

Section 9 Practical Solutions

Intrinsic safety barriers are the core of Pepperl+Fuchs product portfolio. We offer the widest selection of products for protection of electrical signals located in hazardous (explosive) areas. This guide presents common hazardous area applications involving intrinsic safety barriers to assist in selecting the correct barrier for your application.

By far, our most popular intrinsic safety barrier is the flexible, DIN rail mounted K-System isolator. This product line consists of over 150 different functional designs to meet the demands of today's factory and process automation industries. The unique design allows simple expansion with no additional wires, and can be easily designed for several redundant power configurations. K-System components meet SIL IEC61508 ratings to ensure conformity to international safety standards for systems and processes.

Zener diode barriers are the most economical hardware method available to solve a hazardous area barrier/intrinsic safety application. Our SafeSnap series of zener barriers has over 85 unique versions to solve your intrinsic safety application. SafeSnapPlus barriers contain a removable fuse that eliminates disassembly, disconnection of wiring or disposal of an entire barrier in the event of a fault.

In addition to the intrinsic safety barriers presented in this application guide, Pepperl+Fuchs also offers HiD2000, our line of backplane mounted isolated barriers. This innovative product is ideal for applications requiring tight DCS or system integration. The powerful motherboard system is available in a wide range of termination assembly versions that can be installed easily. The intrinsic safety modules simply plug into the motherboard, so wiring is never an issue on the barrier itself. Plus, HART multiplexers can be integrated easily into a HiD2000 system once the proper module is installed on the motherboard.

Also available is our μZ range of zener diode barriers that combines outstanding features and performance in a compact housing. Its thin width and low profile—the lowest profile zener on the market—make it perfect for those hard-to-reach areas of a cabinet or an enclosure. Plus, μZ comes with many of the great features found in our full line SafeSnap product.

At Pepperl+Fuchs, we build and support quality products that meet the demands of our customers and take intrinsic safety well into the 21st century.



Switches and NAMUR Sensors

Zener Diode Barriers

The following illustration shows a standard method of transferring the switch status. Zener diode barriers in the “quasi-floating” configuration enable a load to operate in either leg of the power supply.

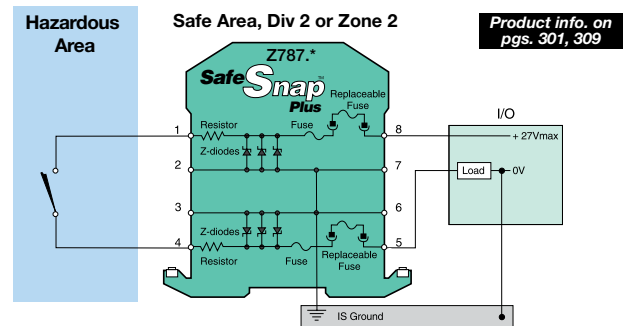


Figure 9.1

This illustrates an alternate method of providing multiple channels in a “quasi-floating” configuration. The first channel of the Z787.* (or Z787.H.*) is used as the field power supply while each diode return channel is isolated from ground.

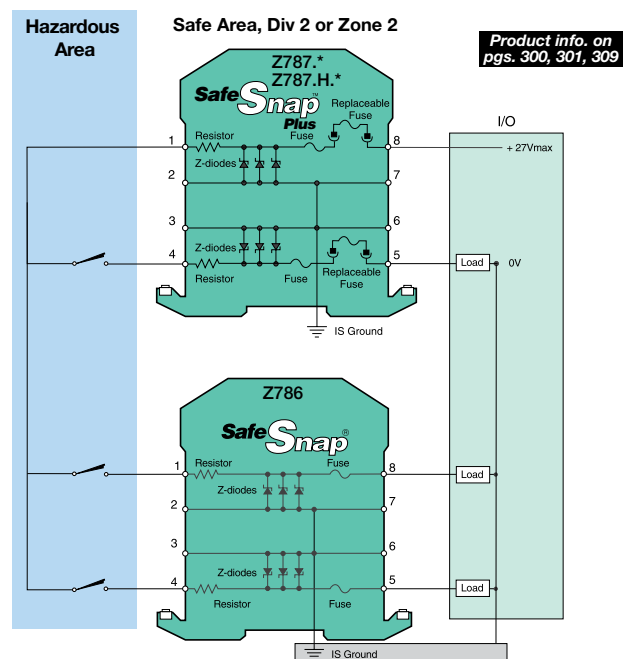


Figure 9.1

Note: SafeSnapPlus zener barriers are designed with replaceable fuses which is denoted by an “F” at the end of the model number. SafeSnap zener barriers have internal fuses.

Isolated Barriers

The barriers shown in the following diagrams are galvanically isolated switch repeaters. These units are provided with an amplifier that transfers discrete signals (NAMUR proximity sensors/mechanical contacts) from a hazardous area to a safe area. The proximity sensor or mechanical contact will initiate a safe area control mechanism in the barrier such as a relay contact or transistor. All of these barriers can be used in SIL 2 applications according to IEC 61508 and in SIL 3 applications when installed in a redundant structure. The following illustrations show several of the possible configurations.

Single Channel AC

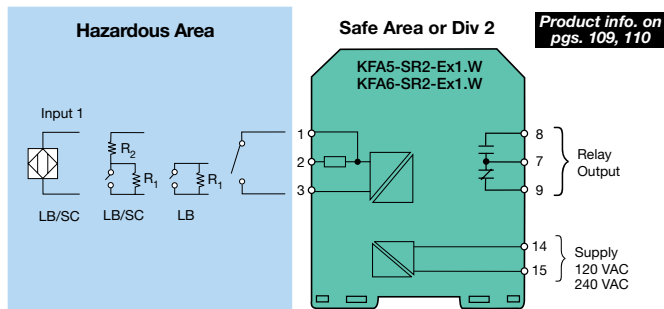


Figure 9.3

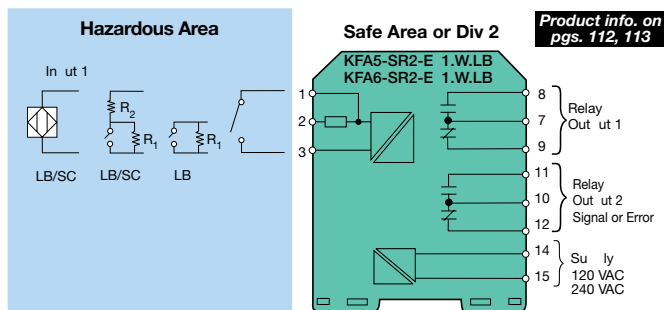


Figure 9.4

Single Channel DC

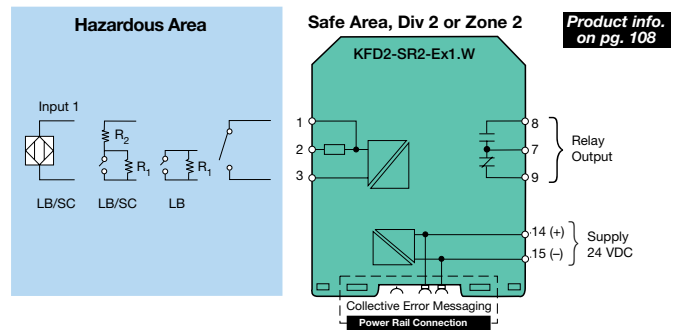


Figure 9.7

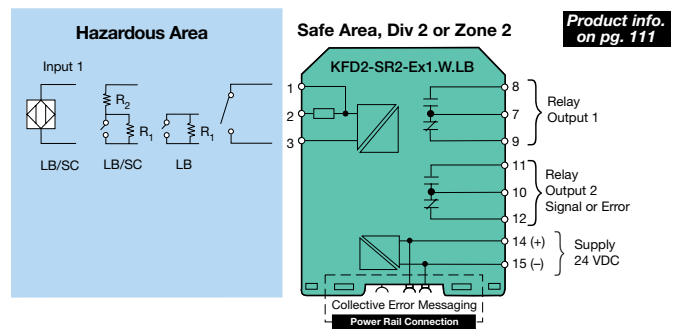


Figure 9.8

Dual Channel AC

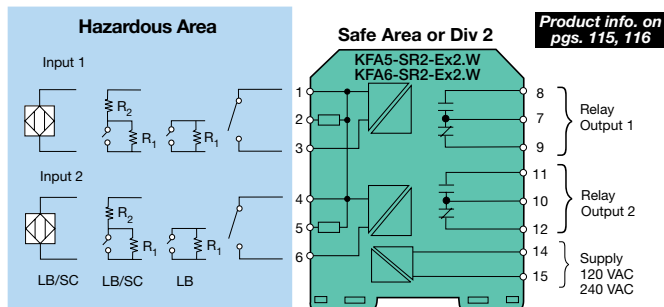


Figure 9.5

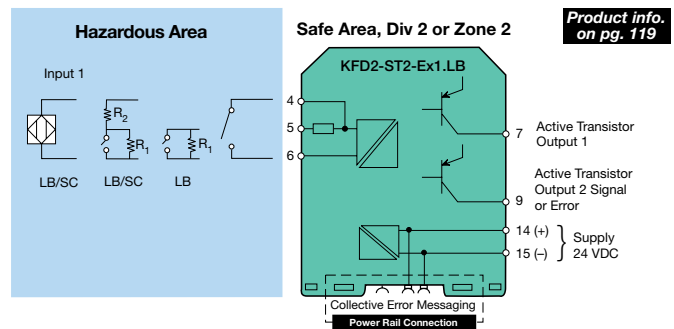


Figure 9.10

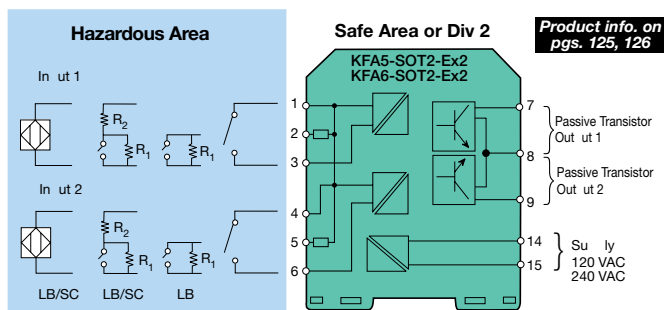


Figure 9.6

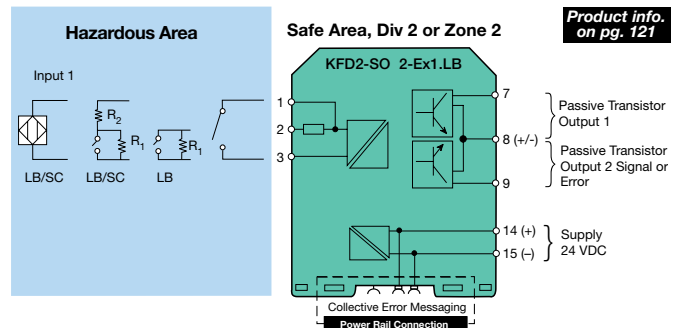


Figure 9.11

Dual Channel DC

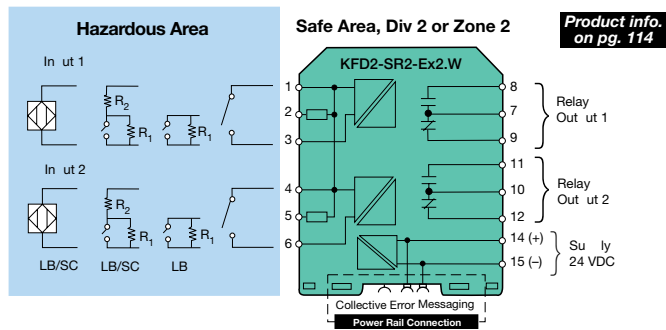


Figure 9.12

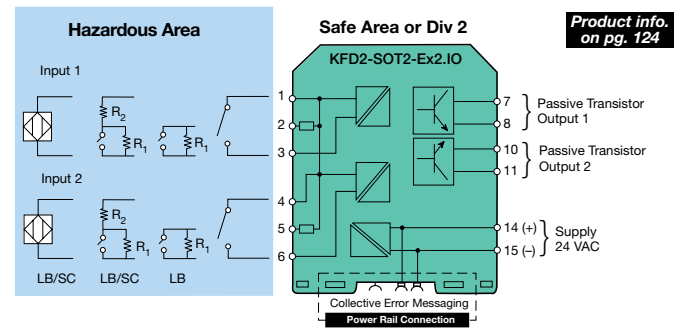


Figure 9.16

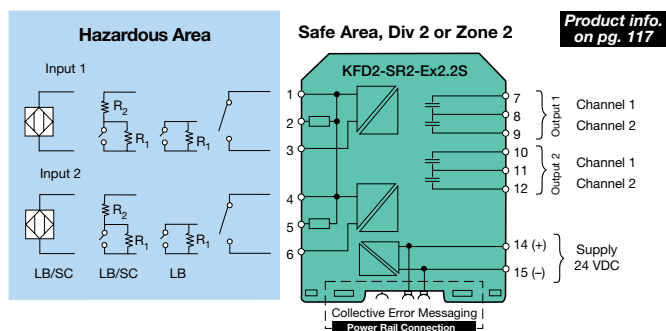


Figure 9.13

Quad Channel DC

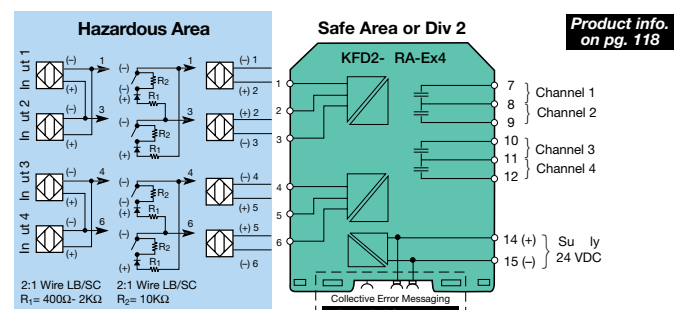


Figure 9.17

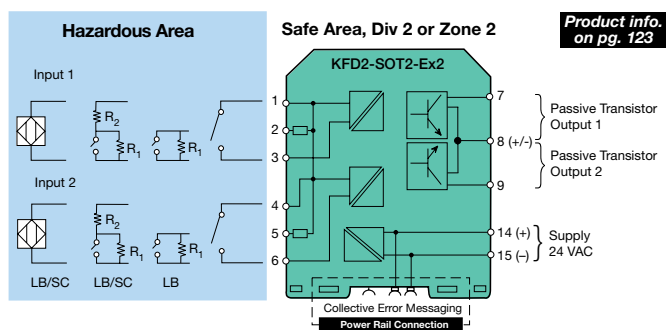


Figure 9.14

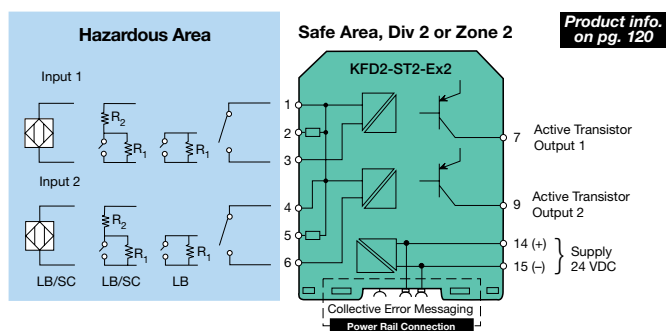


Figure 9.15

Transmitters

Zener Diode Barriers

This is the most common method of connecting a 2-wire transmitter to a zener barrier. Due to the “quasi-floating” configuration of this barrier, multiple I/O channels are not required to be isolated from one another.

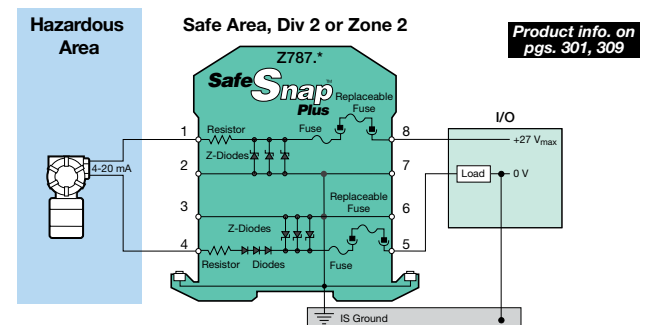


Figure 9.18

The figure below shows the most efficient method of connecting 2-wire transmitters providing the power supply for each I/O channel is individually isolated from one another or the measurement load is attached to the positive leg of the supply as shown.

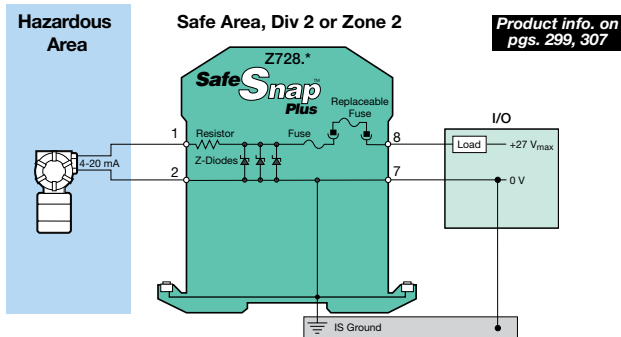


Figure 9.20

Note: SafeSnapPlus zener barriers are designed with replaceable fuses which is denoted by an "F" at the end of the model number. SafeSnap zener barriers have internal fuses.

If the I/O system requires a 1-5 V input, the Z788.R contains a precision 250 resistor internally connected between Terminals 3 and 4 to facilitate the 1-5 V output from a 4-20 mA transmitter.

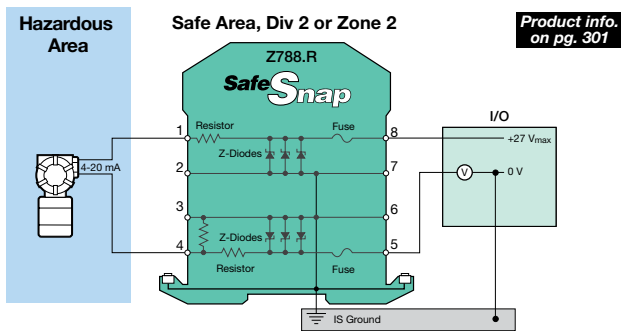


Figure 9.21

Note: If additional voltage is required for the transmitter, the Z788.R.H can provide the necessary increase. The entity parameters must, however, be verified.

Isolated Barriers

Dual Channel Isolated Transmitter Power Supply

This dual channel galvanically isolated transmitter power supply provides 3-way isolation between power, input and output for optimal signal integrity. This isolator powers a 2-wire transmitter within a hazardous area and transfers the analog 4-20 mA signal from the hazardous to the safe area. These barriers are suitable for SIL 2 applications according to IEC 61508.

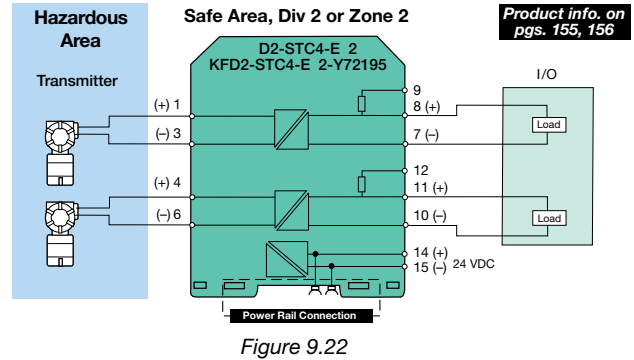


Figure 9.22

Isolated Transmitter Power Supply

This galvanically isolated transmitter power supply provides 3-way isolation between power, input and output for optimal signal integrity. This intrinsic safety barrier can be used for 2 or 3-wire transmitters (0/4-20 mA) and will source current to a 800 load in the safe area with an accuracy of $\leq 10 \mu A$. This barrier is suitable for SIL 2 applications according to IEC 61508.

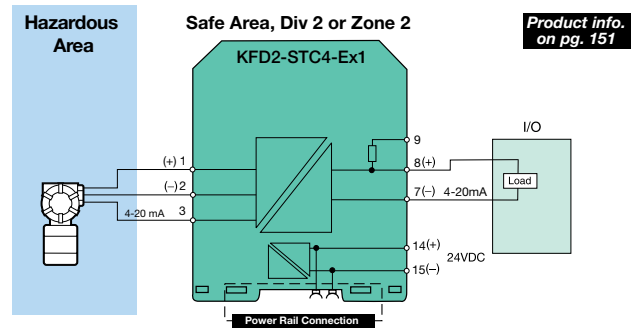


Figure 9.23

Isolated Transmitter Power Supply

This figure shows a galvanically isolated transmitter power supply similar to Figure 9.23, except the safe area output sinks the current from the I/O device. This barrier is suitable for SIL 2 applications according to IEC 61508.

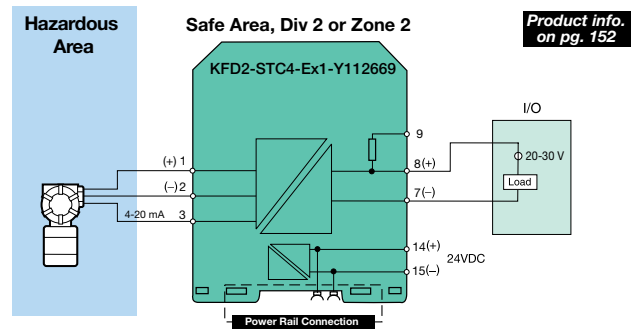


Figure 9.24

Isolated Transmitter Power Supply

This figure illustrates a galvanically isolated transmitter power supply similar to Figure 9.23, except the safe area output is equipped with 2 isolated outputs. These barriers are suitable for SIL 2 applications according to IEC 61508.

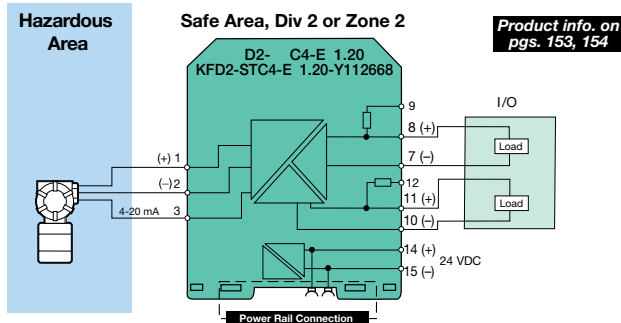


Figure 9.25

Note: The KFD2-STC4-Ex1.20-Y112668 has sink mode outputs.

SMART Transmitters

Zener Diode Barriers

For bidirectional digital communication between the safe and hazardous locations, the Z787.* is the most common zener barrier used for SMART transmitter applications. The communicator can be connected as shown, however other configurations are possible.

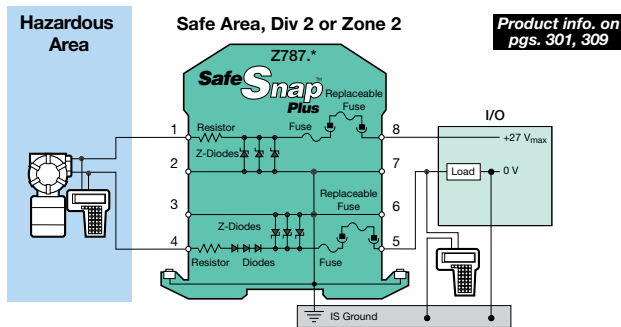


Figure 9.26

The figure below shows an alternate method of achieving bidirectional SMART communication through a zener diode barrier. The circuit implementing the Z728.* zener barrier must be individually isolated from each I/O channel or must have the measurement load attached to the positive leg of the supply for proper analog/digital communication to occur.

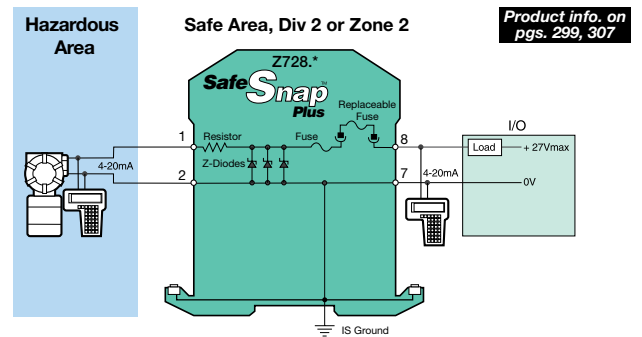


Figure 9.27

Note: When using zener barriers with SMART Transmitters, the over-all resistance for the loop must be considered to ensure correct operation. SafeSnapPlus zener barriers are designed with replaceable fuses which is denoted by an "F" at the end of the model number. SafeSnap zener barriers have internal fuses.

Isolated Barriers

Isolated SMART Transmitter Power Supplies

The following illustrations identify wiring diagrams for P+F's galvanically isolated SMART transmitter power supplies. This group of barriers provides signal isolation between the hazardous and safe areas while providing the necessary voltage for 2-wire SMART transmitters. Nearly all field device manufacturers have been successfully tested with P+F isolators. It must be noted that some high frequencies used for communication require the KFD2-STC3-Ex1 to be used since this isolator is rated for frequencies up to 40 kHz. The transfer characteristics of these units is $\leq 10 \mu A$. The STC4 version barriers are suitable for SIL 2 applications according to IEC 61508 and SIL 3 applications when installed in a redundant structure.

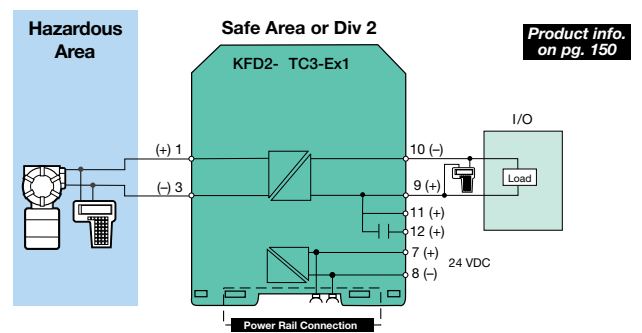
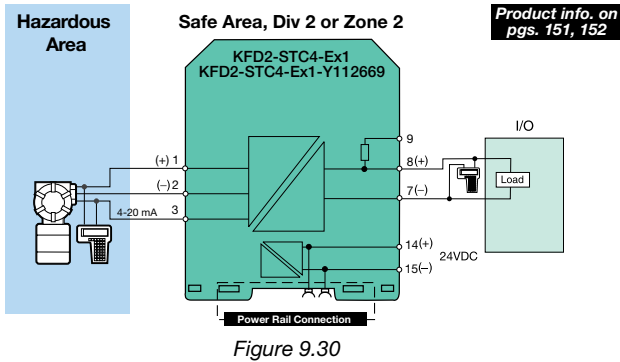
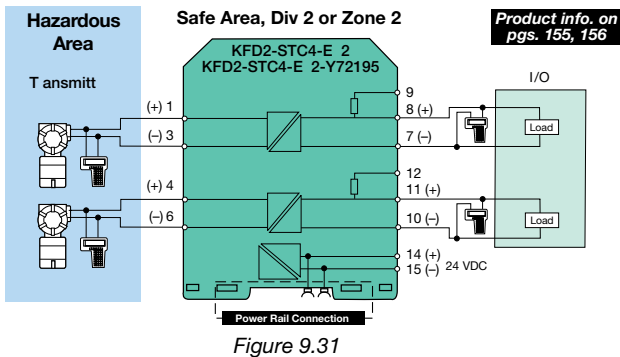


Figure 9.28

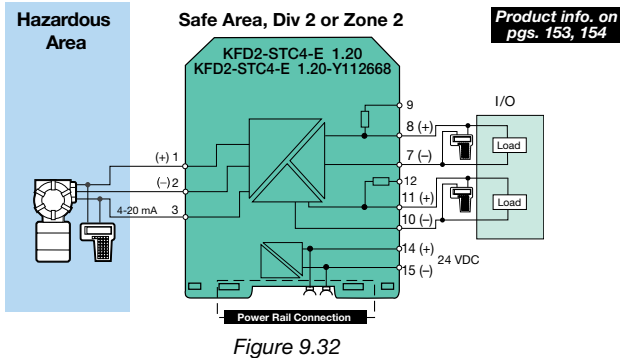
Note: Depending on calibrator design, connection can be made across Terminals 9 and 10 in the safe area.



Note: The KFD2-STC4-Ex1.20-Y112669 has sink mode outputs.



Note: The KFD2-STC4-Ex2-Y72195 has sink mode outputs

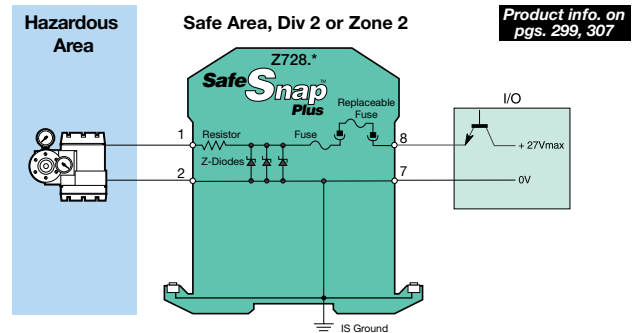


Note: The KFD2-STC4-Ex1.20-Y112668 has sink mode outputs.

I/P Converters

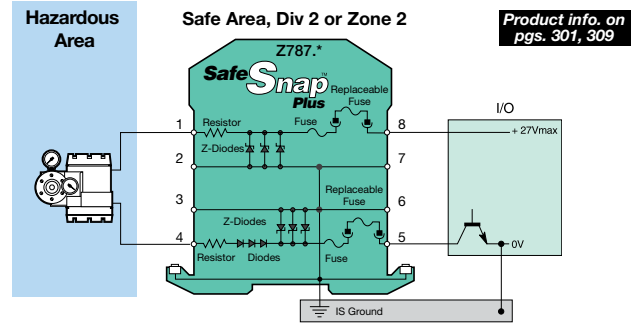
Zener Diode Barriers

A single channel Z728.* is the most efficient method of connecting an I/P converter if the power supply in the controller is either isolated from other I/O channels or has its negative return connected to the earth ground.



Note: In order to conserve DIN rail space, the dual channel Z779.* could provide operation and protection for two I/P converters if the Z728.* is acceptable.

A dual channel Z787.* can be used in situations where the return line of the I/P cannot be connected to the earth ground. The additional diode-return channel of the Z787.* provides isolation for the 4-20 mA current.



Note: SafeSnapPlus zener barriers are designed with replaceable fuses which is denoted by an "F" at the end of the model number. SafeSnap zener barriers have internal fuses.

Isolated Barriers

Isolated Current/Voltage Driver

The KFD2-CD-Ex1.32 driver barrier features high accuracy and temperature stability. By special order both the input and output of this galvanically isolated barrier can be altered to suit the application. They can be independently configured for either voltage or current. This module provides 3-way isolation between power, input and output for superior signal integrity. This barrier is suitable for SIL 2 applications according to IEC 61508.

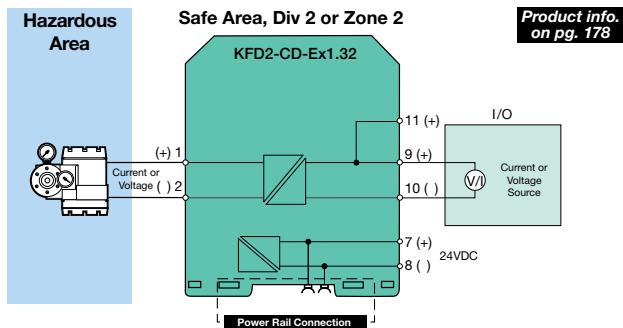


Figure 9.35

Isolated Current Driver

The loop powered KFD0-CS-Ex1.51P barrier is galvanically isolated making its application very simple. Although primarily designed for fire detector applications where accuracy is much less important, it is usually accurate enough for I/Ps. The accuracy of the KFD0-CS-Ex1.51P is $\leq 200 \mu A$. This barrier is suitable for SIL 2 applications according to IEC 61508.

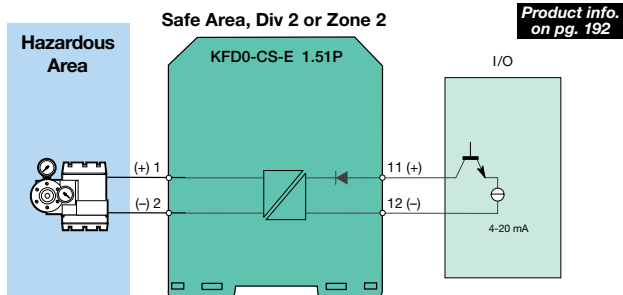


Figure 9.36

Note: A dual channel KFD0-CS-Ex2.51P can provide both cost and space savings.

Isolated Current Driver

The KFD2-SCD2-Ex1.LK current driver barrier features 3-way isolation between power, input and output. The isolator is designed to control I/P converters in a hazardous location. It also provides lead breakage and short circuit monitoring. This barrier is suitable for SIL 2 applications according to IEC 61508.

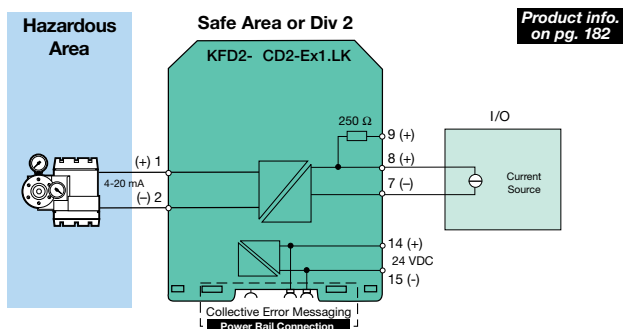


Figure 9.37

Dual Channel Isolated Current Driver

The KFD2-SCD2-Ex-2.LK is a dual channel current driver barrier, and provides 3-way isolation between power, input and output. The isolator is designed to control I/P converters electrical values and positioners in a hazardous area. It also provides lead breakage and short circuit monitoring. This barrier is suitable for SIL 2 applications according to IEC 61508.

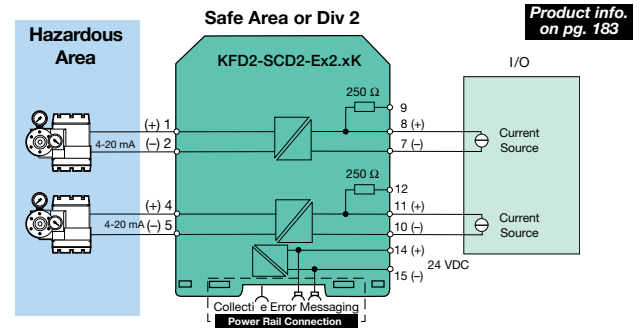


Figure 9.38



SMART I/P Converters

Zener Diode Barriers

A single channel Z728.* is the most efficient method of connecting a 2-wire SMART I/P if the power supply in the controller is either isolated from other I/O channels or has its negative return connected to the earth ground.

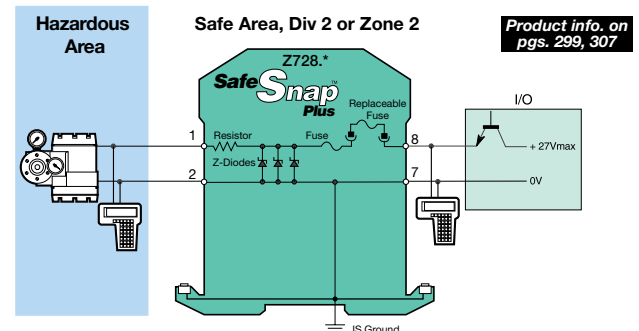


Figure 9.40

A dual channel Z787.* can be used in situations where the return line of the SMART I/P cannot be connected to the earth ground. The additional diode-return channel of the Z787.* provides isolation for the 4-20 mA current and digital signal.

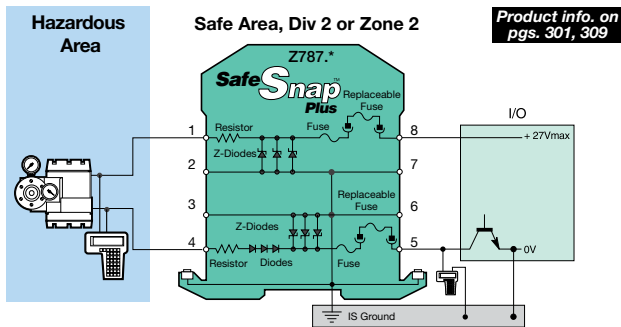


Figure 9.41

Note: When using zener barriers with SMART I/P field devices, the over-all resistance for the loop must be considered to ensure correct operation. SafeSnapPlus zener barriers are designed with replaceable fuses which is denoted by an "F" at the end of the model number. SafeSnap zener barriers have internal fuses.

Isolated Barriers

Isolated SMART Current Driver

The KFD2-SCD2-Ex1.LK SMART current driver barrier provides 3-way isolation between power, input and output for optimal signal integrity. This intrinsic safety barrier is designed to control SMART I/P converters in a hazardous location. The digital information generated by the processing system, field device or hand-held terminal is bidirectionally transferred by the barrier. This barrier is suitable for SIL 2 applications according to IEC 61508.

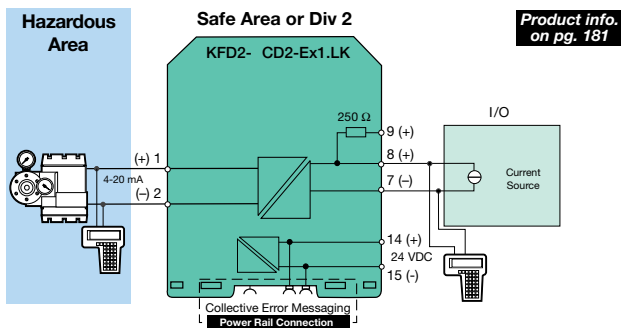


Figure 9.42

Dual Channel Isolated SMART Current Driver

The KFD2-SCD2-Ex2.LK is a dual channel SMART current driver barrier, and which provides 3 way isolation between power, input and output. The isolator is designed to control SMART I/P converters, electrical valves and positioners in a hazardous area. It also provides lead breakage and short circuit monitoring. This barrier is suitable for SIL 2 applications according to IEC 61508.

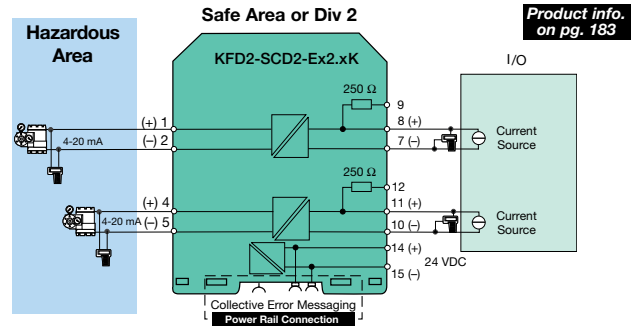


Figure 9.43

Thermocouples

Zener Diode Barriers

This is most common method of connecting a thermocouple to a zener diode barrier. The dual channel configuration provides a balanced circuit with a maximum of 64 in each channel, allowing operation for any thermocouple type.

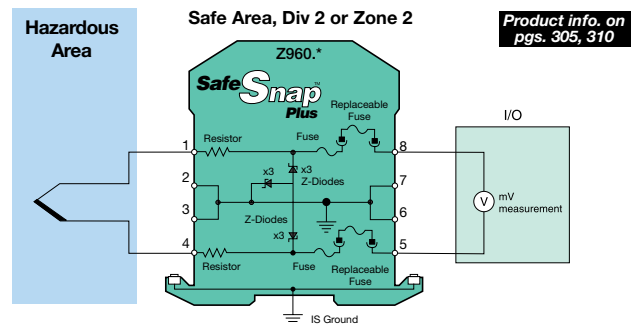


Figure 9.44

Note: SafeSnapPlus zener barriers are designed with replaceable fuses which is denoted by an "F" at the end of the model number. SafeSnap zener barriers have internal fuses.

Isolated Barriers

Isolated Loop Powered Thermocouple Transmitter

The loop powered KFD0-TT-Ex1 barrier is galvanically isolated and provides a 4-20 mA output for multiple thermocouple inputs. This barrier can be configured manually for the thermocouple type and upscale or downscale burnout and is also provided with zero and span point potentiometers.

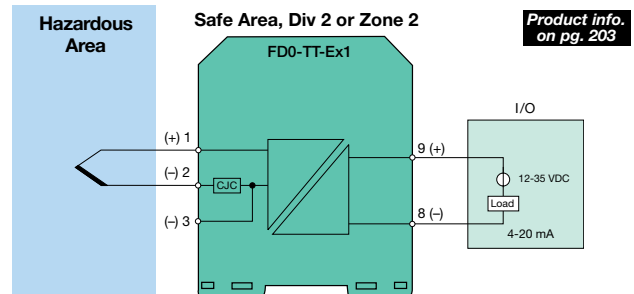


Figure 9.45

Isolated Milivolt Repeater

When an increased interference rejection or increased isolation between the thermocouple and measuring instrument is required, this galvanically isolated mV repeater can provide the necessary results. This barrier will repeat the mV signal generated by the thermocouple while the KFD2-VR-Ex1.50m.R and KFD2-VR-Ex1.50m.L will additionally output a +80 mV or -80 mV signal during a burnout condition.

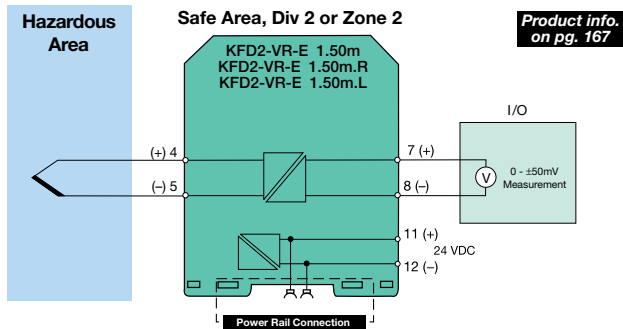


Figure 9.46

Isolated Thermocouple Transmitter – mA

This figure illustrates a galvanically isolated thermocouple transmitter barrier. This barrier provides accuracy and temperature stability over the entire input range selected. The thermocouple type, burnout condition, span, zero, tag information and user specific data are configurable through a standard PC port and a P+F software package.

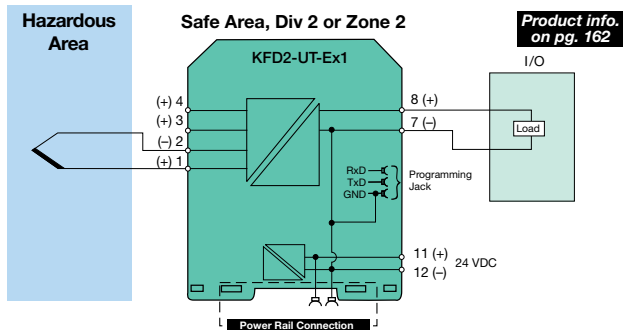


Figure 9.47

Note: Contact Pepperl+Fuchs regarding the availability of the new single-channel KFD2-UT2-Ex1 and dual-channel KFD2-UT2-Ex2.

RTDs

Zener Diode Barriers

This circuit shows a 3-wire RTD connected to a Z954 zener barrier. Due to its 3-channel configuration, the negative power supply lead is not connected directly to ground, providing a “quasi-floating system.” All three channels have matched end-to-end resistance which in conjunction with the bridge measuring instrument keep errors to a minimum.

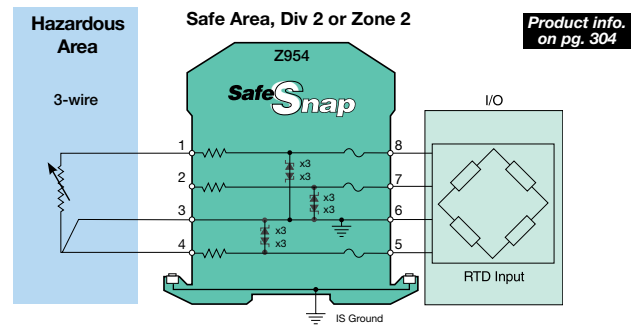


Figure 9.48

A 4-wire RTD connection with zener barriers offers the most accuracy. In this configuration, the measurement circuit is not sensitive to the end-to-end resistance of the barrier.

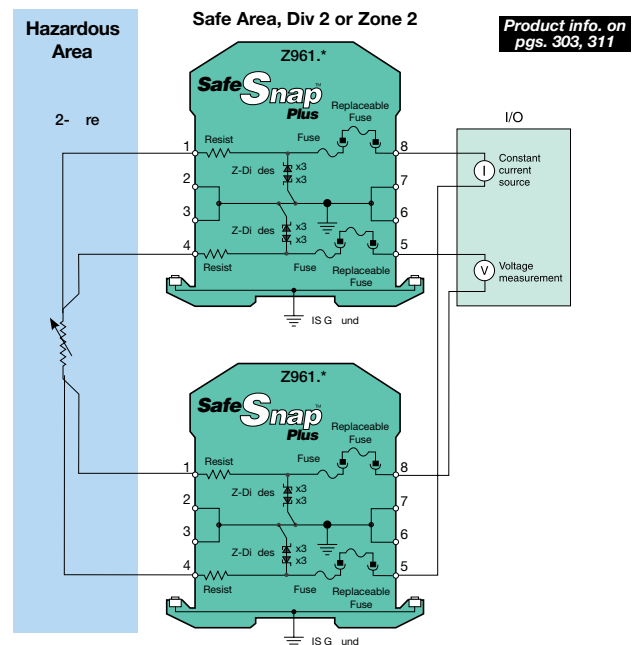


Figure 9.49

Note: SafeSnapPlus zener barriers are designed with replaceable fuses which is denoted by an “F” at the end of the model number. SafeSnap zener barriers have internal fuses.

Isolated Barriers

Isolated Loop Powered RTD Transmitter

The loop powered KFD0-TR-Ex1 barrier is galvanically isolated and provides a 4-20 mA output for 2- or 3-wire RTDs. The zero and span for the RTD are adjusted manually with calibration potentiometers located on the barrier.

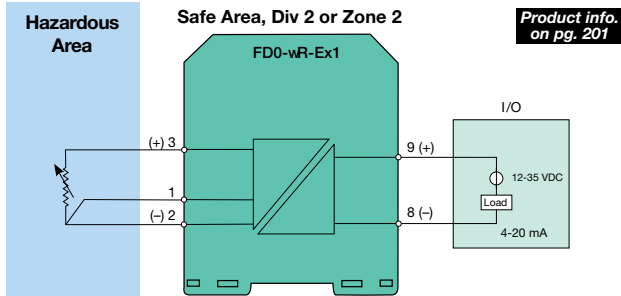


Figure 9.50

Isolated RTD Transmitter

When increased interference rejection or increased isolated between the RTD and measuring instrument is required, this galvanically isolated RTD repeater can provide the necessary results. Depending on the required accuracy, this barrier can be used in a 2-, 3- or 4-wire configuration. The barrier repeats the resistance measurement of the RTD into the safe area.

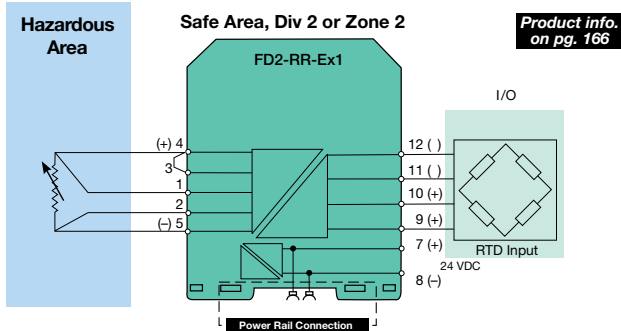


Figure 9.51

Isolated RTD Transmitter – mA

This figure illustrates a galvanically isolated RTD transmitter barrier. This barrier provides accuracy and temperature stability over the entire input range selected. The RTD type, lead breakage condition, span, zero, tag information and user specific data are configurable through a standard PC port and a P+F software package.

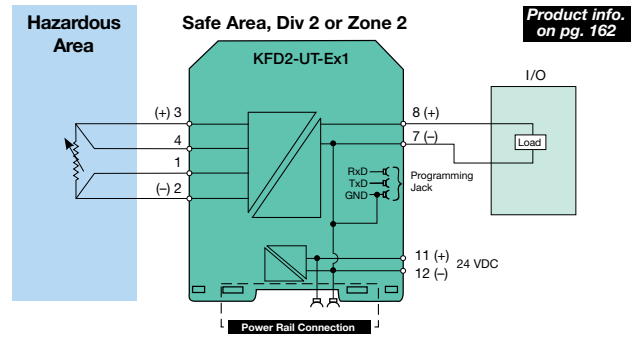


Figure 9.52

Note: Contact Pepperl+Fuchs regarding the availability of the new single-channel KFD2-UT2-Ex1 and dual-channel KFD2-UT2-Ex2.

Strain Gauges

Zener Diode Barriers

The Z966.* zener barrier supplies a 350 Ω strain gauge bridge with the necessary excitation voltage while the optional Z964.* supplies the power supply with a voltage sense input for increased accuracy. The millivolt signal is transferred to the safe area through the Z961.* These barriers are connected in a “quasi-floating” configuration for the best possible signal integrity when using zener barriers.

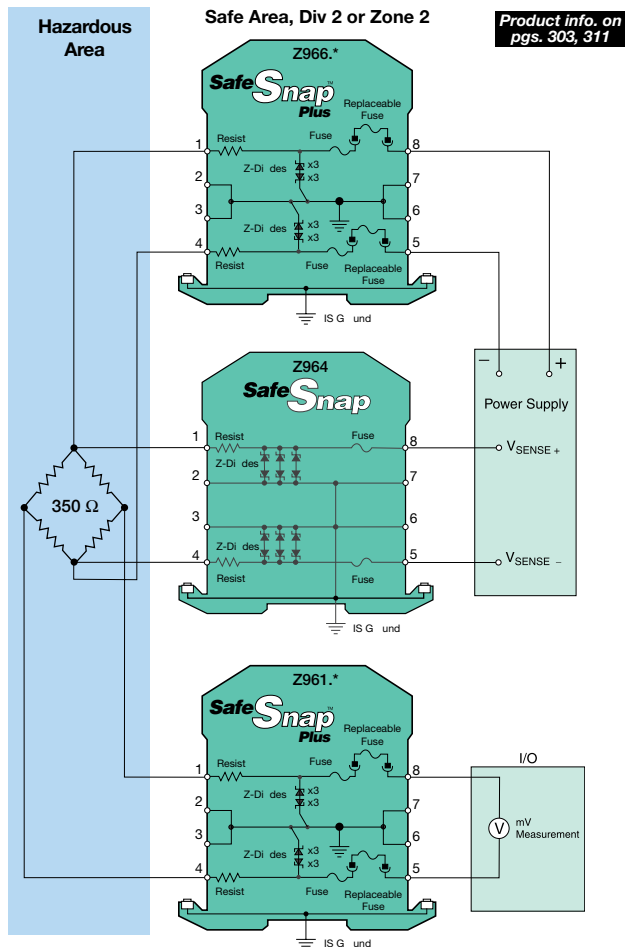


Figure 9.53

Note: SafeSnapPlus zener barriers are designed with replaceable fuses which is denoted by an “F” at the end of the model number. SafeSnap zener barriers have internal fuses.

Isolated Barriers

Isolated Strain Gauge Current Transmitter

This figure illustrates a galvanically isolated strain gauge transmitter barrier. With its 3-way isolation between power supply, input and output, this barrier provides a highly accurate means of supporting strain gauge applications within a hazardous location. The strain gauge can be connected in either a 4- or 6-wire configuration depending on the required accuracy. The strain gauge excitation voltage, mV signal range, tare value and current output range are all field selectable on the barrier.

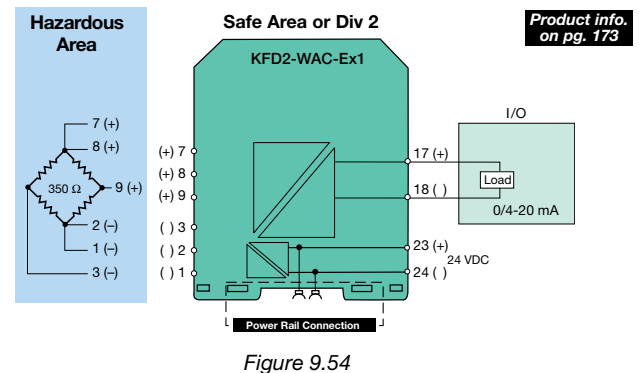


Figure 9.54

Note: Contact Pepperl+Fuchs regarding the availability of the new KFD2-WAC2-Ex1 strain gauge converter.



Vibration Monitoring

Zener Diode Barriers

This figure illustrates an example of a zener diode barrier and a vibration monitor in the hazardous area. The vibration monitor outputs a voltage signal, which is referenced to the positive supply, proportional to the vibration waveform at frequencies up to 4 kHz. Therefore, a negative polarity barrier is required and the positive side of the power supply must be grounded.

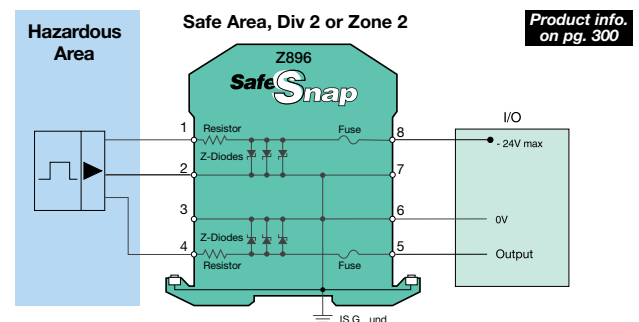


Figure 9.55

Isolated Barriers

Isolated Voltage Repeater

The galvanically isolated model KFD2-VR4-Ex1.26 is designed specifically for use with vibration monitoring instruments. The unit is designed with three port isolation between power, input and output while it provides a stable supply for the vibration transducer. A high-input impedance amplifier modifies the transducer signal and repeats the signal on safe side by a second amplifier to give low-output impedance.

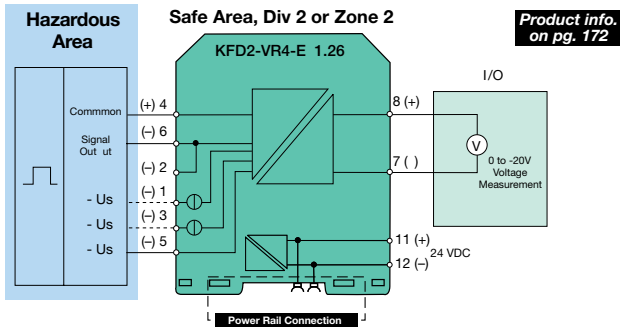


Figure 9.56

Isolated Voltage Repeater

For applications where the frequency requirements are over 5 kHz, the KFD2-VR-Ex1.19-Y109129 will accept an active voltage pulse up to +/-10V. The voltage pulse can be transmitted up to frequencies of 50 kHz.

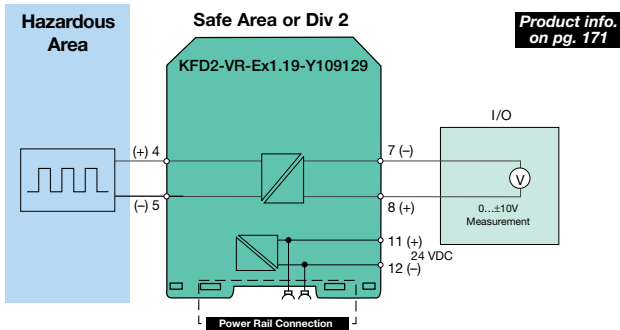


Figure 9.57

Potentiometers

Zener Diode Barriers

If the accuracy of the potentiometer signal is not critical, the Z960.* offers a 3-wire configuration that connects the return line to the I.S. ground. This connection can influence the measurement since the resistance in the negative line must be taken into account.

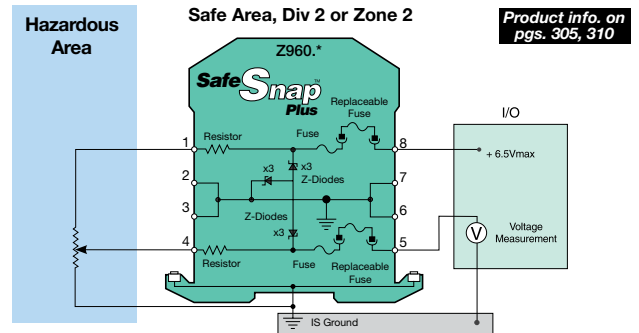


Figure 9.58

When a higher degree of accuracy is required on the potentiometer voltage signal, a four-wire connection is recommended. In this case, neither the source nor the signal is connected to the I.S. ground. This results in a high level of accuracy.

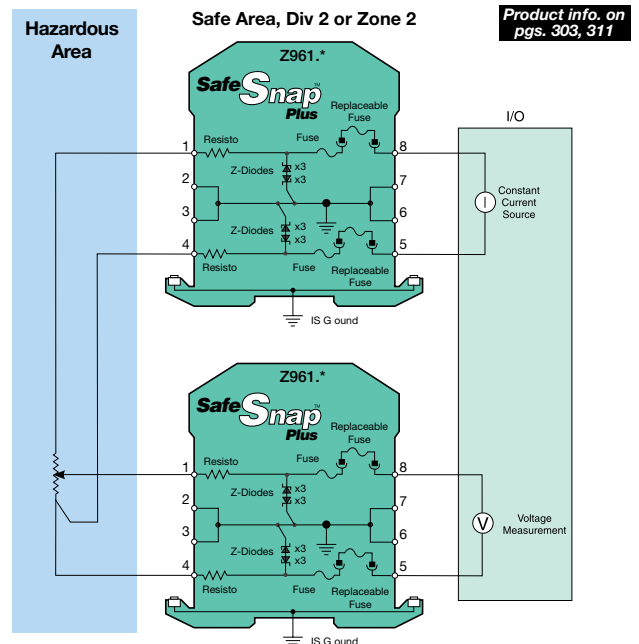


Figure 9.59

Note: SafeSnapPlus zener barriers are designed with replaceable fuses which is denoted by an "F" at the end of the model number. SafeSnap zener barriers have internal fuses.

Isolated Barriers

Isolated Potentiometer Transmitter – mA

These potentiometer transmitter barriers feature 3-way galvanic isolation between power supply, input and output for the best signal conversion accuracy and noise immunity. This barrier can be configured for either 3-, 4- or 5-wire potentiometers depending on the required accuracy of the application. The KFD2-PT2-Ex1-4 and KFD2-PT2-Ex1-5 are designed to provide a safe area signal of 0-20 mA and 4-20 mA respectively.

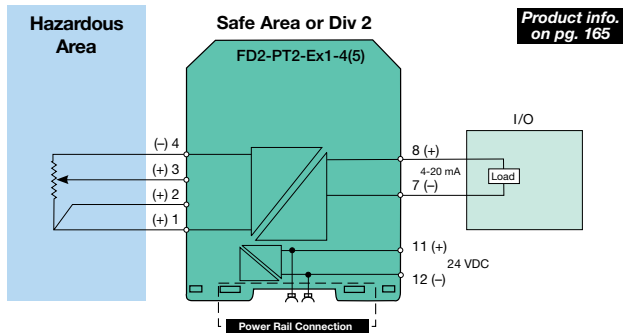


Figure 9.60

Isolated Potentiometer Transmitter – Voltage

The KFD2-PT2-Ex1, KFD2-PT2-Ex1-1, KFD2-PT2-Ex1-2 and KFD2-PT2-Ex1-3 are similar to the unit shown in Figure 9.60, except the safe area output is a voltage signal of 0-10 V, 0-5 V, 2-10 V and 1-5 V respectively.

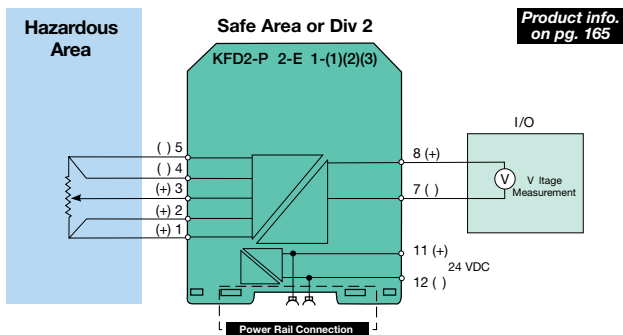


Figure 9.61

LED Clusters, Solenoids and Alarms

Zener Diode Barriers

Figure 9.62 illustrates the standard method of driving solenoids, LED clusters and audible/visual alarms in a hazardous location. For this configuration, the control switch must be located in the source line for proper operation. If additional voltage is required for the field instrument, a Z728.H.* may provide the necessary increase.

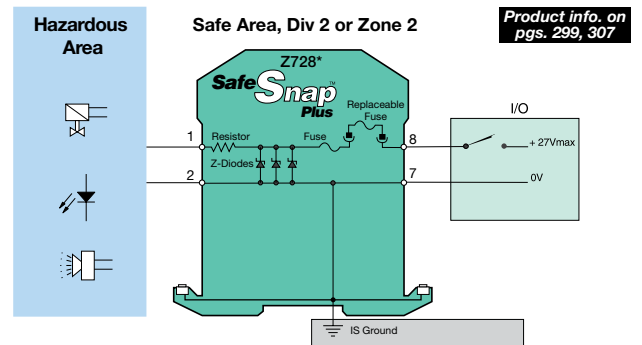


Figure 9.62

This figure shows an alternate method of driving solenoids, LED clusters and audible/visual alarms in a hazardous location when the control switch is located in the return line.

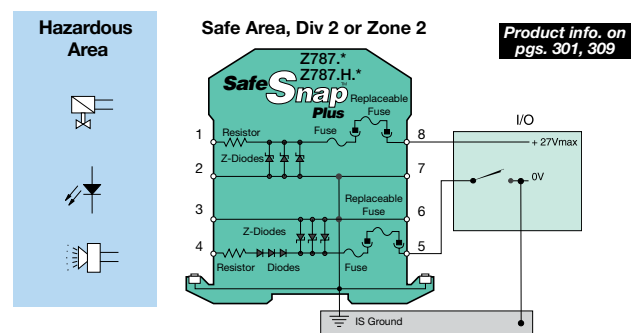


Figure 9.63

Note: SafeSnapPlus zener barriers are designed with replaceable fuses which is denoted by an "F" at the end of the model number. SafeSnap zener barriers have internal fuses.

Isolated Barriers

Isolated Loop Powered Discrete Output Driver

The loop powered KFD0-CS-Ex1.51P barrier is a galvanically isolated discrete output barrier. It can be used to energize certain types of solenoids, LEDs and alarms. With a 24 V source, this barrier will supply approximately 27 mA at 12 V to the hazardous area field instrument. This barrier is suitable for SIL 2 applications according to IEC 61508.

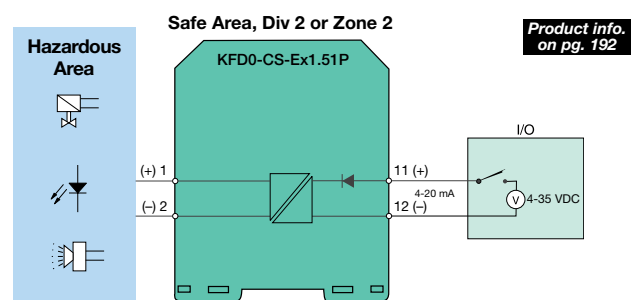


Figure 9.64

Note: A dual channel KFD0-CS-Ex2.51P provides both cost and DIN rail space savings.

Isolated Loop Powered Solenoid Driver

The following solenoid driver barriers provide the necessary power to energize discrete output instruments such as solenoids, LEDs and alarms. The KFD2-SD-Ex1.48, KFD2-SD-Ex1.48.90A and KFD2-SD-Ex1.36 are internally current-limited to 35mA, 45mA and 80mA respectively. These barriers are suitable for SIL 2 applications according to IEC 61508.

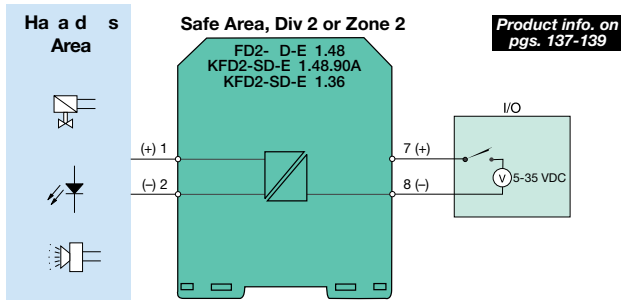


Figure 9.65

Isolated Logic Input Solenoid Driver

The KFD2-SL2-Ex1 Single channel solenoid driver provides power to a load in a hazardous area and can be switched on or off by a signal from a logic circuit. It also provides lead breakage, short circuit monitoring and collective error messaging. These barriers are suitable for SIL 2 applications according to IEC 61508.

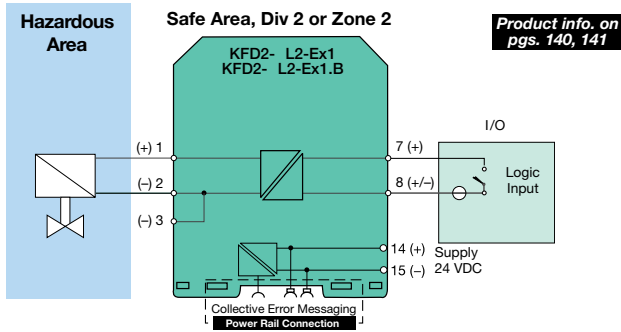


Figure 9.66

Note: KFD2-SL2-Ex1.B is the basic unit and does not include such features as LB/SC monitoring or collective error messaging.

Dual Channel Isolated Logic Input Solenoid Driver

The KFD2-SL2-Ex2 dual channel solenoid driver provides power to a load in a hazardous area and can be switched on or off by a signal from a logic circuit. It also provides lead breakage, short circuit monitoring and collective error messaging. These barriers are suitable for SIL 2 applications according to IEC 61508.

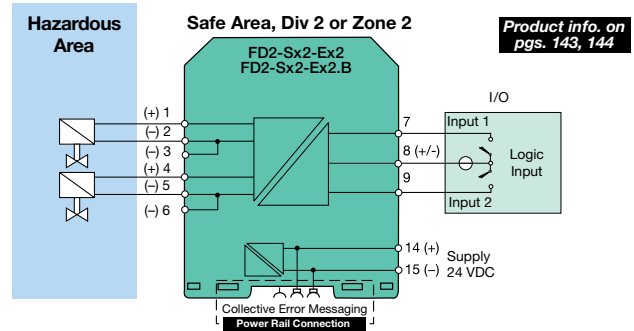


Figure 9.67

Note: KFD2-SL2-Ex2.B is the basic unit and does not include such features as LB/SC monitoring or collective error messaging.

Isolated Logic Input Solenoid Driver

The KFD2-SL2-Ex1.LK solenoid driver provides power to a load in a hazardous area and can be switched on or off by a signal from a logic circuit. It also provides lead breakage, short circuit monitoring and collective error messaging and a relay contact fault output that can be wired in series for a fail-safe configuration. This barrier is suitable for SIL 2 applications according to IEC 61508.

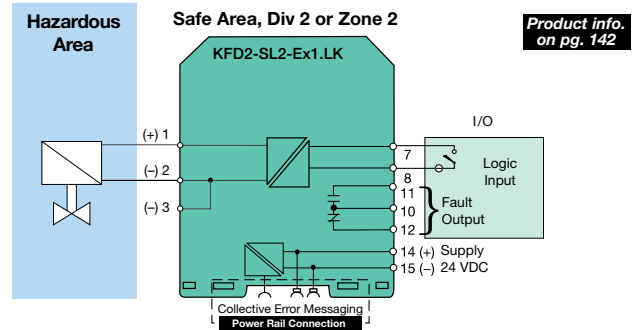


Figure 9.68

Pulse Input/Serial Communication

Zener Diode Barriers

The figure below illustrates an example of a zener diode barrier and an active pulse generator located in the hazardous area. The voltage pulse can be as high as 20 V since the signal is isolated from ground due to the dual channel configuration of the zener diode barrier.

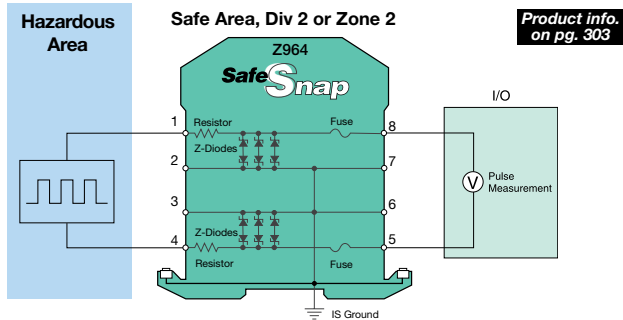


Figure 9.69

This configuration can be used when the passive pulse signal generator requires a voltage source to operate. The pulses are received in the safe area through the diode return channel of the barrier. These diodes may attenuate the pulse height, therefore the sensitivity of the receiving instrument must be considered.

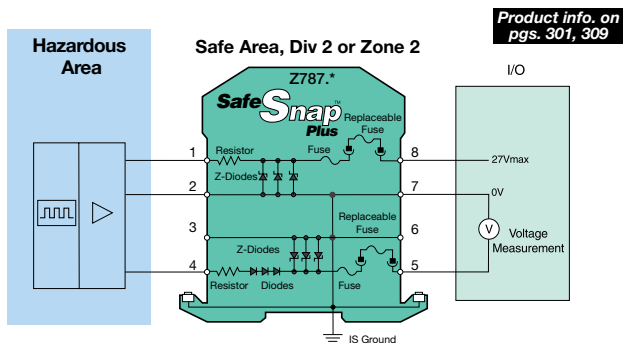


Figure 9.70

Note: SafeSnapPlus zener barriers are designed with replaceable fuses which is denoted by an "F" at the end of the model number. SafeSnap zener barriers have internal fuses.

Isolated Barriers

Isolated Millivolt Repeater

This galvanically isolated millivolt repeater provides 3-way isolation between the power, input and output for the best pulse repetition. When the active pulse signal has a magnitude of ± 500 mV, the KFD2-VR-Ex1.500m will accurately repeat the signal up to 1.3 kHz.

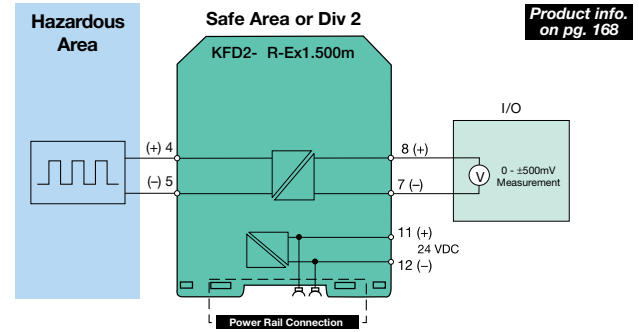


Figure 9.71

Isolated Voltage Repeater

This figure shows a galvanically isolated voltage repeater similar to Figure 3, except the active pulse signal can have a magnitude of ± 10 V. Additionally, the KFD2-VR-Ex1.19 will transmit the voltage pulse at frequencies up to 4 kHz.

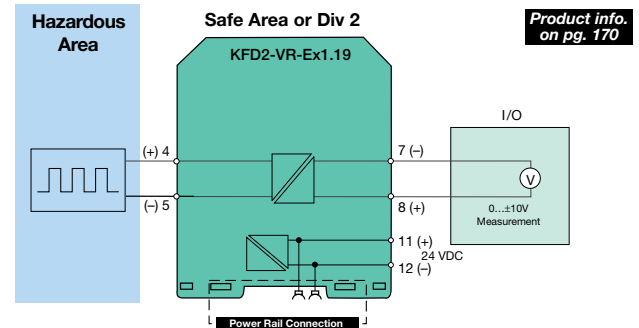


Figure 9.72

Isolated RS-232 Repeater

This figure illustrates a galvanically isolated RS-232 repeater used for data transfer through a hazardous area. The figure below shows the signal being passed through the hazardous location at a maximum data transfer of 20 k bits/sec. Since the barrier is galvanically isolated, an intrinsic safety ground is not necessary.

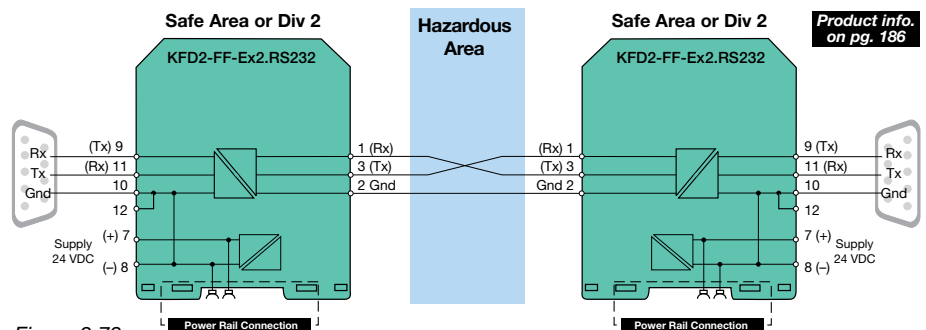


Figure 9.73

Logic Controls/Limit Alarms

Isolated Barriers

Isolated Speed Monitoring

Often it is necessary to know if a process is operating under or over a desired speed. The KFD2-DWB-Ex1.D provides relay outputs that energize at field-programmed setpoints. This barrier is suitable for SIL 2 applications according to IEC 61508.

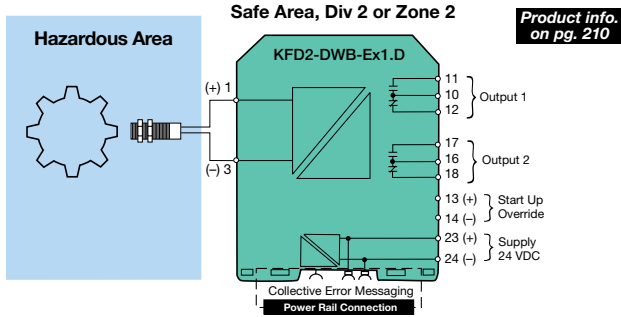


Figure 9.74

Note: For AC Powered units ask for KFA5-DWB-Ex1.D (120 VAC) or KFA6-DWB-Ex1.D (240 VAC). Collective error messaging and Power Rail connection are not available on the AC units.

Isolated TimeDelay Relay

The galvanically isolated KFD2-DU-Ex1.D comes with a display for easy on site programming and is commonly used in applications requiring on delay, off-delay, one-shot or pulsating signal conditioning.

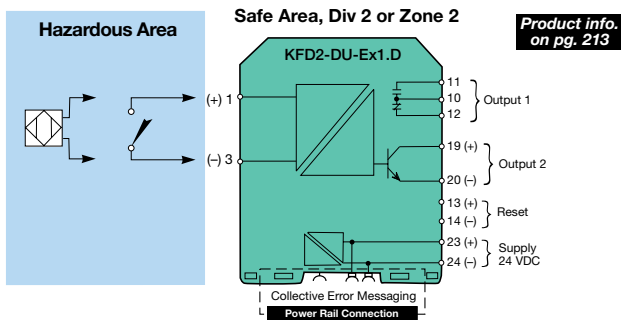


Figure 9.75

Note: For AC versions of this unit order the KFA5-DU-Ex1.D (120 VAC) or the KFA6-DU-Ex1.D (240 VAC). The AC units are not equipped with collective error messaging or Power Rail connection.

Isolated Universal Frequency Converter

The galvanically isolated KFD2-UFC-Ex1.D comes with a display for easy on site programming and converts the signals from a NAMUR proximity sensor or dry contact into a 0/4-20 mA output. For non-display version use the KFD2-UFC-Ex1. These barriers are suitable for SIL 2 applications according to IEC 61508.

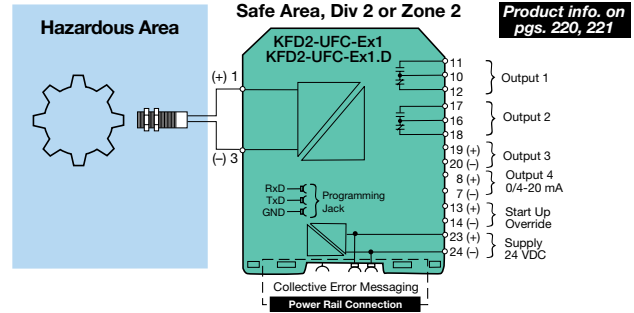


Figure 9.76

Note: For AC powered units ask for our universal power supply version, the KF8-UFC-Ex1.D or KF8-UFC-Ex1. Collective error messaging & Power Rail connections are not available on the universally powered units.

Isolated Rotation Direction Indicator and Synchronization Monitor

The galvanically isolated KFD2-UFT-Ex2.D comes with a display for easy on site programming and is used when a rotation direction indicator or synchronization monitor is needed. A non-display unit is available with the KFD2-UFT-Ex2.

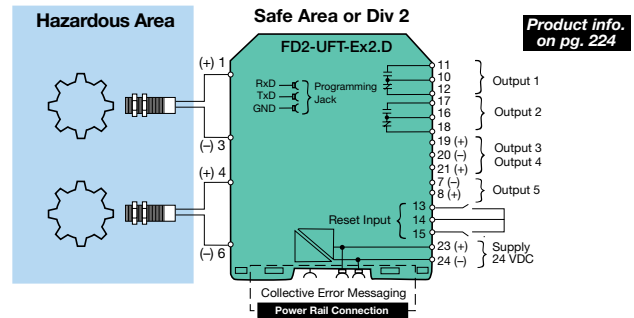


Figure 9.77

Note: For AC versions of this unit ask for our universal power supply version the KF8-UFT-Ex2.D or the KF8-UFT-Ex2. Collective error messaging & Power Rail connection are not available on the universally powered units.

Isolated Limit Alarm

The following galvanically isolated limit alarm provides two independent set points for RTDs, thermocouples or voltage/current signals. This intrinsic safety barrier is PC configurable for trip point, hysteresis and high/low alarm. This module not only provides the necessary isolation for intrinsic safety, but also offers a simple logic function for alarm set points.

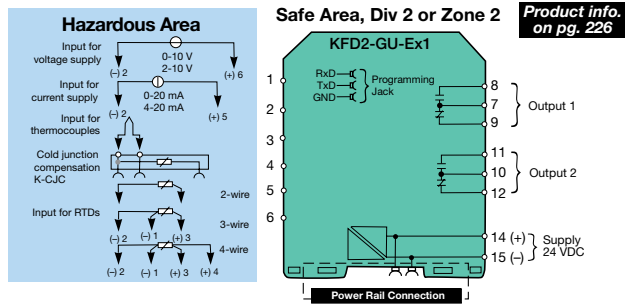


Figure 9.78

Isolated Limit Alarm

The following galvanically isolated limit alarm provides two independent set points for RTDs, thermocouples, voltage or potentiometer signals. This intrinsic safety barrier is PC or push-button programmable.

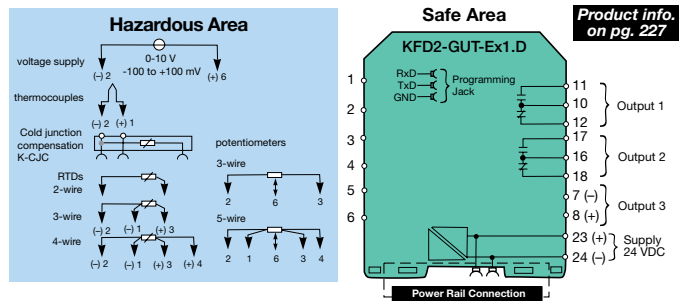


Figure 9.79

Isolated Limit Alarm

The KFD2-CRG-Ex1.D is a galvanically isolated transmitter power supply for a 2- or 3-wire transmitter or current source. It not only repeats the 0/4-20 mA signal but has two programmable relay outputs. Lead breakage and short-circuit monitoring are provided along with collective error messaging. This barrier is suitable for SIL 2 applications according to IEC 61508.

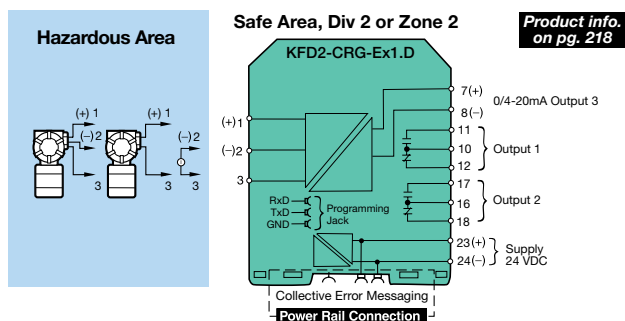


Figure 9.80

Isolated Latching Relay

The galvanically isolated KFA5-SR2-Ex2.W.IR provides latching functions for use as a two step controller. To maintain the levels of a process between two points, this level control unit can be programmed for pump-up or pump-down applications.

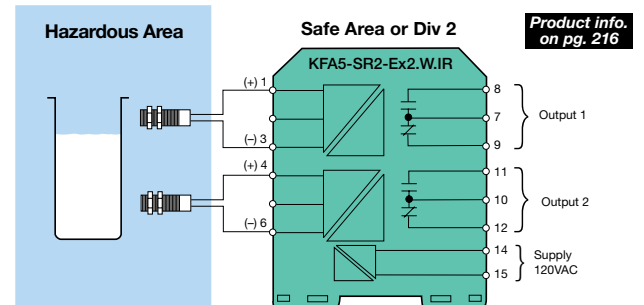


Figure 9.81

Power Supplies

Conventional Wiring Method

The conventional method of wiring barriers is daisy-chaining from barrier to barrier.

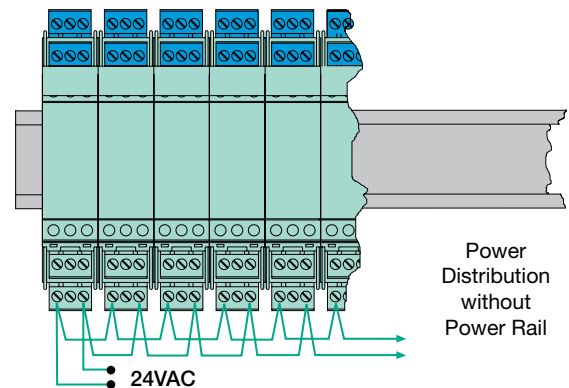


Figure 9.82

Power Rail Method

Eliminate the labor intensive daisy chain method by using Power Rail. Combined with the KFD2-EB2 power feed module and the PR-03 or UPR-03 Power Rail, this configuration quickly and easily distributes power to all the barriers via 2 gold plated conductors.

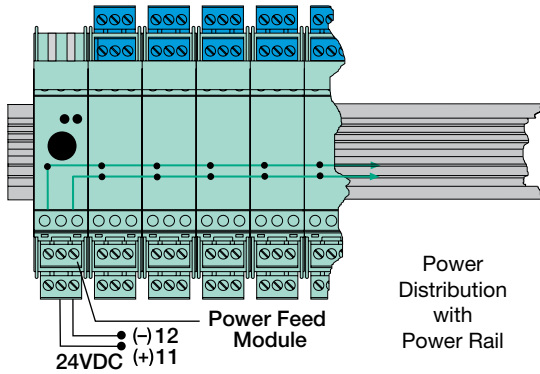


Figure 9.83

Note: PR-03 is a 500 mm insert for standard 35mm DIN Rail. UPR-03 is sold in 2 meter lengths and comes with its own 35 mm DIN Rail.

Collective Error Messaging

The collective error messaging enables lead breakage and short circuit monitoring for Pepperl+Fuchs isolators. The KFD2-EB2 power feed module combined with PR-03 or UPR-03 Power Rail allows a fault signal to be transferred along the Power Rail's 3rd conductor to the KFD2-EB2 and provides a relay contact output for the entire isolator group.

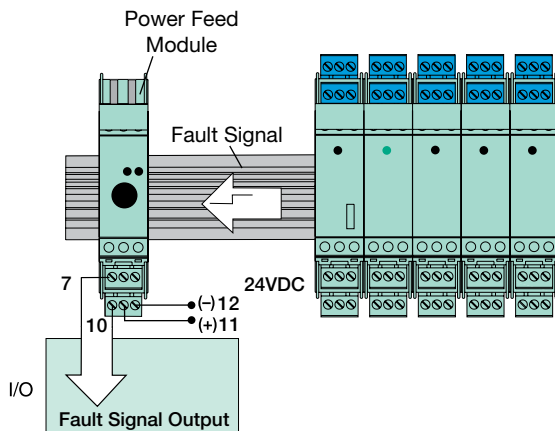


Figure 9.84

Redundant Power Feed Modules

When a process needs a higher degree of safety and reliability, use two KFD2-EB-R4A.B modules. If either power supply fails, the Power Rail and isolators continue to be energized via the second power feed module.

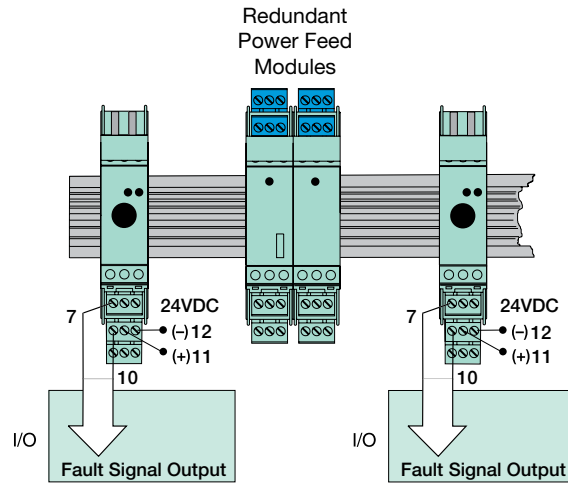


Figure 9.85

Power Supply

Provide a complete solution for an isolator installation by using a 120/240 VAC to 24 VDC/4A power supply. The KFA6-STR-1.24.4. It snaps quickly on to Power Rail to easily distribute power to the isolators.

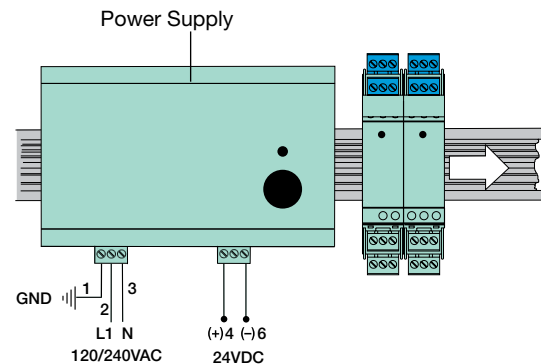


Figure 9.86

Note: The number of isolators per power supply depends upon the power consumption of each module.

Power Supply

The KFA6-STR-1.24.500 provides 24 VDC 500 mA for those small projects that do not require a large number of isolators. It snaps quickly on to Power Rail to easily distribute power to the isolators.

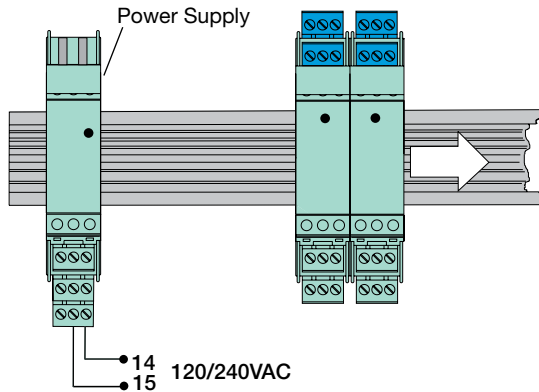
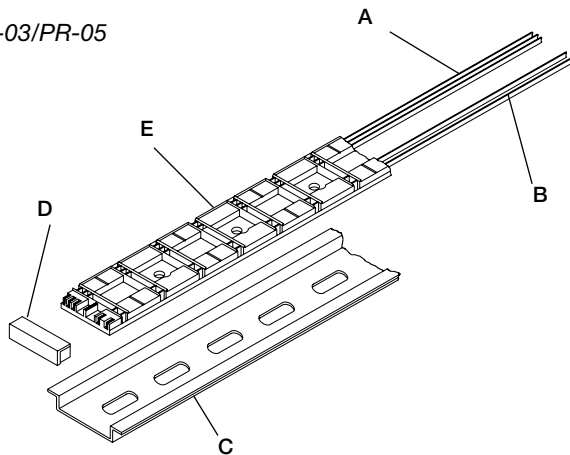


Figure 9.87

Note: The number of isolators per power supply depends upon the power consumption of each module.

Power Rail

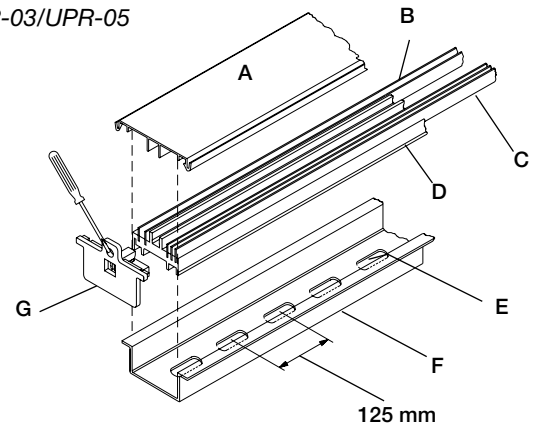
PR-03/PR-05



- A** - One conductor for collective error (PR-03)
Three conductors for bus connection (PR-05)
- B** - Two conductors for power supply
- C** - DIN Rail
- D** - End Cap
- E** - Power Rail

Note: PR-03 and PR-05 is a 500 mm insert for standard 35 mm DIN rail. Individual sections can be connected with a VE-PR link.

UPR-03/UPR-05



- A** - Cover
- B** - Two leads for power
- C** - One conductor for collective error (UPR-03)
Three conductors for bus connection (UPR-05)
- D** - Universal Power Rail
- E** - Mounting Holes
- F** - DIN Rail
- G** - End Cap UPR-E

Note: The UPR-03 and UPR-05 is two meters in length and comes with its own 35 mm DIN rail.