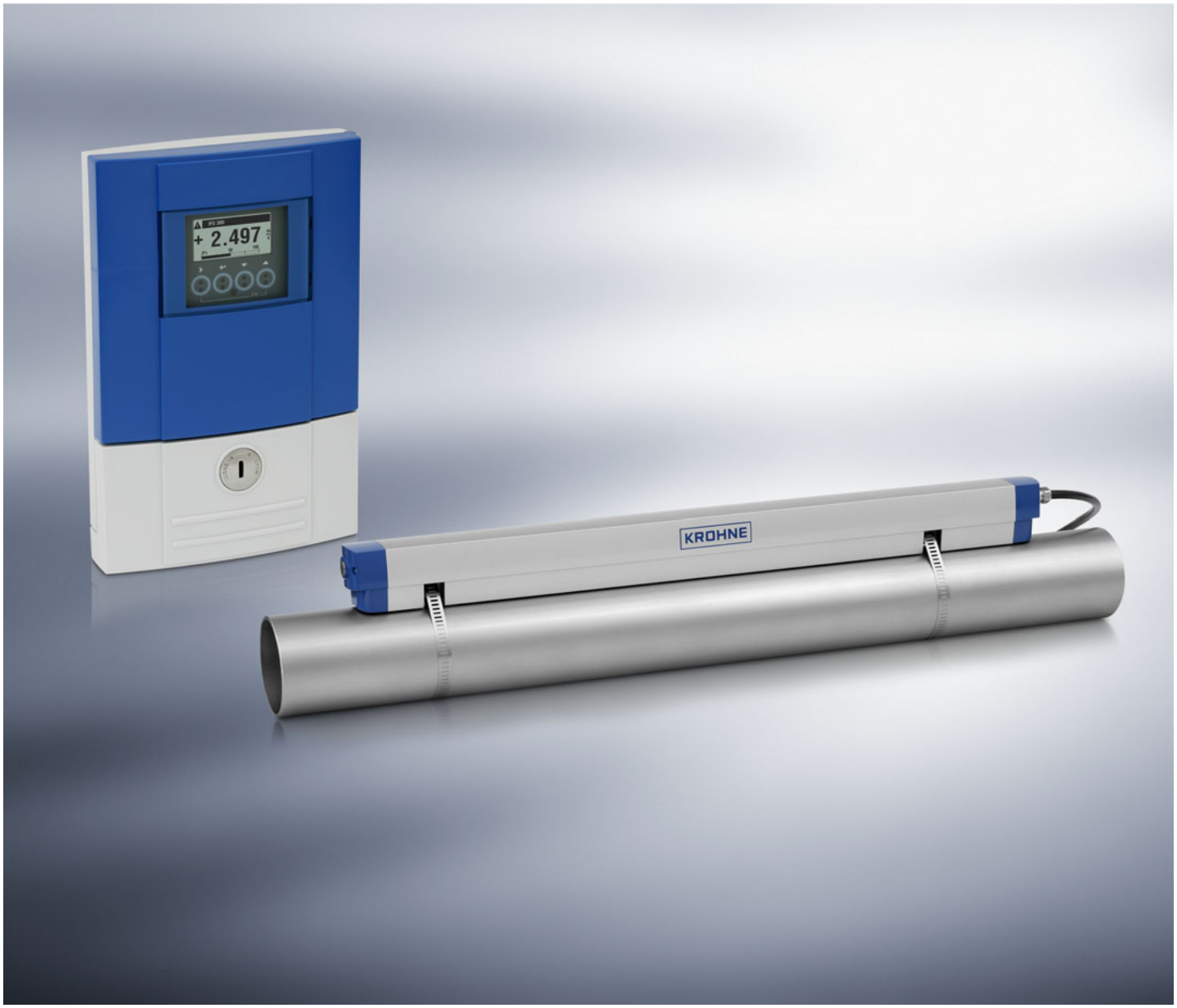


OPTISONIC 6300

Handbook

Ultrasonic clamp-on flowmeter

KROHNE

IMPRINT

1.1 Intended use

The OPTISONIC 6300 is an ultrasonic clamp-on flowmeter that can be fitted on the outside of piping to measure the flow rate of liquids.
The OPTISONIC 6300 is a combination of one up to three OPTISONIC 6000 Clamp-on sensor(s) and one UFC300 ultrasonic flow converter.

OPTISONIC 6000 + UFC 300 = OPTISONIC 6300

The overall functionality of the KROHNE OPTISONIC 6300 clamp-on flowmeter is the continuous measurement of actual volume flow, mass flow, flow speed, velocity of sound, gain, SNR and diagnosis value.

1.2 Certification

CE

In accordance with KROHNE's commitment to customer service and safety, the OPTISONIC 6300 clamp-on flowmeter, described in this handbook meets the following safety requirements:

- EMC Directive 89 / 336 / EEC and 93 / 68 / EEC in conjunction with EN 61326-1 (1997) and A1 (1998), A2 (2001)
- Low-Voltage Directives 73 / 23 / EEC and 93 / 68 / EEC in conjunction with EN 61010-1: 2001

All devices are based on the CE marking and meet the requirements of NAMUR Guideline NE 21 / 04 with UFC 300 signal converter.

1.3 Safety instructions from the manufacturer

This document contains important information on the product. KROHNE attempts to be as accurate and up-to-date as possible but accept no responsibility for errors or omissions. Nor does KROHNE make any commitment to update the information contained herein. This document and all other documents are subject to change without prior notice.

1.3.1 Disclaimer

KROHNE will not be liable for any damage of any kind by using its product, including, but not limited to direct, indirect, incidental, punitive and consequential damages.

This disclaimer does not apply in case KROHNE has acted on purpose or with gross negligence. In the event any applicable law does not allow such limitations on implied warranties or the exclusion of limitation of certain damages, you may, if such law applies to you, not be subject to some or all of the above disclaimer, exclusions or limitations.

Any product purchased from KROHNE is warranted in accordance with the relevant product documentation and our Terms and Conditions of Sale.

KROHNE reserves the right to alter the content of its documents, including this disclaimer in any way, at any time, for any reason, without prior notification, and will not be liable in any way for possible consequences of such changes.

1.3.2 Product liability and warranty

Ultrasonic flowmeters from KROHNE are designed solely for measuring the flow rate and the velocity of sound of process liquids.

Responsibility as to suitability and intended use of these ultrasonic flowmeters rests solely with the operator. The supplier does not accept any liability resulting from misuse by the operator. Improper installation and operation of the flowmeters (systems) may lead to loss of warranty. In addition, the “General conditions of sale“ which forms the basis of the purchase agreement are applicable.

1.3.3 Information concerning the documentation

To prevent any injury to the user or flowmeter it is essential that you read the information in this document and observe applicable national standards, safety requirements and accident prevention regulations.

If this document is not in your native language and if you have any problems understanding the text, we advise you to contact your local KROHNE office for assistance. KROHNE can not accept responsibility for any damage or injury caused by misunderstanding of the information in this document.

This document is provided to help you establish operating conditions, which will permit safe and efficient use of this flowmeter. Special considerations and precautions are also described in the document, which appear in the form of underneath pictograms.

1.3.4 Display conventions

The following symbols are used to help you navigate this documentation more easily:

DANGER!

These warning signs must be observed without fail. Even only partial disregarding such warnings can result in serious health damage, damage to the flowmeter itself or to parts of the operator's plant.

DANGER!

This symbol designates safety advice on handling electricity.

INFORMATION!

This symbol designates important information for the handling of the device.

LEGAL NOTICE!

This symbol designates information on statutory directives and standards.

CAUTION!

l HANDLING

This symbol designates all instructions for actions to be carried out by the operator in the specified sequence.

i CONSEQUENCE

This symbol designates all important consequences of the previous actions.

1.4 Safety instructions for the operator

CAUTION!

In general, devices from KROHNE may only be installed, commissioned, operated and maintained by properly trained and authorized personnel.

This document is provided to help you establish operating conditions, which will permit safe and efficient use of this device.

2.1 Scope of delivery

INFORMATION!

Check the packing list to see if you have received all that you require.
The OPTISONIC 6300 will arrive in two cartons. The square carton contains the UFC 300 converter. The rectangular carton contains the OPTISONIC 6000 transducer set.

NOTE!

Inspect the cartons carefully for damage or signs of rough handling. Report damage to the carrier and to your local KROHNE office.

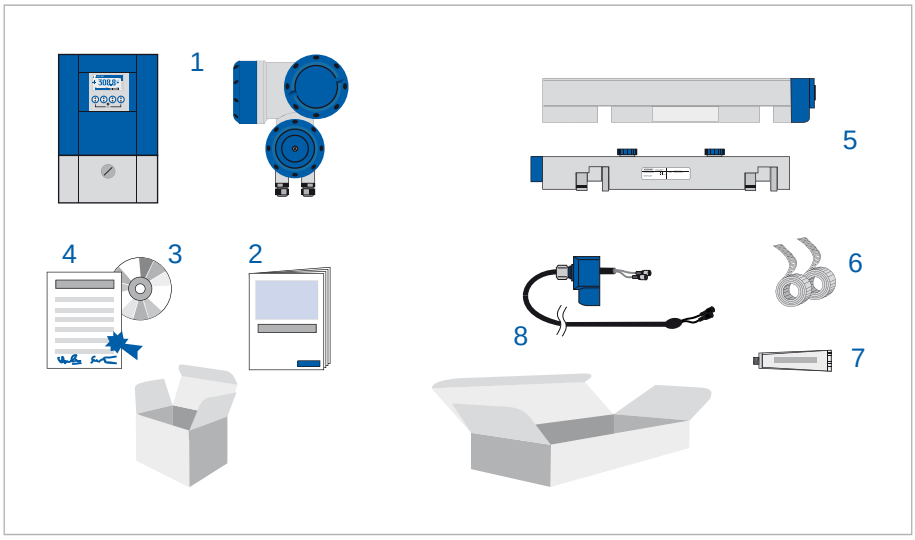


Figure 2-1: Scope of delivery

1 Signal converter in ordered version, wall version (standard) or field version (optional)
2 Quick Start
3 CD-ROM (including Handbook, Quick Start, Technical Datasheet, Support database, movie)
4 Factory calibration report
5 Transducer set in the version as ordered (standard: OPTISONIC 6000 – medium) including 1 rail with 2 integrated transducers and 2 integrated rattle units and 1 cover including end cap
6 2 packages of metal strap
7 Coupling grease as ordered (standard: mineral grease)
8 Signal cable in the length as ordered (standard: 5 m / 16.4 ft) and connector cap

INFORMATION!

No special tools, no training required!

2.2 Instrument description

The OPTISONIC 6300 is an ultrasonic clamp-on flowmeter that can be fitted on the outside of piping to measure the flow rate of liquids.
The OPTISONIC 6300 is a combination of one up to three OPTISONIC 6000 Clamp-on sensor(s) and one UFC 300 ultrasonic flow converter.

OPTISONIC 6000 + UFC 300 = OPTISONIC 6300

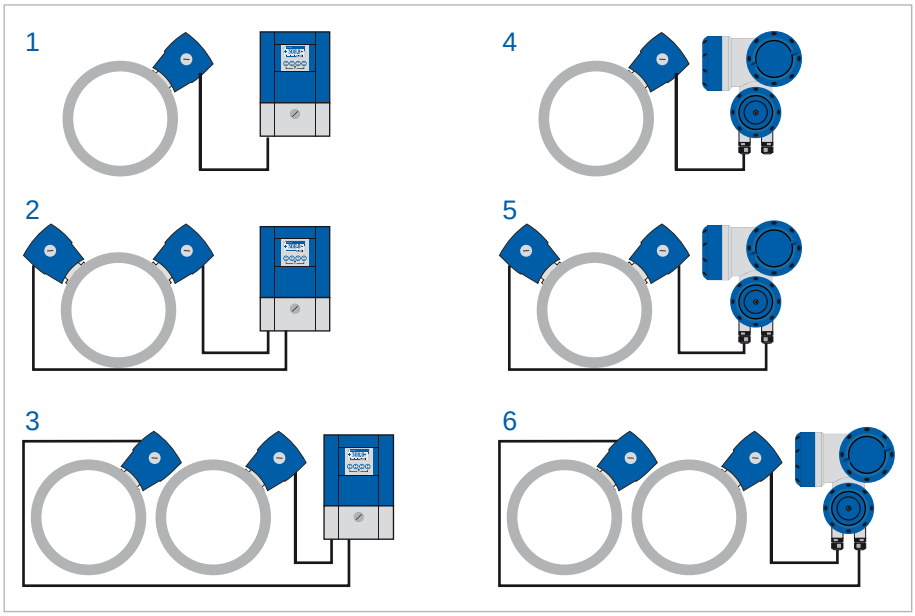


Figure 2-2: System configuration possibilities

1 1 path; 1 pipe; wall housing
2 2 paths; 1 pipe; wall housing
3 2 paths; 2 pipes; wall housing
4 1 path; 1 pipe; field housing
5 2 paths; 1 pipe; field housing
6 2 paths; 2 pipes; field housing

For the OPTISONIC 6300 underneath accessories can be ordered optionally:

- GDC interface set (part number: XN0002100)
- SoundCheck (part number: 5316447200)
- Coupling grease; mineral (part number: X380030100)

2.3 Nameplate

NOTE!

Please check on the device nameplates, that the device is supplied according to your order. Check for the correct mains voltage printed on the nameplate. If not, contact your local KROHNE representative for advice.

2.3.1 OPTISONIC 6000

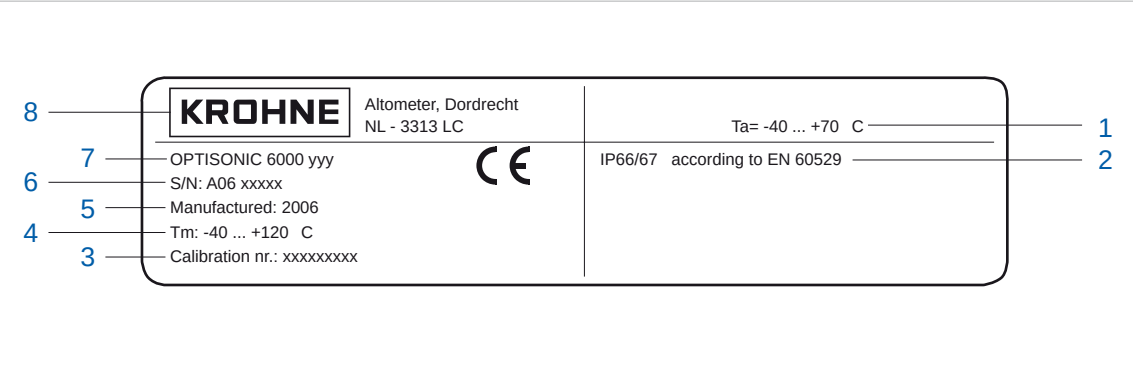


Figure 2-3: Nameplate OPTISONIC 6000 - rail

1 Ambient temperature
2 Protection category
3 Calibration number
4 Process temperature
5 Manufacturing year
6 Serial number
7 Device type (yyy = small, medium or large)
8 Manufacturer

2.3.2 UFC 300 Signal converter

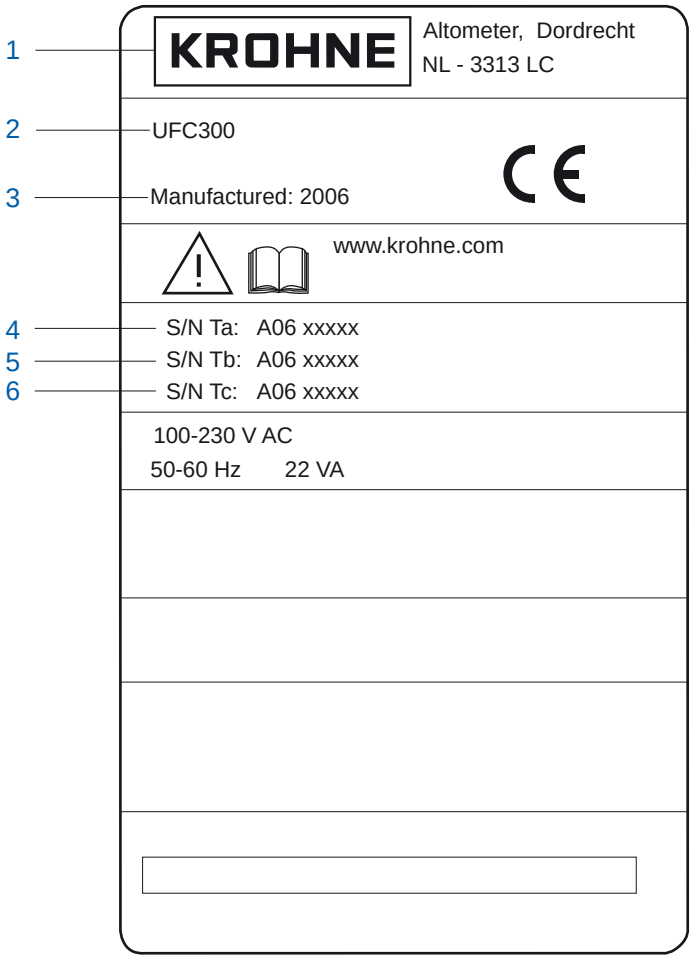


Figure 2-4: Nameplate UFC 300

1 Manufacturer
2 Device type
3 Manufacturing year
4 Serial number OPTISONIC 6000 sensor 1
5 Serial number OPTISONIC 6000 sensor 2
6 Empty

2.3.3 Coding for I/O assemblies

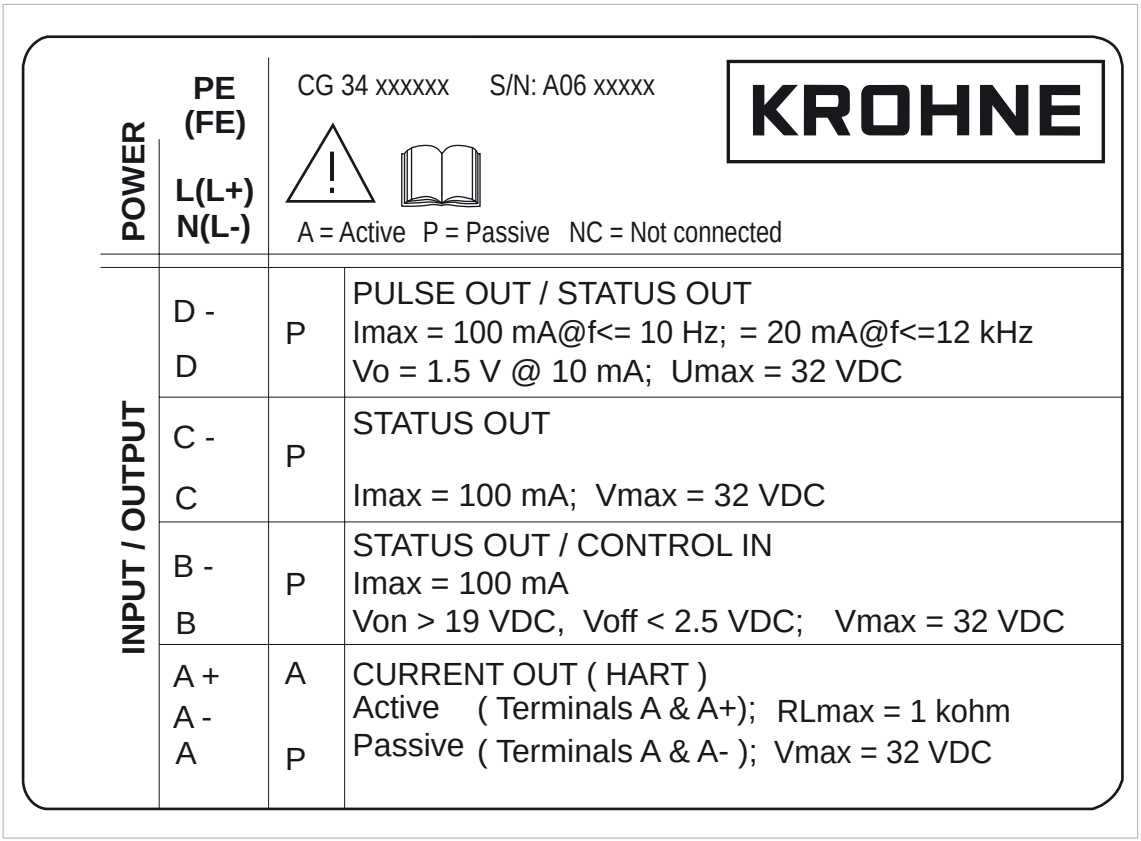


Figure 2-5: Nameplate inputs / outputs

3.1 Pre-installation requirements

NOTE!

To assure a quick, safe and uncomplicated installation, we kindly request you to make provisions as stated below.

3.1.1 Environmental requirements

- Pollution degree 2
- Protection class I
- Humidity: 5...80 % RH
- Temperature: –40…+65°C / -40…+149°F operating and –50…+70°C / -58…+158°F storage
- Suitable for indoor and outdoor use and certified for operating up to an altitude of 2000 m / 6562 ft
- IP class 66/67

CAUTION!

The OPTISONIC 6300 should be protected from corrosive chemicals or gases and dust / particles accumulation.

3.1.2 Installation requirements

- Allow 10…20 cm / 3.9…7.9" of space at the sides and rear of the UFC 300 signal converter to permit free air circulation.
- Protect UFC 300 signal converter against direct solar radiation, install a sunshield if necessary.
- Signal converters installed in switchgear cabinets require adequate cooling, e.g. by fan or heat exchanger.
- Do not expose the UFC 300 signal converter to intense vibration.

NOTE!

For detailed information please also refer to *Dimensions and weights* on page 95.

3.2 General installation notes

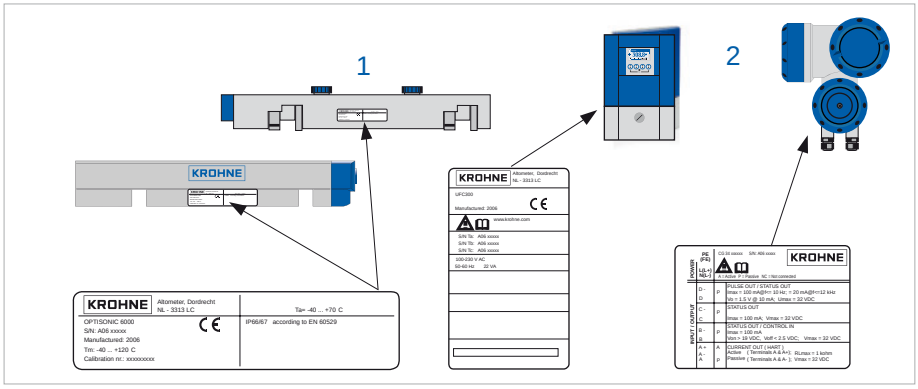


Figure 3-1: Visual check

1 Rail

2 Signal converter

The following procedures have to be carried out before installing the flowmeter!

- Check the packing and the flowmeter itself for any damage.
- Check the contents of the consignment for completeness.
- Compare your order specification with the scope of delivery.
- Check nameplates at rail 1 and the signal converter 2

3.3 Storage

- Store the flowmeter in a dry and dust-free location.
- Avoid lasting direct exposure to the sun.
- Store the flowmeter in its original packing.

3.4 Transport

No special requirements.

3.5 Installation requirements

NOTE!

To avoid measuring errors and malfunctioning of the flowmeter due to gas or air inclusions or an empty pipe, please observe the following precautions.

CAUTION!

Since gas will collect at the highest point of a pipe, installation of the flowmeter at that location should be avoided at all times. Also installation in a down going pipe should be avoided since a completely filled pipe may not be guaranteed due to cascading affects. Additionally flow profile distortion is possible.

3.5.1 Inlet, outlet and recommended mounting area

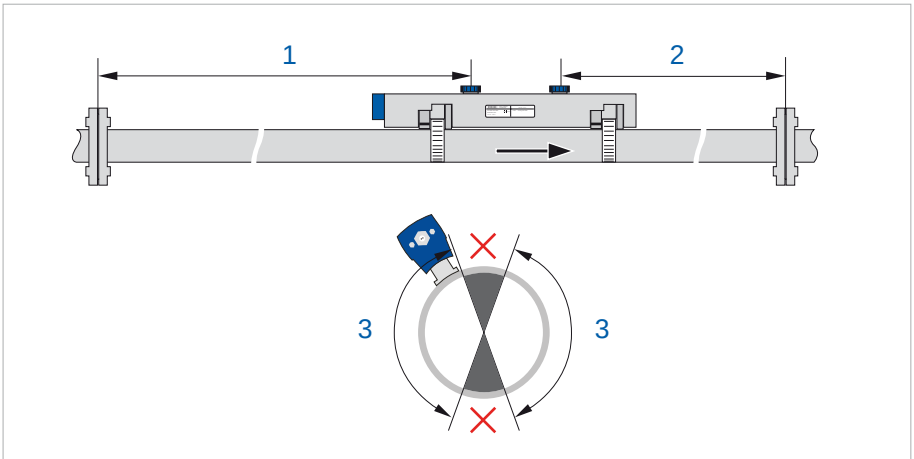


Figure 3-2: Inlet, outlet and recommended mounting area

1 Min. 10 DN

2 Min. 5 DN

3 OK

3.5.2 Long horizontal pipes

- Install on slightly ascending pipe section.
- If not possible, ensure adequate velocity to prevent air, gas or vapor from collecting in upper part.
- In partially filled pipes, the clamp-on flowmeter will report incorrect flow rates, or not measure.

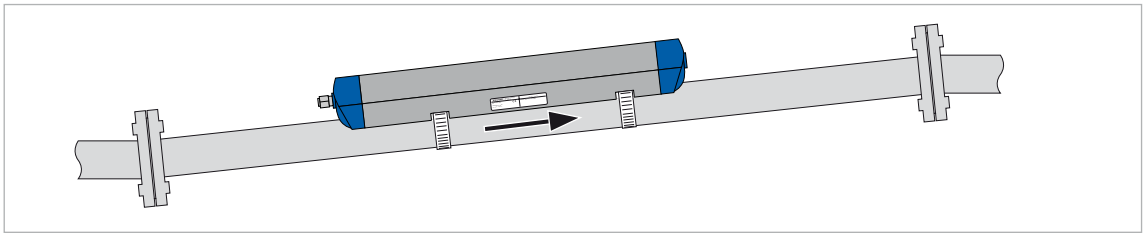


Figure 3-3: Long horizontal pipes

3.5.3 Open feed or discharge

Install meter on a lowered section of the pipe to ensure a full pipe condition through the meter.

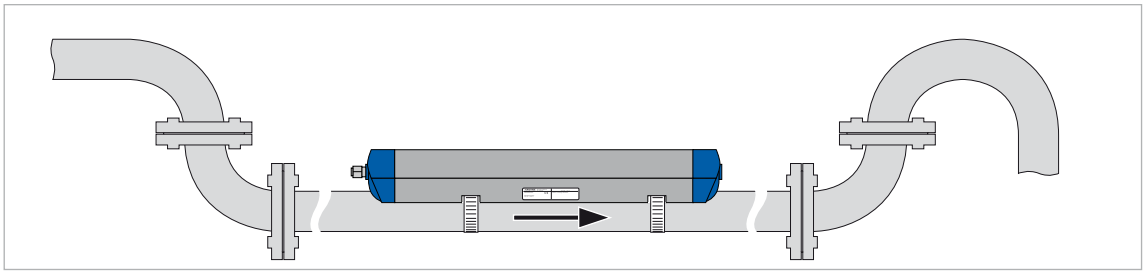


Figure 3-4: Open feed or discharge

3.5.4 Down going pipeline over 5 m /16 ft length

Install air vent downstream of the flow meter to prevent vacuum. Although this will not harm the meter, it may cause gases to come out of solution (cavitate) and interfere with proper measurements.

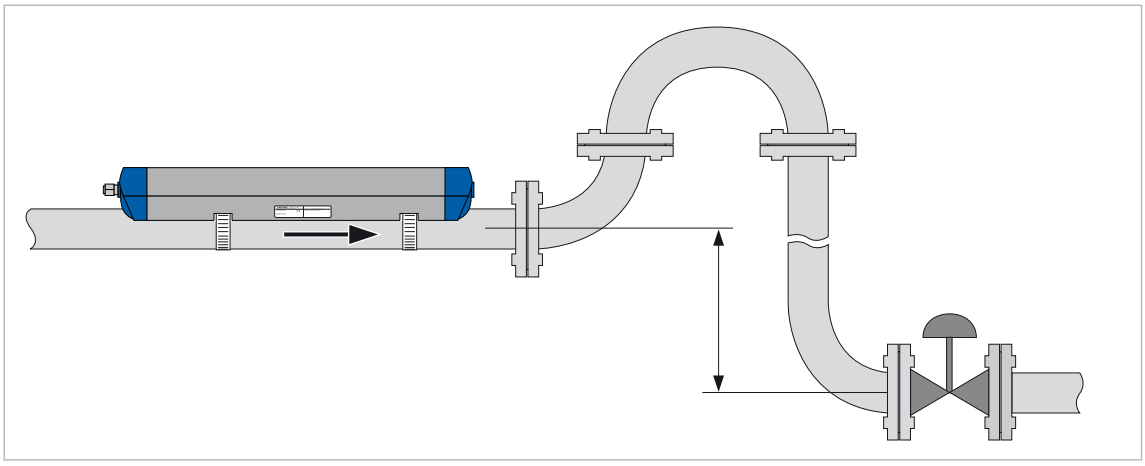


Figure 3-5: Down going pipeline over 5 m /16 ft length

3.5.5 Position of control valve

Always install control valves downstream of flowmeter in order to avoid cavitation or distortion of flow profile.

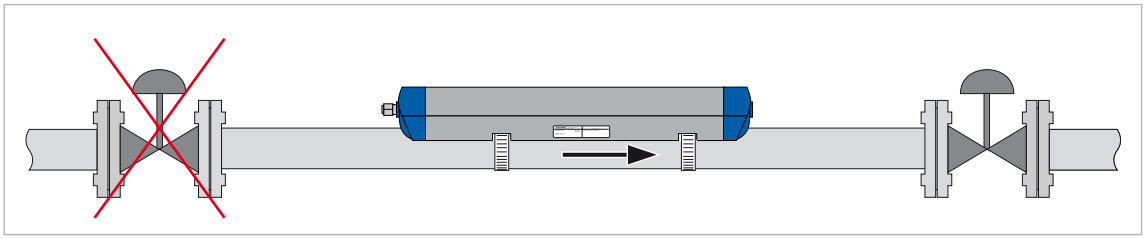


Figure 3-6: Position of control valve

3.5.6 Position of pump

CAUTION!

Never install flowmeter at a pump suction side in order to avoid cavitation or flashing in the flowmeter.

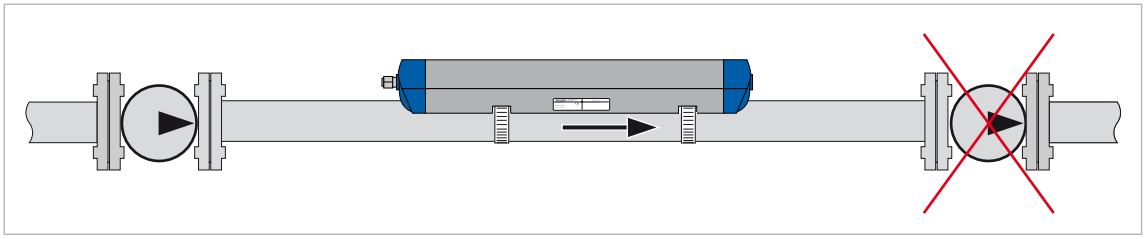


Figure 3-7: Position of pump

3.5.7 Pipe diameters and transducer construction

Sensor type	Diameter range	Supported modes	Transducer construction
Small	DN15…100 / 0.5…4"	2 and 4 traverses (V and W mode)	transducer pair integrated in rail
Medium	DN50…400 / 2…16"	2 and 4 traverses (V and W mode)	transducer pair integrated in rail
Large	DN200…4000 / 8…160"	1 and 2 traverses (Z and V mode)	each transducer in separate rail

Table 3-1: Pipe diameters and transducer construction

3.5.8 Pipe and media parameters

NOTE!

Detailed databases of most pipe and media parameters are on the supplied CD.

3.6 Installation

3.6.1 General installation notes

NOTE!

No special tools for installing the mechanical part of this clamp-on flowmeter are required. An ordinary screw driver and Allen key are sufficient

3.6.2 Installation of rail with metal straps

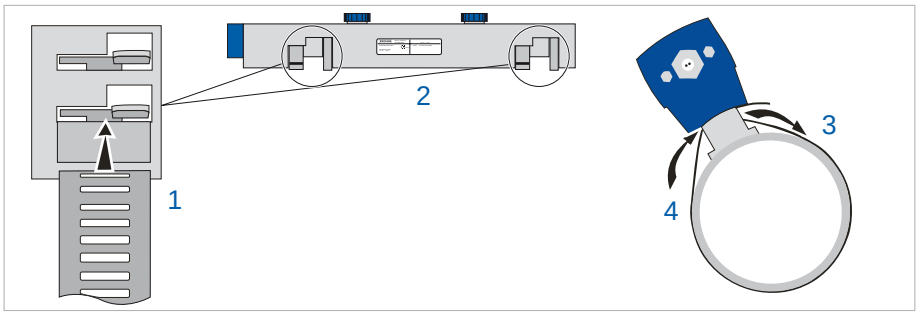


Figure 3-8: Installation step 1...4

- Clean pipe location and make sure that dust, grease, liquid and/or loose paint are removed
- Take metal strap 1 and rail 2 from the package and click metal strap 1 into integrated rattle unit.
- Position the rail with metal strap to the desired location in the correct flow direction.
- Mount metal strap around pipe 3 and click end of the metal strap into the slide at the back side of the integrated rattle unit. 4

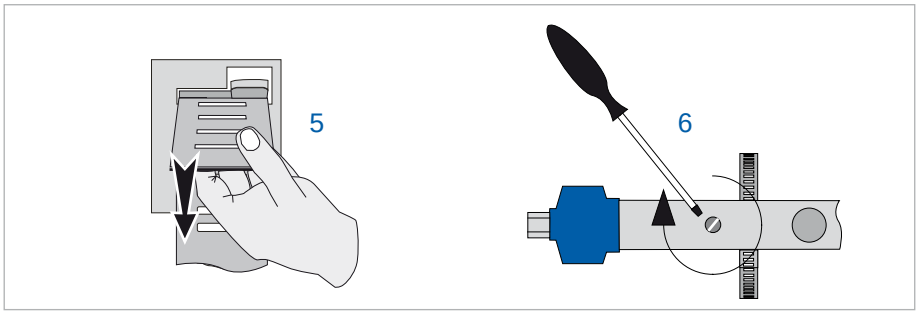


Figure 3-9: Installation step 5...6

- Pull metal strap moderately by hand. 5
- Secure rail to the pipe with screw using a screw driver. 6

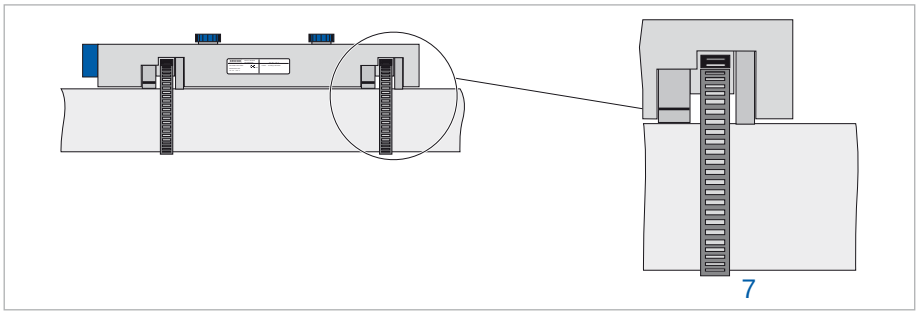


Figure 3-10: Installation step 7

- Repeat steps 1…6 at the other side of rail. 7

3.7 Mounting of Converter

CAUTION!

Always use the supplied KROHNE signal cable.

3.7.1 Mounting of UFC 300 F

The following procedures have to be carried out:

- Mount UFC 300 F with mounting plate on wall or standpipe.
- Keep distance between OPTISONIC 6000 transducer set and signal converter as short as possible
- Observe max. allowed length of 30 m / 98.4 ft for the signal cable

3.7.2 Mounting of UFC 300 W

The following procedures have to be carried out:

- Remove aluminium mounting plate from rear of the signal converter, and attach to wall or standpipe.
- Mount signal converter.
- Position lock washers and nuts on the housing bolts, tighten nuts slightly.
- Align housing, tighten nuts firmly.
- Observe max. allowed length of 30 m / 98.4 ft for the signal cable.

4.1 Safety instructions

CAUTION!

All work on the flowmeter electrics may only be carried out by appropriately trained personnel. The regional occupational health and safety directives and safety regulations must be observed without exception.

DANGER!

All work on the electrical connections may only be carried out with the power disconnected. Take note of the voltage data on the nameplate!

DANGER!

Observe national installation regulations!

4.2 Construction of the various housing versions

4.2.1 UFC 300 F

The terminal compartments are accessible after unscrewing cover 2 and 6.

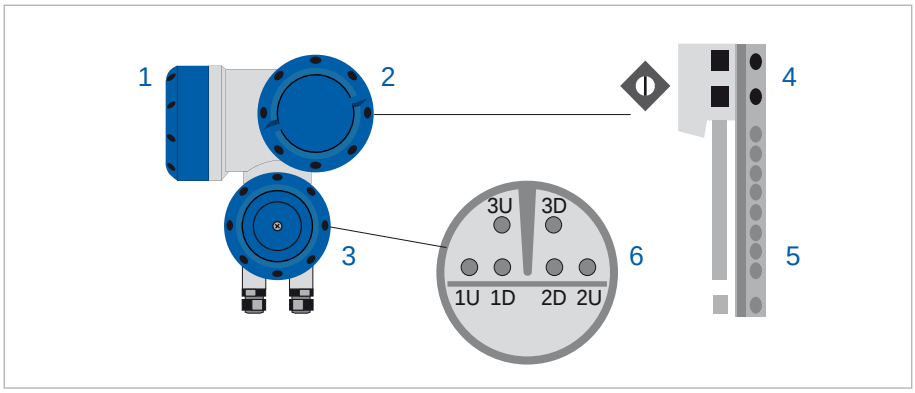


Figure 4-1: Construction of UFC 300 F (field)

1 Cover, electronics compartment
2 Cover, terminal compartment for power supply and inputs/outputs
3 Cover, sensor terminal compartment
4 Cable entry for power
5 Cable entry for inputs/outputs
6 Cable entry for sensor cable

Turning display of UFC 300 F

The display of the UFC 300 F can be turned in steps of 90°.

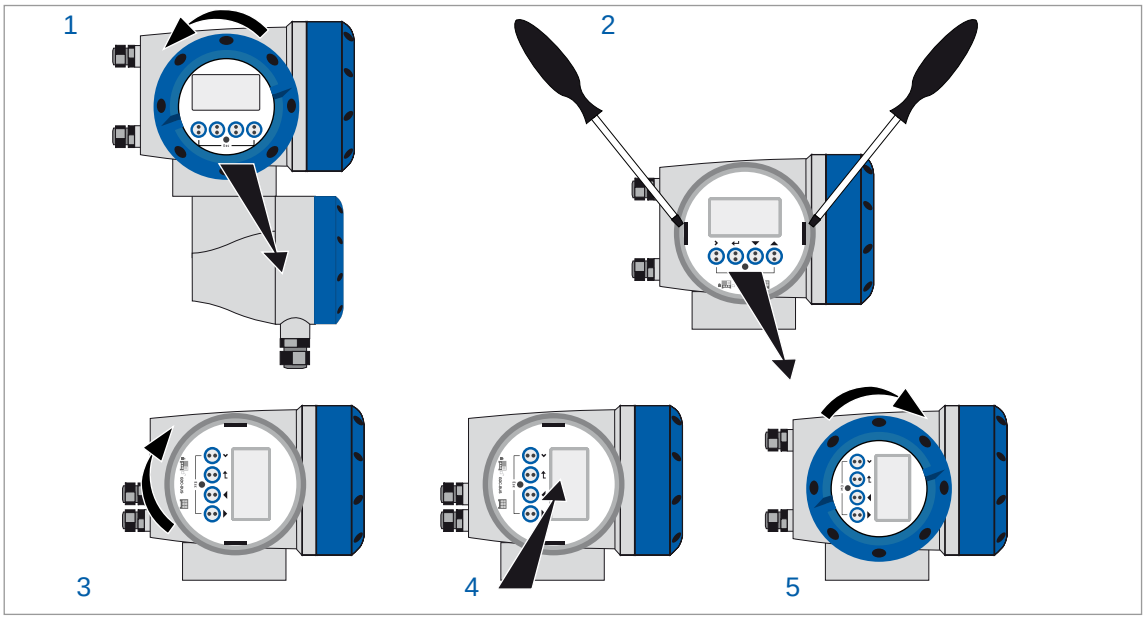


Figure 4-2: Turning display of UFC 300 F (field)

To do this,

- Unscrew the cover of the electronics compartment 1.
- Pull the two metal clips to the left and right of the display 2, using a screwdriver or similar tool.
- The display between the metal clips can then be pulled off and re-inserted in the required position 3 and 4.
- Replace cover and tighten down by hand 5.

CAUTION!

Before pushing back the clips simultaneously with the display into the electronics compartment, make sure not to kink the display's flat ribbon cable more than absolutely necessary.

NOTE!

Cover threads need to be protected from dirt and well greased at all times.

4.2.2 UFC 300 W

The terminal compartments are accessible after opening cover 2.

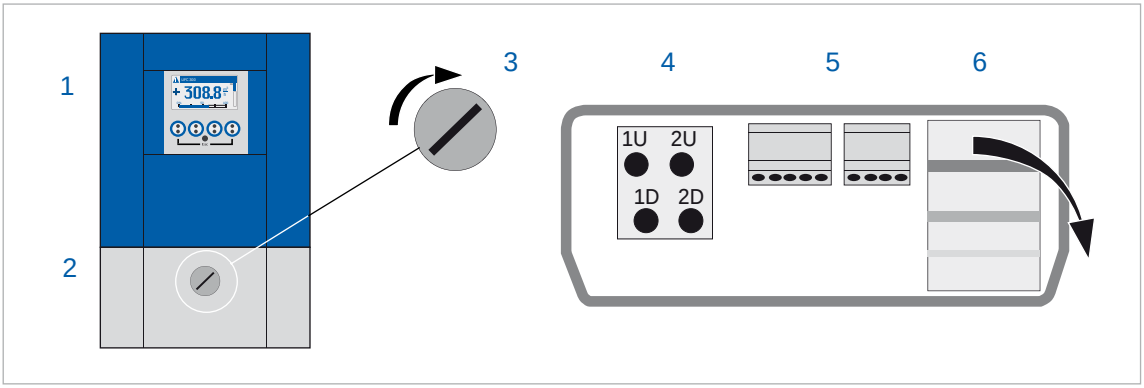


Figure 4-3: Construction of UFC 300 W (remote)

1 Cover, electronics compartment
2 Cover for the three separate terminal compartments for power, sensor connection and inputs/outputs
3 Locking screw, 1/2 turn left/right to open/close cover 2
4 Sensor terminal compartment
5 Terminal compartment for inputs/outputs
6 Power terminal compartment, open separate shock-hazard protection cover

4.3 Electrical connection

- The UFC 300 signal converter is connected to the OPTISONIC 6000 transducer set via a single signal cable.
- Proper functioning is ensured when using this factory supplied signal cable.

INFORMATION!

The signal cable must be connected to the transducer terminal compartment of the UFC 300, taken into account the appropriate labelling.

4.3.1 OPTISONIC 6000, signal cable

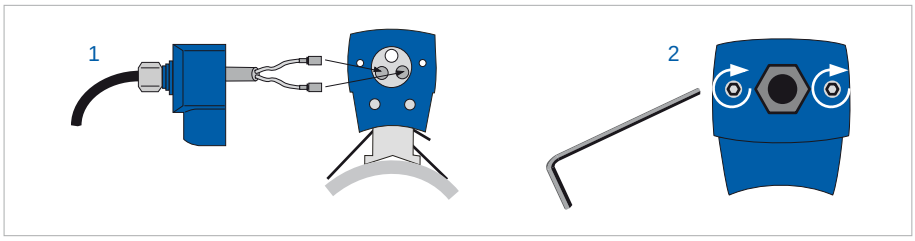


Figure 4-4: Connect signal cable

To do this,

- Take the signal cable with attached connector cap and connect the internal coax cable with identification “up” to the connector at the back of the rail with identification “up” . 1
- Repeat step above for the coax connection with identification “dn”.
- Connect connector cap to the rail; secure the 2 socket screws using an Allen key size 4. 2
- Mount converter with mounting plate on wall; keep distance between transducer rail and converter as short as possible.
- Connect signal cable to the converter according to wiring diagram.

4.3.2 UFC 300, power supply

NOTE!

The power terminals in the terminal compartments equipped with additional hinged lids to prevent accidental contact.

DANGER!

Signal converter must be properly grounded to avoid personnel shock hazard. All directions, operating data and connection diagrams do not apply to devices used in hazardous areas.

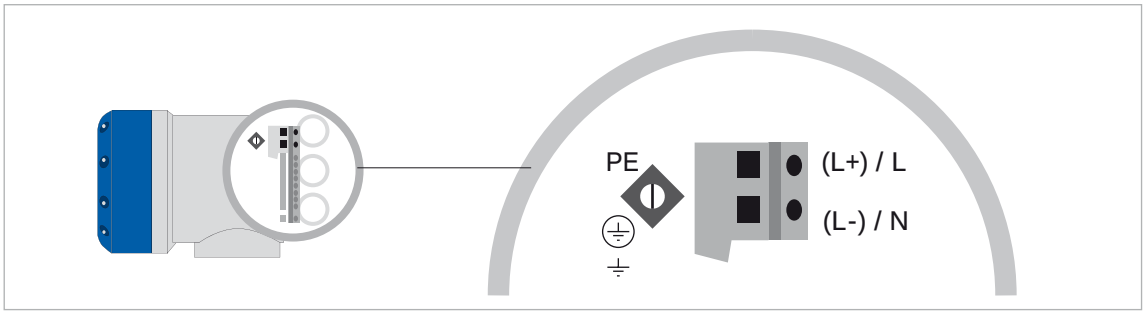


Figure 4-5: UFC 300 F, power supply

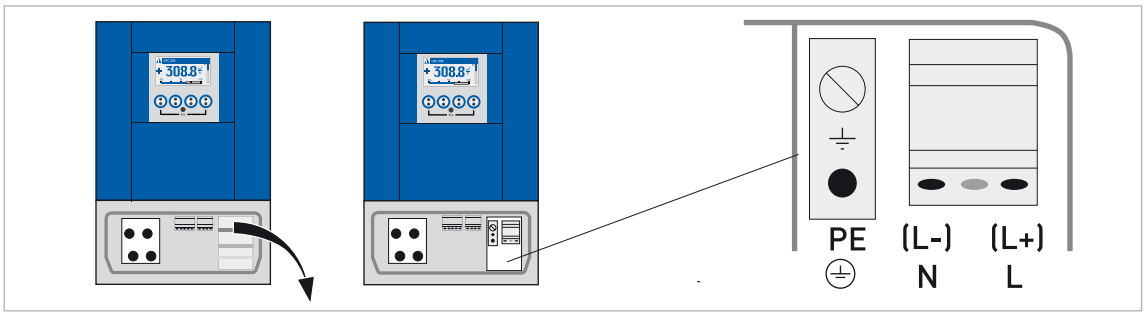


Figure 4-6: UFC 300 W, power supply

100…230 VAC (-15% / +10%)

- The protective ground conductor PE of the power supply is connected to the separate terminal in the terminal compartment of the signal converter.

12…24 VAC/DC (24 VAC: +10% / -15%, 50/60 Hz; 24 VDC: +30% / -25%)

- For reasons to do with the measurement process, connect a functional ground FE to the separate U-clamp terminal in the terminal compartment of the signal converter.
- When connecting to functional extra-low voltages, provide a facility for protective separation (PELV) (VDE 0100 / VDE 0106 and/or IEC 364 / IEC 536 or relevant national regulations).

4.3.3 UFC 300, signal cable

CAUTION!

Connect coax cables and follow indications up/down (1U 1D; 2U 2D; 3U 3D).

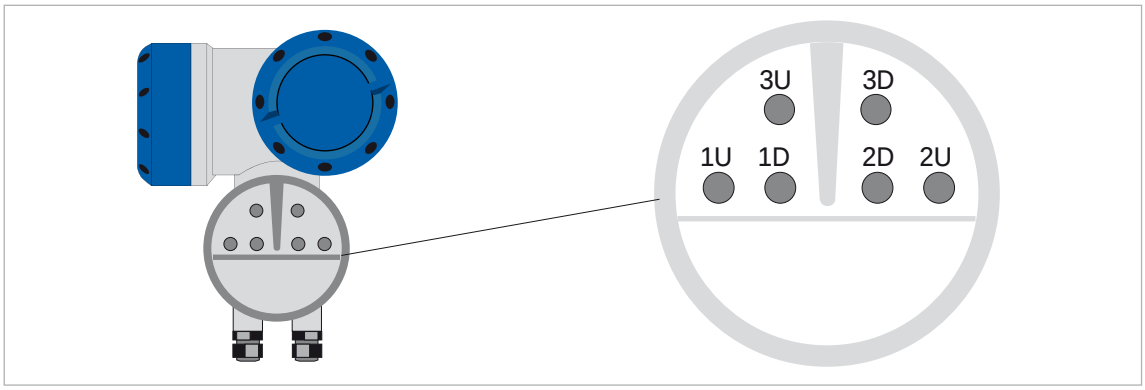


Figure 4-7: UFC 300 F, connect signal cable

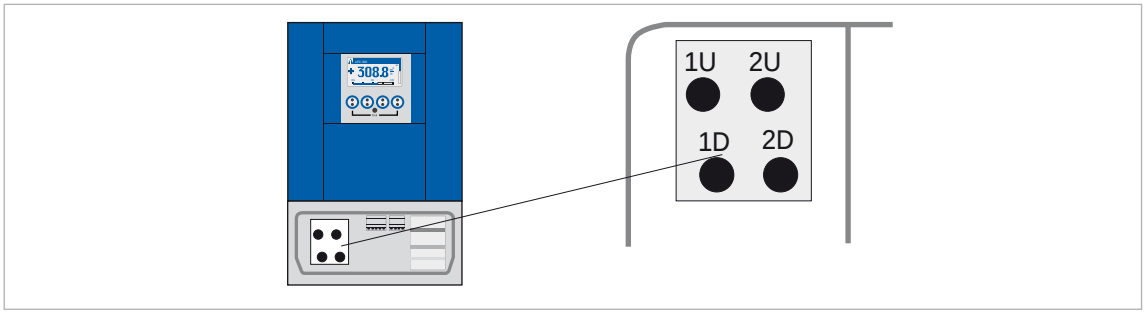


Figure 4-8: UFC 300 W, connect signal cable

4.4 Basic inputs and outputs

The OPTISONIC 6300 has several in / output ports, accessible via the terminal compartment of the UFC 300 signal converter for interfacing with external devices. The terminal compartment is accessible after unscrewing cover.

Figure 4-9: UFC 300 F, I/O terminals

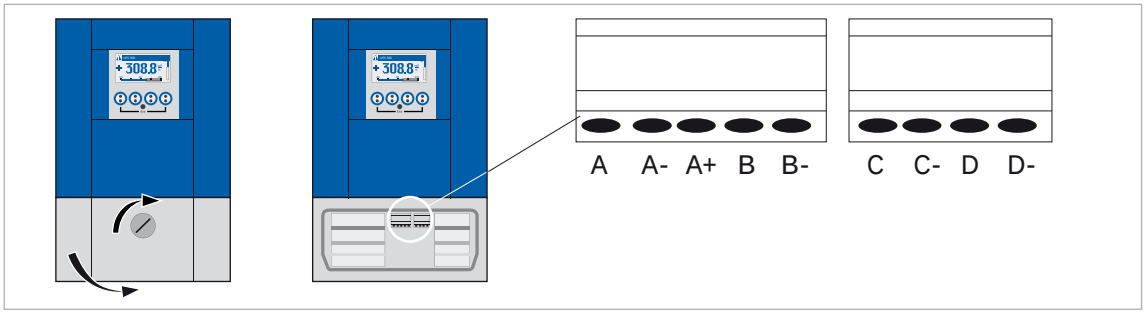


Figure 4-10: UFC 300 W, I/O terminals

The input / output groups are galvanic separated from each other and from all other input and output circuits.

- **Active I/O:** the UFC 300 signal converter supplies the power for operation
- **Passive I/O:** an external power supply is required

Basic I/O consisting of:

- 1 current output,
- 1 pulse output,
- 1 status output,
- 1 control input.

The pulse output can also be set as a status output. One of the status outputs can be set as a control input.

INFORMATION!

For detailed information please also refer to *Modular Inputs and Outputs* on page 37.

4.4.1 General

- Depending on the version, the inputs and outputs to be connected passively or actively and / or to NAMUR EN 60947-5-6.
- All inputs and outputs are galvanic separated from each other and from all other circuits.
- Factory-set data and functions are mentioned in the delivered factory calibration certificate.
- All operating data and functions are adjustable (see menu structure).

WARNING!

All directions, operating data and connection diagrams do not apply to devices used in hazardous areas.

CAUTION!

The following connection diagrams and operating data do not apply to hazardous-duty equipment (EEx).

NOTE!

Terminals that are not used should not have any conductive connection to other electrically conductive parts.

4.4.2 Electrical symbol description

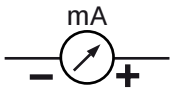
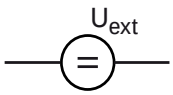
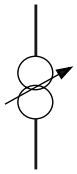
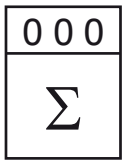
	mA meter
	External voltage source
	Current voltage source, in-house
	Steered current generator, in-house
	Electronic totalizer
	Push-button

Table 4-1: Symbol description

4.4.3 Current output (analog)

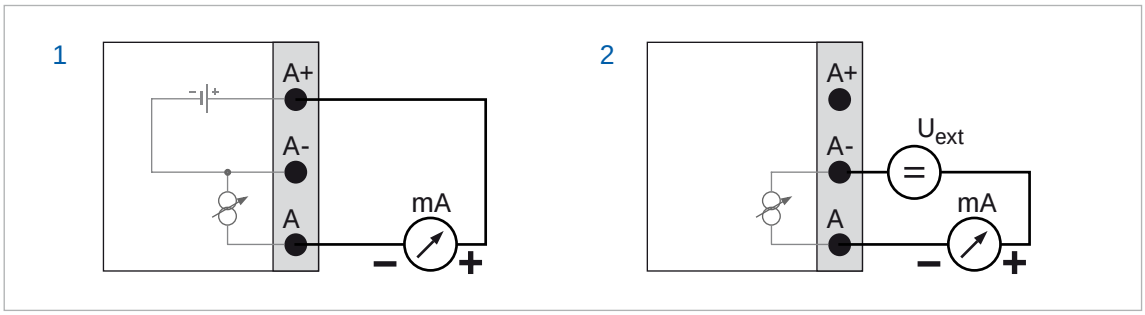


Figure 4-11: Connection current output

1 **Active mode:** load impedance $R_l \leq 1$ kOhm at $I \leq 22$ mA

2 **Passive mode:** external power supply; $U_{ext} \leq 32$ VDC at $I \leq 22$ mA

4.4.4 Pulse output (digital)

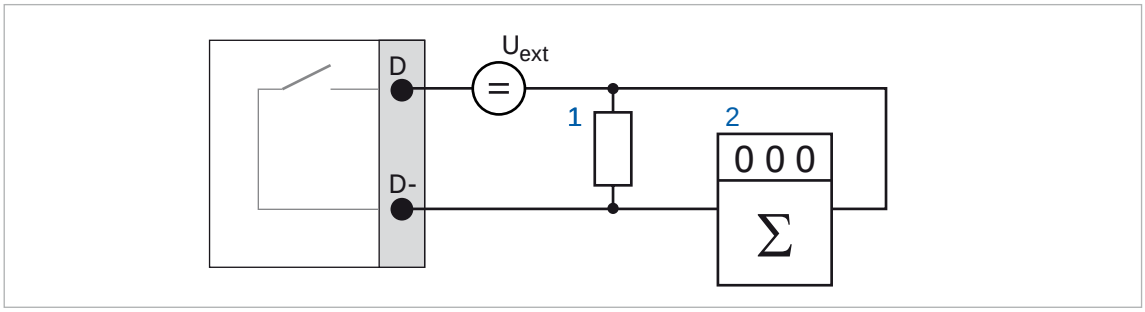


Figure 4-12: Connection pulse output passive (P_p)

1 R = 1.2 kOhm / 0.5 W, only necessary when using 2

2 Electronic totalizer with internal resistance of more than 5 kOhm

- **Passive mode:**
  external power supply; $U_{ext} \leq 32$ VDC at $I \leq 20$ mA and freq ≤ 10 kHz
- **Active mode:**
  internal power supply; $U_{nom} \leq 24$ VDC at $I \leq 20$ mA and freq ≤ 10 kHz
- **NAMUR mode:**
  passive in accordance with EN 60947-5-6

4.4.5 Status output (digital)

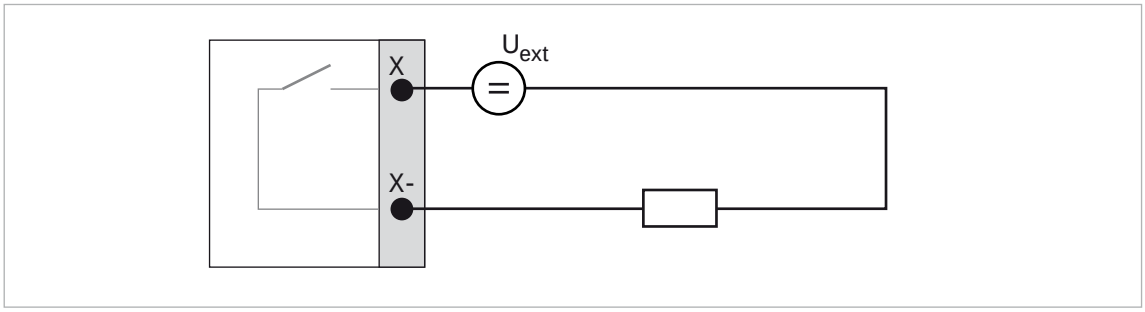


Figure 4-13: Connection status output passive (S_p); (X = terminals B or D)

- **Passive mode:**
  external power supply; $U_{ext} \leq 32$ VDC at $I \leq 100$ mA and freq ≤ 10 kHz
- **Active mode:**
  internal power supply; $U_{nom} \leq 24$ VDC at $I \leq 100$ mA and freq ≤ 10 kHz
- **NAMUR mode:**
  passive in accordance with EN 60947-5-6

4.4.6 Control input (digital)

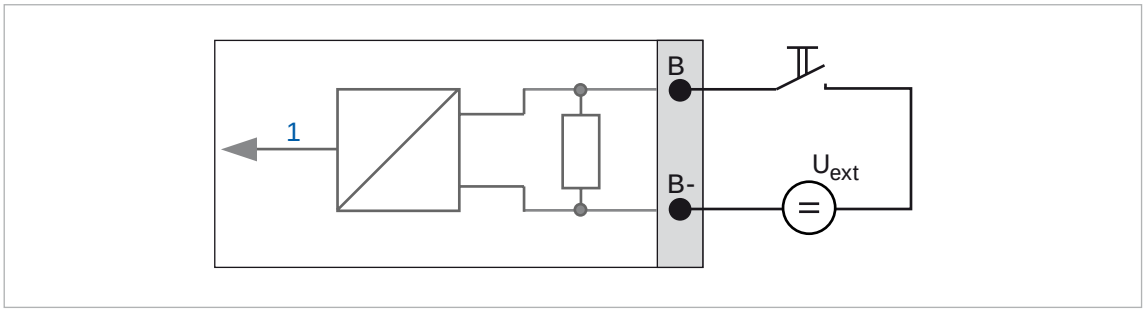


Figure 4-14: Connection control input passive (C_p)

1 Signal

- $U_{ext} \leq 32$ V DC
- I_o 16 mA at 24 V
- $I \leq 20$ mA
- $U_{on} > 19$ VDC
- $U_{off} < 2.5$ VDC

4.5 Connection via HART®

NOTE!

In the Basic I/O, the current output at terminals A+ / A- / A is always HART®-compatible!
In the Modular I/O, only the current output module for terminals C / C- is HART®-compatible!

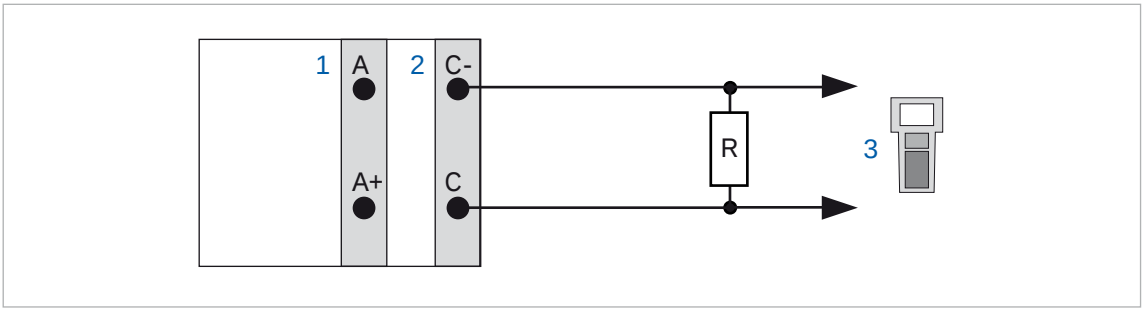


Figure 4-15: HART® connection active (I_a)

1 Basic I/O terminal A and A+
2 Modular I/O terminal C and C-
3 HART® communicator

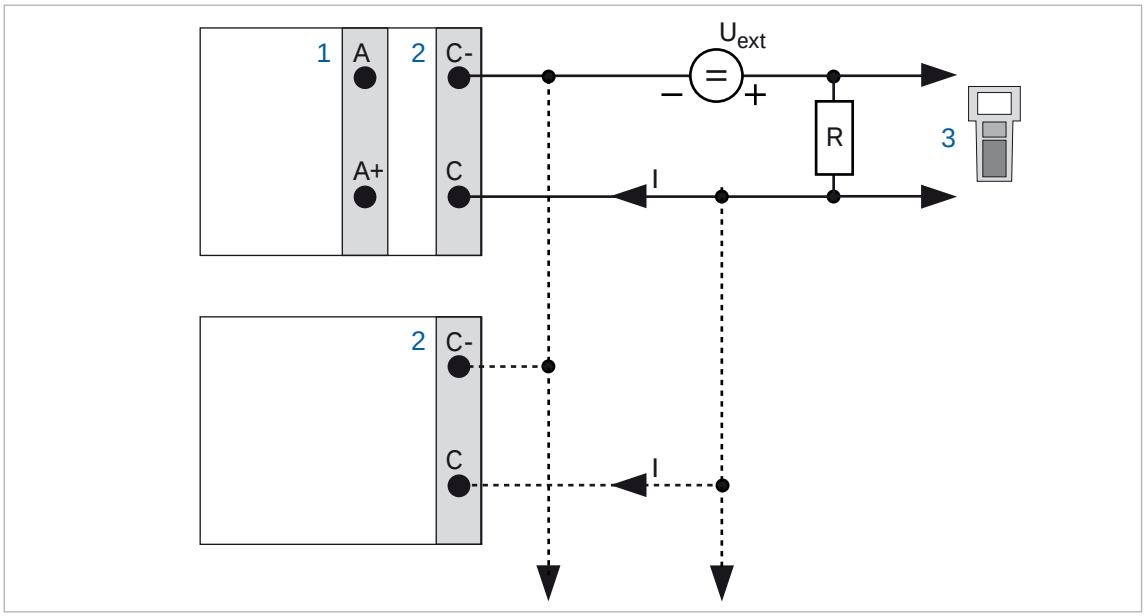


Figure 4-16: HART® connection passive (I_p)

1 Basic I/O terminal A and A-

2 Modular I/O terminal C and C-

3 HART® communicator

- **I:** $I_{0\%}$ = 4 mA
- **Multidrop I:** I_{fix} = 4 mA
- $U_{ext} \leq$ 32 VDC: R ≥ 230 Ω

4.6 Modular Inputs and Outputs

INFORMATION!

In the following connection diagrams, the terminals A, B, C or D (depending on the version of the UFC 300) are marked with a **"X"**.

4.6.1 Alterable I/Os

CG-No.			Terminals							
			D-	D	C-	C	B-	B	A-	A	A+
4			P_a / S_a 1		I_a + HART® active		max. 2 option modules for terminals **B + A:** I_a or P_a / S_a or C_a				
8			P_a / S_a 1		I_p + HART® passive		max. 2 option modules for terminals **B + A:** I_p or P_a / S_a or C_a				
6			P_p / S_p 1		I_a + HART® active		max. 2 option modules for terminals **B + A:** I_a or P_p / S_p or C_p				
B			P_p / S_p 1		I_p + HART® passive		max. 2 option modules for terminals **B + A:** I_p or P_p / S_p or C_p				
7			P_N / S_NNAMUR 1		I_a + HART® active		max. 2 option modules for terminals **B + A:** I_a or P_N / S_N or C_N				
C			P_N / S_NNAMUR 1		I_p + HART® passive		max. 2 option modules for terminals **B + A:** I_p or P_N / S_N or C_N				

1 changeable

Option modules

Abbreviation	Description	Ident. for CG No.
I_a	Active current output	A
I_p	Passive current output	B
P_a / S_a	Active pulse, frequency, status output or limit switch	C
P_p / S_p	Passive pulse, frequency, status output or limit switch	E
P_N / S_N	Pulse, frequency, status output or limit switch to NAMUR	F
C_a	Active control input	G
C_p	Passive control input	K
C_N	Control input to NAMUR	H
-	No module installed	8
-	No further module possible	0

4.6.2 Current output active I_a (HART®)

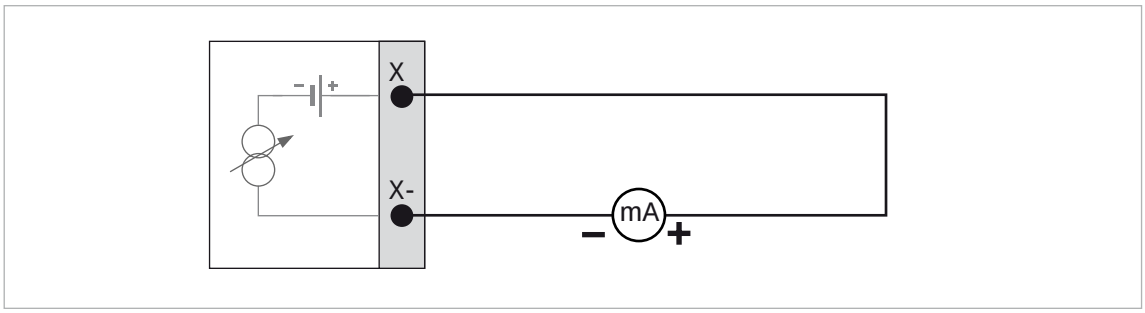


Figure 4-17: Current output active I_a

- U_{int} = 24 VDC
- I ≤ 22 mA
- R_L ≤ 1 kΩ

4.6.3 Current output passive I_p (HART®)

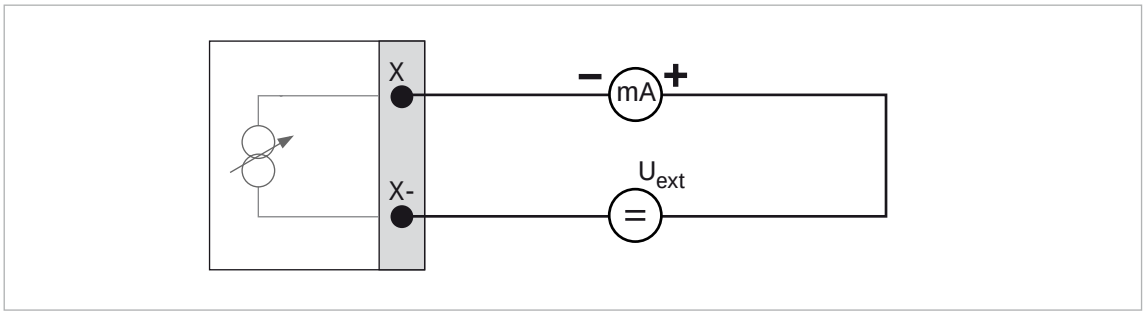


Figure 4-18: Current output passive I_p

- I ≤ 22 mA
- U_{ext} ≤ 32 VDC

4.6.4 Pulse / frequency output active P_a

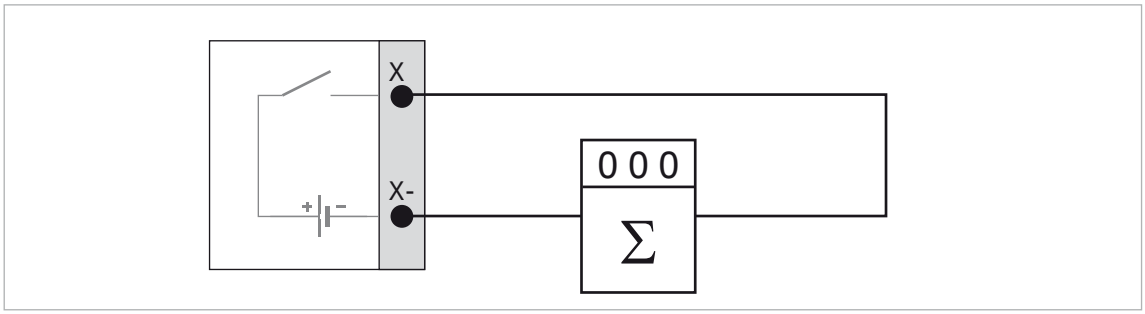


Figure 4-19: Pulse / frequency output active P_a

- U_{ext} = 24 VDC
- f ≤ 10 kHz: I ≤ 20 mA
- f ≤ 100 kHz: I ≤ 100 mA
- U_0 = 1.5 V at 10 mA
- U_{nom} = 24 VDC

4.6.5 Pulse / frequency output passive P_p

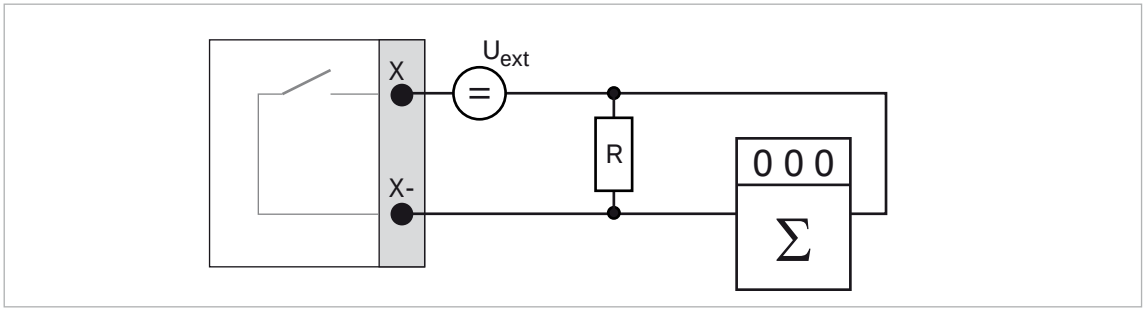


Figure 4-20: Pulse / frequency output passive P_p

- U_{ext} = 32 VDC
- f ≤ 10 kHz: I ≤ 20 mA
- f ≤ 100 kHz: I ≤ 100 mA
- U_0 1.5 V at 10 mA
- R = 1.2 kΩ / 0.5 W (only necessary when using electronic totalizer with internal resistance of R_i > 5 kΩ

4.6.6 Status output / limit switch active S_a

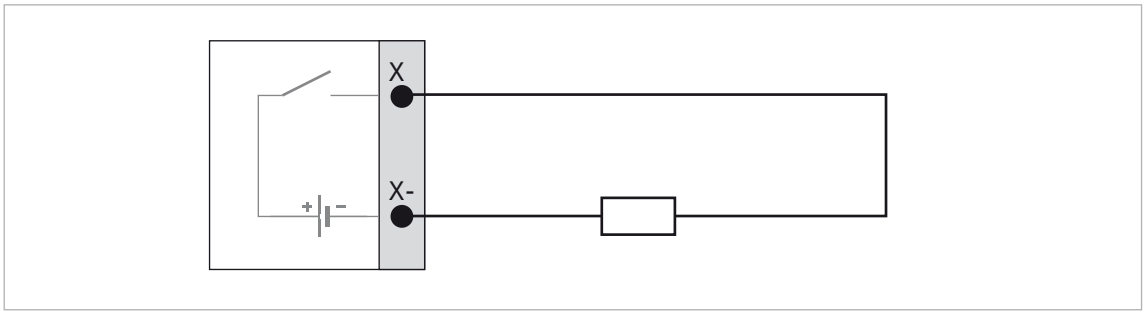


Figure 4-21: Status output / limit switch active S_a

- U_0 = 1.5 V at 10 mA
- I ≤ 100 mA
- U_{nom} = 24 VDC

4.6.7 Status output / limit switch passive S_p

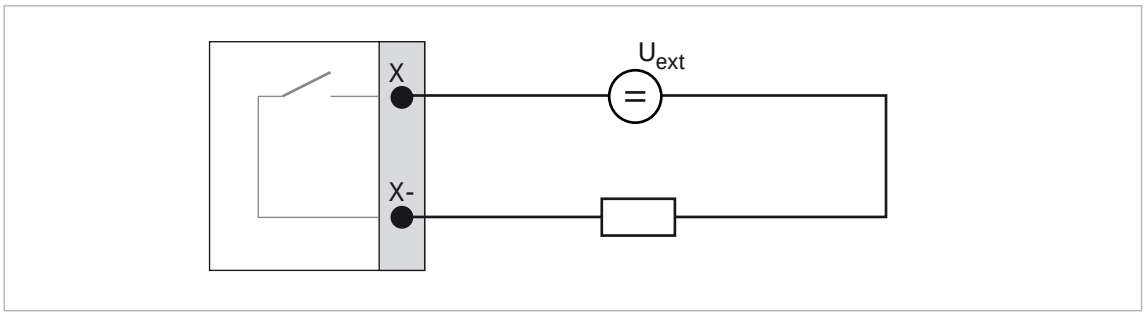


Figure 4-22: Status output / limit switch passive S_p

- U_0 = 1.5 V at 10 mA
- U_{ext} = 32 VDC
- I ≤ 100 mA

4.6.8 Control input active C_a

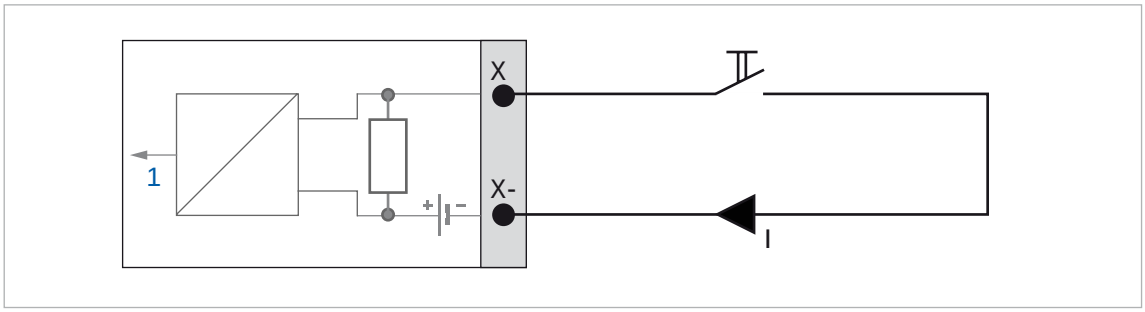


Figure 4-23: Control input active C_a

1 Signal

- I_{nom} = 16 mA
- U_{nom} = 24 VDC

4.6.9 Control input passive C_p

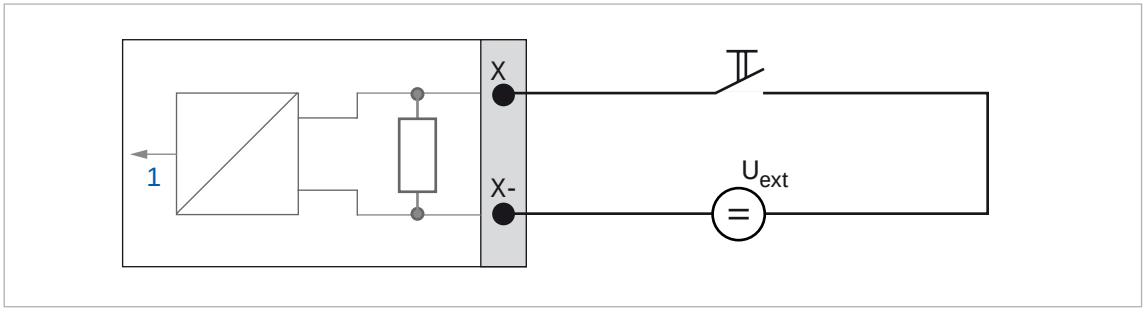


Figure 4-24: Control input passive C_p

1 Signal

- U_{on} > 19 VDC
- U_{off} < 2.5 VDC
- U_{ext} ≤ 32 VDC
- U_{nom} = 16 mA

4.6.10Pulse, frequency and status output / limit switch passive P_N / S_N to NAMUR EN 60947-5-6

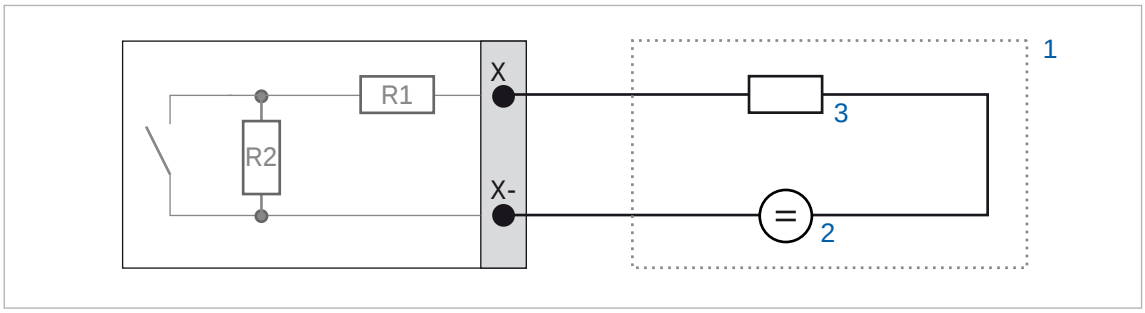


Figure 4-25: Pulse, frequency and status output / limit switch passive P_N / S_N to NAMUR EN 60947-5-6

1 Switching amplifier to NAMUR with internal voltage source
2 R_i = 1 kΩ
3 U = 8.2 VDC

4.6.11Control input active C_N to NAMUR EN 60947-5-6

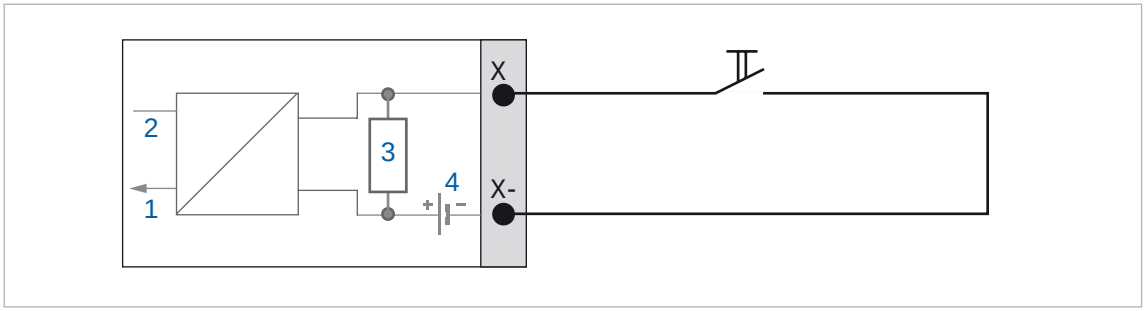


Figure 4-26: Control input active C_N to NAMUR EN 60947-5-6

1 Signal
2 Error
3 R_i = 1kΩ
4 U = 8.2 VDC

DANGER!

Before connecting the UFC 300 signal converter to power, check if the power supply is corresponding with the OPTISONIC 6300 clamp-on flowmeter.

5.1 Start

- Power up converter and start installation menu.
- Connect converter to power supply.
- Power up converter.
- Read display “Installation required”; Keep left button “>” pressed until “Release key now“ appears to enter installation menu.

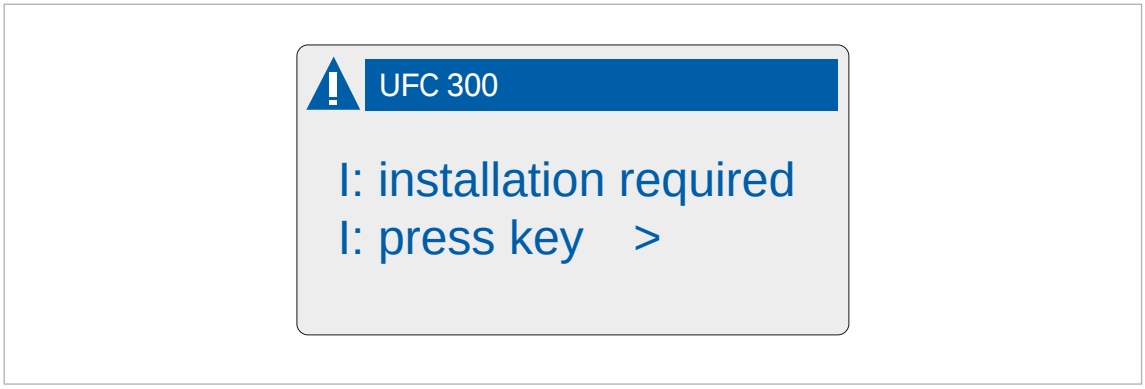


Figure 5-1: Start installation menu

6.1 Display and operating elements

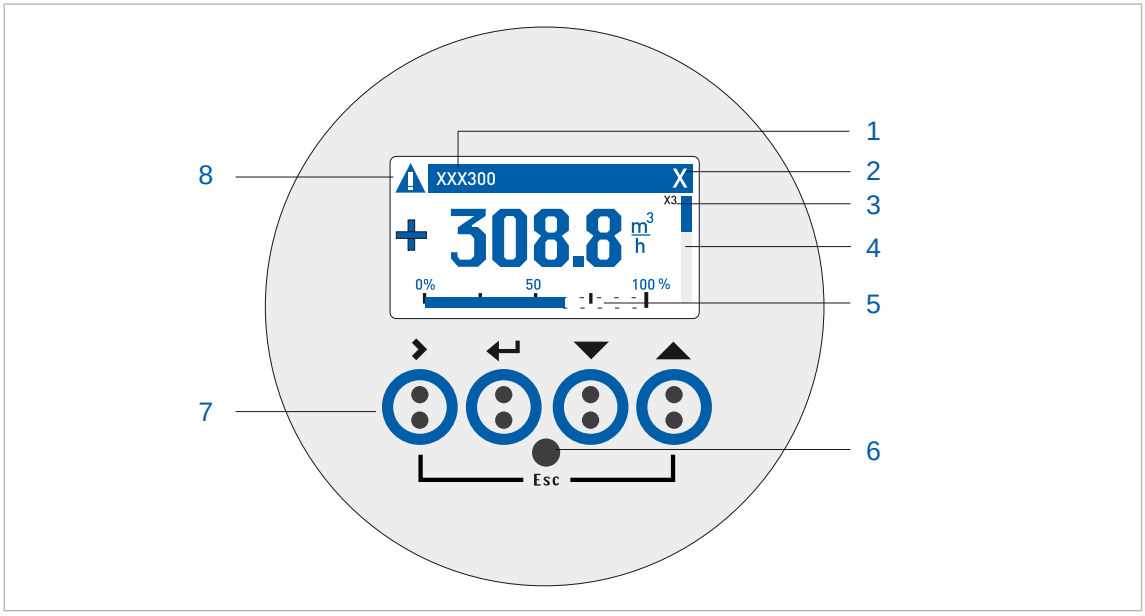


Figure 6-1: Display and operating elements

1 Product name
2 X shows optical button is activated
3 Indication of menu number
4 Block indicates the menu height
5 0 - 100 % = measuring range
6 Infrared sensor for IR cable (Option)
7 Operating keys (see table below for description)
8 Status: ↑↓ scroll down to help listing

The 4 operating keys are optical sensors that can be actuated while keeping the cover closed. Approach the keys perpendicular to the front.

Key	Description	Used symbol
	start installation, select menu	>
	return	^
	down	↓
	up	↑
	escape	> + ↑

Table 6-1: Key functions

6.2 Basic principles of operation

Keys	Meas. mode	Menu	Submenu	Data
↑↓	Alternate between display measured value pages 1 + 2 , status page and graphical page.	scroll	Select function or (sub) function.	- change number - change unit - change property - change decimal point
>	Switch from measuring mode to menu mode, press key for 2.5 s, then installation menu displayed.	enter	enter	For numerical values, move cursor (blue) one place to the right.
^	-	return	return	return
>+↑	-	-	escape	escape

Table 6-2: Description of operating key functions

NOTE!

Time out function:

After 5 minutes without key operating, the menu will return to the measuring mode without acceptance of previously changed settings.

6.3 Menu overview

X installation

X1	language
X2	GDC IR interface
X3	units
X4	number of pipes
X5	number of paths
X6	pipe data
X6	pipe data 1
X7	pipe data 2
X9	install transd. 1
X10	install transd. 2
X12	transducer sets

A quick setup

A1	language
A2	Tag
A3	reset
A4	analog outputs
A5	digital outputs
A6	GDC IR interface

B test

B1	simulation
B2	actual values
B3	information

C setup

C1	process input 1
C2	process input 2
C1	process input
C4	transducer sets
C5	IO
C6	IO Counter
C7	IO HART
C8	device

6.4 Menu structure

6.4.1 X Installation

X1 language

X1	language	>	select from list using ↑↓>		^

X2 GDC IR interface

X2	GDC IR interface	>	activate / cancel		^

X3 units

X3	units		>	X3.1, X3.2, …	↑↓	
	X3.1	size	>	select from list using ↑↓>		^
	X3.2	volume flow	>	select from list using ↑↓>		^
	X3.3	velocity	>	select from list using ↑↓>		^
	X3.4	density	>	select from list using ↑↓>		^
	X3.5	viscosity	>	select from list using ↑↓>		^

X4 number of pipes

X4	number of pipes	>	1 pipe / 2 pipes	↑↓	^

X5 number of paths

(X5 becomes active if **one pipe** is selected in X4)					
X5	number of paths	>	1 path / 2 paths	↑↓	^
(end)					

X6 pipe data

(underneath X6 becomes active if **one pipe and two paths** are selected in X4 and X5)						
(Note: the measurement results of **path 1 and path 2** are averaged !)						
X6	pipe data		>	X6.2, X6.3, …	↑↓	
	X6.2	pipe tag	>	fill in 12 pos using ↑↓>		^
	X6.3	diameter	>	fill in using ↑↓>		^
	X6.4	pipe material	>	select from list using ↑↓>		^
	X6.5	VoS pipe material	>	read advise or fill in using ↑↓>		^
	X6.6	wall thickness	>	fill in using ↑↓>		^
	X6.7	liner material	>	select from list using ↑↓>		^
	X6.8	VoS liner material	>	read advise or fill in using ↑↓>		^
	X6.9	liner thickness	>	fill in using ↑↓>		^
	X6.10	fluid	>	select from list using ↑↓>		^
	X6.11	VoS fluid	>	read advise or fill in using ↑↓>		^
	X6.12	density	>	read advise or fill in using ↑↓>		^
	X6.13	viscosity	>	fill in using ↑↓>		^
(end)						

X6 pipe data 1

(underneath X6 until X8 become active if **two pipes** are selected in X4)						
X6	pipe data 1		>		↑↓	
	X6.2	pipe tag	>	fill in 12 pos using ↑↓>		^
	X6.3	diameter	>	fill in using ↑↓>		^
	X6.4	pipe material	>	select from list using ↑↓>		^
	X6.5	VoS pipe material	>	read advise and/or fill in using ↑↓>		^
	X6.6	wall thickness	>	fill in using ↑↓>		^
	X6.7	liner material	>	select from list using ↑↓>		^
	X6.8	VoS liner material	>	read advise and/or fill in using ↑↓>		^
	X6.9	liner thickness	>	fill in using ↑↓>		^
	X6.10	fluid	>	select from list using ↑↓>		^
	X6.11	VoS fluid	>	read advise and/or fill in using ↑↓>		^
	X6.12	density	>	read advise and/or fill in using ↑↓>		^
	X6.13	viscosity	>	fill in using ↑↓>		^

X7 pipe data 2

X7	pipe data 2		>		↑↓	
	X7.1	copy pipe 1 data	>	start to copy ?	↑↓	
				if no:	copy pipe 1 data appears Go to X7 Fill in menu X7.2 up to X7.13: is similar to X6.2 up to X6.13	^
				if yes:	copy pipe 1 data appears after copy process	^
(end)						

X9 install transd. 1

X9	install transd. 1		>	X9.1, X9.2,...	↑↓	
	X9.1	transducer set	>	read preset Ta,Tb,Tc / confirm or overrule using ↑↓>		
	X9.2	calibration number		read		^
	X9.3	number of traverses	>	read preset 1,2,4 / confirm or overrule using ↑↓>		
	X9.4	mount transducers at		read advise		^
		please wait: decounting 30 seconds				
	X9.5	act. flow, preliminary		read		^
	X9.6	check signal		read (0 - 100 %)		^
	X9.7	actual distance	>	fill in using ↑↓>		^
	X9.9	act. flow, preliminary		(press key to continue)		^
	X9.10	path ready ?	>	yes/no	↑↓	^
				if no:	go to X9	
				if yes and one pipe, one path is selected in X4:	continue with X9.11	
				if yes and two pipes are selected in X4:	continue with X10	
				if yes and two paths are selected in X5:	continue with X9	
	X9.11	end installation	>	yes/no	↑↓	?
				if no:	go to X9	
				if yes:	display switches to measuring screen	

X10 install transd. 2

(underneath X10 becomes active if **two pipes or two paths** are selected in X4)						
X10	install transd. 2		>		↑↓	
				submenus identical to X9.1 up to X9.10		
				if no:	go to X10	
				if yes and two pipes are configurated:	continue with X9.11	
				if yes and two paths are configurated:	continue with X9.11	
						^
(end)						

X12 transducer sets

X12	transducer sets		>	X12.1, X12.2,…	↑↓	
	X12.1	Ta serial no.	>	fill in using ↑↓>		^
	X12.2	Ta calibration no.	>	fill in using ↑↓>		^
	X12.3	Tb serial no.	>	fill in using ↑↓>		^
	X12.4	Tb calibration no.	>	fill in using ↑↓>		^
	X12.5	Tc serial no.	>	fill in using ↑↓>		^
	X12.6	Tc calibration no.	>	fill in using ↑↓>		^

6.4.2 Quick setup

A1 language

A1	language	>	english / german / french	↑↓	^

A2 Tag

A2	Tag	>	fill in using ↑↓>		^

A3 reset

A3	reset		>	A3.1, A3.2,…	↑↓	
	A3.1	reset errors		yes/no	↑↓	^
	A3.2	counter 1		yes/no	↑↓	^
	A3.3	counter 2		yes/no	↑↓	
	(underneath counter becomes active if modular IO)					
	A3.4	counter 3		yes/no	↑↓	^
	(end)					

A4 analoge outputs

A4	analog outputs		>	A4.1, A4.2,…	↑↓	
	A4.1	measurement	>	select from list using ↑↓>		^
				use at all outputs	↑↓	
				yes/no		^
				if no:	only HART current output is selected	
				if yes:	all analog outputs are selected	
	A4.2	unit	>	select from list using ↑↓>		^
	A4.3	range	>	fill in using ↑↓>		^
				use at all outputs	↑↓	
				yes/no		^

				if no:	only HART current output is selected	
				if yes:	all analog outputs are selected	
	A4.4	low flow cutoff	>	fill in using ↑ ↓ >		^
				use at all outputs	↑ ↓	
				yes/no		^
				if no:	only HART current output is selected	
				if yes:	all analog outputs are selected	
	A4.5	time constant	>	fill in using ↑ ↓ >		^
				use at all outputs	↑ ↓	
				yes/no		^
				if no:	only HART current output is selected	
				if yes:	all analog outputs are selected	

A5 digital outputs

A5	digital outputs		>	A5.1, A5.2,...	↑ ↓	
	A5.1	measurement	>	select from list using ↑ ↓ >		^
				use at all outputs	↑ ↓	
				yes/no		^
				if no:	only pulse output D is selected	
				if yes:	all digital outputs are selected	
	A5.2	pulse value unit	>	fill in using ↑ ↓ >		^
				use at all outputs	↑ ↓	
				yes/no		^
				if no:	only pulse output D is selected	
				if yes:	all digital outputs are selected	
	A5.3	value p. pulse	>	fill in using ↑ ↓ >		^
				use at all outputs	↑ ↓	
				yes/no		^
				if no:	only pulse output D is selected	
				if yes:	all digital outputs are selected	
	A5.4	low flow cutoff	>	fill in using ↑ ↓ >		^
				use at all outputs	↑ ↓	
				yes/no		^
				if no:	only pulse output D is selected	
				if yes:	all digital outputs are selected	

A6 GDC IR interface

A6	GDC IR interface	>	activate/cancel	↑ ↓	^

6.4.3 Test

B1 simulation

B1	simulation		>	B1.1, B1.2,…	↑↓	
	B1.1	volume flow	>	set value/cancel	↑↓	
				start simulation	↑↓	
				yes/no		^
	(underneath B1.1 until B1.3 become active if **two pipes or two paths** are selected in X4 and X5)					
	B1.1	volume flow 1	>	set value/cancel	↑↓	
				start simulation	↑↓	
				yes/no		^
	B1.2	volume flow 2	>	submenu identical to B1.1	↑↓	
	(end)					
	B1.4	vel. of sound	>	set value/cancel	↑↓	
				start simulation	↑↓	
				yes/no		^
	(underneath B1.4 until B1.5 become active if **two pipes or two paths** are selected in X4 and X5)					
	B1.4	vel. of sound 1	>		↑↓	
				set value/cancel		
				start simulation	↑↓	
				yes/no		^
	B1.5	vel. of sound 2	>	submenu identical to B1.4	↑↓	
	(end)					
	B1.7	terminal A (depends on IO setting hardware)	>	select from list using ↑↓>		^
	B1.8	terminal B (depends on IO setting hardware)	>	select from list using ↑↓>		^
	B1.9	terminal C (depends on IO setting hardware)	>	select from list using ↑↓>		^
	B1.10	terminal D (depends on IO setting hardware)	>	select from list using ↑↓>		^

B2 actual values

B2	actual values		>		↑↓	
	B.2.1	act. volume flow	>		↑↓	
	(underneath B2.1.1 until B2.1.2 become active if **two pipes or two paths** are selected in X4 and X5)					
	B2.1.1	pipe 1		read		^
	B2.1.2	pipe 2		read		^
	(end)					
	B.2.2	act. mass flow	>		↑↓	
	(additional menus for two pipes or two paths)					
	B.2.3	act. Reynolds nr.	>		↑↓	
	(additional menus for two pipes or two paths)					
	B.2.4	act. vel. of sound	>		↑↓	
	(additional menus for two pipes or two paths)					
	B.2.5	act. flow speed	>		↑↓	
	(additional menus for two pipes or two paths)					
	B.2.6	act. gain	>		↑↓	
	(additional menus for two pipes or two paths)					
	B.2.7	act. SNR	>		↑↓	
	(additional menus for two pipes or two paths)					
	B.2.8	act. signal quality	>		↑↓	
	(additional menus for two pipes or two paths)					
	B.2.9	operating hours	>		↑↓	

B3 information

B3	information		>	B3.1, B3.2,…	↑↓	
	B3.1	C number		read		^
	B3.2	process input			↑↓	
	B3.2.1	sensor CPU		read		^
	B3.2.2	sensor DSP		read		^
	B3.2.3	sensor driver		read		^
	B3.3	device		sernr/swnr/yymmdd	↑↓	^
	B3.4	display		sernr/swnr/yymmdd	↑↓	^

6.4.4 Setup

C setup

C	setup	>		↑↓	

C1 process input 1

(underneath C1 becomes active if **two pipes** are selected in X4)						
C1	process input 1		>	C1.1, C1.3,...	↑↓	^
	C1.1	number of pipes	>	read		^
	C1.3	pipe data	>	C1.3.1	↑↓	
	C1.3.1	pipe tag				
	(further submenus C1.3.2 up to C1.3.12 are identical to X6.2 up to X6.13)					
	C1.4	transducer data	>	C1.4.1,...	↑↓	^
	C1.4.1	transducer set	>	Ta,Tb,Tc,none	↑↓	^
	C1.4.2	number of traverses	>	1,2,4	↑↓	^
	C1.4.3	actual distance	>	fill in using ↑↓>		^
	C1.5	extra measurements	>	select on pipe 1, on pipe 2		^
	C1.6	calibration	>	C1.6.1, C1.6.2,...	↑↓	
	C1.6.1	zero calibration	>	calibrate zero ?	select cancel, automatic, default	
	C1.6.2	meter factor	>	fill in using ↑↓>		^
	C1.6.3	Reynolds correction	>	on,off	↑↓	^
	C1.7	filter	>	C1.7.1, C1.7.2,...	↑↓	^
	C1.7.1	limitation	>	fill in using ↑↓>		^
	C1.7.2	flow direction	>	normal/reverse	↑↓	^
	C1.7.3	time constant	>	fill in using ↑↓>		^
	C1.7.4	low flow cutoff	>	fill in using ↑↓>		^
	C1.8	simulation	>	C1.8.1, C1.8.2,...	↑↓	^
	C1.8.1	volume flow	>	set value/cancel	↑↓	
				start simulation	↑↓	
				yes/no		^
	C1.8.2	vel. of sound	>		↑↓	
				set value/cancel	↑↓	
				start simulation	↑↓	
				yes/no		^
	C1.9	plausibility	>	C1.9.1, C1.9.2,...	↑↓	^
	C1.9.1	error limit	>	fill in using ↑↓>		^
	C1.9.2	counter decrease	>	fill in using ↑↓>		^
	C1.9.3	counter limit	>	fill in using ↑↓>		^
	C1.10	information	>	C1.10.1, C1.10.2,...	↑↓	^
	C1.10.1	sensor CPU		read		
	C1.10.2	sensor DSP		read		^
	C1.10.3	sensor driver		read		^

C2 process input 2

C2	process input 2	>		↑↓	
(further submenus C2.1 up to C2.10 are identical to C1.2 up to C1.1)					
(end)					

C1 process input

(underneath C1 becomes active if **two paths** are selected in X5)						
C1	process input		>	C1.1, C1.2,...	↑↓	
	C1.1	number of pipes	>	read		^
	C1.2	pipe 1: total paths	>	read		^
	C1.3	pipe data	>	C1.3.1, C1.3.2,...	↑↓	^
	C1.3.1	pipe tag				
	(further submenus C1.3.2 up to C1.3.12 are identical to X6.2 up to X6.13)					
	C1.4	transducer data	>	C1.4.1, C1.4.2,...	↑↓	
	C1.4.1	transducer set 1	>	Ta,Tb,Tc,none	↑↓	^
	C1.4.2	number of traverses 1	>	1,2,4	↑↓	^
	C1.4.3	actual distance 1	>	fill in using ↑ ↓ >	↑↓	
	C1.4.4	transducer set 2	>	Ta,Tb,Tc,none	↑↓	^
	C1.4.5	number of traverses 2	>	1,2,4	↑↓	^
	C1.4.6	actual distance 2	>	fill in using ↑ ↓ >	↑↓	
	C1.6	calibration	>	C1.6.1, C1.6.2,...	↑↓	^
	C1.6.1	zero calibration	>	calibrate zero ?	select cancel, automatic, default	
	C1.6.2	meter factor	>	fill in using ↑ ↓ >		^
	C1.6.3	Reynolds correction	>	on,off	↑↓	^
	C1.7	filter	>	C1.7.1, C1.7.2,...	↑↓	^
	C1.7.1	limitation	>	fill in using ↑ ↓ >		^
	C1.7.2	flow direction	>	normal/reverse	↑↓	^
	C1.7.3	time constant	>	fill in using ↑ ↓ >		^
	C1.7.4	low flow cutoff	>	fill in using ↑ ↓ >		^
	C1.8	simulation	>	C1.8.1, C1.8.2,...	↑↓	^
	C1.8.1	volume flow	>	set value/cancel	↑↓	
				start simulation	↑↓	
				yes/no		
	C1.8.2	vel. of sound	>	set value/cancel	↑↓	
				start simulation	↑↓	
				yes/no		
	C1.9	plausibility	>	C1.9.1, C1.9.2,...	↑↓	^
	C1.9.1	error limit	>	fill in using ↑ ↓ >		^
	C1.9.2	counter decrease	>	fill in using ↑ ↓ >		^
	C1.9.3	counter limit	>	fill in using ↑ ↓ >		^
	C1.10	information	>	C1.10.1, C1.10.2,...	↑↓	^
	C1.10.1	sensor CPU		read		^
	C1.10.2	sensor DSP		read		^
	C1.10.3	sensor driver		read		^

C4 transducer sets

C4	transducer sets		>	C4.1, C4.2,...	↑↓	^
	C4.1	Ta serial no.	>	fill in using ↑ ↓ >		^
	C4.2	Ta calibration no.	>	fill in using ↑ ↓ >		^
	C4.3	Tb serial no.	>	fill in using ↑ ↓ >		^
	C4.4	Tb calibration no.	>	fill in using ↑ ↓ >		^
	C4.5	Tc serial no.	>	fill in using ↑ ↓ >		^
	C4.6	Tc calibration no.	>	fill in using ↑ ↓ >		^

C5 I/O

C5	I/O		>	C5.1, C5.2,...	↑↓	
	C5.1	hardware	>	C5.1.1, C5.1.2,...	↑↓	^
	C5.1.1	terminals A	>	select current output/off using ↑↓		^
	C5.1.2	terminals B	>	select from list using ↑↓		^
	C5.1.3	terminals C	>	select from list using ↑↓		^
	C5.1.4	terminals D	>	select from list using ↑↓		^
	C5.2	current out A	>	C5.2.1, C5.2.2,...	↑↓	^
	C5.2.1	range 0-100%	>	fill in using ↑↓>		^
	C5.2.2	extended range	>	fill in using ↑↓>		^
	C5.2.3	error current	>	fill in using ↑↓>		^
	C5.2.4	error condition	>	select from list using ↑↓		^
	C5.2.5	measurement	>	select from list using ↑↓		^
	C5.2.6	range	>	fill in using ↑↓>		^
	C5.2.7	polarity	>	select from list using ↑↓		^
	C5.2.8	limitation	>	fill in using ↑↓>		^
	C5.2.9	low flow cutoff	>	fill in using ↑↓>		^
	C5.2.10	time constant	>	fill in using ↑↓>		^
	C5.2.11	special function	>	select from list using ↑↓		^
	C5.2.12	threshold	>	fill in using ↑↓>		^
	C5.2.13	information	>	read		^
	C5.2.14	simulation	>	select set on/off/cancel		^
	C5.2.15	4 mA trimming	>	fill in using ↑↓>		^
	C5.2.16	20 mA trimming	>	fill in using ↑↓>		^
	C5.3	frequency out X	>	C5.3.1, C5.3.2,...	↑↓	^
	C5.3.1	pulse shape	>	select from list using ↑↓		^
	C5.3.2	pulse width	>	fill in using ↑↓>		^
	C5.3.3	100 % pulse rate	>	fill in using ↑↓>		^
	C5.3.4	measurement	>	select from list using ↑↓		^
	C5.3.5	range	>	fill in using ↑↓>		^
	C5.3.6	polarity	>	select from list using ↑↓		^
	C5.3.7	limitation	>	fill in using ↑↓>		^
	C5.3.8	low flow cutoff	>	fill in using ↑↓>		^
	C5.3.9	time constant	>	fill in using ↑↓>		^
	C5.3.10	invert signal	>	fill in using ↑↓>		^
	C5.3.11	phase shift	>	select from list using ↑↓		^
	C5.3.12	special function	>	fill in using ↑↓>		^
	C5.3.13	information	>	read		^
	C5.3.14	simulation	>	select set on/off/cancel		^
	C5.4	pulse output X	>	C5.4.1, C5.4.2,...	↑↓	^
	C5.4.1	pulse shape	>	select from list using ↑↓		^
	C5.4.2	pulse width		fill in using ↑↓>		^
	C5.4.3	max. pulse rate	>	fill in using ↑↓>		^
	C5.4.4	measurement	>	select from list using ↑↓		^
	C5.4.5	pulse value unit	>	fill in using ↑↓>		^
	C5.4.6	value p. pulse	>	fill in using ↑↓>		^
	C5.4.7	polarity	>	select from list using ↑↓		^
	C5.4.8	low flow cutoff	>	fill in using ↑↓>		^
	C5.4.9	time constant	>	fill in using ↑↓>		^
	C5.4.10	invert signal	>	select on/off		^

	C5.4.11	phase shift		select from list using ↑ ↓		^
	C5.4.12	special function		select from list using ↑ ↓		^
	C5.4.13	information	>	read		^
	C5.4.14	simulation	>	select set on/off/cancel		^
	C5.5	status output X	>	C5.5.1, C5.5.2,…	↑ ↓	^
	C5.5.1	mode	>	select from list using ↑ ↓		^
	C5.5.2	current output Y	>	select from list using ↑ ↓		^
	C5.5.3	frequency output Y	>	select from list using ↑ ↓		^
	C5.5.4	pulse output Y	>	select from list using ↑ ↓		^
	C5.5.5	status output Y	>	select from list using ↑ ↓		^
	C5.5.6	limit switch Y	>	read: status off		^
	C5.5.7	control input Y	>	read: status off		^
	C5.5.8	off	>	read: status off		^
	C5.5.9	invert signal	>	select on/off		^
	C5.5.10	information	>	read		^
	C5.5.11	simulation	>	select set on/off/cancel		^
	C5.6	limit switch X	>	C5.6.1, C5.6.2,…	↑ ↓	^
	C5.6.1	measurement	>	select from list using ↑ ↓		^
	C5.6.2	threshold	>	fill in using ↑ ↓ >		^
	C5.6.3	polarity	>	select from list using ↑ ↓		^
	C5.6.4	time constant	>	fill in using ↑ ↓ >		^
	C5.6.5	invert signal	>	select on/off		^
	C5.6.6	information	>	read		^
	C5.6.7	simulation	>	select set on/off/cancel		^
	C5.7	control input X	>	C5.7.1, C5.7.2,…	↑ ↓	^
	C5.7.1	mode	>	select from list using ↑ ↓		^
	C5.7.2	invert signal	>	select on/off		^
	C5.7.3	information	>	read		^
	C5.7.4	simulation	>	select set on/off/cancel		^

C6 I/O Counter

(active if HART device)						
C6	I/O Counter		>	C6.1, C6.2	↑ ↓	
	C6.1	counter 1	>	C6.1.1, C6.1.2,…	↑ ↓	^
	C6.1.1	function of counter	>	select from list using ↑ ↓		^
	C6.1.2	measurement	>	select from list using ↑ ↓		^
	C6.1.3	low flow cutoff	>	fill in using ↑ ↓ >		^
	C6.1.4	time constant	>	fill in using ↑ ↓ >		^
	C6.1.5	preset value	>	fill in using ↑ ↓ >		^
	C6.1.6	reset counter	>	select yes/no		^
	C6.1.7	set counter	>	select set on/off/cancel		^
	C6.1.8	stop counter	>	select yes/no		^
	C6.1.9	start counter	>	select yes/no		^
	C6.1.10	information	>	read		^
	C6.2	counter 2	>	C6.2.1, C6.2.2,…	↑ ↓	
	(underneath submenus identical to C6.1.1 to C6.1.10)					

C7 I/O HART

C7	I/O HART		>	C7.1, C7.2,...	↑↓	
	C7.1	PV is	>	C7.1.1, C7.1.2,...	↑↓	^
	C7.1.1	current output A	>	read		^
	(depends on I/O configuration)					
	C7.1.2	frequency output X	>	read		^
	C7.1.3	HART dynamic variable	>	select from list using ↑↓		^
	C7.2	SV is	>	C7.2.1		
	C7.2.1	HART dynamic variable	>	select from list using ↑↓		^
	C7.3	TV is	>	C7.3.1		
	C7.3.1	HART dynamic variable	>	select from list using ↑↓		^
	C7.4	4V is	>	C7.4.1		
	C7.4.1	HART dynamic variable	>	select from list using ↑↓		^
(end)						

C8 device

C8	device		>	C8.1, C8.2,...	↑↓	
	C8.1	device info	>	C8.1.1, C8.1.2,...	↑↓	^
	C8.1.1	Tag	>	fill in using ↑↓>		^
	C8.1.2	C number	>	read		^
	C8.1.3	device serial no.	>	read		^
	C8.1.4	electronic serial no.	>	read		^
	C8.1.5	information	>	read		^
	C8.2	display	>	C8.2.1, C8.2.2,...	↑↓	^
	C8.2.1	language	>	select from list using ↑↓		^
	C8.2.2	contrast	>	fill in using ↑↓>		^
	C8.2.3	default display	>	select from list using ↑↓		^
	C8.2.5	information	>	read		^
	C8.3	1. meas. page	>	C8.3.1, C8.3.2,...	↑↓	
	C8.3.1	function	>	select from list using ↑↓		^
	(if two or three lines: C5.3.8 etc active)					
	C8.3.2	measurement 1.line	>	select from list using ↑↓		^
	C8.3.3	range	>	fill in using ↑↓>		^
	C8.3.4	limitation	>	fill in using ↑↓>		^
	C8.3.5	low flow cutoff	>	fill in using ↑↓>		^
	C8.3.6	time constant	>	fill in using ↑↓>		^
	C8.3.7	format 1.line	>	select from list using ↑↓		^
	C8.3.8	measurement 2.line	>	select from list using ↑↓		^
	C8.3.9	format 2.line	>	select from list using ↑↓		^
	C8.3.10	measurement 3.line	>	select from list using ↑↓		^
	C8.3.11	format 3.line	>	select from list using ↑↓		^
	C8.4	2. meas. page	>	C8.4.1, C8.4.2,...	↑↓	
	(underneath submenus identical to C8.3.1 to C8.3.11)					
	C8.5	graphic page	>	C8.5.1, C8.5.2,...	↑↓	^
	C8.5.1	select range	>	select manual/automatic		^
	C8.5.2	range	>	fill in using ↑↓>		^
	C8.5.3	time scale	>	fill in using ↑↓>		^
	C8.6	special functions	>	C8.6.1, C8.6.2,...	↑↓	^
	C8.6.1	reset errors	>	select yes/o		^
	C8.6.2	save settings	>	select from list using ↑↓		^

	C8.6.3	load settings	>	select from list using ↑ ↓		^
	C8.6.4	password quick setup	>	fill in 4 digits using ↑ ↓ >		^
	C8.6.5	password setup	>	fill in 4 digits using ↑ ↓ >		^
	C8.6.6	GDC IR interface	>	activate/cancel		^
	C8.7	units	>	C8.7.1, C8.7.2,…	↑ ↓	^
	C8.7.1	size				
	C8.7.2	volume flow	>	select from list using ↑ ↓		^
	C8.7.3	mass flow	>	select from list using ↑ ↓		^
	C8.7.4	velocity	>	select from list using ↑ ↓		^
	C8.7.5	volume flow	>	select from list using ↑ ↓		^
	C8.7.6	mass	>	select from list using ↑ ↓		^
	C8.7.7	density	>	select from list using ↑ ↓		^
	C8.7.8	viscosity	>	select from list using ↑ ↓		^
	C8.8	HART	>	C8.8.1, C8.8.2,…	↑ ↓	^
	C8.8.1	HART	>	select on/off		^
	C8.8.2	address	>	fill in 2 digits using ↑ ↓ >		^
	C8.8.3	message	>	fill in using ↑ ↓ >		^
	C8.8.4	description	>	fill in using ↑ ↓ >		^
	C8.9	quick setup	>	C8.9.1, C8.9.2,…	↑ ↓	^
	C8.9.1	reset counter 1	>	select yes/no		^
	C8.9.2	reset counter 2	>	select yes/no		^
	C8.9.3	reset counter 3	>	select yes/no		^

6.5 Installation menu

CAUTION!

Follow the installation menu described in this chapter and fill in menu X.

6.5.1 Installation menu X1...X6

I Follow installation menu and fill in menu X1...X6.

X1 language

X1	language	>	select from list using ↑ ↓ >		^

X2 GDC IR interface

X2	GDC IR interface	>	activate / cancel		^

X3 units

X3	units	>	X3.1, X3.2, …	↑ ↓	
	X3.1 size	>	select from list using ↑ ↓ >		^
	X3.2 volume flow	>	select from list using ↑ ↓ >		^
	X3.3 velocity	>	select from list using ↑ ↓ >		^

	X3.4	density	>	select from list using ↑ ↓ >		^
	X3.5	viscosity	>	select from list using ↑ ↓ >		^

X4 number of pipes

X4	number of pipes	>	1 pipe / 2 pipes	↑ ↓	^

X5 number of paths

(X5 becomes active if **one pipe** is selected in X4)					
X5	number of paths	>	1 path / 2 paths	↑ ↓	^
(end)					

X6 pipe data

(underneath X6 becomes active if **one pipe and two paths** are selected in X4 and X5)						
(Note: the measurement results of **path 1 and path 2** are averaged !)						
X6	pipe data		>	X6.2, X6.3, …	↑ ↓	
	X6.2	pipe tag	>	fill in 12 pos using ↑ ↓ >		^
	X6.3	diameter	>	fill in using ↑ ↓ >		^
	X6.4	pipe material	>	select from list using ↑ ↓ >		^
	X6.5	VoS pipe material	>	read advise or fill in using ↑ ↓ >		^
	X6.6	wall thickness	>	fill in using ↑ ↓ >		^
	X6.7	liner material	>	select from list using ↑ ↓ >		^
	X6.8	VoS liner material	>	read advise or fill in using ↑ ↓ >		^
	X6.9	liner thickness	>	fill in using ↑ ↓ >		^
	X6.10	fluid	>	select from list using ↑ ↓ >		^
	X6.11	VoS fluid	>	read advise or fill in using ↑ ↓ >		^
	X6.12	density	>	read advise or fill in using ↑ ↓ >		^
	X6.13	viscosity	>	fill in using ↑ ↓ >		^
(end)						

X6 pipe data 1

(underneath X6 until X8 become active if **two pipes** are selected in X4)						
X6	pipe data 1		>		↑ ↓	
	X6.2	pipe tag	>	fill in 12 pos using ↑ ↓ >		^
	X6.3	diameter	>	fill in using ↑ ↓ >		^
	X6.4	pipe material	>	select from list using ↑ ↓ >		^
	X6.5	VoS pipe material	>	read advise and/or fill in using ↑ ↓ >		^
	X6.6	wall thickness	>	fill in using ↑ ↓ >		^
	X6.7	liner material	>	select from list using ↑ ↓ >		^
	X6.8	VoS liner material	>	read advise and/or fill in using ↑ ↓ >		^
	X6.9	liner thickness	>	fill in using ↑ ↓ >		^
	X6.10	fluid	>	select from list using ↑ ↓ >		^
	X6.11	VoS fluid	>	read advise and/or fill in using ↑ ↓ >		^

	X6.12	density	>	read advise and/or fill in using ↑ ↓ >		^
	X6.13	viscosity	>	fill in using ↑ ↓ >		^

X7 pipe data 2

X7	pipe data 2		>		↑ ↓	
	X7.1	copy pipe 1 data	>	start to copy ?	↑ ↓	
				if no:	copy pipe 1 data appears Go to X7 Fill in menu X7.2 up to X7.13: is similar to X6.2 up to X6.13	^
				if yes:	copy pipe 1 data appears after copy process	^
(end)						

6.5.2 Pre programmed pipe and medium parameters

NOTE!

Select pipe- and media parameters; if not in list select “other”. For advise on "other" please consult the supplied CD.

Pipe material	VoS	
	[m/s]	[ft/s]
Carbon steel	3230	10767
Stainless steel	3120	10400
Cast iron	2500	8333
Aluminium	3050	10167
Asbestos cement	4200	14000
Concrete	2500	8333
Acrylics	2700	9000
PP/PVC	2400	8000
Polyamide	2200	7333
GRP/FRP	2500	8333
other		free entry

Table 6-3: Velocity of sound of pipe materials

Liner material	VoS	
	[m/s]	[ft/s]
Cement	4200	14000
Epoxy	2500	8333
LDPE	1900	6333
HDPE	2400	8000
PTFE	1350	4500
Rubber	1500	5000
other		free entry
none		-

Table 6-4: Velocity of sound of liner materials

Pipe material	VoS		Density	
	[m/s]	[ft/s]	[kg/m^3]	[lbs/ft^3]
Water	1485	4950	1.0	0.06
Alkanes	1050	3500	0.65	0.04
Oil	1480	4933	0.98	0.06
Acids	1500	5000	1.3	0.08
CxHx refined	1250	4167	0.8	0.05
CxHx light	1000	3333	0.6	0.04
Alcohols	1200	4000	0.8	0.05

Pipe material	VoS		Density	
	[m/s]	[ft/s]	[kg/m^3]	[lbs/ft^3]
Refrigerant	800	2667	1.5	0.09
Caustic soda	2040	6800	1.25	0.08
solvents	1200	4000	0.8	0.05
other	1500	5000	1.0	0.06

Table 6-5: Velocity of sound and density of fluids

6.5.3 Installation menu X9.1...X9.3, install transducer

X9.1: Read factory preset transducer code (Ta/Tb/Tc) from rail.

X9.2: Carefully check factory preset calibration number.

X9.3: Read factory preset number of traverses.

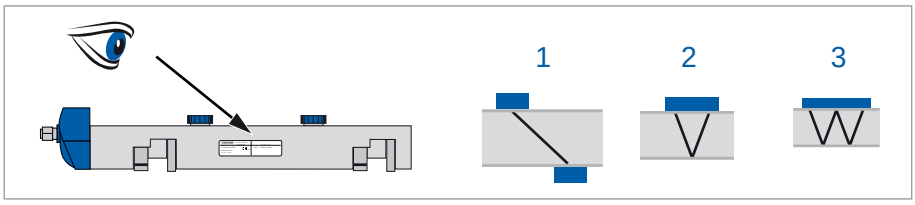


Figure 6-2: Installation transducer

1 Z mode; 1 traverse: for large diameter pipes

2 V mode; 2 traverses: for small and medium diameter pipes

3 W mode; 4 traverses: for small and medium diameter pipes

X9 install transd. 1

X9	install transd. 1		>	X9.1, X9.2,...	↑↓	
	X9.1	transducer set	>	read preset Ta,Tb,Tc / confirm or overrule using ↑↓>		
	X9.2	calibration number		read		^
	X9.3	number of traverses	>	read preset 1,2,4 / confirm or overrule using ↑↓>		
	X9.4	mount transducers at		read advise		^
		please wait: decounting 30 seconds				

6.5.4 Set advised mounting distance

- X9.4: Read the advised mounting distance.

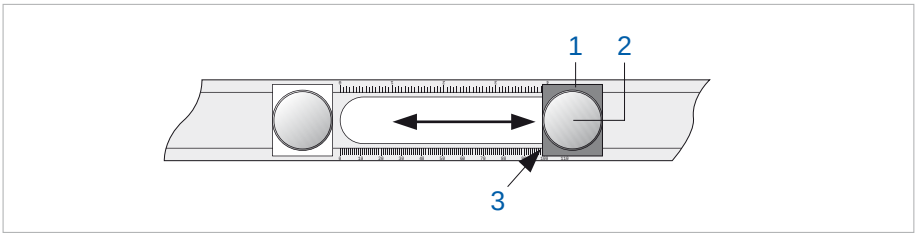


Figure 6-3: Set advised mounting distance

1 Floating transducer
2 Locking knob
3 Reading point

Set advised mounting distance by doing the following steps:

- Release rail via the push buttons.
- Unlock floating transducer 1 by turning locking knob 2 counter clockwise.
- Slide transducer 1 via locking knob 2 to the advised mounting distance (reading in menu X9.4).
- Lift rail, turn rail and grease transducer surfaces (see following figure for procedure and for detailed information please also refer to Greasing of transducers on page 78).
- Turn locking knob 2 clockwise until tightenend.
- Press rail at both ends to the pipe by clicking.

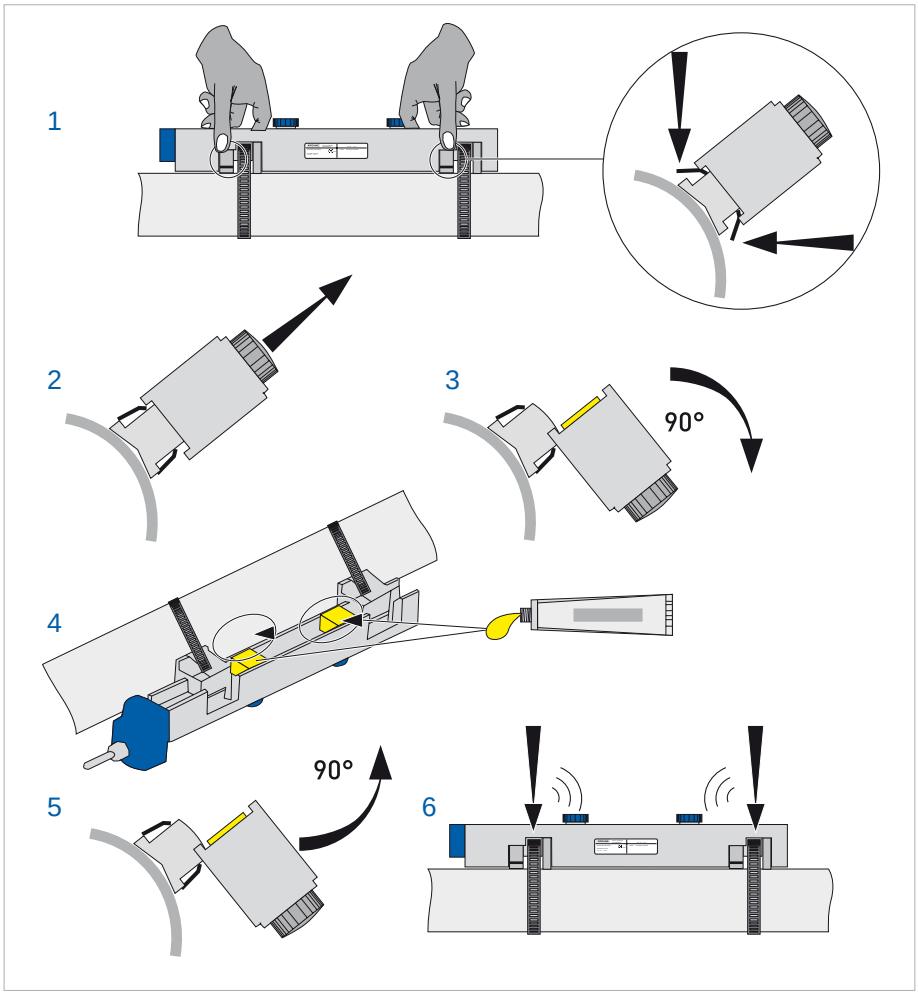


Figure 6-4: Grease transducer surfaces

NOTE!

OPTISONIC 6300 is mounted to the pipe and ready for first preliminary measurement. In the display appears "please wait". After 5...30 seconds the signal is stabilized and the message will disappear.

6.5.5 Installation menu X9.5...X9.7, check signal

X9 install transd. 1

X9	install transd. 1		>	X9.5, X9.6,...	↑↓	
	X9.5	act. flow, preliminary		read		^
	X9.6	check signal		read (0 - 100 %)		^
	X9.7	actual distance	>	fill in using ↑↓>		^

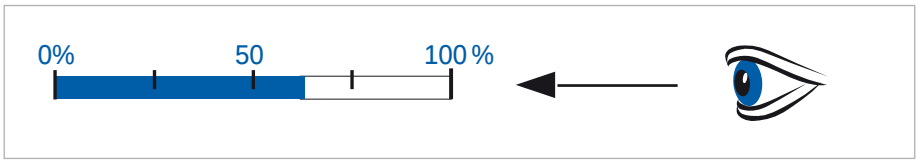


Figure 6-5: Check signal

Advise for entering optimization loop yes/no:

- **Signal > 75%:** good signal, optimization loop not needed
- **Signal 50...75%:** fairly good signal, optimization loop can improve the signal
- **Signal 10...50%:** low signal, optimization loop needed
- **Signal < 10%:** bad or no signal, check settings in menu X6, increase transducer distance and/or go into the optimization loop.

6.5.6 Optimization loop, X9.8.1...X9.8.5

X9 install transd. 1

X9	install transd. 1		>	X9.8.1, X9.8.2,...	↑↓	
	(start optimization loop)					
	X9.8.1	optimize distance ?		yes/no		^
				if no:	go to X9.9	
				if yes:	continue with X9.8.2	
	X9.8.2	act. VoS fluid		read		^
	X9.8.3	continue ?		yes/no		^
				if no:	go to X9.9	
				if yes:	continue with X9.8.4	
	X9.8.4	VoS fluid		read / confirm or overrule using ↑↓>		^
	X9.8.5	mount transducers at		read advise		^
	(end optimization loop; next menu appearing is X9.8.1)					

X10 install transd. 2

(underneath X10 becomes active if **two pipes or two paths** are selected in X4)						
X10	install transd. 2		>		↑↓	
				submenus identical to X9.1 up to X9.10		
				if no:	go to X10	
				if yes and two pipes are configurated:	continue with X9.11	
				if yes and two paths are configurated:	continue with X9.11	
						^
(end)						

6.5.7 Set new advised mounting distance

- Release rail via push buttons.
- Unlock floating transducer by turning locking knob counter clockwise. (A slight decrease in signal is normal).
- Slide transducer via locking knob to the new distance.
- Keep sufficient grease between transducers and pipe.
- Turn locking knob clockwise until tightened.
- Press rail at both ends to the pipe by clicking.

NOTE!

In the display appears "please wait". After 5...30 seconds the signal is stabilized and the message will disappear.

X9 install transd. 1

X9	install transd. 1		>	X9.9, X9.10,...	↑↓	
	X9.9	act. flow, preliminary		(press key to continue)		^
	X9.10	path ready ?	>	yes/no	↑↓	^
				if no:	go to X9	
				if yes and **one pipe, one path** is selected in X4:	continue with X9.11	
				if yes and **two pipes** are selected in X4:	continue with X10	
				if yes and **two paths** are selected in X5:	continue with X9	
	X9.11	end installation	>	yes/no	↑↓	?
				if no:	go to X9	
				if yes:	display switches to measuring screen	

6.5.8 Finish installation

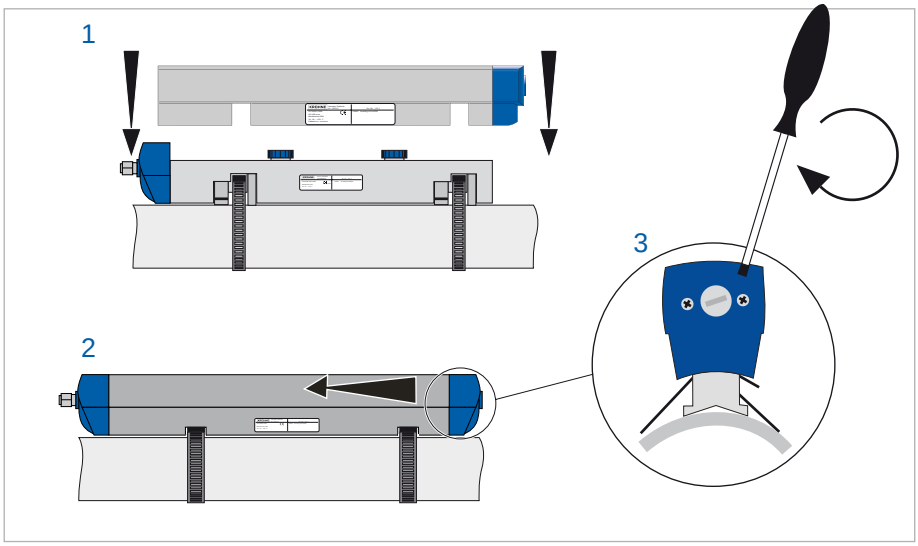


Figure 6-6: Finish installation

1 Put cover over rail

2 Slide cover 2...3 mm / 0.08...0.12" to connector cap

3 Connect cover to rail by tightening the screw attached to the end cap using a screw driver

6.5.9 Customize settings

After installation the display switches to the first measurement screen.

The UFC 300 has 4 different display pages:

- 2 measurement pages
- 1 graphical page
- 1 status page

Using the ↓↑ buttons, you can switch between the displayed pages.

Customizing used transducers sets:

To alter settings in the menu, keep button > pressed until "Release key now" appears in the display.

X12 transducer sets

X12	transducer sets		>	X12.1, X12.2,...	↑↓	
	X12.1	Ta serial no.	>	fill in using ↑↓>		^
	X12.2	Ta calibration no.	>	fill in using ↑↓>		^
	X12.3	Tb serial no.	>	fill in using ↑↓>		^
	X12.4	Tb calibration no.	>	fill in using ↑↓>		^
	X12.5	Tc serial no.	>	fill in using ↑↓>		^
	X12.6	Tc calibration no.	>	fill in using ↑↓>		^

6.6 Function description

Menu No.	Display	Function description	Selection list

Power up

Power up	I: power fail	Standard indication that UFC 300 has been powered off	No action needed
	I: installation required	Indication that the OPTISONIC 6300 has not been installed before	No action needed
	I: press key ">"		Keep key ">" pressed until in display appears: release key now

X Installation

X	**Installation**		
X3	**units**		
X3.1	size	unit for dimension	mm, inch
X3.2	volume flow	unit for volume flow	L/s, L/min,L/h, m3/s, m3/min, m3/h, m3/d, ft3/s, ft3/min, ft3/h, gal/s, gal/min,gal/h, gal/d, IG/s, IG/min, IG/h, IG/d, bbl/h, bbl/d, free unit
X3.3	velocity	unit for flow speed and velocity of sound (VoS)	m/s, ft/s
X3.4	density	unit for density	kg/L, kg/m3, lb/ft3, lb/gal, free unit
X3.5	viscosity	unit for viscosity	cSt, m2/s, mm2/s
X5	**number of paths**	in case "2 paths" is selected, the measurement results will be averaged	1 path, 2 paths
X6.3	diameter	size for outer diameter of pipe	min-max: 20 - 4300 mm / 0.787 - 169.3 inch
X6.4	pipe material		carbon steel, stainless steel, cast iron, aluminum, concrete, GRF/RFP, asbestos cement, PP/PVC, acrylics, polyamide, other
X6.5	VoS pipe material		min-max: 1000.0 - 4500.0 m/s / 3280.8 - 14764 ft/s
X6.6	wall thickness		min-max: 1.000 - 100.0 mm / 0.039 - 3.937 inch
X6.7	liner material		cement, epoxy, PP, LDPE, HDPE, PTFE, rubber, other, none
X6.8	VoS liner material		min-max: 1000.0 - 4500.0 m/s / 3280.8 - 14764 ft/s
X6.9	liner thickness		min-max: 0.100 - 20.00 mm / 0.004 - 0.787 inch
X6.10	fluid		water, alkanes, alcohols, oil, acids, CxHx refined, CxHx light, refrigerant, solvents, caustic soda, other
X6.11	VoS fluid		min-max: 500 - 2500 m/s / 1640.4 - 8202.1 ft/s
X6.12	density		min-max: 0.1000 - 5.0000 kg/l / 6.2428 lb/ft3 to 312.14 lb/ft3
X6.13	viscosity		min-max: 0.100 cSt to 9999 cSt (mm2/s)
X9.1	transducer set	short code for transducer set, mentioned on sensor	Ta, Tb, Tc, none
X9.7	actual distance		min-max: -10.00 - +9999 mm / -0.394 - +393.7 inch
X12.1/3/5	Tx serial no.	factory serial number of sensor	Ayy, 5 free units
X12.2/4/6	Tx calibration no.	set calibration number of sensor according to type sticker	9 free units

A Quick setup

A	**quick setup**		
A1	**language**		english, german, french, dutch
A2	**Tag**	unique location in plant	12 free selectable digits
A4	**analog outputs**	only active if HART device	current output A, B or C, pulse output A, B or D

Menu No.	Display	Function description	Selection list
A4.1	measurement	value for HART current output	(depends on pipe configuration: 1 or 2 pipes) volume flow, mass flow, VoS, flow speed, gain, SNR, diagnosis value, volume flow 1 or 2, VoS 1 or 2
A4.2	unit	unit for HART current output	L/s, L/min,L/h, m3/s, m3/min, m3/h, m3/d, ft3/s, ft3/min, ft3/h, gal/s, gal/min,gal/h, gal/d, IG/s, IG/min, IG/h, IG/d, bbl/h, bbl/d, free unit
A4.3	range	range for main HART current output	min-max: 0.00 - xxxx (depends on configuration)
A4.4	low flow cutoff	low flow cutoff for main HART current output	min-max: 00.0 - 20.0
A4.5	time constant	time constant for main HART current output	min-max: 000.1 - 100.0
A5	**digital outputs**	only active if HART device	pulse output A, B or D, counter 1
A5.1	measurement	value for pulse output	(depends on pipe configuration: 1 or 2 pipes) volume flow, mass flow, volume flow 1 or 2
A5.2	pulse value unit	unit for main pulse output	(unit class depends on selected measurement)
A5.3	value p. pulse	value of pulse per volume or mass for pulse output	(min-max depends on selected measurement)
A5.4	low flow cutoff	low flow cutoff for pulse output	(min-max depends on selected measurement)

B Test

B	**test**		
B1.7	terminal A	(depends on IO setting hardware)	current output A, frequency output A, pulse output A, status output A, limit switch A, control input A
B1.8	terminal B	(depends on IO setting hardware)	current output B, frequency output B, pulse output B, status output B, limit switch B, control input B
B1.9	terminal C	(depends on IO setting hardware)	current output C, status output C, limit switch C
B1.10	terminal D	(depends on IO setting hardware)	frequency output D, pulse output D, status output D, limit switch D
B3.1	C number	identification of electronics	also see converter sticker; first line: circuit board, second line: software, third line:calibration or production date
B3.2.1	Sensor CPU	identification of hardware and software for flow processing	also see sensor board of electronics
B3.2.2	Sensor DSP	identification of hardware and software for signal processing	also see sensor board of electronics
B3.2.3	Sensor driver	identification of hardware and software for driver part	also see sensor board of electronics
B3.3	Device	identification of circuit board	serial number of circuit board, main software version number, production date

C Setup

C	**setup**		
C1.5	extra measurements	extra available parameters for display or input/output	(only for dual pipe configuration: 1, 2 pipes) on pipe 1: mass flow, flow speed, gain, SNR on pipe 2: mass flow, flow speed, gain, SNR
C1.6.1	zero calibration	transit time offset at zero flow	cancel, default, automatic min-max: -10000 - +10000 ps
C1.6.2	meter factor	set factor for correction of volume flow, mass flow, flow speed and Reynolds number	min-max: 0.500 - 2.000
C1.6.3	Reynolds correction	set Reynolds correction for flow profile disturbances, effective on volume flow, mass flow	on,off
C1.7.1	limitation	set lower and upper limit for flow speed on all outputs	min-max: -100 - +100 m/s
C1.7.2	flow direction	select flow direction	normal, reverse
C1.7.3	time constant	within set time, measurements are averaged, displayed and sent to current output	min-max: 000.0 - 100.0 s
C1.7.4	low flow cutoff	beneath set flow speed, zero appears in display	min-max: 0.000 - 10.00 m/s / 0.000 - 32.81 ft/s

Menu No.	Display	Function description	Selection list
C1.8.2	vel. of sound	simulation of the VoS	min-max: 0.0000 - 2500.0 m/s / 0.0000 - 8202.1 ft/s
C1.9.1	error limit	with set limits, every erroneous measurement is counted as percentage of the measured values	min-max: 000 - 100 %
C1.9.2	counter decrease	amount with which the counter decreases	min-max: 00 - 99
C1.9.3	counter limit	totalized correct measurements equal to set counter decrease, decrease error limit by 1	min-max: 000 - 999
C5.1	**I/O Hardware**		
C5.1.1	terminals A	assign terminal A	for basic I/O: current output, off for Modular I/O: free selectable 1st IO Module
C5.1.2	terminals B	assign terminal B	for basic I/O: status output, limit switch, control input for Modular I/O: free selectable 2nd IO Module
C5.1.3	terminals C	assign terminal C	for basic I/O: status output, limit switch, off for Modular I/O: fixed current out
C5.1.4	terminals D	assign terminal D	for basic I/O: status output, limit switch, pulse output, frequency output, off for Modular I/O: fixed current out
C5.2	**current out A**		
C5.2.1	range 0-100%	set current range	min-max: 04.0 - 20.0 mA
C5.2.2	extended range	set upper current range to extended value	min-max: 03.5 - 21.5 mA
C5.2.3	error current	after error this selected current is set	min-max: 03.0 - 22.0 mA
C5.2.4	error condition		error in device, out of specification, application error
C5.2.5	measurement	measurement value to current output	(depends on pipe configuration: 1 or 2) volume flow, mass flow, VoS, flow speed, gain, SNR, diagnosis value, volume flow 1 or 2, VoS 1 or 2
C5.2.6	range	set measurement range from 0 to 100 %	(min-max depends on parameter settings)
C5.2.7	polarity	set polarity of current output	positive -, negative -, both polarity(ies), absolute value
C5.2.8	limitation	set lower and upper limit for current output	min-max: -150 - +150 %
C5.2.9	low flow cutoff	beneath set value, current output is set to zero	min-max: 00.0 - 20.0
C5.2.10	time constant	within set time, measurements are averaged, displayed and sent to current output	min-max: 000.1 - 100.0
C5.2.11	special functions	for ranging	automatic range, external range, off
C5.2.12	threshold	inactive if C2.2.12 is set to off: set lag value between normal and extended range	min-max: 05.0 - 80.0
C5.2.13	information	serial number of circuit board, software version, calibration date of circuit board	
C5.2.14	simulation A	simulation of current output A	set value:on/off, cancel min-max: 00.0 - 22.0 mA
C5.2.15	4 mA trimming	restore factory setting for 4 mA	min-max: 3.6000 - 5.5000 mA
C5.2.16	20 mA trimming	restore factory setting for 20 mA	min-max: 18.500 - 21.500 mA
C5.3	**frequency output**		
C5.3.1	pulse shape	set shape	symmetric, automatic, fixed
C5.3.2	pulse width	active if C2.3.1 is set to fixed: set time for pulse activation	min-max: 0000.05 - 2000.00
C5.3.3	100 % pulse rate		min-max: 00000.0 - 10000.0
C5.3.4	measurement	measurement value to frequency output	(depends on pipe configuration: 1 or 2 pipes) volume flow, mass flow, VoS, flow speed, gain, SNR, diagnosis value, volume flow 1 or 2, VoS 1 or 2
C5.3.5	range	set measurement range from 0 to 100 %	(min-max depends on parameter settings)
C5.3.6	polarity	set polarity of frequency output	both polarities
C5.3.7	limitation	set lower and upper limit for frequency output	min-max: -150 - +150 %
C5.3.8	low flow cutoff	set low values to zero	min-max: 00.0 - 20.0
C5.3.9	time constant	within set time, measurements are averaged, displayed and sent to current output	min-max: 000.1 - 100.0

Menu No.	Display	Function description	Selection list
C5.3.10	invert signal	define frequency output activation	off: activate high current/switch closed on: low current/switch open
C5.3.11	phase shift	phase shift between output B and D	0, 90, 180 degrees
C5.3.12	special function	for ranging	off, phase shift
C5.3.13	information		
C5.3.14	simulation	simulation of frequency output	on, off, cancel
C5.4	**pulse output**		
C5.4.1	pulse shape	set shape	symmetric, automatic, fixed
C5.4.2	pulse width	set time for pulse activation	available if pulse shape is set: fixed min-max: 0000.05 - 2000.00
C5.4.3	max. pulse rate		min-max: 00000.0 - 10000.0 Hz
C5.4.4	measurement	measurement value to pulse output	(depends on pipe configuration: 1 or 2 pipes) volume flow, mass flow, volume flow 1 or 2
C5.4.5	pulse value unit	unit for pulse output	mL, L, free unit
C5.4.6	value p. pulse	value of pulse per volume or mass for pulse output	no min-max
C5.4.7	polarity	set polarity of pulse output	positive -, negative -, both polarity(ies), absolute value
C5.4.8	low flow cutoff	set low values to zero	min-max: 00.0 - 20.0
C5.4.9	time constant	within set time, measurements are averaged, displayed and sent to current output	min-max: 000.1 - 100.0
C5.4.10	invert signal	activate switch closed, open	off, on
C5.4.11	phase shift	phase shift between output B and D	0, 90, 180 degrees
C5.4.12	special function	for ranging	off, phase shift
C5.4.13	information	serial number of circuit board, software version, calibration date of circuit board	
C5.4.14	simulation	simulation of pulse output	on, off, cancel
C5.5	**status output**		
C5.5.1	mode	output is activated if an error occurs	(depends on pipe configuration: 1 or 2 pipes) off, error in device, application error, out of specification, empty pipe, polarity flow, over range flow, application error 1 or 2, out of specification 1 or 2, empty pipe 1 or 2, polarity flow 1 or 2, over range flow 1 or 2, counter 1 preset, counter 2 preset, output A/B/C/D
C5.5.2	current output Y	active if selected under status output mode (C2.5.1) output Y and output is current output	polarity, over range, automatic range
C5.5.3	frequency output Y	active if selected under status output mode (C2.5.1) output Y and output is frequency output	polarity, over range
C5.5.4	pulse output D	active if selected under status output mode (C2.5.1) output Y and output is pulse output	polarity, over range
C5.5.5	status output Y	active if selected under status output mode (C2.5.1) output Y and output is status output	same signal, inverted signal
C5.5.6	limit switch Y	active if selected under status output mode (C2.5.1) output Y and output is limit switch	off
C5.5.7	control input Y	active if selected under status output mode (C2.5.1) output Y and output is control input	off
C5.5.8	off	active if selected under status output mode (C2.5.1) output Y and output is switched off	off
C5.5.9	invert signal	define status output activation	off: activate high current/switch closed on: low current/switch open
C5.5.10	information	serial number of circuit board, software version, calibration date of circuit board	
C5.5.11	simulation	simulation of status output	on, off, cancel
C5.6	**limit switch X**		

Menu No.	Display	Function description	Selection list
C5.6.1	measurement	measurement value to limit switch	(depends on pipe configuration: 1 or 2 pipes) volume flow, mass flow, VoS, flow speed, gain, SNR, diagnosis value, volume flow 1 or 2, VoS 1 or 2
C5.6.2	threshold	1e: switch level 2e:time lag	min-max: 500.0 - 2500 m/s
C5.6.3	polarity	set polarity of limit switch	positive -, negative -, both polarity(ies), absolute value
C5.6.4	time constant	within set time, measurements are averaged, displayed and sent to current output	min-max: 000.1 - 100.0
C5.6.5	invert signal	define limit switch activation	off: high current by exceeded limit on: low current by exceeded limit
C5.6.6	information	serial number of circuit board, software version, calibration date of circuit board	
C5.6.7	simulation	simulation of limit switch	on, off, cancel
C5.7	**control input X**		
C5.7.1	mode	define function of control input	off, hold all outputs, hold output X, all outputs to zero, output X to zero, reset to all counters, reset counter X, stop all counters, stop counter X, zero outp.+ stop cnt, range change X, error reset
C5.7.2	invert signal		off: activate a current on: activate no current
C5.7.3	information	serial number of circuit board, software version, calibration date of circuit board	
C5.7.4	simulation	simulation of control input	on, off, cancel
C6	**I/O Counter**		
C6.1…6.2	**Counter 1 and 2**	only if HART device	
C.x.1	function of counter	define counter	off, +counter, -counter, sum counters
C.x.2	measurement	select the measurement for the counter	(depends on pipe configuration: 1 or 2 pipes) volume flow, mass flow, volume flow 1 or 2
C.x.3	low flow cutoff	set low values to zero	(depends on parameter settings)
C.x.4	time constant	within set time, measurements are averaged, displayed and sent to current output	min-max: 000.1 - 100.0
C.x.5	preset value	active when under status output mode (C2.5.1) preset counter X is selected	min-max: 0.00000 - 1.00 +15
C.x.6	reset counter		yes/no
C.x.7	set counter	select set value	on, off, cancel
C.x.8	stop counter	stop counter and hold actual value	yes/no
C.x.9	start counter	start after stop counter	yes/no
C.x.10	information	serial number of circuit board, software version, calibration date of circuit board	
C7	**I/O HART**	only if HART device; HART dynamic values are linked to analog outputs	free selectable only if analog output is NOT active
C7.1	PV is	Primary Variable; linked to HART current output	
C7.1.1	current output A	show selected value	
C7.1.2	frequency output X	show selected value	
C7.1.3	HART dynamic variable	select the variable	(depends on pipe configuration: 1 or 2 pipes) volume flow, mass flow, VoS, flow speed, gain, SNR, diagnosis value, volume flow 1 or 2, VoS 1 or 2, counter 1 or 2, operating hours
C7.2	SV is	Secondary Variable; linked to frequency output D	
C7.3	TV is	Third Variable	
C7.4	4V is	Fourth Variable	
C8	**device**		
C8.2.2	contrast		min-max: -9 - +9
C8.2.3	default display		1.meas.page, 2.meas.page, graphic page, status page, none

Menu No.	Display	Function description	Selection list
C8.3		settings for first and second measurement display	
C8.3.1	function		one, two, three line(s)
C8.3.2	measurement 1.line		(depends on pipe configuration: 1 or 2 pipes) volume flow, mass flow, VoS, flow speed, gain, SNR, diagnosis value, volume flow 1 or 2, VoS 1 or 2
C8.3.3	range	set measurement range from 0 to 100 %	(depends on parameter settings)
C8.3.4	limitation	set lower and upper limit	min-max: -150 - +150 %
C8.3.5	low flow cutoff	set low values to zero	min-max: 00.0 - 20.0
C8.3.6	time constant	within set time, measurements are averaged, displayed and sent to current output	min-max: 000.1 - 100.0
C8.3.7	format 1.line	number of decimals	automatic, No.x.xxxx (no - four decimals)
C8.3.8	measurement 2.line		bargraph, operating hours, counter 1, counter 2, diagnosis value, SNR, gain, flow speed, mass flow, VoS, volume flow
C8.5.1	select range	set Y-axis scaling	manual, automatic
C8.5.2	range	active if under select range (C5.5.1) manual is selected	min-max: -100 - +100%
C8.5.3	time scale	set X-axis scaling	min-max: 001 - 100 min
C8.6.2	save settings		factory settings, back up 1, back up 2, cancel
C8.6.3	load settings		factory settings, back up 1, back up 2, cancel
C8.6.4	password quick setup		0000 - 9999
C8.6.5	password setup		0000 - 9999
C8.7	units		
C8.7.1	volume flow		L/s, L/min,L/h, m3/s, m3/min, m3/h, m3/d, ft3/s, ft3/min, ft3/h, gal/s, gal/min,gal/h, gal/d, IG/s, IG/min, IG/h, IG/d, bbl/h, bbl/d, free unit
C8.7.2	mass flow		kg/s, kg/min, kg/h, t/min, t/h, t/d, lb/s, lb/min, lb/h, ST/min, ST/h, ST/d, LT/h, LT/d, gs, g/min, g/h, free unit
C8.7.3	flow speed		m/s, ft/s
C8.7.4	velocity		m/s, ft/s
C8.7.5	volume		m3, in3, ft3, yd3, mL, L, hL, gal, IG, bbl, free unit
C8.7.6	mass		mg, g, kg, t, oz, lb, ST, LT, free unit
C8.7.7	density		kg/L, kg/m3, lb/ft3, lb/gal, free unit
C8.7.8	viscosity		cSt, m2/s, mm2/s
C8.8.1	HART	factory setting: HART communication on; generates F: application error open circuit A	

6.7 Error messages

Error code	Group message	Error message	Description	Error handling
At power up				
I		power fail	standard indication that UFC300 has been powered off	no action needed
F	application error	open circuit A	no measurement possible, but device ok	factory setting as HART device with current output A open; set parameter in menu C5.2
I		installation required	indication that device is not installed	
I		press key ">"		keep button ">" pressed until "release key now" appears; continue installation
During operation				
F (bold)	error in device		no measurement possible, measured values are not valid	repair or replace device and/or CPU; contact KROHNE service center
F	application error		no measurement possible, but device ok	check parameter settings / power off - wait 5 seconds - power on device
S	out of specification		unreliable measurement	maintenance required, check flowprofile
C	check in progress		test function is active, device is stand-by	wait until finished
I	information		no direct impact on measurements	no action needed
F (bold)		IO 1 (or IO 2)	error or failure of IO Module 1 (or 2)	try to load settings (menu C8.6.3); if error does not disappear, replace electronics unit
F (bold)		parameter	error or failure of data manager, parameter or hardware error	try to load settings (menu C8.6.3); if error does not disappear, replace electronics unit
F (bold)		configuration	incorrect configuration or no confirmation	confirm change of module; if configuration is unchanged, replace electronics unit
F (bold)		display	error of failure of display unit, parameter or hardware error	defect; replace electronics units
F (bold)		current output A (or B, C)	error or failure of the current output A (or B, C), parameter or hardware error	defect; replace electronics units
F (bold)		software user interface		defect; replace electronics units
F (bold)		hardware settings	detected hardware and set hardware settings do not match	follow display instructions
F (bold)		hardware detection	hardware can not be detected	defect; replace electronics units
F (bold)		RAM/ROM error IO 1 (or IO 2)		defect; replace electronics units
F (bold)		communication dsp-up	no communication between DSP and microprocessor PCB	contact KROHNE service center
F (bold)		front end	malfunctioning of front end PCB	contact KROHNE service center
F (bold)		uproc	malfunctioning of microcontroller PCB	contact KROHNE service center
F (bold)		dsp	malfunctioning of DSP	contact KROHNE service center
F		empty pipe	signal lost at two paths	check process conditions
F		flow > max 1	max volume flow exceeded for pipe 1	check parameter in menu C1.7.1
F		flow > max 2	max volume flow exceeded for pipe 2	check parameter in menu C1.7.1
F		open circuit A (or B, C)	current on current output A (or B, C) too low	check cable or reduce resistance (< 1000 Ohm)
F		over range A (or B, C)	current on current output A (or B, C) is limited by parameter setting	extend upper or lower limit for current output in menu C5.2.8
F		over range A (or B, D)	pulse on frequency output A (or B, D) is limited by parameter setting	extend upper or lower limit for frequency output in menu C5.3.7

Error code	Group message	Error message	Description	Error handling
F		active settings	error during CRC check (Cyclic Redundancy Check) of the active settings	load settings; factory setting, back up 1 or back up 2
F		factory settings	error during CRC check of factory settings	
F		back up 1 (or 2) settings	error during CRC check of back up 1 (or 2) settings	
F		signal lost path 1	signal lost at path 1	check signal cable / check for pipe obstructions
F		signal lost path 2	signal lost at path 2	check signal cable / check for pipe obstructions
F		pipe/sens1 param.	unrealistic parameter settings for pipe in combination with path 1	check parameters in menu X6
F		pipe/sens2 param.	unrealistic parameter settings for pipe in combination with path 2	check parameters in menu X6
S		unreliable 1	unreliable measurement at pipe 1	check process conditions for gas bubbles, solids
S		unreliable 2	unreliable measurement at pipe 2	check process conditions for gas bubbles, solids
S		zero converter	invalid value at power up	power off - wait 5 seconds - power on device
S		overflow counter 1 (or 2, 3)	counter is overflowing and will start again at zero	no action needed
S		backplane invalid	error during CRC check of backplane	restore data records on backplane
I		counter 1 (or 2, 3) stopped	counter has stopped	reset counter in menu C8.9.1 (or C8.9.2, C8.9.3)
I		control input A (or B) active	information only	no action needed
I		over range display 1 (or 2)	1e row on 1e (or 2e) measurement page is limited by parameter setting	extend upper or lower limit for limitation in menu C8.3.4
I		backplane sensor	incompatible data sensor on backplane	
I		backplane settings	incompatible data on backplane	
I		backplane difference	different data on backplane and display	
I		optical interface	optical interface is operational, local display can not be used	
I		softw sync error	incompatible DSP and microprocessor software	

7.1 Periodic maintenance

7.1.1 Greasing of transducers

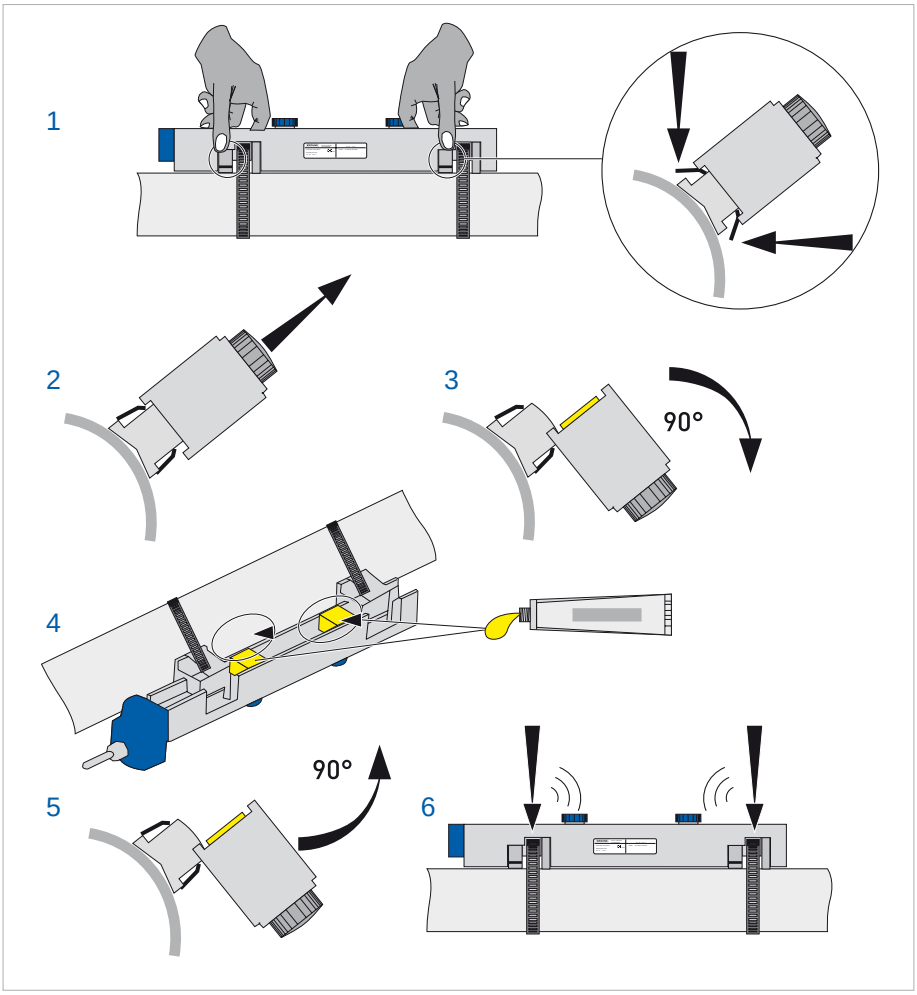


Figure 7-1: Greasing of transducers

- Loosen cover via unscrewing screw, slide cover away from connection cap, lift cover, place cover in safe place to avoid damage. 1
- Release rail via push buttons 2 .
- Lift rail upward and turn rail 90 degrees sideward. 3
  Clean pipe and contact surfaces of transducers with a soft cloth.
- Regrease the contact surfaces of transducers. 4
- Turn rail 90 degrees back. 5
- Press rail at both ends to the pipe by clicking. 6

7.2 Cleaning

- Keep screw thread of the covers of the UFC 300 F signal converter clean.
- Do not damage the screw thread and the gasket.
- Never allow dirt to accumulate.
- Grease the screw thread with Teflon grease.

7.3 Exchange of electronics unit

CAUTION!

The following instructions shall always be carefully followed and only be performed by trained personnel, familiar with the safety requirements and electronics.

Before opening the UFC 300 housing:

DANGER!

Make sure that all connecting cables are safely disconnected from all external sources.

NOTE!

Make notes of important specific data, before exchanging the electronics.
Menu settings are stored on the circuit board (or backplane), that is fixed to the housing. After exchange of electronics unit and power-up, the following start up screen appears:

Load all data ?

l Select yes

i - if in the screen appears “**load sensor data”**, the electronics units were not fully compatible. You can proceed by selecting yes. Note that all settings need to be checked and changed. Only the sensor calibration data are loaded.
- if in the screen appears “**load no data”**, all data have been lost. Contact your local KROHNE representative.

7.3.1 UFC 300 F

DANGER!

Disconnect power!

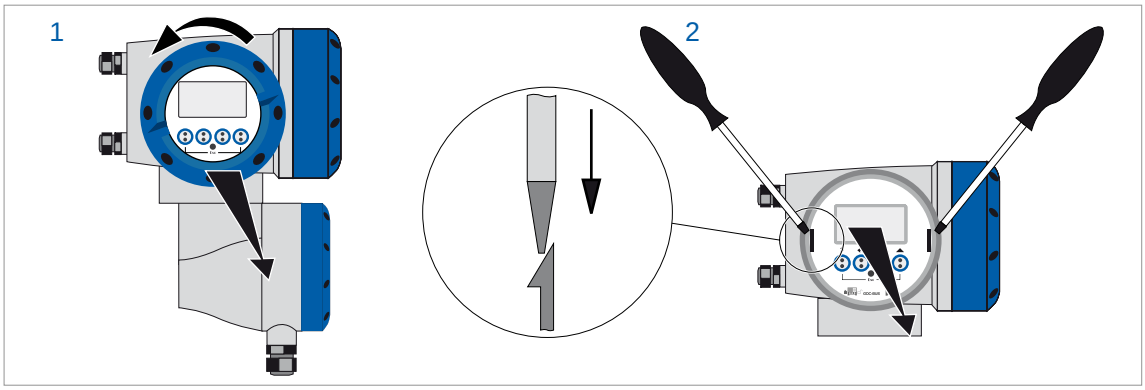


Figure 7-2: Unscrew display and pull out electronics unit

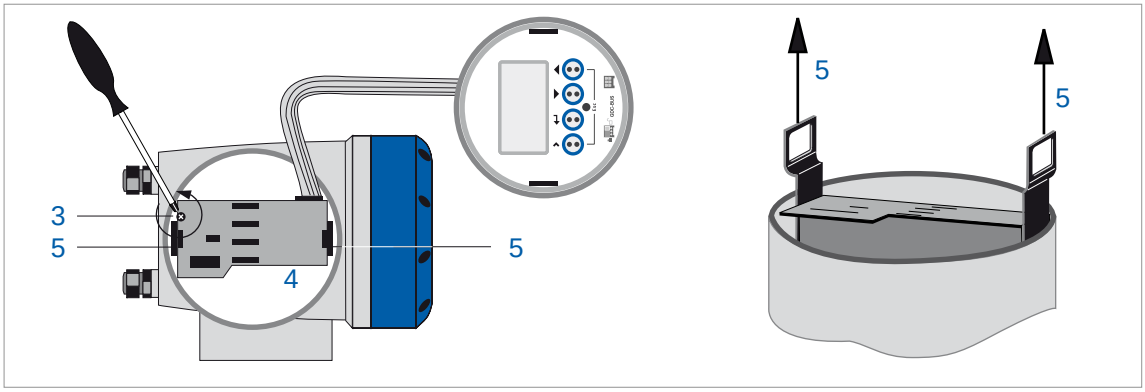


Figure 7-3: Pull off printed circuit board

The following procedures have to be carried out:

- Unscrew the display cover of the electronics compartment by hand, by turning it counter clockwise 1 .
- Remove the display by using two screwdrivers.
- Unscrew the two M4 screws 3 at the electronics unit 4 .
- Pull the two metal pullers 5 at the left and right of the display, using a screwdriver or similar tool and partially pull out the electronics unit 2 .

CAUTION!

Please pay attention that the same amount of force is applied on both pullers, otherwise the connector at the backside can be damaged.

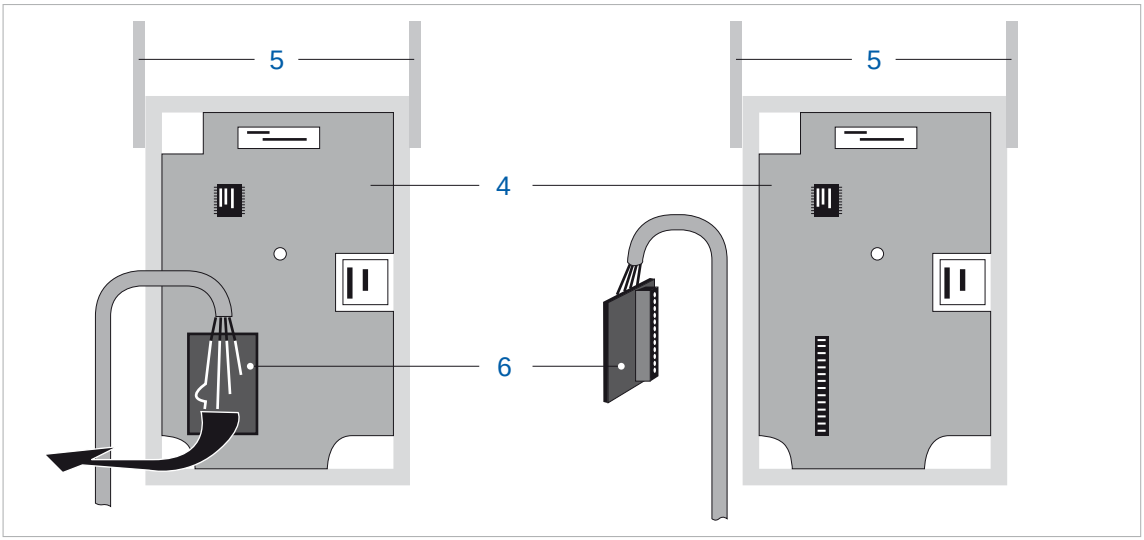


Figure 7-4: Insert new board and finish exchange

DANGER!

Electrostatic discharge (ESD) can damage electronic parts. Make sure to discharge yourself by wearing a wrist strap. If no wrist strap is available, ground yourself by touching a metal surface that is grounded.

- Remove the printed circuit board 6 from the electronics unit 4.
- Check compatibility between the removed and new electronics unit, by checking the power voltage and by reading the version numbers of all boards 4.
- Slide the new electronics unit partially back into the housing.
- Mount the small printed circuit board back onto the sensor driver board.
- Push back the metal pullers 5 simultaneously with the electronics unit.
  Don't use excessive force, otherwise the connector at the backside can be damaged!
- Re-install the display and make sure not to kink the display's flat ribbon cable.
- Screw the electronics unit back to the housing with the two M4 screws.
- Replace cover and tighten down by hand.
- Connect power.

7.3.2 UFC 300 W

DANGER!

Disconnect power!

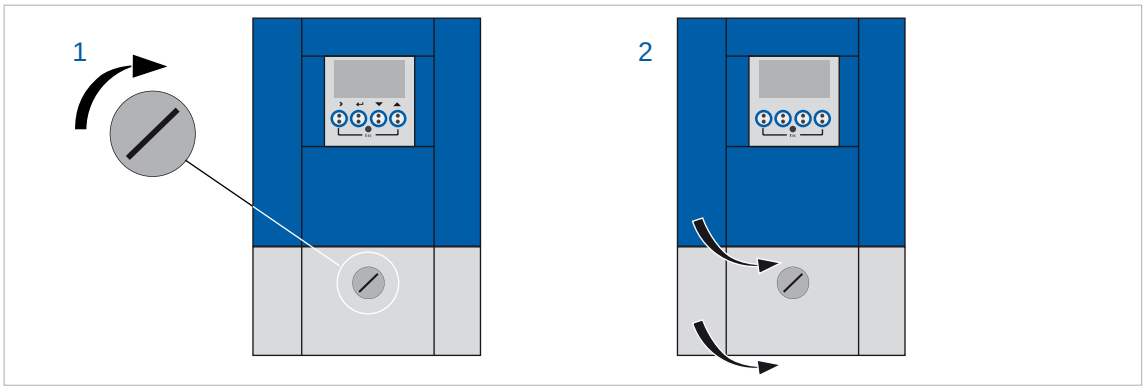


Figure 7-5: Unlock and open door

The following procedures have to be carried out:

- Turn locking screw to the left 1 to unlock the lower white door.
- Open lower white door.
- Pull metal slider, positioned at the left upper angle, downwards.
- Open upper blue door 2.

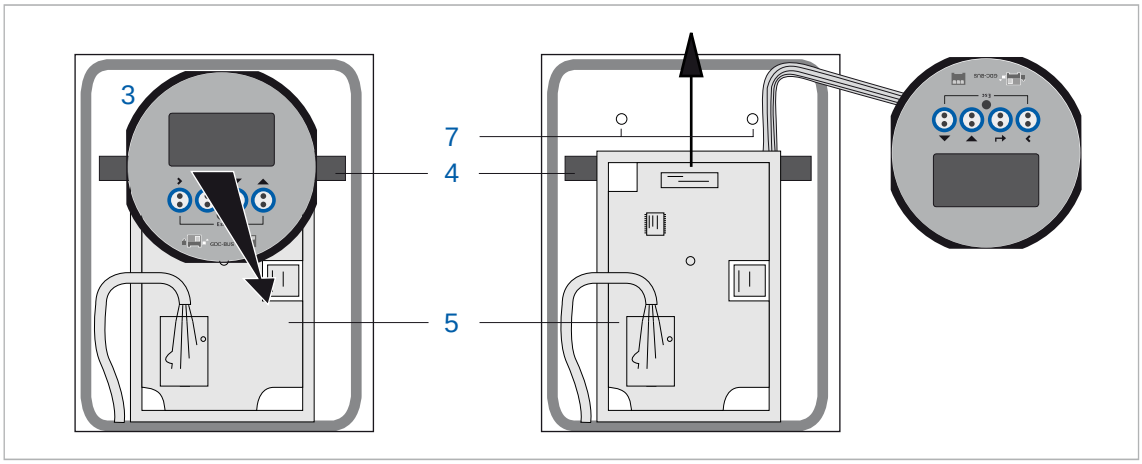


Figure 7-6: Pull off display

- Pull off the display 3 by pressing the plastic holders on both sides 4 and carefully lay the display aside.

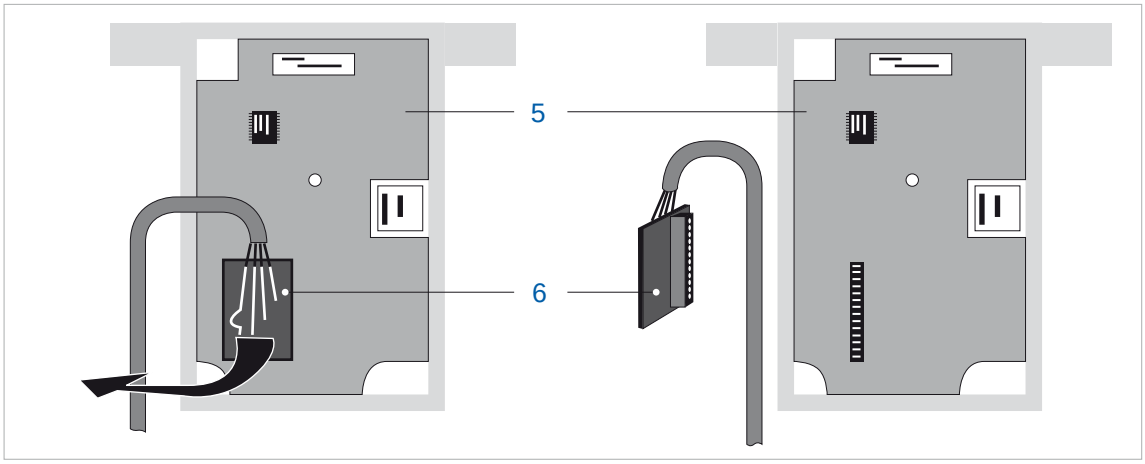


Figure 7-7: Release printed circuit board

- Unscrew the two M4 screws 7 at the electronics unit 5.
- Carefully slide the electronics unit as indicated 4, then lift it out of the housing.

DANGER!

Electrostatic discharge (ESD) can damage electronic parts. Make sure to discharge yourself by wearing a wrist strap. If no wrist strap is available, ground yourself by touching a metal surface that is grounded.

- Pull off the small printed circuit board, with soldered coaxial cables, with great care. This small board can be seen at first sight and is positioned at the lower half onto the first big printed circuit board (sensor driver board).

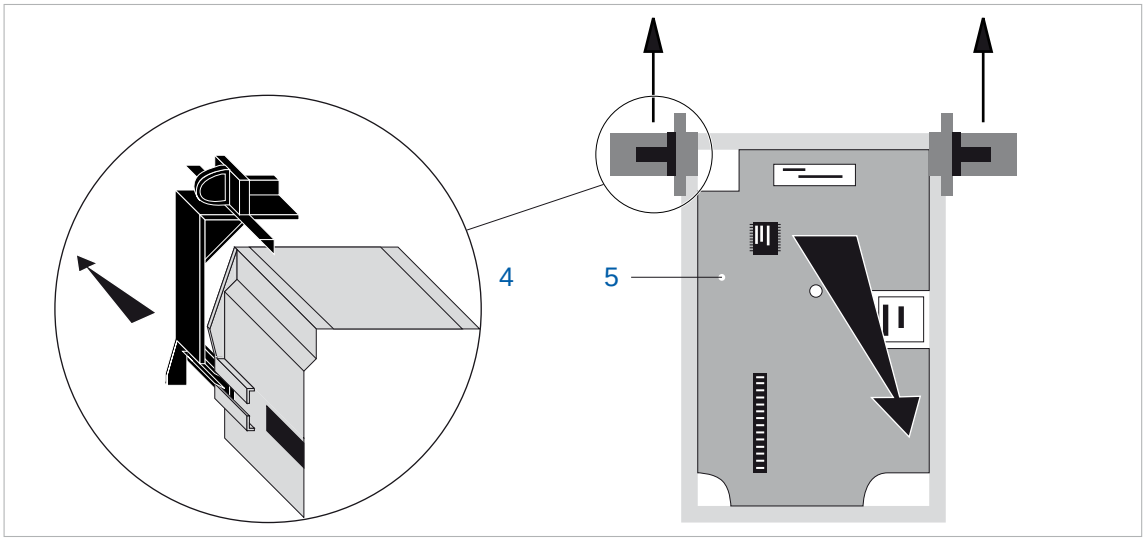


Figure 7-8: Mount new electronics

- Remove the holding brackets 4 from the old electronics unit 5 .
- Check compatibility between the removed and new electronics unit, by checking the power voltage and by reading the version numbers of all boards.
- Click the holding brackets 4 of the display onto the new electronics unit and slide the new electronics unit into the housing.
- Mount the small printed circuit board back onto the sensor driver board.
- Screw the electronics unit back to the housing.
- Click the display back into the holders.
- Close the housing and lock the door.
- Connect power.

INFORMATION!

Before further operating the OPTISONIC 6300, first enter the installation menu refer to *Installation menu* on page 58 and check all important settings.

7.4 Replacing the main fuse

CAUTION!

The following instructions shall always be carefully followed and only be performed by trained personnel, familiar with the safety requirements and electronics.

The mains fuse is in accordance with IEC 127-2. The size is diameter 5 x 20 mm / 0.79" length.

Underneath codings for the mains fuse apply:
100...230 VAC power supply: 0.8 AT/H/250 , breaking capacity 1500 Ampere at 250 V
24 VAC/DC power supply: 2 AT/H/250 , breaking capacity 1500 Ampere at 250 V

DANGER!

Before opening the UFC 300 housing:
Make sure that all connecting cables are safely disconnected from all external sources.

7.4.1 UFC 300 F

DANGER!

Disconnect power!

The following procedures have to be carried out:

- Unscrew the display cover of the electronics compartment by hand, by turning it counter clockwise 1 .
- Unscrew the screws (M4) to release the electronics unit from the F-housing 2 .
- Pull the two metal clips at the left and right of the display 2 , using a screwdriver or similar tool.
- Partially pull out the electronics unit.

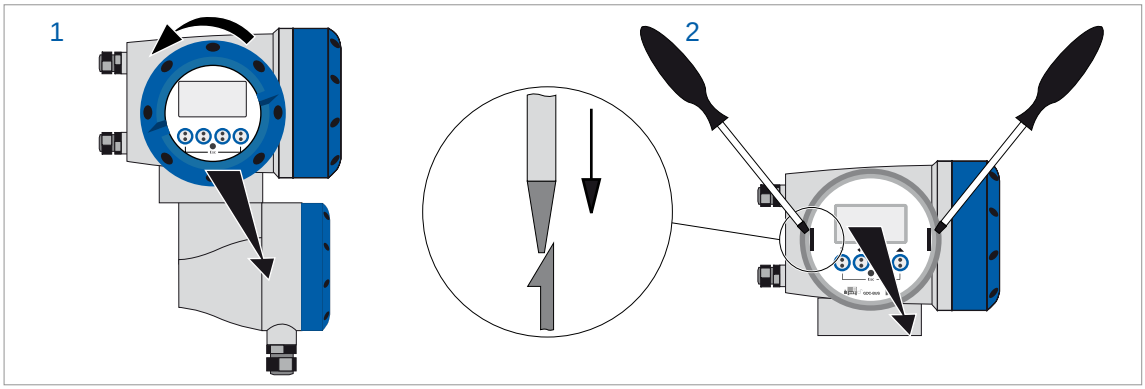


Figure 7-9: Unscrew display and pull out electronics unit

- Pull off the small printed circuit board, with soldered coaxial cables, with great care. This small board can be seen at the bottom printed circuit board (sensor driver board).
- Remove the electronics units.
- The fuse holder with the mains fuse is located on the power board, which is the upper board. Slide the electronics unit partially back into the housing.
- Mount the small printed circuit board back onto the sensor driver board.
- Push back the metal clips simultaneously with the electronics unit, and make sure not to kink the display's flat ribbon cable.
- Screw the electronics unit back to the housing
- Replace cover and tighten down by hand 1 .

7.4.2 UFC 300 W

DANGER!

Disconnect power!

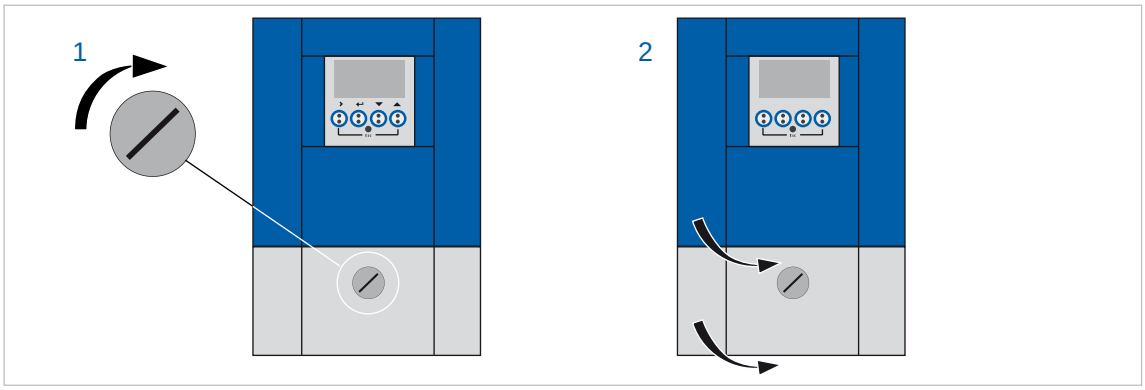


Figure 7-10: Unlock and open door

The following procedures have to be carried out:

- Turn locking screw 1 to the left to unlock the lower white door.
- Open lower white door.
- Pull metal slider, positioned at the left upper angle, downwards.
- Open upper blue door 2.

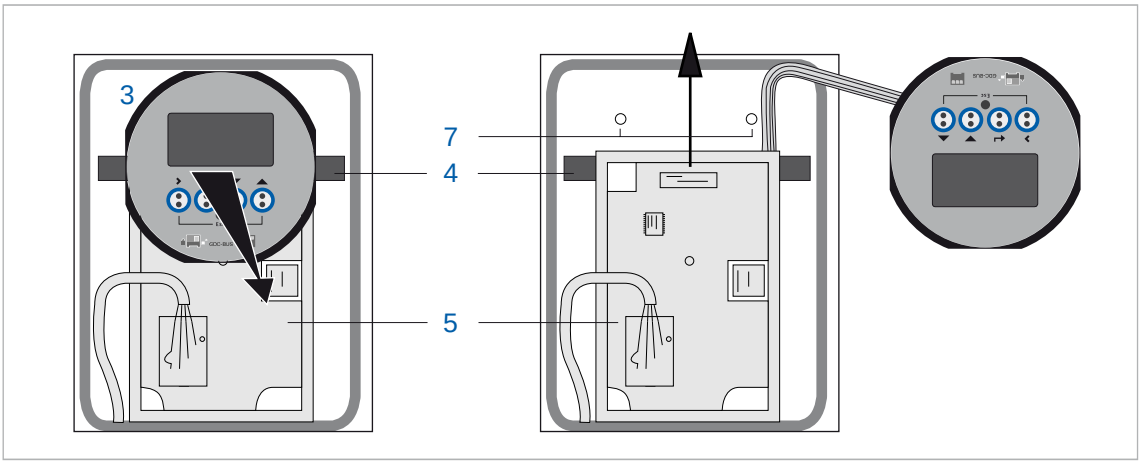


Figure 7-11: Pull off display

- Pull of the display 3 by pressing the plastic holders on both sides 4 and carefully lay the display aside.
- Unscrew the two screws (size M4), to release the electronics unit from the W-housing.
- Carefully lift the electronics unit upwards.
- Pull off the small printed circuit board, with soldered coaxial cables, with great care. This small board can be seen at first sight and is positioned at the lower right side onto the first big printed circuit board (sensor driver board).
- Remove the electronics unit.
- The fuse holder with the mains fuse is located on the power board, which is at the back. Replace the electronics unit.
- Mount the small printed circuit board back onto the sensor driver board.
- Screw the electronics unit back to the housing.
- Click the display back into the holders.
- Close the housing and lock the door 1.

7.5 Spare parts availability

It is the policy of KROHNE to provide operational spare parts for any flowmeter or major accessory for a period of ten (10) years after shipment of the final production run of that flowmeter.

Operational spare parts are defined as those that are susceptible to failure during their normal operation.

7.6 Service availability

KROHNE provides a variety of services to support its customers after warranty expiration.

Repair, technical support and training can be provided.

NOTE!

For detailed information please contact your local KROHNE representative.

7.7 Returning the device to the manufacturer

7.7.1 General information

This device has been carefully manufactured and tested. If installed and operated in accordance with these operating instructions, it will rarely present any problems.

CAUTION!

Should you nevertheless need to return a device for inspection or repair, please pay strict attention to the following points:

- Due to statutory regulations on environmental protection and safeguarding the health and safety of our personnel, KROHNE may only handle, test and repair returned devices that have been in contact with products without risk to personnel and environment.
- This means that KROHNE can only service this device if it is accompanied by the following certificate (see next section) confirming that the device is safe to handle.

CAUTION!

If the device has been operated with toxic, caustic, flammable or water-endangering products, you are kindly requested:

- to check and ensure, if necessary by rinsing or neutralizing, that all cavities are free from such dangerous substances,
- to enclose a certificate with the device confirming that is safe to handle and stating the product used.

7.7.2 Form (for copying) to accompany a returned instrument

Company:		Address:
Department:		Name:
Tel. No.:		Fax No.:
The meter enclosed, type:		
KROHNE Commission or Series No.:		
has been operated with the following liquid:		
Because this liquid is:		hazardous to water
		toxic
		caustic
		flammable
		We have checked that all cavities in the unit are free from such substances.
		We have flushed out and neutralized all cavities in the unit.
We herewith confirm that in returning this unit there is no risk to man or environment through any residual liquid contained in it!		
Date:		Company stamp:
Signature:		

7.8 Disposal

CAUTION!

Disposal must be carried out in accordance with legislation applicable in your country.

8.1 Technical data

Ultrasonic flowmeter OPTISONIC 6300

Versions

OPTISONIC 6300	Standard
OPTISONIC 6300 - EX	Option

Performance

Measurement functionality	Standard actual volume flowrate and totalised volume
Measuring range	0…20 m/s / 0…66 ft/s
Max. deviation (under reference conditions)	< ± 1% of M.V. for DN≥50 mm / 2", v>0.5 m/s / 1.5 ft/s
	< ± 3% of M.V. for DN<50 mm / 2", v>0.5 m/s / 1.5 ft/s
Repeatability	< ± 0.2%
Process conditions	Solid particle content < 5% (by volume)
	Gas content < 2% (by volume)

Measurement configurations

Single path, single pipe	Standard
Dual path, single pipe	Option
Dual pipe, single path	Option

Ultrasonic flow sensor OPTISONIC 6000

Versions

OPTISONIC 6000 - medium (DN50…DN400 / 2"…16")	Standard
OPTISONIC 6000 - small (DN15…DN100 / ½"…4")	Option
OPTISONIC 6000 - large (DN200…DN4000 / 8"…160")	Option
OPTISONIC 6000XT - medium (ext. temp. DN50…DN400 / 2"...16")	Option
OPTISONIC 6000XT - small (ext. temp. DN15…DN100 / 2"…4")	Option

Pipe specifications

Material: metal, plastic, ceramic, asbestos cement, internal / external coated pipes (coatings and liners fully bonded to pipewall)	Standard
Maximum pipewall thickness of 75 mm / 2.95" (metal)	Standard

Protection class

IP66/67	Standard

Electric signal level

Ex-i, intrinscally safe circuits, floating	Standard

Process temperature

-40…+120°C / -40…+248°F	Standard
-50…+200°C / -58…+392°F, XT version	Option

Signal cable length

5 m / 15 ft	Standard

10 m / 30 ft	Option
20 m / 60 ft	Option
30 m / 90 ft	Option

Ultrasonic flow converter UFC 300

Versions

W (wall)	UFC 300 W
F (field)	UFC 300 F

Display languages

Wth local display	Standard
English, French, German, Dutch	Standard

Flow sensor

OPTISONIC 6000	DN 15...4000 / ½"...160"

Communication

Current, pulse & status output, HART® communication, control input	Standard
Modular I/O	Option

Power supply

100…230 VAC (-15/+10%), 50/60 Hz	Standard
24 V AC/DC (24 VAC: +10% / -15%, 50/60 Hz; 24 VDC: +30% / -25%)	Option
Power consumption	22 VA

Approvals

EEx - zone 1 / 2	Option 1
FM - Class I DIV 1 / 2	Option 1
CSA - GP / Class I DIV 1 / 2	Option 1

Protection category

W (wall)	IP 65 (eq. to NEMA 4/4X)
F (remote)	IP 66 / 67 (eq. to NEMA 6)

Temperature

Process	see flow sensor
Ambient	-40...+65ºC / -40...+149ºF
Storage	-50...+70ºC / -58...+158ºF

Cable connection

M20 x 1.5	Standard
½" NPT	Option
PF ½	Option

Materials used

Die-cast aluminium with polyuerethane coating (F-version)	Standard
Polyamide - polycarbonate (W-version)	Standard
Stainless steel 316 L / 1.4404 (F-version)	Option

1 UFC 300 F only

I/O Specifications

Overall functionality

Function	Continuous measurement of actual volume flow, mass flow, flow speed, velocity of sound, gain, SNR, diagnosis value
	Bidirectional flow measurement and totalisation
	Signal quality bar graph

Current output

Function	All operating data configurable; galvanically isolated; HART® communication
Settings	Q = 0%: 0…15 mA
	Q = 100%: 10…22 mA
	Error identification: 0…22 mA
Connection	
Basic / Modular IO: Active	$I \leq 22$ mA / $R_L \leq 1$ kOhm
Ex-i: Active	$I \leq 22$ mA / $R_L \leq 470$ Ohm
	$U_0 = 21$ V / $I_0 = 90$ mA
	$P_0 = 0.5$ W
	$C_0 = 90$ nF / $L_0 = 2$ mH
Basic / Modular IO: Passive	$I \leq 22$ mA / $U \leq 32$ VDC
Ex-i: Passive	$I \leq 22$ mA
	$U_i = 30$ V / $I_i = 100$ mA
	$P_i = 1$ W
	$C_i = 10$ nF / $L_i \sim 0$ mH

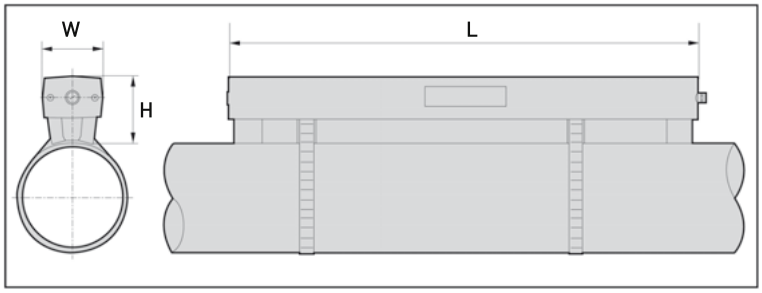
Pulse output and Status output

Function	Configurable as pulse output, identification for automatic range change, indicator of flow direction, overflow, errors, trip point or empty pipe indication
Settings	Q = 100%: 0.0001…10000 pulses per second or pulses per unit volume
	Pulse width: 0.05…2000 ms or auto or sym.
	Status: On or Off
Connection	
Basic / Modular IO: Passive	$f \leq 10$ kHz: $I \leq 20$ mA
	$f \leq 10$ Hz: $I \leq 100$ mA
	$U \leq 32$ VDC / $I \leq 100$ mA
Passive	$U_i = 30$ V / $I_i = 100$ mA
	$P_i = 1$ W
	$C_i = 10$ nF / $L_i \sim 0$ mH
Active	$U_{nom} = 24$ VDC / $I < 1$ mA
	$U_0 = 1.5$ V at 10 mA
Namur (acc. to EN 60947-5-6)	Passive

Control input

Function	Freeze output (e.g. during cleaning), forced return to zero, counter and error reset, ext. range selection.
Settings	Freeze outputs, output zero, reset counter, reset error, start batch (in batch mode)
Connection	
Basic / Modular IO: Active	I_{nom} = 16 mA / U_{nom} = 24 VDC
Basic / Modular IO: Passive	U ≤ 32 VDC
	U_{on} > 19 VDC / U_{off} < 2.5 V DC
Namur (acc. to EN 60947-5-6)	Active

8.2 Dimensions and weights

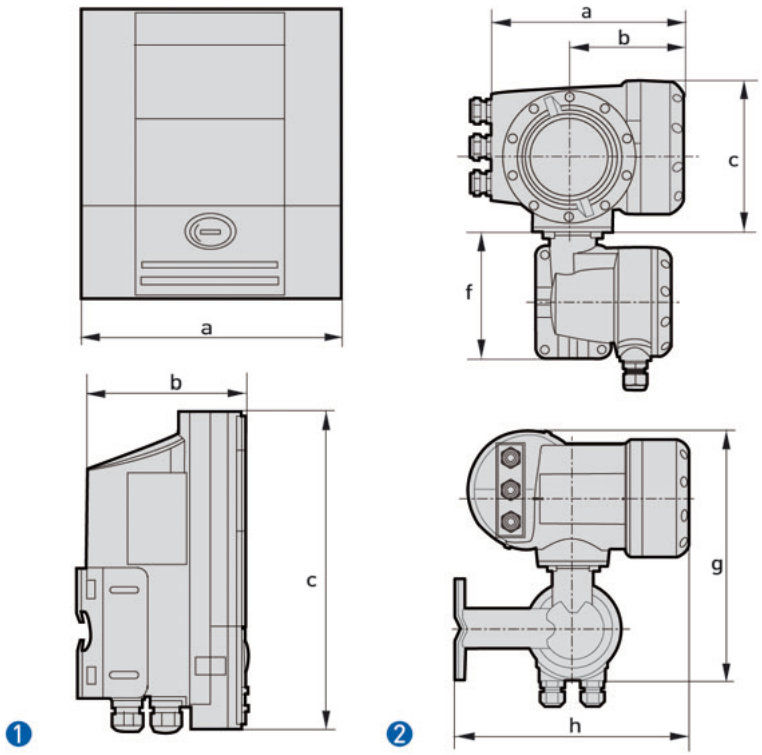


Version	Dimensions [mm]			Approx. weight (without cable / strip)
	L	H	W	[kg]
small	496.3	71	63.1	2.7
medium	826.3	71	63.1	3.6
large	496.3 1	71 1	63.1 1	2.7 1

1 value for one of the 2 delivered rails

Version	Dimensions [inches]			Approx. weight (without cable / strip)
	L	H	W	[lbs]
small	19.5	2.8	2.5	6.0
medium	32.5	2.8	2.5	7.9
large	19.5 1	2.8 1	2.5 1	6.0 1

1 value for one of the 2 delivered rails

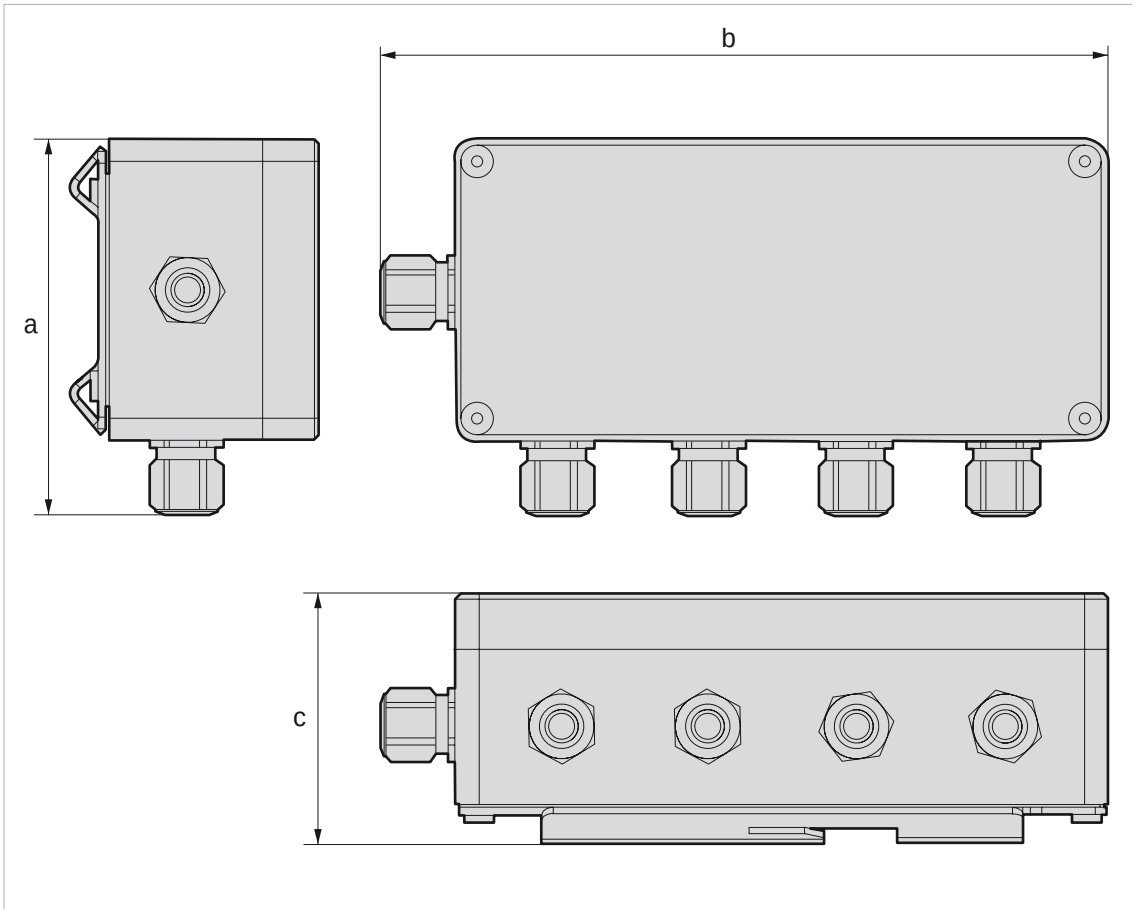


1 UFC 300 W

2 UFC 300 F

Version	Dimensions [mm]						Weight [kg]
	a	b	c	f	g	h	
UFC 300 W	198	138	299	-	-	-	2.4
UFC 300 F	202	120	155	141	296	277	5.7

Version	Dimensions [inches]						Weight [lbs]
	a	b	c	f	g	h	
UFC 300 W	7.8	5.4	11.8	-	-	-	5.3
UFC 300 F	7.75	4.75	6.1	5.5	11.6	10.9	12.6



Dimensions and weights in mm and kg

	Dimensions [mm]			Approx weight without cable/metal [kg]
	a	b	c	
Cable box	102	197	67	0.85

Dimensions and weights in inches and lbs

	Dimensions [inches]			Approx weight without cable/metal [lbs]
	a	b	c	
Cable box	4.01	7.76	2.64	1.87

KROHNE Product Overview

- Electromagnetic flowmeters
- Variable area flowmeters
- Mass flowmeters
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