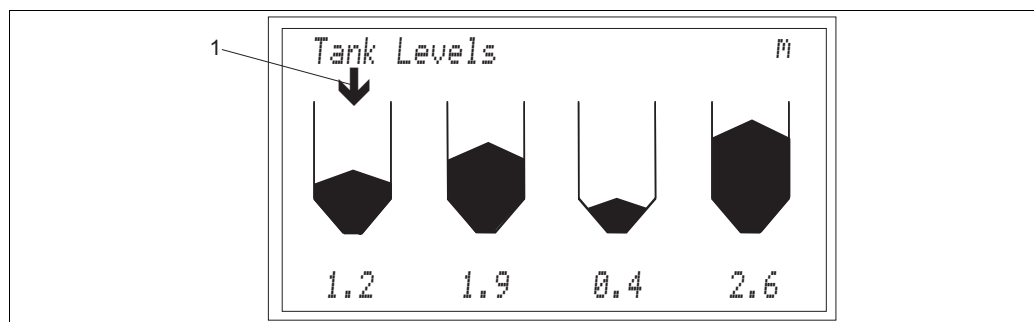


Fig. 12: OVERVIEW display mode (example)

1 Index marker

5.3 Menu structure

With regard to the parameter settings, the menu is split into two levels:



- ADVANCED OFF allows access to the standard parameters that are needed to adapt the system to the application.
- ADVANCED ON allows access to all parameters. This is only needed for service purposes and diagnosis. The parameters in this level can be accessed by entering the code

♀ ♥ ♪


When the system is started for the first time, the transmitter switches to the ADVANCED OFF level and to the factory settings. As soon as you select new settings, these changes are saved. The program you configured is saved as the default even after a power failure.





Parameters marked with an asterisk (*) are only displayed for ADVANCED ON.

Switching on the ADVANCED version:

1. Select the ADVANCED OFF menu item.
2. Press the  key. The field for inputting the code appears on the screen.
3. Using the  key, select the following symbols:

♀ ♥ ♪

Confirm every symbol with the  key. If entered correctly, ENABLE OFF appears.

4. Press the  key. ADVANCED ON/OFF appears on the screen.
5. Use the  key to select ON and confirm with the  key.
6. Press the  key again. You are now in the main menu again.

5.4 Main menu

The main menu contains the following function groups:

- SYSTEM SETUP
- MODIFY POINTS
- MODIFY OUTPUTS
- ADVANCED
- PASSWORD

5.5 SYSTEM SETUP

The function group SYSTEM SETUP takes you to the general basic settings that apply to all connected sensors and measuring points. It contains the following parameters:

Measure	LEVEL/RANGE
Units	[m], [cm], [in], [ft]
Recall/save	User/factory preset
Pulse*	Long, medium, short

Measure:

Use this parameter to determine the type of measurement that should be displayed and calculated:

- LEVEL: The system measures the separation zone from the bottom of the basin.
- RANGE: The system measures the area between the selected reference point (e.g. water surface) and the separation zone.

Range of adjustment: LEVEL, RANGE

Units:

Use this parameter to specify the display unit. The factory setting for the display unit is [m]. A change in the unit is automatically applied to all displays.

Range of adjustment: [m], [cm], [in], [ft]

Recall/save:

Use this option to retrieve the configurations you have set.

With SAVE, you can save your user-specific configurations for retrieval at a later stage.

With RECALL, you can choose between the user-defined parameters or the default factory parameters and confirm and load them with the \square key.

No. of points:

Use this parameter to specify how many sensors are connected to the transmitter. The number of measuring points is preset at the factory depending on the device version ordered (one-channel to four-channel version).

Range of adjustment: 1 ... 4

Pulse:*

Use this parameter to determine the strength of the acoustic radiation energy of the sensor. The factory setting is SHORT.

Range of adjustment: SHORT, MEDIUM, LONG

5.6 MODIFY POINTS

The function group MODIFY POINTS takes you to the specific settings for the each individual measuring point:

Tank config	Tank depth	[m], [cm], [in], [ft]
	Zero adjust	[m], [cm], [in], [ft]
	Dwell time	n
	Min. range*	[m], [cm], [in], [ft]
	Max. range*	[m], [cm], [in], [ft]
Acoustics	Gain start	dB
	Auto gain	ON/OFF
	Sound speed	[m/s]
	Update rate	n
	Sum limit*	n
	Gain increment*	n
	Wall zone AG*	n
	SV adjust*	ON/OFF
	AG setpoint*	n
	Gain band*	n
Tracking	Algorithm	FIRST/LAST
	Threshold	n
	History	n
	G min*	[m], [cm], [in], [ft]
	G max*	[m], [cm], [in], [ft]
	Candidates*	n
	Sensitivity*	n
	Wall zone*	[m], [cm], [in], [ft]
	Set zone*	ON/OFF
	Cell limit*	n
Δy coeff*	n	

Reboot track

Parameters marked with an asterisk (*) are only displayed for ADVANCED ON.

5.6.1 TANK CONFIG

The function group TANK CONFIG is used to enter the specific data of the measuring point:

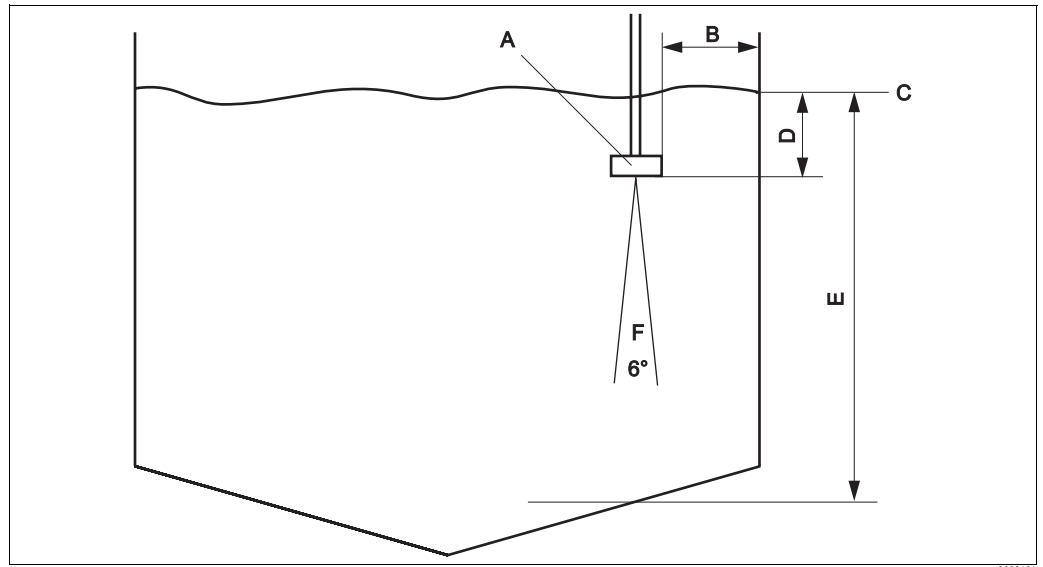


Fig. 13: Basin configuration

- A Sensor
- B Minimum distance of sensor to basin wall = 45 cm (1.31 ft.)
- C Reference point e.g. water surface
- D Zero point
- E Basin depth
- F Opening angle of ultrasonic cone, 6°

Tank depth:

Enter tank depth E at the sensor position in question here (see Fig. 13). Determine the distance between the basin bottom and the reference point C (e.g. water surface or tank upper edge) directly at the sensor immersion point.

Range of adjustment: 0 ... 100 m (0 ... 328.1 ft.)

Zero adjust:

Enter the distance between reference point C and the lower edge of the sensor here.



Note!

The reference point for the tank depth and zero adjust must be the same.

Range of adjustment: -tank depth ... +tank depth

Dwell time:

Here, you can specify how long the value should be displayed per measuring point (for multi-channel operation). The display then switches to the next measuring point. The dwell time is linked to the UPDATE RATE (see 'Acoustics'):

- One update rate unit corresponds to 2 s.
- The dwell time is the multiplication factor.

Example 1: UPDATE RATE = 3, DWELL TIME = 4; this results in: $2 \text{ s} \times 3 \times 4 = 24 \text{ s}$

Example 2: UPDATE RATE = 1, DWELL TIME = 5; this results in: $2 \text{ s} \times 1 \times 5 = 10 \text{ s}$

Range of adjustment: 0 ... 5 (if 0, the measuring point is ignored)

Min range:*

This parameter is used to hide permanent echo signals above the search window. It indicates the minimum distance to the selected reference point from which the system should search for a separation zone. If the zero point changes, the value is adjusted automatically (0.7 m (2.3 ft.) greater than zero point) but can also be changed manually. The smallest possible value for 'Min range' (blocking distance) is zero point + 0.3 m (0.98 ft.) as the sensor cannot receive any echo signal below this point.

Range of adjustment: zero point + 0.3 m (0.98 ft.) ... max range

Max range:*

This parameter is used to hide permanent echo signals below the search window. It indicates the maximum distance from the selected reference point up to which the system should search for a separation zone. If the tank depth changes, the value is adjusted automatically (0.1 m (3.94 ") greater than tank depth) but can also be changed manually. The largest possible value for 'Max range' is 1.1 x tank depth. This ensures that the system can detect separation zones right to the basin bottom even if the tank depth is not accurately determined or if the sound speed changes (density or temperature changes).

Range of adjustment: 0 ... 1.1 x tank depth

5.6.2 ACOUSTICS

The function group ACOUSTICS is used to enter the specific data for ultrasonic signal gain:

Gain start:

This parameter determines the modulation of the echo signal on the graphic display. The way GAIN START works is specified by the AUTO GAIN parameter:

- AUTO GAIN = ON: The transmitter uses the gain value determined in the self-test (initialisation). During operation, this gain is automatically adapted to suit the current process conditions.
- AUTO GAIN = OFF: You can enter a fixed gain value for diagnosis or test purposes. Normal gains for applications with relatively clear water and a "hard" separation zone are between 25 and 35 dB. If the transition between sludge and water is relatively "soft", the values can reach up to 60 dB. If you need significantly higher gain levels, this indicates overdriving. It is then difficult or impossible to reliably evaluate the echo signal.

Range of adjustment: 0 ... 100 dB

The following figures display common echo signals in the graphic mode:

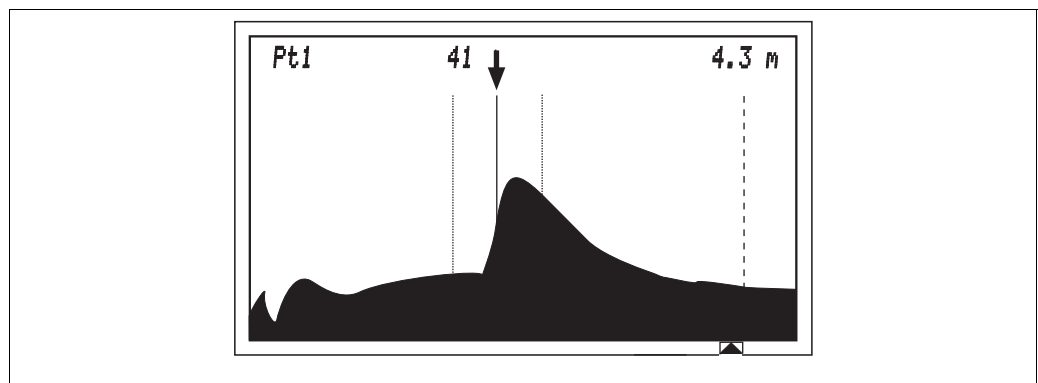


Fig. 14: Primary clarification; the sludge layer is so high here that no echo signal can be received from the basin bottom.

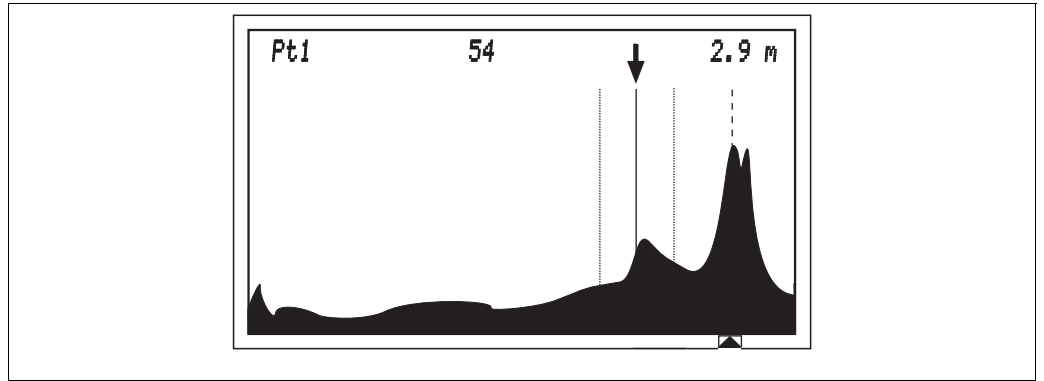


Fig. 15: Secondary clarification; in addition to the sludge level, you can also see the echo signal of the basin bottom.

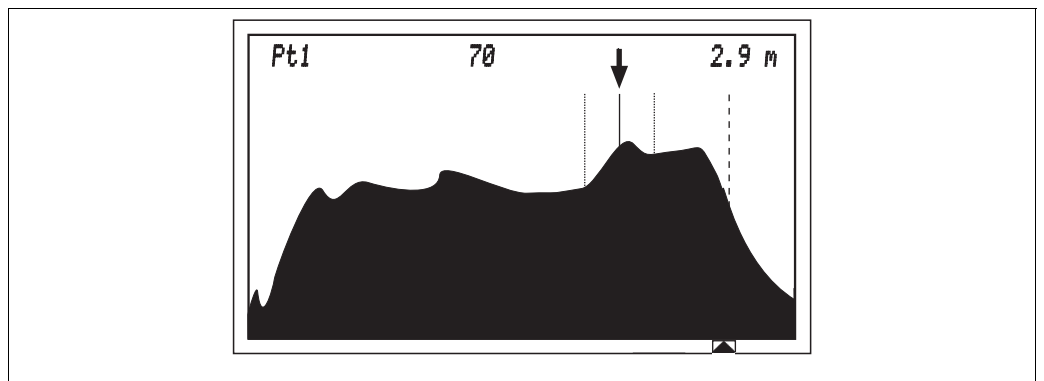


Fig. 16: Signal overdrive with 70 dB.

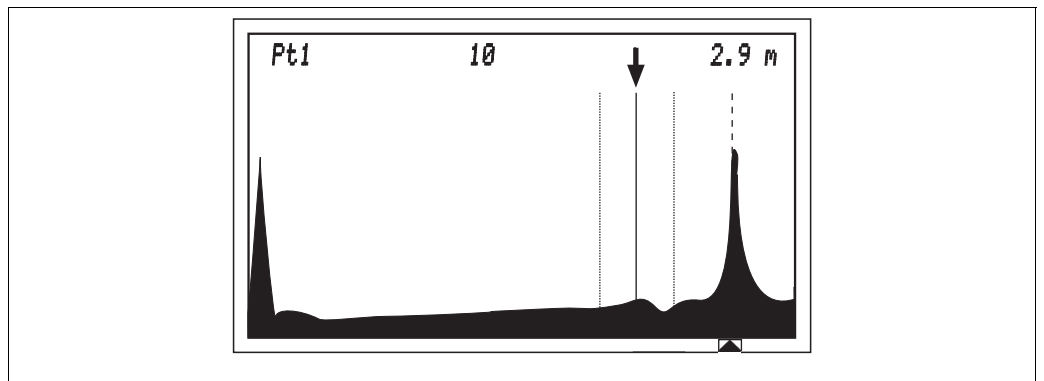


Fig. 17: Signal underdrive with 10 dB.

Auto gain:

This parameter is used to specify whether the gain should be automatically adjusted if the process conditions change. This can result from:

- Changes in the sludge properties
- Changes in the solids concentration in the sludge
- Changes in the sedimentation behaviour
- Air/gas bubbles in the medium
- Gradual contamination of the sensor surface (algae, sludge, biofilms)

If 'Auto gain' is set to "ON", the gain is regulated by AG setpoint and is limited by the following parameters:

- Gain start
- Gain band
- Gain increment
- Sum limit

We recommend you set 'Auto gain' to ON and only use OFF for diagnosis and test purposes.
Range of adjustment: ON/OFF

Sound speed:

Use this function to compensate the effect of the ambient conditions on the sound speed. The sound speed depends on the fluid temperature and the fluid density:

Medium	Temperature	Speed
Water	20 °C (68 °F)	1485 m/s (4870.8 ft./s)
Water	0 °C (32 °F)	1407 m/s (4615.0 ft./s)

Since the temperature and density are only subject to brief fluctuations in the majority of water and wastewater applications, experience shows it suffices to work with the factory setting of 1425 m/s (4674.0 ft./s). However, if very exact measurement is required, this parameter is mainly used to calibrate the tank depth.

If you see the echo signal of the basin bottom in the graphic mode, the basin bottom indicator must be slightly to the left of the peak of the basin bottom. If this is not the case, you can correct this by changing the SOUND SPEED.



Note!

Do **not** change the position of the basin bottom indicator by changing the TANK DEPTH parameter!

Range of adjustment: 305 ... 2000 m/s (in increments of 5) (1000 ... 6560 ft./s)

Update rate:

The update rate specifies the amount of acoustic signal data that has to be gathered and averaged before updating the display and the current outputs. An update rate of 1 updates the display every 2 seconds, an update rate of 2 every 4 seconds, etc.

Range of adjustment: 1 ... 100

Sum limit*

In automatic mode, this parameter limits the gain in order to avoid system overdrive. The area of the echo curve is calculated (in % of the display area). The SUM LIMIT parameter indicates the maximum curve area that may not be exceeded. If the curve area reaches the value set here, the system scales back the gain.

Example: SUM LIMIT = 25: i.e. the maximum permitted gain is such that the echo curve cannot take up more than 25 % of the display area.

Range of adjustment: 0 ... 100

Gain increment:*

This parameter specifies how quickly the gain can adapt to changing process conditions in the automatic mode.

Example: GAIN INCREMENT = 0.5: i.e. the gain can only change by 0.5 dB from one display refresh to another.

Range of adjustment: 0.0 ... 5.0

Wall zone AG:*

With regard to how it works, this parameter corresponds to the AG SETPOINT parameter but is only applied to separation zones that are very close to the basin bottom (see WALL ZONE in the 'Tracking' section). It is used to regulate the gain in situations in which no other echo signal is present, apart from the basin bottom, which the tracking function could identify as a separation zone. Since the echo signal of the basin bottom is very strong, the system would then scale down the gain to such an extent that the echo signal of a new separation layer then being formed would not be amplified sufficiently.

Example: WALL ZONE AG= 60: If no separation zone is present outside the formation zone, the system regulates the gain as per the value entered here and no longer as per AG SETPOINT.

The factory setting is 60 (only change in special cases or for test purposes).



Note!

WALL ZONE AG should always be bigger than AG SETPOINT.

Range of adjustment: 10 ... 100

Automatic sound velocity adjustment (SV adjust):*

Use this parameter (ON) to automatically compensate the effect of the ambient conditions on the sound velocity.

Prerequisites:

- The system can receive an echo signal from the basin bottom.
- The right tank depth has been entered.



Note!

For all common water/wastewater applications, use the factory setting OFF as only minor fluctuations in temperature and density occur. The system then works with the setting specified in SOUND SPEED.

Range of adjustment: ON/OFF

AG setpoint:*

The system uses this parameter to regulate the gain. It determines the vertical position of the intersection point (1) of the separation zone line with the echo peak. The factory setting for the AG setpoint is 30 which corresponds to 30 % of the maximum display height.

- If the intersection point is below AG SETPOINT, the system increases the gain value.
- If the intersection point is above AG SETPOINT, the system decreases the gain value.

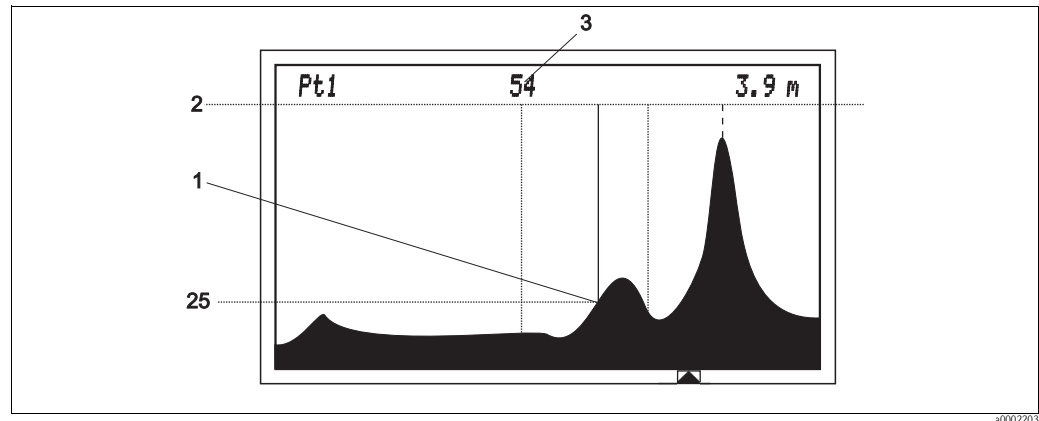


Fig. 18: Example for the AG setpoint

- 1 Intersection point of separation zone line with echo peak (example 25, corresponds to 25 % of the overall display height)
- 2 Overall display height 100
- 3 Gain value

Range of adjustment: 10 ... 50

Gain band:*

Use this parameter to specify the range for the gain. During the initialisation phase (self-test) the system determines the start value. The system can now adjust this start value within the range selected here.

Example: GAIN BAND = 20 and the start value = 35 dB. The system can now regulate the gain in the range from 15 dB to 55 dB.

Range of adjustment: 1 ... 30

5.6.3 TRACKING

The function group TRACKING is used to enter the specific data for evaluating the echo signal:

Algorithm:

If the system finds more than one separation zone, use this parameter to specify which separation zone the system should track and display:

- FIRST: The separation zone closest to the sensor is tracked and displayed.
- LAST: The separation zone farthest from the sensor is tracked and displayed.



Note!

The system does not track any separation zone in the basin bottom range (see 'Wall zone' parameter) if a separation zone has been found outside of it.

Range of adjustment: FIRST/LAST

Threshold:

Use this parameter to define the minimum height of an echo peak for it to be detected as a separation zone. The factory setting is 50 which corresponds to 50 % of the maximum display height. If the amplitude of the echo peak is less than 50 % of the maximum display height, it is not detected as a separation zone. The factory setting suffices for practically every application.

If the separation zone does not appear constant in the GRAPHIC mode, (separation zone line keeps disappearing), reduce the THRESHOLD slightly.

See also the 'Sensitivity' and ' Δy coefficient' parameters.

Range of adjustment: 0 ... 100

History:

Use this parameter to dampen the movement of the indicator arrow. You determine the number of measured value updates that are averaged and that indicate the position of the indicator arrow.

- A value of "1" updates the position of the indicator arrow for every measured value update.
- With a value of "5", the average of the last five updates is applied.

The speed of the updating process is affected by the UPDATE RATE (see 'Update rate' parameter in the 'Acoustics' section)

Select a low value if the height of the sludge level can change very quickly. A higher value prevents the system from tracking transient echo signals (e.g. from a scraper) and the indicator arrow from skipping backwards and forwards.

Experience shows that the factory setting "30" suffices for most applications.

Range of adjustment: 1 ... 200

G min/G max:*

Use these two parameters to define a search window for the separation zone currently being tracked. Echo signals occurring outside this area are initially not tracked. Only if they meet the search criteria for a separation zone for a prolonged period does the window open and the indicator arrow follows the new separation zone.

The speed at which the search window opens is regulated by means of "Cell limit" (see 'Cell limit' parameter).

In the GRAPHIC mode, G MIN is illustrated by the dotted line on the left, G MAX by that on the right.

Together with the 'History' parameter, the system gives you the option of not taking any transient echo signals into account.

The factory setting for both parameters is 0.5 m (1.64 ft.), i.e. the search window is 1 m (3.28 ft.) in width.

Range of adjustment: 0 m ... tank depth

Candidates:*

Use this parameter to set the maximum number of separation zones (candidates) the system should display. In the GRAPHIC MODE, candidates are indicated by a continuous line (separation zone line). The signal strength of the individual echo peaks can be seen from the height of the separation zone line.

Range of adjustment: 2, 3

Sensitivity:*

Use this parameter to define the minimum slope of an echo peak for it to be detected as a separation zone. The higher the setting for the sensitivity, the greater the echo peak slope has to be for it to be detected as a separation zone.

The factory setting is 60. Experience shows that it suffices for most applications. However, if the transition between water and sludge is "soft", you can reduce the minimum slope.

See also the 'Threshold' and ' Δy coefficient' parameters.

Range of adjustment: 0 ... 100

Wall zone:*

Use this parameter to define a hidden zone in the basin bottom area. This is needed for very low sludge levels or basins that are free of sludge. In this zone, different rules apply for the gain and tracking:

- Gain regulation:
If the system does not find a separation zone outside the hidden area, AUTO GAIN is regulated by WALL ZONE AG. This prevents the strong echo signal of the basin bottom from negatively influencing the gain regulation.
- Tracking regulation (if Algorithm = last):
The tracking function does not follow any separation zone in the hidden area unless it is the only one available. If the system finds two separation zones in this area, it displays the left separation zone.

Range of adjustment: 0.0 ... 0.6 m (1.97 ft.)

Set zone:*

The area to the left of the search window (sedimentation area) is what is meant here by the 'Set zone' parameter. If this parameter is set to ON, the system ignores echo signals coming from this area unless they are the only signals present.

If this parameter is set to OFF, the system can also detect and evaluate echo signals coming from the area to the left of the search window.

Range of adjustment: ON/OFF

Cell limit:*

Use this parameter to specify the speed at which the search window opens. The search window opens if a stable echo signal that meets the criteria of a separation zone has formed outside the search window.

If CELL LIMIT is set to 1, the search window needs approx. 30 min until it is open completely. If the value is set to 50, the search window needs 1 min.

The factory setting is 1. Experience shows that it suffices for most applications.

If the sludge level can change very quickly, the reaction speed of the search window can be increased here. At the same time, the history has to be reduced so that the indicator arrow can follow the separation zone quickly enough.

Range of adjustment: 1 ... 50

 Δy Coefficient (Δy Coeff):*

Use this parameter to define the minimum slope of an additional echo peak for it to be detected as a second or third separation zone. The echo peak with the biggest slope serves as the scale for determining additional separation zones.

Example: If you set this parameter to 30, a second echo peak must have a slope of at least 30 % of the main echo peak in order to be detected as an additional separation zone.

Range of adjustment: 1 ... 100

5.6.4 REBOOT TRACK

This function is used to restart the device. This is recommended if you have made major changes to the parameters in the ACOUSTICS or TRACKING submenus. The transmitter automatically performs an initialisation in the same way as during first start-up.

The device then reboots the gain and readjusts it to the altered settings. All other unaltered settings remain unchanged.

5.7 MODIFY OUTPUTS

In the function group MODIFY OUTPUTS, you define the analog outputs, the serial outputs and the function of the relay contacts:

4 ... 20 mA	4 mA setpoint	[m], [cm], [in], [ft]	
	20 mA setpoint	[m], [cm], [in], [ft]	
Relays	ON/OFF		
	Level	Assign to	n
		Condition	<=/>=
		Action	OPEN/CLOSED
		Setpoint	[m]
		Dead band	[m]
	Timer	Cycle	[min]
Serial port		Duration	[s]
	Baud rate	[Bytes]	
	Output	ASCII/WinBin	
	RS 232/485	RS 232 / RS 485	

5.7.1 4 - 20 mA

The "4 ... 20 mA signal outputs" are configured in this submenu. The engineering units shown correspond to the units selected in the system setup. When you select this function group, a list appears with the number of measuring points already set at the factory. From these, select the ones for which you would like to define the 4 ... 20 mA signal output. The defined values must be within the min. and max. range since the system does not display any separation zones outside this window.

4 mA setpoint

- Measuring mode = level
Use this parameter to specify the minimum sludge level beneath the sensor. This value normally corresponds to the height of the basin bottom (4 mA is then 0 m sludge height).
- Measuring mode = range
Use this parameter to specify the level near the sensor. 4 mA is then 0 m distance between the reference point and the sludge level.

Range of adjustment: 0.0 ... 1.1 x tank depth

20 mA setpoint

- Measuring mode = level
Use this parameter to specify the maximum measurable sludge height (30 cm (0.98 ft.) below the sensor).
- Measuring mode = range
Use this parameter to specify the level of the basin bottom. 20 mA is then the maximum measurable distance between the reference point and the sludge level.

Range of adjustment: 0.0 ... 1.1 x tank depth

5.7.2 RELAYS

4 relays are integrated in the transmitter.

- You can assign each of these relays to every sensor.
- You can also assign several or all 4 relays to one sensor.

When you select the RELAY function group, Relay 1 ... 4 appears on the display. Now select the relay to be configured. The possible settings are:

- OFF
- Level
- Timer

When delivered, the relays are wired with the terminals for the cleaning pumps. The relays are then to be operated as timers. The number of terminals is based on the number of channels ordered.

OFF

The relay is not in operation.

Level

With this parameter, you can use the relay as a limit switch. You have the following configuration options:

- Assign to:
Use this parameter to define which sensor should be assigned to the relay.
Range of adjustment: 1 ... 4
- Condition:
Use this parameter to define the switching condition for the relay. You can specify whether the relay should switch for values \leq (smaller than or equal to) or \geq (greater than or equal to) than the SETPOINT.
Range of adjustment: \leq or \geq
- Action:
Use this parameter to define whether the relay should work as a normally open or normally closed contact.
Range of adjustment: n. open or n. closed
- Setpoint:
Use this parameter to specify the sludge level at which the relay should switch. Please note the mode you specified (level or range).
Range of adjustment: 0.0 ... 100 m (328 ft.)
- Dead band:
Use this parameter to define how far the measured value must be from the set value for the relay to switch. This prevents the relay being "unstable".
Example: setpoint = 17 m (55.78 ft.), dead band = 0.5 m (1.64 ft.): if the sludge level reaches 17.5 m (57.42 ft.), the relay switches on and if the sludge level drops below 16.5 m (54.14 ft.), the relay switches off.
Range of adjustment: 0.1 m (0.33 ft.) ... tank depth

Timer

Use this parameter to control the relay with a timer. This can be used to operate the cleaning pumps and to control other events by means of the timer function. You have the following configuration options:

- Cycle:
Use this parameter to define how long a cycle should be between two relay actions.
Range of adjustment: 5 ... 2880 min (max. 2 days)
- Duration
Use this parameter to specify how long a relay action should last.
Range of adjustment: 2 ... 1800 s (max. 30 min)

5.7.3 SERIAL PORT

This function group is used to specify the communication parameters for the serial interface:

Baud rate:

Use this parameter to set the transmission rate.

Range of adjustment: 1200, 2400, 4800, 9600, 19200

Output:

Use this parameter to select the type of communication of the serial interface for the communication unit. WinBin is a visualisation software for recording the echo curve (is used by Service).

Range of adjustment: ASCII, WinBin

RS 232 / 485

Use this parameter to select the type of communication interface.

Range of adjustment: RS 232 / RS 485

5.8 ADVANCED

This function group is used to select whether you want to make all parameters visible or just the parameters of the basic version which suffice for standard operation.

Range of adjustment: ON/OFF

5.9 PASSWORD

This function group can be used to protect menu access with a password of your choice.

6 Commissioning


6.1 Function check



Warning!

- Check all connections for correctness.
- Make sure that the supply voltage is identical to the voltage written on the nameplate!

6.2 Switching on

Familiarise yourself with the operation of the transmitter prior to first switching on the device. For this purpose, read sections 1 "Safety instructions" and 5 "Operation" in particular. After switch-on, the device runs a self-test and then goes to the measuring mode. Press the  key to interrupt the self-test. The main menu appears on the display.

6.3 Quick start-up

6.3.1 Basic settings














In SYSTEM SETUP you select the units and the measure.

For units you can select **m, cm, in, ft**.

For measure you can select:

- **LEVEL**: Display of the sludge level from the bottom of the basin
- **RANGE**: Display of the sludge level from the reference point e.g. water surface

For SYSTEM SETUP proceed as follows:

1. Press the  button as often, till **SYSTEM SETUP** appears in the menu.
2. Press the  button to get to the next level. **Units** and **Measure** appears in the menu.
3. Press the  button several times to select **Units**.
4. Press the  button to get to the units menu. Use the  or  button to select the desired unit and the  button to confirm the selection.
5. Press the  button several times to select **Measure**.
6. Press the  button to get to the measure menu. Use the  or  button to select the desired measure mode and the  button to confirm the selection.
7. Press the  button again to get to the main menu .

6.3.2 Parameter settings

You configure the tank for each measuring point (1 ... 4). The tank configuration consists of:

- the exact **tank depth**: It is measured at the point where the sensor is installed (directly below the sensor). Use the construction drawing to determine the basin depth or measure it directly at the basin. You can measure the basin depth from the water surface, from the basin rim or from any reference point.
- the **zero adjust**: It is the distance between the selected reference point (same reference point as for determining the basin depth) and the lower edge of the sensor.

To select the measuring point proceed as follows:

1. Press the \uparrow button as often, till **Modify points** appears in the menu.
2. Press the \rightarrow button to get to the next level. Measuring points appears in the menu.
3. Press the \uparrow button to select the desired measuring point (1 ... 4 depends on the instrument version).

For the tank configuration proceed as follows:

1. Press the \rightarrow button to get to the **TANK CONFIG** submenu.
2. Select the **Tank depth** with the \uparrow button and press the \rightarrow button to get to the tank depth submenu.
3. Use the \uparrow and \downarrow buttons to enter the tank depth and confirm it with the E button.
4. Select the **Zero adjust** with the \uparrow button and press the \rightarrow button to get to the zero adjust submenu.
5. Use the \uparrow and \downarrow buttons to enter the zero adjust and confirm it with the E button.
6. Use the \uparrow button to select **Reboot track**.
7. Confirm this selection with the E button so often, till Initialisation appears on the display. After the initialisation the display jumps in the digital mode.
8. Repeat the steps 1 ... 7 for each further measuring point.
9. Select with the \uparrow button the desired display mode. After approx. 10 - 15 minutes the transmitter shows stable measured values. The display formats are described in detail in the operating instructions.

6.4 Menu structure and factory settings

Main menu	Function groups		Setting range/ Units	Default setting	Customer setting
SYSTEM SETUP	Measure		LEVEL/RANGE	LEVEL	
	Units		[m] [cm] [in] [ft]	[m]	
	Recall/Save			1	
	No. of points		1 ... 4	1	
MODIFY POINTS	TANK CONFIG	Tank depth	0 ... 100 m 0 ... 328 ft.	0.0 m	
		Zero adjust	-100 ... +100 m -328 ... +328 ft.	+ 0.2 m + 0.66 ft.	
		Dwell time	0 ... 100	5	
		Min. range*	-100 ... +100 m -328 ... +328 ft.	+0.5 m +1.64 ft.	
		Max. range*	0 ... 100 m 0 ... 328 ft.	+0.7 m +2.30 ft.	
	ACOUSTICS	Gain start	0 ... 100 dB	20 dB	
		Auto gain	ON/OFF	ON	
		Sound speed	305 ... 2000 m/s 1000 ... 6560 ft./s	1425 m/s 4674 ft./s	
		Update rate	1 ... 100	10	
		Sum limit*	0 ... 100	25	
		Gain increments*	0.5 ... 5.0	0.5	
		Wall zone AG*	0 ... 200	75	
		SV adjust*	ON/OFF	OFF	
		AG setpoint*	10 ... 50	30	
		Gain band*	1 ... 30	10	
	TRACKING	Algorithm	FIRST/ SECOND/ LAST	FIRST	
		Threshold	0 ... 100	20	
		History	0 ... 200	30	
		G min*	0 ... 10 m 0 ... 32.81 ft.	0.5 m 1.64 ft.	
		G max*	0 ... 10 m 0 ... 32.81 ft.	0.5 m 1.64 ft.	
		Candidates*	0 ... 3	3	
		Sensitivity*	0 ... 100	30	
		Wall zone*	0 ... 100 m 0 ... 328 ft.	0.2 m 0.66 ft.	
		Set zone*	ON/OFF	ON	
		Cell limit*	1 ... 50	1	
		Delta Y coeff*	1 ... 100	30	
	REBOOT TRACK				
MODIFY OUTPUTS	4 ... 20 mA	4 mA setpoint	0 ... 100 m 0 ... 328 ft.	0.5 m 1.64 ft.	
		20 mA setpoint	0 ... 100 m 0 ... 328 ft.	3.8 m 12.47 ft.	

Main menu	Function groups		Setting range/ Units	Default setting	Customer setting
		Trim 4 mA	0 ... 100	0	
		Trim 20 mA	0 ... 100	0	
	RELAYS	ON/OFF	ON/OFF	ON	
		LEVEL			
		Assign to	1 ... 4	1	
		Condition	<= / >=	>=	
		Action	Open/Closed	Open	
		Setpoint	0 ... 100 m 0 ... 328 ft.	0 m	
		Dead band	0 ... 100 m 0 ... 328 ft.	0.3 m 0.98 ft.	
		TIMER			
		Cycle	5 ... 2880 min	120 min	
		Duration	2 ... 1800 s	10 s	
	SERIAL PORTS	Baud rate	1200 ... 56 000 Byte	9600	
		Output	ASCII, WinBin		
		RS 232 / 485	RS 232 / 485	RS 232	
ADVANCED	ON/OFF		ON/OFF	OFF	
PASSWORD	Code number				

* ADVANCED = ON only

6.5 Application-related configuration information

General

For all applications, we recommend first commissioning with the factory settings with the Advanced mode set to OFF.

Please note that when compared to other methods (Ruttner bottle, disk for measuring transparency), deviating results can often occur. This is due to the different ways of using these methods. If you are unsure of whether the ultrasonic measuring system is displaying correct information, we recommend you use a solids probe to determine the distribution of material in the basin.

Primary clarifier / thickener

Experience shows that the factory settings are sufficient for applications in primary clarifiers and thickeners.

Secondary clarifier

If no separation zone is displayed with the factory settings, we recommend the following changes to the settings:

Menu	Parameter	Value
Acoustics	AG setpoint	40
Tracking	Wall zone	0.6 m (1.97 ft.)
Tracking	Set zone	OFF

7 Maintenance

Take all the necessary measures in time to guarantee the operational safety and reliability of the entire measuring system.

Maintenance work at the transmitter comprises:

- Cleaning of transmitter
- Cable and connection check



Warning!

Make sure the device is de-energised before you open it.

If work must be carried out when the device is live, this may only be performed by an electrical technician!



Caution ESD!

- Electronic components are sensitive to electrostatic discharge. Personal protective measures such as discharging at the PE beforehand or permanent grounding with a wrist strap are required.
- For your own safety, use only genuine spare parts. With genuine spare parts, the function, accuracy and reliability are also guaranteed after repair.



Note!

If you have any queries, please contact your local Sales Office.

7.1 Maintenance schedule

Interval	Name	Description
Weekly	Sensor check	Check the sensor for contamination. If necessary, remove any residue from the sensor with spray water and a cloth. Use a soft brush to remove solid build-up.
Weekly	Pump check	Check the pump for contamination. If the pump is contaminated, clean the pump (see 'Cleaning the pump' section).
Annually	Connections	Check that the cable connections are well tightened.

7.2 Cleaning the pump

Please proceed as follows to clean the pump:

1. Switch off the transmitter.
2. Remove the guard from the pump and clean it with water and a brush.
3. Turn the cap (suction side) 90° counter-clockwise and remove the cap.
4. Clean the cap and the impeller with water and a cloth.
5. Mount the impeller, cap and guard.
6. Install the sensor and pump at the measuring point and switch the transmitter on.

7.3 Software update



You can update the software at any time by replacing the EPROM. You need the following tool to do so:

- IC removal and insertion tool 40-pin DIL housing
- Standard tool kit

Please proceed as follows to replace the EPROM:

1. Make a note of your specific parameters.
2. Switch off the transmitter at the mains switch.
3. Open the transmitter housing cover (2 slotted screws).
4. Note the orientation of the EPROM (housing notch).
5. Replace the EPROM with the IC removal and insertion tool.
6. Screw down the housing cover.

After replacing the EPROM, you must proceed as follows when you first switch on the transmitter:

1. Press **and hold down** the  key.
2. Switch on the transmitter.
3. Let the  key go after 3 seconds.
4. Enter the desired parameters.



Note!

The version of the EPROM depends on the serial number of the power supply board. You will find the serial number in the lower left corner of the power supply board (near X7). Please supply this serial number together with your order.

7.4 Spare parts

The following spare parts are available for the CUM750/CUS70 measuring system:

Cleaning pump:

Supply voltage	Order number
230 V AC	51505307
115 V AC	51505308

Fixing bracket for the cleaning pump:

Order number: 51508369

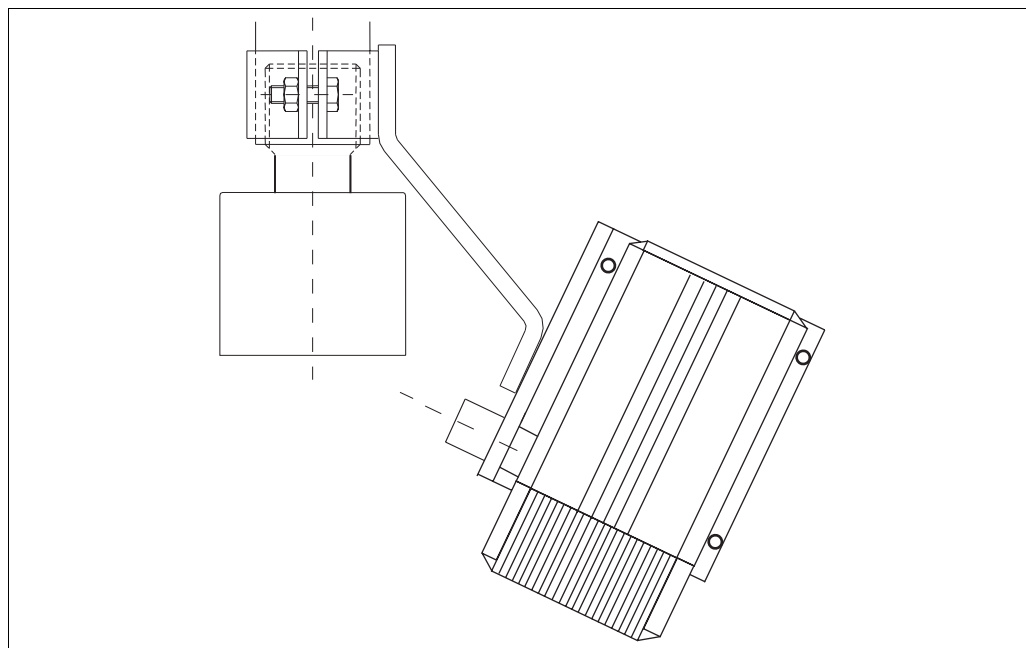


Abb. 19: Cleaning pump with fixing bracket

- Kit CUM750 filter + grid for the cleaning pump; order no: 51507485
- Kit CUM750 processor board (without software); order no: 51518393
- Kit CUM750 power supply board (with power supply); order no: 51518394
- Kit CUM750 power supply board (without power supply); order no: 51518395
- Kit CUM750 power supply; order no: 51518654
- Kit CUM750 TX/RX board; order no: 51518396
- Kit CUM750 LC display complete; order no: 51518397
- Kit CUM750 housing NEMA 4x; order no: 51518400
- Kit CUM750 switch, membrane; order no: 51518401
- Kit CUM750 software DE for SNR < 2000; order no: 51518402
- Kit CUM750 software EN for SNR < 2000; order no: 51518403
- Kit CUM750 software DE for SNR > 2000; order no: 51518404
- Kit CUM750 software EN for SNR > 2000; order no: 51518405

8 Accessories

- Weather protection cover CYY101 for mounting on the field device, absolutely essential for operation in the open air
 Material: stainless steel 1.4031;
 Order No. CYY101-A

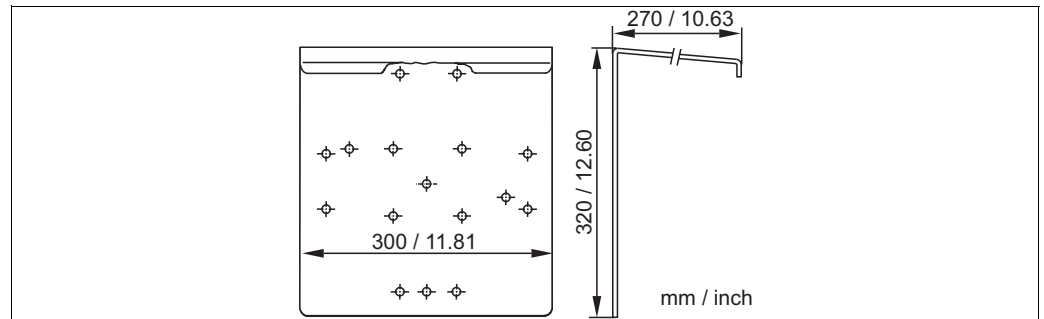


Fig. 20: Weather protection cover

- Universal upright post CYY102
 Square post for mounting of field housing, material: stainless steel 1.4301;
 order no. CYY102-A

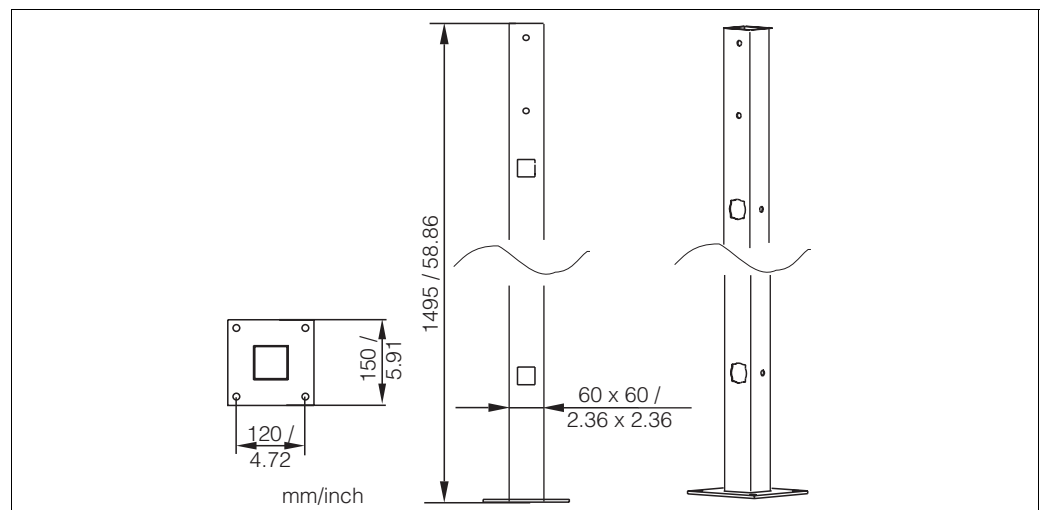


Fig. 21: Square post CYY102

- Wall bracket for immersion tube DN 40, 300 mm (11.81 ") wall clearance
 Order No.: 51503581
- Railing bracket for CUS70 with 300 mm (11.81 ") wall clearance
 Order No.: 51503582
- Railing bracket for CUS70 with 300 mm (11.81 ") wall clearance
 Weather protection cover
 Order No.: 51503583
- Immersion tube DN 40, stainless steel
 Length 2 m (6.56 ft.); Order No.: 51504162
 Length 3 m (9.84 ft.); Order No.: 51504163

9 Technical data

9.1 Input

Measured variable	Height measurement
Measuring principle	Ultrasonic measurement
Frequency	657 Hz
Wavelength	0.2 cm (0.79")
Measuring beam angle	6°
Dead zone (blocking distance)	30 cm (11.81")
Measuring range	0.3 ... 100 m (0.98 ... 328 ft.)
Signal resolution	0,03 m (1.18 ft.)
Accuracy	±1 % of measuring range

9.2 Output

Output signal	0/4 ... 20 mA for height measurement
Number of signal outputs	max. 4
Load	max. 500 Ω
Switching outputs	4 relay contacts
Switching capacity	10 A at 115/230 V AC, 10 A at 30 V DC
Serial ports	RS 232, RS 485

9.3 Power supply

Supply voltage	115/230 V AC, 50/60 Hz +6 ... -10 %
Power consumption	max. 40 VA
Mains fuse	Fine-wire fuse, quick-blow, F 1 A

9.4 Environment

Ambient temperature range	-20 ... +50 °C (-4 ... +122 °F)
Degree of protection	IP 65

9.5 Mechanical construction

Dimensions	L x W x D: 265 x 227 x 160 mm (10.43 x 8.94 x 6.30 ")	
Weight	Approx. 4 kg (8.8 lb.)	
Material	Housing:	Fibre-glass reinforced polyester
	Window	Plexiglas®

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Declaration of Contamination

Erklärung zur Kontamination

Because of legal regulations and for the safety of our employees and operating equipment, we need the "declaration of contamination", with your signature, before your order can be handled. Please make absolutely sure to include it with the shipping documents, or - even better - attach it to the outside of the packaging.

Aufgrund der gesetzlichen Vorschriften und zum Schutz unserer Mitarbeiter und Betriebseinrichtungen, benötigen wir die unterschriebene "Erklärung zur Kontamination", bevor Ihr Auftrag bearbeitet werden kann. Legen Sie diese unbedingt den Versandpapieren bei oder bringen Sie sie idealerweise außen an der Verpackung an.

Type of instrument / sensor

Geräte-/Sensortyp _____

Serial number

Seriennummer _____

Process data / Prozessdaten

Temperature / Temperatur _____ [°C] Pressure / Druck _____ [Pa]

Conductivity / Leitfähigkeit _____ [S] Viscosity / Viskosität _____ [mm²/s]

Medium and warnings

Warnhinweise zum Medium



	Medium /concentration <i>Medium /Konzentration</i>	Identification CAS No.	flammable <i>entzündlich</i>	toxic <i>giftig</i>	corrosive <i>ätzend</i>	harmful/ irritant <i>gesundheitsschädlich/ reizend</i>	other * <i>sonstiges *</i>	harmless <i>unbedenklich</i>
Process medium <i>Medium im Prozess</i>								
Medium for process cleaning <i>Medium zur Prozessreinigung</i>								
Returned part cleaned with <i>Medium zur Endreinigung</i>								

* explosive; oxidising; dangerous for the environment; biological risk; radioactive

* *explosiv; brandfördernd; umweltgefährlich; biogefährlich; radioaktiv*

Please tick should one of the above be applicable, include security sheet and, if necessary, special handling instructions.

Zutreffendes ankreuzen; trifft einer der Warnhinweise zu, Sicherheitsdatenblatt und ggf. spezielle Handhabungsvorschriften beilegen.

Reason for return / Grund zur Rücksendung

Company data / Angaben zum Absender

Company / Firma _____	Contact person / Ansprechpartner _____
_____	Department / Abteilung _____
Address / Adresse _____	Phone number/ Telefon _____
_____	Fax / E-Mail _____
_____	Your order No. / Ihre Auftragsnr. _____

We hereby certify that the returned parts have been carefully cleaned. To the best of our knowledge they are free from any residues in dangerous quantities.

Hiermit bestätigen wir, dass die zurückgesandten Teile sorgfältig gereinigt wurden, und nach unserem Wissen frei von Rückständen in gefährbringender Menge sind.

(place, date / Ort, Datum)

(Company stamp and legally binding signature)
(Firmenstempel und rechtsverbindliche Unterschrift)

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