

## Ultrasonic Flowmeters

# ALTOSONIC V

Addition to the installation and operating instructions

## EEx Operating Manual

UFC/V...-EEx ultrasonic flow converter

UFS 500 F/5STR/...-EEx flow sensor



Variable area flowmeters

Vortex flowmeters

Flow controllers

Electromagnetic flowmeters

**Ultrasonic flowmeters**

Mass flowmeters

Level measuring instruments

Communications technology

Engineering systems & solutions

Switches, counters, displays and recorders

Heat metering

Pressure and temperature

## General advice on safety

- Do not install, operate or maintain this flowmeter without reading, understanding and following the factory-supplied instructions, otherwise injury or damage may result.
- Read these instructions carefully before starting installation and save them for future reference.
- Observe all warnings and instructions marked on the instrument.
- Use only mains supply with protective earthing connected.
- Do not use the instrument with removed covers under wet conditions.
- Consider handling and lifting instructions to avoid damage.
- Install the product securely and stable.
- Install and connect cabling proper to exclude damage or harmful situations.
- If the instrument does not operate normally, refer to the service instructions or refer to qualified KROHNE service engineers.
- There are no operator-serviceable parts inside the instrument.

The following symbols may appear in this manual or on the instrument:



ATTENTION: Refer to operating and installation instructions!



DANGER: Risk of electric shock!



PROTECTIVE EARTH (PE) conductor terminal!

These terms may appear in this manual and/or on the instrument:



WARNING statement: Identify conditions or practice that could result in injury or loss of life.



CAUTION statement: Identify conditions or practice that could result in damage to the product or other property.

## **Disclaimer**

- This document contains important information on the instrument. KROHNE attempts to be as accurate and up-to-date as possible but assumes no responsibility for errors or omissions. Nor does KROHNE make any commitment to update the information contained herein. This manual and all other documents are subject to change without prior notice.
- KROHNE will not be liable for any damage of any kind by using its instrument, including, but not limited to direct, indirect, incidental, punitive and consequential damages.
- This disclaimer does not apply in case KROHNE 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 instrument purchased from KROHNE is warranted in accordance with the relevant product documentation and our Terms and Conditions of Sale.
- KROHNE 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.

## **Product liability and warranty**

- Responsibility for suitability and intended use of this ultrasonic flowmeter rests solely with the user. Improper installation and operation of the flowmeter (system) may lead to loss of warranty.
- In addition, the Terms and Conditions of Sale are applicable and are the basis for the purchase contract.
- If flowmeters need to be returned to KROHNE, please note the information given on the last pages of the installation and operating instructions. KROHNE regrets that they cannot repair or check flowmeter(s) unless accompanied by the completed form (see last pages of the installation and operating instructions).

## **Items included with order**

- UFC-V/EEEx (standard or with optional 30 W heater) or UFC-V/LT-EEEx (low-temperature) Ultrasonic Flow Converter
- UFS 500 F/5STR-EEEx ultrasonic flow tube, in the size as indicated on the packaging box.
- Signal cable

## **Documentation**

These instructions are an extension to the installation instructions and apply to ALTOSONIC V UFC-V/EEEx and UFC-V/LT-EEEx Ultrasonic Flow Converters and the UFS 500 F/5STR-EEEx Flow Sensor. All technical information as described in the installation instructions is applicable, when not specifically excluded, completed or replaced by the instructions in these additional instructions.

This instrument is developed and manufactured by:

KROHNE Altometer  
Kerkeplaat 12  
3313 LC Dordrecht  
The Netherlands

For information, maintenance or service please contact your nearest local KROHNE representative.

**WARNING !**



No changes may be made to the devices. Unauthorized changes might affect the explosion safety of the devices.

Be sure to follow these instructions!

**IMPORTANT !**



- The prescriptions and regulations as well as the electrical data described in the EC type examination certificate must be obeyed.
- Beside the instructions for electrical installations in non-hazardous locations according to the applicable national standard (equivalent of HD 384 or IEC 364, e.g. VDE 0100), especially the regulations in 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!

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# 1. System components

## 1.1 General information

The ALTOSONIC V ultrasonic flowmeter system, consisting of a combination of the UFS 500 F/5STR-EEEx Ultrasonic Flow Sensor and the UFC-V/...-EEEx Ultrasonic Flow Converter, in separate design, is in accordance with the European Directive 94/9 EG (i.e. ATEX 100a) and approved for hazardous classified locations of Zone 1 and 2 by the PTB conform to the European Standards of the EN 500xx series. The Flow Sensor is approved under approval number **PTB 01 ATEX 2012 X** and the flow converter under **KEMA 02 ATEX 2168** (see Appendix 1).

## 1.2 Flow Sensor

The UFS 500 F/5STR-EEEx high-accuracy Flow Sensor has five sensor pairs (10 sensors) in type of protection Intrinsic Safety category "ib" according to EN 50020. All internal sensor circuits are wired by separate coaxial cables and connected through SMB connectors that are each marked by a number x.1 resp. x.2 (opposite sensor), where x runs from 1 to 5 for each sensor circuit. Each of the five sensor circuits is driven by its own (of the five in total) individual UFC 500-EEEx electronics unit that is installed in the flameproof junction box of the UFC-V/...-EEEx flow converter.

Each of the five intrinsical safe "ib" sensor circuits has the following entity parameters:

Maximum input voltage	: $V_{\max}$ = 13.1 V
Maximum output current	: $I_{\max}$ = 600 mA
Maximum internal capacitance	: $C_i$ = 3.9 nF
Maximum internal inductance	: $L_i$ = 38.3 $\mu$ H

The UFS 500 F/5STR-EEEx high-accuracy Flow Sensor is available in meter sizes up to DN500. It is designed for ambient temperatures from -40°C up to +60°C and process liquid temperatures from -20°C up to +120°C. See table below for temperature classification.

Temperature class	Maximum process liquid temperature at Ta = 60°C
T6	80°C
T5	95°C
T4	120°C

The UFS 500 F/5STR-EEEx Flow Sensor is marked with the following code: **II 2G EEx ib IIC T6...T4** (see data plates in Appendix 3).

## 1.3 Flow Converter

The UFC-V/...-EEEx Ultrasonic Flow Converter is available in a standard version and a low-temperature version, which has type designation UFC-V/LT-EEEx. The standard version is suitable for ambient temperatures in the range of -20°C up to +60°C. The low-temperature version is suitable for -55...+60°C with rigid conduit connections and -50...+60°C with cable gland connections. The maximum surface temperature of the flameproof enclosure will not exceed 95°C (including a 5 K safety margin) and the UFC-V/...-EEEx is therefore marked with temperature classification T5.

The UFC-V/...-EEEx Ultrasonic Flow Converter is marked with the explosion safety code: **II 2G EEx d [ib] IIB T5** (see data plates in Appendix 3).

### 1.3.1 Versions

The UFC-V/...-EEEx Ultrasonic Flow Converter is available as standard version with type designation UFC-V/EEEx and as low temperature (LT) version, designated UFC-V/LT-EEEx.

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Both consist of an approved flameproof box, in which five UFC 500...-EEx electronics units and the connecting terminals are installed. The low-temperature version is additionally provided with a heating element of maximum 200 W power, which is controlled by a thermostat to keep the temperature inside the flameproof box above  $-20^{\circ}\text{C}$ . The standard ( $-20^{\circ}\text{C}$ ) version can optionally be provided with a heating element of maximum 30 W and thermostat, to prevent condensation inside the flameproof box.

The UFC 500...-EEx electronics unit can be equipped with one of the following linear power supplies:

- 115/230 Vac  $\pm 13\%$ , 48 – 63 Hz, 12 VA
- 100/200 Vac  $-15\%/+10\%$ , 48 – 63 Hz, 12 VA
- 24/48 Vac  $\pm 13\%$ , 48 – 63 Hz, 12 VA

Or with the switching mode power supply of 24 Vac/dc  $-25\%/+33\%$ , 8 W.

All five UFC 500...-EEx electronics units must have the same power supply version. Each unit is also provided with a RS 485 communication module.

Each UFC 500...-EEx electronics unit drives two of the four intrinsically safe "ib" ultrasonic sensor circuits that form one measuring line (i.e. two opposite ultrasonic transducers) of the UFS 500 F/5STR-EEx Flow Sensor. The intrinsically safe output circuits each has the following maximum values (i.e. entity parameters):

- Maximum output voltage :  $V_o = 8.7 \text{ V}$
- Maximum output current :  $I_o = 360 \text{ mA}$
- Maximum allowed external capacitance :  $C_o = 1.2 \mu\text{F}$
- Maximum allowed external inductance :  $L_o = 0.17 \text{ mH}$

### 1.3.2 Cable and conduit entries

The connecting cables for power supply of the five UFC 500...-EEx electronics units, the heating element with thermostat (only applies to LT-version) and the RS 485 communication module either run through ATEX-approved flameproof "EEx d" cable glands or rigid metal conduits. The rigid conduits must be sealed by ATEX-approved flameproof sealing devices (i.e. stopping boxes) directly at the entrances of the flameproof box. All non-used openings must be sealed by ATEX-approved flameproof blind plugs.

### 1.3.3 Warning messages

The stainless steel data plate of all UFC-V/...-EEx versions is permanently attached to the cover of the flameproof approved box by four stainless steel rivets and contains following warning messages (see Appendix 3):

- DO NOT OPEN "EEx d" ENCLOSURE WHILE ENERGIZED. WAIT AT LEAST 30 MINUTES AFTER DE-ENERGIZING.
- ONLY CABLE GLANDS OF "EEx d" APPROVED TYPE IN ACCORDANCE WITH EN 50018 MAY BE INSTALLED!
- WHEN RIGID CONDUITS ARE USED, THEY MUST BE SEALED BY PRE-CERTIFIED "EEx d" SEALING DEVICES DIRECTLY AT THE ENCLOSURE WALL!

### 1.3.4 Heating element and thermostats

The UFC-V/LT-EEx Ultrasonic Flow Converter for low ambient temperatures ranging from  $-55^{\circ}\text{C}/-50^{\circ}\text{C}$  up to and including  $+60^{\circ}\text{C}$  is provided with a heating element of maximum 200 W and two thermostats T1 and T2, securing a good functioning of the five UFC 500...-EEx units at "extreme" low ambient temperatures (below  $-20^{\circ}\text{C}$ ). Thermostat T1 can be set from  $+5^{\circ}\text{C}$  to  $+55^{\circ}\text{C}$ . It is set at  $+5^{\circ}\text{C}$ , which means that the heating element will continue to heat up the air in the box until it reaches a temperature of  $+5^{\circ}\text{C}$ , at which thermostat T1 will interrupt the power supply of the heating element.

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The second thermostat T2 is a bi-metal controlled thermostwitch that is set to ca. -20°C switching temperature, meaning that when the air-temperature inside the flameproof box exceeds -20°C, the contact closes. Thermostat T2 is connected in series with the live of the five UFC 500...-EEx electronics units, so above an air-temperature of approx. -20°C, the five UFC 500...-EEx units are provided with the supply power and start operating.

Installation, setting and checking of the right functioning of the heating element and the thermostats T1 and T2 is done by KROHNE.

#### **Optional heating for standard UFC-V/EEx**

To prevent condensation inside the flameproof box of the standard version type UFC-V/EEx can optionally be provided with a heating element of maximum 30 W. This heating element can be delivered with a 24 Vdc or 110...240 Vac power supply. The element is controlled by a thermostat of type T1, which is also used in the low-temperature version.



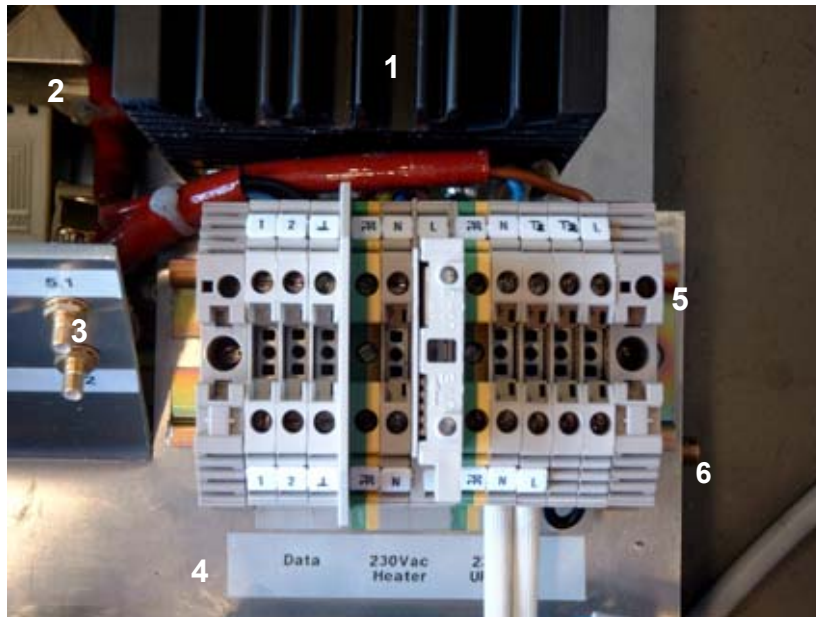
No changes are allowed by any third party (e.g. end user), except when they are authorized and controlled by KROHNE personnel.



## 2. Electrical connections

The two types of UFC-V/...-EEx Ultrasonic Flow Converter have almost the same connection facilities, except that the standard (with optional heater) and the low-temperature version type UFC-V/LT-EEx are provided with three additional terminals (L, N and PE) for connection of thermostat(s) and heating element.

The figure below shows the non-intrinsically safe connection terminals of the optional standard UFC-V/EEx version with 30 W heater and the UFC-V/LT-EEx low-temperature version. The default standard version is identical, but without the two thermostats and additional terminals for the heating element and thermostat T1.



1. Heating element
2. Thermostat T1
3. SMB connectors
4. Sticker with terminal label information
5. Non-intrinsically safe terminals
6. Thermostat T2 (under plate)

Figure 1: Non-intrinsically safe terminals of UFC-V/LT-EEx

The connection facilities inside the approved flameproof box consist of a terminal rail with terminals for the non-intrinsically safe connections: supply power (L, N and PE) for the five UFC 500...-EEx electronics units, the RS485 communication units (1, 2 and  $\perp$ ) and the supply power for the heating element and thermostat (L, N and PE), which applies for the low-temperature version UFC-V/LT-EEx and the optional standard version with max. 30 W heater. The ground connection consists of a cable lug that is screwed into the mounting plate or the bulge that is casted within the bottom of the box. The mounting plate is screwed to the bulges in the corners at the bottom of the flameproof box by four screws with spring or toothed washers. Herewith all metal parts are electrically connected to ground potential.

The intrinsically safe ultrasonic sensor circuits are connected to the ten SMB receptacles (two rows of five male-to-male connectors), which are screwed into the metal terminal plate at the left side of the non-intrinsically safe terminals. The SMB receptacles are marked by the numbers x.1 up to x.2, where x = 1 through 5. The marking consists of a white sticker with black printed number. The SMB plugs that are to be connected to these receptacles are marked by a yellow plastic tubing with the matching black printed number.

Equipotential bonding is established via the external bolt, which is screwed into a bulge on the outside of the box at the base.

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## 2.1 Equipotential bonding system

The UFC-V/...-EEx Ultrasonic Flow Converter with cable glands must always be incorporated into the equipotential bonding system with the UFS 500 F/5STR-EEx 5-beam Flow Sensor. If the UFC-V/...-EEx is provided with metal rigid conduits, equipotential bonding is not required but can optional be connected. The bonding conductor must have a minimum cross-sectional area of 2.5 mm<sup>2</sup> (equivalent to AWG 12) and is provided with a ring cable lug, which is screwed to the bulge at the base of the flameproof box via a stainless steel bolt with spring or toothed washer. Make sure that the bolt is tightly fixed.

## 2.2 Connecting cables

The following cables are shown in the connection diagram:

**Cable A:** Signal cable for RS485 communication.

Cable parameters must be in accordance with the regulations in the EN 60079-14 "Electrical installations in hazardous locations" or an equivalent national standard (e.g. DIN VDE 0165).

**Cable B:** Power supply cable.

Cable parameters must be in accordance with the regulations in the EN 60079-14 "Electrical installations in hazardous locations" or an equivalent national standard (e.g. DIN VDE 0165).

Rated voltage:  $\geq 500$  V

Examples: H07...-, H05...-

**Cable C:** Quad coaxial cable.

Type MR04 (supplied by KROHNE).

### Technical data:

Test voltage:  $\geq 500$  V

Diameter of strand (core and screen):  $\geq 0.1$  mm

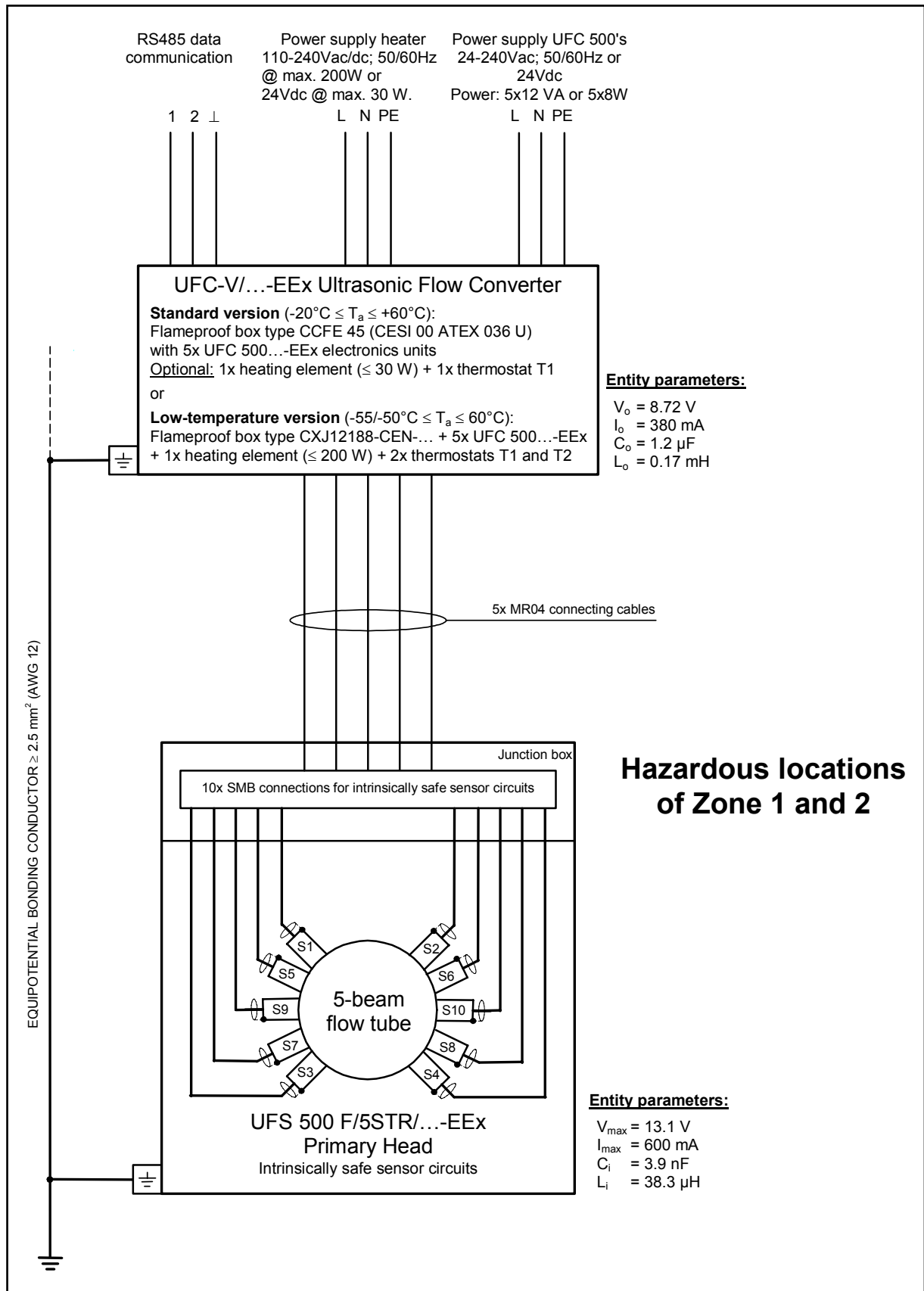
Distributed capacitance (core/screen): 67 pF/m

Distributed inductance (core/screen): 0.4  $\mu$ H/m

### Bonding conductor:

Minimum cross-sectional area:  $\geq 2.5$  mm<sup>2</sup> (equivalent to AWG 12)

## 2.3 Connection diagram



## 3. Service and maintenance

### 3.1 Introduction

Both UFC-V/...-EEx types are maintenance regarding flowmetering properties. Within the scope of the periodical inspections, required for electrical instruments that are installed and used in hazardous classified locations, it is recommended to check the flameproof enclosure.

Contact KROHNE for the ordering information of spare parts or replacements of UFC 500/...-EEx electronics units and/or power fuses.

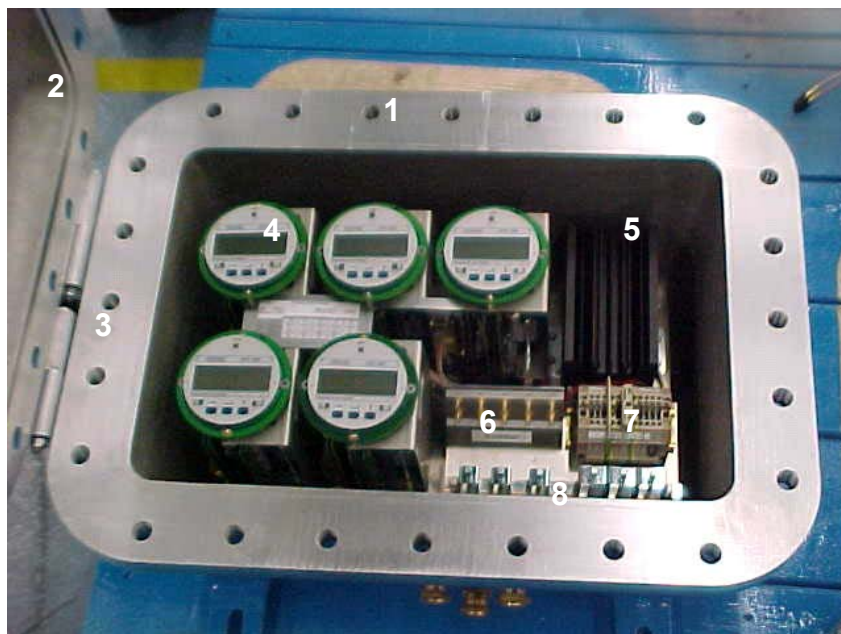


The following instructions must be followed carefully, if the flameproof UFC-V/...-EEx Ultrasonic Flow Converter box has to be opened respectively closed again !

#### Before opening instructions:

- Make absolutely sure that there is no explosion hazard!
- Gas-free certificate!
- Make sure that all connecting cables are safely isolated from the power supply!
- Allow the prescribed waiting time of at least 30 minutes to elapse before opening of the flameproof enclosure.

When the instructions above are strictly followed, the internal wrenching bolts of the cover of the flameproof box may be unscrewed and the cover can be opened. Take care that the weight of the opened cover does not solely support on the two hinges.



1. Flameproof box
2. Cover of flameproof box
3. Hinge (2x)
4. UFC 500...-EEx electronics unit (5x)
5. Heating element
6. Intrinsically safe SMB receptacles
7. Rail with non-I.S. connection terminals
8. EMC-rail with shielding terminals

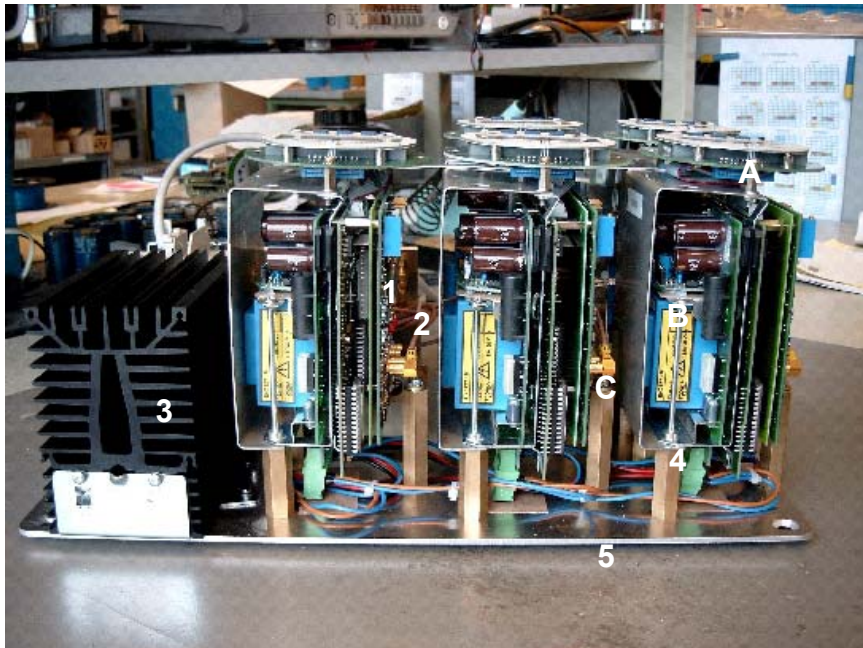
Figure 2 UFC-V/LT-EEx Ultrasonic Flow Converter (inside of box)

#### After opening instructions:

- The copper grounding strip at the back of the electronics unit must be securely screwed to the longest brass mounting bushing by screw C (see figure below). The electronics unit is screwed to the two shorter brass mounting bushings by two screws B. Before screws B and C can be accessed, the display unit must be removed via screws A first. See figure below.

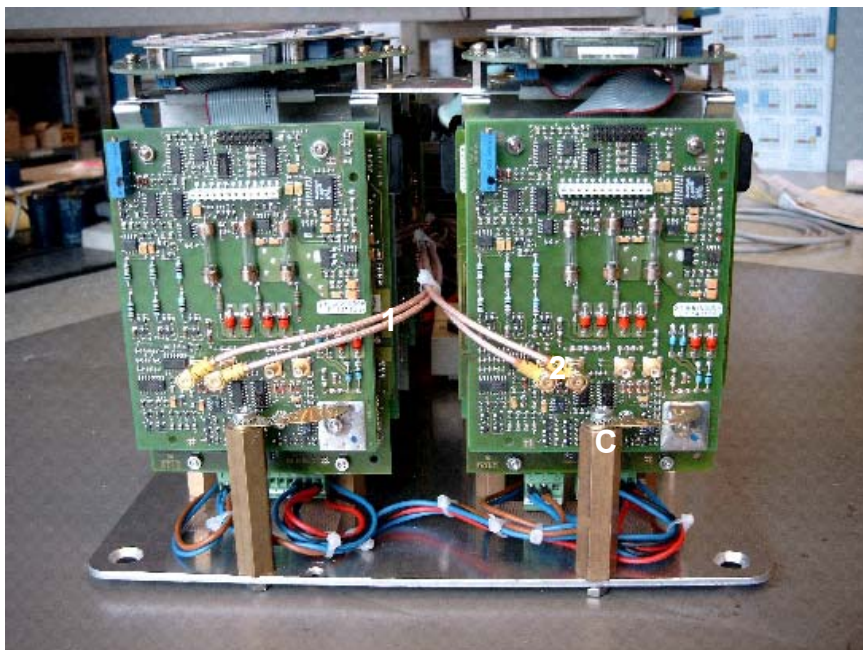


- Before the cover is bolted back onto the flameproof box, the flanged joint as well as the screw-thread of the bolts must be clean and well-greased with an acid and resin-free grease, e.g. silicone grease.
- Screw all bolts tightly into the box with the right size socket-head screw wrench.



1. Coaxial cables (intrinsically safe)
2. SMB plugs (intrinsically safe)
3. Heater
4. Mounting bushing
5. Mounting plate

Figure 3a: Side view of assembled mounting plate of UFC-V/LT-EEx



1. Coaxial cable
2. SMB plugs

Figure 3b: View right side of figure 3

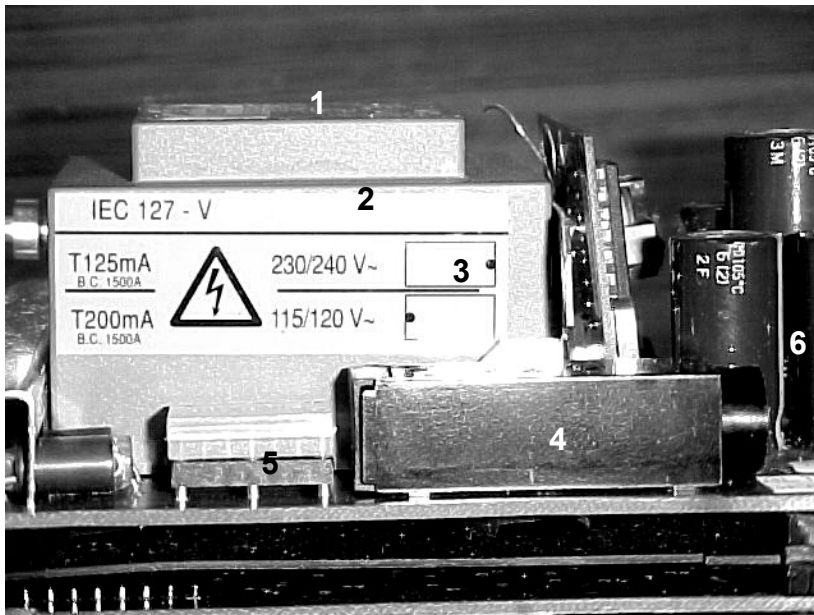
### 3.2 Replacement of electronics unit

Refer to standard installation and operating instructions for information about resetting and reprogramming the new electronics unit after replacement. Important customer specific data should be recorded before replacing the electronics unit(s)!

Before commencing work, note the "Before opening" instructions, then continue as follows:

1. Unscrew all bolts of the flameproof box and open the cover.
2. Disconnect the SMB connectors of the coaxial cables, the 3-pole power supply connector and 5-pole connector of the in-/output circuits at the electronics unit(s) involved.
3. Unscrew the two screws A of the display unit and turn display unit carefully aside or remove the unit completely by taking out the flat cable connector.
4. Unscrew the two mounting screws B of the electronics unit and screw C, which fixes the copper earth strip at the back of the housing. Remove the unit(s) from the box.
5. Check the new electronics unit if the voltage setting (only applicable for AC supplies) and power fuse rating are correct. Change the voltage setting or exchange the fuse if necessary.
6. Install the electronics unit into the box and plug the 3-pole and 5-pole connectors back in. Fixate screws B and C and screw the display unit back on via screws A, after the flat cable connector is connected. Plug the numbered SMB connectors to the corresponding numbered SMB receptacles on the electronics unit.
7. Close the cover of the flameproof box and screw all bolts tightly with the right size socket-head screw wrench.

Note the "After opening" instructions during reassembling.



1. Mains transformer  
115/230 VAC version
2. Sticker with fuse rating
3. Indication of voltage selector (black dot = notch)
4. Mains fuse F1 (in fuse-holder)
5. Voltage selector
6. Side of display unit

Figure 4: Power supply version 115/230 V AC

### 3.3 Replacement of power fuse(s)

#### 3.3.1 AC versions 115/230 V AC and 100/200 V AC

Before commencing work, note the "Before opening" instructions, then continue as follows:

1. Unscrew the bolts and open the cover of the flameproof box.
2. Unscrew the two screws A of the display unit and turn the display unit carefully aside.
3. The fuse-holder, in which the power fuse in accordance with IEC 127-2 size Ø5 x 20 mm is mounted, is now accessible to replace the defect power fuse F1 by a new fuse with the same rating. The fuse rating depends on the voltage setting of the power supply unit (T200mA for 100/115V AC and T125mA for 200/230 V AC). See also the yellow sticker that is glued on the mains transformer as shown in the figure on the previous page.
4. Reassemble the unit in reverse order (points 2 and 1).

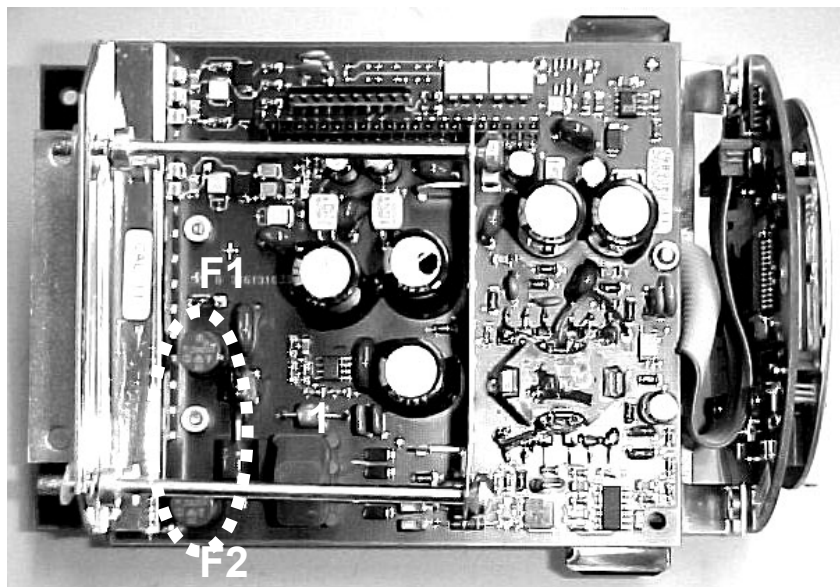
Note the "After opening" instructions during reassembling.

### 3.3.2 24 V AC/DC version

Before commencing work, note the "Before opening" instructions, then continue as follows:

1. Unscrew the bolts and open the cover of the flameproof box.
2. Unscrew screws A of the display unit and disconnect it via the flat cable connector.
3. Unscrew the copper earth strip (screw C) and the mounting screws B of the electronics unit. Disconnect the SMB connectors and the 3-pole and 5-pole connectors. Then take the complete electronics unit out of the box.
4. The power fuses F1 and F2 (see figure below) can be replaced now. The 24 V AC/DC power supply uses two sub-miniature fuses rated T1.25A in accordance with IEC 127-3.
5. Reassemble in reverse order (points 3 through 1).

Note the "After opening" instructions during reassembling.



1. Location of power fuses

Figure 5: Power fuses F1 and F2 on 24 V AC/DC power supply of UFC 500...-EEx

### 3.4 Changing power supply voltage (not for 24 V AC/DC version)

Before commencing work, note the "Before opening" instructions, then continue as follows:

1. Unscrew the bolts and open the cover of the flameproof box.
2. Unscrew screws A of the display unit and disconnect it via the flat cable connector.
3. Unscrew the copper earth strip (screw C) and the mounting screws B of the electronics unit. Disconnect the SMB connectors and the 3-pole and 5-pole connectors. Then take the complete electronics unit out of the box.
4. The voltage setting of the power supply can be changed by turning the dummy dual-in-line block (i.e. voltage selector, see figure 4) over 180° in its socket. The position of the notch on the dummy dual-in-line block indicates the voltage setting. Also see the sticker that is mounted on the mains transformer (Figure 4).
5. Install the electronics unit into the box and plug the 3-pole and 5-pole connectors back in. Fixate screws B and C and screw the display unit back on via screws A, after the flat cable connector is connected. Plug the numbered SMB connectors to the corresponding numbered SMB receptacles on the electronics unit.
6. Close the cover of the flameproof box and screw all bolts tightly with the right size socket-head screw wrench.

Note the "After opening" instructions during reassembling.



# Appendix 1 Type Examination Certificate

PTB Certificate PTB 01 ATEX 2012 EEx UFS 500 F/.../...-EEx German original page 1-3

## Physikalisch-Technische Bundesanstalt

Braunschweig und Berlin



### (1) EG-Baumusterprüfbescheinigung

- (2) Geräte und Schutzsysteme zur bestimmungsgemäßen Verwendung in explosionsgefährdeten Bereichen - **Richtlinie 94/9/EG**
- (3) EG-Baumusterprüfbescheinigungsnummer



**PTB 01 ATEX 2012 X**

- (4) Gerät: Sensorkopf Typ UFS 500 F/.../...-EEx bzw. ULS 500 F/.../...-EEx
- (5) Hersteller: Krohne Altometer
- (6) Anschrift: NL-3313 LC Dordrecht
- (7) Die Bauart dieses Gerätes sowie die verschiedenen zulässigen Ausführungen sind in der Anlage zu dieser Baumusterprüfbescheinigung festgelegt.
- (8) Die Physikalisch-Technische Bundesanstalt bescheinigt als benannte Stelle Nr. 0102 nach Artikel 9 der Richtlinie des Rates der Europäischen Gemeinschaften vom 23. März 1994 (94/9/EG) die Erfüllung der grundlegenden Sicherheits- und Gesundheitsanforderungen für die Konzeption und den Bau von Geräten und Schutzsystemen zur bestimmungsgemäßen Verwendung in explosionsgefährdeten Bereichen gemäß Anhang II der Richtlinie.
- Die Ergebnisse der Prüfung sind in dem vertraulichen Prüfbericht PTB Ex 01-20265 festgehalten.
- (9) Die grundlegenden Sicherheits- und Gesundheitsanforderungen werden erfüllt durch Übereinstimmung mit

**EN 50014:1997+A1+A2**

**EN 50020:1994**

- (10) Falls das Zeichen „X“ hinter der Bescheinigungsnummer steht, wird auf besondere Bedingungen für die sichere Anwendung des Gerätes in der Anlage zu dieser Bescheinigung hingewiesen.
- (11) Diese EG-Baumusterprüfbescheinigung bezieht sich nur auf Konzeption und Bau des festgelegten Gerätes gemäß Richtlinie 94/9/EG. Weitere Anforderungen dieser Richtlinie gelten für die Herstellung und das Inverkehrbringen dieses Gerätes.
- (12) Die Kennzeichnung des Gerätes muß die folgenden Angaben enthalten:

**II 2 G EEx ib IIC T6...T4/T3/T1**

Zertifizierungsstelle Explosionsschutz  
Im Auftrag

Braunschweig, 20. März 2001

Dr.-Ing. U. Johannsmeyer  
Regierungsdirektor



Seite 1/3

EG-Baumusterprüfbescheinigungen ohne Unterschrift und ohne Siegel haben keine Gültigkeit.  
Diese EG-Baumusterprüfbescheinigung darf nur unverändert weiterverbreitet werden.  
Auszüge oder Änderungen bedürfen der Genehmigung der Physikalisch-Technischen Bundesanstalt.

Physikalisch-Technische Bundesanstalt • Bundesallee 100 • D-38116 Braunschweig



(13) **Anlage**

(14) **EG-Baumusterprüfbescheinigung PTB 01 ATEX 2012 X**

(15) Beschreibung des Gerätes

Der Sensorkopf Typ UFS 500 F/.../...-EEx (alternative Typenbezeichnung ULS 500 F/.../...-EEx) dient als Messwertaufnehmer zur Bestimmung des Durchflusses brennbarer und nicht brennbarer flüssiger Medien nach dem Ultraschall-Verfahren. Der Sensorkopf wird in drei Ausführungen gefertigt:

- UFS (ULS) F-EEx für allgemeine Anwendungen
- UFS (ULS) F/5STR-EEx für erhöhte Genauigkeit
- UFS (ULS) F/HT-EEx für einen erweiterten Bereich der Mediumtemperatur

Der zulässige Bereich der Umgebungstemperatur beträgt -40 °C bis + 60 °C .

Die elektrischen Daten, die Zündschutzart sowie die Zuordnung der Temperaturklasse zum zulässigen Bereich der Mediumtemperatur für die einzelnen Ausführungen sind der folgenden Tabelle zu entnehmen:

Typ	UFS F-EEx	UFS F/5STR-EEx	UFS F/HT-EEx
<b>Zündschutzart</b>	EEx ib IIC T6...T3	EEx ib IIC T6...T4	EEx ib IIC T6...T1
<b>Elektrische Daten</b>	in Zündschutzart Eigensicherheit EEx ib IIC nur zum Anschluss an bescheinigte eigensichere Stromkreise		
Höchstwerte:			
U <sub>i</sub> [V]	13,1	13,1	13,1
I <sub>i</sub> [mA]	600	600	600
C <sub>i</sub> [nF]	7,7	3,9	7,7
L <sub>i</sub> [µH]	134	38,3	134
<b>Temperaturklasse</b>	<b>zulässiger Bereich der Mediumtemperatur</b>		
T6	-50 °C ... +80 °C	-20 °C ... +80 °C	-200 °C ... +80 °C
T5	-50 °C ... +95 °C	-20 °C ... +95 °C	-200 °C ... +95 °C
T4	-50 °C ... +130 °C	-20 °C ... +120 °C	-200 °C ... +130 °C
T3	-50 °C ... +180 °C	-	-200 °C ... +195 °C
T2	-	-	-200 °C ... +290 °C
T1	-	-	-200 °C ... +440 °C

# Physikalisch-Technische Bundesanstalt

Braunschweig und Berlin

Anlage zur EG-Baumusterprüfbescheinigung PTB 01 ATEX 2012 X



(16) Prüfbericht PTB Ex 01-20265

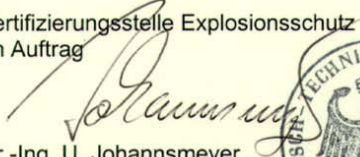
(17) Besondere Bedingungen

Der Anschluss für den Potentialausgleichsleiter ist mit dem Potentialausgleich des explosionsgefährdeten Bereiches sicher zu verbinden.

(18) Grundlegende Sicherheits- und Gesundheitsanforderungen

erfüllt durch die vorgenannten Normen

Zertifizierungsstelle Explosionsschutz  
Im Auftrag

  
Dr.-Ing. U. Johannsmeyer  
Regierungsdirektor



Braunschweig, 20. März 2001

Seite 3/3

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EG-Baumusterprüfbescheinigungen ohne Unterschrift und ohne Siegel haben keine Gültigkeit.  
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Physikalisch-Technische Bundesanstalt • Bundesallee 100 • D-38116 Braunschweig

## Physikalisch-Technische Bundesanstalt

Brunswick and Berlin

### (1) **EC-type examination certificate**

(2) Apparatuses and protective systems intended for use  
in hazardous locations - **Directive 94/9/EC**



(3) EC-type examination certificate number

### **PTB 01 ATEX 2012 X**

(4) Apparatus: Sensor head type UFS 500 F/.../...-EEx resp. ULS 500 F/.../...-EEx

(5) Manufacturer: Krohne Altometer

(6) Address: NL-3313 LC Dordrecht

(7) This electrical apparatus and any acceptable variations thereto are specified in the Annex to this EC-type examination certificate and the documents therein referred to.

(8) The Physikalisch-Technische Bundesanstalt approves as Notified Body No. 0102, conform to Article 9 of the Council Directive of the European Communities of March 23, 1994 (94/9/EC), the completion of the fundamental safety and health requirements for the concept and the manufacturing of apparatuses and protective systems intended for use in hazardous locations conform to Annex II of the Directive.

The test results are documented in the confidential test report PTB Ex 01-20265.

(9) The fundamental safety and health requirements are fulfilled due to the accordance with

**EN 50014:1997 + A1 +A2**

**EN 50020:1994**

(10) In case that the symbol "X" is printed behind the certification number, reference is made to special requirements in the Annex to this certificate for safe use of the apparatus.

(11) This EC-type examination certificate only concerns the concept and testing of the described apparatuses conform to Directive 94/9/EC. Further requirements of this directive apply to the manufacturing and marketing of these apparatuses.

(12) The apparatus' marking shall include the following codes:



**II 2 G EEx ib IIC T6...T4/T3/T1**

Approval department Explosion Safety  
On behalf of

Official stamp  
of the PTB

Brunswick, March 20, 2001

Dr.-Ing. U. Johannsmeyer  
Regierungsdirektor

# Physikalisch-Technische Bundesanstalt

Brunswick and Berlin

## (13) Annex

### (14) EC-type examination certificate PTB 01 ATEX 2012 X

#### (15) Description of the apparatus

The sensor head type UFS 500 F/.../...-EEx (alternative type designation ULS 500 F/.../...-EEx) is used as measuring unit for determination of the flow rate of combustible and non-combustible liquid media according to the ultrasonic measurement principle. The sensor head is manufactured in three different designs:

UFS (ULS) F-EEx                      for general applications  
 UFS (ULS) F/5STR-EEx            for high accuracy  
 UFS (ULS) F/HT-EEx                for an increased range of the medium temperature

The permissible ambient temperature range is -40°C up to +60°C.

The electrical data, the type of protection as well as the classification of the temperature class in relation to the medium temperature range of the individual designs must be derived of the following table:

Type	UFS F-EEx	UFS F/5STR-EEx	UFS F/HT-EEx
<b>Type of protection</b>	EEx ib IIC T6...T3	EEx ib IIC T6..T4	EEx ib IIC T6...T1
<b>Electrical data</b>			
<b>Sensor circuit</b>	in type of protection EEx ib IIC only to be connected to approved intrinsically safe circuits		
Maximum values:			
$V_i$ [V]	13.1	13.1	13.1
$I_i$ [mA]	600	600	600
$C_i$ [nF]	7.7	3.9	7.7
$L_i$ [µH]	134	38.3	134
<b>Temperature class</b>	<b>permissible medium temperature range</b>		
T6	-50°C ... +80°C	-20°C ... +80°C	-200°C ... +80°C
T5	-50°C ... +95°C	-20°C ... +95°C	-200°C ... +95°C
T4	-50°C ... +130°C	-20°C ... +120°C	-200°C ... +130°C
T3	-50°C ... +180°C	-	-200°C ... +195°C
T2	-	-	-200°C ... +290°C
T1	-	-	-200°C ... +440°C

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EC-type examination certificates are not valid without signature and official stamp.  
 These EC-type examination certificates may be circulated only in the unaltered state.  
 Extracts or modifications require the approval of the Physikalisch-Technische Bundesanstalt.  
 Physikalisch-Technische Bundesanstalt • Bundesallee 100 • D-38116 Brunswick

## Physikalisch-Technische Bundesanstalt

Brunswick and Berlin

Annex to EC-type examination certificate PTB 01 ATEX 2012 X

(16) Test report PTB Ex 01-20265

(17) Special requirements

The connection of the equipotential bonding conductor must be securely connected with the equipotential bonding system of the hazardous location.

(18) Fundamental safety and health requirements

fulfilled due to the previous mentioned standards

Approval department Explosion Safety  
On behalf of

Official stamp  
of the PTB

Brunswick, March 20, 2001

Dr.-Ing. U. Johannsmeyer  
Regierungsdirektor





(1) **EC-TYPE EXAMINATION CERTIFICATE**

- (2) Equipment or protective system intended for use in potentially explosive atmospheres - Directive 94/9/EC
- (3) EC-Type Examination Certificate Number: **KEMA 02ATEX2168**
- (4) Equipment or protective system: **Ultrasonic measuring units types Altosonic V UFC-V/EEEx and UFC-V/LT-EEEx**
- (5) Manufacturer: **Krohne Altometer**
- (6) Address: **Kerkeplaat 12, 3313 LC Dordrecht, the Netherlands**
- (7) This equipment or protective system and any acceptable variation thereto is specified in the schedule to this certificate and the documents therein referred to.
- (8) KEMA Quality B.V., notified body number 0344 in accordance with Article 9 of the Council Directive 94/9/EC of 23 March 1994, certifies that this equipment or protective system has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of equipment and protective systems intended for use in potentially explosive atmospheres given in Annex II to the directive.

The examination and test results are recorded in confidential report no. 2021056

- (9) Compliance with the Essential Health and Safety Requirements has been assured by compliance with:  
**EN 50014 : 1997      EN 50018 : 2000      EN 50020 : 1994**
- (10) If the sign "X" is placed after the certificate number, it indicates that the equipment or protective system is subject to special conditions for safe use specified in the schedule to this certificate.
- (11) This EC-Type Examination Certificate relates only to the design, examination and tests of the specified equipment or protective system according to the Directive 94/9/EC. Further requirements of the directive apply to the manufacturing process and supply of this equipment or protective system. These are not covered by this certificate.
- (12) The marking of the equipment or protective system shall include the following:

**II 2 G   EEx d [ib] IIB T5**

Arnhem, 19 June 2002  
KEMA Quality B.V.

T. Pijpker  
Certification Manager

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Utrechtseweg 310, 6812 AR Arnhem, The Netherlands  
P.O. Box 5185, 6802 ED Arnhem, The Netherlands  
Telephone +31 26 3 56 20 00, Telefax +31 26 3 52 58 00

ACCREDITED BY THE  
DUTCH COUNCIL FOR  
ACCREDITATION



**SCHEDULE**

- (13) **SCHEDULE**  
 (14) **to EC-Type Examination Certificate KEMA 02ATEX2168**

(15) **Description**

The ultrasonic flow measuring units types Altosonic V UFC-V/EEEx and UFC-V/LT-EEEx are 5-Beam Flow Converters designed to measure the flow of a liquid.

Ambient temperature range : - 20 °C .. + 60 °C (standard version)  
 : - 50 °C .. + 60 °C (LT version, cable gland)  
 : - 55 °C .. + 60 °C (LT version, conduit)

**Electrical data**

Rated voltage..... 24 V or 115/230 V, 50/60 Hz or 24 Vdc  
 Power dissipation..... max. 50 W (standard version)  
 max. 240 W (LT version)

Measurement circuits in type of explosion protection intrinsic safety EEx ib IIC, only for connection to a certified intrinsically safe circuit, with the following maximum values:

$$\begin{aligned} U_o &= 8,7 && V \\ I_o &= 360 && mA \\ P_o &= 783 && mW \end{aligned}$$

Maximum allowed external capacitance  $C_o = 1,2 \mu F$ ,  
 maximum allowed external inductance  $L_o = 0,17 mH$ .

**Installation instructions**

The cable entry devices and blanking elements of unused apertures shall be of a certified flameproof type, suitable for the conditions of use and correctly installed.

With the use of conduit, a suitable certified sealing device such as a stopping box with compound shall be provided immediately at the entrance to the flameproof enclosure.

**Routine tests**

None.

(16) **Report**

KEMA No. 2021056.

(17) **Special conditions for safe use**

None.

(18) **Essential Health and Safety Requirements**

Covered by the standards listed at (9).



(13) **SCHEDULE**  
(14) **to EC-Type Examination Certificate KEMA 02ATEX2168**

(19) **Test documentation**

1. Component Certificate	PTB No. Ex-99.E.2062 U KEMA No. Ex-96.D.1866 U
Certificate of Conformity	KEMA No. Ex-99.E.2075
EC-Type Examination Certificate	CESI 00 ATEX 036 U
	<u>dated</u>
2. Description (12 pages)	22.04.2002, 21.05.2002 and 13.06.2002
3. Drawings index sheet	22.04.2002



## AMENDMENT 1

to EC-Type Examination Certificate KEMA 02ATEX2168

Manufacturer: **Krohne Altometer**

Address: **Kerkeplaat 12, 3313 LC Dordrecht, the Netherlands**

### Description

In future, the ultrasonic flow measuring units types Altosonic V UFC-V/EEEx and UFC-V/LT-EEEx may also be constructed in accordance with the documentation listed below.

The modifications concern:

- the mechanical and electrical assembly.
- an optional heater (max. 30 W) used in the standard (-20 °C) version.

All other data remain unchanged.

### Test documentation

	<u>dated</u>
1. Description (5 pages)	24.12.2002 and 06.02.2003
2. Drawing List	06.02.2003

Arnhem, 11 June 2003  
KEMA Quality B.V.



T. Pijpker  
Certification Manager

[2026551]

## Appendix 2 Declaration of Conformity

### EC-DECLARATION OF CONFORMITY

**KROHNE**

The Level and Flow Company

KROHNE Altometer  
Kerkeplaat 12  
3313 LC DORDRECHT  
The Netherlands

We declare herewith under sole responsibility that the product(s):

**UFS 500 F/5STR-EEEx flow sensor**  
**UFC-V/EEEx flow converter**  
**UFC-V/LT-EEEx flow converter**

Ultrasonic Flowmeter (Type in accordance with quotation, order acknowledgement, tagging; details in Installation and Operation Manual) are in conformity with the protection requirements of Council Directives (as far as applicable):

EMC Directive 89/336/EC  
Pressure Equipment Directive 97/23/EC  
ATEX Directive 94/9/EC

The stipulated safety and public health safety requirements are fulfilled in accordance with the harmonized standards or mentioned technical specifications (as far as applicable):

89/336/EEC	94/9/EC	97/23/EC
EN 61326-1	EN 50014 EN 50018 EN 50020	EN 13445-2 EN 729-2 AD-2000-Merkblatt Reihe B AD-2000-Merkblatt Reihe W

The equipment type plates and order acknowledgement show the detailed tagging due to these directives. These are described in the Installation and Operation Manual.

Directive	Assessment	Certificate	Notified Body	Ident. No.
94/9/EC	Module B+D	PTB 01 ATEX 2012 X KEMA 02 ATEX 2168	PTB KEMA	
97/23/EC	Module H	STW 304050726	Lloyds	0343

Dordrecht, September 11<sup>th</sup>, 2003



General Management

## Appendix 3 Data plates

<b>KROHNE</b> Kerkeplaat 12 3313 LC Dordrecht The Netherlands		CE 0344
Altometer		
TYPE	ALTOSONIC V UFC-V/EEEx	YEAR OF PRODUCTION
		2002
KEMA 02 ATEX 216B		
II 2G EEx d [ib] IIB T5		
U <sub>o</sub> = 8.7 V	Co = 1.2 μF	IP <input type="checkbox"/>
Io = 360 mA	Lo = 0.17 mH	
AMBIENT TEMPERATURE: -20...+60°C		
SERIAL NO. <input type="text"/>		
ADD. HEATER <input type="text"/>		
POWER <input type="text"/> V <sub>vac</sub> + <input type="text"/> % - <input type="text"/> % <input type="text"/> V <sub>dcc</sub> <sup>+33%</sup> / <sub>-25%</sub>		
48-63Hz/5x12VA 5x8W		
DO NOT OPEN "EEx d" ENCLOSURE WHILE ENERGIZED. WAIT AT LEAST 30 MINUTES AFTER DE-ENERGIZING. ONLY CABLE GLANDS OF "EEx d" APPROVED TYPE IN ACCORDANCE WITH EN 50018 MAY BE INSTALLED ! WHEN RIGID CONDUITS ARE USED, THEY MUST BE SEALED BY PRE-CERTIFIED "EEx d" SEALING DEVICES DIRECTLY AT THE ENCLOSURE WALL !		
UFS 500 F/5STR-EEEx PRIMARY HEAD		
SERIAL No. <input type="text"/>		
METER SIZE <input type="text"/>		
PRIM.CONST. <input type="text"/>		
RANGE F <input type="text"/>		
UFP-V FLOW PROCESSOR UNIT		
SERIAL No. <input type="text"/>		
PULSES <input type="text"/>		

<b>KROHNE</b> Kerkeplaat 12 3313 LC Dordrecht The Netherlands		CE 0344
Altometer		
TYPE	ALTOSONIC V UFC-V/EEEx	YEAR OF PRODUCTION
		2002
KEMA 02 ATEX 216B		
II 2G EEx d [ib] IIB T5		
U <sub>o</sub> = 8.7 V	Co = 1.2 μF	IP <input type="checkbox"/>
Io = 360 mA	Lo = 0.17 mH	
AMBIENT TEMPERATURE: -20...+60°C		
SERIAL NO. <input type="text"/>		
ADD. HEATER <input type="text"/> 30 W / 24 V <sub>dcc</sub>		
POWER <input type="text"/> V <sub>vac</sub> + <input type="text"/> % - <input type="text"/> % <input type="text"/> V <sub>dcc</sub> <sup>+33%</sup> / <sub>-25%</sub>		
48-63Hz/5x12VA 5x8W		
DO NOT OPEN "EEx d" ENCLOSURE WHILE ENERGIZED. WAIT AT LEAST 30 MINUTES AFTER DE-ENERGIZING. ONLY CABLE GLANDS OF "EEx d" APPROVED TYPE IN ACCORDANCE WITH EN 50018 MAY BE INSTALLED ! WHEN RIGID CONDUITS ARE USED, THEY MUST BE SEALED BY PRE-CERTIFIED "EEx d" SEALING DEVICES DIRECTLY AT THE ENCLOSURE WALL !		
UFS 500 F/5STR-EEEx PRIMARY HEAD		
SERIAL No. <input type="text"/>		
METER SIZE <input type="text"/>		
PRIM.CONST. <input type="text"/>		
RANGE F <input type="text"/>		
UFP-V FLOW PROCESSOR UNIT		
SERIAL No. <input type="text"/>		
PULSES <input type="text"/>		

### Standard UFC-V/EEEx Ultrasonic Flow Converter

### Standard version UFC-V/EEEx with optional 30 W heater

<b>KROHNE</b> Kerkeplaat 12 3313 LC Dordrecht The Netherlands		CE 0344
Altometer		
TYPE	ALTOSONIC V UFC-V/LT-EEEx	YEAR OF PRODUCTION
		2002
KEMA 02 ATEX 216B		
II 2G EEx d [ib] IIB T5		
U <sub>o</sub> = 8.7 V	Co = 1.2 μF	IP <input type="checkbox"/>
Io = 360 mA	Lo = 0.17 mH	
AMBIENT TEMPERATURE: -50...+60°C		
SERIAL NO. <input type="text"/>		
ADD. HEATER <input type="text"/> 130 W / 230 V <sub>vac</sub>		
POWER <input type="text"/> V <sub>vac</sub> + <input type="text"/> % - <input type="text"/> % <input type="text"/> V <sub>dcc</sub> <sup>+33%</sup> / <sub>-25%</sub>		
48-63Hz/5x12VA 5x8W		
DO NOT OPEN "EEx d" ENCLOSURE WHILE ENERGIZED. WAIT AT LEAST 30 MINUTES AFTER DE-ENERGIZING. ONLY CABLE GLANDS OF "EEx d" APPROVED TYPE IN ACCORDANCE WITH EN 50018 MAY BE INSTALLED ! WHEN RIGID CONDUITS ARE USED, THEY MUST BE SEALED BY PRE-CERTIFIED "EEx d" SEALING DEVICES DIRECTLY AT THE ENCLOSURE WALL !		
UFS 500 F/5STR-EEEx PRIMARY HEAD		
SERIAL No. <input type="text"/>		
METER SIZE <input type="text"/>		
PRIM.CONST. <input type="text"/>		
RANGE F <input type="text"/>		
UFP-V FLOW PROCESSOR UNIT		
SERIAL No. <input type="text"/>		
PULSES <input type="text"/>		

<b>KROHNE</b> Kerkeplaat 12 3313 LC Dordrecht The Netherlands		YEAR OF PRODUCTION <input type="text"/>
Altometer		
TYPE	UFS 500 F/5STR-EEEx	
SERIAL NO.	<input type="text"/>	

PTB 01 ATEX 2012 X Tamb: -40...+60°C		CE 0344
II 2G EEx ib IIC T6...T4		
5x INTRINSICALLY SAFE SENSOR CIRCUITS:		
PER SENSOR CIRCUIT:		
Ui=13,1V, Ii=600mA, Ci=3,9nF, Li=38,3μH		
MAXIMUM PROCESS TEMPERATURE:		
T6(T <sub>proc</sub> < 80°C) T5(T <sub>proc</sub> < 95°C) T4(T <sub>proc</sub> < 120°C)		

### Low-temperature version UFC-V/LT-EEEx (cable gland design)

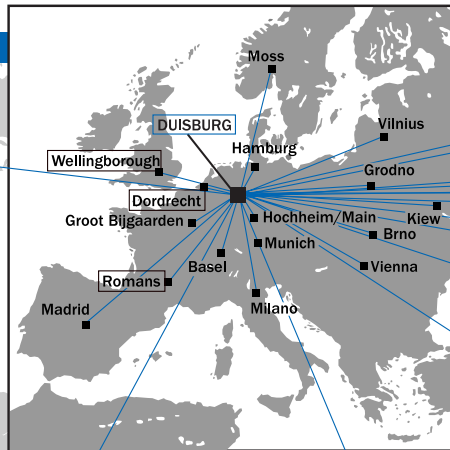
### UFS 500 F/5STR-EEEx Flow Sensor

**NOTE:** The heating element may have a maximum power dissipation of 200 W. The current heating element has a power dissipation of approx. 130 W.

<http://www.krohne.com>

Production

**KROHNE**



#### Australia

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