



# Ultrasonic Flow Meter Series 6 Q.Sonic®

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**Manual  
Safety Instructions**

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# 1 General information

## 1.1 About these instructions

This manual contains safety instructions for installation, operation, and maintenance of the Ultrasonic Flow Meter (UFM) Series 6, models, Q.Sonic-max, Q.Sonic-plus, Q.Sonic-atom, CheckSonic, FlareSonic and Vx.Sonic. In addition to providing essential information for proper operation and maintenance of the product, this manual offers important instructions to prevent accidents and serious damage in all stages of the product's lifespan; pre-commissioning, daily operations, and trouble-free maintenance. Before using any of the products please read this manual carefully, familiarize yourself with the operation of the product, and strictly follow the instructions.

## 1.2 Relevant user documentation

Elster Gas Metering business provides the user documentations such as manuals, certificates, technical information for your UFM Series 6 meter in a ZIP file. The download information for this ZIP file is delivered with your device. Manuals referenced by this manual are included in this ZIP, such as UFM Series 6 "Safety Instructions".

We especially recommend the following manuals:

- ⇒ UFM Series 6 "Shipping and Storage"
- ⇒ UFM Series 6 "Operation and Maintenance" for your meter
- ⇒ UFM Series 6 "Wiring Instructions"
- ⇒ UFM Series 6 "Modbus Protocol"

Single documents are published in the Docuthek. The documents are updated regularly.

[www.docuthek.com/](http://www.docuthek.com/)

Use the device series or the device type as search term:

**UFM Series 6** or **Q.Sonic-max**

### 1.3 Limitation of liability

This manual is based on the latest information. It is provided subject to alterations. We reserve the right to change the construction and/or configuration of our products at any time without obligation to update previously shipped equipment.

The warranty conditions specified in the manufacturer's terms of delivery apply to the product. Warranty claims are excluded in the following cases:

- The repair or replacement of the equipment or parts thereof has been required by natural wear and tear, in whole or in part due to a catastrophe, or because of a defect or fault on the part of the purchaser.
- Maintenance or repair of the device or device parts has not been carried out by an authorized representative of the manufacturer, or modifications have been made to the device or device parts without prior express written consent of the manufacturer.
- No original parts are used.
- The device has been used incorrectly, carelessly, improperly, or not in accordance with its nature and/or intended use.
- The product has been used with unauthorized components or peripherals such as cables, test equipment, computers, or with unauthorized voltages.

The manufacturer is not liable for incidental or consequential damages arising from breach of express or implied warranties, including property damage, and to the extent permitted by law, personal injury.



#### **Read this manual carefully.**

Read the safety instructions carefully before starting any work.

The manufacturer accepts no liability for loss or defects resulting from failure to comply with this manual.

We reserve the right to make technical changes within the scope of optimizing the performance characteristics and continuous further development of the device.

The current warranty conditions in the General Terms and Conditions are available on our website:

[process.honeywell.com/us/en/site/elster-instromet/about-us](https://process.honeywell.com/us/en/site/elster-instromet/about-us)

## 2 Application and operation

### 2.1 System

The ultrasonic flow meter comprises of the following main parts as listed below and seen in ⇒ [Fig. 2-1](#). The flow cell (in yellow) is the part of the ultrasonic flow meter that is mounted in the piping system. All other components are mounted on the flow cell.

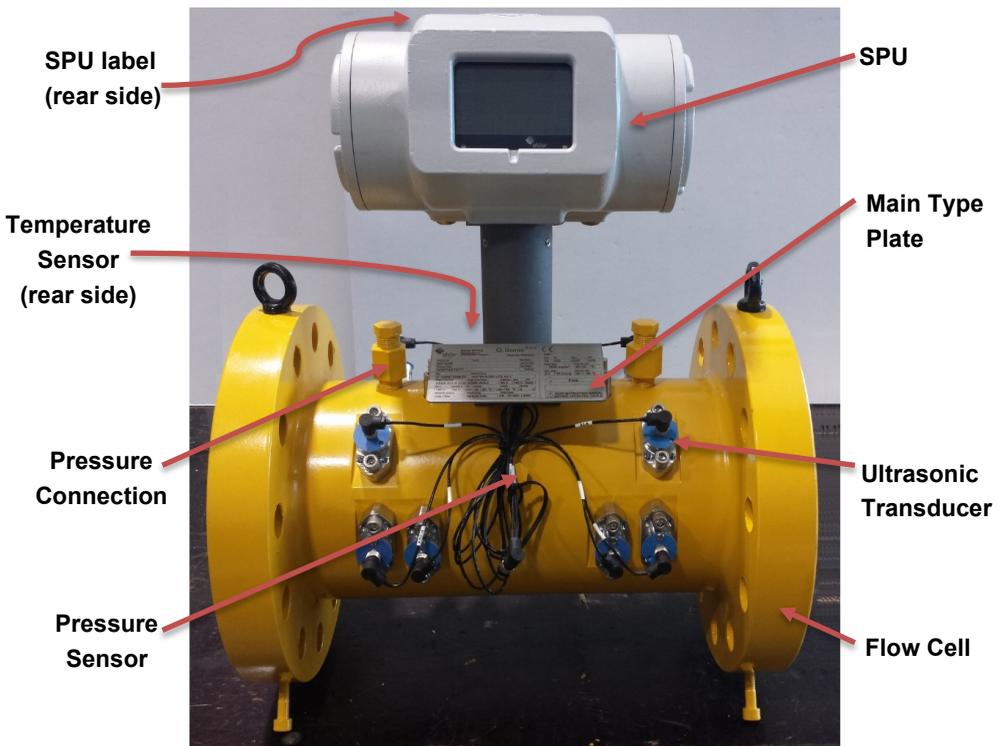


Fig. 2-1: Example of an Elster Ultrasonic Gas Flow Meter

## Flow Meter components:

- The **Signal Processing Unit (SPU)** – houses the flow meter electronics.
- Two **Ultrasonic Transducers** per flow measurement path.
- The spool piece (**Flow Cell**) designed for gas flow measurement.
- An optional Pressure Sensor.
- An optional Temperature Sensor.
- $p_m$  (or  $p_r$ ) **Pressure Connection** (for flow pressure); one or two (provided with adapter piece).
- The **SPU Label** (see subsequent sections)
- The Main Type Plate

**Caution!**

The ultrasonic flow meter is intended for flow measurement as indicated on the SPU label and the flow meter (main) type plate. Never exceed any limitations for use!

**Tip!**

This document provides essential details for safe installation and maintenance of the ultrasonic flow meter, including a non-exhaustive list of safety prescriptions provided in ⇒ [Annex C – Safety prescriptions](#) (p. 31).

The ultrasonic flow meter is to be operated on the local display or by “remote control”, for example, by means of a PC with the enSuite software, as part of your specific flow meter.

## 2.2 SPU

The Signal Processing Unit (SPU) houses the flow meter electronics and comprises the following user interfaces:

- SPU label (⇒ [2.2.2 SPU – labels](#), p. 9)
- Electrical user connections  
⇒ [3 Installation](#) (p. 15) and ⇒ [4 Electrical parameters](#) (p. 23)
- Local display (see the Operation and Maintenance manual of your particular flow meter, latest valid version)

### 2.2.1 SPU – special conditions for safe use

Contact the manufacturer for information on the dimensions of the flameproof joints.

The enclosure is provided with special fasteners of property class A2-70. These special fasteners are only available from Elster.

For FM approved products refer to ⇒ [Annex A – control drawing \(FM\)](#) (p. 27) for particular requirements.

### 2.2.2 SPU – labels

The ultrasonic flow meter is available with approval for use in hazardous areas according to ATEX, IECEx, FM approval, or CSA. Always refer to the actual label information on your flow meter as well as this manual for correct use.

Each SPU label comprises:

- Our company name and address
- Type of ultrasonic flow meter
- Model SPU
- Serial number
- Power: 18-30 VDC / 20Wmax
- Year-Month
- Warning: Read instruction manual before operating device

- Additional label information depending on the applicable approval (⇒ [2.2.2 SPU – labels](#), p. 9)

Please see below for an explanation of each label type using an Ultrasonic Flow Meter Series 6 Q.Sonic-plus model as an example.

### 2.2.2.1 ATEX certification

The explosion proof housing has the following ATEX certification information:

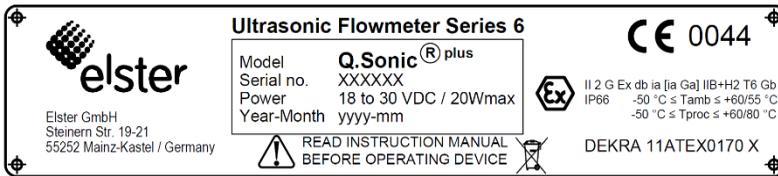


Fig. 2-2: ATEX label – example

- Classification: Ex II 2 G Ex db ia [ia Ga] IIB+H2 T6 Gb IP66
- Temperature ranges for ambient and process condition:
  - 50 °C ≤ Tamb ≤ +60/55 °C
  - 50 °C ≤ Tproc ≤ +60/80 °C
- ATEX markings: II 2 G 0044
- 0044 is the Notified Body number of TÜV NORD CERT GmbH
- ATEX certificate reference: DEKRA 11ATEX0170 X



#### Warning

Read the “Operating and Maintenance” manual for your device before operating device.

### 2.2.2.2 IECEx certification

The explosion proof housing has the following IECEx certification information:

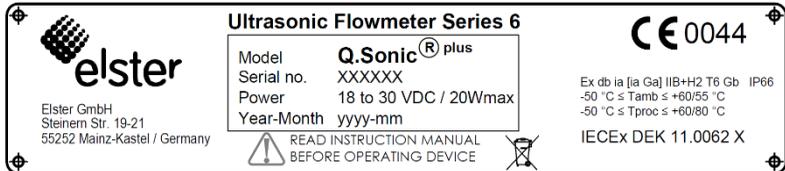


Fig. 2-3: IECEx label – example

- Classification: Ex db ia [ia Ga] IIB+H2 T6 Gb IP66
- Temperature ranges for ambient and process condition:
  - 50 °C ≤ Tamb ≤ +60/55 °C
  - 50 °C ≤ Tproc ≤ +60/80 °C
- IECEx certificate reference: IECEX DEK11.0062 X



#### Warning

Read the “Operating and Maintenance” manual for your device before operating device.

### 2.2.2.3 FM certification

The explosion proof housing has the following FM certification information:

- Explosion proof for Class I, Division 1, Group A, B, C and D
- Intrinsically safe for Class I, Division 1, Group A, B, C and D
- Ta = -40 °F to 140 °F (-40 °C to +60 °C), T6
- Type 4X
- “FM approved” mark
- Installation requirement: Seal fitting required within 1.5 inches of enclosure

- Warning: Read Instruction Manual (Control Drawing: 03.304.001.003.05/2) before operating device. A copy of the control drawing is available in ⇒ [Annex A – control drawing \(FM\)](#) (p. 27).

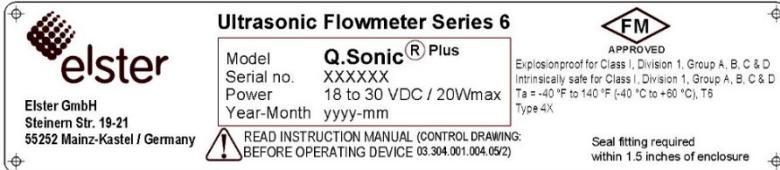


Fig. 2-4: FM Label – example

### 2.2.2.4 CSA certification

The explosion proof housing has the following CSA certification information:

- Explosion proof for Class I, Division 1, Group B, C and D T6
- Ex d ia [ia] IIB + H2 T6
- $-50\text{ °C} \leq T_{amb} \leq +60\text{ °C}$
- Type 4X
- IP66
- CSA 13.70001043
- Installation requirement: Seal all conduit within 1.50 inches in group B & C
- Warnings:
  - Substitution of components may impair intrinsic safety.
  - Read Instruction Manual (control drawing: 03.304.001.004.05/2) before operating device. A copy of the control drawing is available in ⇒ [Annex B – control drawing \(CSA\)](#) (p. 29)

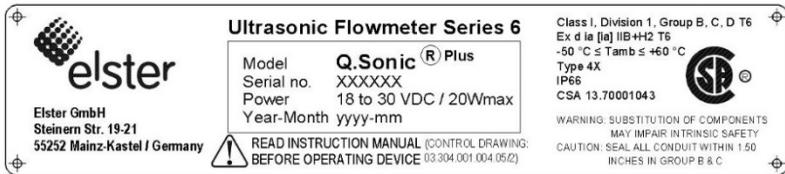


Fig. 3 5: CSA label – example

**WARNING!**

Always refer to the label on the product itself for the correct information for your particular product. Do not use or keep the product outside of its specifications.

## 2.3 Hazardous situations

- Read the instruction manual before operating device.
- Never open the explosion proof box with the electronics inside when meter is energized.
- Do not open the enclosure if explosive atmosphere may be present.
- Use the ultrasonic flow meter only for its intended application. Never use it outside of its intended application or limits.
- It is not allowed to perform repair and maintenance activities on an operating flow meter. The meter is pressurized and is used for dangerous media. Removing / exchanging parts during operation can cause severe harm or even death.
- The meter can be used for media within a specified range.
- Take care of proper grounding of the meter.
- To prevent water entering the electronics enclosure, firmly tighten the box when closing. Make sure O-rings on the covers are correctly fitted and in good condition.
- Take care that no dirt / particles are present on the gasket on the back compartment before closing.
- Also: ⇒ [Annex C – Safety prescriptions](#) (p. 31)

## 2.4 Storage and transportation

The back and main compartments of the electronics enclosure may be equipped with a silica gel bag in the explosion safe box. Before powering up, take the silica gel bag out of its enclosure.

Always store or transport the meter with a silica gel bag in the back and main compartments, to absorb excessive humidity. Replace the silica gel with a fresh one before it is saturated. Check on a regular basis (e.g., monthly).



### **WARNING!**

Obey the rules and regulations that apply to hazardous area operations and those with respect to custody transfer regulations (sealing).

## 3 Installation

### 3.1 General

It is the user's responsibility to ensure that the installation complies with appropriate regulations, including those required by applicable certifications.

It is highly recommended to install the meter on a vibration free location. Continuous vibration or shocks may have negative effects on the construction of the flow meter.

More information on installation of the ultrasonic flow meter in the pipeline is provided in the Operation and Maintenance manual of your particular flow meter (latest valid revision).

This section provides information on the electrical user connections available on the SPU (⇒ [Fig. 2-1](#)). For additional wiring information see document: ⇒ UFM Series 6 "Wiring Instructions".

### 3.2 Wiring

User connections are available in the back compartment of the SPU. The transducers and optional pressure and temperature sensors are already factory connected.

The electronics enclosure is provided with five M20 or ½" NPT size cable gland entries available to the user, as seen in ⇒ [Fig. 3-2](#).

Select and install the glands according to all applicable requirements, such as those stated in:

- National and local regulations;
- the SPU documentation (this manual, order specification stating the type of entry holes) and on the SPU label;
- the certificate and manual of the glands;
- Specifications of the user wiring.

It is recommended to use suitable armoured shielded cable to provide protection against mechanical damage and electrical interference.

**Important!**

Use a cable with suitable resistance, diameter, cores, and length.

If your ultrasonic flow meter is FM approved (see the SPU label), these special remarks are also applicable:

- Installations shall comply with the relevant requirements of the latest edition of the National Electrical Code (ANSI/NFPA 70). Installations shall comply with the latest edition of the manufacturer's instruction manual.
- For intrinsically safe installation in the United States of America, electrical equipment connected to the Associated Apparatus shall not use or generate more than 250 volts rms.
- For guidance on installations in the United States of America, see ANSI/ISA-RP12.06.01, Installation of Intrinsically Safe Systems for Hazardous (Classified) Locations.
- Tampering and replacement with non-factory components may adversely affect the safe use of the system.
- Seal fitting is required within 1.5 inches of enclosure.
- Warning: See control drawing: 03.304.001.003.05/2 before operating device. A copy of the control drawing is available in [Annex A – control drawing \(FM\)](#) (p. 27).

**WARNING!**

- Do not perform any modification of the products supplied.
- The volume of the SPU enclosure to fit user glands is less than 2 liters.
- Unused gland entries must be fitted with suitable certified stopping plugs.
- Before use ensure unused entries contain suitable certified plugs (and not temporary or transportation plugs).
- The connection between each gland or stopping plug and the enclosure must comply with the NEMA or IP class and the temperatures indicated on the SPU (e.g., by using a suitable IP washer).
- During transport and storage, the electronics enclosure back and main compartment may contain a bag of silica gel to absorb excessive humidity. Remove the bags before powering the SPU.

### 3.3 System specifications

Power connection (TB1):

- 18 – 30VDC, 20 Watt maximum. 24 V Nominal.
- Cable max. 700m, max. 5 Ohm/wire
- Built-in surge protection
- Maximum cable cross section 2.5 mm<sup>2</sup>



#### **WARNING!**

For compliance with **EN-IEC 61010** (also harmonized under EU Low Voltage directive 2006/95/EC) the SPU requires an external power supply, limited-energy (< 30 V DC max. 8A), and reinforced insulation between input and output by the safety transformer and appropriate distance between components on the PCB.

Do not open the rear compartment when device is energized.

The electronics requires a (preferably) 24VDC (nominal) power supply. A combined power supply and communication cable between the electronics enclosure and the external equipment can be used. For example, 2 × 2 wire (min. Ø 0.5 mm) twisted-pair max. 700m, max. 5Ω/wire. Armoured shielded cable is recommended to provide protection against mechanical damage and electrical interference.



#### **Cathodic protection!**

In case the ultrasonic flow meter body is connected to a cathodic protection system, **DO NOT CONNECT** the ground of the external power supply to the ground (GND) of the field terminal power connection (TB1).

### 3.3.1 DSL / network connections (TB2 & J4)

- Ethernet communication module
- Power over Ethernet
- Maximum cable cross section 1.5 mm<sup>2</sup>

### 3.3.2 Outputs / communication (TB3)

- Two configurable opto-coupler outputs, max 30VDC @ 12mA.
- Two isolated passive/active 4...20mA analogue outputs, 16-bit resolution.
- Two opto-coupler outputs, max 30VDC @ 12mA (shared with analog outputs.)
- Two RS232/RS485 (software configurable) ports:
  - Cable: 3 × 2 wire (min. 0.5 mm<sup>2</sup>), shielded max. 15m, max. 2,5 Ohm/wire
  - Programmable up to 38400 bps.

Maximum cable cross section 1.5 mm<sup>2</sup>

IS Inputs (optional) (TB4/TB5). For electrical parameters, refer to ⇨ [3.4 Field Terminal Board](#) (p. 20).

- Two isolated passive/active 4...20mA analogue inputs, 16-bit resolution.
- Maximum cable cross section 1.5 mm<sup>2</sup>

### 3.4 Field Terminal Board

The field terminal board in the back compartment of the electronics enclosure is for customer connections.



Figure 3-1: Field Terminal Board in Electronics Enclosure

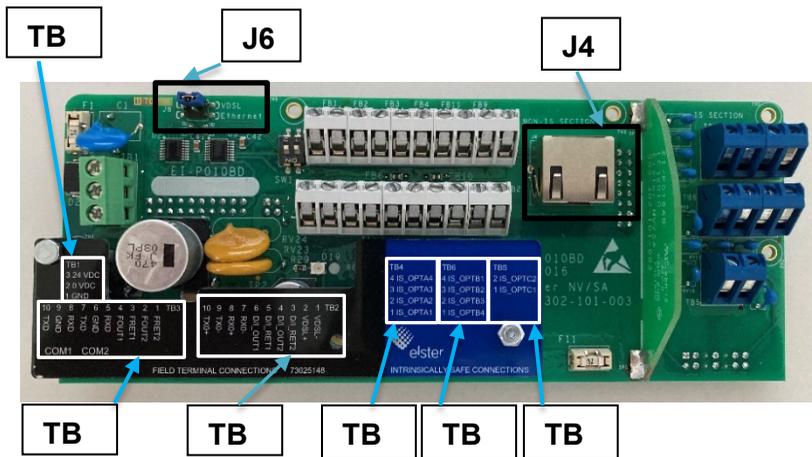


Fig. 3-2: Field Terminal Board with labelled connections

### 3.5 Transducer connections

The Analogue board PCB has a terminal block to connect the transducers for each transducer and the optional pressure sensor. The transducers are connected using a single connector.

### 3.6 Pressure connection

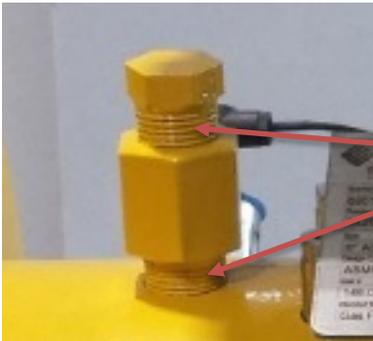
All forged meters bodies sizes 3" (DN80) to 12" (DN300) are supplied with ½" NPT Pr adapters and ½" NPT blind plugs. Adapters and plugs are sealed with PTFE tape and hydrotested with the meter body. After the hydrotest, adapters and plugs are painted together with the meter body. Where necessary, seals on Pm (Pr) point adapter (at both ends) and the blind plug should be replaced with appropriate sealant for the application. Hold the Pr point adapter with a 30mm wrench while removing the blind plug or fitting new connections.



#### Attention!

ALWAYS CHECK NEWLY MADE CONNECTIONS FOR LEAKS.

⇒ Fig. 3-3.



These places need to be checked for leaks when a new pressure connection has been made.

Fig. 3-3: Pressure connection with Pressure Adapter – example

## 3.7 Maintenance

For maintenance refer to the UFM Series 6 “Operation and Maintenance” manual for your particular meter (latest valid revision).

## 4 Electrical parameters

<b>Intrinsically safe</b>	
<b>Field Terminal Board (⇒ Fig. 3-2)</b>	
Terminals: IS_opt_C1, IS_opt_C2	<p>4-20 mA connection with HART, label “IS_opt_C1” and “IS_opt_C2” circuit (terminals P+ and P-) (for p<sub>m</sub> flow pressure sensor)</p> <p>In type of protection intrinsic safety, with the following maximum values:</p> <p>U<sub>o</sub> = 23.1 V            I<sub>o</sub> = 109 mA            P<sub>o</sub> = 629 mW            L<sub>o</sub> = 1 mH            C<sub>o</sub> = 0.1 μF</p>
Terminals: IS_opt_A1, IS_opt_A2, IS_opt_A3, IS_opt_A4	<p>4-wire PT 100 (external) temperature sensor input with label “IS_opt_A1”, “IS_opt_A4”, “IS_opt_A2” and “IS_opt_A3” circuit (terminals I+, I-, U+ and U-):</p> <p>In type of protection intrinsic safety, with the following maximum values:</p> <p>U<sub>o</sub> = 5.9 V            I<sub>o</sub> = 9.8 mA            P<sub>o</sub> = 15 mW            L<sub>o</sub> = 10 mH            C<sub>o</sub> = 0.5 μF</p>

<b>Intrinsically safe</b>	
Terminals: IS_opt_B1, IS_opt_B3	<p>Namur pulse input #1, with label "IS_opt_B1" and "IS_opt_B3" circuit (terminals Z1+ and Z1-):</p> <p>In type of protection intrinsic safety, with the following maximum values:</p> <p>Uo = 9.1 V            Io = 37 mA            Po = 84 mW            Lo = 10 mH            Co = 0.5 <math>\mu</math>F</p>
Terminals: IS_opt_B2, IS_opt_B4	<p>Namur pulse input #2, with label "IS_opt_B2" and "IS_opt_B4" circuit (terminals Z2- and Z2+):</p> <p>In type of protection intrinsic safety, with the following maximum values:</p> <p>Uo = 9.1 V            Io = 37 mA            Po = 84 mW            Lo = 10 mH            Co = 0.5 <math>\mu</math>F</p>

Table 1: Intrinsically Safe Parameters

<b>Non-intrinsically safe</b>	
Terminals: TB1 1,2,3	<p>Power supply connection (Um = 250V) pins:</p> <ol style="list-style-type: none"> <li>3. +24VDC nom. (18 - 30 VDC, 20 W)</li> <li>2. 0 V</li> <li>1. Do not connect (<math>\Rightarrow</math> <a href="#">3 Installation</a>, p. 15)</li> </ol>
Terminals: TB2, TB3, J4 and J6	<p>Non-IS data circuits (Um = 250V)</p> <p>TB2: optional communication module</p> <p>TB3: Output / Communication ports</p>

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	J4: RJ45 Ethernet connector J6: Jumper Ethernet/optional communication module
Terminals: TB4, TB5, TB6	IS-connections: optional board

Table 2: Non-intrinsically Safe Parameters

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# **Annex A – control drawing (FM)**

Drawing 03.304.001.003.05/2 (FM Approved)



# **Annex B – control drawing (CSA)**

Drawing 03.304.001.004.05/2 (CSA Approved)



# **Annex C – Safety prescriptions**

## Ultrasonic Flow Meter Series 6

This annex includes a non-exhaustive list of important safety prescriptions for a Series 6 Ultrasonic Flow Meter. At dispatch the latest version of this Annex is attached to the UFM. For safety reasons it is required to read and understand the entire document to which this Annex belongs:

UFM Series 6 “Safety Instructions”. Ref: 73023465 (last valid revision).

## Safety prescriptions – Ultrasonic Flow Meter Series 6

- Read the instruction manuals before handling or operating the device!  
⇒ [1.2 Relevant user documentation](#) (p. 4)
  
- Storage and transportation (also refer to the UFM Series 6 Shipping and Storage Manual. Ref: 73023469):
  - Use a fork-lift or fork-truck for transportation, loading and unloading of the packed ultrasonic gas flow meter. The wooden cover of the box is not suitable for the use of strap belts and a crane.
  
  - If the package has been removed from the product, lifting, and moving may only be carried out using suitable, properly fitted lifting lugs.
  
  - Take care that the meter will be installed on a vibration free location. Continuous vibration or shocks may have disadvantageous effect on the construction of the flow meter.
  
  - The back and main compartments of the electronics enclosure may be provided with a silica gel bag in the Explosion proof box. Before powering, take the silica gel bag out of the enclosure.
  
  - Always store or transport the meter with a silica gel bag in the SPU box, to absorb excessive humidity. Replace the silica gel with a fresh one before it is saturated. Check on a regular basis (e.g., monthly).
  
- All forged meters bodies sizes 3" (DN80) to 12" (DN300) are supplied with ½" NPT Pr adapters and ½" NPT blind plugs. Adapters and plugs are sealed with PTFE tape and hydrotested

- with meter body. After that hydrotest, adapters and plugs are painted together with meter body. Where necessary, seals on Pm.
- (Pr) point adapter (at both ends) and the blind plug shall be replaced with appropriate sealant for the application. Hold Pr point adapter with 30mm wrench while removing blind plug or fitting new connections. ALWAYS CHECK NEWLY MADE CONNECTIONS FOR LEAKS.
  - IT IS NOT ALLOWED TO DO A HYDROTEST WHEN TRANSDUCERS ARE INSTALLED ON THE ULTRASONIC FLOW METER. Water can be trapped between the transducers and the spool piece. It is very hard to remove this afterwards. This water can cause the ultrasonic flow meter to operate incorrectly.
  - Installation, maintenance, and replacement may only be carried out by qualified personnel under safe conditions.
  - Always use a gas detector during servicing of the meter!
  - Obey the rules and regulations that apply to hazardous area operations and those with respect to custody transfer regulations (sealing).
  - Pressurized parts involved. When executing any work, comply with the regulations that are specifically stipulated applicable to pressurized installations in a possible explosive danger area (as the case may be).
  - Explosion proof box with the electronics inside may never be opened when meter is energized.
  - Do not open the enclosure when explosive atmosphere may be present (see label & manual).

- Use the ultrasonic meter only for its intended application. Restrict to media and pressure & temperature limits. Never use an ultrasonic meter outside of these limits (for information see name plate).
- It is not allowed to perform repair and maintenance activities on an operating ultrasonic meter. The meter is pressurized and is used for dangerous media. Removing / exchanging parts during operation can cause severe harm or even death.
- When a non-retractable transducer needs to be taken out of the flow cell, the meter and the process line must be de-pressurized and have ambient temperature suitable to handle.
- In case of retractable transducers, it is only allowed to exchange these retractable transducers during operation of the meter when the procedure for exchanging transducers, as described in the manual from the manufacturer, is strictly followed.
- Be careful when removing transducers, media from the process line may still come out. This media can be poisonous, inflammable or dangerous in a different kind. Take the necessary precautions to avoid these dangerous situations.
- If any doubts arise about the type of transducers / manual please contact manufacturer: [aftersales@elster-instromet.com](mailto:aftersales@elster-instromet.com) or your local agent.
- When the meter needs to be taken out of the process line, this process line must be de-pressurized.
- The meter can be used for media with high or low temperatures, within the specified range. Any contact with the meter can cause severe harm.

- Always use the correct tools and parts. Never use pneumatically powered tools, electrically powered tools or hydraulically powered tools to perform retraction of an Ultrasonic Transducer.
- Always leak test the meter after installation.
- Take care of proper grounding of the meter.
- To prevent water entering the flameproof certified box, firmly tighten the box when closing.
- Take care of preventive inspection of the meter (environment & weather influence).



### **ATTENTION!**

#### **Removing internal coating and tape**

BEFORE INSTALLATION REMOVE CONSERVING COATING INSIDE SPOOLPIECE.

Before this ultrasonic gas flow meter was shipped a conservative protection layer was applied on the inside of the meter. It was applied immediately after the internal of the meter had been in contact with the atmosphere (oxygen) and should be removed prior to installing the meter in-line or calibration. **The face of the transducers is not coated.**

The face of some particular transducers might be protected against the coating by means of tape that can be removed easily. Prior to installation of the flow meter verify there is no tape.

## **Types of coatings that may be applied in the spool piece of an ultrasonic flow meter:**

### **VCI foam:**

Vapour Corrosion Inhibitor (VCI) foam has been applied if its type reference is mentioned above. The foam needs to be removed before installation. The foam itself is not harmful and can be thrown away as standard garbage. It is recommended to use gloves when handling the foam.

### **Tectyl:**

Tectyl coating has been applied if its type reference is mentioned above. To remove Tectyl coating use cloth and a solvent (e.g., solvent thinner). Avoid the use of chlorinated or highly aromatic solvents. If the Tectyl layer is dried out removal of it will take some effort. Do not clean the face of the transducer with solvent. If cleaning of the transducer is needed, which should not be the case, use only a dry cloth.

### **Oil:**

Oil coating has been applied if its type reference is mentioned above. Removal of oil is not really needed. Because it is not dried out, the gas-flow will certainly remove the present layer. However, it is preferred to remove it using cloth and a solvent. Do not clean the face of the transducer with solvent. If cleaning of the transducer is needed, which should not be the case, use only a dry clod.