



Ultrasonic flow meter, model FLC-UFL

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Prior to starting any work, read the operating instructions.
Keep for later use.

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Declarations of conformity can be found online at www.wika.com.

1. General information

Supplementary documentation:

- ▶ Please follow all the documentation included in the scope of delivery.



With versions for hazardous areas, also observe the additional operating instructions (article no. 81500907).

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1. General information

1.1 Introduction

- This document provides a guide to the field wiring of the FLC-UFL series ultrasonic gas flow meters in hazardous areas where explosion safety regulations apply.
- All field wiring in the FLC-UFL series flow meters is Intrinsically Safe (IS). This means that the energy to the terminals must be limited by the use of suitable Zener barriers, isolators or other means.
- In this document we will recommend certain barriers, isolators and supplies that are suitable. This is, however, not an exhaustive list. In addition, intrinsic safety sets certain limits on parameters (inductance and capacitance) of the user wiring. This is rarely of concern unless very long wiring runs are used, but the user must ensure that the wiring used is within these maxima.
- For the electrical parameters required for intrinsic safety, refer to the ATEX/IECEx control drawing 81500909 or cQPSus control drawing 81511060 and chapter 4 of the document FLC-UFL series flow meter safety instructions (81500907).
- In addition to the requirements and recommendations of this document national and local wiring regulations should be observed. Refer also to the document FLC-UFL series flow meter safety instructions prior to installation of the field wiring. The FLC-UFL series flow meter safety instructions provide essential information for the correct installation and operation of the ultrasonic flow meter. They also contain important instructions to prevent accidents and serious damage during installation, commissioning and operation.
- Before installing the product read and understand this document. Strictly follow the safety instructions and warnings.
- Further information:
 - Internet address: www.wika.com
 - Relevant data sheet: FL-40.01
 - Contact: info@wika.de / info@wika.it

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1.1 Abbreviations

ATEX	ATmosphère Explosive
cQPSus	Certification mark for USA and Canada
CSA	Canadian Standard Associations
EMC	Electromagnetic Compatibility
FM	Factory Mutual
IEC	International Electrotechnical Commission
IECEX	International Electrotechnical Commission certification scheme for Explosive atmospheres
IS	Intrinsic Safety
ISO	International Organization for Standardization
LVD	Low Voltage Directive
OIML	Organisation Internationale de Métrologie Légale
PCBA	Printed Circuit Board Assembly
SPU	Signal Processing Unit
USM	Ultrasonic Flow Meter

1.2 Explanation of symbols



WARNING!

... indicates a potentially dangerous situation and unsafe practices that can result in serious injury or death, if not avoided.



CAUTION!

... indicates a potentially dangerous situation that can result in light injuries or damage to property, product or the environment, if not avoided. It is also used to indicate operations or practices that can cause the product to operate in an unexpected way or provide results that are outside the specification limits.



DANGER!

... indicates a potentially dangerous situation in hazardous areas that can result in serious injury or death, if not avoided. It is also used to give important information to comply with explosion safety regulations.

1.3 References

The last version of the referenced document is leading, unless otherwise specified.

■ **FLC-UFL series safety instructions**

Author: Euromisure

Document code: 81500907 FLC-UFL series safety instructions.

■ **FLC-UFL series operating instructions**

Author: Euromisure

Document code: 81500908 FLC-UFL series operating instructions

2. FLC-UFL series field wiring compartment

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WARNING!

Refer to the document FLC-UFL series ultrasonic flow meter safety instructions prior to installation of the field wiring.

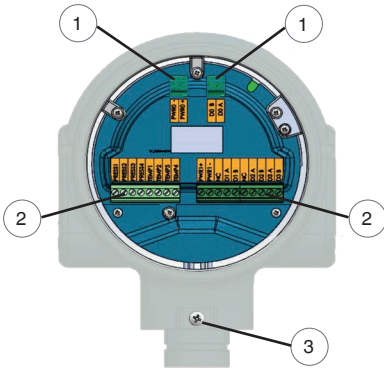


WARNING: Specific information for explosion safety

The recommended Zener barriers, power supplies or isolators are for guidance only. It is the responsibility of the installer to ensure that the Zener barriers, power supplies or isolators meet the local explosion safety requirements.

Refer to the applicable control drawings for further information.

Remove the back cover of the FLC-UFL flow meter to access the field wiring terminals. The wiring compartment is shown in the below figure.



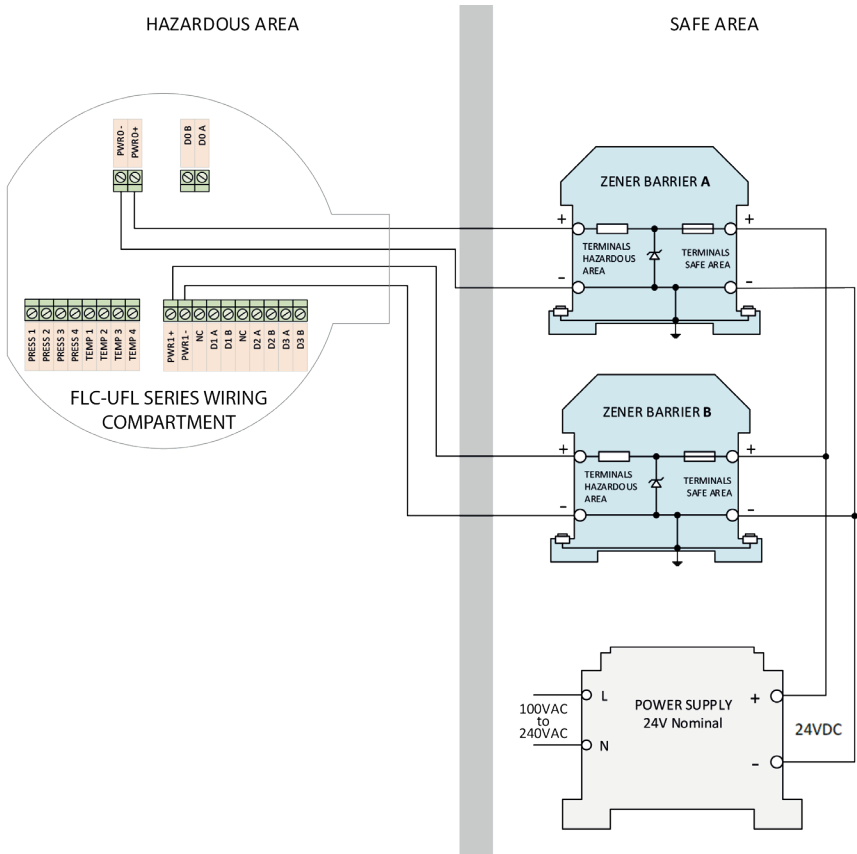
- Main board terminal blocks will be supplied on all units.
- The option board terminal blocks will depend on the options provided.
- The wiring compartment is provided with four M20 or ½ NPT size cable gland entries.
- The screw terminals will accept wire sizes from 24 AWG to 10 AWG (0.2 mm² to about 5.26 mm²).

3. Main board power requirements (PWR0)

3. Main board power requirements (PWR0)

When installing the FLC-UFL series ultrasonic flow meter in a hazardous area, appropriate safety barriers must be used between the supply voltages and the flow meter.

- The wiring diagram for connecting main power to PWR0+ and PWR0- is shown in Figure 1.
- Zener barrier A (located in the safe area) limits energy to safe levels for terminals PWR0+ and PWR0-.
- If an option board is installed, a separate Zener barrier B is required for its power terminals PWR1+ and PWR1-. Alternatively, a dual Zener barrier can be used for both the main and option board power supplies.
- The FLC-UFL series flow meters have isolated power supplies, so using an isolated supply is not necessary.



3. Main board power requirements (PWR0)

Figure 1: FLC-UFL series power wiring

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CAUTION!

The FLC-UFL main board PWR0 terminal operates with a constant current between 20 and 32 mA. Ensure that the selected safety barrier can supply this current. The recommended barriers listed in this manual are verified to support the required current.

Recommended Zener barriers / Isolators for main board power (PWR0)

Manufacturer	Description	Part number
Single-channel		
MTL (EATON)	Solenoid/Alarm driver, max. 300 Ω	MTL5525
Stahl	Safety barriers for positive polarity, max. 268 Ω	9001/01-252-100-141
Allen-Bradley	Zener barrier, 1-Ch, max. 327 Ω	937ZH-DPBN-1
Pepperl+Fuchs	Zener barrier, 1-Ch, max. 327 Ω	Z728
Turck	Zener barrier, 1-Ch, max. 333 Ω	MZB28P
Dual-channel		
Allen-Bradley	Zener barrier, 2-Ch, max. 327 Ω	937ZH-DPBN-2
Pepperl+Fuchs	Zener barrier, 2-Ch, max. 327 Ω	Z779
Turck	Zener Barrier, 2-Ch, max. 333 Ω	MZB79P

4. I/O wiring recommendations

4. I/O wiring recommendations

4.1 Standard (main board) frequency/pulse output (terminals D0)

The standard frequency output on terminals D0A and D0B is an open collector type and is not galvanically isolated from the system ground.

An isolated barrier or isolated frequency converter is therefore recommended, to meet both the isolation and safety requirements.

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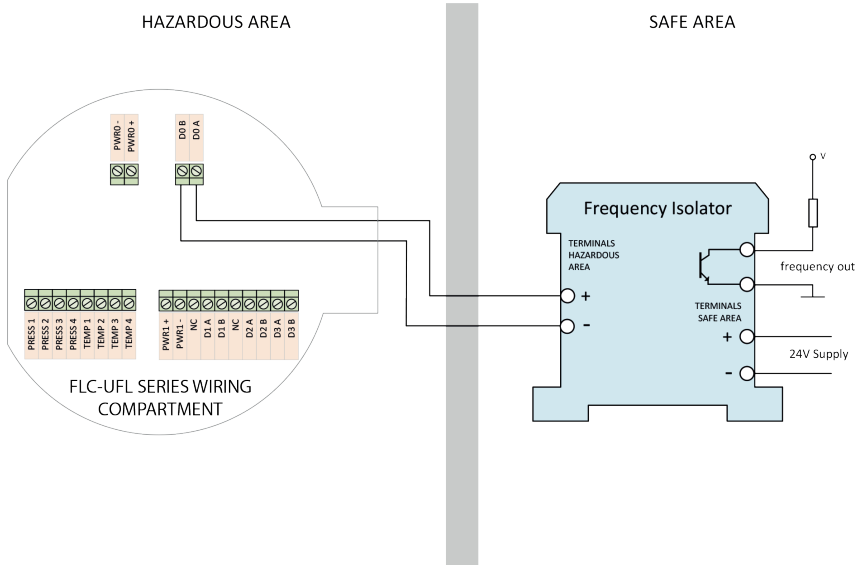


Figure 2: main board wiring

Where the frequency isolator provides a choice of input types select one suitable for open collector or dry contact input.

Recommended frequency isolators

Manufacturer	Description	Part number
Single-channel		
GM International	Frequency-pulse isolating repeater	D1035S
Turck	Isolating switching amplifier	IM1-12EX-T
Allen-Bradley	Switching amplifier, transistor output with splitter	937TH-DISTS-DC1
Dual-channel		
Turck	Isolating switching amplifier	IM1-22EX-T
Allen-Bradley	Switching amplifier transistor output	937TH-DISAT-DC2

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4. I/O wiring recommendations

4.2 I/O option board (SLOT 1) RS-485 port (D1)

The RS-485 port on the I/O option board is isolated, so an isolated barrier is not necessarily required. However, most industrial barriers also provide isolation. A switch on the FLC-UFL series flow meter allows the user to add a 120 Ω terminating resistor if required. Refer to the FLC-UFL series operating instructions for details.

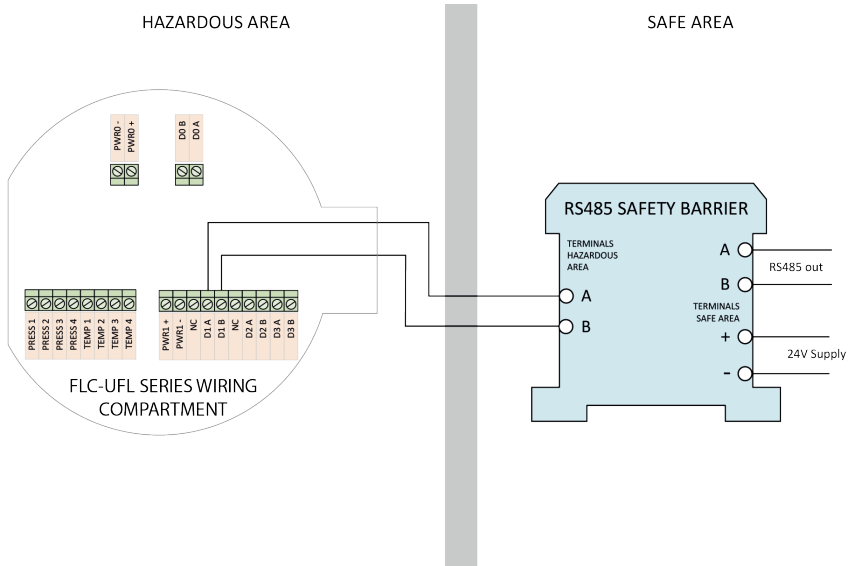


Figure 3: I/O option board wiring

Recommended RS-485 barriers

Manufacturer	Description	Part number
GM International	RS-422 / RS-485 isolating repeater	D1061S
R. Stahl	Fieldbus isolating repeater (suitable for zone 1)	9185/11-35-10s



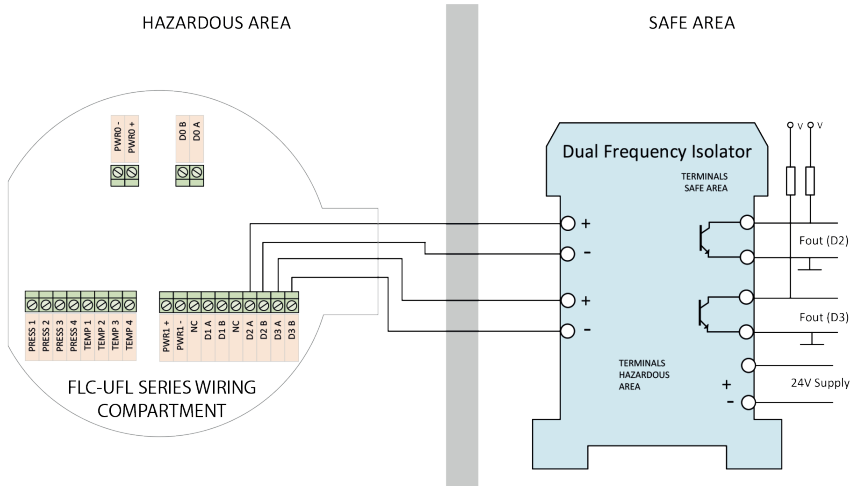
CAUTION!

When using the D1061S from GMI it should be wired via its RS-232 port on the safe area side. When using the RS-485 port it will result in loss of data and communication timeouts.

4. I/O wiring recommendations

4.3 I/O option board (slot 1) isolated frequency/pulse outputs (D2, D3)

There are two optically isolated frequency, pulse or status outputs provided on the I/O option board. The outputs are open collector type. As these outputs are isolated, isolated barriers are not strictly necessary. However, many industrial barriers are isolating including the ones recommended below, and these may of course be used.



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Fig. 4: Frequency/pulse outputs wiring

The wiring in the above figure shows a dual barrier, of course two single barriers may be used.

Recommended frequency barriers/Isolators

Manufacturer	Description	Part number
Single-channel		
GM International	Frequency-pulse isolating repeater	D1035S
Turck	Isolating switching amplifier	IM1-12EX-T
Allen-Bradley	Switching amplifier, transistor output with splitter	937TH-DISTS-DC1
Dual-channel		
Turck	Isolating switching amplifier	IM1-22EX-T
Allen-Bradley	Switching amplifier transistor output	937TH-DISAT-DC2

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4. I/O wiring recommendations

4.4 4 ... 20 mA option board (slot 2, option) LPWR2

The 4 ... 20 mA option is a 2-wire loop powered (external power) configuration. Typical wiring is shown in the below figure. The sense resistor is usually between 50 ... 250 Ω .

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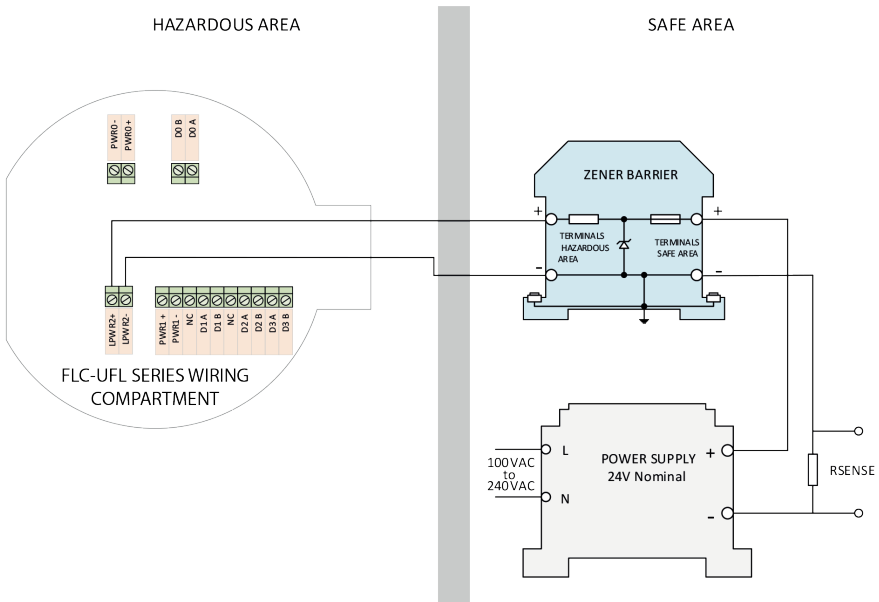


Fig. 5: 4 ... 20 mA option board wiring

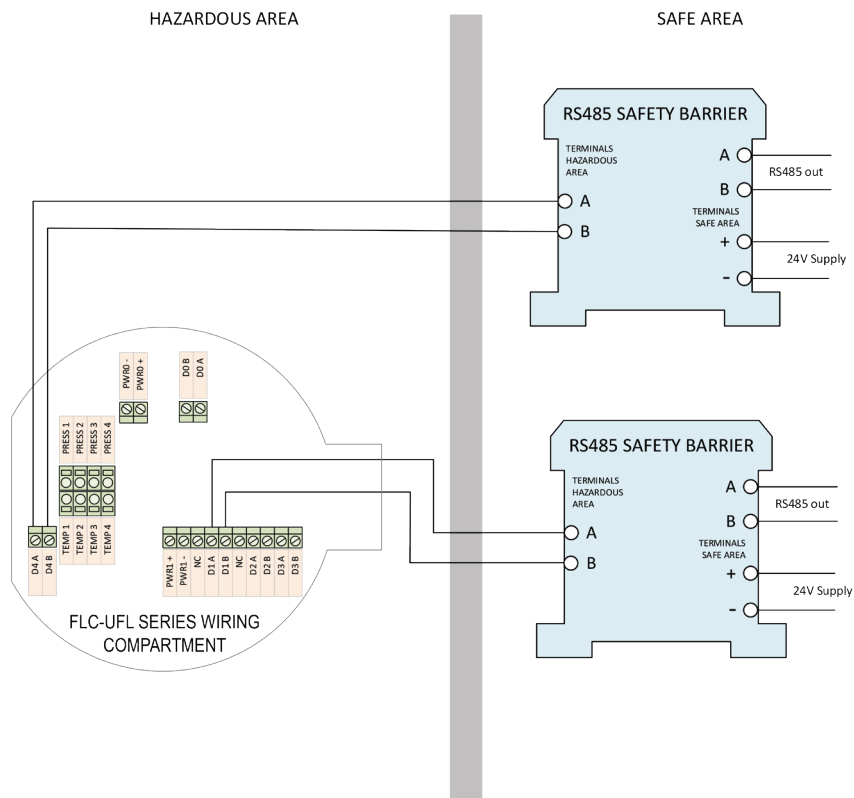
Recommended Zener barriers		
Manufacturer	Description	Part number
Stahl	Safety barriers for positive polarity, max. 268 Ω	9001/01-252-100-141
Allen-Bradley	Zener Barrier, 1-ch, max. 327 Ω	937ZH-DPBN-1
Pepperl+Fuchs	Zener Barrier, 1-ch, max. 327 Ω	Z728
Turck	Zener Barrier, 1-ch, max. 333 Ω	MZB28P

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4. I/O wiring recommendations

4.5 Dual RS-485 option board (slots 1 and 2) RS-485 ports (D1, D4)

The dual RS-485 option board has two independent RS-485 ports. Typical wiring is shown in the following figure.



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Figure 6: Dual RS-485 option board wiring



CAUTION!

PWR1, D2 and D3 are identical to the I/O option board (slot 1)

4. I/O wiring recommendations

4.6 Dual RS-485 option board (slots 1 and 2) pressure and temperature connections

A passive bridge type pressure sensor and a 4-wire Pt100 sensor can be connected to the pressure and temperature interface. Refer to the FLC-UFL series flow meter safety instructions for suitable pressure and temperature sensors.

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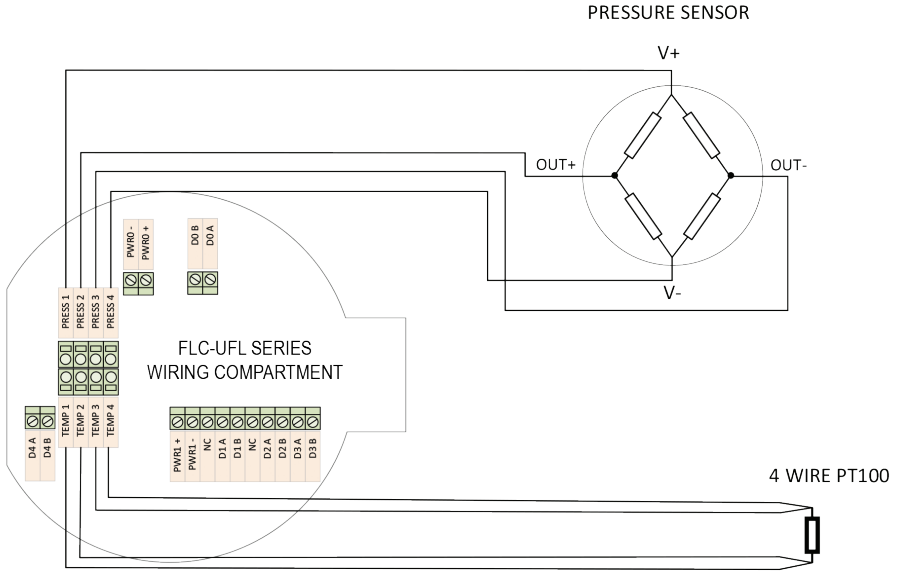


Figure 7: Pressure and temperature interface wiring



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