



## IFC 100 Technical Datasheet

### Signal converter for electromagnetic flowmeters

- Simple and easy to install and start-up
- Diagnostics of device and application
- Extremely fast signal conversion



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

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## 1.1 The more than economical solution

The **IFC 100** 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 a 0° and 45° version. If the measuring point is difficult to access or the ambient conditions prevent the use of the compact variant, the signal converter is available in a wall-mounted housing.

The **IFC 100** was designed for applications requiring an economical measuring solution with a high level of technology.



(signal converter in wall-mounted housing)

- ① Large backlit graphic display with 4 push buttons to operate the signal converter without having to open the housing
- ② Supply voltage: 100...230 VAC (standard) and 24 VDC or 24 VAC/DC (optional)

**Highlights**

- Simple installation and start-up
- Available inputs and outputs: Current output (incl. HART®), pulse/frequency output, status output and control input
- Large backlit graphic display with intuitive operation
- A variety of operating languages integrated as standard
- Maintenance free
- Excellent price/performance ratio
- Extremely quick signal conversion

**Industries**

- Water & Wastewater
- Agriculture
- Heating, Ventilation & Air Conditioning (HVAC)
- Machinery
- Power plants

**Applications**

- Measuring homogeneous media
- Water distribution networks and spray-irrigation systems
- Water treatment
- Environmental technology

## 1.2 Options and variants

### Modular converter concept



[Compact version as 45° version]

Despite its somewhat different appearance, the IFC 100 has many of the same functions as its "big brother" IFC 300. Diagnostic function, conductivity measurement and simple navigation to name but a few.

This latest member of the converter family also has a large number of fully-developed functions:

- various power supply versions (AC, DC, AC/DC)
- HART® as standard
- optional Ex version available

### Compact design in various versions



[Compact version as 0° version]

The IFC 100 C in the 0° version is ideal for installation in vertical pipelines.

On the other hand, the 45° version improves the readability of the display in specific applications.

The backlit display provides excellent readability from long distances. The 4 push buttons make operation, start-up and configuration simple.

In the 0° version, the signal converter can be rotated in 90° increments allowing for customer-specific installation position. The 45° version can only be rotated in 180° increments.

### Remote version in wall-mounted housing



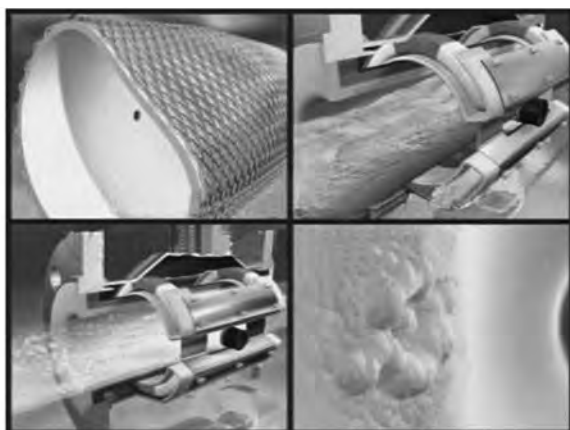
(signal converter in wall-mounted housing)

For temperature effects, vibration or in places that are difficult to access, remote installation is possible with the IFC 100 W.

A signal cable is used to connect the measuring sensor and the converter for the purposes of power supply and signal processing.

The electronics can be used in all housing versions without having to be reconfigured.

### Diagnostics



The IFC 100 has been equipped with a wide variety of diagnostic tools for device function and application check.

- Conductivity measurement
- Electrode error
- Process or ambient temperature too high

### 1.3 Signal converter / measuring sensor combination possibilities

Measuring sensor	Measuring sensor + measuring converter IFC 100	
	Compact (0°/45° version)	Remote wall-mounted housing
OPTIFLUX 1000	OPTIFLUX 1100 C	OPTIFLUX 1100 W
OPTIFLUX 2000	OPTIFLUX 2100 C	OPTIFLUX 2100 W
OPTIFLUX 4000	OPTIFLUX 4100 C	OPTIFLUX 4100 W
OPTIFLUX 5000	OPTIFLUX 5100 C	OPTIFLUX 5100 W
OPTIFLUX 6000	OPTIFLUX 6100 C	OPTIFLUX 6100 W
WATERFLUX 3000	WATERFLUX 3100 C	WATERFLUX 3100 W

### 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:

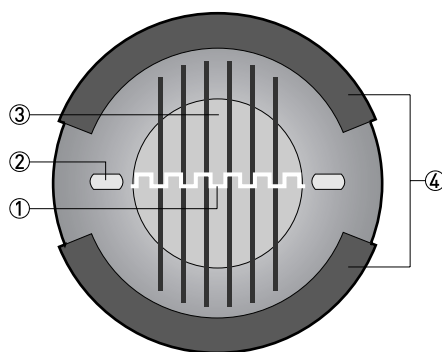
v = mean flow velocity

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 mean flow velocity v and thus the flow rate q. A signal converter is used to amplify the signal voltage, filter it and convert it into signals for totalising, recording and output processing.



- ① 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 (Download Center).

### 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.
<b>Measuring sensor</b>	
OPTIFLUX 1000	DN10...150 / 3/8...6"
OPTIFLUX 2000	DN25...1200 / 1...48"
OPTIFLUX 4000	DN2.5...1200 / 1/10...48"
OPTIFLUX 5000	Flange: DN15...300 / ½...12" Sandwich: DN2.5...100 / 1/10...4"
OPTIFLUX 6000	DN2.5...150 / 1/10...6"
WATERFLUX 3000	DN25...600 / 1...24"
	With the exception of the OPTIFLUX 1000 and WATERFLUX 3000 all measuring sensors are also available in an Ex-version.
<b>Signal converter</b>	
Compact version (C)	IFC 100 C (0° & 45° version)
Remote version (W)	IFC 100 W
	All signal converters are also available in Ex-versions.
<b>Options</b>	
Outputs	Current- (incl. HART®), pulse, frequency, status output and/or limit switch
Totalizer	2 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, empty pipe detection, stabilization



<b>Display and user interface</b>	
Graphic display	LC display, backlit white.
	Size: 128 x 64 pixels, corresponds to 59 x 31 mm = 2.32" x 1.22"
	Ambient temperatures below -25°C / -13°F, may affect the readability of the display.
Operating elements	4 push buttons for operator control of the signal converter without opening the housing.
Remote control	PACTware® (incl. Device Type Manager (DTM)) (in preparation)
	HART® Hand Held Communicator from Emerson Process (in preparation)
	AMS® from Emerson Process (in preparation)
	PDM® from Siemens (in preparation)
	All DTMs and drivers are available free of charge from the manufacturer's website.
<b>Display functions</b>	
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	English, French, German, Dutch, Polish, Portuguese, Danish, Spanish, Swedish, Slovenian, Italian (others on request)
Units	Metric, British and US units selectable as required from lists for volume / mass flow and counting, flow velocity, electrical conductivity, temperature

### Measuring accuracy

Reference conditions	Medium: water
	Temperature: 20°C / 68°F
	Pressure: 1 bar / 14.5 psi
	Inlet section: ≥ 5 DN
Maximum measuring error	±0.3% of the measured value ±1 mm/s, depending on the measuring sensor
	For detailed information and accuracy curves, refer to chapter "Accuracy".
Repeatability	±0.1%

### Operating conditions

<b>Temperature</b>	
Process temperature	Refer to technical data for the measuring sensor.
Ambient temperature	Depends on the version and combination of outputs.
	It is a good idea to protect the converter from external heat sources such as direct sunlight as higher temperatures reduce the life cycle of all electronic components.
	Ambient temperatures below -25°C / -13°F, may affect the readability of the display.
Storage temperature	-40...+70°C / -40...+158°F
<b>Pressure</b>	
Medium	Refer to technical data for the measuring sensor.
Ambient pressure	Atmospheric
<b>Chemical properties</b>	
Electrical conductivity	All media except for water: $\geq 5 \mu\text{S/cm}$ (also refer to the technical data for the measuring sensor)
	Water: $\geq 20 \mu\text{S/cm}$
Physical condition	Conductive, liquid media
Solid content (volume)	$\leq 10\%$ for OPTIFLUX measuring sensors
Gas content (volume)	$\leq 3\%$ for OPTIFLUX measuring sensors
Flow rate	For detailed information, refer to chapter "Flow tables".
<b>Other conditions</b>	
Protection category acc. to IEC 529 / EN 60529	IP66/67 (acc. to NEMA 4/4X)

### 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	Die-cast aluminium (polyurethane coated)
Measuring sensor	For housing materials, 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.
Power supply	100...230 VAC (-15% / +10%), 50/60 Hz; non-Ex: standard; Ex: optional 240 VAC + 5% is included in the tolerance range.
	12...24 VDC (-55% / +30%); only available in non Ex version 12 VDC - 10% is included in the tolerance range.
	24 VAC/DC (AC: -15% / +10%; DC: -25% / +30%); only available as Ex version 12 V is <b>not</b> included in the tolerance range.
Power consumption	AC: 7 VA
	DC: 4 W
Signal cable	Only necessary for remote device versions. <b>DS 300 (type A)</b> Max. length: 600 m / 1950 ft (depending on electrical conductivity and version of measuring sensor)
Cable entries	Standard: M20 x 1.5 (8...12 mm)
	Option: ½" NPT, PF ½

## 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 used abbreviations	$U_{ext}$ = external voltage; $R_L$ = load + resistance; $U_0$ = terminal voltage; $I_{nom}$ = nominal current
<b>Current output</b>	
Output data	Volume flow, mass flow, diagnostics value, flow velocity, coil temperature, conductivity
Settings	<b>Without HART®</b>
	Q = 0%: 0...20 mA; Q = 100%: 10...21.5 mA
	Error identification: 0...22 mA
	<b>With HART®</b>
	Q = 0%: 4...20 mA; Q = 100%: 10...21.5 mA
	Error identification: 3.5...22 mA
<b>Operating data</b>	
Active	$U_{int, nom} = 20 \text{ VDC}$ $I \leq 22 \text{ mA}$ $R_L \leq 750 \Omega$
Passive	$U_{ext} \leq 32 \text{ VDC}$ $I \leq 22 \text{ mA}$ $U_0 \leq 2 \text{ V at } I = 22 \text{ mA}$ $R_L \leq (U_{ext} - U_0) / I_{max}$

<b>HART®</b>	
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!
Multi-Drop operation	Yes, current output = 4 mA
	Multi-Drop address adjustable in operation menu 1...15
Device driver	Available for FC 375/475, AMS, PDM, FDT/DTM
Registration (HART Communication Foundation)	Yes
<b>Pulse or frequency output</b>	
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: setting automatic, symmetric or fixed (0.05...2000 ms)
<b>Operating data</b>	
Passive	$U_{\text{ext}} \leq 32 \text{ VDC}$
	$f_{\text{max}}$ 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 $I \leq 100 \text{ mA}$
	$f_{\text{max}}$ 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 $I \leq 20 \text{ mA}$
<b>Low flow cut-off</b>	
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)

<b>Time constant</b>	
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
<b>Status output / limit switch</b>	
Function 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
<b>Operating data</b>	
Passive	$U_{\text{ext}} \leq 32 \text{ VDC}$ $I \leq 100 \text{ mA}$ 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 $I \leq 100 \text{ mA}$
<b>Modbus (in preparation)</b>	
Description	Modbus RTU, Master / Slave, RS485
Address range	1...247
Broadcast	Supported with function code 16
Supported Baudrate	1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200 Baud

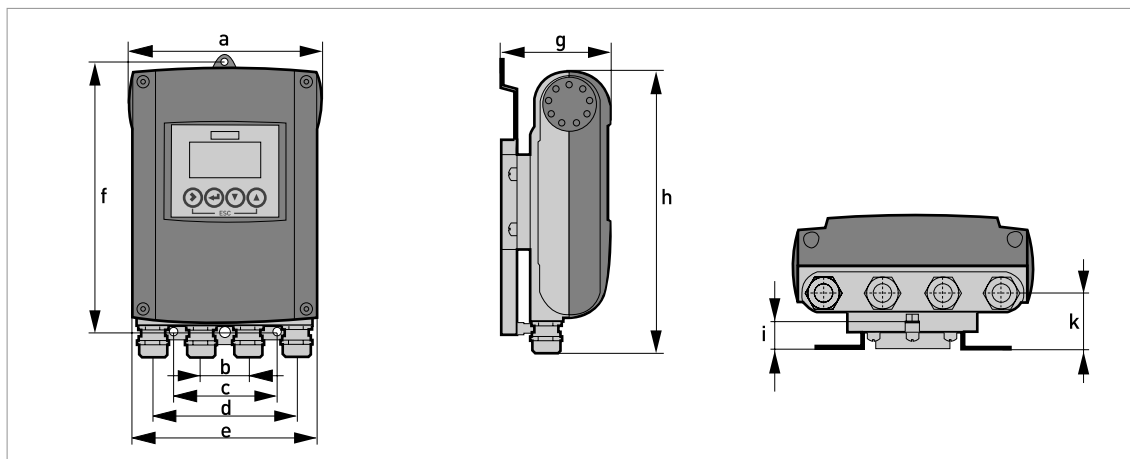
## Approvals and certificates

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
<b>Hazardous areas</b>	
ATEX	<b>Optional (OPTIFLUX 2100 C and OPTIFLUX 4100 C only)</b>
	II 2 G Ex e [ia] mb IIC T4 (DN10...20; DN200...300; DN350...3000)
	II 2 G Ex d e [ia] mb IIC T4 (DN25...150)
	II 2 G Ex e [ia] mb q T4/T3 (DN25...150; DN200...300)
	II 2 D Ex tD A21 IP64 T120°C (all nominal sizes)
	<b>Option (only version W)</b>
	II 2 G Ex e [ia] mb IIC T4
	II 2 D Ex tD A21 IP64 T135°C
<b>Other standards and approvals</b>	
Shock and vibration resistance	IEC 68-2-3
Electromagnetic compatibility (EMC)	2004/108/EC 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

Wall-mounted version



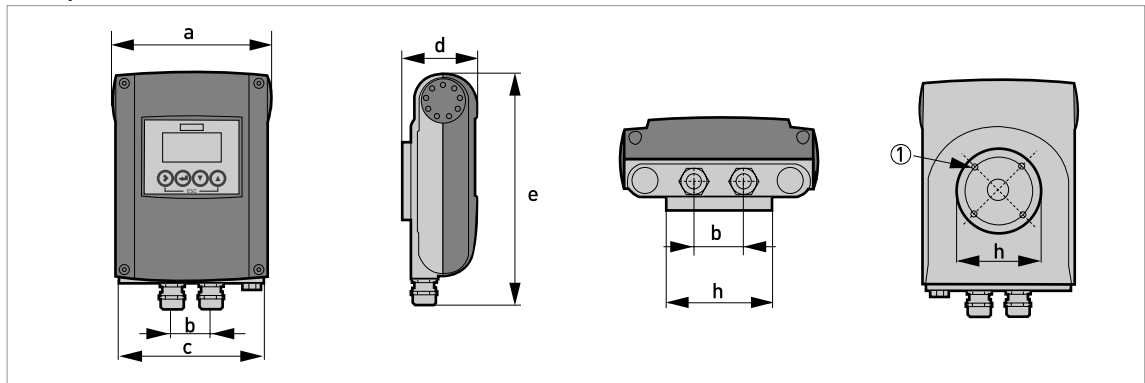
Dimensions and weights in mm and kg

	Dimensions [mm]										Weight [kg]
	a	b	c	d	e	f	g	h	i	k	
Wall-mounted version	161	40	87.2	120	155	241	95.2	257	19.3	39.7	Std: 1.9 Ex: 2.4

Dimensions and weights in inches and lb

	Dimensions [inch]										Weight [lb]
	a	b	c	d	e	f	g	h	i	k	
Wall-mounted version	6.34	1.57	3.43	4.72	6.10	9.50	3.75	10.12	0.76	1.56	Std: 4.2 Ex: 5.3

## Compact 0° version



① 4 x M 6

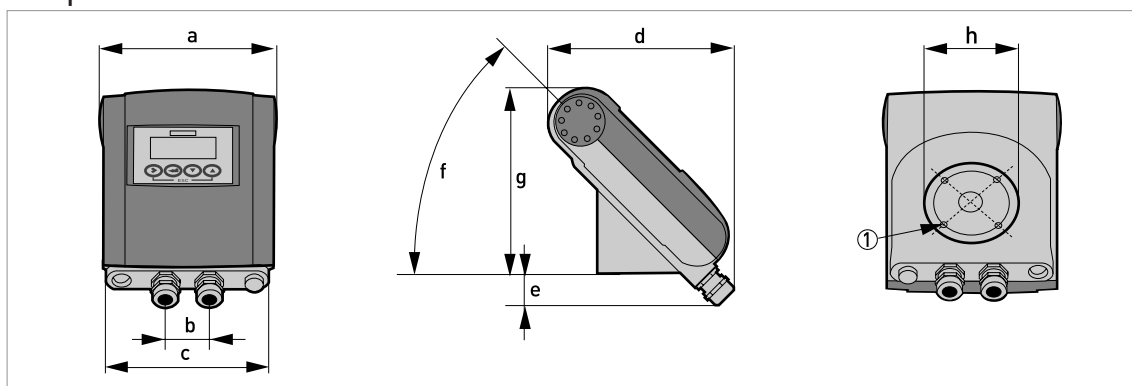
## Dimensions and weights in mm and kg

	Dimensions [mm]								Weight [kg]
	a	b	c	d	e	f	g	h	
0° version	161	40	155	81.5	257	-	-	Ø72	Std: 1.9 Ex: 2.4

## Dimensions and weights in inches and lb

	Dimensions [inch]								Weight [lb]
	a	b	c	d	e	f	g	h	
0° version	6.34	1.57	6.1	3.21	10.12	-	-	Ø2.83	Std: 4.2 Ex: 5.3

## Compact 45° version



① 4 x M 6

## Dimensions and weights in mm and kg

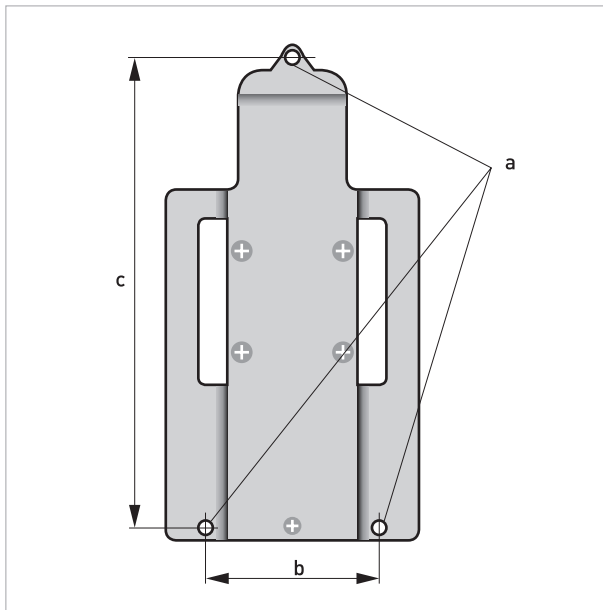
	Dimensions [mm]								Weight [kg]
	a	b	c	d	e	f	g	h	
45° version	161	40	155	184	27.4	45°	186	Ø72	Std: 2.1 Ex: 2.6

## Dimensions and weights in inches and lb

	Dimensions [inch]								Weight [lb]
	a	b	c	d	e	f	g	h	
45° version	6.34	1.57	6.10	7.24	1.08	45°	7.32	Ø2.83	Std: 4.6 Ex: 5.7



### 2.2.2 Mounting plate, wall-mounted version



Dimensions in mm and inches

	[mm]	[inches]
a	Ø6.5	Ø0.26
b	87.2	3.4
c	241	9.5

## 2.3 Flow tables

Flow rate in m/s and m<sup>3</sup>/h

	Q <sub>100 %</sub> in m <sup>3</sup> /h			
v [m/s]	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

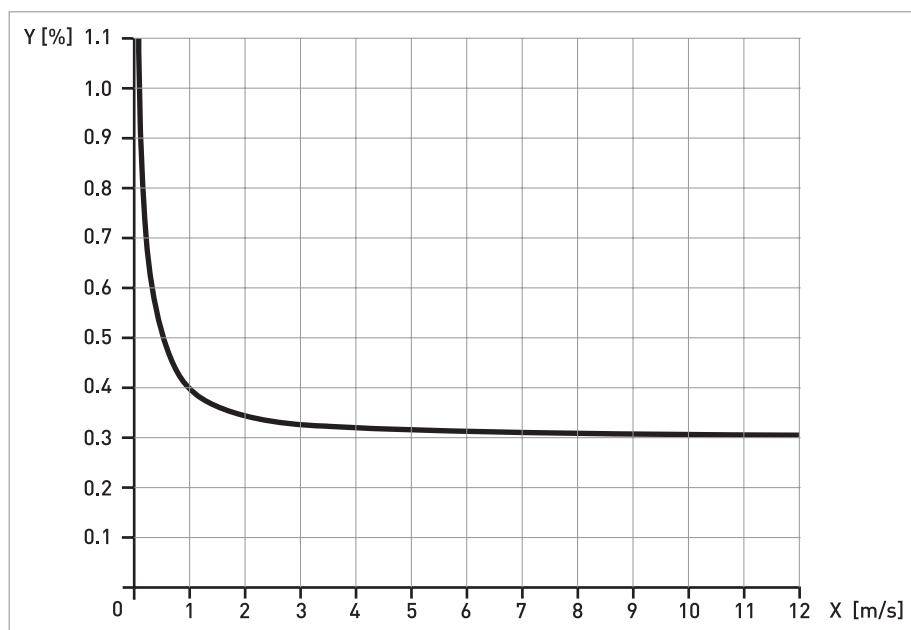
## Flow rate in ft/s and US gallons/min

	Q <sub>100</sub> % 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

## 2.4 Measuring accuracy

### Reference conditions

- Medium: water
- Temperature: 20°C / 68°F
- Pressure: 1 bar / 14.5 psi
- Inlet section:  $\geq 5$  DN



X [m/s]: flow velocity

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

	DN [mm]	DN [inches]	Accuracy	Curve
OPTIFLUX 2100 / 4100 / 5100 / 6100	10...1200	3/8...48	0.3% of mv + 1 mm/s	①
OPTIFLUX 1100	10...150	3/8...6	0.4% of mv + 1 mm/s	as ① + 0.1%
OPTIFLUX 4100 / 5100 / 6100	2.5...6	1/10...1/4		
WATERFLUX 3100	25...600	1...24	0.3% of mv + 1 mm/s	①

### 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.*

*If the device is not used according to the operating conditions (refer to chapter "Technical data"), the intended protection could be affected.*

### 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 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.*

#### 3.4.1 Wall mounting

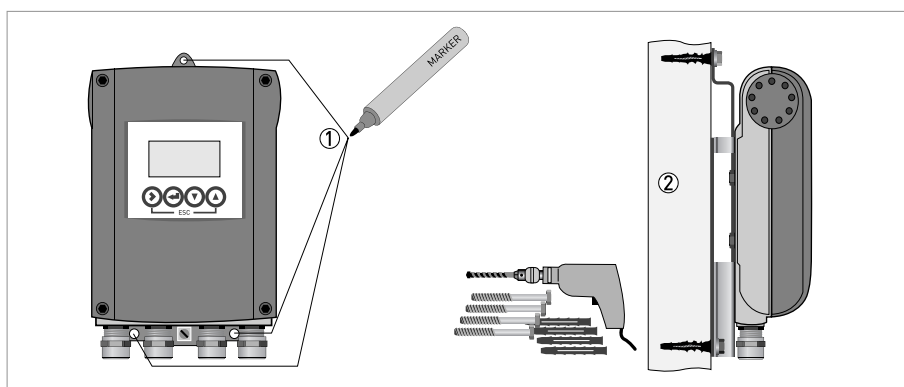
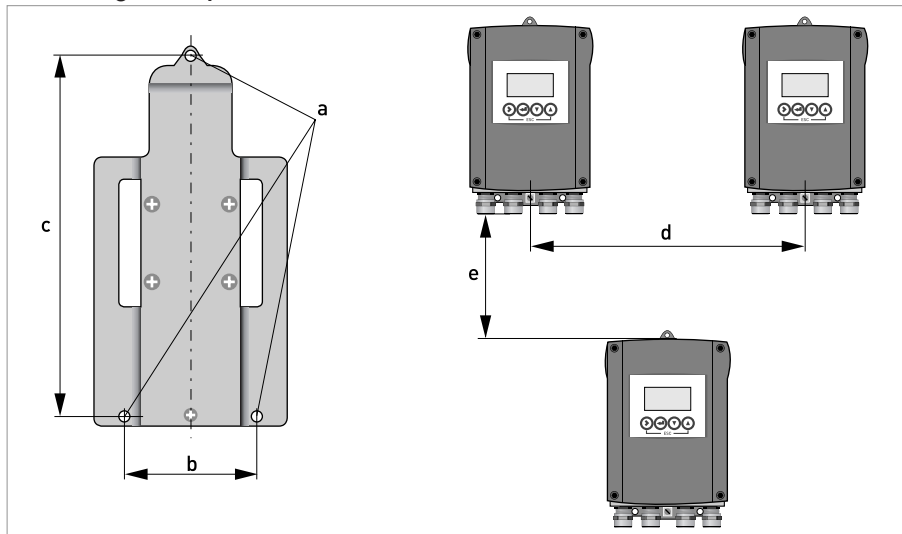


Figure 3-1: Mounting the wall-mounted housing

- ① Prepare the holes with the aid of the mounting plate. For further information refer to *Mounting plate, wall-mounted version* on page 17.
- ② Fasten the device securely to the wall with the mounting plate.

### Mounting multiple devices next to each other



	[mm]	[inches]
a	Ø6.5	Ø0.26
b	87.2	3.4
c	241	9.5
d	310	12.2
e	257	10.1

## 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 sensor and converter are configured together in the factory. For this reason, please connect the devices in pairs. Ensure that the sensor constant GK/GKL (see type plates) are identically set.
- If delivered separately or when installing devices that were not configured together, set the converter to the DN size and GK/GKL of the 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.*

### 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:  $\geq 50 \text{ mm} / 2''$

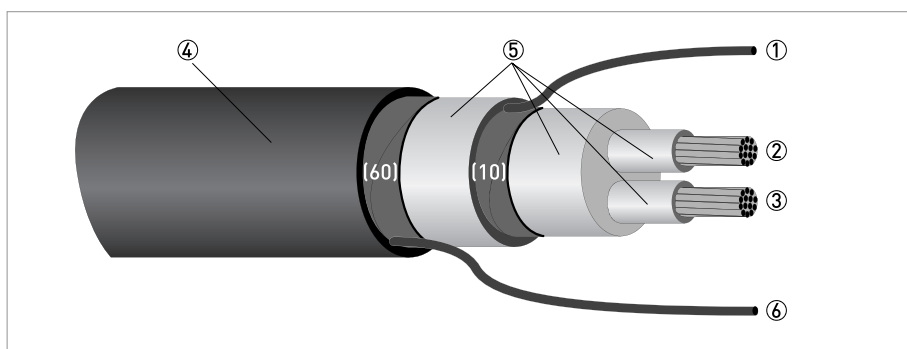


Figure 4-1: Construction of signal cable A

- 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 [μS/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...1200	8...48	20	A2
OPTIFLUX 4000 F	2.5...150	1/10...6	1	A1
	200...1200	8...48	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	25...600	1...24	20	A1

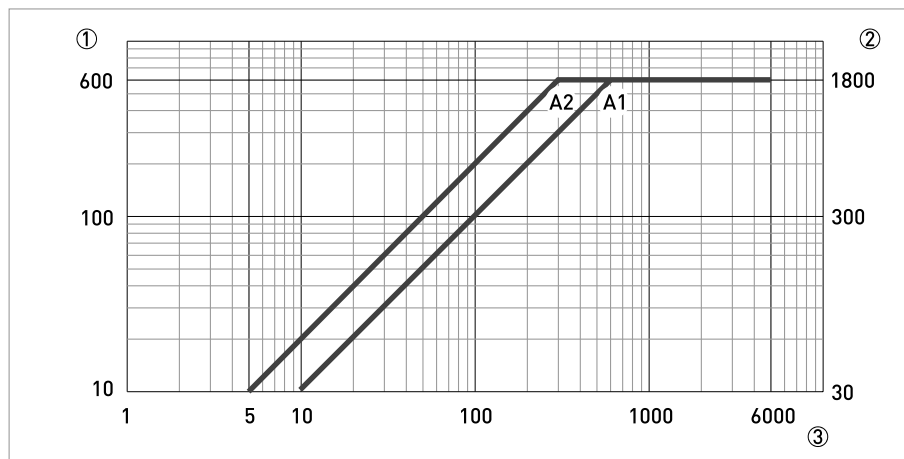


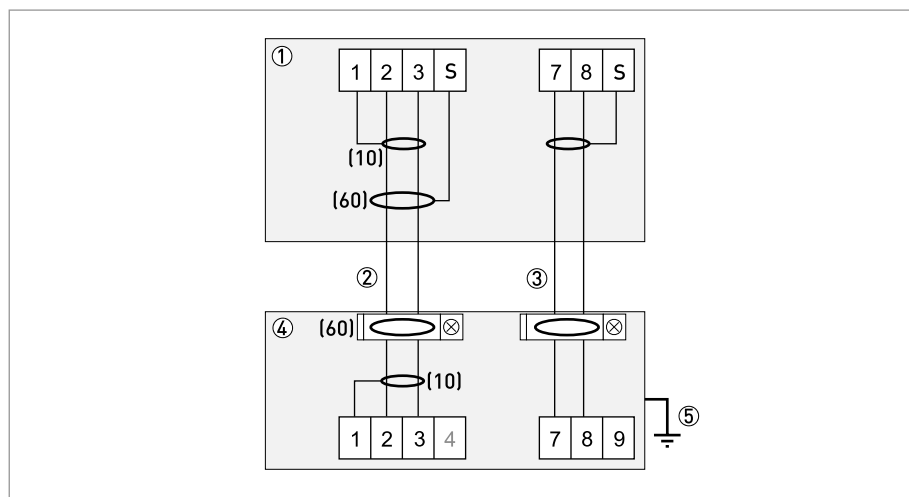
Figure 4-2: Maximum length of signal cable A

- 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 [μS/cm]

### 4.2.3 Connection diagram for signal and field current cable

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

- A shielded two-wire copper cable is used as the field current cable. The shielding **MUST** be connected in the housing of the measuring sensor and signal converter.
- The outer shield (60) is connected in the terminal compartment of the measuring sensor directly via the shield and a clip.
- 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 4-3: Connection diagram for signal and field current cable**

- ① Electrical terminal compartment in signal converter
- ② Signal cable A
- ③ Field current cable C
- ④ Electrical terminal compartment in measuring sensor
- ⑤ Functional ground FE

### 4.3 Connecting the power

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

- 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.

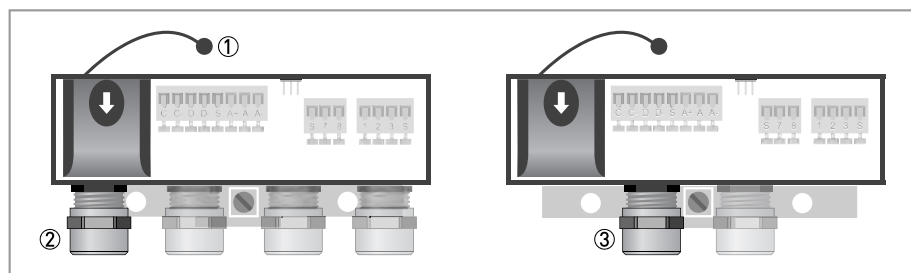


Figure 4-4: Terminal compartment for power

- ① Retaining band of the cover
- ② Cable entry power supply remote version
- ③ Cable entry power supply compact version

#### Version overview

Version	Non-Ex	Ex
100...230 VAC	Standard	Optional
12...24 VDC	Standard	-
24 VAC/DC	-	Standard

- Open the cover of the electrical terminal compartment by pressing down and pulling forwards at the same time.

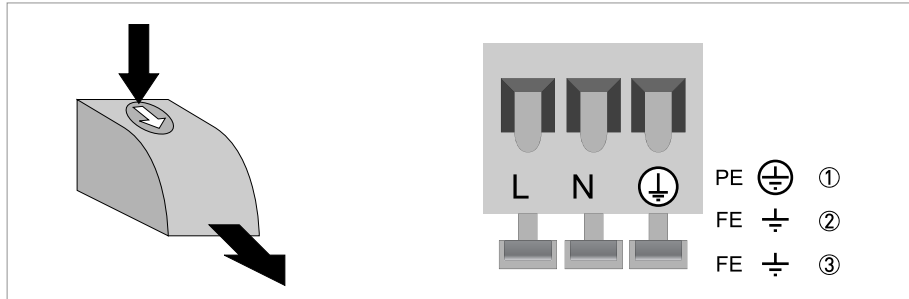


Figure 4-5: Power supply connection

- ① 100...230 VAC (-15% / +10%), 8 VA
- ② 24 VDC (-55% / +30%), 4 W
- ③ 24 VAC/DC (AC: -15% / +10%; DC: -25% / +30%), 7 VA and 4 W

- Close the cover after the power has been connected.

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

- Note the power supply voltage and frequency (50...60 Hz) on the nameplate.

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

#### 12...24 VDC (tolerance range: -55% / +30%)

- Note the data on the nameplate!
- When connecting to functional extra-low voltages, provide a facility for protective separation (PELV) (acc. to VDE 0100 / VDE 0106 and IEC 364 / IEC 536 or relevant national regulations).

*12 VDC - 10% is included in the tolerance range.*

#### 24 VAC/DC (tolerance range: AC: -15% / +10%; DC: -25% / +30%)

- AC: Note the power supply voltage and frequency (50...60 Hz) on the nameplate.
- DC: When connecting to functional extra-low voltages, provide a facility for protective separation (PELV) (acc. to VDE 0100 / VDE 0106 and IEC 364 / IEC 536 or relevant national regulations).

*12 V is **not** included in the tolerance range.*

## 4.4 Overview of outputs

### 4.4.1 Description of the CG number

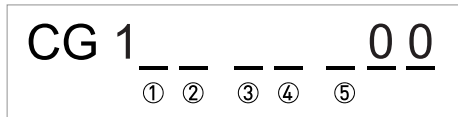


Figure 4-6: Marking (CG number) of the electronics module and output variants

- ① ID number: 0
- ② ID number: 0 = standard; 9 = special
- ③ Power supply
- ④ Display (language versions)
- ⑤ Output version

### 4.4.2 Fixed, non-alterable output versions

This signal converter is available with various 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 output version.

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

#### Basic outputs (I/O) Standard

1 0 0		I <sub>p</sub> + HART® passive ①	S <sub>p</sub> passive	P <sub>p</sub> / S <sub>p</sub> passive ②
	I <sub>a</sub> + HART® active ①			

① function changed by reconnecting

② changeable

#### Description of used abbreviations

I <sub>a</sub>	I <sub>p</sub>	Current output active or passive
P <sub>p</sub>		Pulse/frequency output passive
S <sub>p</sub>		Status output / limit switch passive

## 4.5 Laying electrical cables correctly

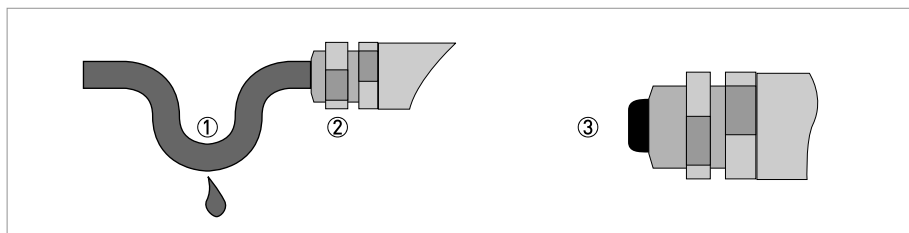
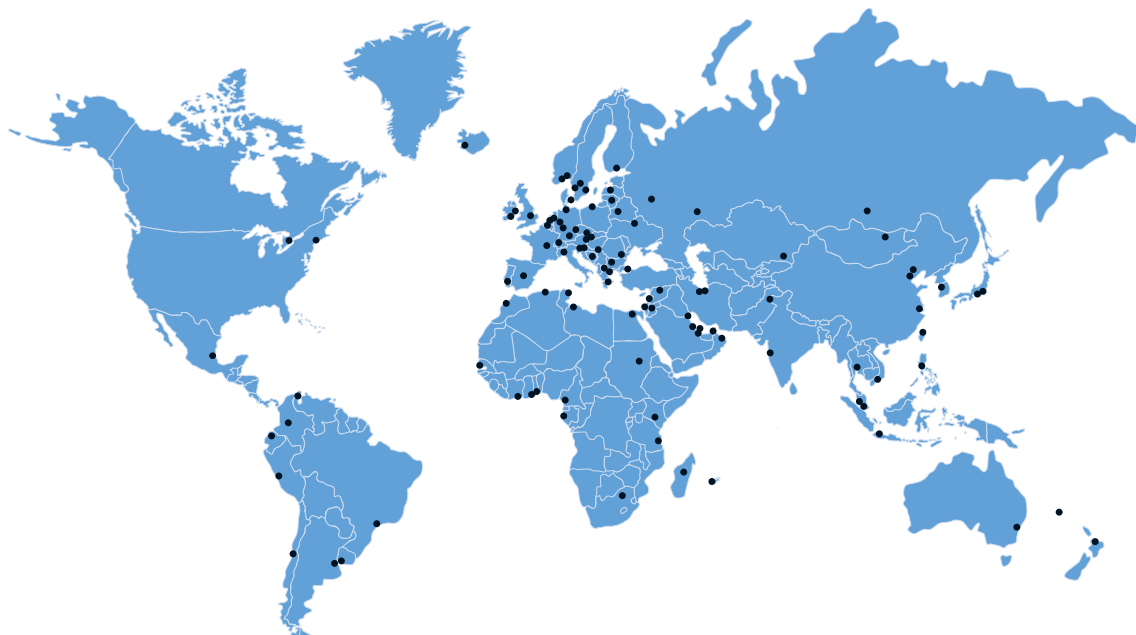


Figure 4-7: Protect housing from dust and water

- ① For compact versions with nearly horizontally-oriented cable entries, lay the necessary electric cables with a drip loop as shown in the illustration.
- ② Tighten the screw connection of the cable entry securely.
- ③ 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

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[www.krohne.com](http://www.krohne.com)

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