MANUAL

H-System

Isolated Barriers and Termination Boards
With regard to the supply of products, the current issue of the following document is applicable: The General Terms of Delivery for Products and Services of the Electrical Industry, published by the Central Association of the Electrical Industry (Zentralverband Elektrotechnik und Elektroindustrie (ZVEI) e.V.) in its most recent version as well as the supplementary clause: “Expanded reservation of proprietorship”
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1 Introduction

1.1 Content of this Document

This document contains information that you need in order to use your product throughout the applicable stages of the product life cycle. These can include the following:

- Product identification
- Delivery, transport, and storage
- Mounting and installation
- Commissioning and operation
- Maintenance and repair
- Troubleshooting
- Dismounting
- Disposal

Note!
This document does not substitute the instruction manual.

Note!
For full information on the product, refer to the instruction manual and further documentation on the Internet at www.pepperl-fuchs.com.

The documentation consists of the following parts:

- Present document
- Instruction manual
- Datasheet

Additionally, the following parts may belong to the documentation, if applicable:

- EU-type examination certificate
- EU declaration of conformity
- Attestation of conformity
- Certificates
- Control drawings
- Additional documents

1.2 Target Group, Personnel

Responsibility for planning, assembly, commissioning, operation, maintenance, and dismounting lies with the plant operator.

Only appropriately trained and qualified personnel may carry out mounting, installation, commissioning, operation, maintenance, and dismounting of the product. The personnel must have read and understood the instruction manual and the further documentation.

Prior to using the product make yourself familiar with it. Read the document carefully.
1.3 Symbols Used

This document contains symbols for the identification of warning messages and of informative messages.

Warning Messages

You will find warning messages, whenever dangers may arise from your actions. It is mandatory that you observe these warning messages for your personal safety and in order to avoid property damage.

Depending on the risk level, the warning messages are displayed in descending order as follows:

**Danger!**

This symbol indicates an imminent danger.

Non-observance will result in personal injury or death.

**Warning!**

This symbol indicates a possible fault or danger.

Non-observance may cause personal injury or serious property damage.

**Caution!**

This symbol indicates a possible fault.

Non-observance could interrupt the device and any connected systems and plants, or result in their complete failure.

Informative Symbols

**Note!**

This symbol brings important information to your attention.

**Action**

This symbol indicates a paragraph with instructions. You are prompted to perform an action or a sequence of actions.
2 Product Specifications

2.1 Function

Isolated barriers are used to protect intrinsically safe circuits in explosive areas. In addition to the required current, voltage and power 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.

![Generic H-System termination board with isolated barriers](image)

Figure 2.1 Generic H-System termination board with isolated barriers

Generic 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
2.2 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

Both versions cover all functions and the interoperability of the H-System.

The pin assignment and terminal designations are consistent for all termination boards. Each H-System isolated barrier can therefore be mounted in each termination board slot.

- HiC isolated barriers on HiC termination boards
- HiD isolated barriers on HiD termination boards

The termination 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**

![HiC Device Housing](image)

Figure 2.2 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
**HiD Device Housing**

![HiD device housing (18 mm)](image)

**Figure 2.3** HiD device housing (18 mm)

Used for high channel density
- Compact 18 mm housing
- Packing density from 4.5 mm per channel
- For mounting on HiD termination boards
2.2.1 **Color Coding of the Isolated Barriers**

The color coding of the devices has the following meaning:

![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

**Universal**
- Red identifier (8) for universal barrier
2.2.2 Status Indications of the Isolators

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 indication 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>No power supply 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></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>Line 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>• A binary switching signal is present.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• An analog limit value is reached.</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>• A binary switching signal is present.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• An analog limit value is reached.</td>
</tr>
</tbody>
</table>

Table 2.1 Meaning of status indications
2.2.3 Label Carriers

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

<table>
<thead>
<tr>
<th></th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Green LED &quot;PWR&quot;</td>
</tr>
<tr>
<td></td>
<td>Power supply status indication</td>
</tr>
<tr>
<td>2</td>
<td>Yellow LED &quot;STATUS&quot;</td>
</tr>
<tr>
<td></td>
<td>Switching state of the output</td>
</tr>
<tr>
<td>3</td>
<td>Red LED &quot;FAULT&quot;</td>
</tr>
<tr>
<td></td>
<td>Lead breakage and short circuit status indication</td>
</tr>
</tbody>
</table>

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
2.3 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.

![Connection example termination board with 8 slots](image)

Figure 2.7 Connection example termination board with 8 slots

1. Field side connection
2. Connection power supply and fault indication output
3. Control side connection
4. Connection HART communication (if available)

Features depending on version
- For HiC or HiD isolated barriers
- With 8, 16, or 32 slots
- For redundant and fused power supply
- For fault monitoring and diagnostics
2.3.1 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:

Screw terminals

![Connection example: field-side screw terminals](image)

Figure 2.8 Connection example: field-side screw terminals

Spring terminals

![Connection example: field-side spring terminals](image)

Figure 2.9 Connection example: field-side spring terminals

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 via screw terminals or spring terminals.

The supply voltage range depends on

- The values used for the isolated barriers
- The voltage drop of the decoupling diodes on the termination board

![Connection example of power supply and fault indication output](image)

Figure 2.10 Connection example of power supply and fault indication output
Connecting the Control Side

The termination board on the control side can be connected via the following connection options:

Screw terminals

![Figure 2.11 Connection example: control-side screw terminals](image1)

Spring terminals

![Figure 2.12 Connection example: control-side spring terminals](image2)

Sub-D plug

![Figure 2.13 Connection example: control-side Sub-D plugs](image3)

Control system-specific plug

![Figure 2.14 Connection example: control-side system plugs](image4)
Establishing the HART Communication

Establish the HART communication via HART plug and HART multiplexer.

**HART plug**

![HART plug connection diagram]

Figure 2.15  Connection via control-side HART plug

**HART multiplexer**

![HART multiplexer connection diagram]

Figure 2.16  HART multiplexer connection

*Note!*

See corresponding datasheets for further information.
2.3.2 Status Indicators of Termination Boards

LEDs are often used on termination boards to indicate different statuses (e.g., power supply, device failure, status messages). Standard LED colors are assigned to the status display according to NAMUR NE 44.

<table>
<thead>
<tr>
<th>LED</th>
<th>Display function</th>
<th>Display</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Red LED &quot;FAULT&quot;</td>
<td>Device fault</td>
<td>On</td>
<td>Module fault, module failure</td>
</tr>
<tr>
<td></td>
<td>Power supply failure</td>
<td>Flashing</td>
<td>Power supply failure</td>
</tr>
<tr>
<td>Green LED &quot;PWR2&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>Green LED &quot;PWR1&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>
</tbody>
</table>

Table 2.2 Meaning of status indicators

Figure 2.17 Example status indicators

1. Red LED "FAULT"
   Module fault, module failure, power supply failure
2. Green LED "PWR2"
   Status indicator power supply II
3. Green LED "PWR1"
   Status indicator power supply I
2.3.3 Accessories

Label Carriers for Termination Boards

The termination boards can be fitted with a label carrier for individual identification.

![Figure 2.18 Label carrier for termination boards](image)

1 Label carrier HiALC-HiCT*-SET-*** for HiC termination boards
1 Label carrier HiALC-HiDT*-SET-*** for HiD-termination boards

HART Communication Board

The HART Communication Board is connected to HART-compatible H-System termination boards. It has one slot to mount a 32-channel HiD Mux2700-type HART multiplexer master.

Preconfigured HART connection cables enable easy connection between the H-System termination boards and the HART Communication Board.

The device offers a redundant fused power supply with an LED indicator. The RS 485 terminals have a redundant configuration and enable simple bridging to the next bus node.

![Figure 2.19 HART Communication Board HiATB01-HART-4x8](image)
Application Example

The following diagram shows a typical example of an application with a HART Communication Board.

Figure 2.20  H-System topology

1  Termination board
2  HART Communication Board
3  Connection power supply I and II (redundant)
4  Connection control side
5  Connection HART communication
5  Connection fault indication output

2.3.4  DIN Mounting Rail, on the User Side

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

Figure 2.21  Example: DIN mounting rail (35 mm x 7.5 mm)
3 Mounting and Installation

**Danger!**
Explosion hazard from damaged electronic components

Premature wear of electronic components in a device that was previously used in a general electrical installation can cause sparks that can ignite the surrounding potentially explosive atmosphere.

Never install devices that have already been operated in general electrical installations in electrical installations used in combination with hazardous areas!

**Danger!**
Explosion hazard from pollution

An excessively polluted surface of the device can become conductive and consequently ignite a surrounding potentially explosive atmosphere.

Ensure that you install the device only in environments with a pollution degree 2 or better according to IEC/EN 60664–1.

3.1 Termination Board Mounting

**Warning!**
Risk of short circuit

Working on live parts can cause injuries and can compromise the function and the electrical safety of the device.

- 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.

Figure 3.1 Termination board mounting

1 DIN mounting rail
2 Termination board

Figure 3.2 Termination board fixing

1 DIN mounting rail
2 Termination board
3 Fastening screws
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.

<table>
<thead>
<tr>
<th>Vertical mounting</th>
<th>Horizontal mounting</th>
</tr>
</thead>
</table>

Figure 3.3

3.2 Isolated Barriers Mounting

Mounting in the Non-Hazardous Area

Mounting the Isolated Barriers on the Termination Board

Mount the barrier as described in the following section, see Figure 3.4.

Mounting in Areas that Require the Equipment Protection Level Gc

**Danger!**

Explosion hazard from insufficient type of protection

The usage of modules with termination boards with insufficient type of protection can cause sparks or other hazards for potentially explosive atmospheres that can ignite the surrounding atmosphere.

Only use the modules in the hazardous area if the termination boards are also approved for the hazardous area.

**Danger!**

Explosion hazard from live wiring of non-intrinsically safe circuits

If you connect or disconnect energized non-intrinsically safe circuits in a potentially explosive atmosphere, sparks can ignite the surrounding atmosphere.

Only connect or disconnect energized non-intrinsically safe circuits in the absence of a potentially explosive atmosphere.
*Danger!*

Explosion hazard from wrong mounting

The device safety can be impaired by external environmental influences and by mechanical stress. That can lead to sparking that can ignite a surrounding potentially explosive atmosphere.

Mount the device in a surrounding enclosure that complies with IEC/EN 60079–0 and that is rated with the degree of protection IP54 according to IEC/EN 60529.

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.

![Mounting of an H-System isolated barrier](image)

1. Quick Lok Bar
2. Coding pins
3. Adjustment pins
3.3 Mounting Instructions for Offshore Applications

To find out whether an isolator or termination board is approved for use in offshore applications, please refer to the certificate. This certificate can be found at www.pepperl-fuchs.com.

Mounting the Isolated Barriers on the Termination Board to Ensure Vibration Resistance

Following the instructions below will ensure that the isolated barriers and the termination board are mounted in a manner that ensures vibration resistance in line with IACS Unified Requirements E10.

1. Mount the termination board as described in the previous section. Make sure that the back of the device is flush with the mounting base.

2. Mount the isolated barriers as described in the previous section.

3. Mount the isolated barriers (1) side by side on the termination board. Ensure that all slots are occupied.

4. Fix eight isolated barriers using four cable ties (2) level with the grip (4).

5. Ensure that the cable tie ratchets (3) are positioned at the corners. We recommend this arrangement as the cable ties are difficult to bend.

6. Pull the cable ties (2) tight. Ensure a secure fit.

![Mounting the isolated barriers to ensure vibration resistance](image-url)

**Figure 3.5** Mounting the isolated barriers to ensure vibration resistance

1. Isolated barriers
2. Cable ties
3. Cable tie ratchet
4. Grip
Mounting the Isolated Barriers and Termination Boards to Ensure Flame Resistance

Parts of the isolated barriers and termination boards contain materials that fall under flammability class V-2 in accordance with UL 94. This flammability class is not sufficient for offshore applications. A sufficient flammability class can be achieved by following the instructions below.

1. Mount the isolated barriers and termination boards in a switch cabinet or housing that meets the requirements of flammability class V-1 in accordance with UL 94 as a minimum.

2. Alternatively:

3. Mount the isolated barriers and termination boards in a switch cabinet or housing that meets the flammability requirements of IACS Unified Requirements E10.
### 3.4 Connection

**Danger!**
Explosion hazard from live wiring of non-intrinsically safe circuits

If you connect or disconnect energized non-intrinsically safe circuits in a potentially explosive atmosphere, sparks can ignite the surrounding atmosphere.

Only connect or disconnect energized non-intrinsically safe circuits in the absence of a potentially explosive atmosphere.

**Danger!**
Danger to life from electric shock

Absent or insufficient insulation can result in electric shock.

- Maintain sufficient distance between the connection lines, terminals, housing, and the environment.
- Insulate connection lines, terminals, and the housing from the environment.

**Danger!**
Danger to life from incorrect installation

Incorrect installation of cables and connection lines can compromise the function and the electrical safety of the device.

- Observe the permissible core cross section of the conductor.
- When using stranded conductors, crimp wire end ferrules on the conductor ends.
- Use only one conductor per terminal.
- When installing the conductors the insulation must reach up to the terminal.
- Observe the tightening torque of the terminal screws.

**Danger!**
Explosion hazard from exposed conductors

Exposed conductors of inadequately attached cables can cause sparks that can ignite the surrounding potentially explosive atmosphere.

When installing the device ensure that the cables are adequately attached.

**Caution!**
Property damage from use of inappropriate tool

Using an inappropriate tool may damage the screw heads.

- Use a slot-head screwdriver with a size of 3.5 x 0.5.
- Observe the tightening torque of the terminal screws. The tightening torque is 0.5 Nm to 0.6 Nm.
Connecting the Field Side

**Danger!**
Explosion hazard from wrong separation distances

If you do not observe the minimum separation distance between 2 intrinsically safe circuits, this can lead to added currents or voltages. This can result in a current/voltage flashover generating sparks. The sparks can ignite the surrounding potentially explosive atmosphere.

Ensure that you observe all separation distances between 2 adjacent intrinsically safe circuits according to IEC/EN 60079-14.

**Danger!**
Explosion hazard from wrong separation distances

If you do not observe the minimum separation distances between intrinsically safe circuits of associated apparatus and non-intrinsically safe circuits, this can lead to added currents or voltages. This can result in a current/voltage flashover generating sparks. The sparks can ignite the surrounding potentially explosive atmosphere.

Ensure that you observe the compliance of the separation distances to all non-intrinsically safe circuits according to IEC/EN 60079–14.

Connect the field devices to the termination board via the screw terminals or spring terminals.

Connecting the Power Supply and Fault Indication Output

**Danger!**
Danger to life from electric shock

Absent or insufficient insulation can result in electric shock.
Only connect supplies that provide protection against electric shock (e.g. SELV or PELV).

Connect the power supply and fault indication output via the screw terminals or spring terminals.

Connecting the Control Side

**Danger!**
Danger to life from electric shock

Absent or insufficient insulation can result in electric shock.
Only connect circuits that provide protection against electric shock (e.g. SELV or PELV).

**Warning!**
Risk of short circuit

Live working can cause injuries to the operator and/or damage to the device.
Disconnect the device, before you plug or unplug the plugs.
Connect the Termination Board on the control side via the following connection options:

- Screw terminals
- Spring terminals
- Sub-D plug
- Control system-specific plug

**Establishing the HART Communication**

Establish the HART communication via HART plug and HART multiplexer on the control side.

**Connecting Circuits**

1. Connect the field circuit.
2. Connect the control circuit.
3. Connect the power supply.
4. Establish the HART communication.

*Note!*

See corresponding datasheets for further information.
4 Configuration

4.1 Configuration of the Isolated Barriers

Danger!
Explosion hazard from sparking when using operating elements

Using operating elements in a potentially explosive atmosphere can cause sparks that can ignite the surrounding atmosphere.

Only use operating elements (e.g., switch, slider, button, etc.) in the absence of a potentially explosive atmosphere.

Caution!
Fault in the plant

Changing the device data changes the device function.

Before entering new device data, make sure the plant is not endangered by changing the device data.

The devices are configured using DIP switches.

Configuring the Isolated Barrier

Set the DIP switches on the device side as follows:
1. Remove the isolated barriers from the termination board as described in the "Dismounting" section.
2. Set the DIP switches as described in the "Configuration" section of the datasheet.
3. Mount the device as described in the "Mounting" section.

Note!
See corresponding datasheets for further information.
### 4.2 Device Coding

The isolated barriers are factory coded depending on their function. The coding is realized by trimmed and untrimmed pins. It is possible to code the slots on the termination board according to the module coding. The pins for this coding are supplied with the termination boards.

The following tables show the pin assignment between isolated barriers and termination boards.

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

<table>
<thead>
<tr>
<th>No.</th>
<th>Termination board</th>
<th>Isolated barrier</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Top view</td>
<td>Bottom view</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Safe area</td>
<td>Hazardous area</td>
<td>Safe area</td>
</tr>
<tr>
<td>A</td>
<td></td>
<td>4321</td>
<td></td>
</tr>
<tr>
<td>B</td>
<td></td>
<td>4321</td>
<td></td>
</tr>
<tr>
<td>C</td>
<td></td>
<td>4321</td>
<td></td>
</tr>
<tr>
<td>D</td>
<td></td>
<td>4321</td>
<td></td>
</tr>
<tr>
<td>E</td>
<td></td>
<td>4321</td>
<td></td>
</tr>
<tr>
<td>F</td>
<td></td>
<td>4321</td>
<td></td>
</tr>
<tr>
<td>G</td>
<td></td>
<td>4321</td>
<td></td>
</tr>
<tr>
<td>H</td>
<td></td>
<td>4321</td>
<td></td>
</tr>
<tr>
<td>I</td>
<td></td>
<td>4321</td>
<td></td>
</tr>
<tr>
<td>J</td>
<td></td>
<td>4321</td>
<td></td>
</tr>
<tr>
<td>K</td>
<td></td>
<td>4321</td>
<td></td>
</tr>
<tr>
<td>L</td>
<td></td>
<td>4321</td>
<td></td>
</tr>
</tbody>
</table>

|      | HiC2000 all non-intrinsically safe devices |
|      | HiC2095  |
|      | HiC2025HC |
|      | HiC2025, HiC2025ES, HiC2031, HiC2031ES |
|      | HiC2027, HiC2027DE, HiC2027ES, HiC2877 |
|      | HiC2031HC |
|      | HiC2441, HiC2871, HiC2873, HiC2873Y1, HiC2883 |
|      |              |
|      |              |
### H-System – Isolated Barriers and Termination Boards

#### Configuration

<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></td>
</tr>
<tr>
<td>M</td>
<td>1234</td>
<td>4321</td>
<td>HiC2081</td>
</tr>
<tr>
<td>N</td>
<td>1234</td>
<td>4321</td>
<td>HiC2077</td>
</tr>
<tr>
<td>O</td>
<td>1234</td>
<td>4321</td>
<td>HiC2065, HiC2068</td>
</tr>
<tr>
<td>P</td>
<td>1234</td>
<td>4321</td>
<td>Empty position</td>
</tr>
</tbody>
</table>

- **Device side view**
  - Insert polarizing pin
  - Don't insert polarizing pin
  - Pin to be trimmed
  - Pin untrimmed

**Table 4.1**
# Device Coding of HiD Devices and HiD Termination Boards

<table>
<thead>
<tr>
<th>No.</th>
<th>Termination board</th>
<th>Isolated barrier</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Top view</td>
<td>Bottom view</td>
<td></td>
</tr>
<tr>
<td>Safe area</td>
<td>Hazardous area</td>
<td>Safe area</td>
<td>Hazardous area</td>
</tr>
<tr>
<td>A</td>
<td><img src="imageA" alt="Termination board" /></td>
<td><img src="imageA" alt="Isolated barrier" /></td>
<td>HiD2000 (all non-intrinsically safe devices)</td>
</tr>
<tr>
<td>B</td>
<td><img src="imageB" alt="Termination board" /></td>
<td><img src="imageB" alt="Isolated barrier" /></td>
<td>–</td>
</tr>
<tr>
<td>C</td>
<td><img src="imageC" alt="Termination board" /></td>
<td><img src="imageC" alt="Isolated barrier" /></td>
<td>HiD2096</td>
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<tr>
<td>D</td>
<td><img src="imageD" alt="Termination board" /></td>
<td><img src="imageD" alt="Isolated barrier" /></td>
<td>–</td>
</tr>
<tr>
<td>E</td>
<td><img src="imageE" alt="Termination board" /></td>
<td><img src="imageE" alt="Isolated barrier" /></td>
<td>HiD2881</td>
</tr>
<tr>
<td>F</td>
<td><img src="imageF" alt="Termination board" /></td>
<td><img src="imageF" alt="Isolated barrier" /></td>
<td>HiD2061, HiD2062, HiD2071, HiD2072, HiD2821, HiD2822, HiD2824, HiD2842, HiD2844</td>
</tr>
<tr>
<td>G</td>
<td><img src="imageG" alt="Termination board" /></td>
<td><img src="imageG" alt="Isolated barrier" /></td>
<td>HiD2022, HiD2022SK, HiD2024, HiD2025, HiD2025SK, HiD2026, HiD2026SK, HiD2029, HiD2029SK, HiD2030, HiD2030SK, HiD2031, HiD2032, HiD2033, HiD2034, HiD2035, HiD2036, HiD2037, HiD2038, HiD2039Y, HiD2875, HiD2876, HiD2877, HiD2878</td>
</tr>
<tr>
<td>H</td>
<td><img src="imageH" alt="Termination board" /></td>
<td><img src="imageH" alt="Isolated barrier" /></td>
<td>HiD2871, HiD2872, HiD2873, HiD2874</td>
</tr>
<tr>
<td>I</td>
<td><img src="imageI" alt="Termination board" /></td>
<td><img src="imageI" alt="Isolated barrier" /></td>
<td>–</td>
</tr>
<tr>
<td>J</td>
<td><img src="imageJ" alt="Termination board" /></td>
<td><img src="imageJ" alt="Isolated barrier" /></td>
<td>HiD2081, HiD2082</td>
</tr>
<tr>
<td>K</td>
<td><img src="imageK" alt="Termination board" /></td>
<td><img src="imageK" alt="Isolated barrier" /></td>
<td>HiD2025ES, HiD2031ES</td>
</tr>
<tr>
<td>L</td>
<td><img src="imageL" alt="Termination board" /></td>
<td><img src="imageL" alt="Isolated barrier" /></td>
<td>HiD2012</td>
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<tr>
<td>M</td>
<td><img src="imageM" alt="Termination board" /></td>
<td><img src="imageM" alt="Isolated barrier" /></td>
<td>HiD2891</td>
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<tr>
<td>N</td>
<td><img src="imageN" alt="Termination board" /></td>
<td><img src="imageN" alt="Isolated barrier" /></td>
<td>–</td>
</tr>
</tbody>
</table>
### H-System – Isolated Barriers and Termination Boards

#### Configuration

<table>
<thead>
<tr>
<th>No.</th>
<th>Termination board</th>
<th>Isolated barrier</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Top view</td>
<td>Bottom view</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Safe area</td>
<td>Hazardous area</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Hazardous area</td>
<td>Safe area</td>
<td></td>
</tr>
</tbody>
</table>

| O   | ![Termination board](image) | ![Isolated barrier](image) | –     |
| P   | ![Termination board](image) | ![Isolated barrier](image) | HiD2862 Empty position |

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

### Table 4.2

<table>
<thead>
<tr>
<th>No.</th>
<th>Termination board</th>
<th>Isolated barrier</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Top view</td>
<td>Bottom view</td>
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</tr>
<tr>
<td></td>
<td>Safe area</td>
<td>Hazardous area</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Hazardous area</td>
<td>Safe area</td>
<td></td>
</tr>
</tbody>
</table>

**Note!**

See corresponding datasheets for further information.
5 Operation

5.1 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.

5.2 Fault Output

Several H-System isolators monitor the field cables for lead breakages and short circuits so that faults in the plant can be detected immediately. Line faults are prevented from being interpreted as signals.

Depending on the configuration of the devices, these faults are transmitted to the outputs at the control side and in separate fault indication outputs as additional information.
Fault Indication Output

Line and device faults are transmitted if the device has a fault indication output (FAULT). The fault indication output is active in a normal state and inactive in a fault state (closed-circuit principle).

![Figure 5.1](image)

**Line Fault Transparency (LFT)**

If the device has a signal output with line fault transparency, the fault message can also be transferred to the signal line, saving additional wiring and enabling the transfer of channel selective fault messages. A resistive passive transistor output is used for digital signals. The signals 0 and 1 are transmitted using two resistance values at the output. The output switches to high impedance in the event of a fault. Corresponding input cards are required in the controller for this line fault transparency function.

![Figure 5.2](image)

**Fault Signal on Termination Board**

The majority of the termination boards have an internal fault signal.

**Danger!**

Explosion hazard from changing the fuse

The changing of the fuse under voltage can cause sparks. This can ignite the surrounding potentially explosive atmosphere.

De-energize the device before changing the fuse.

Information about a missing supply voltage of the termination board is available for the system as a volt-free contact.

Wiring errors from field side will be reported via the same relay contact, if this function supported by the isolators and the termination board.
5.3 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 encountered in addition to the 0/2 V to 10 V voltage signal.

Analog sensor signals and 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.

Figure 5.3 Signal ranges according to NAMUR NE43 (e.g. current signal)

1. Failure information
2. Measuring information
6 Dismounting, Maintenance, and Repair

Danger!
Danger to life from using damaged or repaired devices. Using a defective or repaired device can compromise its function and its electrical safety.
- Do not use a damaged or polluted device.
- The device must not be repaired, changed or manipulated.
- If there is a defect, always replace the device with an original device from Pepperl+Fuchs.

Danger!
Explosion hazard from live wiring of non-intrinsically safe circuits
If you connect or disconnect energized non-intrinsically safe circuits in a potentially explosive atmosphere, sparks can ignite the surrounding atmosphere.
Only connect or disconnect energized non-intrinsically safe circuits in the absence of a potentially explosive atmosphere.

Danger!
Explosion hazard from changing the fuse
The changing of the fuse under voltage can cause sparks. This can ignite the surrounding potentially explosive atmosphere.
De-energize the device before changing the fuse.

Disconnecting Circuits
1. Disconnect the power supply.
2. Disconnect the field circuit.
3. Disconnect the control circuit.
6.1 Isolated Barriers Dismounting

Dismounting the Isolated Barrier from the Termination Board

1. Pull the Quick Lok bar (1) into the upper position.
2. Carefully pull out the device from the contacts and locking elements.

Figure 6.1 Dismounting of an H-System isolated barrier

1. Quick Lok Bar
2. Coding pins
3. Adjustment pins
### 6.2 Termination Board Dismounting

**Warning!**

Risk of short circuit

Working on live parts can cause injuries and can compromise the function and the electrical safety of the device.
- Before working on the device, always disconnect the supply voltage.
- Connect the device to the supply voltage only after completion of the work.

Dismounting the Termination Boards

1. Loosen the mounting screws (3).
2. Remove the termination board (2) from the DIN mounting rail (1).

![Termination board fixing](image1)

![Termination board dismounting](image2)

1. DIN mounting rail
2. Termination board
3. Fastening screws

1. DIN mounting rail
2. Termination board
7 Technical Specifications

7.1 Technical Data

Electrical Data

Power Supply to the Isolated Barriers
- HiC devices: 19 V DC to 30 V DC
- HiD devices: 20.4 V DC to 30 V DC

*Note*
See corresponding datasheets for possible exceptions.

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-Hazardous Area Signals or Control Circuit Signals
- 0/4 mA to 20 mA signal level according to NE 43
- 0/2 V to 10 V signal level according to NE 43
- 0/1 V to 5 V signal level according to NE 43
- 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

Hazardous Area Signals or Field Circuit Signals
- 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
  - EN 61326-3-2, only for devices with SIL rating, where the datasheet mentions this standard.
    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.
  - NAMUR NE 21
    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 NE 44
- Software according to NAMUR NE 53

Digital Inputs and Outputs according to NAMUR
- IEC/EN 60947-5-6: Low voltage switch gear and control gear – part 5 and 6: Control devices and switching elements – DC interface for proximity sensors and switch amplifiers (NAMUR), 1999

Ambient Conditions

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

Storage Temperature
- -40 °C to 85 °C (-40 °F to 185 °F), exceptions see datasheets

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
**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.

**Degree of Protection**
- 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:
  - Screw terminals: 0.25 to 1.5 mm² (24 ... 12 AWG)
    Observe the tightening torque of the terminal screws. The tightening torque is 0.5 Nm to 0.6 Nm.
  - Spring terminals: 0.25 to 1.5 mm² (24 ... 12 AWG)
- Power supply and fault indication output:
  - Screw terminals: 0.25 to 1.5 mm² (24 ... 12 AWG)
    Observe the tightening torque of the terminal screws. The tightening torque is 0.5 Nm to 0.6 Nm.
  - Spring terminals: 0.25 to 1.5 mm² (24 ... 12 AWG)
- Control side:
  - Screw terminals: 0.25 to 1.5 mm² (24 ... 12 AWG)
    Observe the tightening torque of the terminal screws. The tightening torque is 0.5 Nm to 0.6 Nm.
  - Spring terminals: 0.25 to 1.5 mm² (24 ... 12 AWG)
  - 37-pin Sub-D connector

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

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

Termination Boards
- The HiALC-HiCT*-SET-*** label carrier is available as an option for the HiC termination boards.
- The HiALC-HiDT*-SET-*** label carrier is available as an option for the HiD termination boards.

Note!
See corresponding datasheets for further information.
### 7.2 Model Number Description

#### Model Number Description Isolated Barriers

<table>
<thead>
<tr>
<th>Position 1</th>
<th>Hi</th>
<th>H-System</th>
</tr>
</thead>
<tbody>
<tr>
<td>Position 2</td>
<td>C</td>
<td>HiC device, 12.5 mm width</td>
</tr>
<tr>
<td></td>
<td>D</td>
<td>HiD device, 18 mm width</td>
</tr>
<tr>
<td>Position 3</td>
<td>2</td>
<td>Isolated barrier</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>Signal conditioner</td>
</tr>
<tr>
<td>Position 4</td>
<td>0</td>
<td>Analog device</td>
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<tr>
<td></td>
<td></td>
<td>010 bis 020 Converter</td>
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<tr>
<td></td>
<td></td>
<td>020 bis 030 Transmitter power supply</td>
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<tr>
<td></td>
<td></td>
<td>031 bis 040 Current driver</td>
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<td></td>
<td></td>
<td>060 bis 090 Temperature converter</td>
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<td></td>
<td></td>
<td>065 und 068 Repeater</td>
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<td></td>
<td>091 bis 099 Repeater</td>
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<td>7</td>
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<td>700 HART multiplexer master</td>
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<td>8</td>
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<td></td>
<td>820 bis 860 Switch amplifier</td>
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<td>861 bis 870 Relay module</td>
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<td>871 bis 890 Solenoid driver</td>
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<td>891 bis 899 Converter</td>
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<td>9</td>
<td>Terminal module</td>
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<td></td>
<td></td>
<td>900 Terminal module</td>
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<tr>
<td>Position 5</td>
<td>ES</td>
<td>Version with enhanced safety</td>
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<tr>
<td></td>
<td>HC</td>
<td>Versions for long field wiring</td>
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<tr>
<td></td>
<td>R1</td>
<td>Version with DCS specific line fault transparency (LFT)</td>
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<td></td>
<td>R2</td>
<td>Version with DCS specific line fault transparency (LFT)</td>
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<tr>
<td></td>
<td>SK</td>
<td>Version with current sink output</td>
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</table>
## Model Number description Generic Termination Boards

<table>
<thead>
<tr>
<th>Position</th>
<th>Description</th>
</tr>
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<tbody>
<tr>
<td>1</td>
<td>Hi System</td>
</tr>
<tr>
<td>2</td>
<td>Housing type</td>
</tr>
<tr>
<td>3</td>
<td>Device type</td>
</tr>
<tr>
<td>4</td>
<td>Number of slots</td>
</tr>
<tr>
<td>5</td>
<td>Control side connection</td>
</tr>
<tr>
<td>6</td>
<td>Number of pins per module on the control side</td>
</tr>
<tr>
<td>7</td>
<td>Number of pins per module on the field side</td>
</tr>
<tr>
<td>8</td>
<td>Termination board channel configuration</td>
</tr>
<tr>
<td>9</td>
<td>Field side connection</td>
</tr>
<tr>
<td>10</td>
<td>Power supply</td>
</tr>
<tr>
<td>11</td>
<td>Fault monitoring</td>
</tr>
<tr>
<td>12</td>
<td>Version</td>
</tr>
</tbody>
</table>

### Hi

- **Position 2**: C for HiC devices, housing width 12.5 mm
- **Position 2**: D for HiD devices, housing width 18 mm

### TB

- **Position 3**: Termination board

### 08

- **Position 4**: 08 8 slots
- **Position 4**: 16 16 slots
- **Position 4**: 32 32 slots

### SCT

- **Position 5**: Screw terminals
- **Position 5**: Sub-D connector
- **Position 5**: Spring terminals

### 2

- **Position 6**: 2 2 pins per module
- **Position 6**: 4 4 pins per module
- **Position 6**: 8 8 pins per module
- **Position 6**: 9 9 pins per module

### 2

- **Position 7**: 2 2 pins per module
- **Position 7**: 4 4 pins per module
- **Position 7**: 8 8 pins per module
- **Position 7**: 9 9 pins per module

### A

- **Position 8**: Alternative channel configuration
- **Position 8**: Consecutive channel configuration
- **Position 8**: Channel configuration suitable for signal splitter

### PL

- **Position 9**: Pluggable screw terminals
- **Position 9**: Screw terminals
- **Position 9**: Spring terminals

### D

- **Position 10**: Daisychainable power supply
- **Position 10**: Without power supply
- **Position 10**: Redundant power supply
- **Position 10**: Single power supply
### Position 11

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>All faults monitored</td>
</tr>
<tr>
<td>L</td>
<td>Capable of line fault transparency (LFT)</td>
</tr>
<tr>
<td>M</td>
<td>Only module faults monitored</td>
</tr>
<tr>
<td>S</td>
<td>Only supply faults monitored</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Y</td>
<td>Version</td>
</tr>
<tr>
<td>***</td>
<td>Without specification</td>
</tr>
</tbody>
</table>

**Note!**

Information on control system-specific termination boards is available on request.
7.3 Dimensions

7.3.1 Housing Designs for H-System Isolated Barriers

HiC Device Housings

Figure 7.1

HiD Device Housings

Figure 7.2
7.3.2 Housing Types Termination Boards

HiC Termination Board for 8 Modules

Figure 7.3

HiC Termination Board for 16 Modules

Figure 7.4
HiC Termination Board for 32 modules

Figure 7.5

HiD Termination Board for 8 Modules

Figure 7.6
**HiD Termination Board for 16 Modules**

![Diagram of HiD Termination Board for 16 Modules](image)

**Figure 7.7**

**Accessory Boards**

![Diagram of Accessory Boards](image)

**Figure 7.8**