KROHNE

measure the facts

# IFC 100 Signal Converter

## For Electromagnetic flowmeters

- Simple and easy to install and start up
- Increased diagnostic features
- Highest possible measurement accuracy

HART® FIELD COMMUNICATIONS PROTOCOL

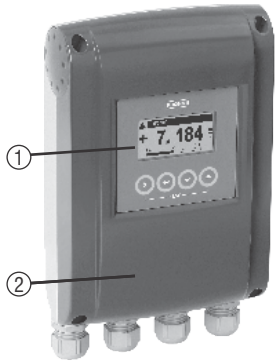
Fieldbus Foundation

PROFI® PROCESS FIELD BUS

## Product Features

The IFC 100 signal converter is designed to measure the flow velocity, conductivity, volume and mass flow of electrically conductive liquid media.

IFC 100 signal converter can be combined with any KROHNE flow sensor, making it very widely used. Available in compact version, in which the signal converter is connected to the flow sensor, at 0° and 45° version. If the measuring point is difficult to access or the ambient conditions prevent the use of the compact version, the signal converter is available in a remote wall-mounted housing.




(Signal converter in wall-mounted housing)

(Compact designs with 45° and 0° versions)

1. Large back lit graphic display with 4 push buttons to operate the signal converter.
2. Supply voltage: 85...250 VAC, 24 VDC or 24 VDC/AC (4 wire).

## Highlights

- Simple installation and start-up
- Available inputs and outputs: Current output (incl. HART®), pulse/frequency output, status output and control input
- Large back lit graphic display with intuitive operation
- A variety of operating languages integrated as standard
- Maintenance free
- Excellent price to performance ratio
- Extremely quick signal conversion
- Housing in aluminum with a polyester top coat or in SS316L optionally

## Applications and Industries

- Suitable for diverse flow measuring applications from clear liquids to slurries
- Media with solid content and aggressive chemicals
- Water & Wastewater
- Water treatment and distribution network
- Agriculture
- Heating, Ventilation & Air Conditioning (HVAC)
- Machinery
- Power plants
- Oil and Gas etc

## Signal converter / Flow sensor combinations

| Flow sensor | Signal converter | |
|---|---|---|
| | Compact (0° / 45°) version | Remote version |
| Optiflux 1000 | Optiflux 1100C | Optiflux 1100W |
| Optiflux 2000 | Optiflux 2100C | Optiflux 2100W |
| Optiflux 4000 | Optiflux 4100C | Optiflux 4100W |
| Optiflux 5000 | Optiflux 5100C | Optiflux 5100W |
| Optiflux 6000 | Optiflux 6100C | Optiflux 6100W |
| Ecomag | Ecomag 100C | Ecomag + IFC 100W |
| Aquamag | Aquamag 100C | Aquamag + IFC 100W |
| IFS 4000 | IFM 4100C | IFS 4000 + IFC 100W |
| Aquaflux | Aquaflux 100C | Aquaflux + IFC 100W |

## Measuring Principle – Faraday's law

An electrically conductive fluid flows inside an electrically insulated 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**

Where

**V** = Mean flow velocity

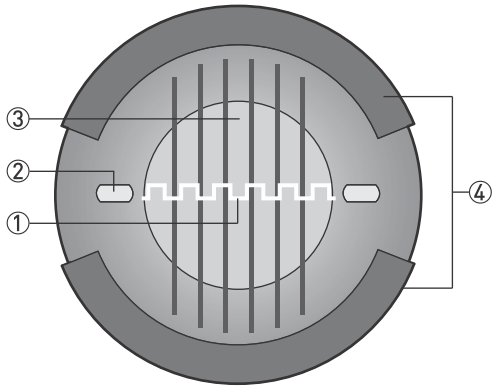
**K** = Meter constant / correction factor for geometry

**B** = Magnetic field strength

**D** = Inner diameter of flowmeter

The signal voltage **U** is picked up by electrodes and is directly proportional to the mean flow velocity **V** and thus the flow rate **Q**. The generated signal voltage is very low.

Signal converter is used to amplify this signal voltage, filter it (separate from noise) and convert it into signals for totalising, recording and output processing.




1. Voltage (Induced voltage is directly proportional to flow velocity)
2. Electrodes
3. Magnetic field
4. Field coils

# Technical Data

## Measuring System

| | |
|---|---|
| Measuring principle | Faraday's law of electromagnetic induction |
| Application range | Continuous measurement of instantaneous and totalized flow, velocity, mass flow (at constant density), conductivity and coil temperature |

## Design

| | |
|---|---|
| **Measuring sensor** | |
| Optiflux 1000 | DN 25 ... DN 150 / 1" ... 6" |
| Optiflux 2000 | DN 25 ... DN 1200 / 1" ... 48" |
| Optiflux 4000 | DN 2.5 ... DN 1200 / 1/10" ... 48" |
| Optiflux 5000 | DN 2.5 ... DN 300 / 1/10" ... 12" |
| Optiflux 6000 | DN 2.5 ... DN 150 / 1/0" ... 6" |
| Ecomag | DN 25 ... DN 150 / 1" ... 6" |
| Aquamag | DN 50 ... DN 150 / 2" ... 6" |
| IFS 4000 | DN 10 ... DN 1200 / 3/8" ... 48" |
| Aquaflux | DN 50 ... DN 1200 / 3/8" ... 48" |
| **Signal converter** | |
| Compact version (C) | IFC 100C (0° and 45° version ) |
| Remote version (W) | IFC 100W |
| Version | Standard: Non-Ex, Optional: Ex-version |
| **Outputs** | |
| Current | 0 / 4 ... 20mA, HART® (active / passive), HART®version : V5 |
| Pulse | 10 kHz (active / passive) |
| Status output<br>Passive | Adjustable as automatic measuring range conversion, display of flow direction, counter overflow, error, switching point or empty pipe detection<br>$U_{ext}$ ≤ 32 VDC, I ≤ 100 mA<br>Open: I ≤ 0.05 mA at $U_{ext}$ = 32 VDC<br>Closed: $U_0$, max = 0.2 V at I ≤ 10 mA<br>$U_0$, max = 2 V at I ≤ 100 mA |
| **Optional output** | |
| Relay | 2nos |
| Rating | 230VAC, 5A / 24VDC, 5A |
| Counters | 2 internal counters with a max. of 8 digit counter places (e.g. for counting volume and/or mass units) |
| Verification | Integrated verification, diagnostics functions: Empty pipe detection, Coil temperature, Stabilisation |
| **PROFIBUS DP** | |
| Description | Galvanically isolated acc. to IEC 61158-2 |
| | PA profile versions: class B. V3. 02 |
| | Automatic data transmission rate recognition (max. 1.5 Mbaud) |
| | Bus address adjustable via local display at the measuring device |
| Function blocks | 5 x analogue input, 3 x totaliser |
| Output data | Volume flow, mass flow, volume counter 1+2, mass counter, velocity, coil temperature, conductivity |

| | |
|---|---|
| **PROFIBUS PA** | |
| Description | Galvanically isolated acc. to IEC 61158-2 |
| | PA profile versions: class B. V3. 02 |
| | Current consumption: 10.5 mA |
| | Permissible bus voltage: 9...32 VDC; in Ex application: 9...24 VDC |
| | Bus interface with integrated reverse polarity protection |
| | Typical error current FDE (Fault Disconnection Electronic): 6 mA |
| | Bus address adjustable via local display at the measuring device |
| Function blocks | 5 x analogue input, 3 x totaliser |
| Output data | Volume flow, mass flow, volume counter 1+2, mass counter, velocity, coil temperature, conductivity |
| **FOUNDATION Fieldbus** | |
| Description | Galvanically isolated acc. to IEC 61158-2 |
| | Current consumption: 10.5 mA |
| | Permissible bus voltage: 9...32 VDC; in Ex application: 9...24 VDC |
| | Bus interface with integrated reverse polarity protection |
| | Link Master function (LM) supported |
| | Tested with Interoperble test Kit (ITK) version 5.2 |
| Function blocks | 3 x analogue input, 2 x integrator, 1 X PID |
| Output data | Volume flow, mass flow, velocity, coil temperature, conductivity, electronics temperature |
| **Modbus** | |
| Description | Modbus RTU, Master/Slave, RS485 |
| Address range | 1...247 |
| Broadcast | Supported with function code 16 |
| Supported Baud rate | 1200, 2400, 3600, 4800, 9600, 19200, 38400, 57600, 115200 Baud |
| **Display and User interface** | |
| Graphic display | LC Display, backlit white, Size: 128 x 64 pixel |
| Units | Metric, British and US units selectable as required from lists for volume / mass flow and counting, flow velocity, electrical conductivity, temperature |
| Programming | 4 push buttons for operator control of the signal converter |
| Remote programming | PACTware® (incl. Device Type Manager (DTM))<br>HART® through Hand Held Communicator |
| Measuring Accuracy | |
| Measuring error | ±0.3% of the measured value + 1mm/s |
| Optional | ±0.2% of the measured value + 1mm/s |
| Repeatability | ±0.1% |
| Calibration media | Water |
| **Operating conditions** | |
| **Temperature** | |
| Process temperature | Refer to technical data for the measuring sensor. |
| Ambient temperature | -40...+65°C / -40...+149°F |
| Storage temperature | -40...+70°C / -40...+158°F |
| **Chemical properties** | |
| Electrical conductivity | ≥ 5 µS/cm |
| Solid content (volume) | ≤ 70% by volume |
| Gas content (volume) | ≤ 3% by volume |

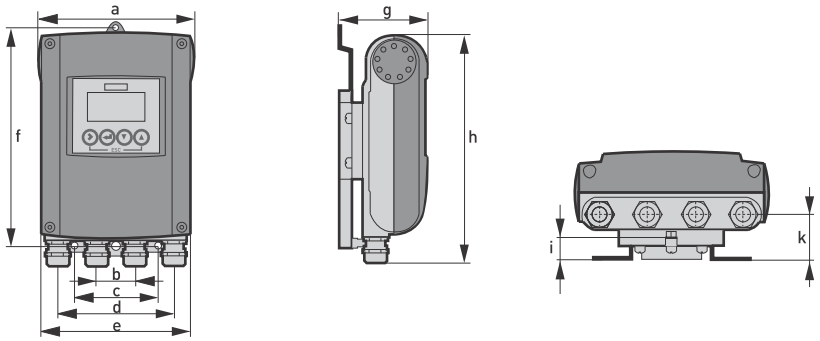
| | |
|---|---|
| **Materials** | |
| Signal converter housing | Aluminum with a polyester topcoat<br>Option: Stainless steel 1.4404 / AISI SS316L |
| **Electrical connection** | |
| Power supply | Universal power supply 100...230 VAC (-15% / +10%), 50/60 Hz |
| | 24 VDC (-55% / +30%) |
| | 24 VAC/DC (AC: -15% / +10%; DC: -25% / +30%) |
| Power consumption | AC: 7 VA<br>DC: 4 W |
| Cable length | Maximum 600 m / 1950 ft |
| Cable entry | Standard: M20 x 1.5 (8...12 mm)<br>Option: ½" NPT, PF ½ |
| Error Identification | Without HART®: 20 ... 22mA<br>With HART®: 3.0 ... 22mA |
| **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 | 0 ... 100s |
| Settings | Set in increments of 0.1 |
| | 0...100 s |
| **Approvals and Certifications** | |
| Protection category to | IP 66 / 67 (eq. to NEMA 4X/6) |
| IEC 529 / EN 60529 | |
| CE | The device fulfils the statutory requirements of the EC directives. |
| Hazardous area | ATEX II 2 G Ex e [ia] mb IIC T4 and CCOE |
| Shock and vibration resistance | IEC 68-2-27, IEC 68-2-64 |
| NAMUR | NE21, NE43, NE53 |
| Electromagnetic compatibility (EMC) | 2004 / 108 / EC in conjunction with EN 61326-1(A1, A2) |

## Accuracy

| Flow sensor | Size | Accuracy |
|---|---|---|
| Optiflux 1000 | DN 25 ... DN 150 / 1" ... 6" | 0.5% of mv + 1mm/s |
| Optiflux 2000 | DN 25 ... DN 1200 / 1" ... 48" | 0.3% of mv + 1mm/s |
| Optiflux 4000 | DN 10 ... DN 1200 /3/8" ... 48" | 0.3% of mv + 1mm/s |
| Optiflux 4000 / 5000 / 6000 | DN 2.5 ... DN 6 / 1/10" ... ¼" | 0.5% of mv + 1mm/s |
| Ecomag | DN 25 ... DN 150 / 1" ... 6" | 0.5% of mv + 1mm/s |
| Aquamag | DN 50 ... DN 150 / 2" ... 6" | 0.5% of mv + 1mm/s |
| IFS 4000 | DN 10 ... DN 1200 / 3/8" ... 48" | 0.3% of mv + 1mm/s |
| Aquaflux | DN 50 ... DN 1200 / 2" ... 48" | 0.3% of mv + 1mm/s |

## Dimensions and weights

### Wall-mounted version



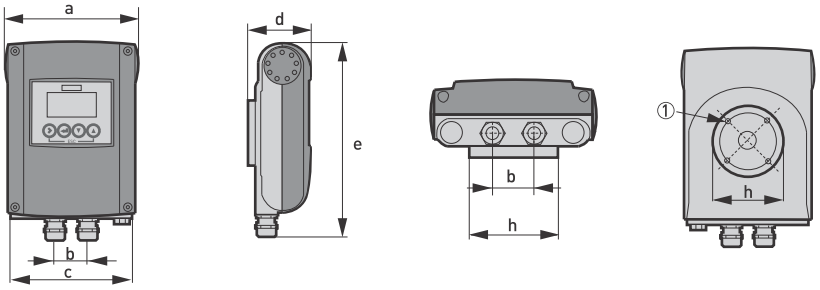

### Dimensions and weights in mm and kg

| | 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<br>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<br>Ex: 5.3 |

### Compact 0° version ① 4 x M6




### Dimensions and weights in mm and kg

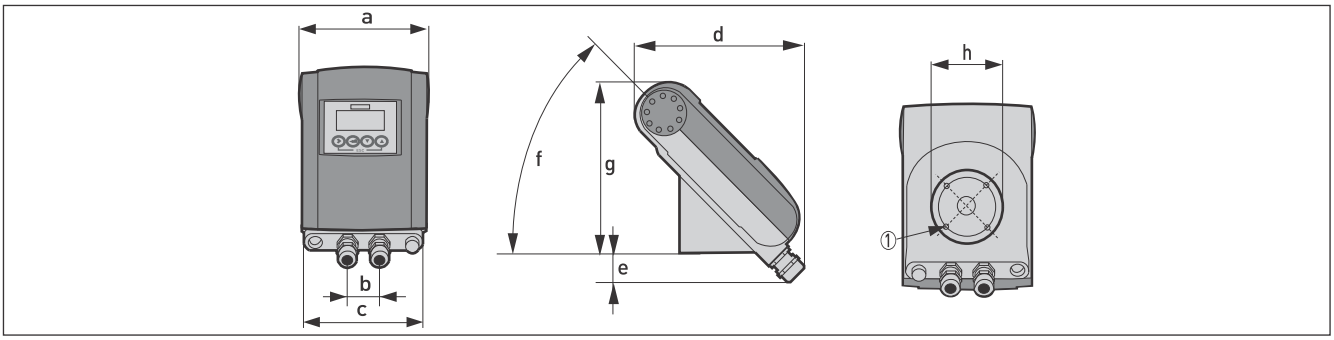
| | Dimensions (mm) | | | | | | | Weight | |
|---|---|---|---|---|---|---|---|---|---|
| | a | b | c | d | e | f | g | h | (kg) |
| 0° version | 161 | 40 | 155 | 81.5 | 257 | - | - | Ø72 | Std: 1.9<br>Ex: 2.4 |

### 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<br>Ex: 5.3 |

## Dimensions and weights

### Compact 45° version ① 4 x M6



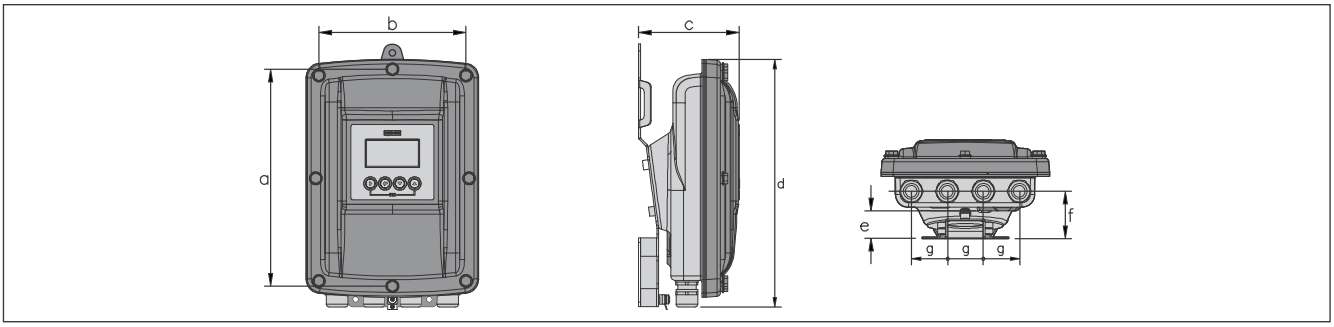

### Dimensions and weights in mm and kg

| | 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<br>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<br>Ex: 5.7 |

### Wall-mounted and compact 10° version, stainless steel housing




### Dimensions and weights in mm and kg

| | Dimensions (mm) | | | | | | | Weight (kg) |
|---|---|---|---|---|---|---|---|---|
| | a | b | c | d | e | f | g | |
| Wall-mounted version | 268 | 187 | 110 | 276 | 29 | 53 | 40 | Approx. 3.5 |

### Dimensions and weights in inches and lbs

| | Dimensions (mm) | | | | | | | Weight (lbs) |
|---|---|---|---|---|---|---|---|---|
| | a | b | c | d | e | f | g | |
| Wall-mounted version | 10.55 | 7.36 | 4.33 | 10.87 | 1.14 | 2.09 | 1.57 | Approx. 7.7 |

**The compact 10° version is without mounting plate.**

Note: The subject flow meters cannot be used as a weight or measures under the Legal Metrology Act. Specifications subject to changes without prior notice DOC#FMKRH/0119/2314/V3.R1

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