



IFC 300 Technical Datasheet

Signal converter for electromagnetic flowmeters

- Diagnostics: Process and device diagnostics, accuracy check
- One signal converter for all applications
- Exceeds requirements of VDI / VDE 2650 and NAMUR NE 107



The documentation is only complete when used in combination with the relevant documentation for the sensor.

1	Product features	3
1.1	The signal converter with the highest performance	3
1.2	Options and variants	5
1.3	Signal converter/measuring sensor combination possibilities.....	7
1.4	Measuring principle.....	7
2	Technical data	8
2.1	Technical data.....	8
2.2	Dimensions and weights	20
2.2.1	Housing	20
2.2.2	Mounting plate, field housing	21
2.2.3	Mounting plate, wall-mounted housing	21
2.3	Flow tables	22
2.4	Accuracy	24
3	Installation	25
3.1	Intended use	25
3.2	Installation specifications	25
3.3	Mounting of the compact version	25
3.4	Mounting the field housing, remote version	25
3.4.1	Pipe mounting	25
3.4.2	Wall mounting	26
3.5	Mounting the wall-mounted housing, remote version	27
3.5.1	Pipe mounting	27
3.5.2	Wall mounting	28
4	Electrical connections	29
4.1	Important notes on electrical connection	29
4.2	Preparing the signal and field current cables	29
4.2.1	Signal cable A (type DS 300), construction.....	29
4.2.2	Length of signal cable A.....	30
4.2.3	Signal cable B (type BTS 300), construction.....	31
4.2.4	Length of signal cable B	32
4.3	Connecting the signal and field current cables	33
4.3.1	Connection diagram for measuring sensor, field housing	33
4.3.2	Connection diagram for measuring sensor, wall-mounted housing.....	34
4.3.3	Connection diagram for measuring sensor, 19" rack-mounted housing.....	35
4.4	Connecting power, all housing variants.....	36
4.5	Inputs and outputs, overview	38
4.5.1	Combinations of the inputs/outputs (I/Os)	38
4.5.2	Description of the CG number	39
4.5.3	Fixed, non-alterable input/output versions.....	40
4.5.4	Alterable input/output versions.....	42
4.6	Laying electrical cables correctly	43

1.1 The signal converter with the highest performance

The **IFC 300** electromagnetic signal converter is designed to measure the flow velocity, conductivity, volume and mass flow of electrically conductive liquid media.

The signal converter can be combined with any measuring sensor, making it very widely used. In terms of available housing versions, there is a compact variant, in which the signal converter is connected to the measuring sensor, as well as the field, wall-mounted and 19" rack-mounted housing.

The electronics plug-in module is identical, regardless of the housing version, providing the same functionality and a standardized operating concept.



(signal converter in compact housing)

- ① Communication with any third party system possible via Foundation Fieldbus, Profibus PA/DP or Modbus
- ② Intuitive navigation and a wide variety of languages integrated as standard for ease of operation
- ③ Supply voltage: 100...230 VAC (standard) and 24 VDC or 24 VAC/DC (optional)



(signal converter in wall-mounted housing)

- ① Large backlit graphic display with 4 optical buttons to operate the signal converter without having to open the housing
- ② Any combination of up to 4 inputs and outputs is possible

Highlights

- High measuring accuracy and long-term stability : $\pm 0.15\%$ of measured value ± 1 mm/s
- Optimal zero point stability independent from product properties
- Superior process reliability thanks to standard integrated diagnostics: testing of device functions, check for compliance with specifications and application testing
- Available inputs and outputs: Current output (incl. HART[®]), pulse/frequency output, status output, control input and current input
- Approved for custody transfer according to OIML R 49 and R 117-1, MI-001 and MI-005 (optional)
- Integrated temperature and conductivity measurement
- Optionally available virtual reference offers cost savings and increased process reliability as grounding electrodes and rings are no longer needed
- One converter for all applications, and thus advantages with regard to procurement, engineering and stock-keeping

Industries

- Water & Wastewater
- Chemicals
- Food & Beverage
- Minerals & mining
- Pharmaceutical
- Power plants
- Pulp & Paper

Applications

Flow measurement of conductive liquids, acids and bases right down to difficult applications such as:

- Products with low conductivity, high solid content or entrained air
- Inhomogeneous, abrasive and corrosive products
- Rapid product change
- Sudden change in pH value
- Pulsating or turbulent flows

1.2 Options and variants

Modular converter concept



(signal converter in compact housing)

The electromagnetic signal converter IFC 300 comes in different variants and gives the highest performance for all applications you can think of. From networking in the water & wastewater industry to blending in the chemical industry, from batching in the food & beverage industry to transport in the paper & pulp industry.

And not to forget all of the other applications where the flow of electrically conductive liquids is to be measured. The different versions of the signal converter and measuring sensor can be put together in modules and adapted to a wide variety of applications.

Separate design in various versions



(signal converter in wall-mounted housing)

The signal converter in the wall-mounted housing is generally used when it is difficult to access the measuring point or when ambient conditions do not allow for the use of the compact version.



(signal converter in 19" rack-mounted housing)

The signal converter in the 19" rack-mounted housing is typically built into the central control room, away from the harsh ambient conditions that can be present at the measuring point.

One signal converter for any application



(signal converter in field housing)

The basic variant covers over 90% of all applications, featuring a current output with HART[®], pulse/frequency output, status output and control input.

In the modular input/output variant, up to four inputs and outputs can be combined in almost any way. You can also select whether they are passive or active inputs/outputs.

All inputs and outputs are galvanically isolated from each other and from the rest of the electronic equipment.

In addition, the electronics can be equipped with Fieldbus functionality (i.e. Foundation Fieldbus, Profibus PA/DP, Modbus, etc.) enabling communication to any third party system.

Diagnostics



A part of the standard functionality is the comprehensive diagnosis, which consists of three different testing series.

Testing the device function

Checking the microcontroller, memory and outputs.

Out-of-spec diagnosis

Online and cyclical verification to determine whether the measuring device is still within its specifications regarding accuracy and linearity.

Application testing

The detection of potential problems such as gas bubbles, electrode deposits, low conductivity, liner damage, faulty flow profile etc.

1.3 Signal converter/measuring sensor combination possibilities

Measuring sensor	Signal converter IFC 300			
	Compact	Remote field housing	Remote wall-mounted housing	Remote rack-mounted housing
OPTIFLUX 1000	OPTIFLUX 1300 C	OPTIFLUX 1300 F	OPTIFLUX 1300 W	OPTIFLUX 1300 R
OPTIFLUX 2000	OPTIFLUX 2300 C	OPTIFLUX 2300 F	OPTIFLUX 2300 W	OPTIFLUX 2300 R
OPTIFLUX 4000	OPTIFLUX 4300 C	OPTIFLUX 4300 F	OPTIFLUX 4300 W	OPTIFLUX 4300 R
OPTIFLUX 5000	OPTIFLUX 5300 C	OPTIFLUX 5300 F	OPTIFLUX 5300 W	OPTIFLUX 5300 R
OPTIFLUX 6000	OPTIFLUX 6300 C	OPTIFLUX 6300 F	OPTIFLUX 6300 W	OPTIFLUX 6300 R
WATERFLUX 3000	WATERFLUX 3300 C	WATERFLUX 3300 F	WATERFLUX 3300 W	WATERFLUX 3300 R

1.4 Measuring principle

An electrically conductive fluid flows inside an electrically insulating pipe through a magnetic field. This magnetic field is generated by a current, flowing through a pair of field coils. Inside of the fluid, a voltage U is generated:

$$U = v * k * B * D$$

in which:

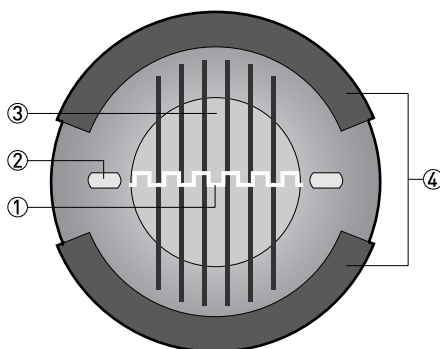
v = mean flow velocity

k = factor correcting for geometry

B = magnetic field strength

D = inner diameter of flow meter

The signal voltage U is picked off by electrodes and is proportional to the main flow velocity v and thus the flow rate q. The signal voltage is quite small (typically 1 mV at v = 3 m/s / 10 ft/s and field coil power of 1 W). Finally, a signal converter is used to amplify the signal voltage, filter it (separate from noise) and convert it into signals for totalising, recording and output processing.



- ① Voltage (induced voltage proportional to flow velocity)
- ② Electrodes
- ③ Magnetic field
- ④ Field coils

2.1 Technical data

- *The following data is provided for general applications. If you require data that is more relevant to your specific application, please contact us or your local representative.*
- *Additional information (certificates, special tools, software,...) and complete product documentation can be downloaded free of charge from the website (Downloadcenter).*

Measuring system

Measuring principle	Faraday's law of induction
Application range	Continuous measurement of current volume flow, flow velocity, conductivity, mass flow (at constant density), coil temperature of the measuring sensor

Design

Modular design	The measuring system consists of a measuring sensor and a signal converter.
Measuring sensor	
OPTIFLUX 1000	DN10...150 / 3/8...6"
OPTIFLUX 2000	DN25...3000 / 1...120"
OPTIFLUX 4000	DN2.5...3000 / 1/10...120"
OPTIFLUX 5000	Flange: DN15...300 / ½...12" Sandwich: DN2.5...100 / 1/10...4"
OPTIFLUX 6000	DN2.5...150 / 1/10...6"
WATERFLUX 3000	DN50...600 / 2...24"
	With the exception of the OPTIFLUX 1000 and WATERFLUX 3000 all measuring sensors are also available in an Ex-version.
Signal converter	
Compact version (C)	IFC 300 C
Field housing (F) - remote version	IFC 300 F
Wall-mounted housing (W) - remote version	IFC 300 W
19" rack-mounted housing (R) - remote version	IFC 300 R
	Compact and field housing versions are also available in Ex versions.
Options	
Outputs / inputs	Current- (incl. HART®), pulse, frequency and/or status output, limit switch and/or control input, current input (depends on the I/O version)
Counters	2 (optional 3) internal counters with a max. of 8 counter places (e.g. for counting volume and/or mass units)
Verification	Integrated verification, diagnostic functions: measuring device, process, measured value, empty pipe detection, stabilization
Communication interfaces	Foundation Fieldbus, Profibus PA and DP, Modbus, HART®

Display and user interface	
Graphic display	LC display, backlit white.
	Size: 128 x 64 Pixel, corresponds to 59 x 31 mm = 2.32" x 1.22"
	Display can be turned in steps of 90°.
	Ambient temperatures below -25°C / -13°F, may affect the readability of the display.
Operating elements	4 optical keys for operator control of the signal converter without opening the housing.
	Infrared interface for reading and writing all parameters with IR interface (option) without opening the housing.
Remote control	PACTware® (incl. Device Type Manager (DTM))
	HART® Hand Held Communicator from Emerson Process
	AMS® from Emerson Process
	PDM® from Siemens
	All DTMs and drivers are available free of charge from the manufacturer's website.
Display functions	
Operating menu	Setting the parameters using 2 measured value pages, 1 status page, 1 graphics page (measured values and graphics are freely adjustable)
Language display texts (as language package)	Standard: English, French, German, Dutch, Portuguese, Swedish, Spanish, Italian
	Eastern Europe: English, Slovenian, Czech, Hungarian
	Northern Europe: English, Danish, Polish
	China: English, Chinese
	Russia: English, Russian
Units	Metric, British and US units selectable as required from lists for volume / mass flow and counting, flow velocity, electrical conductivity, temperature, pressure

Measuring accuracy

Reference conditions	Medium: water
	Temperature: 20°C / 68°F
	Pressure: 1 bar / 14.5 psi
	Inlet run: ≥ 5 DN
Maximum measuring error	±0.15% of the measured value ±1 mm/s, depending on the measuring sensor
	For detailed information and accuracy curves, see chapter "Accuracy".
Repeatability	±0.06% to OIML R117; not valid for WATERFLUX 3000

Operating conditions

Temperature	
Process temperature	Refer to technical data for the measuring sensor.
Ambient temperature	Depends on the version and combination of outputs.
	-40...+65°C / -40...+149°F (ambient temperature 55°C / 131°F and higher: protect electronics against self-heating, because an increase in the electronics temperature in 10°C / 50°F steps leads to a corresponding reduction of the electronics' service life by a factor of two.)
	Stainless Steel housing: -40...+60°C / -40...+140°F
	Ambient temperatures below -25°C / -13°F, may affect the readability of the display.
Storage temperature	-50...+70°C / -58...+158°F
Pressure	
Medium	Refer to technical data for the measuring sensor.
Ambient pressure	Atmosphere.
Chemical properties	
Electrical conductivity	All media except for water: $\geq 1 \mu\text{S/cm}$ (also refer to the technical data for the measuring sensor)
	Water: $\geq 20 \mu\text{S/cm}$ for OPTIFLUX measuring sensors, $\geq 50 \mu\text{S/cm}$ for WATERFLUX 3000
Physical condition	Conductive, liquid media
Solids content (volume)	$\leq 70\%$ for OPTIFLUX measuring sensors
Gas content (volume)	$\leq 5\%$ for OPTIFLUX measuring sensors
Flow rate	For detailed information, see chapter "Flow tables".
Other conditions	
Protection category to IEC 529 / EN 60529	C (compact version) & F (field housing): IP 67 / 68 (eq. to NEMA 4X/6)
	W (wall-mounted housing): IP65 (eq. to NEMA 4/4X)
	R (19" rack-mounted housing): IP 20 (eq. to NEMA 1)

Installation conditions

Installation	For detailed information, refer to chapter "Installation conditions".
Inlet/outlet runs	Refer to technical data for the measuring sensor.
Dimensions and weights	For detailed information refer to chapter "Dimensions and weights".

Materials

Signal converter housing	Standard
	Version C and F: die-cast Aluminium (polyurethane-coated)
	Version W: polyamide - polycarbonate
	Version R: Aluminium, Stainless Steel and Aluminium sheet, partially polyester-coated
	Option
	Versions C and F: Stainless Steel 316 L (1.4408)
Measuring sensor	For materials for housing, process connections, liners, grounding electrodes and gaskets, see the technical data for the measuring sensor.

Electrical connection

General	Electrical connection is carried out in conformity with the VDE 0100 directive "Regulations for electrical power installations with line voltages up to 1000 V" or equivalent national regulations.
Voltage	Standard: 100...230 VAC (-15% / +10%), 50/60 Hz
	Option 1: 24 VDC (-55% / +30%)
	Option 2: 24 VAC/DC (AC: -15% / +10%, 50/60 Hz; DC: -25% / +30%)
Power consumption	AC: 22 VA
	DC: 12 W
Signal cable	Only for remote versions.
	DS 300 (type A) Max. length: 600 m / 1950 ft (depending on electrical conductivity and measuring sensor version)
	BTS 300 (type B) Max. length: 600 m / 1950 ft (depending on electrical conductivity and measuring sensor version)
	Type LIYCY (only FM, Class 1 Div. 2) Max. length: 100 m / 330 ft (depending on electrical conductivity and measuring sensor version)
	WSC (only for WATERFLUX 3000) Max. length: 25 m / 82 ft
Cable entries	Standard: M20 x 1.5 (8...12 mm)
	Option: ½" NPT, PF ½

Inputs and outputs

General	All outputs are electrically isolated from each other and from all other circuits.		
	All operating data and output values can be adjusted.		
Description of the used abbreviations	U_{ext} = external voltage; R_L = load + resistance; U_0 = terminal voltage; I_{nom} = nominal current Safety limit values (Ex-I): U_1 = max. input voltage; I_1 = max. input current; P_1 = max. input power rating; C_1 = max. input capacity; L_1 = max. input inductivity		
Current output			
Output data	Volume flow, mass flow, diagnostics value, flow velocity, coil temperature, conductivity		
Settings	Without HART®		
	Q = 0%: 0...20 mA; Q = 100%: 10...21.5 mA		
	Error identification: 0...22 mA		
	With HART®		
	Q = 0%: 4...20 mA; Q = 100%: 10...21.5 mA		
	Error identification: 3.5...22 mA		
Operating data	Basic I/Os	Modular I/Os	Ex i
Active	$U_{int, nom} = 24 \text{ VDC}$ $I \leq 22 \text{ mA}$ $R_L \leq 1 \text{ k}\Omega$		$U_{int, nom} = 20 \text{ VDC}$ $I \leq 22 \text{ mA}$ $R_L \leq 450 \Omega$
			$U_0 = 21 \text{ V}$ $I_0 = 90 \text{ mA}$ $P_0 = 0.5 \text{ W}$ $C_0 = 90 \text{ nF} / L_0 = 2 \text{ mH}$ $C_0 = 110 \text{ nF} / L_0 = 0.5 \text{ mH}$
Passive	$U_{ext} \leq 32 \text{ VDC}$ $I \leq 22 \text{ mA}$ $U_0 \geq 1.8 \text{ V}$ $R_L \leq (U_{ext} - U_0) / I_{max}$		$U_{ext} \leq 32 \text{ VDC}$ $I \leq 22 \text{ mA}$ $U_0 \geq 4 \text{ V}$ $R_L \leq (U_{ext} - U_0) / I_{max}$
			$U_1 = 30 \text{ V}$ $I_1 = 100 \text{ mA}$ $P_1 = 1 \text{ W}$ $C_1 = 10 \text{ nF}$ $L_1 \sim 0 \text{ mH}$

HART®			
Description	HART® protocol via active and passive current output		
	HART® version: V5		
	Universal HART® parameter: completely integrated		
Load	≥ 250 Ω at HART® test point; Note maximum load for current output!		
Multidrop operation	Yes, current output = 4 mA		
	Multidrop address adjustable in operation menu 1...15		
Device driver	Available for FC 375, AMS, PDM, FDT/DTM		
Registration (HART Communication Foundation)	Yes		
Pulse or frequency output			
Output data	Pulse output: volume flow, mass flow		
	Frequency output: volume flow, mass flow, diagnostic value, flow velocity, coil temperature, conductivity		
Function	Adjustable as pulse or frequency output		
Pulse rate/frequency	0.01...10000 pulses/s or Hz		
Settings	Pulses per volume or mass unit or max. frequency for 100% flow		
	Pulse width: adjustable as automatic, symmetric or fixed (0.05...2000 ms)		
Operating data	Basic I/Os	Modular I/Os	Ex i
Active	-	$U_{nom} = 24 \text{ VDC}$ f_{max} in operating menu set to $f_{max} \leq 100 \text{ Hz}$: $I \leq 20 \text{ mA}$ open: $I \leq 0.05 \text{ mA}$ closed: $U_{0, nom} = 24 \text{ V}$ at $I = 20 \text{ mA}$	-
		f_{max} in operating menu set to $100 \text{ Hz} < f_{max} \leq 10 \text{ kHz}$: $I \leq 20 \text{ mA}$ open: $I \leq 0.05 \text{ mA}$ closed: $U_{0, nom} = 22.5 \text{ V}$ at $I = 1 \text{ mA}$ $U_{0, nom} = 21.5 \text{ V}$ at $I = 10 \text{ mA}$ $U_{0, nom} = 19 \text{ V}$ at $I = 20 \text{ mA}$	

Passive	$U_{\text{ext}} \leq 32 \text{ VDC}$		-
	f_{max} in operating menu set to $f_{\text{max}} \leq 100 \text{ Hz}$: $I \leq 100 \text{ mA}$ open: $I \leq 0.05 \text{ mA}$ at $U_{\text{ext}} = 32 \text{ VDC}$ closed: $U_{0, \text{max}} = 0.2 \text{ V}$ at $I \leq 10 \text{ mA}$ $U_{0, \text{max}} = 2 \text{ V}$ at $I \leq 100 \text{ mA}$		
	f_{max} in operating menu set to $100 \text{ Hz} < f_{\text{max}} \leq 10 \text{ kHz}$: $I \leq 20 \text{ mA}$ open: $I \leq 0.05 \text{ mA}$ at $U_{\text{ext}} = 32 \text{ VDC}$ closed: $U_{0, \text{max}} = 1.5 \text{ V}$ at $I \leq 1 \text{ mA}$ $U_{0, \text{max}} = 2.5 \text{ V}$ at $I \leq 10 \text{ mA}$ $U_{0, \text{max}} = 5.0 \text{ V}$ at $I \leq 20 \text{ mA}$		
NAMUR	-	Passive to EN 60947-5-6	Passive to EN 60947-5-6
		open: $I_{\text{nom}} = 0.6 \text{ mA}$ closed: $I_{\text{nom}} = 3.8 \text{ mA}$	open: $I_{\text{nom}} = 0.43 \text{ mA}$ closed: $I_{\text{nom}} = 4.5 \text{ mA}$ $U_I = 30 \text{ V}$ $I_I = 100 \text{ mA}$ $P_I = 1 \text{ W}$ $C_I = 10 \text{ nF}$ $L_I \sim 0 \text{ mH}$
Low flow cut-off			
Function	Switching point and hysteresis separately adjustable for each output, counter and the display		
Switching point	Set in increments of 0.1.		
	0...20% (current output, frequency output) or 0...±9.999 m/s (pulse output)		
Hysteresis	Set in increments of 0.1.		
	0...5% (current output, frequency output) or 0...5 m/s (pulse output)		
Time constant			
Function	The time constant corresponds to the elapsed time until 67% of the end value has been reached according to a step function.		
Settings	Set in increments of 0.1.		
	0...100 s		

Status output / limit switch			
Functions and settings	Adjustable as automatic measuring range conversion, display of flow direction, counter overflow, error, switching point or empty pipe detection		
	Valve control with activated dosing function		
	Status and/or control: ON or OFF		
Operating data	Basic I/Os	Modular I/Os	Ex i
Active	-	$U_{int} = 24 \text{ VDC}$ $I \leq 20 \text{ mA}$ open: $I \leq 0.05 \text{ mA}$ closed: $U_{0, nom} = 24 \text{ V}$ at $I = 20 \text{ mA}$	-
Passive	$U_{ext} \leq 32 \text{ VDC}$ $I \leq 100 \text{ mA}$ open: $I \leq 0.05 \text{ mA}$ at $U_{ext} = 32 \text{ VDC}$ closed: $U_{0, max} = 0.2 \text{ V}$ at $I \leq 10 \text{ mA}$ $U_{0, max} = 2 \text{ V}$ at $I \leq 100 \text{ mA}$	$U_{ext} = 32 \text{ VDC}$ $I \leq 100 \text{ mA}$ $R_{L, max} = 47 \text{ k}\Omega$ $R_{L, min} = (U_{ext} - U_0) / I_{max}$ open: $I \leq 0.05 \text{ mA}$ at $U_{ext} = 32 \text{ VDC}$ closed: $U_{0, max} = 0.2 \text{ V}$ at $I \leq 10 \text{ mA}$ $U_{0, max} = 2 \text{ V}$ at $I \leq 100 \text{ mA}$	-
NAMUR	-	Passive to EN 60947-5-6 open: $I_{nom} = 0.6 \text{ mA}$ closed: $I_{nom} = 3.8 \text{ mA}$	Passive to EN 60947-5-6 open: $I_{nom} = 0.43 \text{ mA}$ closed: $I_{nom} = 4.5 \text{ mA}$ $U_I = 30 \text{ V}$ $I_I = 100 \text{ mA}$ $P_I = 1 \text{ W}$ $C_I = 10 \text{ nF}$ $L_I = 0 \text{ mH}$

Control input			
Function	Hold output values (e.g. when cleaning), set value of outputs to "zero", counter and error reset, range conversion.		
	Start of dosing when dosing function is activated.		
Operating data	Basic I/Os	Modular I/Os	Ex i
Active	-	$U_{int} = 24 \text{ VDC}$ Ext. contact open: $U_{0, nom} = 22 \text{ V}$ Ext. contact closed: $I_{nom} = 4 \text{ mA}$ Contact closed (on): $U_0 \geq 12 \text{ V}$ with $I_{nom} = 1.9 \text{ mA}$ Contact open (off): $U_0 \leq 10 \text{ V}$ with $I_{nom} = 1.9 \text{ mA}$	-
Passive	$8 \text{ V} \leq U_{ext} \leq 32 \text{ VDC}$ $I_{max} = 6.5 \text{ mA}$ at $U_{ext} \leq 24 \text{ VDC}$ $I_{max} = 8.2 \text{ mA}$ at $U_{ext} \leq 32 \text{ VDC}$ Contact closed (on): $U_0 \geq 8 \text{ V}$ with $I_{nom} = 2.8 \text{ mA}$ Contact open (off): $U_0 \leq 2.5 \text{ V}$ with $I_{nom} = 0.4 \text{ mA}$	$3 \text{ V} \leq U_{ext} \leq 32 \text{ VDC}$ $I_{max} = 9.5 \text{ mA}$ at $U_{ext} \leq 24 \text{ V}$ $I_{max} = 9.5 \text{ mA}$ at $U_{ext} \leq 32 \text{ V}$ Contact closed (on): $U_0 \geq 3 \text{ V}$ with $I_{nom} = 1.9 \text{ mA}$ Contact open (off): $U_0 \leq 2.5 \text{ V}$ with $I_{nom} = 1.9 \text{ mA}$	$U_{ext} \leq 32 \text{ VDC}$ $I \leq 6 \text{ mA}$ at $U_{ext} = 24 \text{ V}$ $I \leq 6.6 \text{ mA}$ at $U_{ext} = 32 \text{ V}$ On: $U_0 \geq 5.5 \text{ V}$ or $I \geq 4 \text{ mA}$ Off: $U_0 \leq 3.5 \text{ V}$ or $I \leq 0.5 \text{ mA}$
			$U_1 = 30 \text{ V}$ $I_1 = 100 \text{ mA}$ $P_1 = 1 \text{ W}$ $C_1 = 10 \text{ nF}$ $L_1 = 0 \text{ mH}$
NAMUR	-	Active to EN 60947-5-6 Terminals open: $U_{0, nom} = 8.7 \text{ V}$ Contact closed (on): $U_{0, nom} = 6.3 \text{ V}$ with $I_{nom} > 1.9 \text{ mA}$ Contact open (off): $U_{0, nom} = 6.3 \text{ V}$ with $I_{nom} < 1.9 \text{ mA}$ Detection of cable break: $U_0 \geq 8.1 \text{ V}$ with $I \leq 0.1 \text{ mA}$ Detection of cable short circuit: $U_0 \leq 1.2 \text{ V}$ with $I \geq 6.7 \text{ mA}$	-

Current input			
Function	The following values can be delivered from the measuring sensor to the current input: temperature, pressure and current		
Operating data	Basic I/Os	Modular I/Os	Ex i
Active	-	$U_{\text{int, nom}} = 24 \text{ VDC}$ $I \leq 22 \text{ mA}$ $I_{\text{max}} \leq 26 \text{ mA}$ (electronically limited) $U_{0, \text{min}} = 19 \text{ V}$ at $I \leq 22 \text{ mA}$ No HART®	$U_{\text{int, nom}} = 20 \text{ VDC}$ $I \leq 22 \text{ mA}$ $U_{0, \text{min}} = 14 \text{ V}$ at $I \leq 22 \text{ mA}$ No HART®
			$U_0 = 24.5 \text{ V}$ $I_0 = 99 \text{ mA}$ $P_0 = 0.6 \text{ W}$ $C_0 = 75 \text{ nF} / L_0 = 0.5 \text{ mH}$ No HART®
Passive	-	$U_{\text{ext}} \leq 32 \text{ VDC}$ $I \leq 22 \text{ mA}$ $I_{\text{max}} \leq 26 \text{ mA}$ (electronically limited) $U_{0, \text{max}} = 5 \text{ V}$ at $I \leq 22 \text{ mA}$ No HART®	$U_{\text{ext}} \leq 32 \text{ VDC}$ $I \leq 22 \text{ mA}$ $U_{0, \text{max}} = 4 \text{ V}$ at $I \leq 22 \text{ mA}$ No HART®
			$U_1 = 30 \text{ V}$ $I_1 = 100 \text{ mA}$ $P_1 = 1 \text{ W}$ $C_1 = 10 \text{ nF}$ $L_1 = 0 \text{ mH}$ No HART®

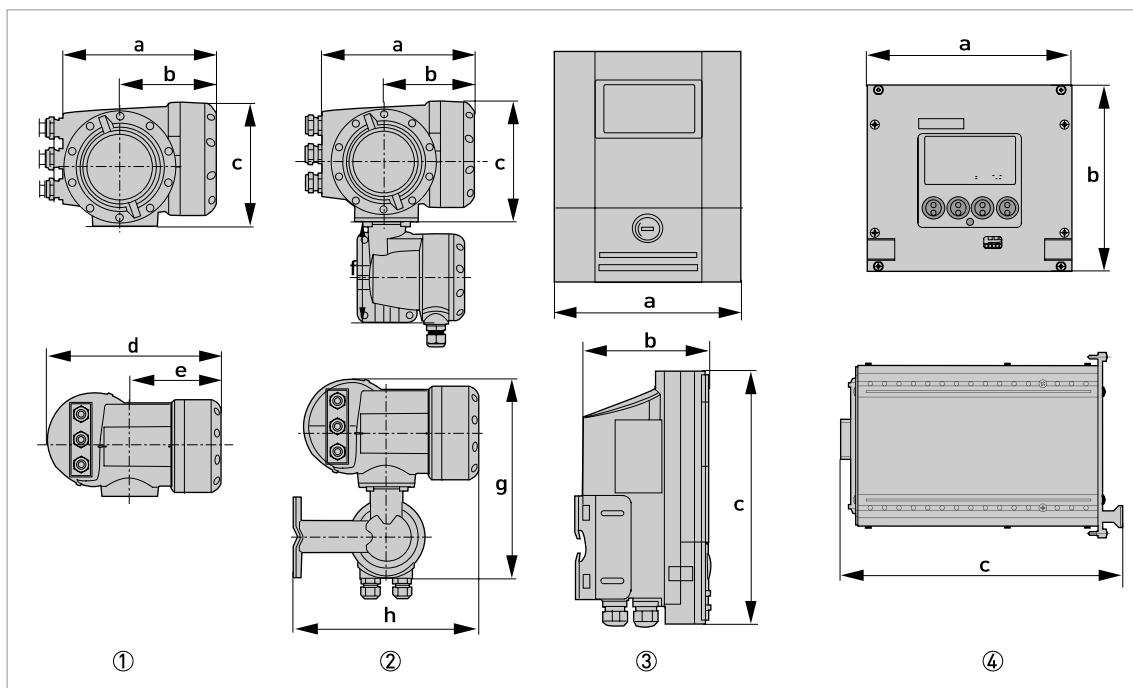
PROFIBUS DP	
Description	Galvanically isolated acc. to IEC 61158
	Profile version: 3.01
	Automatic data transmission rate recognition (max. 12 MBaud)
	Bus address adjustable via local display at the measuring device
Function blocks	5 x analogue input, 3 x totalizer
Output data	Volume flow, mass flow, volume counter 1 + 2, mass counter, velocity, coil temperature, conductivity
PROFIBUS PA	
Description	Galvanically isolated acc. to IEC 61158
	Profile version: 3.01
	Current consumption: 10.5 mA
	Permissible bus voltage: 9...32 V; in Ex application: 9...24 V
	Bus interface with integrated reverse polarity protection
	Typical error current FDE (Fault Disconnection Electronic): 4.3 mA
	Bus address adjustable via local display at the measuring device
Function blocks	5 x analogue input, 3 x totalizer
Output data	Volume flow, mass flow, volume counter 1 + 2, mass counter, velocity, coil temperature, conductivity
FOUNDATION Fieldbus	
Description	Galvanically isolated acc. to IEC 61158
	Current consumption: 10.5 mA
	Permissible bus voltage: 9...32 V; in Ex application: 9...24 V
	Bus interface with integrated reverse polarity protection
	Link Master function (LM) supported
	Tested with Interoperable Test Kit (ITK) version 5.1
Function blocks	3 x analogue input, 2 x integrator
Output data	Volume flow, mass flow, velocity, coil temperature, conductivity, electronics temperature
Modbus	
Description	Modbus RTU, Master / Slave, RS485
Address range	1...247
Supported function codes	03, 04, 16
Broadcast	Supported with function code 16
Supported Baudrate	1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200 Baud

Approvals and certifications

CE	The device fulfils the statutory requirements of the EC directives. The manufacturer certifies that these requirements have been met by applying the CE marking.
Non-Ex	Standard
Hazardous areas	
Option (only version C)	
ATEX	II 2 GD Ex d [ia] IIC T6...T3
	II 2 GD Ex de [ia] IIC T6...T3
	II 2 GD Ex e [ia] IIC T6...T3
	II 3 G Ex nA [nL] IIC T4...T3
Option (only version F)	
ATEX	II 2 GD Ex de [ia] IIC T6
	II 2(1) GD Ex de [ia] IIC T6
Nepsi	Ex de [ia] IIC T6
Optional (only versions C and F)	
FM / CSA	Class I, Div. 2, Group A, B, C and D
	Class II, Div. 2, Group F and G
SAA (in preparation)	Aus Ex zone 1/2
TIIS (in preparation)	Zone 1/2
Custody transfer	
Without	Standard
Option	Cold drinking water (OIML R 49, KIWA K618); liquids other than water 2004/22/EC (MID) acc. to OIML R 117-1; MI-001 and MI-005
Other standards and approvals	
Shock and vibration resistance	IEC 68-2-3
Electromagnetic compatibility (EMC)	89/336/EEC and 93/68/EEC in conjunction with EN 61326-1 (A1, A2)
European Pressure Equipment Directive	PED 97/23 (only for compact versions)
NAMUR	NE 21, NE 43, NE 53

2.2 Dimensions and weights

2.2.1 Housing



- ① Compact version (C)
- ② Field housing (F) - remote version
- ③ Wall-mounted housing (W) - remote version
- ④ 19" rack-mounted housing (R) - remote version

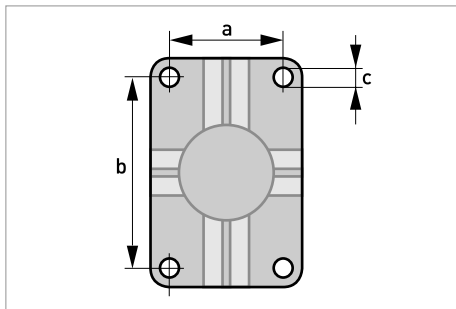
Dimensions and weights in mm and kg

Version	Dimensions [mm]							Weight [kg]
	a	b	c	d	e	g	h	
C	202	120	155	260	137	-	-	4.2
F	202	120	155	-	-	295.8	277	5.7
W	198	138	299	-	-	-	-	2.4
R	142	129	195	-	-	-	-	1.2

Dimensions and weights in inches and lbs

Version	Dimensions [inches]							Weight [lbs]
	a	b	c	d	e	g	h	
C	7.75	4.75	6.10	10.20	5.40	-	-	9.30
F	7.75	4.75	6.10	-	-	11.60	10.90	12.60
W	7.80	5.40	11.80	-	-	-	-	5.30
R	5.59	5.08	7.68	-	-	-	-	2.65

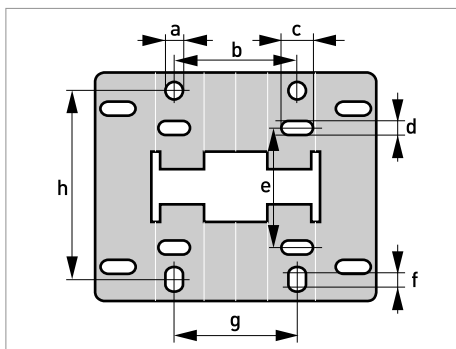
2.2.2 Mounting plate, field housing



Dimensions in mm and inches

	[mm]	[inches]
a	60	2.4
b	100	3.9
c	Ø9	Ø0.4

2.2.3 Mounting plate, wall-mounted housing



Dimensions in mm and inches

	[mm]	[inches]
a	Ø9	Ø0.4
b	64	2.5
c	16	0.6
d	6	0.2
e	63	2.5
f	4	0.2
g	64	2.5
h	98	3.85

2.3 Flow tables

Flow rate in m/s and m³/h

v [m/s]	Q _{100%} in m ³ /h			
	0.3	1	3	12
DN [mm]	Min. flow	Nominal flow		Max. flow
2.5	0.005	0.02	0.05	0.21
4	0.01	0.05	0.14	0.54
6	0.03	0.10	0.31	1.22
10	0.08	0.28	0.85	3.39
15	0.19	0.64	1.91	7.63
20	0.34	1.13	3.39	13.57
25	0.53	1.77	5.30	21.21
32	0.87	2.90	8.69	34.74
40	1.36	4.52	13.57	54.29
50	2.12	7.07	21.21	84.82
65	3.58	11.95	35.84	143.35
80	5.43	18.10	54.29	217.15
100	8.48	28.27	84.82	339.29
125	13.25	44.18	132.54	530.15
150	19.09	63.62	190.85	763.40
200	33.93	113.10	339.30	1357.20
250	53.01	176.71	530.13	2120.52
300	76.34	254.47	763.41	3053.64
350	103.91	346.36	1039.08	4156.32
400	135.72	452.39	1357.17	5428.68
450	171.77	572.51	1717.65	6870.60
500	212.06	706.86	2120.58	8482.32
600	305.37	1017.90	3053.70	12214.80
700	415.62	1385.40	4156.20	16624.80
800	542.88	1809.60	5428.80	21715.20
900	687.06	2290.20	6870.60	27482.40
1000	848.22	2827.40	8482.20	33928.80
1200	1221.45	3421.20	12214.50	48858.00
1400	1433.52	4778.40	14335.20	57340.80
1600	2171.46	7238.20	21714.60	86858.40
1800	2748.27	9160.9	27482.70	109930.80
2000	3393.00	11310.00	33930.00	135720.00
2200	4105.50	13685.00	41055.00	164220.00
2400	4885.80	16286.00	48858.00	195432.00
2600	5733.90	19113.00	57339.00	229356.00
2800	6650.10	22167.00	66501.00	266004.00
3000	7634.10	25447.00	76341.00	305364.00

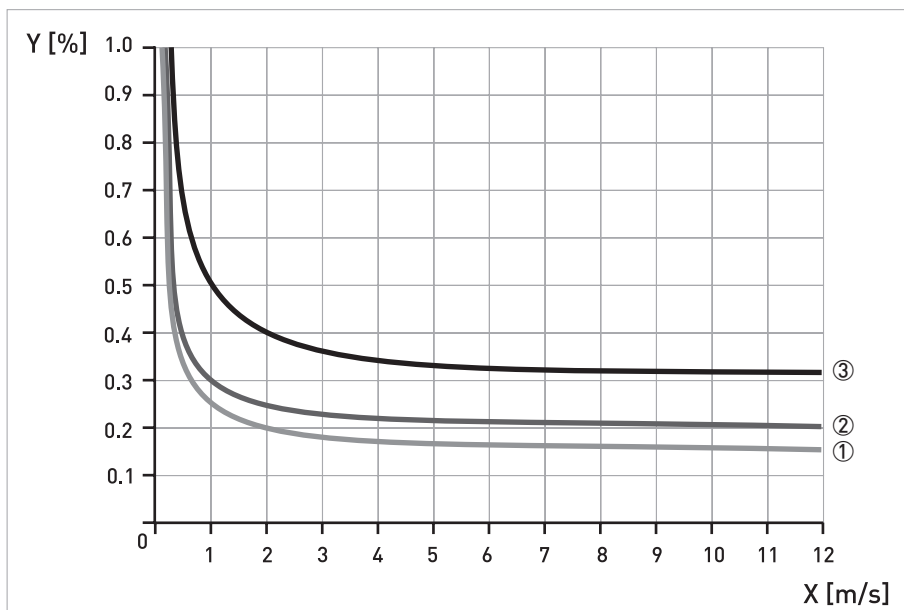
Flow rate in ft/s and gallons/min

	Q ₁₀₀ % in US gallons/min			
v [ft/s]	1	3.3	10	40
DN [inches]	Min. flow	Nominal flow		Max. flow
1/10	0.02	0.09	0.23	0.93
1/8	0.06	0.22	0.60	2.39
1/4	0.13	0.44	1.34	5.38
3/8	0.37	1.23	3.73	14.94
1/2	0.84	2.82	8.40	33.61
3/4	1.49	4.98	14.94	59.76
1	2.33	7.79	23.34	93.36
1.25	3.82	12.77	38.24	152.97
1.5	5.98	19.90	59.75	239.02
2	9.34	31.13	93.37	373.47
2.5	15.78	52.61	159.79	631.16
3	23.90	79.69	239.02	956.09
4	37.35	124.47	373.46	1493.84
5	58.35	194.48	583.24	2334.17
6	84.03	279.97	840.29	3361.17
8	149.39	497.92	1493.29	5975.57
10	233.41	777.96	2334.09	9336.37
12	336.12	1120.29	3361.19	13444.77
14	457.59	1525.15	4574.93	18299.73
16	597.54	1991.60	5975.44	23901.76
18	756.26	2520.61	7562.58	30250.34
20	933.86	3112.56	9336.63	37346.53
24	1344.50	4481.22	13445.04	53780.15
28	1829.92	6099.12	18299.20	73196.79
32	2390.23	7966.64	23902.29	95609.15
36	3025.03	10082.42	30250.34	121001.37
40	3734.50	12447.09	37346.00	149384.01
48	5377.88	17924.47	53778.83	215115.30
56	6311.60	21038.46	63115.99	252463.94
64	9560.65	31868.51	95606.51	382426.03
72	12100.27	40333.83	121002.69	484010.75
80	14938.92	49795.90	149389.29	597557.18
88	18075.97	60252.63	180759.73	723038.90
96	21511.53	71704.38	215115.30	860461.20
104	25245.60	84151.16	252456.02	1009824.08
112	29279.51	97597.39	292795.09	1171180.37
120	33611.93	112038.64	336119.31	1344477.23

2.4 Accuracy

Reference conditions

- Medium: water
- Temperature: 20°C / 68°F
- Pressure: 1 bar / 14.5 psi
- Inlet run: ≥ 5 DN



X [m/s]: flow velocity

Y [%]: deviation from the actual measured value (mv)

	DN [mm]	DN [inches]	Accuracy	Curve
OPTIFLUX 5300	10...100	3/8...4	0.15% of mv + 1 mm/s	①
	150...300	6...12	0.2% of mv + 1 mm/s	②
OPTIFLUX 2300 / 4300 / 6300	10...1600	3/8...80	0.2% of mv + 1 mm/s	②
OPTIFLUX 1300	10...150	3/8...6	0.3% of mv + 2 mm/s	③
OPTIFLUX 2300 / 4300	>1600	>64	0.3% of mv + 2 mm/s	③
OPTIFLUX 4300 / 5300 / 6300	<10	<3/8	0.3% of mv + 2 mm/s	③
WATERFLUX 3300	50...600	2...24	0.2% of mv + 1 mm/s	②

3.1 Intended use

The electromagnetic flowmeters are designed exclusively to measure the flow and conductivity of electrically conductive, liquid media.

For devices used in hazardous areas, additional safety notes apply; please refer to the Ex documentation.

3.2 Installation specifications

The following precautions must be taken to ensure reliable installation.

- *Make sure that there is adequate space to the sides.*
- *Protect the signal converter from direct sunlight and install a sun shade if necessary.*
- *Signal converters installed in control cabinets require adequate cooling, e.g. by fan or heat exchanger.*
- *Do not expose the signal converter to intense vibration. The flowmeters are tested for a vibration level in accordance with IEC 68-2-3.*

3.3 Mounting of the compact version

The signal converter is mounted directly on the measuring sensor. For installation of the flowmeter, please observe the instructions in the supplied product documentation for the measuring sensor.

3.4 Mounting the field housing, remote version

Assembly materials and tools are not part of the delivery. Use the assembly materials and tools in compliance with the applicable occupational health and safety directives.

3.4.1 Pipe mounting

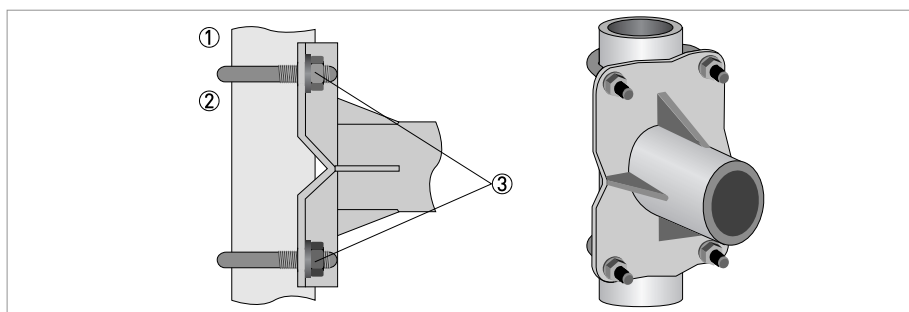


Figure 3-1: Pipe mounting of the field housing

- ① Fix the signal converter to the pipe.
- ② Fasten the signal using standard U-bolts and washers.
- ③ Tighten the nuts.

3.4.2 Wall mounting

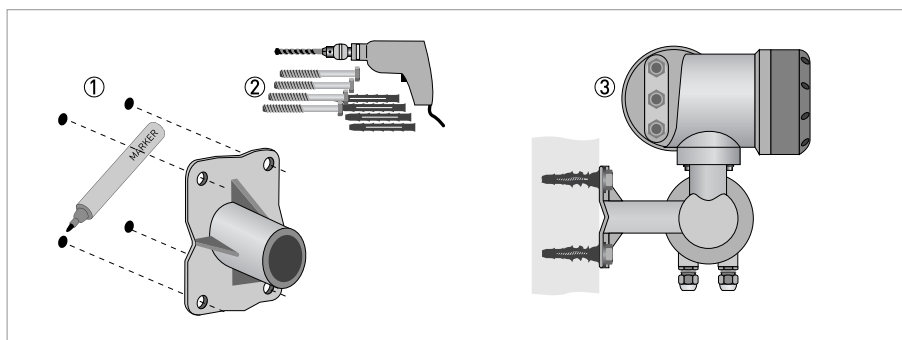
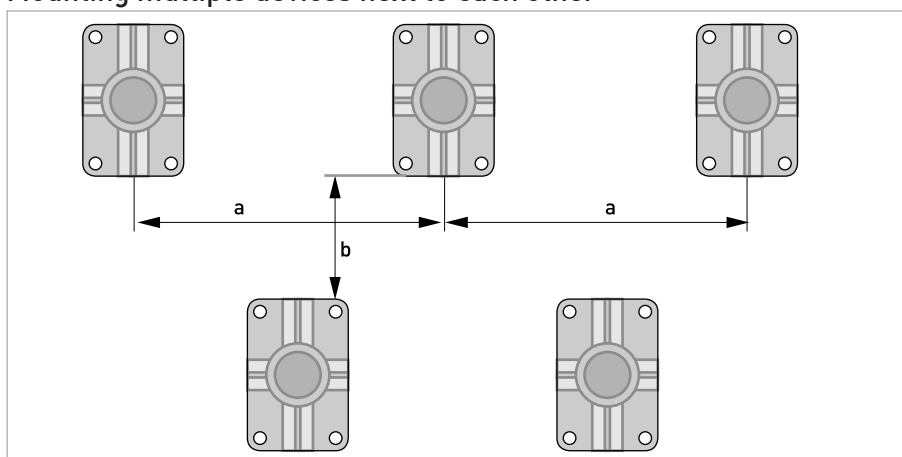


Figure 3-2: Wall mounting of the field housing

- ① Prepare the holes with the aid of the mounting plate. For further information refer to *Mounting plate, field housing* on page 21.
- ② Use the mounting material and tools in compliance with the applicable occupational health and safety directives.
- ③ Fasten the housing securely to the wall.

Mounting multiple devices next to each other



$a \geq 600 \text{ mm} / 23.6''$
 $b \geq 250 \text{ mm} / 9.8''$

3.5 Mounting the wall-mounted housing, remote version

Assembly materials and tools are not part of the delivery. Use the assembly materials and tools in compliance with the applicable occupational health and safety directives.

3.5.1 Pipe mounting

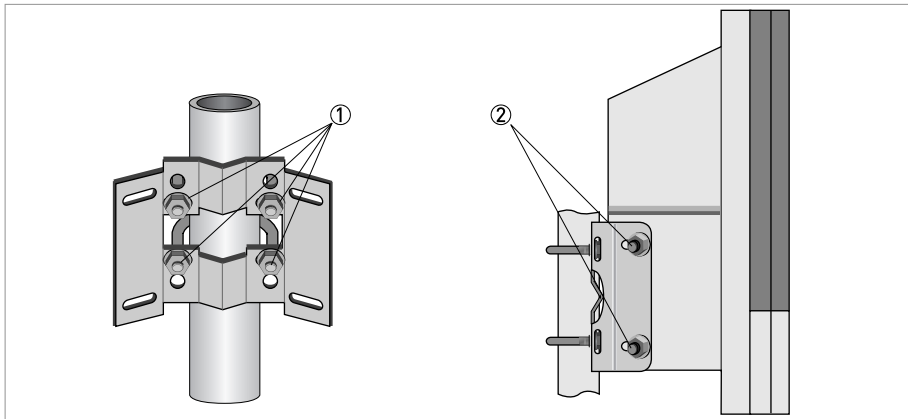


Figure 3-3: Pipe mounting of the wall-mounted housing

- ① Fasten the mounting plate to the pipe with standard U-bolts, washers and fastening nuts.
- ② Screw the signal converter to the mounting plate with the nuts and washers.

3.5.2 Wall mounting

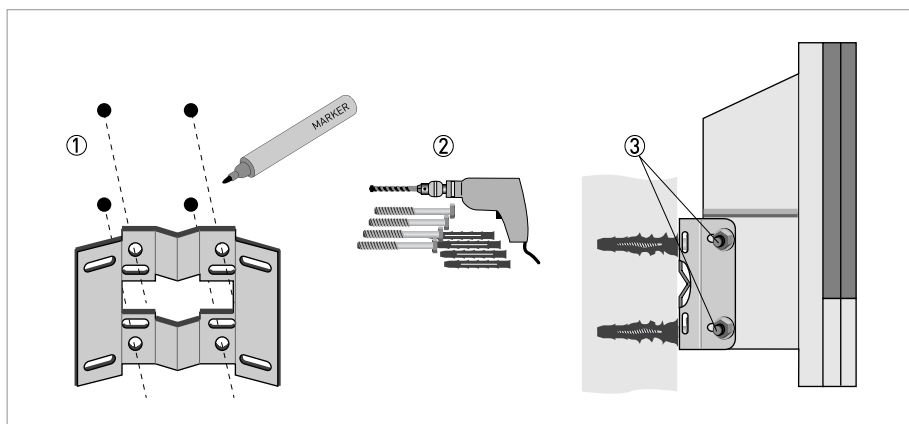
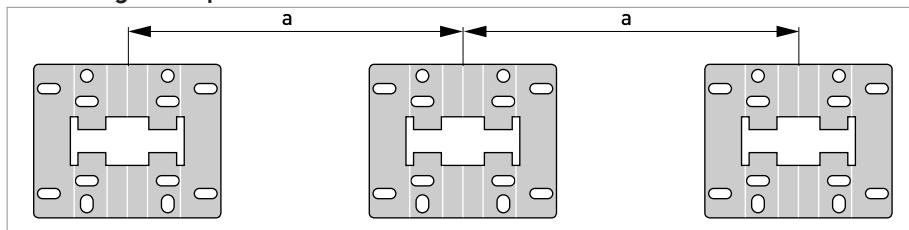


Figure 3-4: Wall mounting of the wall-mounted housing

- ① Prepare the holes with the aid of the mounting plate. For further information refer to *Mounting plate, wall-mounted housing* on page 21.
- ② Fasten the mounting plate securely to the wall.
- ③ Screw the signal converter to the mounting plate with the nuts and washers.

Mounting multiple devices next to each other



$a \geq 240 \text{ mm} / 9.4''$

4.1 Important notes on electrical connection

Electrical connection is carried out in conformity with the VDE 0100 directive "Regulations for electrical power installations with line voltages up to 1000 V" or equivalent national regulations.

- Use suitable cable entries for the various electrical cables.
- The measuring sensor and signal converter have been calibrated together at the factory. The devices should therefore always be installed in pairs. Make sure that the measuring sensor constants GK/GKL have identical settings (see nameplates).
- In the event of separate delivery or the installation of devices that have not been calibrated together, the signal converter must be set to the DN size and GK/GKL of the measuring sensor.

4.2 Preparing the signal and field current cables

Assembly materials and tools are not part of the delivery. Use the assembly materials and tools in compliance with the applicable occupational health and safety directives.

The electrical connection of the outer shield is different for the various housing variants. Please observe the corresponding instructions.

4.2.1 Signal cable A (type DS 300), construction

- Signal cable A is a double-shielded cable for signal transmission between the measuring sensor and signal converter.
- Bending radius: $\geq 50 \text{ mm} / 2''$

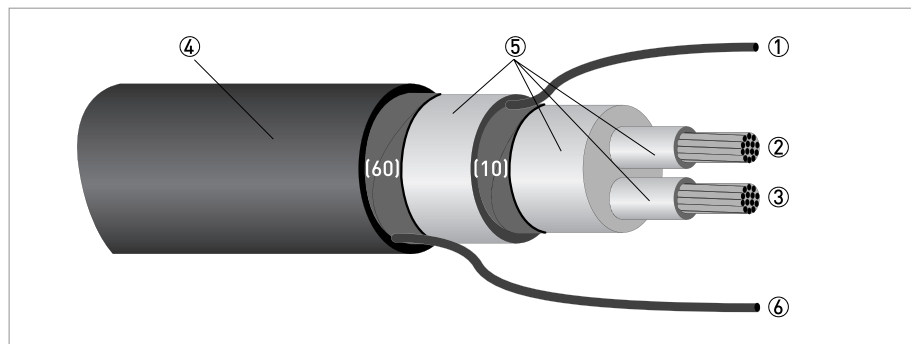


Figure 4-1: Construction of signal cable A

- ① Stranded drain wire (1) for the inner shield (10), $1.0 \text{ mm}^2 \text{ Cu}$ / AWG 17 (not insulated, bare)
- ② Insulated wire (2), $0.5 \text{ mm}^2 \text{ Cu}$ / AWG 20
- ③ Insulated wire (3), $0.5 \text{ mm}^2 \text{ Cu}$ / AWG 20
- ④ Outer sheath
- ⑤ Insulation layers
- ⑥ Stranded drain wire (6) for the outer shield (60)

4.2.2 Length of signal cable A

For temperatures of the medium above 150°C / 300°F, a special signal cable and a ZD intermediate socket are necessary. These are available including the changed electrical connection diagrams.

Measuring sensor	Nominal size		Min. electrical conductivity [$\mu\text{S}/\text{cm}$]	Curve for signal cable A
	DN [mm]	[inches]		
OPTIFLUX 1000 F	10...150	3/8...6	5	A1
OPTIFLUX 2000 F	25...150	1...6	20	A1
	200...2000	8...80	20	A2
OPTIFLUX 4000 F	2.5...150	1/10...6	1	A1
	200...2000	8...80	1	A2
OPTIFLUX 5000 F	2.5...100	1/10...4	1	A1
	150...250	6...10	1	A2
OPTIFLUX 6000 F	2.5...150	1/10...6	1	A1
WATERFLUX 3000 F	50...600	2...24	50	A1

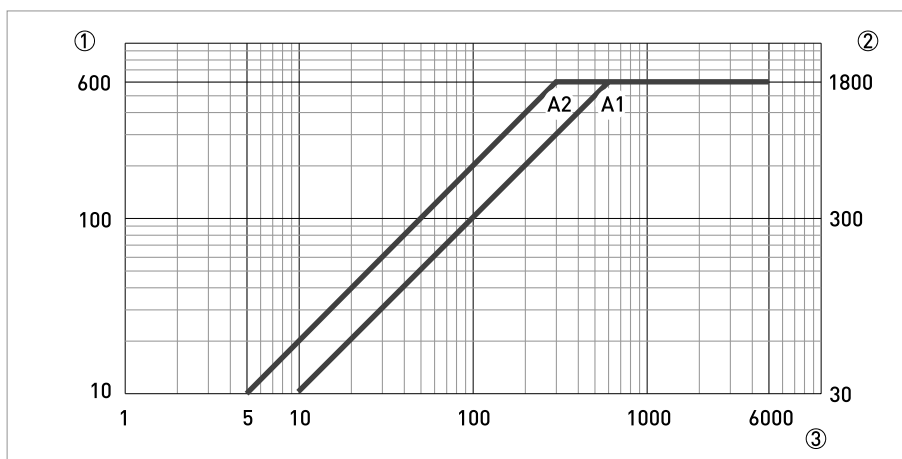


Figure 4-2: Maximum length of signal cable A

- ① Maximum length of signal cable A between the measuring sensor and signal converter [m]
- ② Maximum length of signal cable A between the measuring sensor and signal converter [ft]
- ③ Electrical conductivity of the medium being measured [$\mu\text{S}/\text{cm}$]

4.2.3 Signal cable B (type BTS 300), construction

- Signal cable B is a triple-shielded cable for signal transmission between the measuring sensor and signal converter.
- Bending radius: $\geq 50 \text{ mm} / 2''$

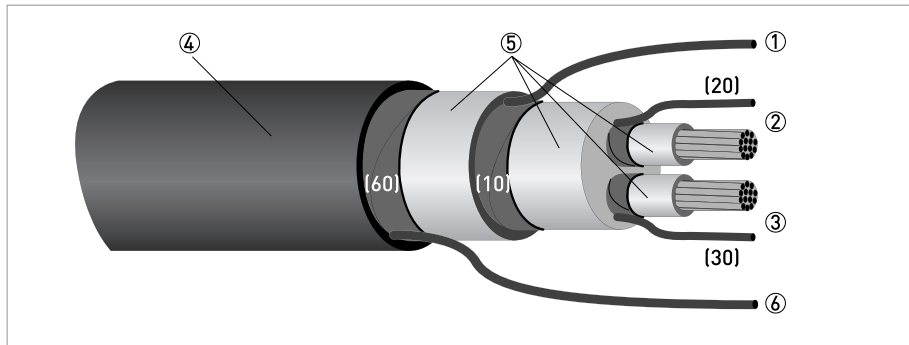


Figure 4-3: Construction of signal cable B

- ① Stranded drain wire for the inner shield [10], $1.0 \text{ mm}^2 \text{ Cu}$ / AWG 17 (not insulated, bare)
- ② Insulated wire [2], $0.5 \text{ mm}^2 \text{ Cu}$ / AWG 20 with stranded drain wire [20] of shield
- ③ Insulated wire [3], $0.5 \text{ mm}^2 \text{ Cu}$ / AWG 20 with stranded drain wire [30] of shield
- ④ Outer sheath
- ⑤ Insulation layers
- ⑥ Stranded drain wire [6] for the outer shield [60], $0.5 \text{ mm}^2 \text{ Cu}$ / AWG 20 (not insulated, bare)

4.2.4 Length of signal cable B

For temperatures of the medium above 150°C / 300°F, a special signal cable and a ZD intermediate socket are necessary. These are available including the changed electrical connection diagrams.

Measuring sensor	Nominal size		Min. electrical conductivity [μS/cm]	Curve for signal cable B
	DN [mm]	[inches]		
OPTIFLUX 1000 F	10...150	3/8...6	5	B2
OPTIFLUX 2000 F	25...150	1...6	20	B3
	200...2000	8...80	20	B4
OPTIFLUX 4000 F	2.5...6	1/10...1/6	10	B1
	10...150	3/8...6	1	B3
	200...2000	8...80	1	B4
OPTIFLUX 5000 F	2.5	1/10	10	B1
	4...15	1/6...1/2	5	B2
	25...100	1...4	1	B3
	150...250	6...10	1	B4
OPTIFLUX 6000 F	2.5...15	1/10...1/2	10	B1
	25...150	1...6	1	B3
WATERFLUX 3000 F	50...600	2...24	50	A1

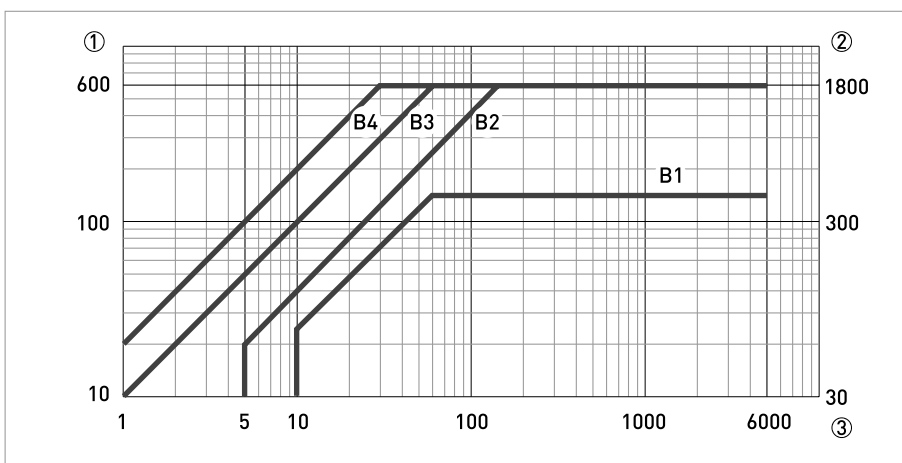


Figure 4-4: Maximum length of signal cable B

- ① Maximum length of signal cable B between the measuring sensor and signal converter [m]
- ② Maximum length of signal cable B between the measuring sensor and signal converter [ft]
- ③ Electrical conductivity of the medium being measured [μS/cm]

4.3 Connecting the signal and field current cables

Cables may only be connected when the power is switched off.

The device must be grounded in accordance with regulations in order to protect personnel against electric shocks.

For devices used in hazardous areas, additional safety notes apply; please refer to the Ex documentation.

Observe without fail the local occupational health and safety regulations. Any work done on the electrical components of the measuring device may only be carried out by properly trained specialists.

4.3.1 Connection diagram for measuring sensor, field housing

The device must be grounded in accordance with regulations in order to protect personnel against electric shocks.

- If a shielded field current cable is used, the shield must **NOT** be connected.
- The outer shield of signal cable A or B in the signal converter housing is connected via the strain relief terminal.
- Bending radius of signal and field current cable: $\geq 50 \text{ mm} / 2''$
- The following illustration is schematic. The positions of the electrical connection terminals may vary depending on the housing version.

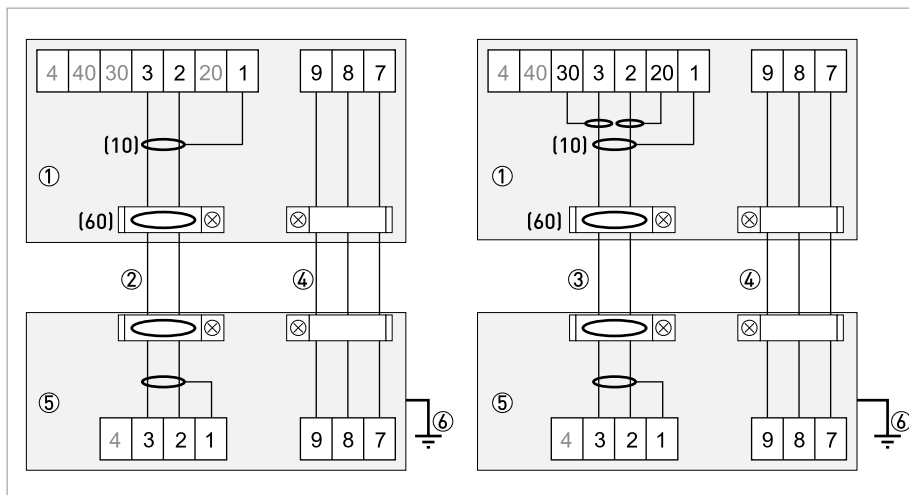


Figure 4-5: Connection diagram for measuring sensor, field housing

- ① Electrical terminal compartment in housing of the signal converter for signal and field current cable.
- ② Signal cable A
- ③ Signal cable B
- ④ Field current cable C
- ⑤ Connection box of measuring sensor
- ⑥ Functional ground FE

4.3.2 Connection diagram for measuring sensor, wall-mounted housing

The device must be grounded in accordance with regulations in order to protect personnel against electric shocks.

- If a shielded field current cable is used, the shield must **NOT** be connected.
- The outer shield of the signal cable is connected in the signal converter housing via the stranded drain wire.
- Bending radius of signal and field current cable: $\geq 50 \text{ mm} / 2''$
- The following illustration is schematic. The positions of the electrical connection terminals may vary depending on the housing version.

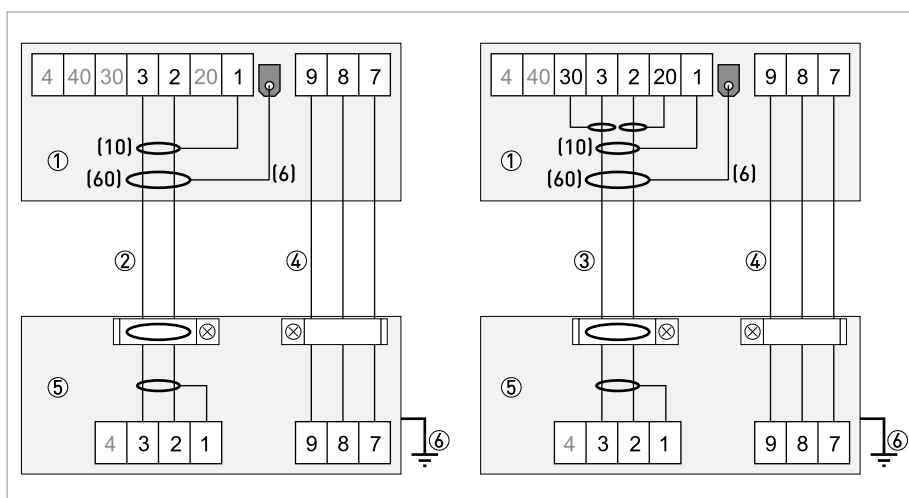


Figure 4-6: Connection diagram for measuring sensor, wall-mounted housing

- ① Electrical terminal compartment in housing of the signal converter for signal and field current cable.
- ② Signal cable A
- ③ Signal cable B
- ④ Field current cable C
- ⑤ Connection box of measuring sensor
- ⑥ Functional ground FE

4.3.3 Connection diagram for measuring sensor, 19" rack-mounted housing

The device must be grounded in accordance with regulations in order to protect personnel against electric shocks.

- If a shielded field current cable is used, the shield must **NOT** be connected.
- The outer shield of the signal cable is connected in the signal converter housing via the stranded drain wire.
- Bending radius of signal and field current cable: $\geq 50 \text{ mm} / 2''$
- The following illustration is schematic. The positions of the electrical connection terminals may vary depending on the housing version.

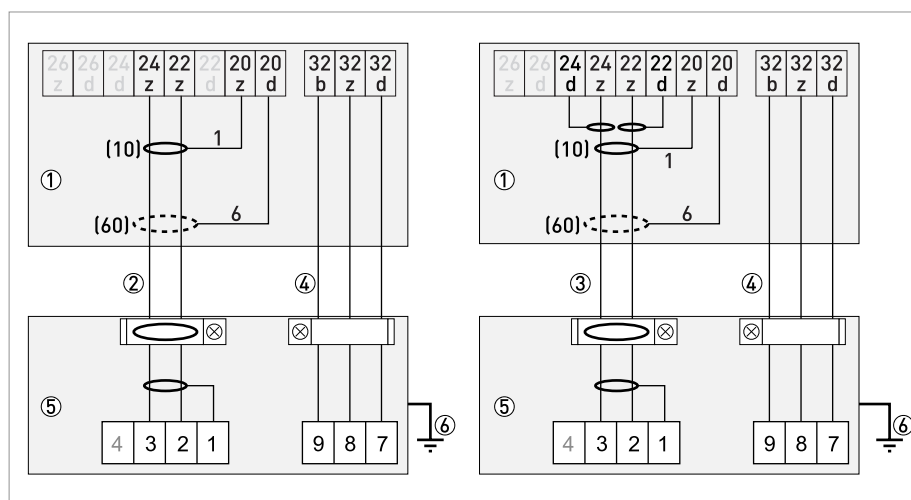


Figure 4-7: Connection diagram for measuring sensor, 19" rack-mounted housing

- ① Electrical terminal compartment in housing of the signal converter for signal and field current cable.
- ② Signal cable A
- ③ Signal cable B
- ④ Field current cable C
- ⑤ Connection box of measuring sensor
- ⑥ Functional ground FE

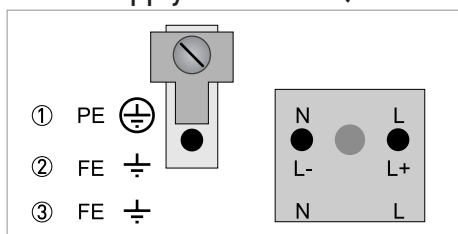
4.4 Connecting power, all housing variants

The device must be grounded in accordance with regulations in order to protect personnel against electric shocks.

For devices used in hazardous areas, additional safety notes apply; please refer to the Ex documentation.

- The protection category depends on the housing versions (IP65...67 to IEC 529 / EN 60529 or NEMA4/4X/6).
- The housings of the devices, which are designed to protect the electronic equipment from dust and moisture, should be kept well closed at all times.. Creepage distances and clearances are dimensioned to VDE 0110 and IEC 664 for pollution severity 2. Supply circuits are designed for overvoltage category III and the output circuits for overvoltage category II.
- Fuse protection ($I_N \leq 16 \text{ A}$) for the infeed power circuit, and also a disconnecting device (switch, circuit breaker) to isolate the signal converter must be provided.

Power supply connection (excluding 19" rack-mounted housing)



- ① 100...230 VAC (-15% / +10%)
- ② 24 VDC (-55% / +30%)
- ③ 24 VAC/DC (AC: -15% / +10%; DC: -25% / +30%)

100...230 VAC (tolerance range: -15% / +10%)

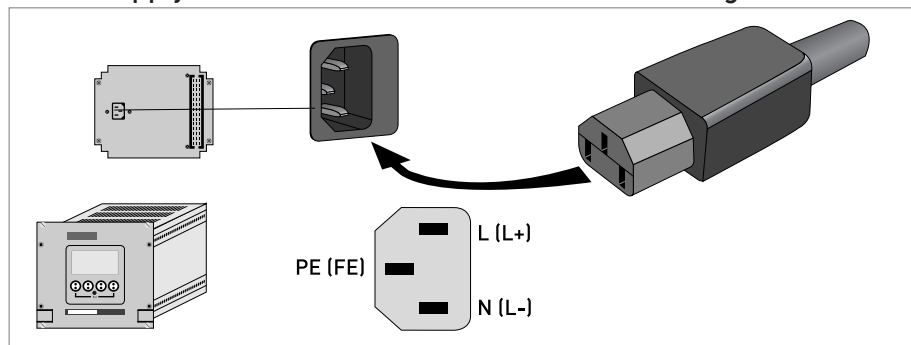
- Note the power supply voltage and frequency (50...60 Hz) on the nameplate.
- The protective ground terminal **PE** of the power supply must be connected to the separate U-clamp terminal in the terminal compartment of the signal converter

240 VAC+5% is included in the tolerance range.

24 VDC (tolerance range: -55% / +30%)**24 VAC/DC (tolerance ranges: AC: -15% / +10%; DC: -25% / +30%)**

- Note the data on the nameplate!
- For measurement process reasons, a functional ground **FE** must be connected 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) (as per VDE 0100 / VDE 0106 and IEC 364 / IEC 536 or relevant national regulations).

For 24 VDC, 12 VDC-10% is included in the tolerance range.

Power supply connection for 19" rack-mounted housing

4.5 Inputs and outputs, overview

4.5.1 Combinations of the inputs/outputs (I/Os)

This signal converter is available with various input/output combinations.

Basic version (fixed, non-alterable)

- Has 1 current, 1 pulse and 2 status outputs / limit switches.
- The pulse output can be set as status output/limit switch and one of the status outputs as the control input.

Exi version (fixed, non-alterable)

- Depending on the task, the device can be configured with various output modules.
- Current outputs can be active or passive.
- Optionally available also with Foundation Fieldbus and Profibus PA

Modular version (alterable)

- Depending on the task, the device can be configured with various output modules.

Bus system (alterable and fixed, non-alterable)

- The device allows intrinsically safe and non intrinsically safe bus interfaces in combination with additional modules.
- For connection and operation of the bus systems, please note the separate documentation!

Ex-option (alterable and fixed, non-alterable)

- For hazardous areas, all of the input/output variants for the housing designs C and F with terminal compartment in the Ex-d (pressure-resistant casing) or Ex-e (increased safety) versions can be delivered.
- Please refer to the separate instructions for connection and operation of the Ex-devices.

4.5.2 Description of the CG number

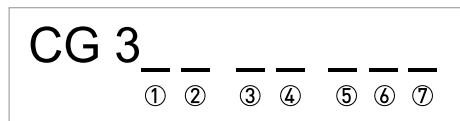


Figure 4-8: Marking (CG number) of the electronics module and input/output variants

- ① ID number: 0
- ② ID number: 0 = standard; 9 = special
- ③ Power supply
- ④ Display (language versions)
- ⑤ Input/output version (I/O)
- ⑥ 1st optional module for connection terminal A
- ⑦ 2nd optional module for connection terminal B

The last 3 digits of the CG number (⑤, ⑥ und ⑦) indicate the assignment of the terminal connections. Please see the following examples.

Examples for CG number

CG 300 11 100	100...230 VAC & standard display; basic I/O: I_a or I_p & S_p/C_p & S_p & P_p/S_p
CG 300 11 7FK	100...230 VAC & standard display; modular I/O: I_a & P_N/S_N and optional module P_N/S_N & C_N
CG 300 81 4EB	24 VDC & standard display; modular I/O: I_a & P_a/S_a and optional module P_p/S_p & I_p

Description of abbreviations and CG identifier for possible optional modules on terminals A and B

Abbreviation	Identifier for CG No.	Description
I_a	A	Active current output (including HART = HART [®] capability)
I_p	B	Passive current output (including HART = HART [®] capability)
P_a / S_a	C	Active pulse, frequency, status output or limit switch (changeable)
P_p / S_p	E	Passive pulse, frequency, status output or limit switch (changeable)
P_N / S_N	F	Passive pulse, frequency, status output or limit switch according to NAMUR (changeable)
C_a	G	Active control input
C_p	K	Passive control input
C_N	H	Active control input to NAMUR Signal converter monitors cable breaks and short circuits as per EN 60947-5-6. Errors indicated on LCD display. Error messages possible via status output.
IIn_a	P	Active current input
IIn_p	R	Passive current input
-	8	No additional module installed
-	0	No further module possible

4.5.3 Fixed, non-alterable input/output versions

This signal converter is available with various in-/output combinations.

- The grey boxes in the tables denote unassigned or unused connection terminals.
- In the table, only the final digits of the CG-No. are depicted.
- Connection terminal A+ is only operable in the basic input/output version.

CG-No.	Connection terminals								
	A+	A	A-	B	B-	C	C-	D	D-

Basic in-/output (I/O) (Standard)

1 0 0		I_p + HART® passive ①	S_p / C_p passive ②	S_p passive	P_p / S_p passive ②
		I_a + HART® active ①			

Ex-i inputs/outputs (optional)

2 0 0				I_a + HART® active	P_N / S_N NAMUR ②
3 0 0				I_p + HART® passive	P_N / S_N NAMUR ②
2 1 0		I_a active	P_N / S_N NAMUR C_p passive ②	I_a + HART® active	P_N / S_N NAMUR ②
3 1 0		I_a active	P_N / S_N NAMUR C_p passive ②	I_p + HART® passive	P_N / S_N NAMUR ②
2 2 0		I_p passive	P_N / S_N NAMUR C_p passive ②	I_a + HART® active	P_N / S_N NAMUR ②
3 2 0		I_p passive	P_N / S_N NAMUR C_p passive ②	I_p + HART® passive	P_N / S_N NAMUR ②

PROFIBUS PA (Ex-i) (Option)

D 0 0				PA+	PA-	PA+	PA-
				FISCO Device		FISCO Device	
D 1 0		I_a active	P_N / S_N NAMUR C_p passive ②	PA+	PA-	PA+	PA-
				FISCO Device		FISCO Device	
D 2 0		I_p passive	P_N / S_N NAMUR C_p passive ②	PA+	PA-	PA+	PA-
				FISCO Device		FISCO Device	

CG-No.	Connection terminals								
	A+	A	A-	B	B-	C	C-	D	D-

FOUNDATION Fieldbus (Ex-i) (Option)

E 0 0				V/D+	V/D-	V/D+	V/D-
				FISCO Device		FISCO Device	
E 1 0		I _a active	P _N / S _N NAMUR C _p passive ②	V/D+	V/D-	V/D+	V/D-
				FISCO Device		FISCO Device	
E 2 0		I _p passive	P _N / S _N NAMUR C _p passive ②	V/D+	V/D-	V/D+	V/D-
				FISCO Device		FISCO Device	

① function changed by reconnecting

② changeable

4.5.4 Alterable input/output versions

This signal converter is available with various in-/output combinations.

- The grey boxes in the tables denote unassigned or unused connection terminals.
- In the table, only the final digits of the CG-No. are depicted.
- Term. = (connection) terminal

CG-No.	Connection terminals								
	A+	A	A-	B	B-	C	C-	D	D-

Modular inputs/outputs (Option)

4 __		max. 2 optional modules for term. A + B	I _a + HART® active	P _a / S _a active ①
8 __		max. 2 optional modules for term. A + B	I _p + HART® passive	P _a / S _a active ①
6 __		max. 2 optional modules for term. A + B	I _a + HART® active	P _p / S _p passive ①
B __		max. 2 optional modules for term. A + B	I _p + HART® passive	P _p / S _p passive ①
7 __		max. 2 optional modules for term. A + B	I _a + HART® active	P _N / S _N NAMUR ①
C __		max. 2 optional modules for term. A + B	I _p + HART® passive	P _N / S _N NAMUR ①

PROFIBUS PA (Option)

D __		max. 2 optional modules for term. A + B	PA+ (2)	PA- (2)	PA+ (1)	PA- (1)
------	--	-----------------------------------------	---------	---------	---------	---------

FOUNDATION Fieldbus (Option)

E		max. 2 optional modules for term. A + B	V/D+ (2)	V/D- (2)	V/D+ (1)	V/D- (1)
---	--	-----------------------------------------	----------	----------	----------	----------

PROFIBUS DP (Option)

F _0		1 optional module for term. A	Termination P	RxD/TxD-P(2)	RxD/TxD-N(2)	Termination N	RxD/TxD-P(1)	RxD/TxD-N(1)
------	--	-------------------------------	---------------	--------------	--------------	---------------	--------------	--------------

Modbus (Option)

G __ ②		max. 2 optional modules for term. A + B		Common	Sign. B (D1)	Sign. A (D0)
H __ ③		max. 2 optional modules for term. A + B		Common	Sign. B (D1)	Sign. A (D0)

① changeable

② not activated bus terminator

③ activated bus terminator

4.6 Laying electrical cables correctly

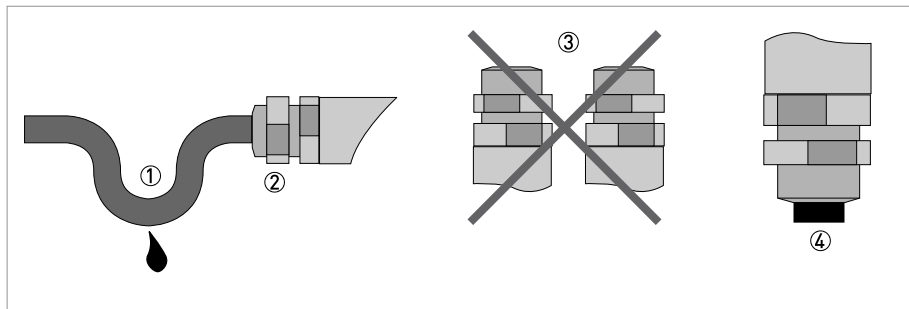
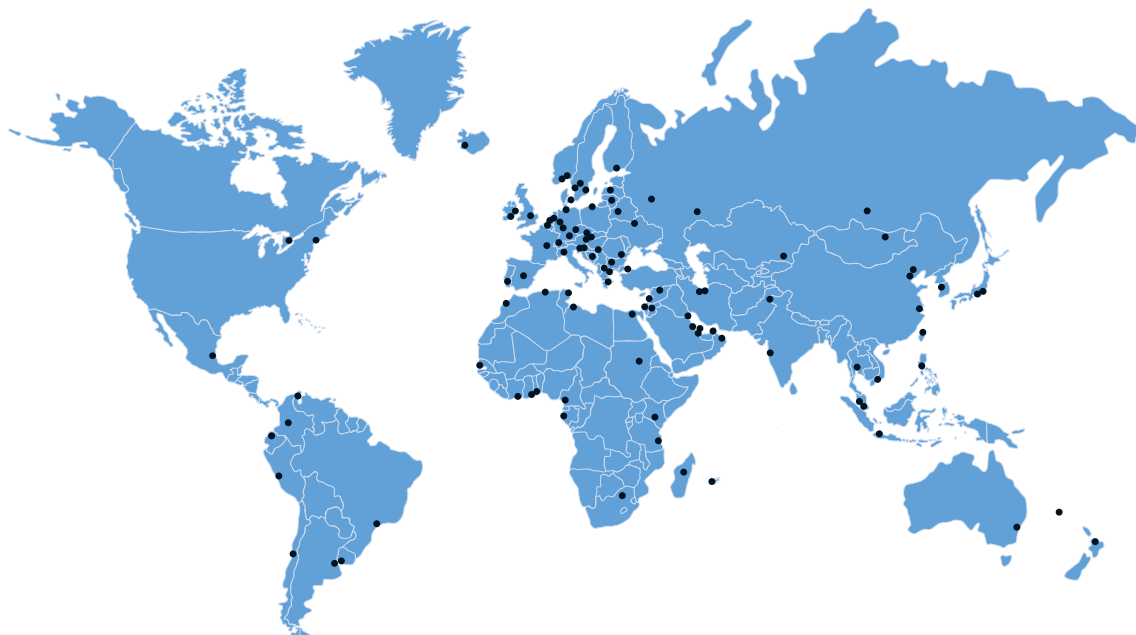


Figure 4-9: Protect housing from dust and water

- ① Lay the cable in a loop just before the housing.
- ② Tighten the screw connection of the cable entry securely.
- ③ Never mount the housing with the cable entries facing upwards.
- ④ Seal cable entries that are not needed with a plug.



KROHNE product overview

- Electromagnetic flowmeters
- Variable area flowmeters
- Ultrasonic flowmeters
- Mass flowmeters
- Vortex flowmeters
- Flow controllers
- Level meters
- Temperature meters
- Pressure meters
- Analysis products
- Measuring systems for the oil and gas industry
- Measuring systems for sea-going tankers

Head Office KROHNE Messtechnik GmbH & Co. KG
Ludwig-Krohne-Str. 5
D-47058 Duisburg
Tel.: +49 (0)203 301 0
Fax: +49 (0)203 301 10389
info@krohne.de

The current list of all KROHNE contacts and addresses can be found at:
www.krohne.com

KROHNE