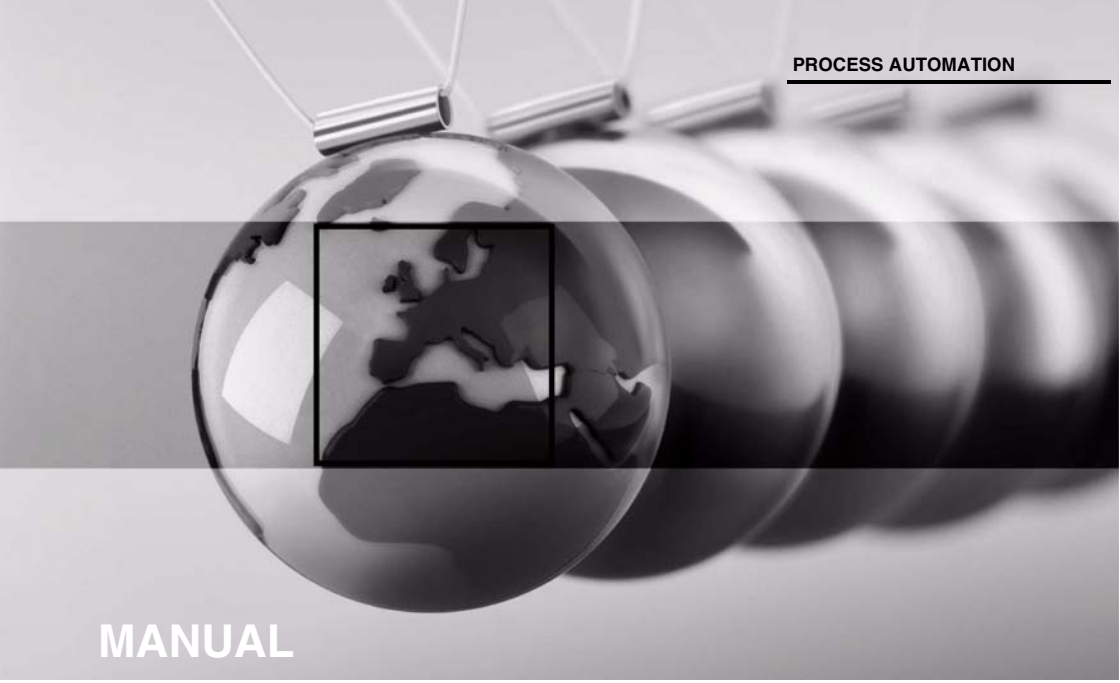
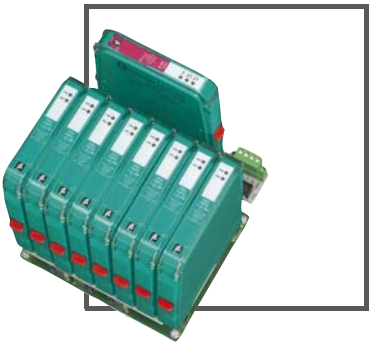


MANUAL

FIELDBUS POWER HUB HIGH DENSITY HONEYWELL



PEPPERL+FUCHS
PROTECTING YOUR PROCESS

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"

1 Used Symbols

Safety-relevant Symbols

Danger!
This symbol indicates a warning about a possible danger.

In the event the warning is ignored, the consequences may range from personal injury to death.

Warning!
This symbol indicates a warning about a possible fault or danger.

In the event the warning is ignored, the consequences may course personal injury or heaviest property damage.

Caution!
This symbol warns of a possible fault.

Failure to observe the instructions given in this warning may result in the devices and any connected facilities or systems develop a fault or fail completely.

Informative Symbols

Note!
This symbol brings important information to your attention.

Action

This symbol marks an acting paragraph.

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2 Safety Information

Protection of operating personnel and the system is not ensured if the product is not used in accordance with its intended purpose.

The operator of the system is responsible in terms of planning, mounting, commissioning, operating and maintenance.

If devices have been operated in general electrical systems, they must not subsequently be operated in electrical systems related to explosive areas.

Installation and commissioning of all devices must be performed by a trained professional only.

Devices being operated in connection with hazardous areas may not be changed or manipulated. If there is a defect, the product must always be replaced with an original part.

In case of defect, the device must be removed and replaced with a new one.

The devices may not be repaired, changed or manipulated. If there is a defect, the product must always be replaced with an original part.

Devices must be mounted for installation in the safe area in a housing which corresponds at least to protection class IP 20 per EN 60529.

The Statement of Conformity and any included "special conditions for safe use“ must be observed.

If plastic enclosures are used in the hazardous area, they must be constructed in such a way that if used as intended, ignition dangers from electrostatic charge during maintenance and cleaning are avoided.

The connection and disconnection of non-power-limited circuits carrying current is permitted only during installation or maintenance, or for purposes of repair.

The Declaration of Conformity and Certificate of Compliance of all parts belonging to the Fieldbus Power Hub system must be observed. It is especially important to pay attention to any special conditions for safe use that are indicated.

The Fieldbus Power Hub should be installed in a protection class IP 54 or better enclosure in accordance with EN 60529.

Only devices which are suitable for operation in hazardous areas Zone 2/ Div. 2 and the conditions present at the place of operation (see Declaration of Conformity or Certificate of Compliance), shall be connected to non-energy limited circuits in Zone 2, resp. Class I, Div. 2.

In a Zone 2 installation, connection or disconnection of energized non-energy-limited circuits on the trunk is only permitted during installation, maintenance or for repair purposes since the presence of an explosive atmosphere during the short period of installation, maintenance or repair is considered as improbable.

Special care must be taken if Power Supplies are to be used in conjunction with Pepperl+Fuchs Segment Protectors for energy limited, non-incendive field wiring. A check must be made to ensure that the correct Power Supply type is used in relation to its output values. For example, the output voltage must be equal or less than the maximum voltage of the connected field devices.

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3 Introduction

This document describes the Fieldbus Power Hub System, which consists of the following products:

Product	Specification
MB-FB-4R.HO.SC	Motherboard 4x redundant Fieldbus segments (8x Power Supplies + 1x Diagnostic module) with Honeywell Series C connector
HD2-FBPS-1.25.360	Isolated Fieldbus Power Supply, 25 - 28 V, 360 mA output
HD2-DM-B	Basic Diagnostic Module
HD2-DM-A	Advanced Diagnostic Module (general description only, see corresponding manual and data sheet)

These operating instructions assume technical knowledge and experience with FOUNDATION Fieldbus technology as well as explosion protection.Laws and regulations applicable to the usage or planned purpose of usage must be observed.Devices are only approved for proper usage in accordance with intended purpose. Improper handling will result in voiding of any warrantee or manufacturer's responsibility.

The Declaration of Conformity, Certificate of Compliance, Statement of Conformity, EC-type-examination certificate and data sheets are an integral part of this document.

The data sheet contains the electrical data of the Declaration of Conformity, the Certificate of Compliance and the EC-type-examination certificate.

The documents mentioned are available from http://www.pepperl-fuchs.com or contact your local Pepperl+Fuchs representative.

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4 Instructions

4.1 Intended Use

The Fieldbus Power Hub HD product range is intended to power up to four FOUNDATION Fieldbus H1 segments in redundant mode according to IEC 61158-2.

The HD2-FBPS-1.25.360 Fieldbus Power Supply is the preferred type of module to be used in conjunction with the Honeywell Power Hub Motherboard. Power Supplies with a higher inrush current like the HD2-FBPS-1.500, HD2-FBPS-1.17.500 or HD2-FBPS-1.23.500 may be used only when the Power Hub Motherboard is externally powered see chapter 6.3. All statements in this document referring to the HD2-FBPS-1.25.360 Power Supply are applicable for the other Power Supplies too if this single restriction is fulfilled.

The Fieldbus Power Hub HD product range may be installed in Zone 2 or Class I Division 2 hazardous areas. Type of protection is EEx nA (non-arcing) for Zone 2 Gas Groups IIC, IIB, IIA, and non-incendive for use in Class I Division 2 Gas Groups A, B, C and D.

Laws and/or regulations governing the use or intended use must be observed. The Fieldbus Power Hub HD products are only approved for proper professional use in accordance with the intended purposes. Improper handling will void any claim made under the warranty as well as any manufacturer's liability.

The Fieldbus Power Hub HD must only be operated by trained professionals in accordance with this manual.

4.2 Marking

The Fieldbus Power Hub product range is product-specifically marked with:

Motherboard	Power Supply Module	Basic Diagnostic Module
Pepperl+Fuchs GmbH	Pepperl+Fuchs GmbH	Pepperl+Fuchs GmbH
Fieldbus Power Hub	Fieldbus Power Hub	Fieldbus Power Hub
MB-FB-4R.HO.SC	HD2-FBPS-1.25.360	HD2-DM-B
TÜV 04 ATEX 2500 X	TÜV 04 ATEX 2500 X	TÜV 04 ATEX 2500 X
II 3 G Ex nA C IIC T4	II 3 G Ex nA C IIC T4	II 3 G Ex nA C IIC T4

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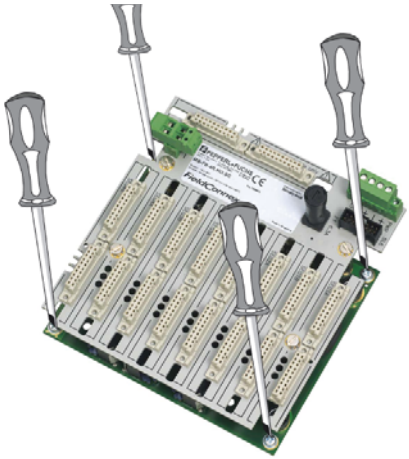
4.3 Mounting and Dismounting

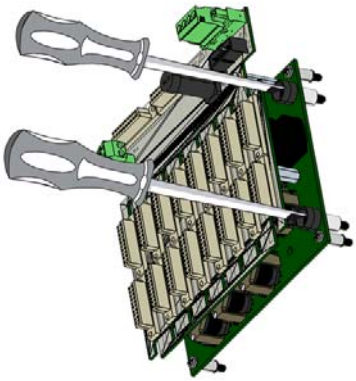
Mounting of Honeywell Motherboards in the Honeywell Channel

To mount a motherboard in a Honeywell Channel, proceed as follows:

1. Place the motherboard in the Honeywell Channel.
2. Tighten each of the 4 screws located in the corner of the bottom motherboard to attach the motherboard to the Honeywell Channel.



3. Tighten the power screws as indicated in the picture below.



The motherboard has been mounted in the Honeywell Channel.

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Mounting of HD2*-Modules on the motherboard

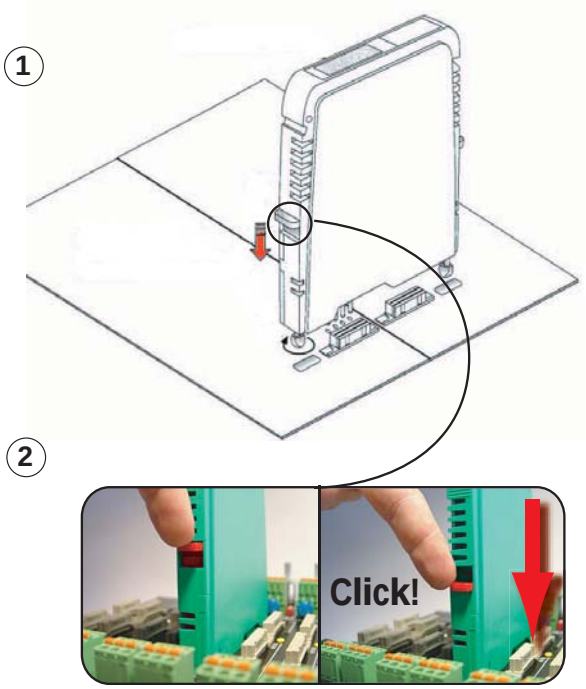
Caution!
Hardware Damage

There is a special connection slot for the diagnostic modules HD2-DM* on the Power Hub motherboard, which is labeled “Diagnostic Module only“.

Do not try to plug other modules into this connection slot. Other modules may be damaged.

To install a new module on the motherboard, proceed as follows:

1. Carefully center the polarisation holes and mate the two connectors, then gently press down the module.
2. Push down the red Quick LOK bars on each side of the module to fix it to the panel (no tools required).



The new module has been installed.

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Dismounting of HD2* Modules from the Motherboard

To dismount a module from the motherboard, proceed as follows:

Push the red Quick LOK bars upwards and lift off the entire module gently.

The module has been removed from the motherboard.

4.4 Repair and Maintenance

If a motherboard is defective, it can be removed from a chain of Power Hubs by linking the two adjacent motherboards by means of a relief connection. The replacement of any part of the Fieldbus Power Hub may be done under live conditions.

Tasks for eleminating malfunctions must only be performed by specialists who are specially trained and authorized for the task.

4.5 Disposal

Disposal of devices and their packaging material must be performed in compliance with the applicable laws and guidelines of the corresponding country.

The devices do not contain batteries which need to be disposed of separately from the products.

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5 Specification

5.1 Overview

The FieldConnex High-density Power Hub is a high-performance power supply for FOUNDATION Fieldbus with redundant configuration as standard for four segments. It consists of a motherboard with sockets for plug-in modules: Two power supply modules per segment and a diagnostic module. The Power Hub is designed for use with fieldbus systems in accordance with IEC 61158-2. This standard specifies how power and communication are transmitted sharing one shielded twisted-pair cable. Communication between field devices and a host system is established by modulating the data signal onto the power stream utilizing Manchester Bus Powered (MBP) transmission.

All FieldConnex Power Hubs feature superior design elements. The main design points are redundancy, passive impedance generation, well balanced circuitry and low heat dissipation.

All active electronic components are located in the plug-in modules. Each module holds the electronic components for only one segment and two modules build a redundant configuration. When an exchange becomes necessary only the smallest amount of electronic components is exchanged compared to block configurations for power supplies. Modules can be exchanged while the system is energized without the use of tools, thus ensuring very high system availability.

Impedance generation prevents the data signal from being short circuited by the power supply's low internal resistance. This impedance generation is designed with passive components such as inductances and resistors with very long durability.

A fully balanced circuit and segment design is important for undisturbed fieldbus operation. An external disturbance through EMI impacts both leads of the shielded twisted-pair cable symmetrically. The data signal is thus undisturbed. Low heat dissipation allows highest packing density inside the cabinet and a very long service life.

The Power Hub feeds fieldbus segments following the High-Power Trunk concept for explosion protection. High energy level on the trunk line is fed to the field instrument via FieldBarriers or Segment Protectors – wiring blocks with energy limitation according to FISCO, Entity, or if you have ever purchased a device: FNICO at each spur. The instrument can be installed in Zone 0/Div. 1 and maintained while the system is energized. Thus limitations for explosion protection are overcome enabling maximum cable lengths and highest number of devices in any explosive area.

A plug-in Advanced Diagnostic Module for fieldbus is available. This module monitors the physical layer online and in real time enabling detection of degradation and faults during operation. Measurement data and alarms are transmitted to the control room thus bringing visibility to the fieldbus physical layer, which can now be treated as active component in Plant Asset Management systems. Operators are enabled to decide on proactive measures to avoid unwanted situations and while the plant is running smoothly.

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The following table summarizes the main features and benefits of the Power Hub:

Features	User benefit
Low heat dissipation of less than 2 W per segment under full load condition.	Long service life. Very high packing density and reduced cooling requirements.
Exchange of modules while the system is energized and load share between power modules.	Increased segment availability
Full balance of electric circuitry with high isolation against RF and in-band interference	High resistance to external disturbance such as EMI.
High-integrity passive power conditioners	Long service life.
Local and remote alarm annunciation	Easy maintenance and troubleshooting
Tolerance against inrush currents during segment start	Long-term, robust operation with tolerance towards field device misbehavior
Full current span operation from 10…350 mA	Flexible segment design and tolerance against live working on field devices
Advanced Diagnostic Module for physical layer fieldbus diagnostics	Improved and known quality of fieldbus installation. Live supervision for preventive and pro-active maintenance. Professional Tools for easy fieldbus troubleshooting

5.2 System components

5.2.1 Motherboard MB-FB-4R.HO.SC

The motherboard MB-FB-4R.HO.SC is the base of the FieldConnex Power Hub designed for the Honeywell Series C system. It connects four fieldbus segments with their respective host interfaces. All connectors are adapted for easy installation and integration into the Series C mechanical and system connector design.

5.2.2 Power Supply Module HD2-FBPS-1.25.360

Modules providing full galvanic isolation between bulk power supply and fieldbus segments are called “Power Supply Modules“. They provide optimal system reliability for applications where cabling and wiring are routed through critical or harsh electrical environments, i.e. where superior protection from electromagnetic interference (EMI) is mandatory.

Power Modules are connected to the motherboards via sockets. They can be exchanged while the system is in operation. In redundant configuration load is shared between two power modules.

5.2.3 Diagnostic Modules

Basic Diagnostic Module

The Basic Diagnostic Module provides basic system diagnostics. It monitors the input voltage of the bulk power supply and each segment for overload and short-circuit conditions. Each Power Supply Module is checked for proper function. Power Modules operating in redundant configuration are checked for compatibility. Status and faults are indicated by LEDs and can be transmitted via dry contact.

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Advanced Diagnostic Module

The Advanced Diagnostic Module is a comprehensive measurement tool for the fieldbus physical layer. It is well suited for commissioning, online monitoring and maintenance. The module provides the exact segment and individual device data needed for detection of changes in the fieldbus physical layer. Segment measurements include fieldbus voltage and load current; device specific measurements are: signal level, noise and jitter. All data is transmitted to the control room via Ethernet. The Diagnostic Manager – Basic Edition shows all data on easy to use displays.

The Diagnostic Manager - Professional Edition offers additional functionality: the Commissioning Wizard generates automated reports; the software displays clear-text messages for troubleshooting of out-of spec behavior. The OPC server transmits user-selectable summary alarms to the DCS.

5.3 Technical Data

System Specification	
Ambient Conditions	
Ambient temperature	-40 ... 60 °C
Storage temperature	-40 ... 85 °C
Shock resistance	15 g 11 ms
Vibration resistance	1 g, 58 to 150 Hz
Humidity	< 95 % non condensing
Mechanical specification	
Connection type for external wiring	Plug with screw flange
Cross core section	Up to 2.5 mm^2
Protection degree	IP 20 acc. to EN 60529
Motherboard mounting	DIN rail 35 mm
Standards	
Shock resistance	DIN EN 60068-2-27
Vibration resistance	DIN EN 60068-2-6
EMC	Namur NE 21 EN 61326 IEC 61158-2
Fieldbus	IEC 61158-2
Hazardous area classification	
Approvals	Zone 2 II 3 G EEx nA II T4 Class I Division 2 Gas Groups A-D

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Basic Diagnostic Module Type HD2-DM-B	
Supply	
Rated voltage	19.2 ... 35 V DC
Rated current	20 mA
Power dissipation	Max. 0.5 W
Indicators/operating means	
LED Pri Power	Green: primary input power connected
LED Sec Power	Green: secondary input power connected
LED ERR	red: 2 Hz flashing, power supply fault (short circuit, undervoltage), redundancy fault
Fault Signal	VFC alarm 1 A, 50 V AC, normally closed

Advanced Diagnostic Module Type HD2-DM-A	
Supply	
Rated voltage	19.2 ... 35 V
Rated current	110 ... 30 mA
Power dissipation	Max. 2 W
Fieldbus interface	
Number of segments	4
Rated Voltage	9 ... 32 V
Indicators/operating means	
LED PRI PWR	Green: primary input power connected
LED SEC PWR	Green: secondary input power connected
LED Seg 1 ... 4	Yellow: Bus activity. Red (flashing with 2 Hz): Alarm Red: Hardware Error
Fault Signal	VFC alarm 1 A, 50 V AC, normally closed
DIP Switch	Diagnostic Address 1 to 247, binary coded

Motherboard Connectors	
Host and trunk terminal	Honeywell Series C system plug connector
Alarm terminal	T-Connector for diagnostic bus

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5.4 Ordering Information

Designation	Part Number	Description
HD2-FBPS-1.25.360	189516	Isolated Fieldbus Power Supply Module with 25 ... 28 V DC and 360 mA output.
HD2-DM-B	131001	Basic Diagnostic Module with LED indication and common relay fault output.
HD2-DM-A	131000	The Advanced Diagnostic Module allows, in conjunction with the FDT/DTM based Diagnostic Manager, to analyze signal and segment parameters as well as measurement of specific system and node physical layer values.
MB-FB-4R.HO.SC	188869	4x redundant segment Fieldbus motherboard with redundant bulk power feed and diagnostic interface, all connectors screw terminal type. Host side adapted for direct connection to Honeywell Series C system.

Accessories

Designation	Part Number	Description
ACC-MB-HON.05	198643	0.5 meter Honeywell System Cabel
ACC-MB-HON.10	198642	1 meter Honeywell System Cabel
ACC-MB-HON.20	198644	2 meter Honeywell System Cabel

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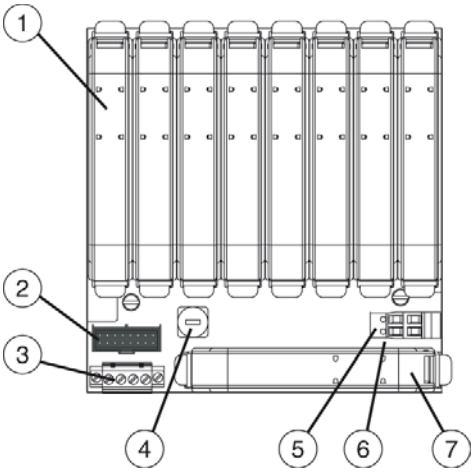
5.5 Component Identity



1 Power Supply Module

2 Honeywell Series C System plug connector

3 Terminal for external power

4 Fuse carrier with integrated fuse T 6.3 A, 250 V

5 T-Connector for diagnostic bus

6 Motherboard MB-FB-4R.HO.SC

7 Diagnostic module

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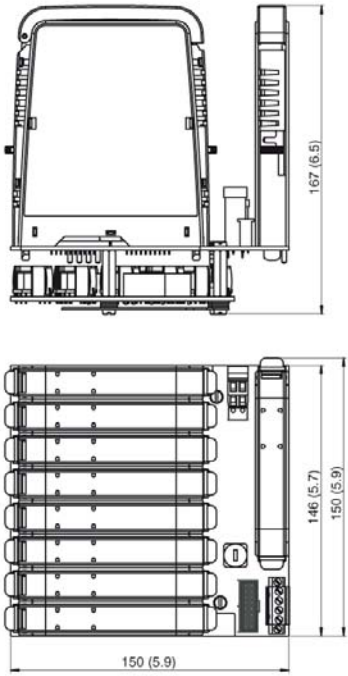
5.6 Dimensional Drawings



All dimensions in millimeters and inches (values in brackets) and without tolerance indication.

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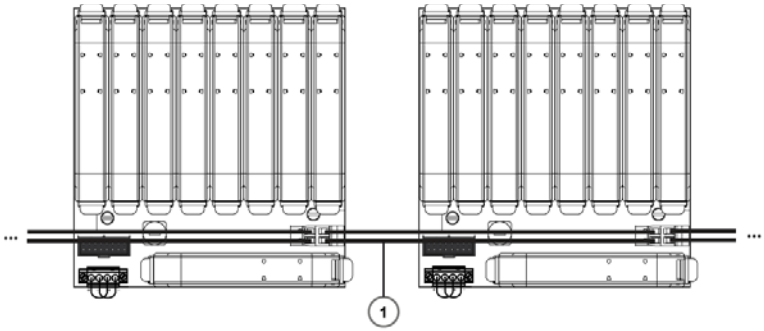
6 Installation and Commissioning

6.1 Shielding and Grounding

The Fieldbus Power Hub High Density Honeywell is grounded via the Honeywell Channel.

6.2 Diagnostic Connection



1 Diagnostic link

Note!

The diagnostic link pictured above can easily be established using a pair of commercially available cables by interconnecting the T-connectors of several motherboards as indicated above.

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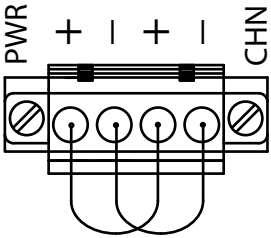
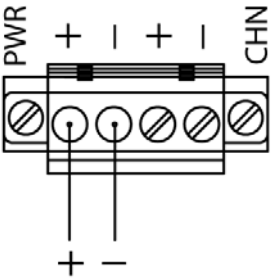
6.3 Power Connection

The Power Hub High Density Honeywell can either be powered via the Honeywell Channel or using an external power supply.

To supply the Power Hub via the Honeywell Channel, connect the power screws to the Honeywell Channel (For details, see chapter 4). Then bridge the power connector using a pair of cables as shown below:



To supply the Power Hub using an external power supply, connect the power supply to the PWR terminals as shown below:



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7 Installation in hazardous areas

7.1 Installation of the High Density Power Hub within Zone 2 or Class I Division 2 area

The Fieldbus Power Hub system may be installed in Zone 2 and Class I Division 2 hazardous areas. The type of protection is EEx nA (non-arcing) for Zone 2 Gas Groups IIC, IIB, IIA, and non-incendive for use in Class I, Division 2 Gas Groups A, B, C and D.

The Fieldbus trunk is always rated EEx nA (non-arcing) for Zone 2 applications. Furthermore, the Fieldbus trunk can be placed within a Division 2 area as long as it is installed according to a Division 2 wiring method. The High Density Power Hub, used in conjunction with the Pepperl+Fuchs Segment Protectors (SP), allows the user to 'hot swap' field devices within Zone 2 or Division 2 environment.The maximum output current of the SPs is limited to 45 mA the maximum voltage to 32V. The necessary safety parameters for field instruments suitable for Zone 2 energy limited or Class I Div. 2 non-incendive field wiring applications is:

Type of protection	Safety-relevant parameters
EEx nL Entity	$U_i \geq 32$ V, $L_i \leq$ 20 µH, $C_i \leq 5$ nF

7.2 Energy-limited, non incendive field wiring for field devices using the Fieldbus Power Supply HD2-FBPS-1.25.360

If the general purpose Fieldbus Power Supply HD2-FBPS-1.25.360 is used in conjunction with Pepperl+Fuchs Segment Protectors (SPs), the outputs of the SP will be classified EEx nL (energy limited) or non-incendive field wiring.

Due to the unlimited trunk energy, live work at the trunk is not permitted without gas clearance. However, live connect or disconnect at the output spurs of the SP is allowed, if the following Entity Concept safety evaluation/requirements for the field devices are followed:

- $32\ V \leq U_i$ (field device)
- L_i (field device) + L (cable) ≤ 0.25 mH
- C_i (field device) + C (cable) ≤ 100 nF

No special safety requirements exist for the host interface, provided the host itself is installed in the safe area. If the host interface is installed in Zone 2 or Div. 2, a Declaration of Conformity or a Certificate of Compliance for EEx nA, non-incendive equipment must be provided.

Field devices with a voltage of $U_i \geq 32$ V, certified EEx nL or EEx i are allowed to be connected to the outputs of the SP under a Zone 2 energy limited, Div. 2 non-incendive field wiring rating.

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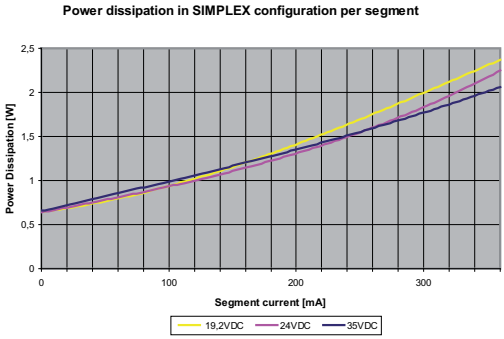
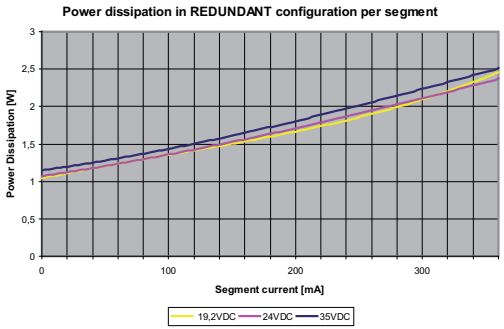
8 Thermal Dissipation

Each Fieldbus Power Supply will dissipate, i. e. lose energy in form of heat. The graphs below illustrate typical power dissipation values in Watts for one segment including motherboard power losses, for given output currents and supply voltages.

Thermal Dissipation of HD2-FBPS-1.25.360, including motherboard





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9 IEC 60079 Codes

Code	Desciption
EX n	Type of protection "n", applied to electrical apparatus such that in normal operation and on certain specified abnormal conditions it is not capable of igniting a surrounding explosive atmosphere. Equivalent US/NEC classification = "non-incendive equipment", apparatus having electrical circuitry that is incapable, under normal operation conditions, of causing ignition of a specified flammable gas-air mixture due to arcing of thermal means.
Ex nA	Non-sparking classified circuits are not allowed to be worked on in life situation if energized, but will under normal conditions not be able of causing ignition of the specified explosive atmosphere. Equivalent US/NEC classification = "non-incendive circuits", a circuit, other than field wiring, in which any arc or thermal effect produced under intended operating conditions of the equipment is not capable, under specified test conditions, of igniting a flammable gas-air, vapor-air or dust-air mixture.
Ex nL	Energy limited circuits which are allowed to be opened and shorted under energized condition. Equivalent US/NEC classification = "non-incendive field wiring", a circuit which under normal conditions of the equipment, is not capable, due to arcing or thermal effects, of igniting a flammable gas-air, vapor-air or dust-air mixture. Normal operation includes opening, shorting or grounding the circuit.
Ex nA [L], Ex nA[nL]	Associated energy limited apparatus, energy limited circuits could be opened and shorted in life situation, e. g. Segment Protector outputs, non-energy limited circuits could only be opened and shorted with gas clearance, e. g. Segment Protector trunk. Equivalent US/NEC classification = "associated non-incendive field wiring apparatus", apparatus in which the circuits are not necessarily non-incendive, but affect the energy in non-incendive field wiring circuits and are relied upon to maintain non-incendive energy levels. Associated non-incendive field wiring apparatus may be either of the following: • Electrical apparatus that has an alternative type of protection for use in the appropriate hazardous (classified) location. • Electrical apparatus not so protected that shall not be used in a hazardous (classified) location. Associated non-incendive field wiring apparatus has designated associated non-incendive field wiring apparatus connections for non-incendive field wiring apparatus and may also have connections for other electrical apparatus.

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