TERMINATION BOARD SOLUTION

H-SYSTEM FOR YOKOGAWA
PROSAFE-RS
About Pepperl+Fuchs

Pepperl+Fuchs is a leading developer and manufacturer of electronic sensors and components for the global automation market. Since more than 60 years, our continuous innovation, high quality products, and steady growth guarantee continued success.

One Company – Two Divisions

PEPPERL+FUCHS – PROTECTING YOUR PROCESS

The Process Automation Division is a market leader in intrinsically safe explosion protection. We offer comprehensive, application-oriented system solutions, including customer-specific control cabinet solutions for the process industry. A large portfolio of components is available from our various product lines: isolated barriers, fieldbus infrastructure solutions, remote I/O systems, HART interface solutions, level measurement devices, purge and pressurization systems, industrial monitors and HMI solutions, power supplies, separator alarm systems for oil and petrol separators, hazardous area enclosures and equipment.

PEPPERL+FUCHS – SENSING YOUR NEEDS

The main target markets of the Factory Automation Division are machine and plant construction, the automotive industry, storage and material handling, printing and paper industry, packaging technology, process equipment, door, gate and elevator construction, mobile equipment, renewable energies. With the invention of the inductive proximity sensor in 1958, the company set an important milestone in the development of automation technology. Under the motto “Sensing your needs”, customers benefit from tailor-made sensor solutions for factory automation. The division offers a wide product range of industrial sensors whether it's inductive, photoelectric or ultrasonic sensors, rotary encoders, identification systems, barcode readers for 1D, 2D and data matrix codes, and vision sensors.
We’re There When You Need Us

A global presence enables Pepperl+Fuchs to offer the best of both worlds: extremely high engineering standards combined with efficient, low-cost manufacturing facilities.

A worldwide presence means we have exactly what you need to make your process efficient and reliable. It means the most advanced technical expertise in the business is standard with every Pepperl+Fuchs product.

It means we have the largest and most ingenious staff of seasoned and skilled engineers and field representatives in the industry. It means we’re there when you need us – anywhere in the world.

Pepperl+Fuchs offers proven industry expertise through market-based, customer-focused products that provide answers to the toughest application problems. Our target industries are involved with chemicals, pharmaceuticals, oil & gas, petrochemicals, and other areas including wastewater treatment and power technology. In all industrial areas, Pepperl+Fuchs is both a supplier and partner for end users, control systems manufacturers, system integrators and engineering contractors. We set the standard by offering the best product, service and support in the world. From our expert application analysis and global key account management, to our on-site engineering of new systems and technical support after the sale, we stand solidly behind every product we build.
Introduction

Termination Board Solutions

System Description

Termination Boards

H-System Isolated Barriers

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Glossary

General Notes

Model Number Index
The Catalog
This catalog presents the product portfolio of Termination Board solutions for Yokogawa ProSafe-RS and, compiled by our inhouse Termination Board experts, shares concise technical knowledge based on years of substantiated experience.

Product Selection Tables
Product selection tables are located at the beginning of each section, making it easy to find the product you need.

Product Data Pages
The product data sheets contain all of the relevant data necessary to select and specify the equipment. It includes four major sections: Features, Function, Technical Data, and Diagrams. Surrounding these key elements are navigation tools necessary to help identify the product including special colors, markings, and symbols.

Comprehensive product information can be found at www.pepperl-fuchs.com.
The Website

For the most up-to-date and comprehensive product information, please visit our website:

www.pepperl-fuchs.com

On the website, you can narrow your search and find the product information you need in two different ways:

- To find information about a specific product, use the search function.
- To find a product based on specific features, use the product selector.

The Search Function

In the search field on our website enter either of the following:

- Product name if known
- Part of the product name, e.g., from the catalog
- Part number, e.g., from the type label of a product you have already purchased

Note: The search function is not case sensitive. You can also carry out a wildcard search, using *.

Depending on the completeness of the product name or part number you entered, the search result displays a hit list with a short description of each product from which you can select the required product.

The Product Selector

Use the product selector to navigate to the required product group.

Here, you can choose the following:

- a list of products or
- a table with a list of attributes

Now select the required product feature. Each time you make a selection, the number of products that meet the criteria is displayed. The more features you define, the fewer suitable products will be displayed.

Finally, click on Product Selector Tool Results to access the product list and view the required product.
The Pepperl+Fuchs and Yokogawa Termination Board Solutions

Are you Looking for a Reliable Project Partner?

Pepperl+Fuchs is the undisputed market leader in intrinsically safe explosion protection components and protection of hazardous area applications. Our interface solutions are preferred on projects worldwide.

We continue to work closely with Yokogawa and now offer a wide variety of custom solutions for Yokogawa Control and Safety Systems. Please use this document to be able to use the preferred solutions for the system cards which has been born out of a long history and has resulted in Pepperl+Fuchs and Yokogawa partnership.

The Yokogawa and Pepperl+Fuchs Partnership

March 2002, Yokogawa Electric Corporation, Japan and Pepperl+Fuchs, Germany signed a Global Preferred Vendor Agreement.

Since this time we continued to work strongly together and have developed many products together. Today, Pepperl+Fuchs is announced by Yokogawa as the preferred interface solution for both CENTUM VP and ProSafe-RS. The partnership nowadays extends from interface equipment and Remote I/O to Fieldbus technologies.

Yokogawa can offer complete “Field to Control Room” solutions, utilizing Pepperl+Fuchs extensive range of interface technologies with the new H-System platform. Based on the newest generation of Surface Mounted Devices (SMD) this platform is ensuring not only a longer lifetime of the electronics itself but more important also lower energy consumption due to both lower losses as well as requirements on environment within cabinets or panels.

The objective of this agreement is to provide you, our mutual customer with interface products to complement Yokogawa’s control and safety systems. Solutions found in this document have been fully tested at several HQ and are compliant and integrated into Yokogawa’s business concept, thus guaranteeing customers’ investments.

Figure 1  Automation pyramid
Cabinet Buildup
Based on standard concepts and historic interpretation this new H-System platform has a perfect form fit into cabinets. Mountable either horizontal or vertical and by a reduction of the space requirements combined with low heat dissipation a NAMUR mixture up to 192 channels in one cabinet side is applicable.

Acceptance Tests Termination Board
Based on Yokogawa specifications the Termination Boards have been developed and afterwards conducted to tests.
The following inspections and tests have been carried out:
- Visual inspection
- Power distribution
- Functional test
- Current consumption and hot-spot detection
- Data sheet inspection

Advantages
The data sheet describes both (if applicable) settings at the IO card as well as interface module. Thus ensuring an easy installation.

By using the H-System platform, you have the following advantages:
- Space savings = lower amount of cabinets or panels = less space in control rooms = less cooling/heating (energy efficient)
- Low heat dissipation = longer life of electronics = reduced energy consumption = reduced power supply = reduced UPS costs
- Energy efficiency throughout the plant life cycle and lower operating costs!

Please ask your Pepperl+Fuchs representative for legacy systems.
Termination Board Solutions for Yokogawa ProSafe-RS
**Safety**

**Validity**
The chapter “Safety” is valid as instruction manual. Specific processes and instructions in this document require special precautions to guarantee the safety of the operating personnel.

**Target Group/Personnel**
The plant owner is responsible for its planning, installation, commissioning, operation, maintenance and disassembly. Mounting, installation, commissioning, operation, maintenance and disassembly of any devices may only be carried out by trained, qualified personnel. The instruction manual must be read and understood.

**Reference to further documentation**
Laws, standards, or directives applicable to the intended use must be observed. In relation to hazardous areas, Directive 1999/92/EC must be observed.

The corresponding data sheets, declarations of conformity, EC Type-examination certificates, certificates and Control Drawings if applicable (see data sheet) are an integral part of this document. You can find this information under www.pepperl-fuchs.com.

Due to constant revisions, documentation is subject to permanent change. Please refer only to the most up-to-date version, which can be found under www.pepperl-fuchs.com.

**Marking**

<table>
<thead>
<tr>
<th>Device identification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pepperl+Fuchs GmbH</td>
</tr>
<tr>
<td>Lilienthalstrasse 200, 68307 Mannheim, Germany</td>
</tr>
<tr>
<td>Model number</td>
</tr>
<tr>
<td>ATEX approval</td>
</tr>
<tr>
<td>Group, category, type of protection, temperature classification</td>
</tr>
<tr>
<td>Statement of conformity (where appropriate)</td>
</tr>
<tr>
<td>Group, category, type of protection (where appropriate)</td>
</tr>
</tbody>
</table>

The exact designation of the device can be found on the name plate on the device side.

**Intended Use**
The devices are only approved for appropriate and intended use. Ignoring these instructions will void any warranty and absolve the manufacturer from any liability.

The device must only be operated in the ambient temperature range and at the relative humidity (non-condensing) specified. The devices are used in C&I technology for the galvanic isolation of C&I signals such as 20 mA and 10 V standard signals or alternatively for adapting or standardizing signals. Devices that incorporate intrinsically safe circuit are used for operating intrinsically safe field devices in hazardous areas.

**Improper Use**
Protection of the operating personnel and the overall system is not ensured if the product is not being used according to its intended purpose.

The equipment is not suitable for isolating signals in high current applications unless this is noted separately in the corresponding datasheet.

**Mounting/Installation**
Prior to mounting, installation, and commissioning of the device you should make yourself familiar with the device and carefully read the instruction manual.

The device must not be installed at locations where corrosive vapors may be present.

The devices fulfill a degree of protection IP 20 according to IEC/EN 60529.

The devices are designed for use in pollution degree 2 and overvoltage category II as per IEC/EN 60664-1.

If used in areas with higher pollution degree, the devices need to be protected accordingly.

Observe the tightening torque of the terminal screws.

The installation instructions in accordance with IEC/EN 60079-14 must be observed.

Intrinsically safe circuits of associated apparatus (installed in safe areas) can be led into hazardous areas, whereby special attention must be paid to maintain separation distances to all non-intrinsically safe circuits according to the requirements in IEC/EN 60079-14.

All separation distances between two adjacent intrinsically safe circuits need to be observed in accordance with IEC/EN 60079-14.

If “Ex i” protected circuits (intrinsically safe) were operated with non-intrinsically safe circuits, they must no longer be used as “Ex i” protected circuits.

The respective peak values of the field device and the associated apparatus with regard to explosion protection should be considered when connecting intrinsically safe field devices with intrinsically safe circuits of associated apparatus (verification of intrinsic safety). Make sure to observe IEC/EN 60079-14 and IEC/EN 60079-25.

If more channels of one device are connected in parallel, make sure the parallel connection is made directly at the terminals of the device. When verifying the intrinsic safety, the maximum values for the parallel connection must be considered.

**Operation, Maintenance, Repair**
The devices must not be repaired, changed or manipulated. If there is a defect, the product must always be replaced with an original device.
System Description
Termination Board Solutions for Yokogawa ProSafe-RS

Delivery, Transport, Disposal
Check the packaging and contents for damage. Check if you have received every item and if the items received are the ones you ordered. Keep the original packaging. Always store and transport the device in the original packaging. Always store the device in a clean and dry environment. The permitted storage temperature (see data sheet) must be considered. Disposing of devices, packaging material, and possibly contained batteries must be in compliance with the applicable laws and guidelines of the respective country.

Product Specifications
Function
Isolated barriers are used to protect intrinsically safe circuits in explosive areas. In addition to the required current and voltage limitation, the isolated barriers have a galvanic isolation between the field circuit and the controller. The H-System isolated barriers are mounted on Termination Boards. Pre-wiring is possible on Termination Boards. To close the signal circuit, the isolated barriers are simply plugged in. The isolated barriers can be replaced during live operation when the wiring is connected.

Isolated Barriers
H-System isolated barriers are available in two different housing widths depending on the function and application:
- HiC devices with a width of 12.5 mm
- HiD devices with a width of 18 mm
HiC isolated barriers are mounted on HiC Termination Boards. HiD isolated barriers are mounted on HiD Termination Boards. The board can be coded together with the isolated barriers. This prevents the isolated barriers being mixed up on the Termination Board. The safety-relevant data for the connected field devices is backed up.

HiC Device Housing

Figure 1  H-System Termination Board with isolated barriers for Yokogawa ProSafe-RS

Universal and control system-specific Termination Boards are available in the H-System. Termination Boards can be adapted to specific input/output requirements. These requirements can be implemented via
- Various connecting plugs to the controller
- Various terminals to the field device
- A large selection of isolated barriers

HiD Device Housing

Figure 2  HiC device housing (12.5 mm)
Used for high signal integrity
- Narrow 12.5 mm housing
- Highest packing density with "single-loop integrity"
- For mounting on HiC Termination Boards

Figure 3  HiD device housing (18 mm)
Used for high channel density
- Compact 18 mm housing
- Highest channel density on the market
- Only 4.5 mm per channel (for 4-channel devices)
- For mounting on HiD Termination Boards
Termination Boards

Termination Boards form the wiring level for field and control signals. The isolated barriers are mounted on Termination Boards. The isolated barriers are connected with the field and control side via the Termination Boards. Once the isolated barrier is mounted, the signal circuit between the field and control side is closed.

Figure 4 Connection example Termination Board with 8 slots

1 Field side connection
2 Connection power supply and fault indication output
3 Control side connection

Use
- For HiC or HiD isolated barriers
- With 8, or 16 slots
- For redundant and fused power supply
- For fault monitoring and diagnostics

Accessories

Label carriers for Termination Boards

The Termination Boards can be fitted with a label carrier for individual identification.

Figure 5 Label carrier for Termination Boards

1 Label carrier HiALC-HiCT*-SET-*** for HiC Termination Boards
2 Label carrier HiALC-HiDT*-SET-*** for HiD-Termination Boards

Connection Options

A variety of Termination Boards is available with different methods of connecting to the field and control side. Please refer to the documentation for the respective device for the specific connection layout.

Connecting the Field Side

The field devices can be connected to the Termination Board with the following connection options:

Figure 6 Spring terminals, double-row

Figure 7 Spring terminals, three-row

Connecting the power supply and Fault Indication Output

Isolated Barriers

The isolated barriers are supplied via the Termination Board. The isolated barriers are therefore attached to the Termination Board.

Termination Boards

The Termination Boards are supplied with power via screw terminals in accordance with their design. The supply voltage range depends on
- The values used for the isolated barriers
- The voltage drop of the decoupling diodes on the Termination Board

Figure 8 Connection of power supply and fault indication output via screw terminals
System Description

Termination Board Solutions for Yokogawa ProSafe-RS

Connecting the Control Side
The Termination Board on the control side can be connected via the following connection options:

![Figure 9 Yokogawa system connector, 40-pin](image)

![Figure 10 Yokogawa system connector, 50-pin](image)

Color Coding of the Isolated Barriers
The color coding of the devices has the following meaning:

![Figure 11 Color identification of devices](image)

**Digital Input**
- Orange identifier (1) for switch amplifiers with a relay output
- Orange identifier (2) and "S" indicator for switch amplifiers, which are used in combination with the safety sensors SN, S1N
- Blue identifier (3) for switch amplifiers with a transistor output

**Digital Output**
- Purple identifier (4) for solenoid drivers

**Analog Input**
- Magenta identifier (5) for transmitter power supplies, measuring transmitters, and repeaters
- Yellow identifier (6) for temperature converters

**Analog Output**
- Green identifier (7) for current drivers

Note!
For more information see the corresponding data sheets.
### Status Indicators with LEDs

LEDs are often used on isolators to indicate different statuses (e.g. for power supply, device failure, status messages, binary switching states). Standard LED colors are assigned to the status display according to NAMUR NE44.

<table>
<thead>
<tr>
<th>LED</th>
<th>Display function</th>
<th>Display</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Green LED</td>
<td>Power supply</td>
<td>On</td>
<td>Power supply OK</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Off</td>
<td>Power failure or insufficient power supply – device faulty</td>
</tr>
<tr>
<td>Red LED</td>
<td>Device fault, device failure</td>
<td>On</td>
<td>Internal fault signal, failure signal – fault/failure display of causes detected inside the device, device needs replacing</td>
</tr>
<tr>
<td></td>
<td>Line fault</td>
<td>Flashing</td>
<td>External fault signal, failure signal – fault/failure display of causes detected outside the device, inspection and elimination of fault required</td>
</tr>
<tr>
<td></td>
<td>No fault</td>
<td>Off</td>
<td>No malfunction, device is operating properly</td>
</tr>
<tr>
<td>Yellow LED</td>
<td>Switching states of binary inputs and outputs</td>
<td>On</td>
<td>Possible causes of the output:</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• The relay is energized.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• The NO contact (also a change-over contact) is actively closed.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• The open collector is switched through.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• The switching voltage generated inside the device is applied.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Possible causes of the input:</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• An external contact is opened.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• A NAMUR sensor is undamped (OK range according to closed-circuit current principle).</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• A switching signal is actively applied.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Off</td>
<td>Possible causes of the output:</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• The relay is de-energized.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• The NO contact (also a change-over contact) is actively opened.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• The open collector is not switched through.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• The switching voltage generated inside the device is not applied.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Possible causes of the input:</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• An external contact is opened.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• A NAMUR sensor is damped (fault range according to closed-circuit current principle).</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• A switching signal is not applied.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Table 1</th>
<th>Meaning of status indicators</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Yellow LED “OUT”</td>
</tr>
<tr>
<td></td>
<td>Switching state of the output</td>
</tr>
<tr>
<td>2</td>
<td>Red LED “CHK”</td>
</tr>
<tr>
<td></td>
<td>Lead breakage and short circuit status indicator</td>
</tr>
<tr>
<td>3</td>
<td>Green LED “PWR”</td>
</tr>
<tr>
<td></td>
<td>Power supply status indicator</td>
</tr>
</tbody>
</table>

**Figure 12** Example status indicators

1. Yellow LED “OUT”  
   Switching state of the output
2. Red LED “CHK”  
   Lead breakage and short circuit status indicator
3. Green LED “PWR”  
   Power supply status indicator
Status Indicators of Termination Boards

LEDs are often used on Termination Boards to indicate different statuses (e.g., for power supply, device failure, status messages, binary switching states). Standard LED colors are assigned to the status display according to NAMUR NE44.

<table>
<thead>
<tr>
<th>LED</th>
<th>Display function</th>
<th>Display</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Green LED &quot;PW1&quot;</td>
<td>Power supply I</td>
<td>On</td>
<td>Power supply OK</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Off</td>
<td>No power</td>
</tr>
<tr>
<td>Green LED &quot;PW2&quot;</td>
<td>Power supply II</td>
<td>On</td>
<td>Power supply OK</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Off</td>
<td>No power</td>
</tr>
<tr>
<td>Red LED &quot;FAULT&quot;</td>
<td>Power supply failure</td>
<td>Flashing</td>
<td>Power failure or insufficient power supply</td>
</tr>
</tbody>
</table>

Table 2  Meaning of status indicators

Label Carriers

The isolated barriers are fitted with a label carrier ex works for individual identification.

![Label carrier on the front](image)

Figure 14  Label carrier on the front

1  Label carrier on HiC devices for 35 mm x 10.5 mm labels
2  Label carrier on HiD devices for 35 mm x 10.5 mm labels

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Figure 13  Example status indicators

1  Green LED "PW1"  
   Status indicator power supply I
2  Green LED "PW2"  
   Status indicator power supply II
3  Red LED "FAULT"  
   power supply failure
Termination Board Solutions for Yokogawa ProSafe-RS

System Description

Installation

DIN Mounting Rail

The devices are mounted on a 35 mm DIN mounting rail according to EN 60715.

![Example: DIN mounting rail 35 mm x 15 mm](image)

Mounting

**Warning!**

Risk of short circuit

Injuries and damage to the device are possible when working with live parts.

- Before working on the device, always disconnect the supply voltage.
- Connect the device to the supply voltage only after completion of the work.

Mounting the Termination Boards

The Termination Boards are mounted on the 35 mm DIN mounting rail. The DIN mounting rail runs centrally below the Termination Board.

1. Clip the Termination Board (2) onto the DIN mounting rail (1).
2. Tighten the mounting screws (3).

The Termination Board (2) is now properly mounted and secured.

![Termination Board mounting](image)

Vertical and Horizontal Mounting

Both mounting options are possible. Unrestricted operation is possible across the entire temperature range of the system in each mounting direction.

![Termination Board fixing](image)
System Description

Termination Board Solutions for Yokogawa ProSafe-RS

Mounting the Isolated Barriers on the Termination Board
1. Push the Quick Lok bar (1) into the upper position.
2. Center the pins (2) above the contact elements of the Termination Board. Note the connection direction of the device.
3. Center the locking pins (3) above the locking elements of the Termination Board.
4. Carefully push the device into the contacts and locking elements.
5. Push the red Quick Lok bar (1) down on either side of the device.
   The device is now mounted.

Figure 20  Mounting of an H-System isolated barrier

1  Quick Lok Bar
2  Coding pins
3  Adjustment pins

Connection

Connecting the Field Side
Connect the field devices to the Termination Board via the following connection options:
- Spring terminals, two-row
- Spring terminals, three-row

Connecting the Power Supply and Fault Indication Output
Connect the power supply and fault indication output via the screw terminals.
Observe the tightening torque of the terminal screws. The tightening torque is 0.5 Nm to 0.6 Nm.

Connecting the Control Side
Connect the Termination Board on the control side via the following connection options:
- Yokogawa system connector, 40-pin
- Yokogawa system connector, 50-pin

Note!
For more information see the corresponding data sheets.

Device Parameterization
The devices are parameterized using DIP switches.

Configuration of the isolated barriers
Parameterize the DIP switches on the device side as follows:
1. Remove the isolated barriers from the Termination Board by pulling the red Quick Lok Bar up on either side of the device.
2. Parameterize the DIP switches as described in the "Configuration" section of the data sheet.
3. Mount the device as described in the section on mounting.

Note!
For more information see the corresponding data sheets.

Operation

Fault Monitoring
Numerous faults can occur between measurement of the process variable and evaluation in the control system. This can lead to undesirable process statuses under certain circumstances. These process statuses may result in plant downtime or quality problems or even present a hazard to persons and the environment. Depending on the device version, the isolators enable monitoring of the following faults:
- Line faults
  Here, the connection cables between the isolator and field device are monitored for lead breakages or short circuits. If a fault is detected, it is output at the fault message output or collective fault message. The relevant switching outputs are then switched to a de-energized state. The red fault indication LEDs signal the fault.
- Device faults
  The isolators are designed so that internal faults are detected and reported. In the case of a power failure, the outputs are switched to a de-energized state.

Fault Output
Several H-System isolators monitor the field leads for lead breakage and short circuits. This means that faults are immediately identified in the system, and that lead faults are not interpreted as a signal. Depending on the parameterization of the devices, these lead faults are output on the control-side outputs.

Fault Signal Output
If the device has a fault indication output (FAULT), lead and device faults are output. The fault indication output is active in normal status and is deactivated in fault status (closed-circuit principle). In the case of fault indication output, it is not possible to reverse the direction of operation.
Line Fault Transparency (LFT)

If the device has a signal output with line fault transparency, the fault message can be transmitted on the signal lead. This saves additional wiring and delivers channel-selective fault messages. For digital signals, a resistive passive transistor output is used. Signals 0 and 1 are output using two resistance values at the output. In the event of a fault, the output will become highly resistive. For this line fault transparency function, corresponding input cards are required in the controller.

Current and Voltage Standard Signals

The following signals have established themselves as the standard:

- the 0/4 mA to 20 mA current signal
- the 0/2 V to 10 V voltage signal

The 0/1 V to 5 V voltage signal is also occasionally encountered in addition to the 0/2 V to 10 V voltage signal. Analog sensor signals digital frequency signals are converted into one of the two standard signals for processing in a wide variety of measurement, regulatory and control tasks. This offers the measurement and control technician an easy-to-measure standard signal common to all manufacturers. Sensor signals are converted into standard signals via signal converters.

For more diagnostic options, the NAMUR organization published NAMUR recommendation NE43, dividing the value range of the signal (e.g., current signal) into several areas. Valid, defined measurement value information is transferred within the range from 3.8 mA to 20.5 mA. Failure information is available when the signal current is < 3.6 mA or > 21 mA i.e. outside of the range for measured value information. The same applies to the voltage signal.
### Technical specifications

#### Technical Data

**Electrical Data**

**Power Supply to the Isolated Barriers**
- HiC devices: 19.6 V DC to 30 V DC
- HiD devices: 20.4 V DC to 30 V DC

The voltage drop on the Termination Board via the decoupling diodes must be considered.

Each isolated barrier is internally protected. The Termination Boards have redundant power supply connections with fuses that can be replaced by the customer.

**Non-Ex Signals or Signals in the Drive Circuit**
- 0/4 mA to 20 mA signal level according to NE43
- 0/2 V to 10 V signal level according to NE43
- 0/1 V to 5 V signal level according to NE43
- Current output HART compatible
- Current input HART compatible
- Digital output: active or passive electronic output 100 mA/30 V, short-circuit protected
- Relay output 2 A, minimum load 1 mA/24 V
- Logic level 24 V according to IEC 60946
- Functional isolation or safe isolation according to IEC 61140 and NAMUR NE23

**Ex Signals or Signals in the Field Circuit**
- Transmitter power supply up to 17 V DC
- Current output HART compatible
- Pt100, 2-, 3-, (4)-wire technology
- Resistor 0 Ω to 400 Ω with freely definable characteristic
- Potentiometer
- Thermocouples of all types, internal cold junction, external reference
- Current output HART compatible
- Digital input according to NAMUR EN 60947-5-6
- Digital output for standard Ex-i valves, short circuit-protected

**Characteristic Safety Values**
- MTBF: Mean Time Between Failures

#### Conformity

**General**
- Isolated barriers with explosion protection, preferably Ex ia IIC/Class I, Div. 1, international approvals
- EMV according to
  - EN 61326-1
  - NAMUR NE21
  
  If you operate the device with a DC supply voltage, you must ensure that the bridging of the 20 ms voltage interruption is realized by the power supply.
- LEDs according to NAMUR NE44
- Software according to NAMUR NE53

**Digital Inputs and Outputs according to NAMUR**

The standards references for this interface have changed many times:
- German standard (old): DIN 19234: Electrical distance sensors – DC interface for distance sensors and switch amplifiers; 1990-06
- European standard (old): EN 50227: Low voltage switch gear and control gear – control devices and switching elements – proximity switches, DC interface for proximity sensors and switch amplifiers (NAMUR), 1996-10
- German version (old): DIN EN 50227: Low voltage switch gear – control devices and switching elements – proximity switches, DC interface for proximity sensors and switch amplifiers (NAMUR), 1997
- **Current designation: EN 60947-5-6**: Low voltage switch gear – control devices and switching elements – proximity switches, DC interface for proximity sensors and switch amplifiers (NAMUR), 2000
- **Current IEC designation: IEC 60947-5-6**: Low voltage switch gear and control gear – part 5-6: Control devices and switching elements – DC interface for proximity sensors and switch amplifiers (NAMUR), 1999
Termination Board Solutions for Yokogawa ProSafe-RS

System Description

Termination Boards

The HiALC-HI*TF-SET-1** label carrier is available as an option for the Termination Boards.

Mechanical Data

Mounting
- Termination Boards: Snap-on 35 mm DIN mounting rail according to EN 60715. Can be mounted horizontally or vertically.
- Isolated barriers: mounting on Termination Board via Quick Lok Bar

Housing Material
- Termination Boards: Polycarbonate (PC), glass fiber reinforced
- Isolated barriers: Polycarbonate (PC)

Dimensions
- Dimension drawings please refer to chapter Dimensions.

Protection Degree
- Termination Boards:
  - without isolated barriers IP00 according to EN 60529
  - with isolated barriers plugged IP20 according to EN 60529
- Isolated barriers: IP20 according to EN 60529

Connection to Termination Board
- Field side:
  - Spring terminals, two-row:
    rigid: 0.2 ... 2.5 mm²
    flexible: 0.25 ... 1.5 mm²
  - Spring terminals, three-row:
    rigid: 0.2 ... 2.5 mm²
    flexible: 0.25 ... 1.5 mm²
- Power supply and fault indication output:
  - Screw terminals: max. 1 x 2.5 mm² (14 AWG)
  - Observe the tightening torque of the terminal screws. The tightening torque is 0.5 Nm to 0.6 Nm.
- Control side:
  - Yokogawa system connector, 40-pin
  - Yokogawa system connector, 50-pin

Fire Protection Class
- Housing: V2 according to UL 94 standard. Unless stated otherwise all details relate to the reference conditions.

Note!
For more information see the corresponding data sheets.

Ambient Conditions

Ambient Temperature
- -20 °C to 60 °C (-4 °F to 140 °F), exceptions see data sheets

Storage Temperature
- -40 °C to 90 °C (-40 °F to 194 °F), exceptions see data sheets

Reference Conditions for Adjustment
- 20 °C (68 °F)

Relative Humidity
- max. 95 % without moisture condensation

Vibration Resistance
- according to EN 60068-2-6, 10 Hz to 150 Hz, 1 g, high crossover frequency

Shock Resistance
- according to EN 60068-2-27, 15 g, 11 ms, half-sine

Labeling

Isolated Barriers
Space for labeling on the front side, labels: 35 mm x 10.5 mm

Termination Boards

The HiALC-HI*TF-SET-1** label carrier is available as an option for the Termination Boards.

Mechanical Data

Mounting
- Termination Boards: Snap-on 35 mm DIN mounting rail according to EN 60715. Can be mounted horizontally or vertically.
- Isolated barriers: mounting on Termination Board via Quick Lok Bar

Housing Material
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- Isolated barriers: Polycarbonate (PC)

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    flexible: 0.25 ... 1.5 mm²
  - Spring terminals, three-row:
    rigid: 0.2 ... 2.5 mm²
    flexible: 0.25 ... 1.5 mm²
- Power supply and fault indication output:
  - Screw terminals: max. 1 x 2.5 mm² (14 AWG)
  - Observe the tightening torque of the terminal screws. The tightening torque is 0.5 Nm to 0.6 Nm.
- Control side:
  - Yokogawa system connector, 40-pin
  - Yokogawa system connector, 50-pin

Fire Protection Class
- Housing: V2 according to UL 94 standard. Unless stated otherwise all details relate to the reference conditions.

Note!
For more information see the corresponding data sheets.
# System Description
## Termination Board Solutions for Yokogawa ProSafe-RS

### Model Number Description

**Model Number Description Isolated Barriers**

<table>
<thead>
<tr>
<th>Hi</th>
<th>2</th>
</tr>
</thead>
</table>

- **Special functions, if available**
  - ES: Version with increased safety
  - HC: Versions for long field wiring
  - R1: Version with DCS specific line fault transparency (LFT)
  - R2: Version with DCS specific line fault transparency (LFT)
  - SK: Version with current sink output

<table>
<thead>
<tr>
<th>Signal type</th>
<th>Description</th>
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<tbody>
<tr>
<td>0</td>
<td>Analog devices</td>
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<tr>
<td>2010 to 2020</td>
<td>Converters</td>
</tr>
<tr>
<td>2020 to 2030</td>
<td>Transmitter power supplies</td>
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<tr>
<td>2031 to 2040</td>
<td>Current drivers</td>
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<tr>
<td>2060 to 2090</td>
<td>Temperature converter</td>
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<tr>
<td>2091 to 2100</td>
<td>Repeater</td>
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<td>8</td>
<td>Digital devices</td>
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<tr>
<td>2820 to 2860</td>
<td>Switch amplifiers</td>
</tr>
<tr>
<td>2871 to 2890</td>
<td>Solenoid drivers</td>
</tr>
<tr>
<td>2891 to 2900</td>
<td>Converters</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>Housing type</th>
<th>Description</th>
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<tbody>
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<td>C</td>
<td>HiC device, housing width 12.5 mm</td>
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<tr>
<td>D</td>
<td>HiD device, housing width 18 mm</td>
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**System**
- Hi: H-System

### Model Number Description Termination Boards

<table>
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<tr>
<th>Hi</th>
<th>TB</th>
<th>Y</th>
<th>RS</th>
<th>R</th>
<th>R</th>
<th>B</th>
<th>CC</th>
<th>Y</th>
</tr>
</thead>
</table>

- **Version**
  - Y

- **Number of channels**
  - 08: 8 channels
  - 16: 16 channels

- **Signal types**
  - AI: Analog input
  - AO: Analog output
  - DI: Digital input
  - DO: Digital output

- **Field side connection**
  - CC: Spring terminals

- **Control side connection**
  - AK: AKB connector
  - KS: KS connector

- **Termination Board housing width**
  - B: 175 mm

- **Termination Board fault detection**
  - R: via relay

- **Termination Board power supply**
  - R: Redundant power supply 24 V DC

- **DCS name**
  - RS: ProSafe-RS

- **DCS manufacturer**
  - Y: Yokogawa

- **Number of positions**
  - 08: 8 positions
  - 16: 16 positions

- **Termination Board power supply**
  - R: Redundant power supply 24 V DC

- **Housing type**
  - C: for HiC devices
  - D: for HiD devices

- **System**
  - Hi: H-System

---

Refer to "General Notes Relating to Pepperl+Fuchs Product Information"
## Pin Assignment and Device Coding

The isolated barriers are coded in accordance with their function.

**Warning!**
Possible Device Failure
Changes in the pin configuration may lead to device failure. To polarize the device in accordance with its safety parameters, the pins are shortened at the factory.
- Do not change the factory setting!

### Device Coding of HiC Devices and HiC Termination Boards

<table>
<thead>
<tr>
<th>No.</th>
<th>Termination Board Top view</th>
<th>Isolated barrier Bottom view</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Safe area</td>
<td>Hazardous area</td>
<td>Hazardous area</td>
</tr>
<tr>
<td>A</td>
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<tr>
<td></td>
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<td></td>
<td>all non-intrinsically safe devices</td>
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<tr>
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<tr>
<td>E</td>
<td><img src="image" alt="Termination Board Top view" /></td>
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<td>HIC2025HC</td>
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<tr>
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<td>–</td>
</tr>
</tbody>
</table>
### System Description

Termination Board Solutions for Yokogawa ProSafe-RS

#### Termination Boards

Refer to "General Notes Relating to Pepperl+Fuchs Product Information".

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#### Device Coding of HiD Devices and HiD Termination Boards

<table>
<thead>
<tr>
<th>No.</th>
<th>Termination Board Top view</th>
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<td></td>
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<tr>
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<td></td>
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<tr>
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- Insert polarizing pin
- Don't insert polarizing pin
- Pin to be trimmed
- Pin untrimmed

**Figure:** Device side view

<table>
<thead>
<tr>
<th>No.</th>
<th>Termination Board Top view</th>
<th>Isolated barrier Bottom view</th>
<th>Type</th>
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<tbody>
<tr>
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</tbody>
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Table 3

Refer to "General Notes Relating to Pepperl+Fuchs Product Information".

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Edition 250501 08/2013
## System Description

### Termination Board Solutions for Yokogawa ProSafe-RS

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<td>Top view</td>
<td>Bottom view</td>
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<tr>
<td></td>
<td>Safe area</td>
<td>Hazardous area</td>
<td>Hazardous area</td>
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<tr>
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<tr>
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<tr>
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<td>HiD2862 Empty position</td>
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</table>

**Table 4**

- Insert polarizing pin
- Don’t insert polarizing pin
- Pin to be trimmed
- Pin untrimmed

**Device side view**

- ![Device side view](image)

**Note!**

For more information see the corresponding data sheets.
Dimensions
Housing Designs for H-System Isolated Barriers

**HiC device housings**

![HiC device housings diagram](image)

**HiD device housings**

![HiD device housings diagram](image)
Housing Types Termination Boards

HiC Termination Board for 8 Modules

![HiC Termination Board for 8 Modules](image)

HiC Termination Board for 16 Modules

![HiC Termination Board for 16 Modules](image)

HiD Termination Board for 8 Modules

![HiD Termination Board for 8 Modules](image)
Termination Boards

Refer to "General Notes Relating to Pepperl+Fuchs Product Information".

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Analog Outputs

Selection Tables ............................................................... 29
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## Digital Inputs

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<thead>
<tr>
<th>Yokogawa</th>
<th>Channel</th>
<th>Class</th>
<th>Number of Modules</th>
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<th>Pepperl+Fuchs Module</th>
<th>Page</th>
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<tbody>
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## Digital Outputs

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## Analog Inputs

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<th>Pepperl+Fuchs Module</th>
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## Analog Outputs

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Refer to "General Notes Relating to Pepperl+Fuchs Product Information".

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Features

- System Board for Yokogawa ProSafe-RS
- For 16-channel DI card SDV144
- For 8 modules
- Recommended module: HiC2832R1 (DI)
- 24 V DC supply
- Hazardous area: spring terminals, blue
- Safe area: Yokogawa system connector, 50-pin

Function

The function of the Termination Board as well as the connector pin assignment exactly fit the requirement of Yokogawa systems.

Information about missing supply voltage of the interface modules is available for the system as potential-free contact.

The Termination Boards are supplied with a robust glass fiber reinforced plastic housing as standard. This design permits the fast and reliable installation on 35 mm DIN mounting rail acc. to EN 60715 in the cabinet.
### Technical data

**Supply**
- Rated voltage: 24 V DC, in consideration of rated voltage of used isolated barriers
- Voltage drop: 0.9 V, voltage drop across the series diode on the Termination Board must be considered
- Ripple: ≤10 %
- Fusing: 2 A, in each case for 8 modules
- Power loss: ≤500 mW, without modules
- Reverse polarity protection: yes

**Electrical specifications**
- Volt-free fault indication output: max. 30 V AC/40 V DC, 2 A

**Redundancy**
- Supply: Redundancy available. The supply for the modules is decoupled, monitored and fused.

**Indicators/settings**
- Display elements: LEDs PWR ON (Termination Board power supply)
  - LED power supply I, green LED
  - LED power supply II, green LED
  - LED Fault (fault indication), red LED
  - LED flashes: power supply failure

**Directive conformity**
- Conformity: Electromagnetic compatibility, NE 21:2011
  - For further information see system description.
- Protection degree: IEC 60529:2001

**Ambient conditions**
- Ambient temperature: -20 ... 60 °C (-4 ... 140 °F)
- Storage temperature: -40 ... 70 °C (-40 ... 158 °F)

**Mechanical specifications**
- Protection degree: IP20
- Connection: hazardous area connection (field side): spring terminals, blue
- Safe area connection (control side): Yokogawa system connector, 50-pin
- Core cross-section:
  - spring terminals:
    - rigid: 0.2 ... 2.5 mm²
    - flexible: 0.25 ... 1.5 mm²
- Material:
  - housing: polycarbonate, 30 % fiberglass reinforced
- Mass: approx. 490 g
- Dimensions: 205 x 175 x 153 mm (8.1 x 6.9 x 6.02 in)
- Mounting: on 35 mm DIN mounting rail acc. to EN 60715:2001

**Data for application in connection with Ex-areas**
- EC-Type Examination Certificate: CESI 06 ATEX 022
- Group, category, type of protection:
  - II (1)G [Ex ia Ga] IIC
  - II (1)D [Ex ia Da] IIIC
  - I (M1) [Ex ia Ma] I
- Safe area:
  - Maximum safe voltage: 250 V (Attention! $U_{es}$ is no rated voltage.)
- Electrical isolation:
  - Field circuit/control circuit: safe electrical isolation acc. to IEC/EN 60079-11, voltage peak value 375 V
- Directive conformity:
- IECEx approval:
  - IECEx CES 06.0003
- Approved for:
  - [Ex ia Ga] IIC
  - [Ex ia Da] IIIC
  - [Ex ia Ma] I

**Accessories**
- Designation: optional accessories: Label Carrier HIALC-HI*TB-SET-1**
The pin-out configuration has to be observed. For information see corresponding pin-out table on www.pepperl-fuchs.com.
Termination Board

HiCTB08-YRS-RRB-AK-CC-DI16

ProSafe-RS

Digital Inputs

Digital Outputs

Analog Inputs

Analog Outputs

Refer to "General Notes Relating to Pepperl+Fuchs Product Information".

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HiCTB16-YRS-RRB-AK-CC-DI16

Termination Board

Features

- System Board for Yokogawa ProSafe-RS
- For 16-channel DI card SDV144
- For 16 modules
- Recommended module: HiC2831R1 (DI)
- 24 V DC supply
- Hazardous area: spring terminals, blue
- Safe area: Yokogawa system connector, 50-pin

Function

The function of the Termination Board as well as the connector pin assignment exactly fit the requirement of Yokogawa systems.

Information about missing supply voltage of the interface modules is available for the system as potential-free contact.

The Termination Boards are supplied with a robust glass fiber reinforced plastic housing as standard. This design permits the fast and reliable installation on 35 mm DIN mounting rail acc. to EN 60715 in the cabinet.

Connection

24 V DC (I),
24 V DC (II),
ERR

SDV144

(SDV144)

Zone 0, 1, 2
Div. 1, 2

Refer to “General Notes Relating to Pepperl+Fuchs Product Information”
## Technical data

### Supply
- **Rated voltage**: 24 V DC, in consideration of rated voltage of used isolated barriers
- **Voltage drop**: 0.9 V, voltage drop across the series diode on the Termination Board must be considered
- **Ripple**: ≤10 %
- **Fusing**: 4 A, in each case for 16 modules
- **Power loss**: ≤500 mW, without modules
- **Reverse polarity protection**: yes

### Electrical specifications
- **Volt-free fault indication output**: max. 30 V AC/40 V DC, 2 A

### Redundancy
- **Supply**: Redundancy available. The supply for the modules is decoupled, monitored and fused.

### Indicators/settings
- **Display elements**: LEDs PWR ON (Termination Board power supply)
  - LED power supply I, green LED
  - LED power supply II, green LED
  - LED Fault (fault indication), red LED
  - LED flashes: power supply failure

### Directive conformity
- **Electromagnetic compatibility**
  - Directive 2004/108/EC
  - EN 61326-1:2006

### Ambient conditions
- **Ambient temperature**: -20 ... 60 °C (-4 ... 140 °F)
- **Storage temperature**: -40 ... 70 °C (-40 ... 158 °F)

### Mechanical specifications
- **Protection degree**: IP20
- **Connection**: hazardous area connection (field side): spring terminals, blue
  - safe area connection (control side): Yokogawa system connector, 50-pin
- **Core cross-section**: spring terminals:
  - rigid: 0.2 ... 2.5 mm²
  - flexible: 0.25 ... 1.5 mm²
- **Material**: housing: polycarbonate, 30 % fiberglass reinforced
- **Mass**: approx. 650 g
- **Dimensions**: 240 x 175 x 153 mm (9.45 x 6.9 x 6.02 in)
- **Mounting**: on 35 mm DIN mounting rail acc. to EN 60715:2001

### Data for application in connection with Ex-areas
- **EC-Type Examination Certificate**: CESI 06 ATEX 022
  - **Group, category, type of protection**
    - II (1)G [Ex ia Ga] IIC
    - II (1)D [Ex ia Da] IIIC
    - I (M1) [Ex ia Ma] I
  - **Protection degree**: I
- **Safe area**: maximum safe voltage 250 V (Attention! Um is no rated voltage.)
- **Electrical isolation**: safe electrical isolation acc. to IEC/EN 60079-11, voltage peak value 375 V
- **IECEx approval**: IECEx CES 06.0003
  - **Approved for**
    - [Ex ia Ga] IIC
    - [Ex ia Da] IIIC
    - [Ex ia Ma] I

### Accessories
- **Designation**: optional accessories: Label Carrier HIALC-Hi*TB-SET-1**
Application

Typical loop

The pin-out configuration has to be observed. For information see corresponding pin-out table on www.pepperl-fuchs.com.
HiCTB16-YRS-RRB-AK-CC-DI16

Termination Board
HiCTB08-YRS-RRB-AK-CC-DO08

Termination Board

**Features**
- System Board for Yokogawa ProSafe-RS
- For 8-channel DO card SDV531
- For 8 modules
- Recommended module: HiC2871 (DO)
- 24 V DC supply
- Hazardous area: spring terminals, blue
- Safe area: Yokogawa system connector, 50-pin

**Function**
The function of the Termination Board as well as the connector pin assignment exactly fit the requirement of Yokogawa systems.

Information about missing supply voltage of the interface modules is available for the system as potential-free contact.

The Termination Boards are supplied with a robust glass fiber reinforced plastic housing as standard. This design permits the fast and reliable installation on 35 mm DIN mounting rail acc. to EN 60715 in the cabinet.

**Connection**

Zone 0, 1, 2
Div. 1, 2

24 V DC (I),
24 V DC (II),
ERR

SDV531

(SDV531)
## Technical data

**Supply**

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated voltage</td>
<td>24 V DC, in consideration of rated voltage of used isolated barriers</td>
</tr>
<tr>
<td>Voltage drop</td>
<td>0.9 V, voltage drop across the series diode on the Termination Board must be considered</td>
</tr>
<tr>
<td>Ripple</td>
<td>≤ 10 %</td>
</tr>
<tr>
<td>Fusing</td>
<td>2 A, in each case for 8 modules</td>
</tr>
<tr>
<td>Power loss</td>
<td>≤500 mW, without modules</td>
</tr>
<tr>
<td>Reverse polarity protection</td>
<td>yes</td>
</tr>
</tbody>
</table>

**Electrical specifications**

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Volt-free fault indication output</td>
<td>max. 30 V AC/40 V DC, 2 A</td>
</tr>
</tbody>
</table>

**Redundancy**

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply</td>
<td>Redundancy available. The supply for the modules is decoupled, monitored and fused.</td>
</tr>
</tbody>
</table>

**Display elements**

<table>
<thead>
<tr>
<th>Display elements</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>LEDs PWR ON (Termination Board power supply)</td>
<td>- LED power supply I, green LED</td>
</tr>
<tr>
<td></td>
<td>- LED power supply II, green LED</td>
</tr>
<tr>
<td></td>
<td>- LED Fault (fault indication), red LED</td>
</tr>
<tr>
<td></td>
<td>- LED flashes: power supply failure</td>
</tr>
</tbody>
</table>

## Directive conformity

**Electromagnetic compatibility**

<table>
<thead>
<tr>
<th>Directive</th>
<th>Value</th>
</tr>
</thead>
</table>

**Conformity**

<table>
<thead>
<tr>
<th>Conformity</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electromagnetic compatibility</td>
<td>NE 21:2011</td>
</tr>
<tr>
<td>Protection degree</td>
<td>IEC 60529:2001</td>
</tr>
</tbody>
</table>

## Ambient conditions

<table>
<thead>
<tr>
<th>Condition</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ambient temperature</td>
<td>-20 ... 60 °C (-4 ... 140 °F)</td>
</tr>
<tr>
<td>Storage temperature</td>
<td>-40 ... 70 °C (-40 ... 158 °F)</td>
</tr>
</tbody>
</table>

## Mechanical specifications

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protection degree</td>
<td>IP20</td>
</tr>
<tr>
<td>Connection</td>
<td>hazardous area connection (field side): spring terminals, blue</td>
</tr>
<tr>
<td>Core cross-section</td>
<td>safe area connection (control side): Yokogawa system connector, 50-pin</td>
</tr>
<tr>
<td>Material</td>
<td>housing: polycarbonate, 30 % fiberglass reinforced</td>
</tr>
<tr>
<td>Mass</td>
<td>approx. 490 g</td>
</tr>
<tr>
<td>Dimensions</td>
<td>205 x 175 x 153 mm (8.1 x 6.9 x 6.02 in)</td>
</tr>
<tr>
<td>Mounting</td>
<td>on 35 mm DIN mounting rail acc. to EN 60715:2001</td>
</tr>
</tbody>
</table>

## Data for application in connection with Ex-areas

<table>
<thead>
<tr>
<th>Certificate</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>EC-Type Examination Certificate</td>
<td>CESI 06 ATEX 022</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Group, category, type of protection</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>I (M1) [Ex ia Ma] I</td>
<td></td>
</tr>
<tr>
<td>II (1)D [Ex ia Da] IIIC</td>
<td></td>
</tr>
<tr>
<td>II (1)G [Ex ia Ga] IIC</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Safe area</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum safe voltage</td>
<td>250 V (Attention! U_{ms} is no rated voltage.)</td>
</tr>
</tbody>
</table>

## Electrical isolation

<table>
<thead>
<tr>
<th>Condition</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Field circuit/control circuit</td>
<td>safe electrical isolation acc. to IEC/EN 60079-11, voltage peak value 375 V</td>
</tr>
</tbody>
</table>

## Directive conformity

<table>
<thead>
<tr>
<th>Directive</th>
<th>Value</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>IECEx approval</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>IECEx CES 06.0003</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Approved for</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>[Ex ia Ga] IIC</td>
<td></td>
</tr>
<tr>
<td>[Ex ia Da] IIIIC</td>
<td></td>
</tr>
<tr>
<td>[Ex ia Ma] I</td>
<td></td>
</tr>
</tbody>
</table>

## Accessories

<table>
<thead>
<tr>
<th>Designation</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>optional accessories</td>
<td>Label Carrier HIALC-Hi*TB-SET-1**</td>
</tr>
</tbody>
</table>
Typical loop

The pin-out configuration has to be observed. For information see corresponding pin-out table on www.pepperl-fuchs.com.
<table>
<thead>
<tr>
<th>ProSafe-RS</th>
<th>Digital Inputs</th>
<th>Analog Inputs</th>
<th>Analog Outputs</th>
<th>Digital Outputs</th>
</tr>
</thead>
</table>

Refer to "General Notes Relating to Pepperl+Fuchs Product Information".

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HiDTB08-YRS-RRB-AK-CC-DO16
Termination Board

Features

- System Board for Yokogawa ProSafe-RS
- For 16-channel DO card SDV541
- For 8 modules
- Recommended modules: HiD2872 (DO), HiD2876 (DO)
- 24 V DC supply
- Hazardous area: spring terminals, blue
- Safe area: Yokogawa system connector, 50-pin

Function

The function of the Termination Board as well as the connector pin assignment exactly fit the requirement of Yokogawa systems.

Information about missing supply voltage of the interface modules is available for the system as potential-free contact.

The Termination Boards are supplied with a robust glass fiber reinforced plastic housing as standard. This design permits the fast and reliable installation on 35 mm DIN mounting rail acc. to EN 60715 in the cabinet.

Connection

Zone 0, 1, 2
Div. 1, 2

X20
CN2
CN1

24 V DC (I), 24 V DC (II), ERR

(SDV541)

SDV541
Technical data

Supply
- Rated voltage: 24 V DC, in consideration of rated voltage of used isolated barriers
- Voltage drop: 0.9 V, voltage drop across the series diode on the Termination Board must be considered
- Ripple: ≤ 10 %
- Fusing: 2 A, in each case for 8 modules
- Power loss: ≤ 500 mW, without modules
- Reverse polarity protection: yes

Electrical specifications
- Volt-free fault indication output: max. 30 V AC/40 V DC, 2 A

Redundancy
- Supply: Redundancy available. The supply for the modules is decoupled, monitored and fused.

Indicators/settings
- Display elements: LEDs PWR ON (Termination Board power supply)
  - LED power supply I, green LED
  - LED power supply II, green LED
  - LED Fault (fault indication), red LED
  - LED flashes: power supply failure

Directive conformity
- Electromagnetic compatibility
  - Directive 2004/108/EC
  - EN 61326-1:2006
  - NE 21:2011
  - For further information see system description.

Mechanical specifications
- Protection degree: IP20
- Core cross-section:
  - spring terminals: rigid: 0.2 ... 2.5 mm²
  - flexible: 0.25 ... 1.5 mm²
- Material:
  - housing: polycarbonate, 30 % fiberglass reinforced
  - approx. 490 g
- Dimensions: 205 x 175 x 153 mm (8.1 x 6.9 x 6.02 in)

Data for application in connection with Ex-areas
- EC-Type Examination Certificate: CESI 11 ATEX 062
- Group, category, type of protection:
  - II (1)G [Ex ia Ga] IIC
  - II (1)D [Ex ia Da] IIIC
  - I (M1) [Ex ia Ma] I
- Safe area:
  - Maximum safe voltage: 250 V (Attention! Um is no rated voltage.)
- Electrical isolation:
  - Field circuit/control circuit: safe electrical isolation acc. to IEC/EN 60079-11, voltage peak value 375 V
- Directive conformity:
  - Directive 94/9/EC
- IECEx approval:
  - IECEx CES 11.0022
  - [Ex ia Ga] IIIC
  - [Ex ia Da] IIIC
  - [Ex ia Ma] I

Accessories
- Designation:
  - optional accessories: Label Carrier HIACL-HI*TB-SET-1**
**ProSafe-RS**

**HiDTB08-YRS-RRB-AK-CC-DO16**

**Termination Board**

**Application**

**Typical loop**

<table>
<thead>
<tr>
<th>Field side</th>
<th>Termination Board</th>
<th>Control side</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15</td>
<td></td>
<td></td>
</tr>
<tr>
<td>16</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Module switch settings**

<table>
<thead>
<tr>
<th>Type</th>
<th>DIP switch</th>
<th>Position</th>
</tr>
</thead>
<tbody>
<tr>
<td>HiD2872 (DO)</td>
<td>S1</td>
<td>OFF</td>
</tr>
<tr>
<td>HiD2876 (DO)</td>
<td>S2</td>
<td>ON</td>
</tr>
<tr>
<td></td>
<td>S3</td>
<td>ON</td>
</tr>
<tr>
<td></td>
<td>S4</td>
<td>ON</td>
</tr>
<tr>
<td></td>
<td>S5</td>
<td>OFF</td>
</tr>
<tr>
<td></td>
<td>S6</td>
<td>ON</td>
</tr>
<tr>
<td></td>
<td>S7</td>
<td>OFF</td>
</tr>
<tr>
<td></td>
<td>S8</td>
<td>OFF</td>
</tr>
</tbody>
</table>

- Loop powered without control
- Test pulse filter enable

*The pin-out configuration has to be observed. For information see corresponding pin-out table on www.pepperl-fuchs.com.*
Refer to "General Notes Relating to Pepperl+Fuchs Product Information".
**Features**

- System Board for Yokogawa ProSafe-RS
- For 16-channel DO card SDV541
- For 16 modules
- Recommended modules: HiC2871 (DO), HiC2873 (DO), HiC2877 (DO)
- 24 V DC supply
- Hazardous area: spring terminals, blue
- Safe area: Yokogawa system connector, 50-pin

**Function**

The function of the Termination Board as well as the connector pin assignment exactly fit the requirement of Yokogawa systems.

Information about missing supply voltage of the interface modules is available for the system as potential-free contact.

The Termination Boards are supplied with a robust glass fiber reinforced plastic housing as standard. This design permits the fast and reliable installation on 35 mm DIN mounting rail acc. to EN 60715 in the cabinet.

**Connection**

- SDV541
- (SDV541)
- 24 V DC (I), 24 V DC (II), ERR
- Zone 0, 1, 2
- Div. 1, 2
## Technical data

### Supply
- **Rated voltage**: 24 V DC, in consideration of rated voltage of used isolated barriers
- **Voltage drop**: 0.9 V, voltage drop across the series diode on the Termination Board must be considered
- **Ripple**: ≤10%
- **Fusing**: 4 A, in each case for 16 modules
- **Power loss**: ≤500 mW, without modules
- **Reverse polarity protection**: yes

### Electrical specifications
- **Volt-free fault indication output**: max. 30 V AC/40 V DC, 2 A

### Redundancy
- **Supply**: Redundancy available. The supply for the modules is decoupled, monitored and fused.

### Indicators/settings
- **Display elements**: LEDs PWR ON (Termination Board power supply)
  - LED power supply I, green LED
  - LED power supply II, green LED
  - LED Fault (fault indication), red LED
  - LED flashes: power supply failure

### Directive conformity

### Ambient conditions
- **Ambient temperature**: -20 ... 60 °C (-4 ... 140 °F)
- **Storage temperature**: -40 ... 70 °C (-40 ... 158 °F)

### Mechanical specifications
- **Protection degree**: IP 20
- **Connection**: hazardous area connection (field side): spring terminals, blue
- **Core cross-section**:
  - rigid: 0.2 ... 2.5 mm²
  - flexible: 0.25 ... 1.5 mm²
- **Material**: housing: polycarbonate, 30 % fiberglass reinforced
- **Mass**: approx. 650 g
- **Dimensions**: 240 x 175 x 153 mm (9.45 x 6.9 x 6.02 in)
- **Mounting**: on 35 mm DIN mounting rail acc. to EN 60715:2001

### Data for application in connection with Ex-areas
- **EC-Type Examination Certificate**: CESI 06 ATEX 022
  - **Group, category, type of protection**:
    - II (1)G [Ex ia Ga] IIC
    - II (1)D [Ex ia Da] IIIC
    - I (M1) [Ex ia Ma] I
- **Safe area**
- **Maximum safe voltage**: 250 V (Attention! U_{ma} is no rated voltage.)
- **Electrical isolation**: Field circuit/control circuit
  - safe electrical isolation acc. to IEC/EN 60079-11, voltage peak value 375 V

### Directive conformity
- **IECEx approval**: IECEx CES 06.0003
  - **Approved for**:
    - [Ex ia Ga] IIC
    - [Ex ia Da] IIIC
    - [Ex ia Ma] I

### Accessories
- **Designation**: optional accessories: Label Carrier HIALC-HI*TB-SET-1**
**Module switch settings**

<table>
<thead>
<tr>
<th>Type</th>
<th>DIP switch</th>
<th>Position</th>
</tr>
</thead>
<tbody>
<tr>
<td>HiC2873 (DO, with test pulse filter)</td>
<td>S1</td>
<td>OFF</td>
</tr>
<tr>
<td>HiC2877 (DO, with test pulse filter)</td>
<td>S2</td>
<td>ON</td>
</tr>
<tr>
<td></td>
<td>S3</td>
<td>ON</td>
</tr>
<tr>
<td></td>
<td>S4</td>
<td>ON</td>
</tr>
<tr>
<td></td>
<td>S5</td>
<td>OFF</td>
</tr>
<tr>
<td></td>
<td>S6</td>
<td>ON</td>
</tr>
<tr>
<td></td>
<td>S7</td>
<td>OFF</td>
</tr>
<tr>
<td>HiC2871 (DO, without test pulse filter)</td>
<td>S8</td>
<td>OFF</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Notes:**
- Loop powered without control
- Test pulse filter enable

---

*The pin-out configuration has to be observed. For information see corresponding pin-out table on www.pepperl-fuchs.com.*
| ProSafe-RS | Digital Inputs | Digital Outputs |
| Analog Inputs | Analog Outputs |

Refer to "General Notes Relating to Pepperl+Fuchs Product Information".

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HiCTB16-YRS-RRB-KS-CC-AI16

Termination Board

Features

- System Board for Yokogawa ProSafe-RS
- For 16-channel AI card SAI143
- For 16 modules
- Recommended module: HiC2025 (AI)
- 24 V DC supply
- Hazardous area: spring terminals, blue
- Safe area: Yokogawa system connector, 40-pin

Function

The function of the Termination Board as well as the connector pin assignment exactly fit the requirement of Yokogawa systems.

Information about missing supply voltage of the interface modules is available for the system as potential-free contact.

The Termination Boards are supplied with a robust glass fiber reinforced plastic housing as standard. This design permits the fast and reliable installation on 35 mm DIN mounting rail acc. to EN 60715 in the cabinet.

Connection

Zone 0, 1, 2
Div. 1, 2

24 V DC (I),
24 V DC (II),
ERR

SAI143

(SAI143)
### Technical data

#### Supply

<table>
<thead>
<tr>
<th>Spec</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated voltage</td>
<td>24 V DC, in consideration of rated voltage of used isolated barriers</td>
</tr>
<tr>
<td>Voltage drop</td>
<td>0.9 V, voltage drop across the series diode on the Termination Board must be considered</td>
</tr>
<tr>
<td>Ripple</td>
<td>≤10%</td>
</tr>
<tr>
<td>Fusing</td>
<td>4 A, in each case for 16 modules</td>
</tr>
<tr>
<td>Power loss</td>
<td>≤500 mW, without modules</td>
</tr>
<tr>
<td>Reverse polarity protection</td>
<td>yes</td>
</tr>
</tbody>
</table>

#### Electrical specifications

- **Analog Inputs**
  - volt-free fault indication output: max. 30 V AC/40 V DC, 2 A

- **Digital Outputs**
  - Redundancy available. The supply for the modules is decoupled, monitored and fused.

#### Indicators/settings

<table>
<thead>
<tr>
<th>Element</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>LEDs PWR ON</td>
<td>(Termination Board power supply)</td>
</tr>
<tr>
<td>- LED power supply I, green LED</td>
<td></td>
</tr>
<tr>
<td>- LED power supply II, green LED</td>
<td></td>
</tr>
<tr>
<td>LED Fault (fault indication), red LED</td>
<td></td>
</tr>
<tr>
<td>- LED flashes: power supply failure</td>
<td></td>
</tr>
</tbody>
</table>

#### Directive conformity

- **Electromagnetic compatibility**
  - Directive 2004/108/EC
  - EN 61326-1:2006

- **Conformity**
  - NE 21:2011
  - For further information see system description.

- **Protection degree**
  - IEC 60529:2001

#### Ambient conditions

- **Ambient temperature**
  - -20 ... 60 °C (-4 ... 140 °F)
- **Storage temperature**
  - -40 ... 70 °C (-40 ... 158 °F)

#### Mechanical specifications

- **Protection degree**
  - IP20
- **Connection**
  - hazardous area connection (field side): spring terminals, blue
  - safe area connection (control side): Yokogawa system connector, 40-pin
- **Core cross-section**
  - spring terminals: rigid: 0.2 ... 2.5 mm²
  - flexible: 0.25 ... 1.5 mm²
- **Material**
  - housing: polycarbonate, 30 % fiberglass reinforced
- **Mass**
  - approx. 650 g
- **Dimensions**
  - 240 x 175 x 153 mm (9.45 x 6.9 x 6.02 in)
- **Mounting**
  - on 35 mm DIN mounting rail acc. to EN 60715:2001

#### Data for application in connection with Ex-areas

- **EC-Type Examination Certificate**
  - CESI 06 ATEX 022
  - Group, category, type of protection:
    - II (1)G [Ex ia Ga] IIC
    - II (1)D [Ex ia Da] IIIC
    - I (M1) [Ex ia Ma] I

- **Safe area**
  - Maximum safe voltage: 250 V (Attention! $U_{in}$ is no rated voltage.)

#### Electrical isolation

- Field circuit/control circuit: safe electrical isolation acc. to IEC/EN 60079-11, voltage peak value 375 V

- **Directive conformity**
  - Directive 94/9/EC

- **IECEx approval**
  - IECEx CES 06.0003

#### Accessories

- **Designation**
  - optional accessories: Label Carrier HIALC-Hi*TB-SET-1**
**Typical loop**

<table>
<thead>
<tr>
<th>Module switch settings</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Type (AI)</strong></td>
</tr>
<tr>
<td>HiC2025 (source)</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Card switch settings</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Type (AI)</strong></td>
</tr>
<tr>
<td>SAI143 (sink)</td>
</tr>
</tbody>
</table>

The pin-out configuration has to be observed. For information see corresponding pin-out table on www.pepperl-fuchs.com.
Termination Board

HiCTB16-YRS-RRB-KS-CC-A116

Refer to "General Notes Relating to Pepperl+Fuchs Product Information".
Features

- System Board for Yokogawa ProSafe-RS
- For 16-channel AI card SAI143
- For 8 modules
- Recommended modules: HiD2026 (AI), HiD2030 (AI)
- 24 V DC supply
- Hazardous area: spring terminals, blue
- Safe area: Yokogawa system connector, 40-pin

Function

The function of the Termination Board as well as the connector pin assignment exactly fit the requirement of Yokogawa systems.

Information about missing supply voltage of the interface modules is available for the system as potential-free contact.

The Termination Boards are supplied with a robust glass fiber reinforced plastic housing as standard. This design permits the fast and reliable installation on 35 mm DIN mounting rail acc. to EN 60715 in the cabinet.

Connection

![Connection Diagram]

- Zone 0, 1, 2
- Div. 1, 2
## Technical data

### Supply
- **Rated voltage**: 24 V DC, in consideration of rated voltage of used isolated barriers
- **Voltage drop**: 0.9 V, voltage drop across the series diode on the Termination Board must be considered
- **Ripple**: ≤10 %
- **Fusing**: 2 A, in each case for 8 modules
- **Power loss**: ≤500 mW, without modules
- **Reverse polarity protection**: yes

### Electrical specifications
- **Volt-free fault indication output**: max. 30 V AC/40 V DC, 2 A

### Redundancy
- **Supply**: Redundancy available. The supply for the modules is decoupled, monitored and fused.

### Indicators/Settings
- **Display elements**
  - LEDs PWR ON (Termination Board power supply)
  - LED power supply I, green LED
  - LED power supply II, green LED
  - LED Fault (fault indication), red LED
  - LED flashes: power supply failure

### Directive conformity
- **Electromagnetic compatibility**
  - Directive 2004/108/EC
  - EN 61326-1:2006
- **Conformity**
  - Directive 2004/108/EC:
    - NE 21:2011
    - For further information see system description.
- **Protection degree**
  - IEC 60529:2001
- **Ambient conditions**
  - **Ambient temperature**: -20 ... 60 °C (-4 ... 140 °F)
  - **Storage temperature**: -40 ... 70 °C (-40 ... 158 °F)

### Mechanical specifications
- **Protection degree**
  - IP20
- **Connection**
  - Hazardous area connection (field side): spring terminals, blue
  - Safe area connection (control side): Yokogawa system connector, 40-pin
- **Core cross-section**
  - Spring terminals:
    - Rigid: 0.2 ... 2.5 mm²
    - Flexible: 0.25 ... 1.5 mm²
- **Material**
  - Housing: polycarbonate, 30 % fiberglass reinforced
- **Mass**
  - Approx. 490 g
- **Dimensions**
  - 205 x 175 x 153 mm (8.1 x 6.9 x 6.02 in)
- **Mounting**
  - on 35 mm DIN mounting rail acc. to EN 60715:2001

### Data for application in connection with Ex-areas
- **EC-Type Examination Certificate**
  - CESI 11 ATEX 062
- **Group, category, type of protection**
  - II (1)G [Ex ia Ga] IIC
  - II (1)D [Ex ia Da] IIIC
  - I (M1) [Ex ia Ma] I
- **Safe area**
  - **Maximum safe voltage**: 250 V (Attention! $U_{in}$ is no rated voltage.)
- **Electrical isolation**
  - Field circuit/control circuit: safe electrical isolation acc. to IEC/EN 60079-11, voltage peak value 375 V
- **Directive conformity**
  - Directive 94/9/EC:
  - IECEx approval:
    - IECEx CES 11.0022
    - Approved for:
      - [Ex ia Ga] IIC
      - [Ex ia Da] IIIC
      - [Ex ia Ma] I
- **Accessories**
  - Designation optional accessories: Label Carrier HiALC-Hi*TB-SET-1**
**Application**

**Typical loop**

<table>
<thead>
<tr>
<th>Field side</th>
<th>Control side</th>
</tr>
</thead>
<tbody>
<tr>
<td>24 VDC</td>
<td>24 VDC</td>
</tr>
<tr>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>X20</td>
<td>F1, F2</td>
</tr>
<tr>
<td>HART</td>
<td>HART</td>
</tr>
</tbody>
</table>

**Module switch settings**

<table>
<thead>
<tr>
<th>Type</th>
<th>Channel</th>
<th>DIP switch</th>
<th>Position</th>
</tr>
</thead>
<tbody>
<tr>
<td>HiD2030, HiD2026</td>
<td>2</td>
<td>S1</td>
<td>OFF</td>
</tr>
<tr>
<td></td>
<td></td>
<td>S2</td>
<td>OFF</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>S3</td>
<td>OFF</td>
</tr>
<tr>
<td></td>
<td></td>
<td>S4</td>
<td>OFF</td>
</tr>
</tbody>
</table>

**Card switch settings**

<table>
<thead>
<tr>
<th>Type (AI)</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>SAI143 (sink)</td>
<td>4-wire</td>
</tr>
</tbody>
</table>

The pin-out configuration has to be observed. For information see corresponding pin-out table on www.pepperl-fuchs.com.
HiDTB08-YRS-RRB-KS-CC-AI16

Termination Board

ProSafe-RS

Digital Inputs

Digital Outputs

Analog Inputs

Analog Outputs

Refer to "General Notes Relating to Pepperl+Fuchs Product Information".
HiDTB08-YRS-RRB-KS-CC-AI16-Y1

Termination Board

Features

- System Board for Yokogawa ProSafe-RS
- For 16-channel AI card SAV144
- For 8 modules
- Recommended modules: HiD2026 (AI), HiD2030 (AI)
- 24 V DC supply
- Hazardous area: spring terminals, blue
- Safe area: Yokogawa system connector, 40-pin

Function

The function of the Termination Board as well as the connector pin assignment exactly fit the requirement of Yokogawa systems.

Information about missing supply voltage of the interface modules is available for the system as potential-free contact.

The Termination Boards are supplied with a robust glass fiber reinforced plastic housing as standard. This design permits the fast and reliable installation on 35 mm DIN mounting rail acc. to EN 60715 in the cabinet.

Connection

Zone 0, 1, 2
Div. 1, 2

24 V DC (I), 24 V DC (II), ERR

(SAV144)

SAV144
## Technical data

### Supply
- **Rated voltage**: 24 V DC, in consideration of rated voltage of used isolated barriers
- **Voltage drop**: 0.9 V, voltage drop across the series diode on the Termination Board must be considered
- **Ripple**: ≤10 %
- **Fusing**: 2 A, in each case for 8 modules
- **Power loss**: ≤500 mW, without modules
- **Reverse polarity protection**: yes

### Electrical specifications
- **Volt-free fault indication output**: max. 30 V AC/40 V DC, 2 A

### Redundancy
- **Supply**: Redundancy available. The supply for the modules is decoupled, monitored and fused.

### Indicators/settings
- **Display elements**:
  - LED power supply I, green LED
  - LED power supply II, green LED
  - LED Fault (fault indication), red LED
  - LED flashes: power supply failure

### Directive conformity
- **Electromagnetic compatibility**
  - Directive 2004/108/EC
  - EN 61326-1:2006

### Ambient conditions
- **Ambient temperature**: -20 ... 60 °C (-4 ... 140 °F)
- **Storage temperature**: -40 ... 70 °C (-40 ... 158 °F)

### Mechanical specifications
- **Protection degree**: IP20
- **Connection**:
  - Hazardous area connection (field side): spring terminals, blue
  - Safe area connection (control side): Yokogawa system connector, 40-pin
- **Core cross-section**:
  - Spring terminals: rigid: 0.2 ... 2.5 mm²
  - Flexible: 0.25 ... 1.5 mm²
- **Material**:
  - Housing: polycarbonate, 30 % fiberglass reinforced
- **Mass**: approx. 490 g
- **Dimensions**: 205 x 175 x 153 mm (8.1 x 6.9 x 6.02 in)
- **Mounting**: on 35 mm DIN mounting rail acc. to EN 60715:2001

### Data for application in connection with Ex-areas
- **EC-Type Examination Certificate**
  - CESI 11 ATEX 062
- **Group, category, type of protection**:
  - II (1)G [Ex ia Ga] IIIC
  - II (1)D [Ex ia Da] IIIC
  - I (M1) [Ex ia Ma] I
- **Safe area**:
  - Maximum safe voltage: 250 V (Attention! U_{in} is no rated voltage.)
- **Electrical isolation**:
  - Field circuit/control circuit: safe electrical isolation acc. to IEC/EN 60079-11, voltage peak value 375 V
- **Directive conformity**
  - Directive 94/9/EC
- **IECEx approval**
  - IECEx CES 11.0022
  - Approved for:
    - [Ex ia Ga] IIIC
    - [Ex ia Da] IIIC
    - [Ex ia Ma] I

### Accessories
- **Designation**
  - Optional accessories: Label Carrier HiALC-Hi*TB-SET-1**
Application

Typical loop

Module switch settings

<table>
<thead>
<tr>
<th>Type</th>
<th>Channel</th>
<th>DIP switch</th>
<th>Position</th>
</tr>
</thead>
<tbody>
<tr>
<td>HiD2026 (AI)</td>
<td>2</td>
<td>S1</td>
<td>ON</td>
</tr>
<tr>
<td></td>
<td></td>
<td>S2</td>
<td>ON</td>
</tr>
<tr>
<td>HiD2030 (AI)</td>
<td>1</td>
<td>S3</td>
<td>ON</td>
</tr>
<tr>
<td></td>
<td></td>
<td>S4</td>
<td>ON</td>
</tr>
</tbody>
</table>

The pin-out configuration has to be observed. For information see corresponding pin-out table on www.pepperl-fuchs.com.
HiDTB08-YRS-RRB-KS-CC-AI16-Y1
Termination Board
HiCTB16-YRS-RRB-KS-CC-AI16-Y1  Termination Board

**Features**

- System Board for Yokogawa ProSafe-RS
- For 16-channel AI card SAV144
- For 16 modules
- Recommended module: HiC2025 (AI)
- 24 V DC supply
- Hazardous area: spring terminals, blue
- Safe area: Yokogawa system connector, 40-pin

**Function**

The function of the Termination Board as well as the connector pin assignment exactly fit the requirement of Yokogawa systems.

Information about missing supply voltage of the interface modules is available for the system as potential-free contact.

The Termination Boards are supplied with a robust glass fiber reinforced plastic housing as standard. This design permits the fast and reliable installation on 35 mm DIN mounting rail acc. to EN 60715 in the cabinet.

**Connection**

![Connection Diagram]

- 24 V DC (I), 24 V DC (II), ERR
- SAV144
- (SAV144)

---

Refer to “General Notes Relating to Pepperl+Fuchs Product Information”
**Technical data**

**Supply**
- Rated voltage: 24 V DC, in consideration of rated voltage of used isolated barriers
- Voltage drop: 0.9 V, voltage drop across the series diode on the Termination Board must be considered
- Ripple: ≤10 %
- Fusing: 4 A, in each case for 16 modules
- Power loss: ≤500 mW, without modules
- Reverse polarity protection: yes

**Electrical specifications**
- Volt-free fault indication output: max. 30 V AC/40 V DC, 2 A

**Redundancy**
- Supply: Redundancy available. The supply for the modules is decoupled, monitored and fused.

**Indicators/settings**
- Display elements: LEDs PWR ON (Termination Board power supply)
  - LED power supply I, green LED
  - LED power supply II, green LED
  - LED Fault (fault indication), red LED
  - LED flashes: power supply failure

**Directive conformity**
- Electromagnetic compatibility
  - Directive 2004/108/EC
  - EN 61326-1:2006
- Conformity
  - Electromagnetic compatibility
    - NE 21:2011
    - For further information see system description.
- Protection degree
  - IEC 60529:2001

**Ambient conditions**
- Ambient temperature: -20 ... 60 °C (-4 ... 140 °F)
- Storage temperature: -40 ... 70 °C (-40 ... 158 °F)

**Mechanical specifications**
- Protection degree: IP20
- Connection: hazardous area connection (field side): spring terminals, blue
  safe area connection (control side): Yokogawa system connector, 40-pin
- Core cross-section:
  - spring terminals: rigid: 0.2 ... 2.5 mm²
    flexible: 0.25 ... 1.5 mm²
- Material: housing: polycarbonate, 30 % fiberglass reinforced
- Mass: approx. 650 g
- Dimensions: 240 x 175 x 153 mm (9.45 x 6.9 x 6.02 in)
- Mounting: on 35 mm DIN mounting rail acc. to EN 60715:2001

**Data for application in connection with Ex-areas**
- EC-Type Examination Certificate
  - CESI 06 ATEX 022
  - Group, category, type of protection:
    - II (1)G [Ex ia Ga] IIC
    - II (1)D [Ex ia Da] IIIC
    - I (M1) [Ex ia Ma] I
- Safe area
  - Maximum safe voltage: 250 V (Attention! $U_{in}$ is no rated voltage.)
- Electrical isolation
  - Field circuit/control circuit: safe electrical isolation acc. to IEC/EN 60079-11, voltage peak value 375 V
- Directive conformity
  - Directive 94/9/EC
- IECEx approval
  - IECEx CES 06.0003
  - Approved for:
    - [Ex ia Ga] IIC
    - [Ex ia Da] IIIC
    - [Ex ia Ma] I
- Accessories
  - Designation:
    - optional accessories: Label Carrier HiALC-Hi*TB-SET-1**
Application

Typical loop

Module switch settings

<table>
<thead>
<tr>
<th>Type</th>
<th>DIP switch</th>
<th>Position</th>
</tr>
</thead>
<tbody>
<tr>
<td>HiC2025</td>
<td>S1</td>
<td>OFF</td>
</tr>
<tr>
<td></td>
<td>S2</td>
<td>OFF</td>
</tr>
<tr>
<td></td>
<td>S3</td>
<td>ON</td>
</tr>
<tr>
<td></td>
<td>S4</td>
<td>ON</td>
</tr>
</tbody>
</table>

The pin-out configuration has to be observed. For information see corresponding pin-out table on www.pepperl-fuchs.com.
**Features**

- System Board for Yokogawa ProSafe-RS
- For 8-channel AO card SAI533
- For 8 modules
- Recommended module: HiC2031 (AO)
- 24 V DC supply
- Hazardous area: spring terminals, blue
- Safe area: Yokogawa system connector, 40-pin

**Function**

The function of the Termination Board as well as the connector pin assignment exactly fit the requirement of Yokogawa systems.

Information about missing supply voltage of the interface modules is available for the system as potential-free contact.

The Termination Boards are supplied with a robust glass fiber reinforced plastic housing as standard. This design permits the fast and reliable installation on 35 mm DIN mounting rail acc. to EN 60715 in the cabinet.

**Connection**

![Diagram of HiCTB08-YRS-RRB-KS-CC-AO08 Termination Board](image-url)
HiCTB08-YRS-RRB-KS-CC-AO08

Technical data

Supply

- **Rated voltage**: 24 V DC, in consideration of rated voltage of used isolated barriers
- **Voltage drop**: 0.9 V, voltage drop across the series diode on the Termination Board must be considered
- **Ripple**: ≤ 10 %
- **Fusing**: 2 A, in each case for 8 modules
- **Power loss**: ≤ 500 mW, without modules
- **Reverse polarity protection**: yes

Electrical specifications

- **Volt-free fault indication output**: max. 30 V AC/40 V DC, 2 A

Redundancy

- **Supply**: Redundancy available. The supply for the modules is decoupled, monitored and fused.

Indicators/settings

- **Display elements**
  - LED power supply I, green LED
  - LED power supply II, green LED
  - LED Fault (fault indication), red LED
  - LED flashes: power supply failure

Directive conformity

- **Electromagnetic compatibility**
  - Directive 2004/108/EC
  - EN 61326-1:2006
  - NE 21:2011
  - For further information see system description.

Ambient conditions

- **Ambient temperature**: -20 ... 60 °C (-4 ... 140 °F)
- **Storage temperature**: -40 ... 70 °C (-40 ... 158 °F)

Mechanical specifications

- **Protection degree**: IP20
- **Connection**
  - Hazardous area connection (field side): spring terminals, blue
  - Safe area connection (control side): Yokogawa system connector, 40-pin
- **Core cross-section**
  - Spring terminals:
    - Rigid: 0.2 ... 2.5 mm²
    - Flexible: 0.25 ... 1.5 mm²
- **Material**
  - Housing: polycarbonate, 30 % fiberglass reinforced
- **Mass**: approx. 490 g
- **Dimensions**: 205 x 175 x 153 mm (8.1 x 6.9 x 6.02 in)
- **Mounting**: on 35 mm DIN mounting rail acc. to EN 60715:2001

Data for application in connection with Ex-areas

- **EC-Type Examination Certificate**: CESI 06 ATEX 022
- **Group, category, type of protection**
  - II (1)G [Ex ia Ga] IIC
  - II (1)D [Ex ia Da] IIIC
  - I (M1) [Ex ia Ma] I
- **Safe area**
  - Maximum safe voltage: 250 V (Attention! $U_{im}$ is no rated voltage.)
- **Electrical isolation**
  - Field circuit/control circuit: safe electrical isolation acc. to IEC/EN 60079-11, voltage peak value 375 V
- **Directive conformity**
  - Directive 94/9/EC
  - IECEx approval
  - IECEx CES 06.0003
  - Approved for
    - [Ex ia Ga] IIC
    - [Ex ia Da] IIIC
    - [Ex ia Ma] I
- **Accessories**
  - Designation optional accessories: Label Carrier HIALC-HiT-SET-1**
Typical loop

The pin-out configuration has to be observed. For information see corresponding pin-out table on www.pepperl-fuchs.com.
Termination Board

HiCTB08-YRS-RRB-KS-CC-AO08

ProSafe-RS

Digital Inputs

Digital Outputs

Analog Inputs

Analog Outputs

Refer to "General Notes Relating to Pepperl+Fuchs Product Information".

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## Digital Outputs
- Selection Tables ................................................. 73
- Product Data Sheets ............................................. 77
- Entity Parameters .................................................. 89

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- Selection Tables ................................................. 73
- Product Data Sheets ............................................. 82
- Entity Parameters .................................................. 89

## Analog Outputs
- Selection Tables ................................................. 74
- Product Data Sheets ............................................. 85
- Entity Parameters .................................................. 89

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### Digital Inputs

<table>
<thead>
<tr>
<th>Model Number</th>
<th>Housing</th>
<th>Channels</th>
<th>Input (Field)</th>
<th>Output (Control System)</th>
<th>Supply</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>HC2831R1</td>
<td>HIC</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td>75</td>
</tr>
<tr>
<td></td>
<td>HID</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HC2832R1</td>
<td>HIC</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td>76</td>
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<tr>
<td></td>
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### Digital Outputs

<table>
<thead>
<tr>
<th>Model Number</th>
<th>Housing</th>
<th>Channels</th>
<th>Input (Control System)</th>
<th>Output (Field)</th>
<th>Supply</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>HC2871</td>
<td>HIC</td>
<td>1</td>
<td></td>
<td>12 V</td>
<td>45</td>
<td>77</td>
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<tr>
<td>HC2873</td>
<td>HIC</td>
<td>1</td>
<td></td>
<td>12 V</td>
<td>40</td>
<td>78</td>
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<tr>
<td>HC2877</td>
<td>HIC</td>
<td>1</td>
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<td>11.2 V</td>
<td>40</td>
<td>79</td>
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<tr>
<td>HD2872</td>
<td>HIC</td>
<td>2</td>
<td></td>
<td>12 V</td>
<td>40</td>
<td>80</td>
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<td>HID</td>
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<tr>
<td>HD2876</td>
<td>HIC</td>
<td>2</td>
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<td>11.2 V</td>
<td>40</td>
<td>81</td>
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<td>HID</td>
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### Analog Inputs

<table>
<thead>
<tr>
<th>Model Number</th>
<th>Housing</th>
<th>Channels</th>
<th>Input (Field)</th>
<th>Output (Control System)</th>
<th>Specials</th>
<th>Supply</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>HC2025</td>
<td>HIC</td>
<td>1</td>
<td>2-wire Transmitters</td>
<td>0/4 mA ... 20 mA (Source)</td>
<td></td>
<td>24 V VDC (Bus Powered)</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>HID</td>
<td></td>
<td></td>
<td>0/1 V ... 5 V</td>
<td>SMART</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HD2026</td>
<td>HIC</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td>24 V VDC (Bus Powered)</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>HID</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4 VDC Loop Powered</td>
<td>2</td>
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<tr>
<td>HD2030</td>
<td>HIC</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td>24 V VDC (Bus Powered)</td>
<td>2</td>
</tr>
</tbody>
</table>
### Analog Outputs

<table>
<thead>
<tr>
<th>Model Number</th>
<th>Housing</th>
<th>Channels</th>
<th>Input (Control System)</th>
<th>Output (Field)</th>
<th>Supply</th>
<th>Line Fault Detection</th>
<th>Zone 2/Division 2</th>
<th>Mounting</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>HiC2031</td>
<td>HiC</td>
<td>1</td>
<td>0/4 mA ... 20 mA</td>
<td>0/4 mA ... 20 mA</td>
<td>SMART</td>
<td>24 V DC (Bus Powered)</td>
<td>2</td>
<td></td>
<td>85</td>
</tr>
</tbody>
</table>

### Accessories

<table>
<thead>
<tr>
<th>Model Number</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>HiALC-HiCTF-SET-114</td>
<td>Label Carrier Set</td>
<td>88</td>
</tr>
<tr>
<td>HiALC-HiCTF-SET-228</td>
<td>Label Carrier Set</td>
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<tr>
<td>HiALC-HiDTF-SET-156</td>
<td>Label Carrier Set</td>
<td>88</td>
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<tr>
<td>HiALC-HiDTF-SET-312</td>
<td>Label Carrier Set</td>
<td>88</td>
</tr>
<tr>
<td>HiC2000 Blank</td>
<td>Place Holder Barrier</td>
<td>86</td>
</tr>
<tr>
<td>HiD2000 Blank</td>
<td>Place Holder Barrier</td>
<td>87</td>
</tr>
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</table>
HiC2831R1

**Technical data**

<table>
<thead>
<tr>
<th>Supply</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated voltage</td>
<td>19 ... 30 V DC via Termination Board</td>
</tr>
<tr>
<td>Ripple</td>
<td>≤10 %</td>
</tr>
<tr>
<td>Rated current</td>
<td>≤25 mA</td>
</tr>
<tr>
<td>Power loss</td>
<td>≤500 mA</td>
</tr>
<tr>
<td>Power consumption</td>
<td>≤600 mW</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Input</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated values</td>
<td>acc. to EN 60947-5-6 (NAMUR)</td>
</tr>
<tr>
<td>Open circuit voltage/short-circuit current</td>
<td>approx. 10 V DC/approx. 8 mA</td>
</tr>
<tr>
<td>Switching point/switching hysteresis</td>
<td>1.2 ... 2.1 mA/approx. 0.2 mA</td>
</tr>
<tr>
<td>Line fault detection</td>
<td>breakage I ≤0.1 mA, short-circuit I ≥6.5 mA</td>
</tr>
<tr>
<td>Pulse/Pause ratio</td>
<td>≥100 μs/≤100 μs</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Output</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated voltage</td>
<td>19 ... 30 V DC with external resistance &gt; 2 kΩ, e. g. 16-channel ProSafe DI card SDV144 from Yokogawa</td>
</tr>
<tr>
<td>Response time</td>
<td>≤200 μs</td>
</tr>
<tr>
<td>Output I, II</td>
<td>signal or error message, passive transistor output (resistive)</td>
</tr>
<tr>
<td>0-signal: 33 kΩ ± 5 % + voltage drop 6.5 V ± 0.5 V</td>
<td></td>
</tr>
<tr>
<td>1-signal: voltage drop 6.5 V ± 0.5 V</td>
<td></td>
</tr>
<tr>
<td>fault: &gt; 100 kΩ</td>
<td></td>
</tr>
</tbody>
</table>

**Error message output**

- Output type: open collector transistor (internal fault bus)

**Transfer characteristics**

- Switching frequency: ≤5 kHz

**Ambient conditions**

- Ambient temperature: -20 ... 60 °C (-4 ... 140 °F)

**Mechanical specifications**

- Protection degree: IP20
- Mass: approx. 100 g
- Dimensions: 12.5 x 128 x 106 mm (0.5 x 5.1 x 4.2 in)

**Data for application in connection with Ex-areas**

- see page 89 for entity parameters

**EC-Type Examination Certificate**

- BVS 11 ATEX E 026
- Group, category, type of protection: II (1) G [Ex ia] IIC, II (1) D [Ex ia] IIIC
- I (M1) [Ex ia] I

**UL approval**

- Control drawing: 116-0331
- IECEx approval: IECEx BVS 11.0040
- Approved for: [Ex ia Ga] IIC, [Ex ia] IIIC, [Ex ia] I

**Data for application in connection with Ex-areas**

- see page 89 for entity parameters

**Front view**

- LED green: Power supply
- LED yellow/red: Status output/Fault input
- Switch 1 ... 4
- Place for labelling

**Diagram**

- Zone 0, 1, 2

---

**Features**

- 1-channel isolated barrier
- 24 V DC supply (bus powered)
- Dry contact or NAMUR inputs
- Application-specific outputs
- Usable as signal splitter (1 input and 2 outputs)
- 2 passive transistor outputs (resistive)
- Line fault transparency (LFT)
- Up to SIL2 acc. to IEC 61508

**Function**

This isolated barrier is used for intrinsic safety applications. The device transfers digital signals (NAMUR sensors or dry contacts) from a hazardous area to a safe area. The input controls two passive transistor outputs with a resistive output characteristic. The outputs have three defined states: 1-Signal = 6.5 V voltage drop, 0-Signal = 33 kΩ and 6.5 V voltage drop and fault > 100 kΩ. This output characteristic offers line fault transparency on the signal lines. Switches allow to reverse the output mode of operation and to disable the line fault detection of the field circuit. This device mounts on a HiC Termination Board.
**HiC2832R1 Switch Amplifier**

**Features**
- 2-channel isolated barrier
- 24 V DC supply (bus powered)
- Dry contact or NAMUR inputs
- Application-specific outputs
- 2 passive transistor outputs (resistive)
- Line fault transparency (LFT)
- Up to SIL2 acc. to IEC 61508

**Function**
This isolated barrier is used for intrinsic safety applications. The device transfers digital signals (NAMUR sensors or dry contacts) from a hazardous area to a safe area. Each input controls a passive transistor output with a resistive output characteristic. The outputs have three defined states: 1-Signal = 6.5 V voltage drop, 0-Signal = 33 kΩ and 6.5 V voltage drop and fault > 100 kΩ. This output characteristic offers line fault transparency on the signal lines. Switches allow to reverse the output mode of operation and to disable the line fault detection of the field circuit. This device mounts on a HiC Termination Board.

**Technical data**

**Supply**
- Rated voltage: 19 ... 30 V DC via Termination Board
- Ripple: ≤ 10 %
- Rated current: ≤ 30 mA
- Power loss: ≤ 600 mW
- Power consumption: ≤ 700 mW

**Input**
- Rated values: acc. to EN 60947-5-6 (NAMUR)
- Open circuit voltage/short-circuit current: approx. 10 V DC/approx. 8 mA

**Switching point/switching hysteresis**
- 1.2 ... 2.1 mA/approx. 0.2 mA

**Line fault detection**
- Breakage: I ≤ 0.1 mA, short-circuit: I ≥ 6.5 mA
- Pulse/Pause ratio: ≥ 100 μs ≥ 100 μs

**Output**
- Rated voltage: 19 ... 30 V DC with external resistance > 2 kΩ, e.g. 16-channel ProSafe DI card SDV144 from Yokogawa
- Response time: ≤ 200 μs
- Output I, II: signal or error message, passive transistor output (resistive)
  - 0-signal: 33 kΩ ± 5 % + voltage drop 6.5 V ± 0.5 V
  - 1-signal: voltage drop 6.5 V ± 0.5 V
  - Fault: > 100 kΩ

**Error message output**
- Output type: open collector transistor (internal fault bus)

**Transfer characteristics**
- Switching frequency: ≤ 5 kHz

**Ambient conditions**
- Ambient temperature: -20 ... 60 °C (-4 ... 140 °F)

**Mechanical specifications**
- Protection degree: IP20
- Mass: approx. 100 g
- Dimensions: 12.5 x 128 x 106 mm (0.5 x 5.1 x 4.2 in)

**Data for application in connection with Ex-areas**
- see page 89 for entity parameters

**EC-Type Examination Certificate**
- BVS 11 ATEX E 026
- Group, category, type of protection: II (1) G [Ex ia] IIC, II (1) D [Ex ia] IIIC
- I (M1) [Ex ia] I

**UL approval**
- Control drawing: 116-0331

**IECEx approval**
- IECEx BVS 11.0040
- Approved for: [Ex ia Ga] IIC, [Ex ia] IIC, [Ex ia] I

**Diagrams**

**Front view**

- LED green: Power supply
- LED yellow/red: Status output/Fault channel 1
- LED yellow/red: Status output/Fault channel 2
- Place for labeling

**Diagrams**

- Front view
- Top view
- Side view

**Termination Board**

- SL1: 1a, 1b
- SL2: 1a, 1b
- 9a
- 7a
- 5a
- 3a
- ERR

- 24 VDC

Refer to “General Notes Relating to Pepperl+Fuchs Product Information”.

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HiC2871

Technical data

Supply
- Power loss: < 1 W

Input
- Rated voltage $U_i$: 19 ... 30 V loop powered
- Current: $\leq 72$ mA if $U_i = 19$ V, $\leq 50$ mA at $U_i = 30$ V
- with 265 $\Omega$ output load
- $\leq 45$ mA if $U_i = 19$ V, $\leq 31$ mA at $U_i = 30$ V
- with shorted output
- $\leq 14$ mA if $U_i = 19$ V, $\leq 11$ mA at $U_i = 30$ V
- no load at output

Output
- Inrush current: $\leq 200$ mA after 100 $\mu$s

Internal resistor $R_i$: $\leq 238 \Omega$
- Current $I_e$: $\leq 45$ mA
- Voltage $U_e$: $\geq 12$ V
- Open loop voltage $U_{ol}$: $\geq 22.7$ V

Function
This isolated barrier is used for intrinsic safety applications. It supplies power to solenoids, LEDs, and audible alarms located in a hazardous area.

It is loop powered, so the available energy at the output is received from the input signal. The output signal has a resistive characteristic. As a result the output voltage and current are dependent on the load and the input voltage.

At full load, 12 V at 45 mA is available for the hazardous area application.

This module mounts on a HiC Termination Board.

Diagram

- Front view
- LED yellow: Status output
- Place for labeling

Data for application in connection with Ex-areas
- EC-Type Examination Certificate: BASEEFA 06 ATEX 0171X
- Group, category, type of protection: II (1)G [Ex ia Ga] IIIC, II (1)D [Ex ia Da] IIIC, I (M1) [Ex ia Ma] I (-20 °C ≤ $T_{amb}$ ≤ 60 °C)
- Statement of conformity: PF 08 CERT 1048 X
- Group, category, type of protection, temperature class: II 3G Ex nA IIC T4 Gc
- FM approval: 16-534FM-12 (cFMus)
- IECEx approval: IECEx BAS 06.0031X
- Approved for: [Ex ia Ga] IIIC, [Ex ia Da] IIIC, [Ex ia Ma] I

Features
- 1-channel isolated barrier
- 24 V DC supply (loop powered)
- Output 45 mA at 12 V DC
- Up to SIL3 acc. to IEC 61508
**HiC2873**

**Solenoid Driver**

### Features
- 1-channel isolated barrier
- 24 V DC supply (bus or loop powered)
- Output 40 mA at 12 V DC, 55 mA current limit
- Contact or logic control input
- Entity parameter $I_o/I_{sc} = 110$ mA
- Line fault detection (LFD)
- Test pulse immunity
- Up to SIL 2 acc. to IEC 61508 (bus powered)
- Up to SIL 3 acc. to IEC 61508 (loop powered)

### Function
This isolated barrier is used for intrinsic safety applications. It supplies power to solenoids, LEDs, and audible alarms, located in a hazardous area.

It is controlled with a loop-powered control signal, switch contact, transistor, or logic signal.

At full load, 12 V at 40 mA (with 55 mA current limit) is available for the hazardous area application.

Line fault detection of the field circuit is indicated by a red LED and an output on the fault bus.

This device mounts on a HiC Termination Board.

### Technical data

<table>
<thead>
<tr>
<th>Supply</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated voltage</td>
<td>20.4 ... 30 V via Termination Board or 20.4 ... 30 V via loop powered input, reverse polarity protected</td>
</tr>
</tbody>
</table>

| Input current | 62 mA at 24 V, 300 Ω load |

| Power loss | 1 W at 24 V, 300 Ω load |

| Control input | external switch (dry contact or open collector) non-isolated or logic signal input fully floating |

| Signal level | 1-signal: 15 ... 30 V DC (current limited at 3 mA) or contact close (internal 10 kΩ pull-up) 0-signal: 0 ... 5 V DC or contact open |

| Power loss | 1 W at 24 V, 300 Ω load for loop powered |

| Irush current | 0.2 A, 15 ms loop powered |

| Internal resistor $R_i$ | approx. 240 Ω |

| Current $I_g$ | ≥ 40 mA |

| Voltage $U_a$ | ≥ 12 V |

| Current limit $I_{max}$ | 55 mA |

| Open loop voltage $U_a$ | approx. 22.5 V |

| Load | nominal 0.1 ... 5 kΩ |

| Output type | open collector transistor (internal fault bus) |

| Fault current | 4 mA pulsing (20 ms ON, 200 ms OFF) |

| Fault level | lead short-circuit detection at < 25 Ω lead breakage detection at > 100 kΩ typical |

| Ambient temperature | -20 ... 60 °C (-4 ... 140 °F) |

| Protection degree | IP20 |

| Mass | approx. 100 g |

| Dimensions | 12.5 x 128 x 106 mm (0.5 x 5.1 x 4.2 in) |

| Data for application in connection with Ex-areas | see page 89 for entity parameters |

| EC-Type Examination Certificate | CESI 10 ATEX 046 |

| Group, category, type of protection | II (I) GD, I (M1), [Ex ia] II C, [Ex iaD], [Ex ia] I |

| Statement of conformity | PF 10 CERT 1747 X |

| Group, category, type of protection, temperature class | II 3G Ex nA II T4 |

| IECEx approval | IECEx CES 10.0017 |

### Diagrams

#### Front view

- LED green: Power supply
- LED yellow: Status output
- LED red: Fault
- Place for labeling
- Switch 1 ... 8

#### Zone 0, 1, 2

#### X-Y view

- 24 VDC
- ERR

#### Termination Board

---

**Refer to “General Notes Relating to Pepperl+Fuchs Product Information”**
### Technical data

#### Supply
- **Rated voltage**: 20.4 ... 30 V via Termination Board or 20.4 ... 30 V via loop powered input, reverse polarity protected
- **Input current**: 62 mA at 24 V, 300 Ω load
- **Power loss**: 1 W at 24 V, 300 Ω load

#### Input
- **Control input**: external switch (dry contact or open collector) non isolated or logic signal input fully floating
- **Signal level**: 1-signal: 15...30 V DC (current limited at 3 mA) or contact close (internal 10 kΩ pull-up)
- **Power loss**: 1 W at 24 V, 300 Ω load for loop powered
- **Inrush current**: 0.2 A, 15 ms loop powered

#### Output
- **Internal resistor R_i**: approx. 280 Ω
- **Current I_e**: \( \geq 40 \, \text{mA} \)
- **Voltage U_e**: \( \geq 11.2 \, \text{V} \)
- **Current limit I_{\text{max}}**: 55 mA
- **Open loop voltage U_s**: approx. 22.5 V
- **Load**: nominal 0.1 ... 5 kΩ

#### Error message output
- **Output type**: open collector transistor (internal fault bus)
- **Fault current**: 4 mA pulsing (20 ms ON, 200 ms OFF)
- **Fault level**: lead short-circuit detection at < 25 Ω
- **Lead breakage detection at > 100 kΩ typical**

#### Ambient conditions
- **Ambient temperature**: -20 ... 60 °C (-4 ... 140 °F)

#### Mechanical specifications
- **Protection degree**: IP20
- **Mass**: approx. 100 g
- **Dimensions**: 12.5 x 128 x 106 mm (0.5 x 5.1 x 4.2 in)
- **Data for application in connection with Ex-areas**: see page 89 for entity parameters
- **EC-Type Examination Certificate**: CESI 10ATEX 046
- **Group, category, type of protection**: II (I) GD, I (M1), [Ex ia] II C, [Ex iaD], [Ex ia] I
- **Statement of conformity**: PF 10 CERT 1747 X
- **Group, category, type of protection, temperature class**: II 3G Ex nA II T4
- **IECEX approval**: IECEx CES 10.0017

### Features
- **1-channel isolated barrier**
- **24 V DC supply (bus or loop powered)**
- **Output 40 mA at 11.2 V DC, 55 mA current limit**
- **Contact or logic control input**
- **Entity parameter I_o/I_{sc} = 93 mA**
- **Line fault detection (LFD)**
- **Test pulse immunity**
- **Up to SIL2 acc. to IEC 61508 (bus powered)**
- **Up to SIL3 acc. to IEC 61508 (loop powered)**

### Function

This isolated barrier is used for intrinsic safety applications.

It supplies power to solenoids, LEDs, and audible alarms, located in a hazardous area.

It is controlled with a loop-powered control signal, switch contact, transistor, or logic signal.

At full load, 11.2 V at 40 mA (with 55 mA current limit) is available for the hazardous area application.

Line fault detection of the field circuit is indicated by a red LED and an output on the fault bus.

This device mounts on a HiC Termination Board.

### Diagrams

[Diagram showing HiC2877 solenoid driver and its connections]

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**Notes and Details**

Refer to "General Notes Relating to Pepperl+Fuchs Product Information".

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**PEPPERL+FUCHS**

PROTECTING YOUR PROCESS
HiD2872

Solenoid Driver

**Features**
- 2-channel isolated barrier
- 24 V DC supply (bus or loop powered)
- Output 40 mA at 12 V DC, 55 mA current limit
- Contact or logic control input
- Entity parameter \( i_c/i_{sc} = 110 \text{ mA} \)
- Line fault detection (LFD)
- Up to SIL2 acc. to IEC 61508 (bus powered)
- Up to SIL3 acc. to IEC 61508 (loop powered)

**Technical data**

<table>
<thead>
<tr>
<th>Supply</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated voltage</td>
<td>20.4 … 30 V via Termination Board or 20.4 … 30 V via loop powered input, reverse polarity protected</td>
</tr>
<tr>
<td>Input current</td>
<td>62 mA at 24 V, 300 ( \Omega ) load (per channel)</td>
</tr>
<tr>
<td>Power loss</td>
<td>1 W at 24 V, 300 ( \Omega ) load (per channel)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Input</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Control input</td>
<td>external switch (dry contact or open collector) non isolated or logic signal input fully floating</td>
</tr>
<tr>
<td>Signal level</td>
<td>1-signal: 15…30 V DC (current limited at 3 mA) or contact close (internal 10 k( \Omega ) pull-up)</td>
</tr>
<tr>
<td>Power loss</td>
<td>1 W at 24 V, 300 ( \Omega ) load (per channel) for loop powered</td>
</tr>
</tbody>
</table>

| Inrush current | 0.2 A, 15 ms loop powered |

**Output**

- Internal resistor \( R_i \) approx. 240 \( \Omega \)
- Current \( I_g \) \( \geq 40 \text{ mA} \)
- Voltage \( U_b \) \( \geq 12 \text{ V} \)
- Current limit \( I_{max} \) 55 mA
- Open loop voltage \( U_e \) approx. 22.5 V
- Load nominal 0.1 ... 5 \( \text{ k}\( \Omega \) |

**Error message output**

- Output type open collector transistor (internal fault bus)
- Inrush current 0.2 A, 15 ms loop powered
- Fault current 4 mA pulsing (20 ms ON, 200 ms OFF)
- Fault level lead short-circuit detection at < 25 \( \Omega \)
- Lead breakage detection at > 100 \( \text{ k}\( \Omega \) typical

**Ambient conditions**

- Ambient temperature -20 ... 60 °C (-4 ... 140 °F)

**Mechanical specifications**

- Protection degree IP20
- Mass approx. 140 g
- Dimensions 18 x 106 x 128 mm (0.7 x 4.2 x 5 in)

**Data for application in connection with Ex-areas**

<table>
<thead>
<tr>
<th>EC-Type Examination Certificate</th>
<th>CESI 10 ATEX 036</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group, category, type of protection</td>
<td>( \text{(G)} ) II (1)GD [Ex ia] IIC, [Ex iiaD] [circuit(s) in zone 0/1/2/20/21/22]</td>
</tr>
<tr>
<td>Statement of conformity</td>
<td>PF 10 CERT 1729 X</td>
</tr>
<tr>
<td>Group, category, type of protection, temperature class</td>
<td>( \text{(G)} ) II 3G Ex nA II T4</td>
</tr>
</tbody>
</table>

**CSA approval**

- Control drawing 366-005CS-12B (cCSAus)
- IECEx approval IECEx CES 10.0013

**Function**

This isolated barrier is used for intrinsic safety applications. It supplies power to solenoids, LEDs, and audible alarms, located in a hazardous area.

It is controlled with a loop-powered control signal, switch contact, transistor, or logic signal.

At full load, 12 V at 40 mA (with 55 mA current limit) is available for the hazardous area application.

An alternative low current output is available for driving a single LED without installing an external current limiting resistor.

Line fault detection of the field circuit is indicated by a red LED and an output on the fault bus.

This device mounts on a HID Termination Board.
HiD2876

**Features**

- 2-channel isolated barrier
- 24 V DC supply (bus or loop powered)
- Output 40 mA at 11.2 V DC, 55 mA current limit
- Contact or logic control input
- Entity parameter $I_0/I_{sc} = 93$ mA
- Line fault detection (LFD)
- Up to SIL2 acc. to IEC 61508 (bus powered)
- Up to SIL3 acc. to IEC 61508 (loop powered)

**Function**

This isolated barrier is used for intrinsic safety applications. It supplies power to solenoids, LEDs, and audible alarms, located in a hazardous area. It is controlled with a loop-powered control signal, switch contact, transistor, or logic signal.

At full load, 11.2 V at 40 mA (with 55 mA current limit) is available for the hazardous area application. An alternative low current output is available for driving a single LED without installing an external current limiting resistor.

Line fault detection of the field circuit is indicated by a red LED and an output on the fault bus. This device mounts on a HiD Termination Board.

**Technical data**

**Supply**

- Rated voltage: 20.4 ... 30 V via Termination Board or 20.4 ... 30 V via loop powered input, reverse polarity protected
- Input current: 62 mA at 24 V, 300 Ω load (per channel)
- Power loss: 1 W at 24 V, 300 Ω load (per channel)

**Control input**

- Input current: external switch (dry contact or open collector) non isolated or logic signal input fully floating
- Signal level: 1-signal: 15 ... 30 V DC (current limited at 3 mA) or contact close (internal 10 kΩ pull-up)
- Signal level: 0-signal: 0 ... 5 V DC or contact open

**Output**

- Internal resistor $R_i$: approx. 280 Ω
- Current $I_o$: ≥ 40 mA
- Voltage $U_o$: ≥ 11.2 V
- Current limit $I_{max}$: 55 mA
- Open loop voltage $U_s$: approx. 22.5 V
- Load: nominal 0.1 ... 5 kΩ

**Error message output**

- Output type: open collector transistor (internal fault bus)
- Fault current: 4 mA pulsing (20 ms ON, 200 ms OFF)
- Fault level: lead short-circuit detection at < 25 Ω
- Fault level: lead breakage detection at > 100 kΩ typical

**Ambient conditions**

- Ambient temperature: -20 ... 60 °C (-4 ... 140 °F)

**Mechanical specifications**

- Protection degree: IP20
- Mass: approx. 140 g
- Dimensions: 18 x 106 x 128 mm (0.7 x 4.2 x 5 in)

**EC-Type Examination Certificate**

- Group, category, type of protection: II (1)GD [Ex ia] IIC, [Ex iaD] [circuit(s) in zone 0/1/2/20/21/22]
- Statement of conformity: PF 10 CERT 1729 X

**CSA approval**

- Control drawing: 366-005CS-12B (cCSAus)

**IECEx approval**

- Data for application in connection with Ex-areas: see page 89 for entity parameters
- EC-Type Examination Certificate: CESI 10 ATEX 036
- Group, category, type of protection, temperature class: II 3G Ex nA II T4
- Control drawing: 366-005CS-12B (cCSAus)
- EC-Type Examination Certificate: CESI 10 ATEX 036
- Group, category, type of protection, temperature class: II (1)GD [Ex ia] IIC, [Ex iaD] [circuit(s) in zone 0/1/2/20/21/22]

**Statement of conformity**

- PF 10 CERT 1729 X

**CSA approval**

- Control drawing: 366-005CS-12B (cCSAus)
- EC-Type Examination Certificate: CESI 10 ATEX 036
- Group, category, type of protection, temperature class: II 3G Ex nA II T4

**IECEx approval**

- Data for application in connection with Ex-areas: see page 89 for entity parameters
- EC-Type Examination Certificate: CESI 10 ATEX 036
- Group, category, type of protection, temperature class: II (1)GD [Ex ia] IIC, [Ex iaD] [circuit(s) in zone 0/1/2/20/21/22]

**Statement of conformity**

- PF 10 CERT 1729 X

**CSA approval**

- Control drawing: 366-005CS-12B (cCSAus)
- EC-Type Examination Certificate: CESI 10 ATEX 036
- Group, category, type of protection, temperature class: II 3G Ex nA II T4

**IECEx approval**

- Data for application in connection with Ex-areas: see page 89 for entity parameters
- EC-Type Examination Certificate: CESI 10 ATEX 036
- Group, category, type of protection, temperature class: II (1)GD [Ex ia] IIC, [Ex iaD] [circuit(s) in zone 0/1/2/20/21/22]
Features

- 1-channel isolated barrier
- 24 V DC supply (bus powered)
- Input for 2-wire SMART transmitters and current sources
- Output for 4 mA ... 20 mA or 1 V ... 5 V
- Low power dissipation
- Up to SIL2 acc. to IEC 61508

Technical data

**Supply**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated voltage</td>
<td>19 ... 30 V DC via Termination Board</td>
</tr>
<tr>
<td>Ripple</td>
<td>≤10 %</td>
</tr>
<tr>
<td>Rated current</td>
<td>≤45 mA</td>
</tr>
<tr>
<td>Power loss</td>
<td>≤800 mW</td>
</tr>
<tr>
<td>Power consumption</td>
<td>≤1.1 W</td>
</tr>
</tbody>
</table>

**Input**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input signal</td>
<td>4 ... 20 mA</td>
</tr>
<tr>
<td>Voltage drop</td>
<td>approx. 5 V on SL2: 5a(+), 1b(-)</td>
</tr>
<tr>
<td>Available voltage</td>
<td>≥15 V at 20 mA on SL2: 5a(+), 5b(-)</td>
</tr>
</tbody>
</table>

**Output**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Load</td>
<td>0 ... 300 Ω (source mode)</td>
</tr>
<tr>
<td>Output signal</td>
<td>4 ... 20 mA or 1 ... 5 V (on 250 Ω, 0.1 % internal shunt)</td>
</tr>
<tr>
<td>Ripple</td>
<td>20 mV rms</td>
</tr>
</tbody>
</table>

**Transfer characteristics**

- Influence of ambient temperature: < 2 μA/K (0 ... 60 °C (32 ... 140 °F)); < 4 μA/K (-20 ... 0 °C (-4 ... 32 °F))
- Frequency range: field side into the control side: bandwidth with 0.5 Vpp signal 0 ... 3 kHz (-3 dB); control side into the field side: bandwidth with 0.5 Vpp signal 0 ... 3 kHz (-3 dB)
- Setting time               | ≤ 200 ms                  |
- Rise time/fall time        | ≤ 20 ms                   |

**Ambient conditions**

- Ambient temperature: -20 ... 60 °C (-4 ... 140 °F)

**Mechanical specifications**

- Protection degree: IP20
- Mass                       | approx. 100 g              |
- Dimensions                 | 12.5 x 128 x 106 mm (0.5 x 5.1 x 4.2 in) |

**Data for application in connection with Ex-areas**

- EC-Type Examination Certificate: CESI 06 ATEX 017
- Group, category, type of protection: II (1)GD [Ex ia] IIC, [Ex iaD] [circuit(s) in zone 0/1/2/20/21/22]
- I (M1) [Ex ia] I
- Statement of conformity: Pepperl+Fuchs
- Group, category, type of protection, temperature class: II 3G Ex nA IIC T4 Gc
- FM approval: 16-534FM-12 (cFMus)
- IECEx approval: IECEx CES 06.0002

**Diagrams**

- Front view
- Block diagram
- Control drawing
- Connection diagram

Refer to "General Notes Relating to Pepperl+Fuchs Product Information"
HiD2026 SMART Transmitter Power Supply

**Features**
- 2-channel isolated barrier
- 24 V DC supply (bus powered)
- 2-wire SMART transmitter
- Output for 4 mA ... 20 mA or 1 V ... 5 V
- Low power dissipation
- Up to SIL2 acc. to IEC 61508

**Function**
This isolated barrier is used for intrinsic safety applications. It provides 2-wire SMART transmitters with power in the hazardous area, and repeats the current to drive a safe area load.

Bi-directional communication is supported for SMART transmitters that use current modulation to transmit data and voltage modulation to receive data.

The outputs are isolated from the inputs and are referenced to the power supply common.

This module mounts on a HiD Termination Board.

**Technical data**

<table>
<thead>
<tr>
<th>Supply</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated voltage</td>
<td>20.4 ... 30 V via Termination Board</td>
</tr>
<tr>
<td>Rated current</td>
<td>95 mA at 24 V, 20 mA output</td>
</tr>
<tr>
<td>Power loss</td>
<td>0.8 W at 24 V (per channel)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Input</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Input current</td>
<td>4 ... 20 mA, current limit 26 mA typ.</td>
</tr>
<tr>
<td>Ripple</td>
<td>10 mV&lt;sub&gt;eff&lt;/sub&gt;</td>
</tr>
<tr>
<td>Voltage</td>
<td>min. 15.5 V at 20 mA</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Output</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Load</td>
<td>0 ... 650 Ω</td>
</tr>
<tr>
<td>Output signal</td>
<td>4 ... 20 mA or 1 ... 5 V (on 250 Ω, 0.1 % internal shunt)</td>
</tr>
<tr>
<td>Ripple</td>
<td>10 mV&lt;sub&gt;eff&lt;/sub&gt; on a load of 250 Ω</td>
</tr>
<tr>
<td>Response time</td>
<td>40 ms, 10 ... 90 % step change</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Transfer characteristics</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Calibrated accuracy</td>
<td>&lt; ± 0.1 % of full-scale value (current output)</td>
</tr>
<tr>
<td>Influence of temperature</td>
<td>&lt; 2 μA/K (0 ... 60 °C (32 ... 140 °F)); &lt; 4 μA/K (-20 ... 0 °C (-4 ... 32 °F)) 0.01 %/ K</td>
</tr>
<tr>
<td>Frequency range</td>
<td>communication channel: 0.5 ... 40 kHz within 3 db, (-6 db at 100 kHz), Tx to output and output to Tx, suitable for use with SMART transmitters using HART or similar protocol</td>
</tr>
</tbody>
</table>

| Influence of load | < ± 0.1 % of full-scale value from 0 ... 650 Ω |
| Linearity | < ± 0.1 % of full-scale value |

<table>
<thead>
<tr>
<th>Ambient conditions</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Ambient temperature</td>
<td>-20 ... 60 °C (-4 ... 140 °F)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Mechanical specifications</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Protection degree</td>
<td>IP20</td>
</tr>
<tr>
<td>Mass</td>
<td>approx. 140 g</td>
</tr>
<tr>
<td>Dimensions</td>
<td>18 x 106 x 128 mm (0.7 x 4.2 x 5 in)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Data for application in connection with Ex-areas</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>EC-Type Examination Certificate</td>
<td>CESI 10 ATEX 025</td>
</tr>
<tr>
<td>Group, category, type of protection</td>
<td>(II) (1)GD [Ex ia] IIC, [Ex iaD] [circuit(s) in zone 0/1/2/20/21/22]</td>
</tr>
<tr>
<td>Statement of conformity</td>
<td>PF 10 CERT 1609 X</td>
</tr>
<tr>
<td>Group, category, type of protection, temperature class</td>
<td>(II) 3G Ex nA II T4</td>
</tr>
</tbody>
</table>

| CSA approval |  |
| Control drawing | 366-005CS-12B (cCSAus) |
| IECEx approval | IECEx CES 10.0011 |

**Diagrams**

- Front view
- LED green: Power supply
- Place for labeling
- Switch 1 ... 4

Refer to “General Notes Relating to Pepperl+Fuchs Product Information”.

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## HiD2030 SMART Transmitter Power Supply

### Features
- 2-channel isolated barrier
- 24 V DC supply (bus powered)
- 2-wire SMART transmitters or current sources
- Usable as signal splitter (1 input and 2 outputs)
- Dual output 4 mA ... 20 mA or 1 V ... 5 V
- Line fault detection (LFD)
- Up to SIL2 acc. to IEC 61508

### Technical data

#### Supply
- Rated voltage: 20.4 ... 30 V via Termination Board
- Rated current: 60 mA at 24 V, 20 mA output (per channel)
- Power loss: 1.05 W at 24 V (per channel)

#### Input
- Input current: 4 ... 20 mA, current limit 26 mA typ.
- Input resistance: 40 kΩ for current source
- Ripple: 10 mV<sub>eff</sub>
- Voltage: min. 15.5 V at 20 mA
- Communication: pass-through of HART signal to safe area

#### Output
- Load: 0 ... 650 Ω
- Output signal: 4 ... 20 mA or 1 ... 5 V (on 250 Ω, 0.1 % internal shunt)
- Ripple: 10 mV<sub>eff</sub> on a load of 250 Ω
- Response time: 70 ms, 10 ... 90 % step change
- Signal level: no fault: 1 mA ... 23.5 mA input current
- Fault detection: < 0.2 mA or > 24 mA input current

#### Error message output
- Output type: open collector transistor (common to both channels)
- fault bus signal, collective error message

#### Transfer characteristics
- Calibrated accuracy: < ± 0.1 % of full-scale value (current output)
- Influence of temperature: < ± 0.01 %/K
- Influence of load: < ± 0.1 % of full-scale value from 0 ... 650 Ω
- Linearity: < ± 0.05 % of full-scale value
- Ambient conditions
  - Ambient temperature: -20 ... 60 °C (-4 ... 140 °F)

#### Mechanical specifications
- Protection degree: IP20
- Mass: approx. 140 g
- Dimensions: 18 x 106 x 128 mm (0.7 x 4.2 x 5 in)

#### Data for application in connection with Ex-areas
- see page 89 for entity parameters
- EC-Type Examination Certificate: CESI 02 ATEX 086
- Group, category, type of protection:
  - II (1G) [Ex ia Ga] IIC, II (1)D [Ex ia Da] IIIC
- Statement of conformity:
  - PF 11 CERT 2109 X
- Group, category, type of protection, temperature class
  - II 3G Ex nA IIC T4 Gc [device in zone 2]
- CSA approval: 366-005CS-12B (cCSAus)

### Function
This isolated barrier is used for intrinsic safety applications. It provides a fully floating supply to power 2-wire SMART transmitters in the hazardous area, and repeats the current to drive a safe area load. It is also used with 2-wire current sources.

Digital signals may be superimposed on the analog values in the hazardous or safe area, which are transferred bi-directionally.

A separate fault output on the bus is signaled if the input signal is outside the range 0.2 mA ... 24 mA. The fault conditions can be monitored via a Fault Indication Board.

This module mounts on a HiD Termination Board.

### Diagrams

#### Front view
- LED green: Power supply
- LED red: Fault channel 2
- LED red: Fault channel 1
- Switch 1 ... 4
- Place for labeling

#### Termination Board
- 24VDC
- ERR
- Zone 0, 1, 2 Div. 1, 2
- SL2
- SL1
- SL (11) 8a
- (12) 10a
- SL (1) 8a
- (4) 14
- (7) 7a
- 1a 1b
- 2a 2b
HiC2031 SMART Current Driver

### Technical data

**Supply**
- **Rated voltage**: 19 ... 30 V DC via Termination Board
- **Ripple**: ≤ 10 %
- **Rated current**: ≤ 30 mA
- **Power loss**: ≤ 600 mW
- **Power consumption**: ≤ 700 mW

**Input**
- **Input signal**: 4 ... 20 mA limited to approx. 30 mA
- **Input voltage**: depending on switch configuration
- **Input resistance**: > 100 kΩ with field wiring open

**Output**
- **Current**: 4 ... 20 mA
- **Load**: 0 ... 650 Ω
- **Voltage**: ≥ 13 V at 20 mA
- **Ripple**: 20 mV\text{rms}

**Transfer characteristics**
- **Deviation**: at 20 °C (68 °F), 0/4 ... 20 mA ≤ ± 0.1 % incl. non-linearity and hysteresis
- **Influence of ambient temperature**: < 2 μA/K (0 ... 60 °C (32 ... 140 °F)); < 4 μA/K (20 ... 0 °C (-4 ... 32 °F))
- **Rise time**: 10 to 90 % ≤ 100 ms

**Ambient conditions**
- **Ambient temperature**: -20 ... 60 °C (-4 ... 140 °F)

**Mechanical specifications**
- **Protection degree**: IP20
- **Mass**: approx. 100 g
- **Dimensions**: 12.5 x 128 x 106 mm (0.5 x 5.1 x 4.2 in)

**Data for application in connection with Ex-areas**
- **EC-Type Examination Certificate**: CESI 06 ATEX 017
- **Group, category, type of protection**: Ex II (1)GD [Ex ia] IIC, [Ex iaD] [circuit(s) in zone 0/1/2/20/21/22]
- **Statement of conformity**: PF 07 CERT 1050X
- **Group, category, type of protection, temperature class**: Ex II 3G Ex nA IIC T4 Gc

**FM approval**
- **Control drawing**: 16-534FM-12 (cFMus)
- **IECEx approval**: IECEx CES 06.0002

### Features
- 1-channel isolated barrier
- 24 V DC supply (bus powered)
- Current output up to 650 Ω load
- Low power dissipation
- Up to SIL2 acc. to IEC 61508

### Function

This isolated barrier is used for intrinsic safety applications. It repeats a 4 mA ... 20 mA input signal from a control system to drive HART I/P converters, valve actuators, and displays located in a hazardous area.

Digital signals may be superimposed on the analog values in the hazardous or safe area, which are transferred bi-directionally.

An open field circuit presents a high impedance to the control side to allow alarm conditions to be monitored by control systems.

This module mounts on a HiC Termination Board.

### Diagrams

[Diagram showing HiC2031 SMART Current Driver setup]

- **Front view**
- **LED green**: Power supply
- **Switch 1 ... 4**
- **Zone 0, 1, 2 Div. 1, 2**
- **Zone 2 Div. 2**
- **24 V DC**
- **Place for labeling**

Refer to "General Notes Relating to Pepperl+Fuchs Product Information".
HiC2000 Blank
Place Holder Barrier

**Features**
- H-System place holder module
- Housing width 12.5 mm
- Blank module, non-functional

**Function**
This barrier is a non functioning HiC module designed to be a place holder for system expansions. This barrier mounts on a HiC termination board.

---

**Technical data**

<table>
<thead>
<tr>
<th>Conformity</th>
<th>Protection degree</th>
<th>IEC 60529</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ambient conditions</td>
<td>Ambient temperature</td>
<td>-20 ... 70 °C (-4 ... 158 °F)</td>
</tr>
<tr>
<td>Mechanical specifications</td>
<td>Protection degree</td>
<td>IP20</td>
</tr>
<tr>
<td>Mass</td>
<td>approx. 100 g</td>
<td></td>
</tr>
<tr>
<td>Dimensions</td>
<td>12.5 x 128 x 106 mm (0.5 x 5.1 x 4.2 in)</td>
<td></td>
</tr>
</tbody>
</table>

**Diagrams**

Front view

Place for labelling

Zone 0, 1, 2
Div. 1, 2

Termination Board

HiC2000 Blank

Zone 2
Div. 2
Place Holder Barrier

HiD2000 Blank

**Features**
- H-System place holder module
- Housing width 18 mm
- Blank module, non-functional

**Function**
This barrier is a non functioning HiD module designed to be a place holder for system expansions.
This barrier mounts on a HiD termination board.

**Technical data**

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
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<tbody>
<tr>
<td>Conformity</td>
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<td>Ambient conditions</td>
<td>-20...70 °C (-4...158 °F)</td>
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<td>Mechanical specifications</td>
<td></td>
</tr>
<tr>
<td>Protection degree</td>
<td>IP20</td>
</tr>
<tr>
<td>Material</td>
<td>Polycarbonate</td>
</tr>
<tr>
<td>Mass</td>
<td>approx. 140 g</td>
</tr>
<tr>
<td>Dimensions</td>
<td>18 x 106 x 128 mm (0.7 x 4.2 x 5 in)</td>
</tr>
</tbody>
</table>

**Diagrams**

Front view

Zone 0, 1, 2, Div. 1, 2

Termination Board

HID2000 Blank
**Features**

**HiALC-HICTF-SET-114**
- For HiC Termination Boards
- 1 piece for 8-position Termination Board
- 2 pieces for 16-position Termination Board

**HiALC-HICTF-SET-228**
- For HiC Termination Boards
- 1 piece for 16-position Termination Board

**HiALC-HIDTF-SET-156**
- For HiD Termination Boards
- 1 piece for 8-position Termination Board
- 2 pieces for 16-position Termination Board

**HiALC-HIDTF-SET-312**
- For HiD Termination Boards
- 1 piece for 16-position Termination Board

**Function**

The Label Carrier Set is assembled on each Termination Board.

**Technical data**

<table>
<thead>
<tr>
<th>Ambient conditions</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Ambient temperature</td>
<td>-20 ... 60 °C (253 ... 333 K)</td>
</tr>
<tr>
<td>Storage temperature</td>
<td>-40 ... 70 °C (233 ... 343 K)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Mechanical specifications</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Mass</td>
<td>HiALC-HICTF-SET-114: approx. 50 g</td>
</tr>
<tr>
<td></td>
<td>HiALC-HICTF-SET-228: approx. 100 g</td>
</tr>
<tr>
<td></td>
<td>HiALC-HIDTF-SET-156: approx. 70 g</td>
</tr>
<tr>
<td></td>
<td>HiALC-HIDTF-SET-312: approx. 140 g</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Dimensions</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>HiALC-HICTF-SET-114</td>
<td>43.5 x 45 x 114 mm (1.71 x 1.77 x 4.48 in)</td>
</tr>
<tr>
<td>HiALC-HICTF-SET-228</td>
<td>43.5 x 45 x 228 mm (1.71 x 1.77 x 9 in)</td>
</tr>
<tr>
<td>HiALC-HIDTF-SET-156</td>
<td>43.5 x 45 x 156 mm (1.71 x 1.77 x 6.14 in)</td>
</tr>
<tr>
<td>HiALC-HIDTF-SET-312</td>
<td>43.5 x 45 x 156 mm (1.71 x 1.77 x 12.3 in)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Note</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>recommended size of labeling strip:</td>
</tr>
<tr>
<td>HiALC-HICTF-SET-114</td>
<td>HiALC-HICTF-SET-114: 108 x 28 mm (4.25 x 1.1 in)</td>
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**Diagrams**

![Diagram of HiALC-HICTF-SET-*** Label Carrier](image-url)
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Appendix
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Appendix

Glossary

Active Zener Barrier
A Zener Barrier with additional active components (i.e., transistors, integrated circuits, etc.) that provides special functions or features.

AIT
Abbreviation for autogenous ignition temperature.

Amplifier
A device that enables an input signal to control power from a source independent of the signal and thus be capable of delivering an output that bears some relationship to, and is generally greater than, the input signal.

Analog Input
Analog type signal from a hazardous area instrument (i.e., transmitter) to the safe area controller.

Analog Output
Analog type signal from the safe area controller to the hazardous area instrument (i.e., I/P positioner).

ANSI
Abbreviation for American National Standards Institute.

API
Abbreviation for American Petroleum Institute.

Approved
Acceptable to the authority having jurisdiction.

Arcing Device
A device, such as make/break component, that under normal conditions produces an arc with energy sufficient to cause ignition of an ignitable mixture. See also "non-incendive circuit."

Asset Management
Asset Management functionality often includes the monitoring of devices like flow meters, analyzers, actuators, and control valves. It detects faults and sometimes even recommends corrective actions.

Associated Apparatus
Apparatus in which the circuits are not necessarily intrinsically safe themselves, but which affect the energy in the intrinsically safe circuits and are relied upon to maintain intrinsic safety. Associated electrical apparatus may be either
1. electrical apparatus that have an alternative type of protection, for use in the appropriate hazardous (classified) location; or
2. electrical apparatus that are not protected and therefore cannot be used within a hazardous (classified) location.

Associated Non-Incendive Field Wiring Apparatus
Apparatus in which the circuits are not necessarily non-incendive themselves but that affect the energy in non-incendive field wiring circuits and are relied upon to maintain non-incendive energy levels.

Associated Safe-Location Equipment
Equipment designed to form part of an intrinsically safe system, in which not all the circuits are of an intrinsically safe system, in which not all the circuits are intrinsically safe, but which affects the safety of the intrinsically safe system of which it forms a part. Such equipment may not be installed in a hazardous location unless provided with appropriate protection, such as the installation of an explosion-proof enclosure in a Class I hazardous location. Examples of associated safe-location equipment are
1. a line-connected power unit supplying power to intrinsically safe equipment in a hazardous location and
2. a recorder in a safe location actuated by a transducer situated in a hazardous location.

Authority Having Jurisdiction
The organization, office, or individual that has the responsibility and authority for approving equipment, installations, or procedures.

Autogenous Ignition Temperature
The temperature at which a mixture of a specified gas or vapor in air will spontaneously ignite under specified test conditions, without any source of ignition.

Automation System
The system that provides overall control and monitoring functions of a specific process or application. Generally consists of a network of computers, controllers, and I/O modules.
Barrier Specification
The typical way of describing a barrier, for example 28 V, 300 Ω, 93 mA. This is a reference to the maximum voltage of the terminating zener diode during the period of time it takes for the fuse to break, the minimum value of the terminating resistor and the resulting maximum short circuit current. The description does not refer to the working voltage or the end-to-end resistance, but is purely an indication of the potential fault energy that could be generated in the hazardous area.

BASEEFA
Abbreviation for British Approvals Service for Electrical Equipment in Flammable Atmospheres. A governmental body in the United Kingdom that has the authority to accept or reject the design of an electrical apparatus based on recognized safety standards.

BSI
Abbreviation for British Standards Institute.

Bus Technology
A variety of bus technologies are employed throughout the industry. PROFIBUS, MODBUS, FOUNDATION fieldbus, and Ethernet ensure reliable exchange of digital information between the control system and Remote I/O.

Capacitance
The property of a system of conductors and dielectrics that permits the storage of electrically separated charges when potential differences exist between the conductors. The greater the capacitance, the greater the charge that can be stored. The practical difference between capacitance and inductance in an intrinsically safe circuit is minimal. Both store energy but a capacitor will release energy when a circuit is made and an inductor will release energy when the circuit is broken.

CENELEC
Abbreviation for European Electrotechnical Committee for Standardization. The standard for the European Economic Community (EEC) nations and the European Free Trade Association. Legally, certification to the CENELEC standard is sufficient to permit sale in any European country. If IEC standards are available, CENELEC tries to utilize them because these standards are already adopted by the European community.

Certified Equipment
Equipment that has been evaluated by a recognized testing agency and confirmed to be in compliance with the applicable standard(s).

CESI
Abbreviation for Centro Elettronico Sperimentale Italiano. A governmental body in Italy that has the authority to accept or reject the design of an electrical apparatus based on recognized safety standards.

Class I Location
A location in which flammable gases or vapors are or may be present in the air in quantities sufficient to produce explosive or ignitable mixtures.

Class I, Division 1 Location
A location (1) in which ignitable concentrations of flammable gases or vapors can exist under normal operating conditions; (2) in which ignitable concentrations of such gases or vapors may exist frequently because of repair or maintenance operations or because of leakage; or (3) in which breakdown or faulty operation of equipment or processes might release ignitable concentrations of flammable gases or vapors and might also cause simultaneous failure of electrical equipment that could act as a source of ignition.

Class I, Division 2 Location
A location (1) in which volatile flammable liquids or flammable gases are handled, processed, or used, but in which the liquids, vapors, or gases will normally be confined within closed containers or closed systems from which they can escape only in case of accidental rupture or breakdown of such containers or systems, or in case of abnormal operation of equipment; (2) in which ignitable concentrations of gases or vapors are normally prevented by positive mechanical ventilation and might become hazardous through failure or abnormal operation of the ventilating equipment; or (3) that is adjacent to a Class I, Division 1 location and to which ignitable concentrations of gases or vapors might occasionally be communicated unless such communication is prevented by adequate positive-pressure ventilation from a source of clean air and effective safeguards against ventilation failure are provided. Electrical conduits and their associated enclosures separated from process fluids by a single seal or barrier are classified as a Class I, Division 2 location if the outside of the conduit and enclosures is a non-hazardous (unclassified) location.
Class II Location
A location that is hazardous because of the presence of combustible dust.

Class II, Division 1 Location
A location (1) in which combustible dust is in the air under normal operating conditions in quantities sufficient to produce explosive or ignitable mixtures; (2) in which mechanical failure or abnormal operation of machinery or equipment might cause such explosive or ignitable mixtures to be produced and might also provide a source of ignition through simultaneous (the word “simultaneous” is not included in the Canadian definition) failure of electric equipment, operation of protection devices, or from other causes; or (3) in which combustible dusts of an electrically conductive nature may be present in hazardous quantities.

Class II, Division 2 Location
A location in which combustible dust is not normally in the air in quantities sufficient to produce explosive or ignitable mixtures and dust accumulations are normally insufficient to interfere with the normal operation of electrical equipment or other apparatus, but combustible dust may be in suspension in the air as a result of infrequent malfunctioning of handling or processing equipment and where combustible dust accumulations on, in, or in the vicinity of the electrical or may be ignitable by abnormal operation or failure of electrical equipment.

Class III Location
A location that is hazardous because of the presence of easily ignitable fibers or flyings but in which such fibers or flyings are not likely to be in suspension in the air in quantities sufficient to produce ignitable mixtures.

Class III, Division 1 Location
A location in which easily ignitable fibers or materials producing flyings are handled, manufactured, or used.

Class III, Division 2 Location
A location in which easily ignitable fibers are stored or handled (except in the process of manufacture).

Clearance Distance
The shortest distance measured in air between conductive parts.

Code of Practice
An international term referring to a document that describes basic safety features and methods of protection and recommends the selection, installation, and maintenance procedures that should be followed to ensure the safe use of electrical apparatus.

Com Unit and Gateway
Bus systems employ communication units (Com Units) to interface the DCS or PLC master with the Remote I/O slaves. Their properties depend on the protocol they support.

Configuration in Run (CiR or HCiR)
Online Remote I/O changes are made possible by means of (hot) configuration in run (HCiR) methods. This is based on freezing output data during the bus reset period or by offering redundancy rings.

Converter
A type of isolated barrier that receives a signal from the hazardous area instrument (i.e., transmitter, thermocouples, etc.) and converts it into an equivalent signal (i.e., 4 mA ... 20 mA, 1 V ... 5 V, etc.).

Control Drawing
A drawing or other document provided by the manufacturer of the intrinsically safe or associated apparatus that details the allowed interconnections between the intrinsically safe and associated apparatus.

CSA
Abbreviation for Canadian Standards Association. A third party certification agency headquartered in Canada and recognized by OSHA as a Nationally Recognized Test Laboratory in the United States. The presence of CSA, UL, or FM certification marks on equipment is normally sufficient to the local inspector that the product is designed to recognized safety standards.
Definition of Contamination Level 2 per EN 50178

Under normal circumstances, only non-conductive contamination occurs. Occasionally however, short-term conductance may be expected through condensation when the device is not being operated. This applies to the immediate surrounding conditions of the electronic device.

Device Type Manager (DTM)

Manufacturers supply DTMs for their devices to allow a FDT frame application in the DCS or master to configure and service their equipment.

Digital Input

Signal from a hazardous area instrument that is an on/off type electrical input to the safe area (i.e., contact closure, proximity sensor).

Digital Output

On/Off type signal from the safe area to the hazardous area (i.e., signal to a solenoid or LED cluster).

Distance Through Casting Compound

The shortest distance between two conductive parts separated by a casting compound.

Distance Through Solid Insulation

The shortest distance between two conductive parts separated by solid insulation.

Driver

A type of active or transformer isolated barrier that receives a signal from a safe area source (i.e., DCS, process controller, etc.) and drives that signal to the hazardous area instrument (i.e., I/P positioner).

Dust, Combustible

Dust that (when mixed with air in certain proportions) can be ignited and will propagate a flame. The combustible properties of dust are dependent upon test conditions and dust particle size, chemical structure, and other particle characteristics.

Dust-Ignition Proof

A term used in the United States to describe an enclosure that will exclude ignitable amounts of dusts that might affect performance or rating and that, when installed and protected in accordance with the original design intent, will not permit arcs, sparks, or heat otherwise generated or liberated inside the enclosure to cause ignition of exterior accumulations or atmospheric suspensions of a specified dust.

Dust-Protected Enclosure

An international term describing an enclosure in which the ingress of dust is not totally prevented, but dust does not enter in sufficient quantity to interfere with the safe operation of the equipment or accumulate in a position within the enclosure where it is possible to cause an ignition hazard.

Dust-Tight

An enclosure so constructed that dust will not enter the enclosing case under specified test conditions.

EC-Type Examination Certificate

The manufacturer certifies that the product meets the fundamental safety requirements under EC regulations by the application of a registration number to this product. The following regulations apply to Pepperl+Fuchs products:

- 73/23/EWG Low Voltage Directive
- 89/336/EWG EMC Directive
- 94/9/EG Devices and Safety Systems for Hazardous Areas

Encapsulation

An international term describing a type of protection in which the parts that could ignite an explosive atmosphere by either sparking or heating are enclosed in an encapsulant in such a way that this explosive atmosphere cannot be ignited. This type of protection is referred to by CENELEC as "Ex m" in Standard EN 60079-18.

End-to-End Resistance

The resistance between both ends of a barrier channel. It is the sum of the resistor itself and the resistance of the fuse at an ambient temperature of 20 °C.
**Entity Concept**

The entity concept provides more flexibility in selecting equipment to form an intrinsically safe system. The entity concept allows the user to identify acceptable combinations of intrinsically safe apparatus and associated apparatus that have not been examined as a system.

**Entity Parameters**

The four categories that are set by the certification agency in order to properly match the intrinsic safety barrier to the hazardous area instrument. These four parameters are voltage, current, capacitance and inductance.

**Ethernet**

High speed bus, which lends itself to various protocols. Most commonly used protocols are MODBUS TCP and Ethernet IP. Redundancy solutions are in place. Slaves are often connected to the bus via switches.

**Ex "d"**

Designation for the flame-proof (explosion containment) method of protection.

**Ex "e"**

Designation for the increased safety (prevention) method of protection.

**Ex "i"**

Designation for the intrinsic safety (prevention) method of protection. This method consists of two categories-"ia" and "ib."

**Ex "ia"**

This intrinsic safety category is limited to low power circuits and is suitable for process instrumentation. Up to two faults are allowed and can be used in Zones 0, 1, and 2.

**Ex "ib"**

This intrinsic safety category is similar to the Ex "ia" method, except that category "ib" allows only one fault and can only be used in Zones 1 and 2.

**Ex "m"**

Designation for the encapsulation (segregation) method of protection.

**Ex "n"**

Designation for the simplified (prevention) method of protection.

**Ex "o"**

Designation for the oil immersion (segregation) method of protection.

**Ex "p"**

Designation for the pressurization (segregation) method of protection.

**Ex "q"**

Designation for the powder-filling (segregation) method of protection.

**Ex "s"**

Designation for the special (special protection) method of protection. This method is standardized only in Great Britain and Germany.

**Explosion-Proof Enclosure**

An enclosure that is capable of withstanding an explosion of a gas or vapor within it and of preventing the ignition of an explosive gas or vapor that may surround it and that operates at such an external temperature that a surrounding explosive gas or vapor will not be ignited. This type of enclosure is similar to a flame-proof enclosure.

**Explosion-Proof Equipment (apparatus)**

Equipment or apparatus enclosed in an explosion-proof enclosure.

**F**

**Fault**

A defect or electrical breakdown of any component, spacing or insulation that alone or in combination with other faults may adversely affect the electrical or thermal characteristics of the intrinsically safe circuit. If a defect or breakdown leads to defects or breakdowns in other components, the primary and subsequent defects and breakdowns are considered to be a single fault.

**Countable Fault**

A fault that is applied to a part of the electrical apparatus that meets the constructional requirements of this standard.

**Uncountable Fault**

A fault that is applied to areas of the electrical apparatus that do not meet the constructional requirements of this standard. If application of a countable fault leads to subsequent defects and breakdowns, they are considered to be uncountable faults.

**FAT**

Abbreviation for factory acceptance tests.
Fibers and Flyings, Easily Ignitable
Fibers and flyings that are easily ignitable including rayon, cotton (including cotton linters and cotton waste), sisal or henequen, jute, hemp, tow, cocoa fiber, oakum, baled waste kapok, Spanish moss, excelsior, and other materials of similar nature.

FieldConnex
FieldConnex is a comprehensive fieldbus infrastructure that connects the control system to intelligent field instruments via a two wire bus.

Field Device Tool (FDT)
FDT is the name of an interface specification. It offers the frame application for DTM (drivers) supplied by device manufacturers.

Flame-Proof Enclosure
An International term describing an enclosure that can withstand the pressure developed during an internal explosion of an explosive mixture and that prevents the transmission of the explosion to the explosive atmosphere surrounding the enclosure and that operates at such an external temperature that a surrounding explosive gas or vapor will not be ignited. This enclosure is similar to an explosion-proof enclosure. This type of protection is referred to by IEC as “Ex d.”

FM
Abbreviation for Factory Mutual Approvals, a third party certification agency that is recognized by OSHA as a Nationally Recognized Testing Laboratory in the United States. It is a division of Factory Mutual Global, which specializes in property insurance. For marketing in the U.S., FM, CSA, and UL provide testing, listing and labeling services for industrial and safety products. Generally, certifications by FM, CSA, and UL are recognized in most jurisdictions; however, there are exceptions.

FOUNDATION Fieldbus
FOUNDATION fieldbus is a digital communications system that serves as the base-level network in a plant or factory automation environment. It is an open architecture, developed and administered by the Fieldbus Foundation. Fieldbus permits the use of spurs and chicken foot structures based on IEC 61158-2 standards.

Fuse Rating
This is the maximum current that can flow continuously through the fuse (approx. 1000 hours at 35 °C). The rated current may be exceeded for short periods at temperatures up to approximately 55 °C.

G
Galvanic Isolation
A form of isolation that meets stringent standards for intrinsically safe circuits.

GAMP
Abbreviation for good automated manufacturing practices.

Gateway and Com Unit
Bus systems employ gateways to interface the DCS or PLC master with the Remote I/O slaves. Their properties depend on the protocol they support.

Grounding Device
An impedance device used to connect conductors of an electric system to ground for the purpose of controlling the ground current or voltages to ground, or a nonimpedance device used to temporarily ground conductors for the purpose of the safety of workmen. The grounding device may consist of a grounding transformer or a neutral grounding device, or a combination of these. Protective devices, such as surge arresters, may also be included as an integral part of the device.

Group
A classification of flammable materials of similar hazard. Consists of Groups A, B, C, D, E, F, and G to NEC and CEC standards and Groups I, IIa, IIb, and IIIc to IEC standards.

H
HART
Highway Addressable Remote Transducer) is a popular digital fieldbus protocol that solves a wide range of applications. It is used to communicate with field devices, configure and monitor the status of the system, and indicate process variables.

Hazardous (Classified) Location
A location where fire or explosion hazards may exist due to the presence of flammable gases or vapors, flammable liquids, combustible dust, or easily ignitable fibers or flyings.

Hazardous Materials
Gases, vapors, combustible dusts, fibers, or flyings that are explosive under certain conditions.

Hermetically Sealed Device
A device that is sealed against the entrance of an external atmosphere and in which the seal is made by fusion. Continuous soldering, brazing, welding, and the fusion of glass to metal are examples of recognized methods.
**I.S. Ground**
A dedicated ground system to which zener barriers are connected. The resistance to ground path must be less than or equal to 1 Ω from any zener barrier to designated ground electrode.

**I.S.**
Abbreviation for intrinsic safety.

**I/O Module**
A module that provides basic input and output functions between the automation system and the field devices. Disregarding specialty modules, there are four basic types available from various vendors - analog input, analog output, discrete input, and discrete output.

**IEC**
Abbreviation for International Electrotechnical Commission. An international commission of which most nations are members. IEC standards directly affect equipment for sale internationally. The benefit of participation in the IEC is that costly differences in plant or equipment design can be avoided by designing equipment consistent with IEC documents where feasible.

**Ignitible Gas Mixture**
A gas-air mixture that is capable of being ignited by an open flame, arc or spark or high temperature.

**Ignition (Autoignition) Temperature**
The minimum uniform temperature required to initiate or cause self-sustained combustion of a solid, liquid, or gaseous substance (independent of any other ignition source).

**Increased Safety**
An international term that describes a type of protection in which various measures are applied so as to reduce the probability of excessive temperatures and the occurrence of arcs or sparks in the interior and on the external parts of electrical apparatus that do not produce them in normal service. This type of protection is referred to by IEC as "Ex e."

**Inductance**
The property of an electric circuit by virtue of which a varying current induces an electromotive force in that circuit or in a neighboring circuit. The practical difference between capacitance and inductance in an intrinsically safe circuit is minimal. Both store energy, but an inductor will release energy when a circuit is broken, and a capacitor will release energy when the circuit is made.

**Insulation coordination**
The assignment of the insulation characteristics of an apparatus in accordance with:
1. the expected overvoltages
2. the characteristic values of the overvoltage precautions
3. the expected surrounding conditions
4. the protective measures against contamination

**Insulator**
A material that conducts electrons slowly. The importance to intrinsic safety is that air (a spatial distance) is often an insulator.

**Internal Wiring**
Wiring and electrical connections that are made within the apparatus by the manufacturer. Within racks or panels, interconnections between separate pieces of apparatus made in accordance with detailed instructions from the apparatus manufacturer are considered to be internal wiring.

**Intrinsic Safety Barrier**
A component containing a network designed to limit the energy (voltage and current) available to the protected circuit in the hazardous (classified) location under specified fault conditions.

**Intrinsic Safety Ground Bus**
A grounding system that has a dedicated conductor separate from the power system so that ground currents will not normally flow and that is reliably connected to a ground electrode (e.g., in accordance with Article 250 of NEC, ANSI/NFPA 70, or Section 10 of CEC Part I, CSA C22.1).
Appendix

Glossary

Termination Board Solutions for Yokogawa ProSafe-RS

Intrinsic Safety
A type of protection in which a portion of the electrical system contains only intrinsically safe equipment (apparatus, circuits, and wiring) that is incapable of causing ignition in the surrounding atmosphere. No single device or wiring is intrinsically safe by itself (except for battery-operated self-contained apparatus such as portable pagers, transceivers, gas detectors, etc., which are specifically designed as intrinsically safe self-contained devices) but is intrinsically safe only when employed in a properly designed intrinsically safe system. This type of protection is referred to by IEC as “Ex i.”

Intrinsically Safe Apparatus
Apparatus in which all the circuits are intrinsically safe.

Intrinsically Safe Circuit
A circuit in which any spark or thermal effect, produced either normally or in specified fault conditions, is incapable, under the prescribed test conditions, of causing ignition of a mixture of flammable or combustible material in air in the mixture’s most easily ignited concentration.

Intrinsically Safe Equipment
Equipment that may be installed in a hazardous location, in which all the circuits are intrinsically safe, or that is designed to form part of an intrinsically safe system.

Intrinsically Safe Ground
A clearly identified conductor of not less than 12 AWG/4 mm² cross-sectional area with a total impedance from barrier ground bus bar to main power system earth of not more than 1 Ω.

Intrinsically Safe System
An assembly of interconnected intrinsically safe apparatus, associated apparatus, and interconnecting cables in which those parts of the system that may be used in hazardous (classified) locations are intrinsically safe circuits.

ISA
Abbreviation for the Instrumentation, Systems and Automation Society. ISA Committee SP12, established in 1949, has been influential in establishing the recognition of intrinsic safety and non-incendive circuits in the NEC.

Isolated Barriers
A type of barrier with additional active components and galvanic isolation to separate the hazardous area instrument from the safe area controller providing advantages over the traditional zener barrier.

K

Knock-Out
A portion of the wall of an enclosure so fashioned that it may be removed readily by a hammer, screwdriver, and pliers at the time of installation in order to provide a hole for the attachment of an auxiliary device or raceway, cable, or fitting.

L

Labeled Equipment
Equipment or materials, to which has been attached a label, symbol, or other identifying mark of an organization concerned with product evaluation, that may maintain periodic inspection of the production of labeled equipment or materials, and by whose labeling the manufacturer indicates compliance with appropriate standards or performance in a specified manner.

LEL
Abbreviation for lower explosive limit (lower flammable limit).

Life Cycle Management
The product life cycle ensures that products or compatible replacements are available to cover the life of an industrial plant.

Listed
Equipment or materials, included in a list published by an organization concerned with product evaluation, that maintains periodic inspection of production of listed equipment or materials and whose listing states either that the equipment or materials meets appropriate standards or has been tested and found suitable for use in the specified manner.
**Maintenance, Corrective**

Any maintenance activity that is not normal in the operation of the equipment and requires access to the equipment’s interior. Such activities are expected to be performed by qualified personnel who are aware of the hazards involved. Such activities typically include locating causes of faulty performance, replacement of defective components, adjustment of internal controls, and the like.

**Maintenance, Operational**

Any maintenance activity, excluding corrective maintenance, intended to be performed by the operator and required in order for the equipment to serve its intended purpose. Such activities typically include the correcting of “zero” on a panel instrument, changing charts, record keeping, adding ink, and the like.

**Make/Break Components**

Components having contacts that can interrupt a circuit (even if the interruption is transient in nature). Examples of make/break components are relays, circuit breakers, servopotentiometers, adjustable resistors, switches, connectors, and motor brushes.

**Maximum External Capacitance (C_o; C_a)**

Maximum capacitance in an intrinsically safe circuit that can be connected to the connection facilities of the apparatus without invalidating intrinsic safety.

**Maximum External Inductance (L_o; L_a)**

Maximum value of inductance in an intrinsically safe circuit that can be connected to the connection facilities of the apparatus without invalidating intrinsic safety.

**Maximum External Inductance to Resistance Ratio (L_o/R_o)**

Ratio of inductance (L_o) to resistance (R_o) of any external circuit that can be connected to the connection facilities of the electrical apparatus without invalidating intrinsic safety.

**Maximum Inductance to Resistance Ratio (L/R)**

As an alternative value to L_o, the ratio of inductance (L) to resistance (R) of any external circuit that can be connected to the terminals of intrinsically safe apparatus without invalidating the intrinsic safety of the apparatus.

**Maximum Input Current (i_i; I_{max})**

Maximum current (peak AC or DC) that can be applied to the connection facilities for intrinsically safe circuits without invalidating intrinsic safety.

**Maximum Input Power (P_i)**

The maximum power that can be applied to the terminals of an intrinsically safe device without invalidating the intrinsic safety of the device.

**Maximum Input Voltage (U_i; V_{max})**

Maximum voltage (peak AC or DC) that can be applied to the connection facilities for intrinsically safe circuits without invalidating intrinsic safety.

**Maximum Internal Capacitance (C_i)**

The total unprotected internal capacitance of the intrinsically safe apparatus that must be considered as appearing across the terminals of the intrinsically safe apparatus.

**Maximum Internal Inductance (L_i)**

The total unprotected internal inductance of the intrinsically safe apparatus that must be considered as appearing across the terminals of the intrinsically safe apparatus.

**Maximum Internal Inductance to Resistance Ratio (L_i/R_i)**

Ratio of inductance (L_i) to resistance (R_i) which is considered as appearing at the external connection facilities of the electrical apparatus.

**Maximum Output Current (i_o, I_{sc})**

Maximum current (peak AC or DC) in an intrinsically safe circuit that can be taken from the connection facilities of the apparatus.

**Maximum Output Power (P_o)**

Maximum electrical power in an intrinsically safe circuit that can be taken from the apparatus.

**Maximum Output Voltage (U_o, V_{oc})**

Maximum output voltage (peak AC or DC) in an intrinsically safe circuit that can appear under open circuit conditions at the connection facilities of the apparatus at any applied voltage up to the maximum voltage, including U_{m} and U_{i}.

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Refer to "General Notes Relating to Pepperl+Fuchs Product Information".
Maximum RMS Voltage $U_m$

Maximum voltage that can be applied to the non-intrinsically safe connection facilities of associated apparatus without invalidating intrinsic safety. The value of $U_m$ may be different at different sets of connection facilities.

Maximum Surface Temperature

The highest temperature attained by a surface accessible to flammable gases, vapors, or combustible dusts under conditions of operation within the ratings of the apparatus (including recognized overloads and defined fault conditions).

MEIC

Abbreviation for most easily ignited concentration.

MESG

Abbreviation for maximum experimental safe gap.

MIC

Abbreviation for minimum ignition current.

MIE

Abbreviation for minimum ignition energy.

Minimum Igniting Voltage

Minimum voltage of capacitive circuits that causes the ignition of the explosive test mixture in the spark-test apparatus.

MODBUS

Legacy medium speed master/slave bus protocol based on RS485 hardware architecture. Offers easily understandable data address modes. Standard does not cover redundancy but individual solutions are in place. Slaves are connected to the bus in parallel.

NFPA

Abbreviation for National Fire Protection Association. The NFPA has acted as a sponsor and publisher of the National Electrical Code since 1911. Most of the NFPA standards tend to emphasize recommendations for the safe use of electrical apparatus, area classification, fire protection, and hazards of materials.

Non-Hazardous Location

A location utilizing drying, curing, or fusion apparatus and provided with positive mechanical ventilation adequate to prevent accumulation of flammable concentrations of vapors, and provided with effective interlocks to deenergize all electric equipment (other than equipment approved for Class I locations) in case the ventilating equipment is inoperative, shall be permitted to be classified as non-hazardous where the authority having jurisdiction so judges.

Non-Incendive Circuit

A circuit in which any arc or thermal effect produced in normal operating conditions of the equipment is not capable, under prescribed conditions, of igniting the specified flammable gas, vapor-in-air mixture, combustible dusts, or ignitable fibers or flyings.

Non-Incendive Component

A component having contacts for making or breaking a specified incendive circuit in which the contacting mechanism is constructed so that the component is not capable of ignition of the specified flammable gas or vapor-in-air mixture when tested as specified by appropriate test procedure. The housing of a non-incendive component is not intended to exclude the flammable atmosphere or contain an explosion.

Non-Incendive Equipment

Equipment having electrical/electronic circuitry and components that are incapable under normal conditions, of causing ignition of a specified flammable gas or vapor-in-air mixture due to arcing or thermal effect.

Non-Incendive Field Wiring

Wiring that enters or leaves an equipment enclosure and, under normal operating conditions of the equipment, is not capable, due to arcing or thermal effects, of igniting a specified flammable gas or vapor-in-air mixture or combustible dust-in-air mixture. Normal operation includes opening, shorting, or grounding the field wiring.

Non-Incendive Field Wiring Apparatus

Apparatus intended to be connected to non-incendive field wiring.

NEMA

Abbreviation for National Electrical Manufacturers Association. Provides a rating system to identify an enclosure's ability to repel the outside environment. Unlike organizations such as UL, FM, and CSA, NEMA does not require independent testing and leaves compliance to its rating system completely up to the manufacturer.
Normal Operational Conditions

Conditions that conform electrically and mechanically with its design specifications and is used within the limits specified by the manufacturer.

NRTL

Abbreviation for Nationally Recognized Testing Laboratory. This recognition indicates that the Occupational Safety & Health Administration has accredited certain organizations to evaluate products according to consensus based safety standards.

Operational Maintenance

Any maintenance activity, other than corrective maintenance, intended to be performed by the operators and which is required in order for the equipment to serve its intended purpose. Such activities typically include the correcting of “zero” on a panel instrument, changing charts, making records, adding ink, etc.

OSHA

Abbreviation for Occupational Safety and Health Administration. The OSHA Act was passed by the U.S. Congress in 1971. Part 1910 of the OSHA regulations adopted the 1968 NEC and defined “approved” to mean “listed by UL or FM.” “Approved” was redefined in 1972, providing exceptions to FM or UL listing; however, in practice the emphasis on listing remained unchanged. Listing requirements increased interest in developing standards for certain categories of apparatus, such as process control instrumentation. Third-party approval agencies (e.g., UL, FM, CSA) for electrical equipment must be accredited by OSHA.

Overvoltage category

The assignment of an electrical apparatus in accordance with the expected overvoltage.

Table:
The assignment of rated operating voltages to the rated surge voltages

| Rated operating voltage (V) for alternating voltage systems in accordance with DIN IEC 38 | Rated surge voltages (V) for overvoltage category |
|---|---|---|---|---|
| 230/400/277/480 \(^1\) | 1500 | 2500 | 4000 | 6000 |
| 400/690 | 2500 | 4000 | 8000 | 12000 |
| 1000 | 4000 | 6000 | 8000 | 12000 |

\(^1\) Rated operating voltage of 500 V is set.

P

Passive Transistor Output

A transistor in which the emitter and collector are not connected to an internal power source. Only the base is connected so that it may be switched on and off. The emitter and collector may be connected to the customer’s power source.

Polarity

Zener barriers are available in polarized (DC) and non-polarized (AC) versions. Positive polarity types have the negative side of the circuit grounded, while negative polarity types have the positive side of the circuit grounded. Non-polarized barriers have zener diodes connected in inverse series pairs and can be used in both AC and DC circuits.

PROFIBUS DP, DP V1

Widely popular master/slave bus protocol based on RS485 hardware architecture. Offers fast and deterministic data exchange. Standard also covers redundancy. Slaves are connected to the bus in parallel.

Protective (Infallible) Component or Assembly

A component or assembly which is so unlikely to become defective in a manner that will lower the intrinsic safety of the circuit it may be considered not subject to fault when analysis or tests for intrinsic safety are made.

PTB

Abbreviation for Physikalisch-Technische Bundesanstalt. An approval agency in Germany that has the authority to accept or reject the design of an electrical apparatus based on recognized safety standards.

R

Redundancy

Redundancy is used to ensure that a Remote I/O station can continue to work even when there is a fault in a master, in a bus line, in a communication unit, or in a power supply.

Remote I/O

A system of intrinsically safe galvanically isolated input and output devices placed in various locations around a production plant. They provide a way to communicate effectively with modern DCS systems and proven legacy field devices. Remote I/O connect a wide range of digital and analog sensors and actuators to process control systems over a fieldbus. A variety of gateways are available to make use of different bus protocols.
### Glossary

#### Repeater
A type of active or transformer isolated barrier that receives a signal from the hazardous area instrument (i.e., transmitter, thermocouple, etc.) and repeats that signal into the safe area while providing Intrinsic Safety.

#### Resistance Temperature Detector (RTD)
A resistor made of some material for which the electrical resistivity is a known function of the temperature and that is intended for use with a resistance thermometer. It is usually in such a form that it can be placed in the region where the temperature is to be determined.

#### Resistance
That physical property of an element, device, branch, network or system that is the factor by which the mean-square conduction current must be multiplied to give the corresponding power lost by dissipation as heat or as other permanent radiation or loss of electromagnetic energy from the circuit.

#### RS 232
An EIA standard that specifies the electrical, mechanical, and functional characteristics for serial communications. Used in point-to-point applications.

#### RS 485
An EIA standard that specifies the electrical characteristics of a balanced-voltage digital interface. Used in multi-point applications.

#### Safe Area
A non-hazardous location.

#### Seal, Cable, Explosionproof
A cable terminator filled with compound and designed to contain an explosion in the enclosure to which it is attached or to minimize passage of flammable gases or vapors from one location to another. A conduit seal may also be used as a cable seal. This method differs from the international practice, which requires cable glands.

#### Seal, Conduit, Explosionproof
A sealed fitting, poured with a cement-like potting compound, designed to contain an explosion in the enclosure to which it is attached and to minimize passage of flammable gases or vapors from one location to another.

#### Serial Interface
A method of digitally transmitting data between devices over a pair of conductors. See RS 232 and RS 485.

#### Short Circuit Protected
The ability of an intrinsic safety barrier or isolator to withstand the shorting of its’ intrinsically safe connections to ground. Determined by dividing the rated voltage by its’ internal resistance. If the resulting value is less than the fuse rating, the barrier is said to be short circuit protected.

#### Short Circuit Protection
The ability of the solid-state output to withstand a direct short without damage to itself.

#### Shunt Diode Barrier Assembly
A fuse- or resistor- protected diode barrier.

#### Signal Conditioning
Signal conditioning is an important part of any automation system where electrical isolation, electronic signal conversion, and measurement accuracy are critical characteristics of the control loop architecture. This is one of the tasks Remote I/O fulfill.

#### Simple Apparatus
An electrical component or combination of components of simple construction with well-defined electrical parameters that is compatible with the intrinsic safety of the circuit in which it is used. A device that will neither generate nor store more than 1.5 V, 0.1 A and 25 mW. Examples are switches, thermocouples (TCs), light-emitting diodes (LEDs), and resistance temperature devices (RTDs).

#### SIT
Abbreviation for spontaneous ignition temperature.

#### Switch Amplifier
Term used for the type of transformer isolated barrier that is used to repeat signals from discrete inputs (i.e., contact closures, proximity sensors.)

#### System Integration
System integration forms a vital part of Remote I/O technology. The user can configure both the Remote I/O and the field devices from the system’s own workstation or a secondary central operating console.
**Glossary**

**T**

**Temperature Code (Temperature Classification)**
A system of classification by which one of 14 temperature identification numbers (internationally, six temperature classes) is allocated to an electrical apparatus. The temperature code represents the maximum surface temperature of any component that may come in contact with the flammable gas or vapor mixture.

**Termination Panel**
A mechanical assembly that resides in front of the I/O system and performs signal conditioning, electrical isolation, and other functions.

**Thermistor**
An electron device that makes use of the change of resistivity of a semiconductor with change in temperature.

**Thermocouple (TC)**
A pair of dissimilar conductors so joined at two points that an electromotive force is developed by the thermoelectric effects when the junctions are at different temperatures.

**TIB**
Abbreviation for Transformer Isolated Barrier. A term used to describe an isolated intrinsic safety barrier used for hazardous area applications. Although a typical TIB will employ multiple means of isolation, the term TIB is used to generically describe this type of barrier.

**Transmitter (Tx)**
A device for transmitting a coded signal when operated by any one of a group of actuating devices.

**U**

**UEL**
Abbreviation for upper explosive limit (upper flammable limit).

**UL**
Abbreviation for Underwriters Laboratories, Inc, a third party certification agency that is an independent, self-supporting, nonprofit testing laboratory and standards developer. It is recognized by OSHA as a Nationally Recognized Testing Laboratory in the United States. The presence of UL, CSA, or FM certification labels on equipment is normally sufficient evidence to the local inspector that the product is designed to meet recognized safety standards.

**Z**

**Zener Barrier**
An assembly consisting of a fuse, voltage-limiting shunt diodes, and a current-limiting resistor or other current-limiting components.
It is designed to limits current and voltage to the hazardous area to a level below that which would ignite a specific gas/air mixture.
The fuse protects the diodes from open circuiting when high fault current flows.

**Zener Diode**
A class of silicon diodes that exhibit in the avalanche breakdown region a large change in reverse current over a very narrow range of reverse voltage. This characteristic permits a highly stable reference voltage to be maintained across the diode despite a relatively wide range of current through the diode.

**Zone**
The international method of specifying the probability that a location is made hazardous by the presence, or potential presence, of flammable concentrations of gases and vapors. The term Division is used in the United States and Canada.

**Zone 0**
An area in which an explosive gas-air mixture is continuously present or present for long periods. Equal to a Class I, Division 1 hazardous location.

**Zone 1**
An area in which an explosive gas-air mixture is likely to occur in normal operation. Equal to a Class I, Division 1 hazardous location.

**Zone 2**
An area in which an explosive gas-air mixture is not likely to occur and if it does occur, will only exist for a short time. Equal to a Class I, Division 2 hazardous location.

**Zone 20**
An area in which a combustible dust cloud is part of the air permanently, over long periods of time or frequently. Equal to a Class II, Division 1 hazardous location.

**Zone 21**
An area in which a combustible dust cloud in air is likely to occur in normal operation. Equal to a Class II, Division 1 hazardous location.

**Zone 22**
An area in which a combustible dust cloud in air may occur briefly or during abnormal operation. Equal to a Class II, Division 2 hazardous location.
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Appendix

Glossary

General Notes

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## YOUR APPLICATION. OUR CHALLENGE.

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- Intrinsically safe barriers
- Signal conditioners
- Fieldbus infrastructure
- Remote I/O systems
- HART interface solutions
- Level measurement
- Purge and pressurization systems
- Industrial monitors and HMI solutions
- Explosion protection equipment
- Wireless solutions
- Solutions for process interfaces

### INDUSTRIAL SENSORS
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