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

HART COMMUNICATION PROTOCOL

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

KROHNE

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.

The 45° version, on the other hand, allows draining of liquids when it is installed in horizontal pipes. The angled design also improves the readability of the display.

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

In both versions, the signal converter can be rotated in 90° increments, allowing for customer-specific installation.

Remote version in wall-mounted housing

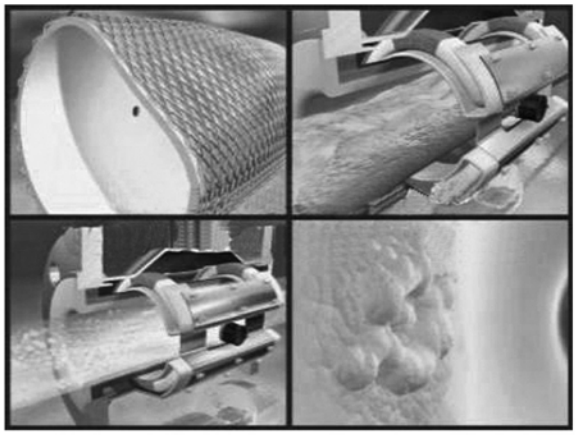
(signal converter in wall-mounted housing)

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 reconfigurated.

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

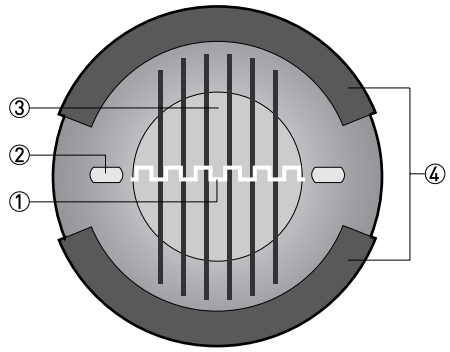
Measuring sensor	Signal converter IFC 100	
	Compact (0°/45° version)	Remote wall-mounted housing
OPTIFLUX 1000	OPTIFLUX 1100 C	OPTIFLUX 1100 W
OPTIFLUX 2000	OPTIFLUX 2100 C	OPTIFLUX 2100 W
OPTIFLUX 4000	OPTIFLUX 4100 C	OPTIFLUX 4100 W
OPTIFLUX 5000	OPTIFLUX 5100 C	OPTIFLUX 5100 W
OPTIFLUX 6000	OPTIFLUX 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 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...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	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 100 C (0° & 45° version)
Remote version (W)	IFC 100 W
	All signal converters are also available in Ex-versions.
Options	
Outputs	Current- (incl. HART®), pulse, frequency, status output and/or limit switch
Counters	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

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"
	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.
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	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 run: ≥ 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, see chapter "Accuracy".
Repeatability	±0.1%

Operating conditions

Temperature	
Process temperature	Refer to technical data for the measuring sensor.
Ambient temperature	-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.)
	Ambient temperatures below -25°C / -13°F, may affect the readability of the display.
Storage temperature	-40...+70°C / -40...+158°F
Pressure	
Medium	Refer to technical data for the measuring sensor.
Ambient pressure	Atmosphere.
Chemical properties	
Electrical conductivity	All media except for water: ≥ 5 µS/cm (also refer to the technical data for the measuring sensor)
	Water: ≥ 20 µS/cm for OPTIFLUX measuring sensors, ≥ 50 µS/cm for WATERFLUX 3000
Physical condition	Conductive, liquid media
Solids content (volume)	≤ 10% for OPTIFLUX measuring sensors
Gas content (volume)	≤ 3% for OPTIFLUX measuring sensors
Flow rate	For detailed information, see chapter "Flow tables".
Other conditions	
Protection category to IEC 529 / EN 60529	IP 66 / 67 (eq. to NEMA 4X/6)

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 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	100…230 VAC (-15% / +10%), 50/60 Hz; non-Ex: standard; Ex: optional
	12...24 VDC (-55% / +30%); only available in non Ex version
	24 VAC/DC (AC: -15% / +10%; DC: -25% / +30%); only available as Ex version
Power consumption	AC: 8 VA
	DC: 4 W
Signal cable	Only necessary for remote device versions.
	DS 300 (type A) Max. length: 600 m / 1950 ft (depending on electrical conductivity and version of measuring sensor)
	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

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_o = terminal voltage; I_{nom} = nominal current
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	
Active	$U_{int,nom}$ = 24 VDC $I \leq 22$ mA $R_L \leq 750\ \Omega$
Passive	$U_{ext} \leq 32$ VDC $I \leq 22$ mA $U_0 \geq 1.8$ V $R_L \leq (U_{ext} - U_0) / I_{max}$

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	
Passive	$U_{ext} \leq 32$ VDC
	f_{max} in operating menu set to $f_{max} \leq 100$ Hz: $I \leq 100$ mA open: $I \leq 0.05$ mA at $U_{ext} = 32$ VDC closed: $U_{0, max} = 0.2$ V at $I \leq 10$ mA $U_{0, max} = 2$ V at $I \leq 100$ mA
	f_{max} in operating menu set to 100 Hz < $f_{max} \leq 10$ kHz: $I \leq 20$ mA open: $I \leq 0.05$ mA at $U_{ext} = 32$ VDC closed: $U_{0, max} = 1.5$ V at $I \leq 1$ mA $U_{0, max} = 2.5$ V at $I \leq 10$ mA $U_{0, max} = 5.0$ V at $I \leq 20$ mA

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	
Passive	$U_{ext} \leq 32$ VDC $I \leq 100$ mA open: $I \leq 0.05$ mA at $U_{ext} = 32$ VDC closed: $U_{0, max} = 0.2$ V at $I \leq 10$ mA $U_{0, max} = 2$ V at $I \leq 100$ mA
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

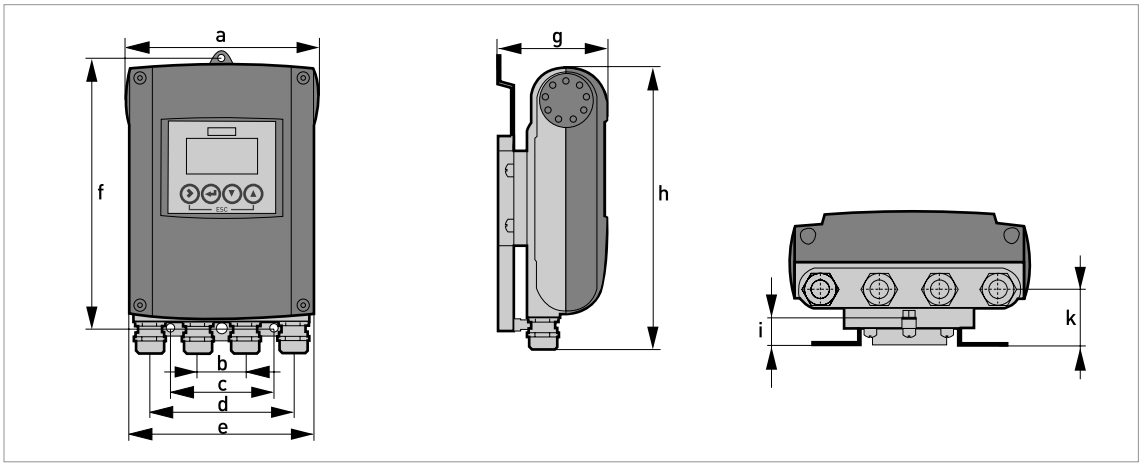
Approvals and certifications

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	
ATEX	**Optional (OPTIFLUX 2100 C and OPTIFLUX 4100 C only)**
	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)
	Option (only version W)
	II 2 G Ex e [ia] mb IIC T4
	II 2 D Ex tD A21 IP64 T135°C
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

Wall-mounted version



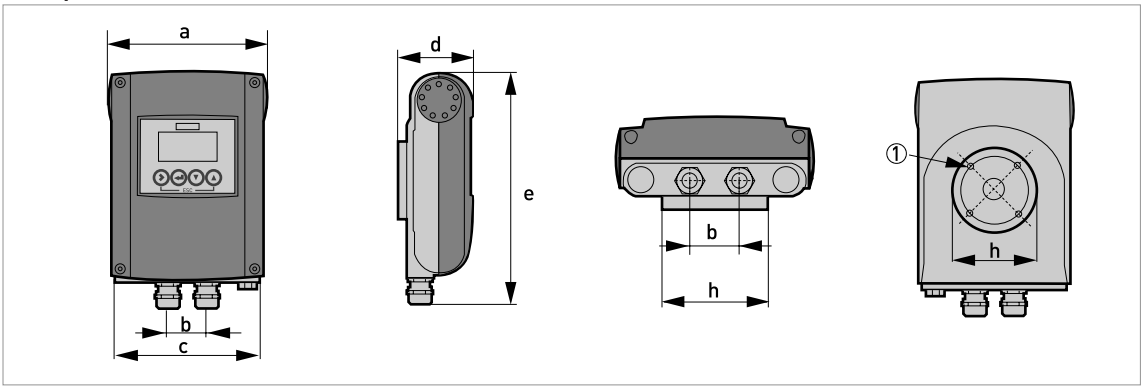
Dimensions and weights in mm and kg

	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 lbs

	Dimensions [inches]										Weight [lbs]
	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

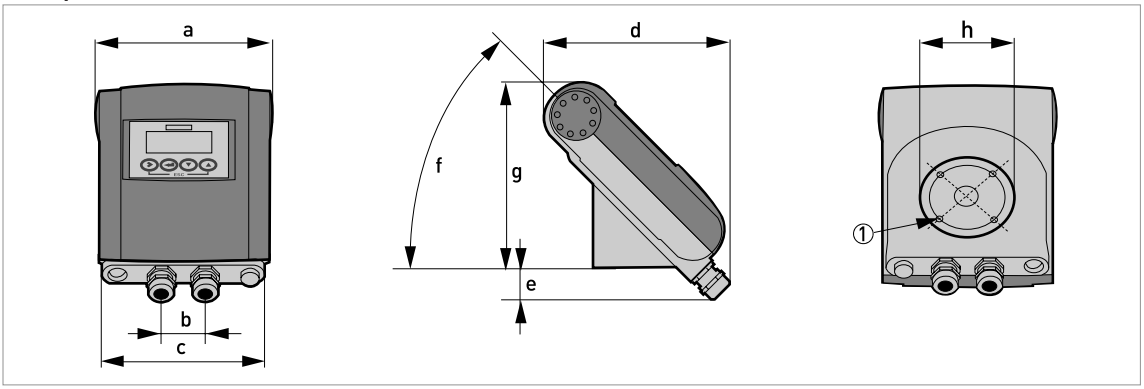
Dimensions and weights in mm and kg

	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 lbs

	Dimensions [inches]								Weight [lbs]
	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

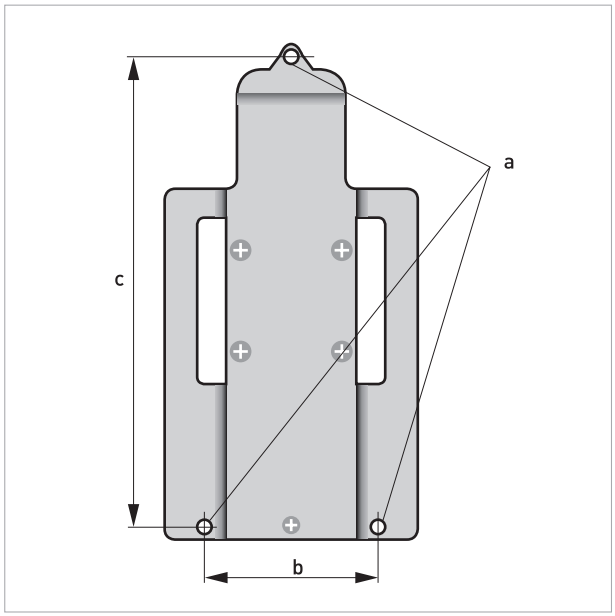
Dimensions and weights in mm and kg

	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 lbs

	Dimensions [inches]								Weight [lbs]
	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^3/h

	$Q_{100\ \%}$ in m^3/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

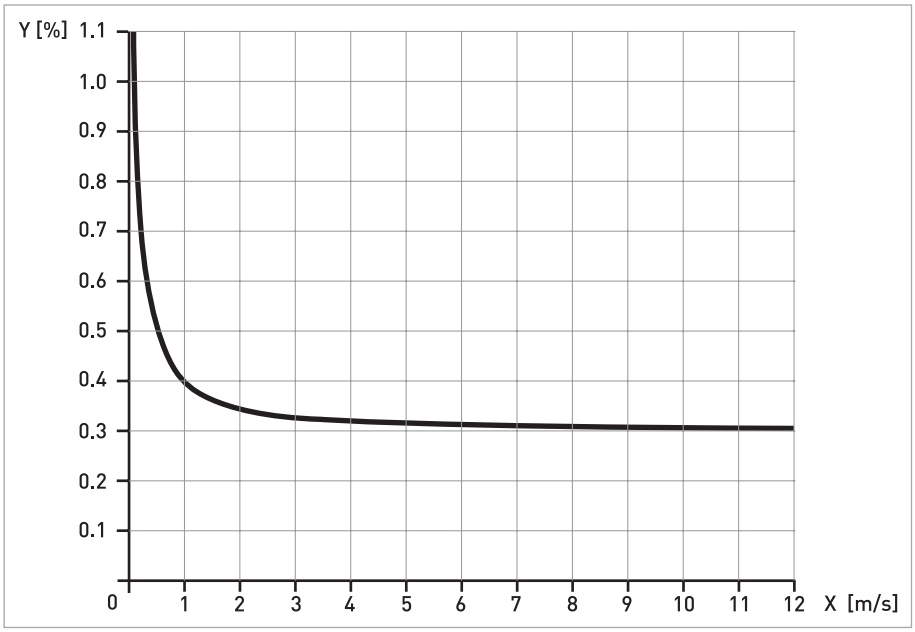
Flow rate in ft/s and gallons/min

	$Q_{100\ \%}$ 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

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 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	50...600	2...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.

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

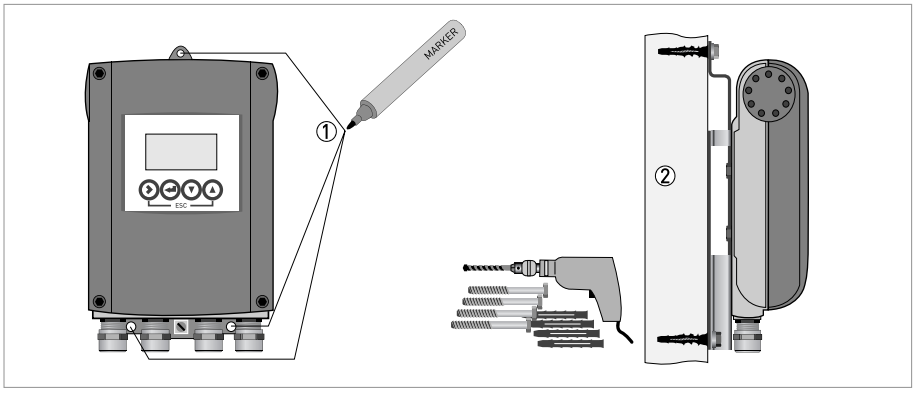
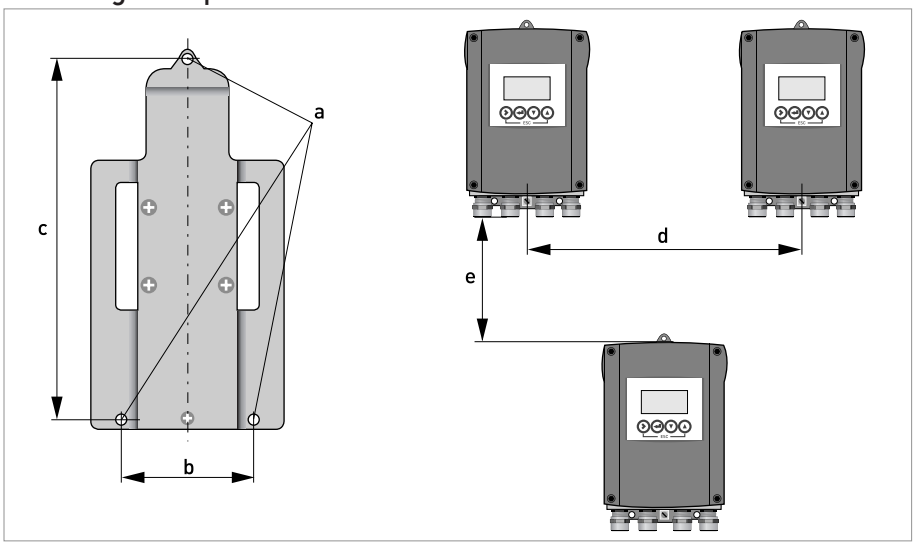


Figure 3-1: Mounting the wall-mounted housing

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 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.

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: ≥ 50 mm / 2"

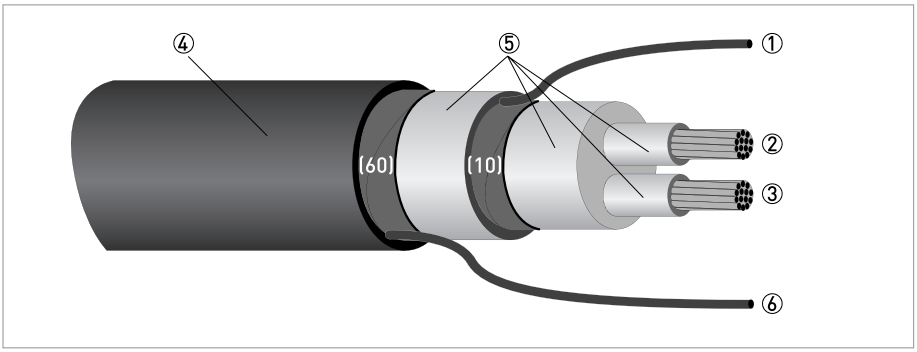


Figure 4-1: Construction of signal cable A

① Stranded drain wire (1) for the inner shield (10), 1.0 mm^2 Cu / AWG 17 (not insulated, bare)
② Insulated wire (2), 0.5 mm^2 Cu / AWG 20
③ Insulated wire (3), 0.5 mm^2 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	50...600	2...24	50	A1

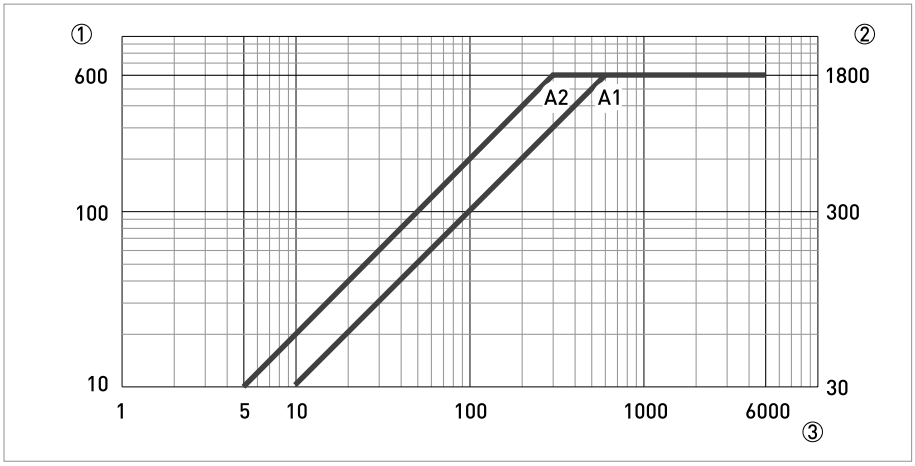


Figure 4-2: Maximum length of signal cable A

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 [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: ≥ 50 mm / 2"
- The following illustration is schematic. The positions of the electrical connection terminals may vary depending on the housing version.

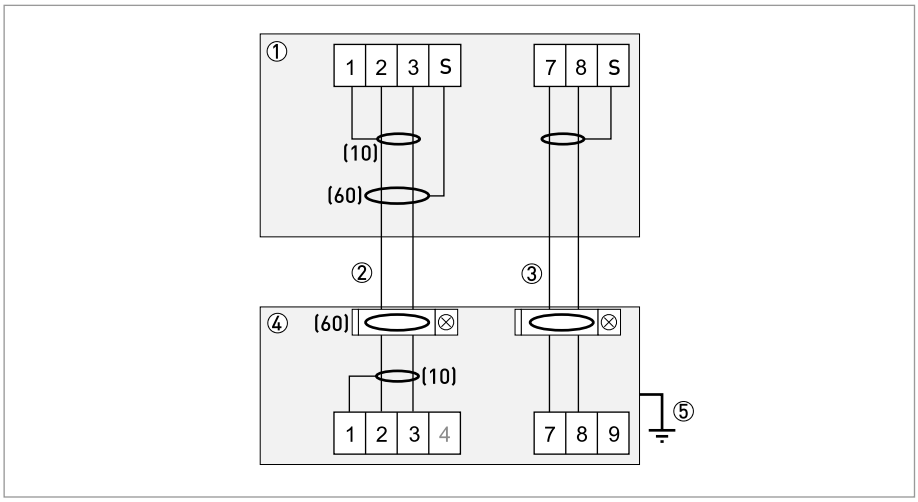


Figure 4-3: Connection diagram for signal and field current cable

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 ($I_N \leq 16$ A) for the infeed power circuit, and also a disconnecting device (switch, circuit breaker) to isolate the signal converter must be provided.

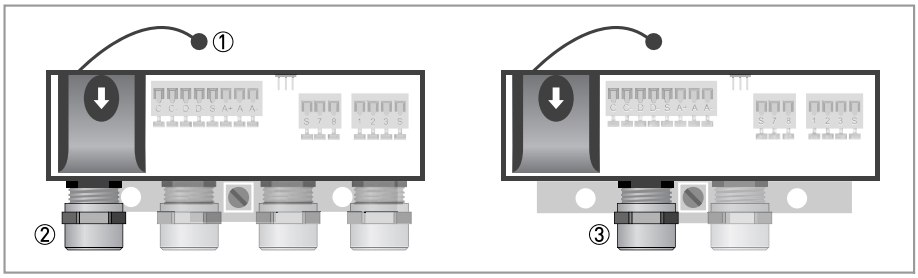


Figure 4-4: Terminal compartment for power

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	Option
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.

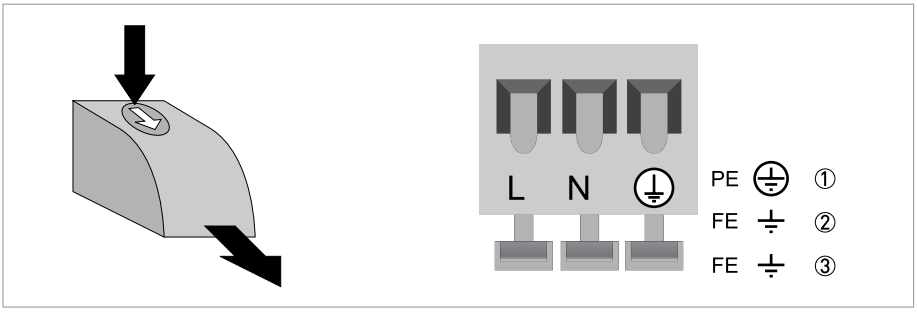


Figure 4-5: Power supply connection

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%), 8 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.

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

- Note the data on the nameplate!
- 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.

4.4 Overview of outputs

4.4.1 Description of the CG number

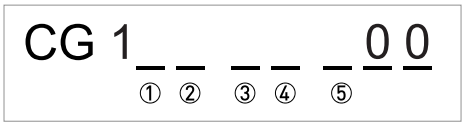


Figure 4-6: Marking (CG number) of the electronics module and output variants

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_p + HART® passive ①	S_p passive	P_p / S_p passive ②
	I_a + HART® active ①			

① Function changed by reconnecting
② changeable

Description of the used abbreviations

I_a	I_p	Current output active or passive
P_p		Pulse/frequency output passive
S_p		Status output / limit switch passive

4.5 Laying electrical cables correctly

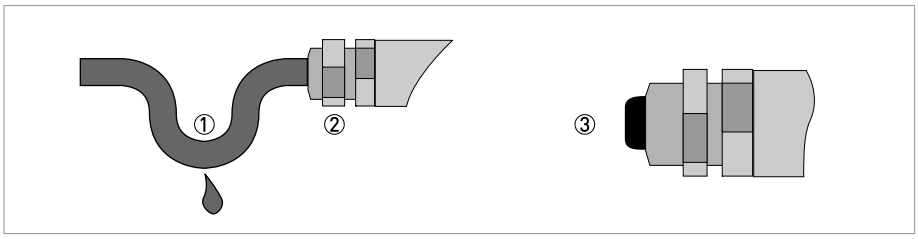
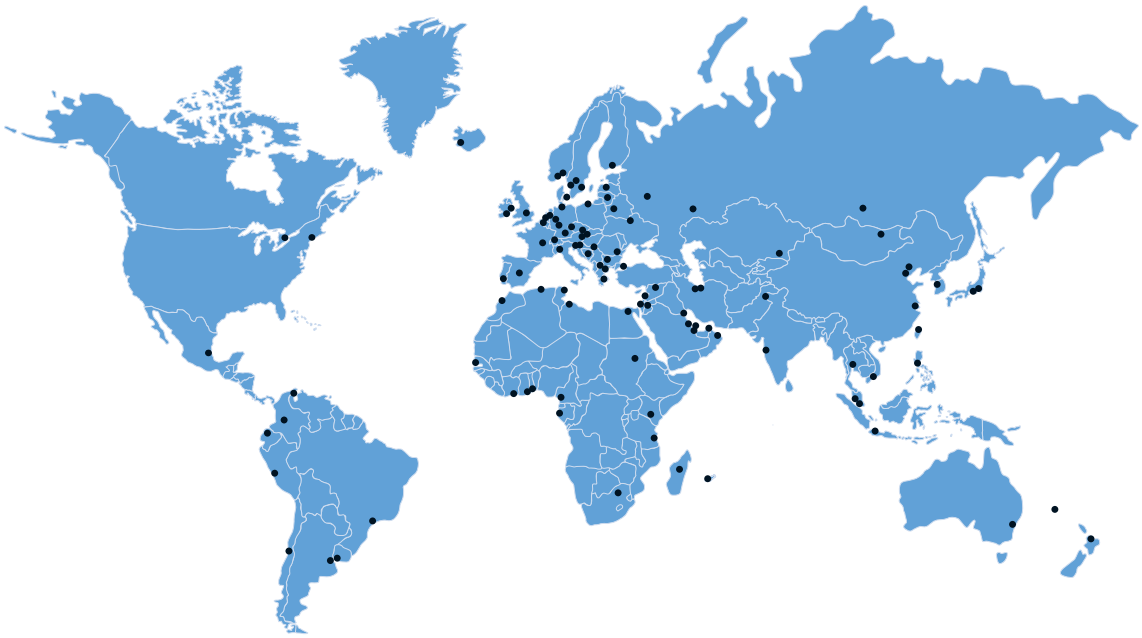


Figure 4-7: Protect housing from dust and water

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

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