UIM Series Flowmeter Field Wiring Guide

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Introduction

This document provides a guide to the field wiring of the UIM Series Ultrasonic Gas Flowmeters in hazardous areas where explosion safety regulations apply. All field wiring in the UIM Series 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 01-0198 and chapter 4 of the document *Safety Instructions UIM Series Flowmeter*.

In addition to the requirements and recommendations of this document national and local wiring regulations should be observed.

Refer also to the document *Safety Instructions UIM Series Flowmeter* prior to installation of the field wiring. The *Safety Instructions UIM Series Flowmeter* document provides essential safety information for the installation and operation of the UIM series ultrasonic gas flowmeter. It contains information for correct installation of this product. It also contains 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.

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1 Contents of this document

This manual contains several sections, covering various aspects for proper installation and operation of the UIM series flowmeter.

Chapter 1 This chapter

Chapter 2 UIM Series Field Wiring

Chapter 3 Power Wiring Recommendations

Chapter 4 I/O Wiring Recommendation

1.1 Conventions

The following symbol and indication conventions are used throughout this manual.

Warning!

A warning indicates hazards or unsafe practices that could result in severe personal injury or death.

Attention!

This sign indicates potential hazardous or unsafe operations that could result in minor personal injury or damage of product or property. It is also used to indicate operations or practices that could cause the product to operate in an unexpected way or provide results that are outside the specification limits

Specific information for explosion safety

This sign is used where specific important information is given in order to comply with explosion safety regulations

1.2 Related documents

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

[1] UIM Series Safety instructions

Author Transus Instruments
Document Code: TI2_UIM_GEN7_Safety_instructions

[2] UIM Series installation, operating and maintenance manual

Author Transus Instruments
Document Code: TI2_UIM_GEN6_installation_operating_maintenance

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1.3 Abbreviations

The following abbreviations may be used throughout the document:

ATEX	ATmosphère Explosive
CSA	Canadian Standards Association
EMC	Electromagnetic Compatibility
FM	Factory Mutual
IEC	International Electrotechnical Commission
IECEx	International Electro technical 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 (the electronics of the flowmeter)
USM	Ultrasonic FlowMeter

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2 UIM Series Field Wiring Compartment

Remove the back cover of the UIM flowmeter to access the field wiring terminals. The wiring compartment is shown in Figure 2-1. 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.

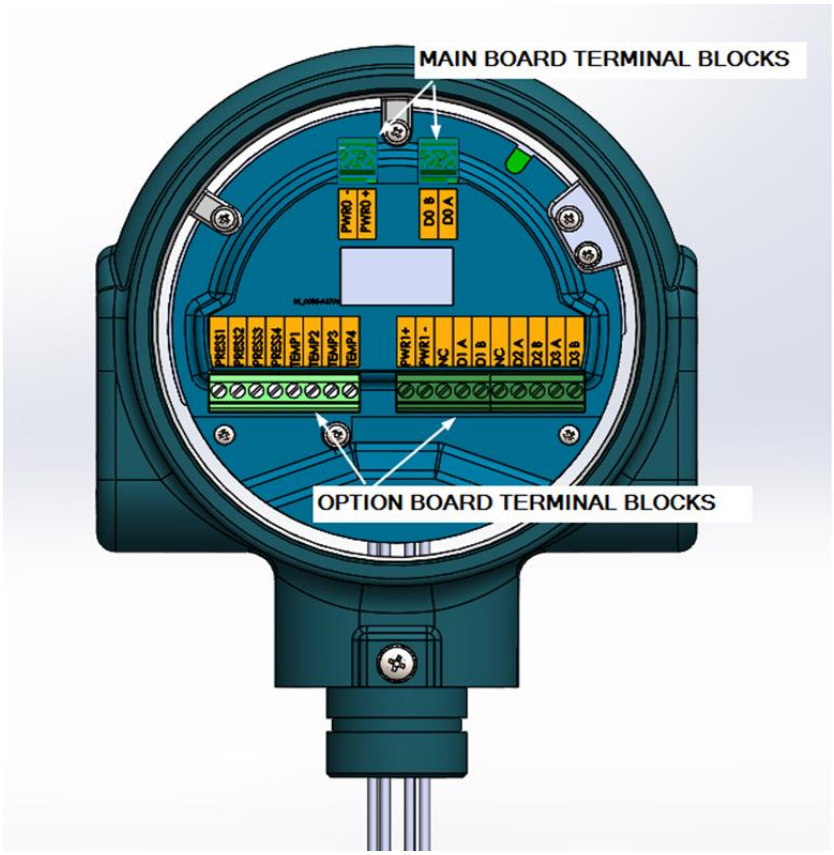

Figure 2-1: UIM Series wiring compartment.

The screw terminals will accept wire size from 24 AWG to 10 AWG (0.2mm^2 to 6mm^2)

Warning!

Refer to the document *Safety Instructions UIM Series Flowmeter* prior to installation of the field wiring.

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.

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3 Mainboard Power requirements (PWR0)

If the UIM Series Flowmeter is installed in a hazardous area suitable safety barriers must be used between the supply voltages and the UIM flowmeter. The wiring diagram for the UIM Flowmeter main power to PWR0+ and PWR0- terminals is shown in Figure 3-1. Zener Barrier A, in the safe area, limits the energy to terminal PWR0+ and PWR0- to safe levels. If an Option Board is included a separate zener barrier (Zener Barrier B) is required for the power connections the Option Board power terminals PWR1+ and PWR1 – as shown in Figure 3-1. Alternatively dual zener barrier may be used for both the main and option supplies.

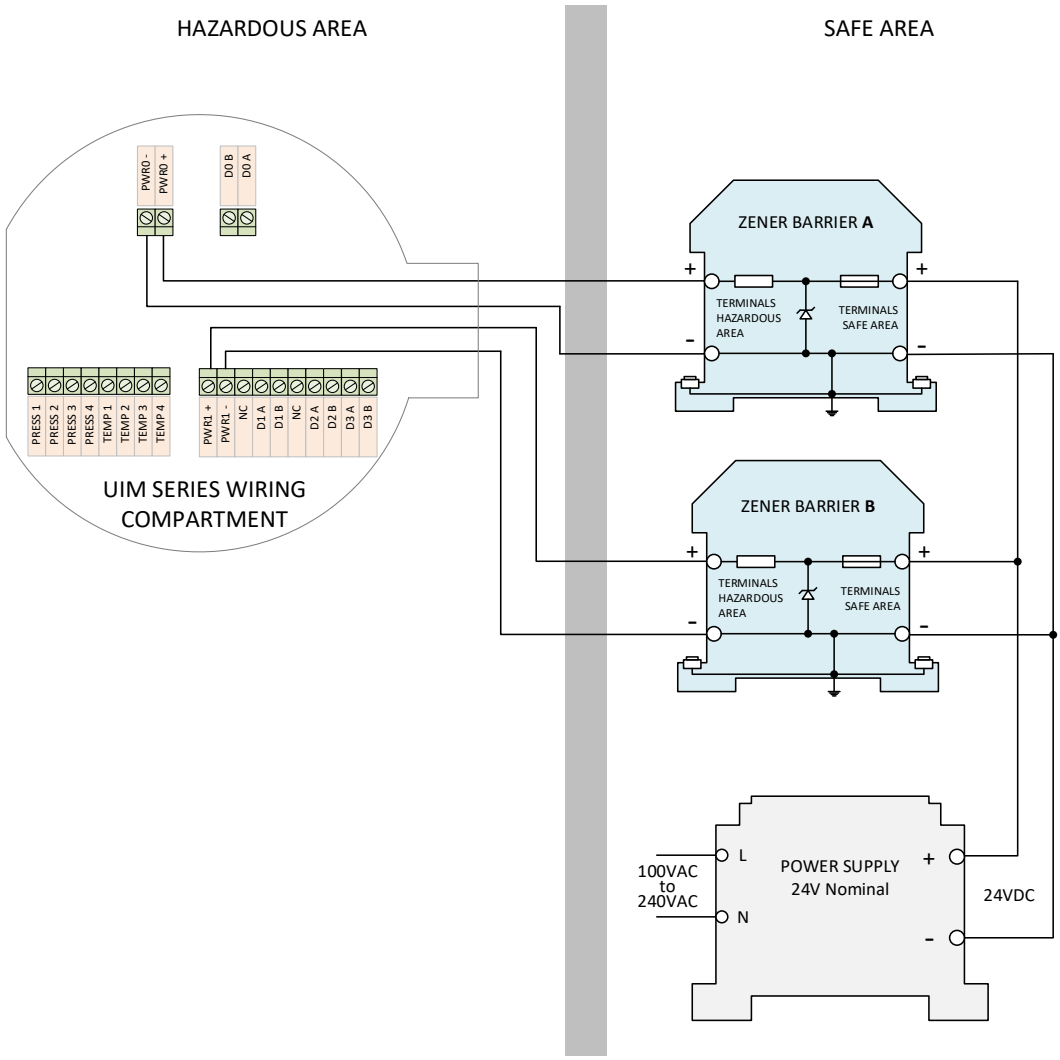

Figure 3-1: UIM Series Power Wiring

The power supplies of the UIM Series flowmeters are isolated, so it is not required to use an isolated supply. Recommended barriers are shown in Table 3-1.

Attention!

The UIM Mainboard PWR0 terminal uses a constant current between 20 and 32mA. Make sure the barrier used can provide this current. The recommended barriers in this manual are proven to be able to support this current.

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RECOMMENDED ZENER BARRIERS / ISOLATORS FOR MAINBOARD POWER (PWR0)		
MANUFACTURER	**DESCRIPTION**	**PART NUMBER**
Single Channel		
MTL (EATON)	Solenoid/Alarm driver, 300 Ohm max	MTL5525
Stahl	Safety Barriers for Positive Polarity, 268 Ohm Max	9001/01-252-100-141
Allen-Bradley	Zener Barrier, 1-Ch, 327 Ohm Max	937ZH-DPBN-1
Pepperl+Fuchs	Zener Barrier, 1-Ch, 327 Ohm Max	Z728
Turck	Zener Barrier, 1-Ch, 333 Ohm Max	MZB28P
Dual Channel		
Allen-Bradley	Zener Barrier, 2-Ch, 327 Ohm Max	937ZH-DPBN-2
Pepperl+Fuchs	Zener Barrier, 2-Ch, 327 Ohm Max	Z779
Turck	Zener Barrier, 2-Ch, 333 Ohm Max	MZB79P

Table 3-1: Recommended Zener Barriers

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4 I/O Wiring Recommendations

4.1 Standard (Main Board) Frequency/Pulse Output (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 isolating repeater or isolated frequency converter is therefore recommended, to meet both the isolation and safety requirements.

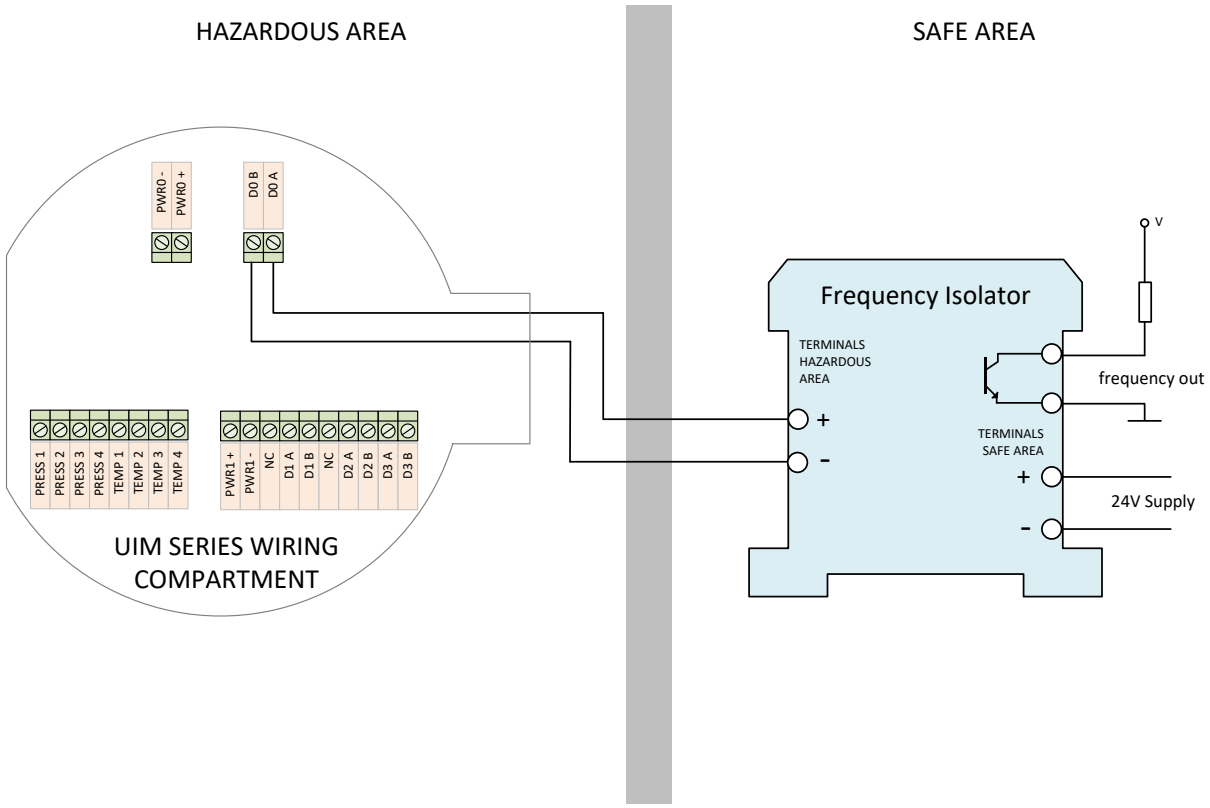

Figure 4-1: Frequency Output wiring

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

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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	Switch Amplifier, Transistor Output with Splitter	937TH-DISTS-DC1
Dual Channel		
Turck	Isolating switching amplifier	IM1-22EX-T
Allen-Bradley	Switch Amplifier Transistor Output	937TH-DISAT-DC2

Table 4-1: Recommended Frequency Isolators

4.2 I/O Option Board (SLOT 1 - 01-0203) RS485 Port (D1)

The RS485 port on the I/O Option Board is isolated so an isolating barrier is not necessarily required. However most industrial barriers also provide isolation. A switch on the UIM Series flowmeter allows the user to add a 120Ω terminating resistor if required. Refer to the *UIM Series installation, operating and maintenance* manual for details.

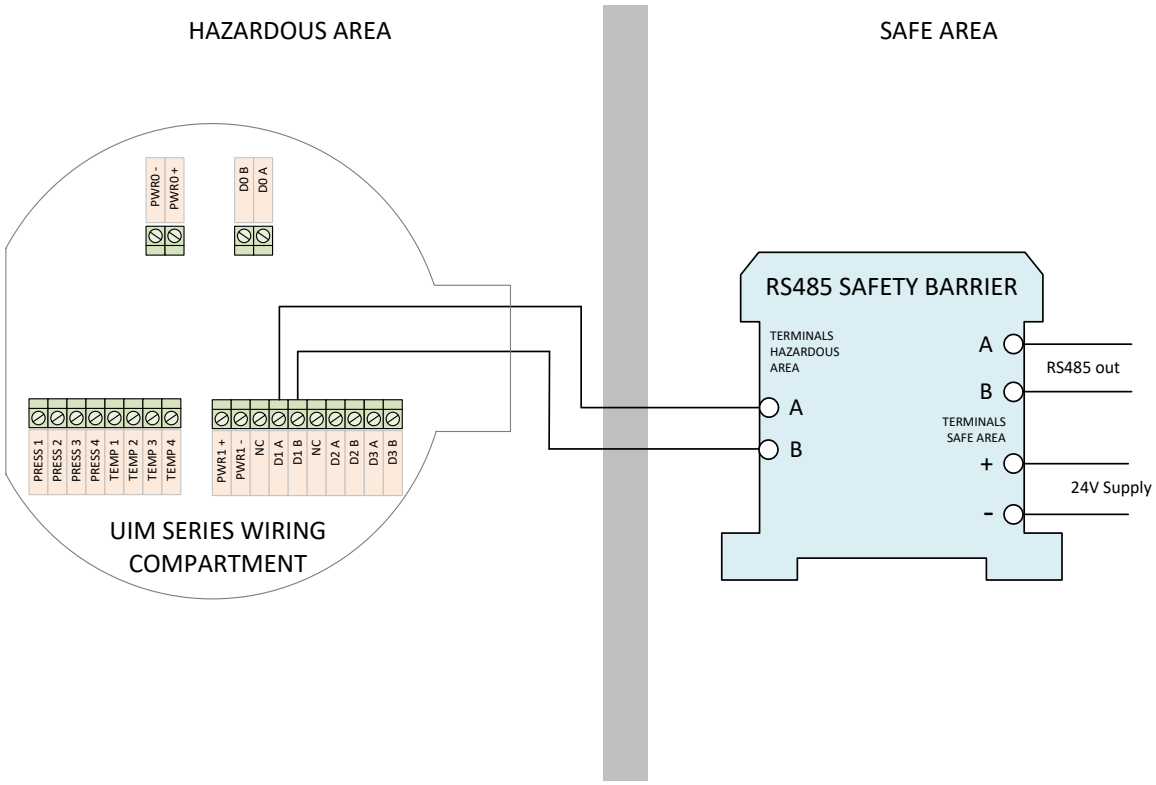

Figure 4-2: RS485 Port wiring

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Recommended RS485 barriers are shown in Table 4-2.

RECOMMENDED RS485 BARRIERS		
MANUFACTURER	**DESCRIPTION**	**PART NUMBER**
GM International	RS422 / RS485 Isolating Repeater	D1061S
R. Stahl	Fieldbus Isolating Repeater (suitable for zone 1)	9185/11-35-10s

Table 4-2: Recommended RS485 Barriers

Attention!

When using the D1061S from GMI it should be wired via its RS232 port on the safe area side. When using the RS485 port it will result in loss of data and communication timeouts.

4.3 I/O Option Board (SLOT 1 - 01-0203) 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, isolating 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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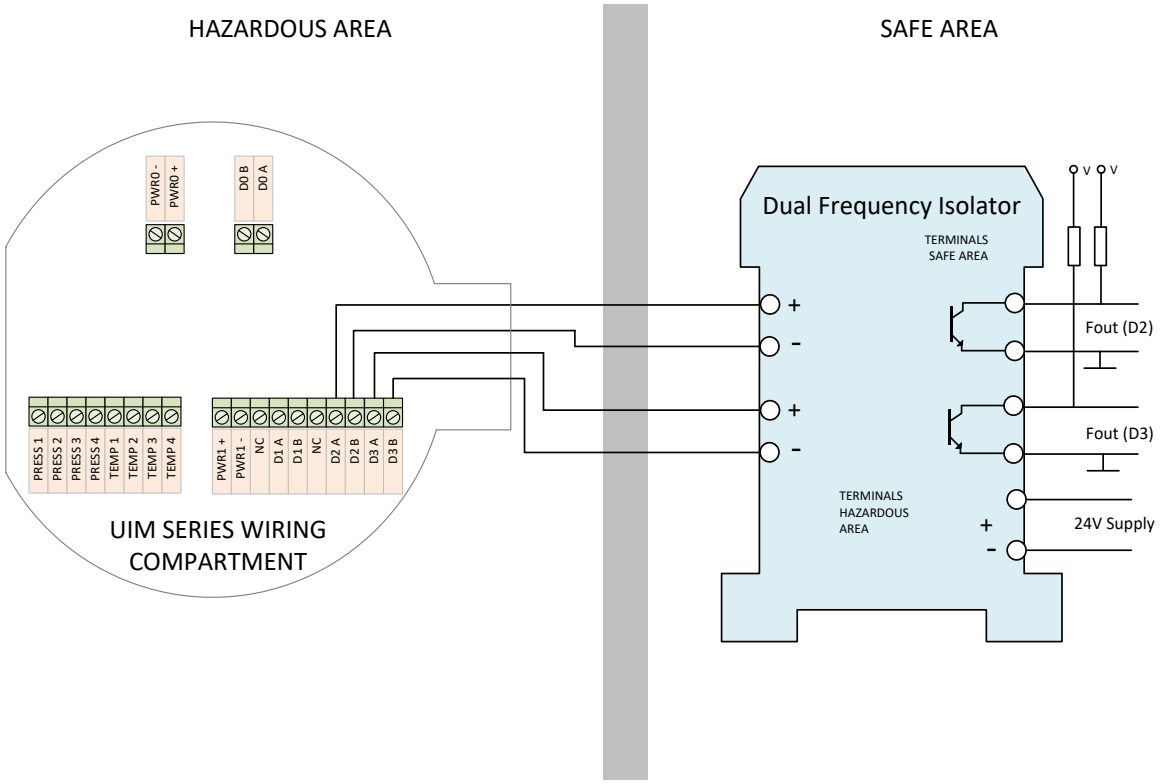

Figure 4-3: Isolated Frequency/Pulse Outputs wiring

Recommended frequency barriers/isolators are shown in Table 4-3. The wiring in Figure 4-3 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	Switch Amplifier, Transistor Output with Splitter	937TH-DISTS-DC1
Dual Channel		
Turck	Isolating switching amplifier	IM1-22EX-T
Allen-Bradley	Switch Amplifier Transistor Output	937TH-DISAT-DC2

Table 4-3: Recommended Frequency Barriers/Isolators

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4.4 4-20mA Option Board (SLOT 2 - 01-0203) LPWR2

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

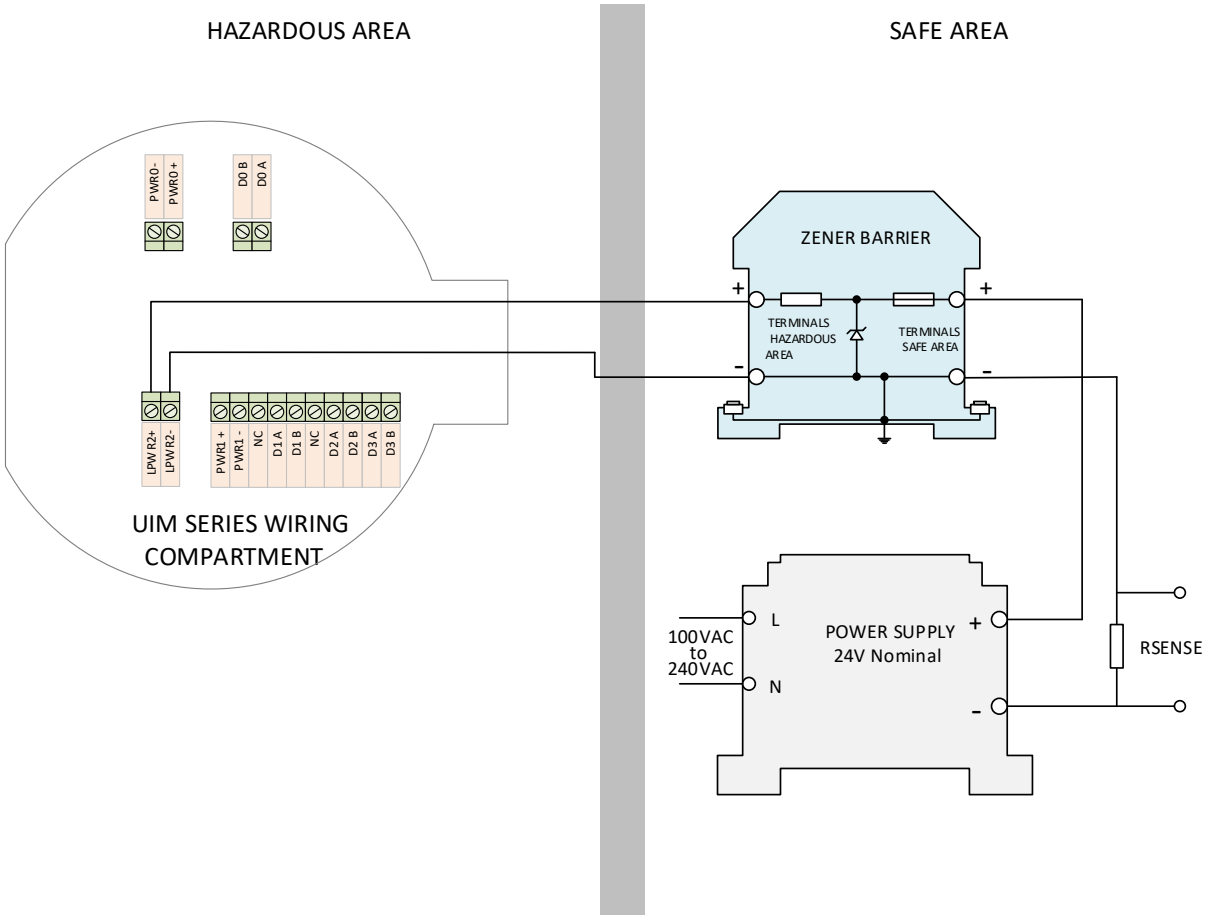

Figure 4-4: 4-20mA Option wiring

Recommended barriers are shown in Table 4-4

RECOMMENDED ZENER BARRIERS		
MANUFACTURER	**DESCRIPTION**	**PART NUMBER**
Stahl	Safety Barriers for Positive Polarity, 268 Ohm Max	9001/01-252-100-141
Allen-Bradley	Zener Barrier, 1-Ch, 327 Ohm Max	937ZH-DPBN-1
Pepperl+Fuchs	Zener Barrier, 1-Ch, 327 Ohm Max	Z728
Turck	Zener Barrier, 1-Ch, 333 Ohm Max	MZB28P

Table 4-4: Recommended 4-20mA Option Zener Barriers

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4.5 Dual RS485 Option board (SLOT 1 and 2 - 01-0251) RS485 ports (D1, D4)

The Dual RS485 option board has two independent RS485 ports. Typical wiring is shown in Figure 4-5.

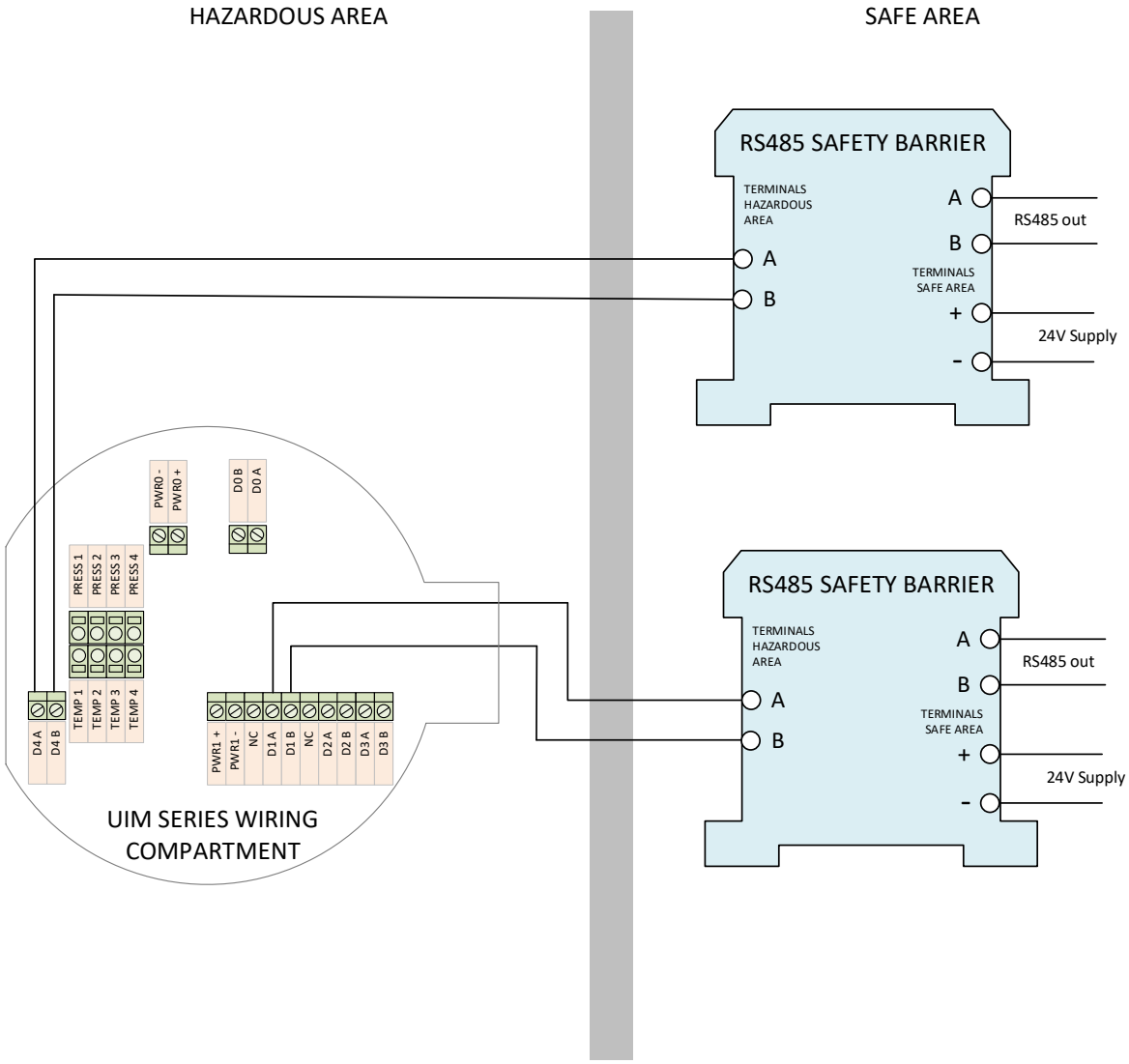

Figure 4-5: Dual RS485 option wiring

Attention!

PWR1, D2 and D3 are identical to the I/O Option Board (SLOT 1 - 01-0203)

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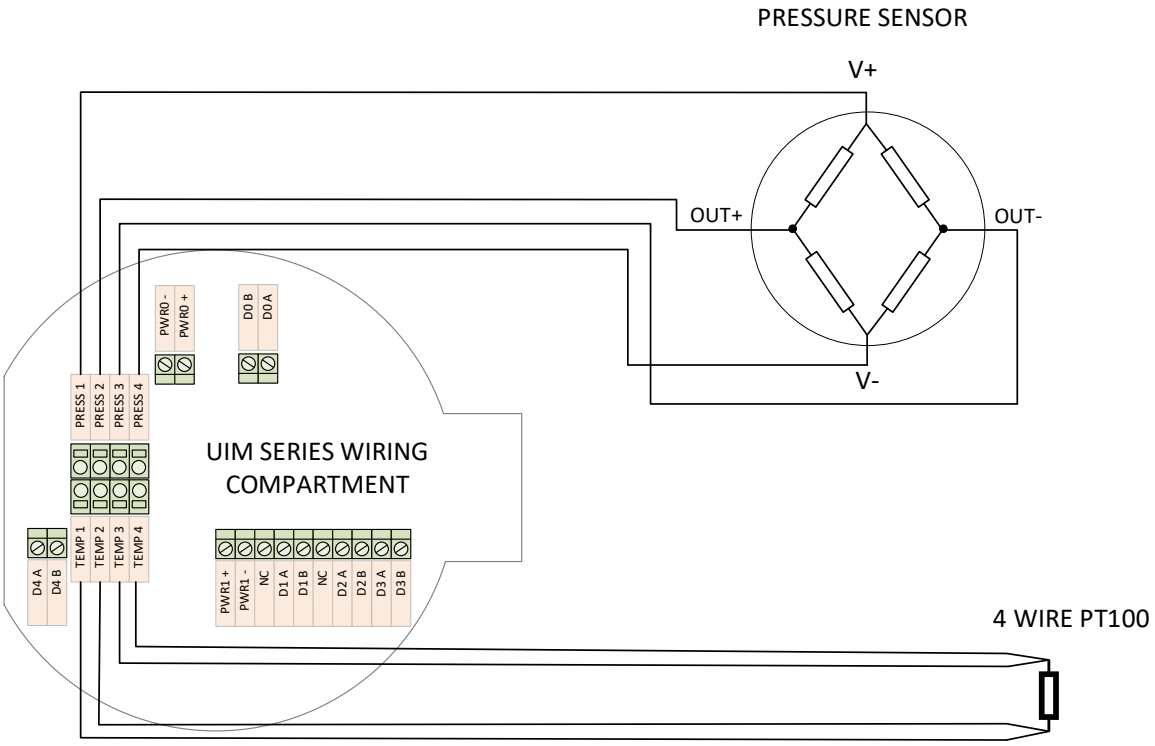
4.6 Dual RS485 Option board (SLOT 1 and 2 - 01-0251) Pressure and temperature connections

A passive bridge type pressure sensor and a 4 wire PT100 sensor can be connected to the PRESS and TEMP interface. Refer to the UIM Series Flowmeter safety instructions for suitable pressure and temperature sensors.