Ultrasonic gas flowmeter

Addendum for hazardous areas.
These additional instructions are an extension to the OPTISONIC 7300 Quick Start and Handbook.
# CONTENTS

## OPTISONIC 7300

### 1 Introduction

1.1 Safety instructions from the manufacturer ................................................................. 4  
1.1.1 Copyright and data protection ................................................................................. 4  
1.1.2 Disclaimer ................................................................................................................. 4  
1.1.3 Product liability and warranty .................................................................................. 5  
1.1.4 Information concerning the documentation ............................................................... 5  
1.1.5 Warnings and symbols used ...................................................................................... 6  
1.2 Manufacturer .............................................................................................................. 6  
1.3 Safety instructions for the operator .............................................................................. 7  
1.4 Special conditions for safe use .................................................................................... 8  
1.4.1 General ...................................................................................................................... 8  
1.4.2 Additional notes for safe operation .......................................................................... 8  
1.5 Approvals .................................................................................................................... 9  
1.6 OPTISONIC 7300 C/...-Ex .......................................................................................... 10  
1.7 OPTISONIC 7000...-Ex ............................................................................................... 10  
1.8 GFC 300 F/...-Ex ......................................................................................................... 11  
1.9 Biogas versions ............................................................................................................ 11  
1.10 Ultrasonic gas transducers ......................................................................................... 11  
1.11 Technical data ............................................................................................................ 12  
1.12 Marking labels (examples) .......................................................................................... 13  
1.12.1 Nameplate sensor OPTISONIC 7000...-Ex ............................................................... 14  
1.12.2 I/O sticker ................................................................................................................. 15  

### 2 Temperature limits

2.1 General ....................................................................................................................... 16  
2.2 GFC 300 F/...-Ex ......................................................................................................... 16  
2.3 OPTISONIC 7300 C/...-Ex ........................................................................................ 16  
2.4 OPTISONIC 7000...-Ex ............................................................................................... 18  

### 3 Connection of separate systems

3.1 General ....................................................................................................................... 19  
3.2 Cable marking ............................................................................................................. 19  
3.3 Equipotential bonding ............................................................................................... 19  
3.3.1 Flow sensor .............................................................................................................. 19  
3.3.2 Signal converter ...................................................................................................... 19
## 4 Electrical connections

- 4.1 General ................................................................. 20
- 4.2 Cable glands .......................................................... 22
- 4.3 Field Wiring ........................................................... 22
- 4.4 Non-“Ex i” I/O connections .................................... 23
- 4.5 “Ex i” I/O connections ............................................. 25

## 5 Maintenance

- 5.1 Maintenance .......................................................... 27
- 5.2 Before and after opening ........................................ 27
- 5.3 Replacement of mains fuse ...................................... 28
- 5.4 Exchange of electronics unit ................................. 29
- 5.5 Service / repair information .................................... 31
- 5.6 Form (for copying) to accompany a returned device .. 32
- 5.7 Disposal ................................................................. 32

## 6 Notes

- 6.0 Notes ................................................................. 33
1.1 Safety instructions from the manufacturer

1.1.1 Copyright and data protection

The contents of this document have been created with great care. Nevertheless, we provide no guarantee that the contents are correct, complete or up-to-date.

The contents and works in this document are subject to copyright. Contributions from third parties are identified as such. Reproduction, processing, dissemination and any type of use beyond what is permitted under copyright requires written authorisation from the respective author and/or the manufacturer.

The manufacturer tries always to observe the copyrights of others, and to draw on works created in-house or works in the public domain.

The collection of personal data (such as names, street addresses or e-mail addresses) in the manufacturer’s documents is always on a voluntary basis whenever possible. Whenever feasible, it is always possible to make use of the offerings and services without providing any personal data.

We draw your attention to the fact that data transmission over the Internet (e.g. when communicating by e-mail) may involve gaps in security. It is not possible to protect such data completely against access by third parties.

We hereby expressly prohibit the use of the contact data published as part of our duty to publish an imprint for the purpose of sending us any advertising or informational materials that we have not expressly requested.

1.1.2 Disclaimer

The manufacturer will not be liable for any damage of any kind by using its product, including, but not limited to direct, indirect or incidental and consequential damages.

This disclaimer does not apply in case the manufacturer has acted on purpose or with gross negligence. In the event any applicable law does not allow such limitations on implied warranties or the exclusion of limitation of certain damages, you may, if such law applies to you, not be subject to some or all of the above disclaimer, exclusions or limitations.

Any product purchased from the manufacturer is warranted in accordance with the relevant product documentation and our Terms and Conditions of Sale.

The manufacturer reserves the right to alter the content of its documents, including this disclaimer in any way, at any time, for any reason, without prior notification, and will not be liable in any way for possible consequences of such changes.
1.1.3 Product liability and warranty

The operator shall bear responsibility for the suitability of the device for the specific purpose. The manufacturer accepts no liability for the consequences of misuse by the operator. Improper installation or operation of the devices (systems) will cause the warranty to be void. The respective "Standard Terms and Conditions" which form the basis for the sales contract shall also apply.

1.1.4 Information concerning the documentation

To prevent any injury to the user or damage to the device it is essential that you read the information in this document and observe applicable national standards, safety requirements and accident prevention regulations.

If this document is not in your native language and if you have any problems understanding the text, we advise you to contact your local office for assistance. The manufacturer cannot accept responsibility for any damage or injury caused by misunderstanding of the information in this document.

This document is provided to help you establish operating conditions, which will permit safe and efficient use of this device. Special considerations and precautions are also described in the document, which appear in the form of icons as shown below.
1.1.5 Warnings and symbols used

Safety warnings are indicated by the following symbols.

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

**DANGER!**
This warning refers to the immediate danger of burns caused by heat or hot surfaces.

**DANGER!**
This warning refers to the immediate danger when using this device in a hazardous atmosphere.

**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.

**LEGAL NOTICE!**
This note contains information on statutory directives and standards.

• **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.

1.2 Manufacturer

The instrument is developed and manufactured by:
KRÖHNE Altometer
Kerkeplaat 12
3313 LC Dordrecht
The Netherlands

For information, maintenance or service please contact your nearest local KRÖHNE representative.
1.3 Safety instructions for the operator

**WARNING!**
- Do not change the device. Unauthorized changes affect the explosion safety of the devices.
- The prescriptions and regulations as well as the electrical data described in the EU type examination certificate must be obeyed.
- Beside the instructions for electrical installations in non-hazardous locations according to the applicable national standard [equivalent to HD 384 or IEC 364, e.g. VDE 0100], especially the regulations in IEC/EN 60079-14 "Electrical installations in hazardous locations" or equivalent national standard [e.g. DIN VDE 0165 Part 1] must be strictly followed.
- Installation, establishment, utilization and maintenance are only allowed to be executed by personnel with an education in explosion safety!

These additional instructions are an extension to the standard documentation and only apply to the Ex versions of the OPTISONIC 7300 C/..., OPTISONIC 7000... and GFC 300 F ultrasonic flowmeters. All technical information as described in the standard documentation is applicable, when not specifically excluded, completed or replaced by the instructions in these additional instructions.

**General**
- The relation between ambient temperature, process temperature and temperature class is described in this manual.
- For details of the flameproof joints, contact KROHNE Aloteameter.
- Repairs on flameproof joints may only be performed in accordance with KROHNE Alotimeter’s design specifications. Repair on basis of the values in tables 1 respectively 2 of IEC 60079-1 is not permissible.
1.4 Special conditions for safe use

1.4.1 General

For information on the flameproof joints please contact your KROHNE representative. No repairs are permitted to the flameproof joints.

To avoid the risk of ignition as a result of electrostatic charging, the equipment can not be used in locations that have:

- High charge generating processes,
- Mechanical friction and separation processes,
- Electron emission (e.g. near electrostatic coating equipment) may occur.

1.4.2 Additional notes for safe operation

Connection conditions
1. When the terminal compartment of the OPTISONIC 7300 C/…-Ex compact ultrasonic gas flow-meter and the connection box of the OPTISONIC 7000…-Ex ultrasonic gas flow sensor is designed as flameproof enclosure “Ex db”, the following must be complied with:

   a. The device shall be connected with suitable cable glands or conduit systems that meet the requirements stipulated in IEC/EN 60079-1, sections 13.1 and 13.2, and for which a separate test certificate has been issued. If the device is connected to conduit systems, the required sealing device shall be provided immediately at the cable entrance(s) of the enclosure

   b. Cable glands and blanking plugs of simple design must not be used

   c. Openings that are not used shall be sealed in compliance with the specifications in IEC/EN 60079-1, section 11.9.

   d. If the electrical connection is made in a potentially explosive area, the connecting cable (unconnected cable end) of the remote ultrasonic gas flow sensor OPTISONIC 7000 …-Ex, shall be connected in an enclosure that meets the requirements of an approved type of protection in accordance with IEC/EN 60079-0, section 1.

2. The connecting cable(s) delivered with the ultrasonic gas flow meter system, shall be fixed and routed so that it will be adequately protected against damage. The cable is rated for a continuous operating temperature of maximum 100°C. The maximum temperatures listed in the temperature classification tables in the next Chapter are limited based on the maximum operating temperature of the connecting cable(s), cable gland(s) and/or blind plug (only in case of a single-beam sensor).

3. The OPTISONIC 7300 C/…-Ex and OPTISONIC 7000…-Ex shall be included in the local equipotential bonding system of the potentially explosive area.

Components attached or installed (i.e. terminal compartments, bushings, Ex-type cable glands, connectors, etc.) shall be of a technical standard that comply with the specifications on the cover sheet and shall have a separate examination certificate. The operating conditions specified in the component certificates must be complied with.
Warning messages

In potentially explosive atmospheres, the enclosure may only be opened after it has been deenergized and the required waiting time has been obeyed (warning sign!).

For the OPTISONIC 7300 C/...-Ex compact gasflowmeter the waiting time is 35 minutes for temperature class T6 and 10 minutes for temperature class T5. No waiting time(s) have to be considered for temperature classes T4 ...T1

The warning message reads as follows:

**WARNING ! - Do not open flameproof enclosure when energized. Minimum waiting time before opening: T6 = 35 min., T5 = 10 min.**

For the OPTISONIC 7000...-Ex remote gas flow sensor no waiting time is required. The warning message reads:

**WARNING ! - Do not open when energized.**

1.5 Approvals

The OPTISONIC 7300 ultrasonic gas flowmeters are manufactured according to the European directive 2014/34/EU and IECEx 02 Certification System. The flowmeters are approved for installation and use in hazardous classified locations of zone 1 and 2 and are in accordance with the European standards of the IEC/EN 60079 series.

<table>
<thead>
<tr>
<th>IEC/EN Standard</th>
<th>Equipment Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>IEC 60079-0: 2011</td>
<td>Equipment - General Requirements</td>
</tr>
<tr>
<td>EN 60079-0: 2012 + A11: 2013</td>
<td></td>
</tr>
<tr>
<td>IEC 60079-1: 2014</td>
<td>Equipment protected by flameproof enclosures &quot;d&quot;</td>
</tr>
<tr>
<td>EN 60079-1: 2014</td>
<td></td>
</tr>
<tr>
<td>IEC 60079-7: 2006</td>
<td>Equipment protected by increased safety &quot;e&quot;</td>
</tr>
<tr>
<td>EN 60079-7: 2007</td>
<td></td>
</tr>
<tr>
<td>IEC 60079-11: 2011</td>
<td>Equipment protection by intrinsic safety &quot;i&quot;</td>
</tr>
<tr>
<td>EN 60079-11: 2012</td>
<td></td>
</tr>
<tr>
<td>IEC 60079-18: 2014</td>
<td>Equipment protection by encapsulation &quot;m&quot;</td>
</tr>
<tr>
<td>EN 60079-18: 2015</td>
<td></td>
</tr>
</tbody>
</table>

The OPTISONIC 7300 ultrasonic gas flowmeter series has the following approval number(s):

KIWA 18ATEX0005 X / IECEx KIWA 18.0004X

**INFORMATION!**

*If you need the approval certificate, please download it from our website.*
1.6 OPTISONIC 7300 C/...-Ex

The OPTISONIC 7300 C/...-Ex is the compact configuration of the GFC 300 ultrasonic flow converter and the OPTISONIC 7000 ultrasonic gas flow sensor. The gas flow sensor contains flameproof (Ex db) gas transducers (type G7.nn or G11.nn) or partially "Ex db" with an encapsulated front "Ex ma" (type G6.nn). The gas flow converter is provided with non-Ex or intrinsically safe (Ex ia) inputs/outputs, indicated by an "i" in the type name and listed as OPTISONIC 7300 C/i/...-Ex. The I/Os and mains supply connections are located in the terminal compartment, which can either be ordered as "Ex db" or "Ex eb".

Depending on the configuration, the marking code can be:

<table>
<thead>
<tr>
<th>&quot;Ex db&quot; terminal compartment</th>
<th>&quot;Ex eb&quot; terminal compartment</th>
</tr>
</thead>
<tbody>
<tr>
<td>II 2 G</td>
<td>II 2 G</td>
</tr>
<tr>
<td>Ex db IIC T6...T2 Gb</td>
<td>Ex db eb IIC T6...T2 Gb</td>
</tr>
<tr>
<td>II 2 G</td>
<td>II 2 G</td>
</tr>
<tr>
<td>Ex db ma IIC T6...T4 Gb</td>
<td>Ex db eb ma IIC T6...T4 Gb</td>
</tr>
<tr>
<td>Ex db [ia Ga] IIC T6...T2 Gb</td>
<td>Ex db eb [ia Ga] IIC T6...T2 Gb</td>
</tr>
<tr>
<td>Ex db ma [ia Ga] IIC T6...T4 Gb</td>
<td>Ex db eb ma [ia Ga] IIC T6...T4 Gb</td>
</tr>
</tbody>
</table>

1.7 OPTISONIC 7000...-Ex

The OPTISONIC 7000...-Ex is the remote configuration of the ultrasonic gas flow sensor and has flameproof (Ex db) constructed gas transducers (type G7.nn and G11.nn). Optionally it can be equipped with type G6.nn gas transducers, that are partially flameproof (Ex db) and have an encapsulated synthetic front (Ex ma).

The marking code is listed below.

<table>
<thead>
<tr>
<th>OPTISONIC 7000...-Ex</th>
</tr>
</thead>
<tbody>
<tr>
<td>II 2 G</td>
</tr>
<tr>
<td>Ex db IIC T6...T2 Gb</td>
</tr>
<tr>
<td>II 2 G</td>
</tr>
<tr>
<td>Ex db ma IIC T6...T4 Gb</td>
</tr>
</tbody>
</table>

The OPTISONIC 7000...-Ex remote flow sensor is always connected to the GFC 300 F/...-Ex ultrasonic flow converter in remote design.

**INFORMATION!**

*When thermally insulating the ultrasonic flow sensor, make sure that the temperature of the connection box does not exceed +90°C / +194°F.*
1.8 GFC 300 F/...-Ex

The GFC 300 F/...-Ex is the remote version of the ultrasonic flow converter. It has flameproof protected connections to the flameproof gas transducers of the ultrasonic flow sensor in remote design. The converter has non-Ex or intrinsically safe (Ex ia) I/Os, indicated by an "i" in the type name as GFC 300 F/i-Ex.

The connection terminals of these I/Os are located in the terminal compartment, which is configured as "Ex db" or "Ex eb".

The GFC 300 F/...-Ex ultrasonic flow converter has the following approval number(s):
KIWA 17ATEX0002 X / IECEx KIWA 17.0001X

The marking code reads as follows:

<table>
<thead>
<tr>
<th>&quot;Ex db&quot; terminal compartment</th>
<th>&quot;Ex e&quot; terminal compartment</th>
</tr>
</thead>
<tbody>
<tr>
<td>II 2 G</td>
<td>II 2 G</td>
</tr>
<tr>
<td>Ex db</td>
<td>Ex db eb</td>
</tr>
<tr>
<td>IIC T6 Gb</td>
<td>IIC T6 Gb</td>
</tr>
<tr>
<td>[ia Ga]</td>
<td>[ia Ga]</td>
</tr>
</tbody>
</table>

1.9 Biogas versions

The biogas versions are low-pressure (maximum 10 bar / 145 psi) designs of the gas flowmeters and available as compact flowmeter (OPTISONIC 7300 C/...-Ex) and as remote flow sensor (OPTISONIC 7000...-Ex). The biogas flow sensors have additionally one or two screw-in connections for ATEX/IECEx-approved ("Ex ia" and/or "Ex d") temperature sensor and (optional) pressure sensor.

1.10 Ultrasonic gas transducers

The OPTISONIC 7000...-Ex gas flow sensor, which is either part of the compact gas flow meter or available as remote design gas flow sensor, can be equipped with ultrasonic gas transducers made of Titanium (type G7.nn) or Inconel (type 11.nn) or stainless steel/synthetic (type G6.nn) front.

Gas transducers (type G7.nn and G11.nn) have type of protection "flameproof enclosure" (Ex db) according to IEC/EN 60079-1. The electrical connections are established in specially designed flameproof enclosures with a free volume far below 100 cm³.

Gas transducers of type G6.nn have a combination of "Ex ma" (encapsulation) and "flameproof enclosure" (Ex db).

The ultrasonic gas transducers are approved as component and has the following approval number(s):
FTZU 17 ATEX 0057U / IECEx FTZU 17.0029 U
### 1.11 Technical data

<table>
<thead>
<tr>
<th>Process medium</th>
<th>Flammable and non-flammable gases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protection category acc. to IEC/EN 60529</td>
<td>IP 66/IP 67</td>
</tr>
</tbody>
</table>

#### Ambient temperature range

<table>
<thead>
<tr>
<th>Signal converter GFC 300 F/...-Ex: -40...+65°C</th>
<th>OPTISONIC 7300 C/...-Ex: -40...+65°C ¹</th>
</tr>
</thead>
<tbody>
<tr>
<td>Titanium transducers type G7.nn and Inconel transducers type G11.nn</td>
<td>OPTISONIC 7000...-Ex : -40...+70°C</td>
</tr>
<tr>
<td>Stainless steel /Synthetic transducers type G6.nn</td>
<td>Temp class T6: -40...+70°C</td>
</tr>
<tr>
<td></td>
<td>Temp class T5: -40...+85°C</td>
</tr>
<tr>
<td></td>
<td>Temp class T4: -40...+100°C</td>
</tr>
</tbody>
</table>

#### Process medium temperature range

<table>
<thead>
<tr>
<th>Titanium transducers type G7.nn</th>
<th>OPTISONIC 7300 C/...-Ex: -50...+185°C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inconel steel transducer type G11.nn</td>
<td>OPTISONIC 7000-Ex: -50...+185°C</td>
</tr>
<tr>
<td>Stainless steel /Synthetic transducers type G6.nn</td>
<td>Temp class T6: -40...+70°C</td>
</tr>
<tr>
<td></td>
<td>Temp class T5: -40...+85°C</td>
</tr>
<tr>
<td></td>
<td>Temp class T4: -40...+100°C</td>
</tr>
</tbody>
</table>

### INFORMATION!

¹ Maximum ambient temperature of 65°C applies to aluminum MH-300-Ex converter housing. The stainless steel version is limited to +60°C.

² The process medium temperature range of -50...+185°C applies to the flow sensor equipped with gas transducers of type G7.nn or G11.nn. The process medium temperature range of -40...+100°C applies to the flow sensor equipped with gas transducers of type G6.nn. The process temperature is the temperature of the medium that surrounds the transducers. The ambient temperature is the (air) temperature at the location where the meter is installed.
1.12 Marking labels (examples)

See the following examples of marking labels [i.e. data stickers] of respectively OPTISONIC 7300 C-Ex, OPTISONIC 7300 C/i-Ex ultrasonic compact flowmeter, GFC 300 F/-Ex ultrasonic signal converter in field design and OPTISONIC 7000...-Ex ultrasonic flow sensor. Other marking codes are possible. The pictures that are shown are an example of a certain configuration, which is described by the text between brackets.

Figure 1-1: OPTISONIC 7300 C-Ex data sticker (example: 100-230 VAC)

1. Ex logo, marking ATEX/IECEx and ambient temperature
2. Ex specific remarks
3. Ex specific warnings
4. Protection class and Tag no.
5. PED data
6. Mains supply data and Electronic Revision no.
7. Calibration data / Size info a.o.
8. Type designation of the flowmeter & CE sign with number(s) of notified body / bodies
9. Name and address of the manufacturer
1. Ex logo, marking ATEX/IECEx and ambient temperature
2. Ex specific remarks and warnings
3. Protection class and Tag no.
4. PED and Mains supply data
5. Calibration data / Size info and Electronic Revision no.
6. Website info and environment logo
7. Type designation of the flowmeter & CE sign with number(s) of notified body / bodies
8. Name and address of the manufacturer

1.12.1 Nameplate sensor OPTISONIC 7000...-Ex

Figure 1-4: Example: OPTISONIC 7000-Ex data sticker

1. Specific Ex logo, marking ATEX/IECEx and ambient temperature
2. Protection class and Explosion safety notes
3. Tag number
4. PED data
5. Size and calibration data
6. Type designation of the flowmeter and manufacturing date
7. Name and address of the manufacturer
1.12.2 I/O sticker

Example of I/O sticker for modules on the inside of the terminal compartment cover

- Fieldbus IO PA on IO board 1.
- Intrinsic safety option with current out active
- Pulse/Status Out/Control in on IO board 2

Other combinations are possible. See chapter 4 “Electrical connections”, for details.
2.1 General

Due to the influence of the process medium (gas) temperature, ultrasonic flow sensors in remote design with type designation OPTISONIC 7000...-Ex and ultrasonic compact gas flowmeters with type designation OPTISONIC 7300 C/...-Ex are not allocated to any fixed temperature class. See temperature classification tables below for details. The temperature limits apply under the following conditions:

- The device is installed and operated in accordance with the installation directions given in the manual.
- The device is not heated up by any additional heat radiation (direct solar radiation, heat from adjacent plant parts) so causing it to operate above the permissible ambient temperature range.
- Insulation is not hindering free ventilation of the ultrasonic signal converter housing.

2.2 GFC 300 F/...-Ex

The GFC 300 F/...-Ex flow converter in remote design is suitable for ambient temperatures in the range -40...+65°C / -40...+149°F with electronics unit installed in the aluminum MH 300-Ex flow converter housing and -40...+60°C / -40...+140°F in case of the stainless steel MH 300-Ex housing. The surface temperature always remains below +80°C / +176°F. The flow converter in remote design is not influenced by the process temperature, because it is installed on a distance of the remote flow sensor. It therefore has a temperature rating of T6.

2.3 OPTISONIC 7300 C/...-Ex

The OPTISONIC 7300 C/...-Ex ultrasonic compact gas flow meter is provided with the same electronics housing as the GFC 300 F/...-Ex and therefore has the same ambient temperature range of -40...+65°C [aluminum housing] and -40...+60°C [stainless steel]. The temperature classification table shows the relationship between the maximum process medium temperatures at a certain maximum ambient temperature.

CAUTION!

The temperature data below only applies to the meters with ultrasonic gas transducers made of titanium or steel (types G7.nn and G11.nn).
Temperature classification OPTISONIC 7300 C/...-Ex with aluminum MH 300-Ex and gas transducers type G7.nn or G11.nn.

<table>
<thead>
<tr>
<th>Temperature class</th>
<th>Maximum process temperature [°C] at</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$T_a \leq 40^\circ C$</td>
</tr>
<tr>
<td>T6</td>
<td>50</td>
</tr>
<tr>
<td>T5</td>
<td>65</td>
</tr>
<tr>
<td>T4</td>
<td>100</td>
</tr>
<tr>
<td>T3</td>
<td>165</td>
</tr>
<tr>
<td>T2</td>
<td>185</td>
</tr>
</tbody>
</table>

Temperature classification OPTISONIC 7300 C/...-Ex with aluminum MH300-Ex and gas transducers type G6.nn.

<table>
<thead>
<tr>
<th>Temperature class</th>
<th>Maximum process temperature [°C] at</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$T_a \leq 40^\circ C$</td>
</tr>
<tr>
<td>T6</td>
<td>65</td>
</tr>
<tr>
<td>T5</td>
<td>80</td>
</tr>
<tr>
<td>T4</td>
<td>100</td>
</tr>
</tbody>
</table>

OPTISONIC 7300 C/...-Ex (stainless steel housing)
The temperature limitations in the table below apply to compact flowmeters with a stainless steel MH 300-Ex housing.

Temperature classification OPTISONIC 7300 C/...-Ex with stainless steel MH 300-Ex and gas transducers type G7.nn or G11.nn.

<table>
<thead>
<tr>
<th>Temperature class</th>
<th>Maximum process temperature [°C] at</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$T_a \leq 40^\circ C$</td>
</tr>
<tr>
<td>T6</td>
<td>50</td>
</tr>
<tr>
<td>T5</td>
<td>65</td>
</tr>
<tr>
<td>T4</td>
<td>100</td>
</tr>
<tr>
<td>T3</td>
<td>165</td>
</tr>
<tr>
<td>T2</td>
<td>185</td>
</tr>
</tbody>
</table>

Temperature classification OPTISONIC 7300 C/...-Ex with stainless steel MH300-Ex and gas transducers type G6.nn.

<table>
<thead>
<tr>
<th>Temperature class</th>
<th>Maximum process temperature [°C] at</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$T_a \leq 40^\circ C$</td>
</tr>
<tr>
<td>T6</td>
<td>65</td>
</tr>
<tr>
<td>T5</td>
<td>80</td>
</tr>
<tr>
<td>T4</td>
<td>100</td>
</tr>
</tbody>
</table>
2.4 OPTISONIC 7000...-Ex

The OPTISONIC 7000...-Ex ultrasonic gas flow sensor is suitable for ambient temperatures ranging from -40 to +70°C.

CAUTION!
The temperature data below only applies to the meters with ultrasonic gas transducers made of titanium or Inconel (types G7.nn and G11.nn).

Temperature classification of OPTISONIC 7000...-Ex sensor with G6.nn.

<table>
<thead>
<tr>
<th>Temperature class</th>
<th>Maximum process temperature [°C] at $T_a$ = 70°C</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$T_a \leq 40°C$</td>
</tr>
<tr>
<td>T6</td>
<td>50</td>
</tr>
<tr>
<td>T5</td>
<td>65</td>
</tr>
<tr>
<td>T4</td>
<td>100</td>
</tr>
<tr>
<td>T3</td>
<td>165</td>
</tr>
<tr>
<td>T2</td>
<td>185</td>
</tr>
</tbody>
</table>

The following table shows the temperature classification for gas flow sensors in remote design equipped with gas transducers of type G6.nn.

Temperature classification of OPTISONIC 7000...-Ex sensor with G6.nn.

<table>
<thead>
<tr>
<th>Temperature class</th>
<th>Maximum process temperature [°C] at $T_a$ = 70°C</th>
</tr>
</thead>
<tbody>
<tr>
<td>T6</td>
<td>65</td>
</tr>
<tr>
<td>T5</td>
<td>80</td>
</tr>
<tr>
<td>T4</td>
<td>100</td>
</tr>
</tbody>
</table>
3.1 General
In the case of field (remote) systems, the electrical connection between OPTISONIC 7000...-Ex ultrasonic flow sensor and GFC 300 F/...-Ex ultrasonic signal converter is established via one [single beam versions] signal cable of type " 2 -pole RG316 triax", or two [dual beam] signal cable[s] . This cable consists of two triax cables [double shielding] surrounded by an additional screen and outer insulation layer. The ends of the cables are provided with SMB connectors. The signal cable is included with the field system.

3.2 Cable marking
The coaxial transducer cables are marked at each end by yellow tubing with a black number of subsequently 1.1 and 1.2 for a single-beam design and numbers 1.1, 1.2, 2.1 and 2.2 for a double-beam design. The first number represents path, 1 (single-beam) or 2 (double-beam) and the second the position of the transducer of that path [1 or 2]. The marking of the SMB counter-plugs in the connection box is identical to that of the transducers cables [1.1, 1.2, ...].

3.3 Equipotential bonding
3.3.1 Flow sensor
The transducer circuits are galvanically isolated from earth and therefore an equipotential bonding conductor between the ultrasonic flow sensor and the ultrasonic signal converter does not have to be connected, but can be used if desirable.

Where screened signal cable is used, the screen should only be earthed at the flow sensor end. In the special case of a screen being earthed at both ends of the system, a potential difference between the sensor and converter is not permitted. Refer to IEC/EN 60079-14, Clause 12.2.2.3, for further requirements of cable screens.

3.3.2 Signal converter
The GFC 300 F/...-Ex ultrasonic signal converter must always be incorporated within the equipotential bonding system of the installation in the hazardous classified location. For this purpose it must be connected to the external U-clamp screw terminal [size M5] on the mounting support of the converter.

The separate bonding conductor must be at least 4 mm² (11 AWG) or 2.5 mm² (14 AWG), in case it is mechanically protected [see Clause 413 of HD 384.4.41 or IEC 364-4-41]. Make sure that the core of the bonding wire is properly mounted under the U-clamp of the PE-terminal and that the screw is tightly fixed.

The transducer circuits of the signal converter are galvanically isolated from earth, therefore an equipotential bonding conductor between the flow sensor and the signal converter does not have to be connected, but can be used if desired [e.g. for EMC reasons].
4.1 General

The OPTISONIC 7300 C/...-Ex compact flowmeter must be incorporated within the equipotential bonding system of the installation. This can be established internally by connection of the protective earth (PE conductor of the mains supply system to the internal PE clamp, or externally, by connecting a separatequipotential bonding conductor to the external U-clamp terminal (size M5) at respectively the flange of the mounting support (in case of compact instruments) or at the mounting device (for signal converters in separate version).

The display cover seals the electronics compartment of the converter housing and provides type of protection “flameproof enclosure” (Ex db) according to IEC/EN 60079-1. The terminal compartment is either in type of protection “increased safety” or performed as “flameproof enclosure”. The threaded joints formed by the covers and housing are a tight fit due to the requirements for type of protection “flameproof enclosure”. Screw the covers on and off with care and never use excessive force!

Keep the screw-threads free of dirt and well-greased (e.g. with PTFE grease). The grease will help to prevent the threads from locking due to corrosion. To unscrew the covers, first release the interlocking devices (one at each cover). Therefore unscrew the M4 head screw with internal hexagon socket set using a No. 3 Allen key until the interlocking device can be turned. After the covers are screwed back onto the housing, make sure that the interlocking devices are properly refitted.

WARNING!
Allow the electronics to de-energize before opening the electronics compartment of the flow converter housing. Wait at least 35 minutes for T6 and 10 minutes for T5 before opening.

Figure 4-1: Electrical connections
① Unscrew interlocking head screw
② Turn cover counterclockwise and remove
③ Open / close safety lid of mains supply section
④ Mains supply & signal / data terminals
The exact I/O-configuration for circuits A, B, C and D is order-specific and can be determined by the CG36 number shown on the I/O sticker inside the terminal compartment. Therefore check the data on the back of the GFC 300 electronics unit. The CG36 number contains 10 characters of which the last three characters (XYZ) determine the configuration of the I/O circuits:

- Position 1...4; CG [converter made in Germany] model 36 (GFC 300)
- Position 5, 6, 7; standard 0, power supply, type of display
- Position 8...10; selection I/O

For a selection of the different CG36 numbers XYZ refer refer to "Ex i" I/O connections on page 25
4.2 Cable glands

The three cable entries in the MH 300-Ex housing have a M20x1.5 screw thread. Make sure that the custom selected cable glands and/or stopping plugs have the same screw thread.

For use in gaseous hazardous areas: the chosen cable glands and/or stopping plugs, must have the appropriate type of protection for the terminal compartment that is increased safety (Ex e) or flameproof enclosure (Ex d). They MUST be suitable for the conditions of use and correctly installed.

The flowmeter with the terminal compartment in type of protection increased safety “Ex e” is factory supplied with two "Ex e" approved cable glands and one "Ex e" approved blanking element (i.e. stopping plug).

**WARNING!**

When the terminal compartment performed as flameproof enclosure “Ex d”, the MH 300-Ex housing is supplied with one “Ex d” approved stopping plug and two temporary plugs. The temporary plugs are only intended for sealing the housing against entry of dust, moisture or else during transport, handling and storage. These temporary plugs must be replaced by suitable “Ex d” approved cable glands, stopping plugs or conduit adapters with sealing devices before the flowmeter is put into operation. Unused openings must be sealed by suitable certified plugs.

4.3 Field Wiring

The wiring of instruments has to be in accordance with the requirements as specified in the relevant national or international standard for electrical installations in hazardous areas, e.g. IEC/EN 60079-14. Section 9 (wiring systems) of this standard applies to all types of protection. Section 10 (additional requirements for type of protection “d” - flameproof enclosures), section 11 (additional requirements for type of protection “e” - increased safety) and section 12 (additional requirements for type of protection “i” - intrinsic safety) apply to respectively "Ex d", "Ex e" and “Ex i” performed connection (terminal) compartments.

**CAUTION!**

The terminal compartment of converters in a “Ex e” version, may be opened in energized state for short periods of time, e.g. to access the intrinsically circuits for possible checks. However, the semi-circular insulation cover (covering the non-intrinsically safe mains supply terminals L and N or L+ and L-) MUST be kept closed at all times.
4.4 Non-"Ex i" I/O connections

The following non-intrinsically safe I/O (inputs/outputs) are available:

<table>
<thead>
<tr>
<th>I/O PCB</th>
<th>Input/output functions, ( U_n &lt; 32 \text{ V DC}, I_n &lt; 100 \text{ mA}, U_m = 253 \text{ V} )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basic I/O</td>
<td>Current Output, active or passive, with HART Status Output / Control Input ( \text{Pulse / Status Output} )</td>
</tr>
<tr>
<td>Modular I/O</td>
<td>Current Output, active or passive, with HART Status Output, active or passive, highC or Namur</td>
</tr>
<tr>
<td>Modular carrier with 1 or 2 I/O modules</td>
<td>Each module: 1 out of following 3 in-/output functions: Current Output, active or passive ( \text{Pulse / Status Output, active or passive, highC or Namur} ) Control Input, active or passive, highC or Namur</td>
</tr>
<tr>
<td>Profibus DP I/O</td>
<td>Profibus-DP, active</td>
</tr>
<tr>
<td>Fieldbus I/O</td>
<td>Profibus-PA or Foundation Fieldbus</td>
</tr>
<tr>
<td>RS 485 Modbus</td>
<td>Modbus with or without termination</td>
</tr>
</tbody>
</table>

The options separated by "/" are software selectable (can be changed by the user)
The options separated by "or" are hardware versions (must be ordered as such)
All outputs are passive unless otherwise indicated
HighC means High Current input/output, Namur means that the in-/outputs are according to the NAMUR NE43 standard
**Overview of the possible combinations, defined by characters XYZ of the CG36 number**

<table>
<thead>
<tr>
<th>Characters XYZ</th>
<th>Name of I/O circuits</th>
<th>Terminals A, A-, A+</th>
<th>Terminals B, B-</th>
<th>Terminals C, C-</th>
<th>Terminals D, D-</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>Basic I/O</td>
<td>CO</td>
<td>SO/Cl</td>
<td>SO</td>
<td>PO/PO</td>
</tr>
<tr>
<td>488 to 4LL</td>
<td>Modular I/O</td>
<td>CO(a) over A+</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>588 to 5LL</td>
<td>Modular I/O</td>
<td>CO(a) over A+</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>688 to 6LL</td>
<td>Modular I/O</td>
<td>CO(a) over A+</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>788 to 7LL</td>
<td>Modular I/O</td>
<td>CO(a) over A+</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>888 to 8LL</td>
<td>Modular I/O</td>
<td>CO(a) over A+</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A88 to ALL</td>
<td>Modular I/O</td>
<td>CO(a) over A+</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B88 to BLL</td>
<td>Modular I/O</td>
<td>CO(a) over A+</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C88 to CLL</td>
<td>Modular I/O</td>
<td>CO(a) over A+</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D88</td>
<td>Fieldbus I/O</td>
<td>n.c.</td>
<td>PA</td>
<td>PA</td>
<td></td>
</tr>
<tr>
<td>D8A to DLL</td>
<td>Fieldbus I/O</td>
<td>n.c.</td>
<td>PA</td>
<td>PA</td>
<td></td>
</tr>
<tr>
<td>E88</td>
<td>Fieldbus I/O</td>
<td>n.c.</td>
<td>FF</td>
<td>FF</td>
<td></td>
</tr>
<tr>
<td>E8A to ELL</td>
<td>Fieldbus I/O</td>
<td>n.c.</td>
<td>FF</td>
<td>FF</td>
<td></td>
</tr>
<tr>
<td>F00 to FL0</td>
<td>Profibus DP I/O</td>
<td>n.c.</td>
<td>DP[a]</td>
<td>DP[a]</td>
<td>DP[a]</td>
</tr>
<tr>
<td>F80 to FL0</td>
<td>Profibus DP I/O</td>
<td>n.c.</td>
<td>DP[a]</td>
<td>DP[a]</td>
<td>DP[a]</td>
</tr>
<tr>
<td>G00 to GLL</td>
<td>RS 485 Modbus</td>
<td>Many combinations possible</td>
<td>RS485</td>
<td>RS485</td>
<td></td>
</tr>
<tr>
<td>H00 to HLL</td>
<td>Modbus with 1 or 2 I/O modules</td>
<td>Many combinations possible</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Used abbreviations for in-/output functions: CO = Current Output, PO = Pulse Output, SO = Status Output, CI = Control Input, PA = Profibus PA, FF = Foundation Fieldbus, DP = Profibus DP, RS485 = RS 485 Modbus, n.c. = not connected.

All in-/outputs are passive unless otherwise noted as active with extension (a).
## 4.5 "Ex i" I/O connections

The following intrinsically safe I/O connections are available:

<table>
<thead>
<tr>
<th>I/O PCB</th>
<th>I/O functions</th>
<th>Ex ia IIC or Ex ib IIC</th>
<th>U_i = 30 V, I_i = 100 mA, P_i = 1.0 W</th>
<th>C_i = 10 nF, L_i = negligibly low</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ex i IO</td>
<td>Current Output, passive + HART communication</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pulse / Status Output, passive</td>
<td>Ex ia IIC or Ex ib IIC</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>U_i = 21 V, I_i = 90 mA, P_i = 0.5 W</td>
<td>Linear characteristics C_o = 90 nF, L_o = 2.0 mH</td>
<td>C_o = 110 nF, L_o = 0.5 mH</td>
</tr>
<tr>
<td>Ex i Option</td>
<td>Current Output, passive</td>
<td>Ex ia IIC or Ex ib IIC</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pulse / Status Output / Control Input, passive</td>
<td>Ex ia IIC or Ex ib IIC</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>U_i = 30 V, I_i = 100 mA, P_i = 1.0 W</td>
<td>C_i = 10 nF, L_i = negligibly low</td>
<td></td>
</tr>
<tr>
<td>Ex i Option 3</td>
<td>Supply (internal via plug connector X2)</td>
<td>U_n = 24 V DC, U_m = 250 V</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Current Input 1 and 2, active</td>
<td>Ex ia IIC or Ex ib IIC</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>U_o = 21 V, I_o = 99 mA, P_o = 0.5 W</td>
<td>Linear characteristics C_o = 90 nF, L_o = 2.0 mH</td>
<td>C_o = 110 nF, L_o = 5.0 mH</td>
</tr>
<tr>
<td>Fieldbus I/O</td>
<td>Profibus-PA Foundation Fieldbus, passive</td>
<td>Ex ia IIC or Ex ib IIC / IIB</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The I/O circuits titled “Ex i IO”, “Ex i Option” and “Ex i Option 3” are always provided with type of protection intrinsic safety (Ex ia). The I/O-circuits “Fieldbus I/O Profibus-PA” as well as “Fieldbus I/O Foundation Fieldbus” can be provided with type of protection intrinsic safety.

Up to a maximum of 4 intrinsically safe (Ex ia) in-/outputs are possible. All intrinsically safe circuits are galvanically isolated from earth and each other. To avoid summation of voltages and current, the wiring of these “Ex ia”-circuits must be sufficiently separated, e.g. in accordance with the requirements of standard IEC/EN 60079-14, clause 12.2.

The “Ex ia” in-/outputs may only be connected to other “Ex ia” or “Ex ib” approved devices (e.g. intrinsically safe isolation amplifiers), even if such devices are installed in a non-hazardous location!

Connection to non-“Ex i” devices cancels the “Ex ia” properties of the flowmeter.

Terminals L and N (or L+ and L-) for connection of the mains supply are not available with type of protection “intrinsic safety”. To achieve the necessary separation distances according to IEC/EN 60079-11 between the non-“Ex i” and “Ex i” circuits, the mains terminals are provided with a semi-circular protection cover with a “snap-in” lock. This cover MUST be closed before establishing the power supply to the converter.
**INFORMATION!**

For converters with an "Ex eb" terminal compartment, the compartment can be opened in an energized state for short periods of time, to access the intrinsically safe terminals for possible checks. However, the semi-circular insulation cover over the non-intrinsically safe mains supply terminals L and N (or L+ and L-) MUST be kept closed.

<table>
<thead>
<tr>
<th>XYZ</th>
<th>Name of I/O circuits</th>
<th>Terminals A, A-, A+</th>
<th>Terminals B, B-</th>
<th>Terminals C, C-</th>
<th>Terminals D, D-</th>
</tr>
</thead>
<tbody>
<tr>
<td>200</td>
<td>Exi-IO</td>
<td>n.c.</td>
<td>n.c.</td>
<td>CO(a)</td>
<td>PO/SO</td>
</tr>
<tr>
<td>300</td>
<td></td>
<td>n.c.</td>
<td>n.c.</td>
<td>CO</td>
<td>PO/SO</td>
</tr>
<tr>
<td>210</td>
<td>Exi-IO with Exi-Option</td>
<td>CO(a)</td>
<td>P0/S0/CI</td>
<td>CO(a)</td>
<td>PO/SO</td>
</tr>
<tr>
<td>220</td>
<td></td>
<td>CO</td>
<td>P0/S0/CI</td>
<td>CO(a)</td>
<td>PO/SO</td>
</tr>
<tr>
<td>310</td>
<td></td>
<td>CO</td>
<td>P0/S0/CI</td>
<td>CO</td>
<td>PO/SO</td>
</tr>
<tr>
<td>320</td>
<td></td>
<td>CO</td>
<td>P0/S0/CI</td>
<td>CO</td>
<td>PO/SO</td>
</tr>
<tr>
<td>D00</td>
<td>Fieldbus I/O Profibus PA</td>
<td>n.c.</td>
<td>n.c.</td>
<td>PA</td>
<td>PA</td>
</tr>
<tr>
<td>D10</td>
<td>Fieldbus I/O Profibus PA</td>
<td>CO(a)</td>
<td>P0/S0/CI</td>
<td>PA</td>
<td>PA</td>
</tr>
<tr>
<td>D20</td>
<td>Fieldbus I/O Profibus PA with Ex i Option</td>
<td>CO</td>
<td>P0/S0/CI</td>
<td>PA</td>
<td>PA</td>
</tr>
<tr>
<td>E00</td>
<td>Fieldbus I/O Foundation Fieldbus</td>
<td>n.c.</td>
<td>n.c.</td>
<td>FF</td>
<td>FF</td>
</tr>
<tr>
<td>E10</td>
<td>Fieldbus I/O Foundation Fieldbus with Ex i Option</td>
<td>CO(a)</td>
<td>P0/S0/CI</td>
<td>FF</td>
<td>FF</td>
</tr>
<tr>
<td>E20</td>
<td></td>
<td>CO</td>
<td>P0/S0/CI</td>
<td>FF</td>
<td>FF</td>
</tr>
</tbody>
</table>

Used abbreviations for in-/output functions: CO = Current Output, PO = Pulse Output, SO = Status Output, CI = Control Input, n.c. = not connected. All in-outputs are passive unless otherwise noted as active with extension (a).
5.1 Maintenance

The flowmeters are maintenance free with respect to the flowmetering properties. Within the scope of periodic inspections required for electrical equipment installed in hazardous areas it is recommended to check the flameproof converter housing and covers for signs of damage or corrosion.

For information about the flameproof joints please contact your KROHNE representative.

The four M6 bolts to screw the MH300-Ex housing have a strength of 700N/mm².

5.2 Before and after opening

**WARNING!**
the following instructions must always be carefully followed, if the housing of the signal converter has to be opened respectively closed again.

**Before opening:**
- Make absolutely sure that there is no explosion hazard (gas-free certificate !)
- Make sure that all connecting cables are safely isolated from all external sources!
- Allow the electronics to de-energize before opening the electronics compartment of the converter housing. Wait at least 35 minutes for T6 and 10 minutes for T5 before opening.

When the instructions above are strictly followed, the display cover (includes glass window) of the electronics compartment may be removed. First unscrew the head screw with internal hexagon socket set (size M4) of the interlocking device by a No. 3 Allen key, until the cover can rotate freely.

**After opening:**
- Before the cover is screwed back onto the housing, the screw-thread must be clean and well-greased with an acid and resin-free grease, e.g. PTFE grease.
- Screw the cover as tight as possible onto the housing by hand, until it cannot be opened by hand anymore. Fixate the screw of the interlocking device tight with the No. 3 Allen key.
5.3 Replacement of mains fuse

**WARNING!**
Before commencing the work, refer to Before and after opening on page 27, then continue as follows:

- Pull the display unit of the mounting frame and turn display unit carefully aside.
- Unscrew the two screws size M4 that hold the mounting frame with the electronics unit.
- Carefully pull the mounting frame with electronics unit out of the housing, until the MCX - connectors are accessible and can be disconnected from the sensor driver PC-board. Now carefully remove the unit from the housing, while keeping the coaxial cables down, and close to the housing wall.
- The mains fuse is located in a fuse holder at the back-end of the electronics unit on the top printed circuit board (power supply PCB). The specifications must be as follows:

<table>
<thead>
<tr>
<th>Power supply</th>
<th>Electrical data</th>
<th>KROHNE part number</th>
</tr>
</thead>
<tbody>
<tr>
<td>12...24 V DC</td>
<td>250 V / 2 A T</td>
<td>5060200000</td>
</tr>
<tr>
<td>24 V AC/DC</td>
<td>250 V / 2 A T</td>
<td>5060200000</td>
</tr>
<tr>
<td>100...230 V AC</td>
<td>250 V / 0,8 A T</td>
<td>5080850000</td>
</tr>
</tbody>
</table>

**WARNING!**
Before reassembling the unit, refer to Before and after opening on page 27, then:

- Reassemble the unit in reverse order.
5.4 Exchange of electronics unit

Before opening the converter housing:

**WARNING!**

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

**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!**

Make notes of important specific data, before exchanging the electronics.

Menu settings are stored on the circuit board (or backplane), that is fixed to the housing. After exchange of electronics unit and power-up, the following start up screen appears:

**Load all data?**

- Select yes

  - if in the screen appears “load sensor data”, the electronics units were not fully compatible. You can proceed by selecting yes. Note that all settings need to be checked and changed. Only the sensor calibration data are loaded.

  - if in the screen appears “load no data”, all data have been lost. Contact your local representative.

**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!

---

Figure 5-1: Unscrew the cover and remove the display
Perform the following procedures:

- Unscrew the display cover of the electronics compartment by hand, by turning it counter clockwise ①.
- Remove the display by using two screwdrivers ②.
- Unscrew the two M4 screws ③ at the electronics unit ④.
- Pull the two metal pullers ⑤ at the left and right of the display, using a screwdriver or similar tool and partially pull out the electronics unit.
- Remove the printed circuit board ⑥ from the electronics unit ④.
- Check compatibility between the removed and new electronics unit ④, by checking the power voltage.
- Slide the new electronics unit ④ partially back into the housing.
- Mount the small printed circuit board back onto the electronics unit ④.
- Push the metal pullers ⑤ back to their original position.
- Don’t use excessive force, otherwise the connector at the backside can be damaged!
- Screw the electronics unit back to the housing.
- Re-install the display and make sure not to kink the display’s flat ribbon cable.
- Replace cover and tighten by hand.
- Connect power.

CAUTION!
Please pay attention that the same amount of force is applied on both pullers, otherwise the connector at the backside can be damaged.

DANGER!
Electrostatic discharge (ESD) can damage electronic parts. Make sure to discharge yourself by wearing a wrist strap. If no wrist strap is available, ground yourself by touching a metal surface that is grounded.
5.5 Service / repair information

This device has been carefully manufactured and tested. If installed and operated in accordance with these operating instructions, it will rarely present any problems.

CAUTION!
Should you nevertheless need to return a device for inspection or repair, please pay strict attention to the following points:

• Due to statutory regulations on environmental protection and safeguarding the health and safety of personnel, the manufacturer may handle, test and repair returned devices that have been in contact with dangerous media only, without bringing any risk to personnel or environment.

• This means that the manufacturer can only service this device if it is accompanied by the following certificate (see next section) confirming that the device is safe to handle.

CAUTION!
If the device has been operated with toxic, caustic, flammable or water-endangering products, you are kindly requested:

• to check and ensure, if necessary by rinsing or neutralizing, that all cavities are free from such dangerous substances,

• to enclose a certificate with the device confirming that is safe to handle and stating the product used.
5.6 Form (for copying) to accompany a returned device

**CAUTION!**
To avoid any risk for our service personnel, this form has to be accessible from outside of the packaging with the returned device.

<table>
<thead>
<tr>
<th>Company:</th>
<th>Address:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Department:</td>
<td>Name:</td>
</tr>
<tr>
<td>Tel. no.:</td>
<td>Fax no. and/or Email address:</td>
</tr>
<tr>
<td>Manufacturer’s order no. or serial no.:</td>
<td></td>
</tr>
</tbody>
</table>

The device has been operated with the following medium:

This medium is:  
- radioactive  
- water-hazardous  
- toxic  
- caustic  
- flammable  

We checked that all cavities in the device are free from such substances.  
We have flushed out and neutralized all cavities in the device.

We hereby confirm that there is no risk to persons or the environment through any residual media contained in the device when it is returned.

<table>
<thead>
<tr>
<th>Date:</th>
<th>Signature:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stamp:</td>
<td></td>
</tr>
</tbody>
</table>

5.7 Disposal

**CAUTION!**
Disposal must be carried out in accordance with legislation applicable in your country.

Separate collection of WEEE [Waste Electrical and Electronic Equipment] in the European Union:

According to the directive 2012/19/EU, the monitoring and control instruments marked with the WEEE symbol and reaching their end-of-life must not be disposed of with other waste.  
The user must dispose of the WEEE to a designated collection point for the recycling of WEEE or send them back to our local organisation or authorised representative.
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