Ultrasonic liquid flowmeter for high temperature and high pressure

ER 3.0.1_
CONTENTS

1 Safety instructions ................................................................. 4

2 Installation ............................................................................. 5
   2.1 Scope of delivery ................................................................ 5
   2.2 Device description .......................................................... 6
   2.3 Nameplates ...................................................................... 7
      2.3.1 Example of nameplate for the compact version ............. 7
      2.3.2 Nameplate for the measuring sensor [field version] ....... 8
      2.3.3 Examples of nameplates on the signal converter [field version] ............................................................................ 8
   2.4 Storage .............................................................................. 10
   2.5 Transport .......................................................................... 10
   2.6 Pre-installation requirements ........................................... 11
   2.7 General requirements ..................................................... 11
      2.7.1 Vibration ..................................................................... 11
      2.7.2 Corrosion preservation ............................................... 11
   2.8 Installation conditions .................................................... 12
      2.8.1 Inlet and outlet ........................................................... 12
      2.8.2 Bends in 2 or 3 dimensions ........................................ 12
      2.8.3 T-section ..................................................................... 13
   2.9 Bends ................................................................................ 13
   2.10 Open feed or discharge .................................................. 14
   2.11 Position of pump ............................................................ 14
   2.12 Control valve ................................................................... 14
   2.13 Down going pipeline over 5 m /16 ft length .................... 15
   2.14 Thermal insulation .......................................................... 15
   2.15 Mounting ......................................................................... 17
   2.16 Rotation of the compact converter housing .................... 17
   2.17 Flange deviation ............................................................. 17
   2.18 Mounting position .......................................................... 18
   2.19 Mounting the field housing, remote version ................... 18
      2.19.1 Pipe mounting ........................................................... 18
      2.19.2 Wall mounting .......................................................... 19
      2.19.3 Turning the display of the field housing version ........... 20

3 Electrical connections .......................................................... 21
   3.1 Safety instructions ........................................................... 21
   3.2 Signal cable [remote versions only] .................................... 21
   3.3 Power supply .................................................................... 23
   3.4 Laying electrical cables correctly ..................................... 24
   3.5 Inputs and outputs, overview ......................................... 25
      3.5.1 Combinations of the inputs/outputs [I/0s] .................... 25
      3.5.2 Description of the CG number .................................... 26
      3.5.3 Fixed, non-alterable input/output versions .................... 27
      3.5.4 Alterable input/output versions .................................... 28

4 Technical data ....................................................................... 29
   4.1 Dimensions and weights ................................................. 29
4.2 ASME B16.5; dimensions and weights ........................................................................... 31
4.3 Signal converter housing ............................................................................................... 33

5 Notes .................................................................................................................................. 34
Warnings and symbols used

DANGER!
This information refers to the immediate danger when working with electricity.

DANGER!
These warnings must be observed without fail. Even partial disregard of this warning can lead to serious health problems and even death. There is also the risk of seriously damaging the device or parts of the operator’s plant.

WARNING!
Disregarding this safety warning, even if only in part, poses the risk of serious health problems. There is also the risk of damaging the device or parts of the operator’s plant.

CAUTION!
Disregarding these instructions can result in damage to the device or to parts of the operator’s plant.

INFORMATION!
These instructions contain important information for the handling of the device.

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

RESULT
This symbol refers to all important consequences of the previous actions.

Safety instructions for the operator

CAUTION!
Installation, assembly, start-up and maintenance may only be performed by appropriately trained personnel. The regional occupational health and safety directives must always be observed.

LEGAL NOTICE!
The responsibility as to the suitability and intended use of this device rests solely with the user. The supplier assumes no responsibility in the event of improper use by the customer. Improper installation and operation may lead to loss of warranty. In addition, the “Terms and Conditions of Sale” apply which form the basis of the purchase contract.

INFORMATION!
• Further information can be found on the supplied CD-ROM in the manual, on the data sheet, in special manuals, certificates and on the manufacturer’s website.
• If you need to return the device to the manufacturer or supplier, please fill out the form contained on the CD-ROM and send it with the device. Unfortunately, the manufacturer cannot repair or inspect the device without the completed form.
2.1 Scope of delivery

INFORMATION!
Do a check of the packing list to make sure that you have all the elements given in the order.

INFORMATION!
Inspect the packaging carefully for damages or signs of rough handling. Report damage to the carrier and to the local office of the manufacturer.

INFORMATION!
The field device will arrive in two cartons. One carton contains the converter and one carton contains the sensor.
Make sure to combine the correct devices together by comparing the serial numbers.

INFORMATION!
Make sure to combine the sensor and the converter correctly, so they match by the devices serial number.

Figure 2-1: Scope of delivery (example of high temperature version)
① Remote signal converter
② Product documentation
③ Factory calibration certificate
④ CD-ROM with product documentation in available languages
⑤ Signal cable (remote versions only)

INFORMATION!
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.
2.2 Device description

This ultrasonic flowmeter is designed for the continuous measurement of actual volume flow, mass flow, flow speed, velocity of sound, gain, SNR and diagnosis value. Exclusively for bi-directional measuring of conductive and/or non-conductive fluids in closed, completely filled pipeline circuits.

Your measuring device is supplied ready for operation. The factory settings for the operating data have been made in accordance with your order specifications.

**INFORMATION!**

Product specific information and extensive product specification is available using PICK, the Product Information Center KROHNE web-tool. PICK can be found via the service menu button on the KROHNE.com website.

The following versions are available:

- Compact version (the signal converter is mounted directly on the measuring sensor)
- Remote version (electrical connection to the measuring sensor via signal cable)

The version shown in most of the illustrations is a High Temperature (remote only) version. The High pressure version is available in compact and remote version.

---

1. HP Compact version
2. HT Remote version

---

1. Single beam version HP compact version (DN25...40)
2. Single beam version (DN50...80)
3. Double beam version (≥DN100)
2.3 Nameplates

**INFORMATION!**

Look at the device nameplate to ensure that the device is delivered according to your order.
Check for the correct supply voltage printed on the nameplate.

2.3.1 Example of nameplate for the compact version

![Nameplate Example](image)

Figure 2-2: Example of nameplate for the compact version

1. Ambient temperature
2. Protection class
3. Tag number
4. PED data, type I / II / II or SEP
5. Mains supply data
6. Electronic revision number
7. Calibration data
8. Type designation of the flowmeter and CE sign with number(s) of notified body / bodies
9. Name and address of the manufacturer
2.3.2 Nameplate for the measuring sensor (field version)

Examples for measuring sensor versions StandardHP and HTversion.

1. Ambient temperature
2. Protection class
3. Tag number
4. PED data, Category I / II / III or SEP
5. Calibration data
6. Type designation of the flowmeter and CE sign with number(s) of notified body / bodies
7. Name and address of the manufacturer

2.3.3 Examples of nameplates on the signal converter (field version)

Figure 2-3: Examples of nameplates on the signal converter (field version)

1. Ambient temperature
2. Protection class
3. Tag number
4. PED data, category I / II / III or SEP
5. Mains supply data
6. Electronics revision number
7. Calibration, size and GK data
8. Type designation of the flowmeter and CE sign with number(s) of notified body / bodies
9. Name and address of the manufacturer
### Electrical connection data of inputs/outputs (example of basic version)

<p>| | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Power supply (AC: L and N, DC: L+ and L-, PE for ≥ 24V AC, FE for ≤ 24 VAC and DC)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Connection data of connection terminal D/D-</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Connection data of connection terminal C/C-</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Connection data of connection terminal B/B-</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Connection data of connection terminal A/A-, A+ only operable in basic version</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **A** = active mode; the signal converter supplies the power for connection of the subsequent devices
- **P** = passive mode; external power supply required for operation of the subsequent devices
- **N/C** = connection terminals not connected

- **POWER**
  - **PE** (FE)
  - **L(L+)**
  - **N(L-)**

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>①</td>
<td>A = Active</td>
<td>P = Passive</td>
</tr>
</tbody>
</table>

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td><strong>D</strong>-</td>
<td><strong>D</strong></td>
<td><strong>P</strong></td>
</tr>
<tr>
<td></td>
<td><strong>I</strong>max = 100 mA@f=10 Hz; ≥ 20 mA@f=12 kHz</td>
<td><strong>V</strong>o = 1.5 V @ 10 mA; <strong>U</strong>max = 32 VDC</td>
<td></td>
</tr>
</tbody>
</table>

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td><strong>C</strong>-</td>
<td><strong>C</strong></td>
<td><strong>P</strong></td>
</tr>
<tr>
<td></td>
<td><strong>I</strong>max = 100 mA; <strong>V</strong>max = 32 VDC</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td><strong>B</strong>-</td>
<td><strong>B</strong></td>
<td><strong>P</strong></td>
</tr>
<tr>
<td></td>
<td><strong>I</strong>max = 100 mA</td>
<td><strong>V</strong>on &gt; 19 VDC, <strong>V</strong>off &lt; 2.5 VDC; <strong>V</strong>max = 32 VDC</td>
<td></td>
</tr>
</tbody>
</table>

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td><strong>A</strong>+</td>
<td><strong>A</strong>-</td>
<td><strong>A</strong></td>
</tr>
<tr>
<td></td>
<td><strong>A</strong></td>
<td><strong>P</strong></td>
<td>Active (Terminals A &amp; A+): <strong>R</strong>Lmax = 1 kohm</td>
</tr>
</tbody>
</table>

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>A</strong></td>
<td><strong>P</strong></td>
<td>Passive (Terminals A &amp; A-): <strong>V</strong>max = 32 VDC</td>
</tr>
</tbody>
</table>
2.4 Storage

- Store the device in a dry, dust-free location.
- Avoid continuous direct sunlight.
- Store the device in its original packaging.
- Storage temperature: -50...+70°C / -58...+158°F
- The carbon steel OPTISONIC 4000 HT flow sensor is treated with corrosion preservative on the inside and the outside. It has a limited working of maximum 3 months after manufacturing.

2.5 Transport

**Signal converter**

- Do not lift the signal converter by the cable glands.

**Measuring sensor**

- Do not lift the measuring sensor by the connection box.
- Use hoisting belts only.
- To transport flange devices, use lifting straps. Wrap these around both process connections.

*Figure 2-4: Transport*

**INFORMATION!**

In the illustration above, use the eyebolts mounted on flanges. For versions without flanges, special eyelets are welded on the tube
2.6 Pre-installation requirements

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

Make sure that you have all necessary tools available:
- Allen key [4 mm]
- Small screwdriver
- Wrench for cable glands
- Wrench for pipe mounting bracket (remote version only) see; on page 18
- Torque wrench for installing flowmeter in pipeline

2.7 General requirements

INFORMATION!
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 68-2-6.

2.7.1 Vibration

INFORMATION!
In case of expected vibrations, please install a field version.

2.7.2 Corrosion preservation

INFORMATION!
The corrosion preservation applied is valid for three months after the manufacturing date. To prevent corrosion of the carbon steel flow sensor after installation in the pipe, corrosion prevention has to be applied.
2.8 Installation conditions

2.8.1 Inlet and outlet

![Diagram of recommended inlet and outlet](image)

Figure 2-6: Recommended inlet and outlet

1. Refer to chapter “Bends in 2 or 3 dimensions”
2. ≥ 3 DN

2.8.2 Bends in 2 or 3 dimensions

![Diagram of bends in 2 or 3 dimensions](image)

Figure 2-7: Inlet when using 2 and/or 3 dimensional bends in front of the flowmeter

Inlet length:
- for 2 path using bends in 2 dimensions: ≥ 10 DN; when having bends in 3 dimensions: ≥ 15 DN
- for 1 path using bends in 2 dimensions: ≥ 20 DN; when having bends in 3 dimensions: ≥ 25 DN
2.8.3 T-section

Figure 2-8: Distance behind a T-section

1. 2 path ≥ 10DN, 1 path ≥ 20 DN

2.9 Bends

Figure 2-9: Installation in bending pipes

Figure 2-10: Installation in bending pipes
2.10 Open feed or discharge

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

2.11 Position of pump

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

2.12 Control valve

Figure 2-13: Installation in front of a control valve
① ≥ 40 DN
2.13 Down going pipeline over 5 m /16 ft length

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

![Diagram of down going pipeline over 5 m /16 ft length](image)

**Figure 2-14: Down going pipeline over 5 m / 16 ft length**

1. ≥ 5 m / 16 ft
2. Install air vent

2.14 Thermal insulation

![Diagram of insulation](image)

**Figure 2-15: Insulation**

1. See the detailed transducer area on next page
2. Connection box
3. Insulation area

**WARNING!**

The flow sensor can be insulated completely, except for the transducer piezo module[s] ① and the connection box ② to allow cooling by free air convection. The transducers can reach a temperature of up to 200 °C./ 392 °F.

See the detailed area ③ in the following illustration

**INFORMATION!**

For devices used in hazardous area, additional maximum temperature and insulation precautions apply. Please refer to the Ex documentation!
Detailed area for insulation

![Thermal insulation diagram](image)

**Figure 2-16: Thermal insulation**

1. Width of flange = free distance
2. Insulation
3. Sensor tube

**INFORMATION!**
The free space (approximately 0.15 m/ 6") around the transducer housing is needed to remove the cover of the piezo module and/or remove the gaskets.

**INFORMATION!**
Do not turn the blue caps at the end of the transducer housing. These design caps have a click-connection.

**INFORMATION!**
Please do not tighten (or loosen) the bolts on the flanges of the transducer. These bolts are preset [according specifications] in the factory. See detailed information on the nameplate of the flow sensor.
2.15 Mounting

2.16 Rotation of the compact converter housing

CAUTION!

Installing devices for hazardous areas
- DO NOT change the position of the converter housing of compact versions
- When not following this warning, there is a very high risk of damaging the internal cables of the device.

Installing devices for non-hazardous areas
Rotating the converter more than 90° relative to the sensor, is not recommended by the manufacturer.

2.17 Flange deviation

CAUTION!
Max. permissible deviation of pipe flange faces:
$\text{L}_{\text{max}} - \text{L}_{\text{min}} \leq 0.5 \text{ mm} / 0.02"$

Figure 2-17: Flange deviation

1. $\text{L}_{\text{max}}$
2. $\text{L}_{\text{min}}$
2.18 Mounting position

Figure 2-18: Allowed mounting position

2.19 Mounting the field housing, remote version

**INFORMATION!**
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.

2.19.1 Pipe mounting

Figure 2-19: Pipe mounting of the field housing

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

1. Prepare the holes with the aid of the mounting plate.
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 ≥ 600 mm / 23.6”
b ≥ 250 mm / 9.8”
2.19.3 Turning the display of the field housing version

The display of the field housing version can be turned in 90° increments

1. Unscrew the cover from the display and operation control unit.
2. Using a suitable tool, pull out the two metal puller devices to the left and right of the display.
3. Pull out the display between the two metal puller devices and rotate it to the required position.
4. Slide the display and then the metal puller devices back into the housing.
5. Re-fit the cover and tighten it by hand.

**CAUTION!**

The ribbon cable of the display must not be folded or twisted repeatedly.

**INFORMATION!**

Each time a housing cover is opened, the thread should be cleaned and greased. Use only resin-free and acid-free grease. Ensure that the housing gasket is properly fitted, clean and undamaged.


3.1 Safety instructions

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

**DANGER!**
Observe the national regulations for electrical installations!

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

**WARNING!**
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.

**INFORMATION!**
Look at the device nameplate to ensure that the device is delivered according to your order. Check for the correct supply voltage printed on the nameplate.

3.2 Signal cable (remote versions only)

The flow sensor is connected to the signal converter via one signal cable, with 2 or 4 (labeled) inner coax cables for the connection of one or two acoustic paths.

---

Scale: 1:1
Dimensions: 18 x 10 mm

**Figure 3-1: Construction of field version**

1. Signal converter
2. Open connection box
3. Tool for releasing connectors
4. Marking on cable
5. Insert cable(s) into terminal compartment

---
**CAUTION!**

To ensure smooth functioning, always use the signal cable(s) included in the delivery.

Figure 3-2: Clamp the cables on the shielding bush

1. Cables
2. Cable glands
3. Grounding clamps
4. Cable with metal shielding bush

**Electrical connection - Remote**

Figure 3-3: Connect the cables in the connection box

**INFORMATION!**

Connect the cable on connector with similar numeral marking
3.3 Power supply

**WARNING!**
When this device is intended for permanent connection to the mains.
It is required (for example for service) to mount an external switch or circuit breaker near the
device for disconnection from the mains. It shall be easily reachable by the operator and marked
as the disconnecting the device for this equipment.
The switch or circuit breaker and wiring has to be suitable for the application and shall also be in
accordance with the local (safety) requirements of the (building) installation
(e.g. IEC 60947-1 / -3)

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

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

1. PE ±
2. FE "
3. FE ±

1. 100...230 VAC (-15% / +10%), 22 VA
2. 24 VDC [-55% / +30%] 12 W
3. 24 VAC/DC (AC: -15% / +10%; DC: -25% / +30%), 22 VA or 12 W

**DANGER!**
The device must be grounded in accordance with regulations in order to protect personnel
against electric shocks.
3 ELECTRICAL CONNECTIONS

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.

INFORMATION!
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) (acc. to VDE 0100/VDE 0106 and/or IEC 364/IEC 536 or relevant national regulations).

3.4 Laying electrical cables correctly

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

Figure 3-4: Protect housing from dust and water
3.5 Inputs and outputs, overview

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

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

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

**Ex i version**
- Depending on the task, the device can be configured with various output modules.
- Current outputs can be active or passive.

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

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

**Ex option**
- 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.
3.5.2 Description of the CG number

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

Examples for CG number

- **CG 350 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 350 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 350 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

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Identifier for CG No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>I_a</td>
<td>A</td>
<td>Active current output</td>
</tr>
<tr>
<td>I_p</td>
<td>B</td>
<td>Passive current output</td>
</tr>
<tr>
<td>P_a/S_a</td>
<td>C</td>
<td>Active pulse output, frequency output, status output or limit switch (changeable)</td>
</tr>
<tr>
<td>P_p/S_p</td>
<td>E</td>
<td>Passive pulse output, frequency output, status output or limit switch (changeable)</td>
</tr>
<tr>
<td>P_N/S_N</td>
<td>F</td>
<td>Passive pulse output, frequency output, status output or limit switch acc. to NAMUR (changeable)</td>
</tr>
<tr>
<td>C_a</td>
<td>G</td>
<td>Active control input</td>
</tr>
<tr>
<td>C_p</td>
<td>K</td>
<td>Passive control input</td>
</tr>
<tr>
<td>C_N</td>
<td>H</td>
<td>Active control input to NAMUR Signal converter monitors cable breaks and short circuits acc. to EN 60947-5-6. Errors indicated on LC display. Error messages possible via status output.</td>
</tr>
<tr>
<td>-</td>
<td>8</td>
<td>No additional module installed</td>
</tr>
<tr>
<td>-</td>
<td>0</td>
<td>No further module possible</td>
</tr>
</tbody>
</table>
### 3.5.3 Fixed, non-alterable input/output versions

This signal converter is available with various input/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.

<table>
<thead>
<tr>
<th>CG-No.</th>
<th>Connection terminals</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A+</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>100</th>
<th>I_p + HART® passive ①</th>
<th>S_p / C_p passive ②</th>
<th>S_p passive</th>
<th>P_p / S_p passive ②</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>I_a + HART® active ①</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Ex-i in-/outputs (Option)

<table>
<thead>
<tr>
<th>200</th>
<th>I_a + HART® active</th>
<th>P_N / S_N NAMUR ②</th>
</tr>
</thead>
<tbody>
<tr>
<td>210</td>
<td>I_a active</td>
<td>P_N / S_N NAMUR ②</td>
</tr>
<tr>
<td>310</td>
<td>I_a active</td>
<td>P_N / S_N NAMUR ②</td>
</tr>
<tr>
<td>220</td>
<td>I_p passive</td>
<td>P_N / S_N NAMUR ②</td>
</tr>
<tr>
<td>320</td>
<td>I_p passive</td>
<td>P_N / S_N NAMUR ②</td>
</tr>
</tbody>
</table>

① Function changed by reconnecting
② Changeable
### 3.5.4 Alterable input/output versions

This signal converter is available with various input/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

<table>
<thead>
<tr>
<th>CG no.</th>
<th>Connection terminals</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A+</td>
</tr>
</tbody>
</table>

**Modular IOs (option)**

- 4 _ _: max. 2 optional modules for term. A + B
  - I_a + HART® active
  - P_a / S_a active

- 8 _ _: max. 2 optional modules for term. A + B
  - I_p + HART® active
  - P_a / S_a active

- 6 _ _: max. 2 optional modules for term. A + B
  - I_a + HART® active
  - P_p / S_p passive

- B _ _: max. 2 optional modules for term. A + B
  - I_p + HART® active
  - P_p / S_p passive

- 7 _ _: max. 2 optional modules for term. A + B
  - I_a + HART® active
  - P_N / S_N NAMUR

- C _ _: max. 2 optional modules for term. A + B
  - I_p + HART® active
  - P_N / S_N NAMUR

**PROFIBUS PA/DP**

- D _ _: max. 2 optional modules for term. A + B
  - PA+ [2]
  - PA- [2]
  - PA+ [1]
  - PA- [1]

- F _ _: 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]

**Modbus (option)**

- G _ _: max. 2 optional modules for term. A + B
  - Commo
  - Sign. B [D1]
  - Sign. A [D0]

1. changeable
2. not activated bus terminator
4.1 Dimensions and weights

The dimensions and weights of the different available versions are described on the following pages.

Description of the abbreviations:

- \( L \) = total length of the flowmeter
- \( H \) = height of the flowmeter (without mounted converter / connection box)
- \( W \) (W1) = width of the flanges
- \( W2 \) = total width of the flow sensor including transducers
- \( D_i \) = internal width of flow sensor

Remote version High Temperature

Note; the dimension \( W2 \) varies, depending on the construction and diameter. The average dimension is approximately 820 mm / 31.7” (± 30mm / 1.2”)

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Dimension</th>
</tr>
</thead>
<tbody>
<tr>
<td>a</td>
<td>88 mm / 3.5”</td>
</tr>
<tr>
<td>b</td>
<td>139 mm / 5.5” (1)</td>
</tr>
<tr>
<td>c</td>
<td>106 mm / 4.2”</td>
</tr>
</tbody>
</table>

(1) The value may vary depending on the used cable glands.
**Compact version High Pressure**

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>a</td>
<td>155 mm / 6.1”</td>
</tr>
<tr>
<td>b</td>
<td>230 mm / 9.1”</td>
</tr>
<tr>
<td>c</td>
<td>260 mm / 10.2”</td>
</tr>
</tbody>
</table>

Total height = H + a #The value depends on version

① The value may vary depending on the used cable glands.
4.2 ASME B16.5; dimensions and weights

For additional values and dimensions (e.g. not mentioned in tables); consult KROHNE.

### ASME 150 lb; High temperature variant - RF flange

<table>
<thead>
<tr>
<th>Nom. size</th>
<th>Dimensions</th>
<th>Inner diameter Di</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>L [inch] [mm]</td>
<td>H [inch] [mm]</td>
<td>W - W1 [inch] [mm]</td>
</tr>
<tr>
<td>1&quot;</td>
<td>27.6 700</td>
<td>15.4 392</td>
<td>6.0 152</td>
</tr>
<tr>
<td>2&quot;</td>
<td>35.4 900</td>
<td>18.0 457</td>
<td>9.0 229</td>
</tr>
<tr>
<td>3&quot;</td>
<td>35.4 900</td>
<td>20.1 510</td>
<td>11.0 279</td>
</tr>
<tr>
<td>4&quot;</td>
<td>39.4 1000</td>
<td>24.6 626</td>
<td>16.0 406</td>
</tr>
<tr>
<td>6&quot;</td>
<td>39.4 1000</td>
<td>27.1 689</td>
<td>19.0 483</td>
</tr>
<tr>
<td>8&quot;</td>
<td>39.4 1000</td>
<td>31.0 788</td>
<td>23.5 597</td>
</tr>
<tr>
<td>10&quot;</td>
<td>39.4 1000</td>
<td>35.0 889</td>
<td>27.5 699</td>
</tr>
<tr>
<td>12&quot;</td>
<td>39.4 1000</td>
<td>39.3 997</td>
<td>32.0 813</td>
</tr>
</tbody>
</table>

### ASME 300 lb; High temperature variant - RF flange

<table>
<thead>
<tr>
<th>Nom. size</th>
<th>Dimensions</th>
<th>Inner diameter Di</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>L [inch] [mm]</td>
<td>H [inch] [mm]</td>
<td>W - W1 [inch] [mm]</td>
</tr>
<tr>
<td>1&quot;</td>
<td>27.6 700</td>
<td>15.4 392</td>
<td>6.0 152</td>
</tr>
<tr>
<td>2&quot;</td>
<td>35.4 900</td>
<td>18.0 457</td>
<td>9.0 229</td>
</tr>
<tr>
<td>3&quot;</td>
<td>35.4 900</td>
<td>18.5 470</td>
<td>10.0 254</td>
</tr>
<tr>
<td>4&quot;</td>
<td>35.4 900</td>
<td>20.8 529</td>
<td>12.5 318</td>
</tr>
<tr>
<td>6&quot;</td>
<td>39.4 1000</td>
<td>23.1 586</td>
<td>15.0 381</td>
</tr>
<tr>
<td>8&quot;</td>
<td>39.4 1000</td>
<td>25.4 645</td>
<td>17.5 445</td>
</tr>
<tr>
<td>10&quot;</td>
<td>39.4 1000</td>
<td>27.9 708</td>
<td>20.5 521</td>
</tr>
<tr>
<td>12&quot;</td>
<td>39.4 1000</td>
<td>29.8 756</td>
<td>23.0 584</td>
</tr>
<tr>
<td>14&quot;</td>
<td>39.4 1000</td>
<td>33.3 845</td>
<td>28.0 711</td>
</tr>
<tr>
<td>16&quot;</td>
<td>39.4 1000</td>
<td>36.5 927</td>
<td>30.5 775</td>
</tr>
</tbody>
</table>
### ASME 600 lb; High temperature variant, RF & RTJ flanges

<table>
<thead>
<tr>
<th>Nom. size</th>
<th>Dimensions</th>
<th>Inner diameter [Di]</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>L [inch]</td>
<td>H [inch]</td>
<td>W - W1 [inch]</td>
</tr>
<tr>
<td>1&quot;</td>
<td>27.6</td>
<td>700</td>
<td>15.7</td>
</tr>
<tr>
<td>2&quot;</td>
<td>35.4</td>
<td>900</td>
<td>18.9</td>
</tr>
<tr>
<td>3&quot;</td>
<td>35.4</td>
<td>900</td>
<td>21.6</td>
</tr>
<tr>
<td>4&quot;</td>
<td>43.3</td>
<td>1100</td>
<td>26.6</td>
</tr>
<tr>
<td>6&quot;</td>
<td>39.4</td>
<td>1000</td>
<td>28.6</td>
</tr>
<tr>
<td>8&quot;</td>
<td>13.8</td>
<td>350</td>
<td>7.1</td>
</tr>
<tr>
<td>10&quot;</td>
<td>23.6</td>
<td>600</td>
<td>9.0</td>
</tr>
<tr>
<td>12&quot;</td>
<td>27.6</td>
<td>700</td>
<td>10.5</td>
</tr>
<tr>
<td>14&quot;</td>
<td>39.4</td>
<td>1000</td>
<td>11.9</td>
</tr>
<tr>
<td>16&quot;</td>
<td>39.4</td>
<td>1000</td>
<td>13.8</td>
</tr>
</tbody>
</table>
4.3 Signal converter housing

Dimensions and weights in mm and kg

<table>
<thead>
<tr>
<th>Version</th>
<th>Dimensions [mm]</th>
<th>Weight [kg]</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>a</td>
<td>b</td>
</tr>
<tr>
<td>C</td>
<td>202</td>
<td>120</td>
</tr>
<tr>
<td>F</td>
<td>202</td>
<td>120</td>
</tr>
</tbody>
</table>

Dimensions and weights in inch and lb

<table>
<thead>
<tr>
<th>Version</th>
<th>Dimensions [inch]</th>
<th>Weight [lb]</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>a</td>
<td>b</td>
</tr>
<tr>
<td>C</td>
<td>7.75</td>
<td>4.75</td>
</tr>
<tr>
<td>F</td>
<td>7.75</td>
<td>4.75</td>
</tr>
</tbody>
</table>

1. Compact housing (C)
2. Field housing (F)
KROHNE – Process instrumentation and measurement solutions

- Flow
- Level
- Temperature
- Pressure
- Process Analysis
- Services

Head Office KROHNE Messtechnik GmbH
Ludwig-Krohne-Str. 5
47058 Duisburg (Germany)
Tel.: +49 203 301 0
Fax: +49 203 301 10389
info@krohne.com

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