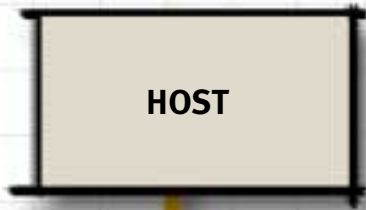




# INSTALLATION TECHNOLOGY FOR PROFIBUS PA



# SYSTEM OVERVIEW AND CONTENT

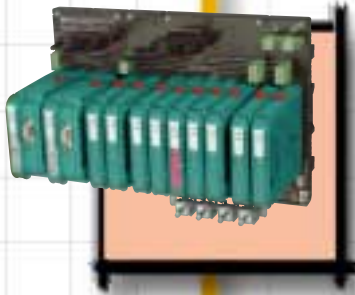


**Plant Communication with Fieldbus** page 4  
Benefit from the future proof, enabling technology

page 12



**Advanced Diagnostics**  
Monitor the fieldbus physical layer: Continuous, in real-time and from remote



**Segment coupler and Power Supply** page 10  
Power your field devices from a wide range of high-performance supply units

page 16

**Fieldbus Distribution with Segment Protection**  
Protect your fieldbus from negative influences of short-circuits

page 6

**Power Feed Concepts**  
Tailor your fieldbus topology exactly to your application



**Fieldbus Distribution** page 15  
Save on cabling with small distributors close to the field devices



page 22

**Fieldbus Cables and Cord Sets**  
Support your signal transmission with high-quality cables fit for all environments.



**Fieldbus Process Interfaces** page 20  
Include your conventional field devices into the fieldbus communication





page **18**

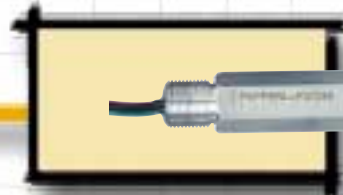
### **Intrinsically safe Fieldbus Distribution**

Combine the optimal explosion protection with high supply power for many field devices



page **24**

### **Fieldbus Terminators** Secure your fieldbus communication



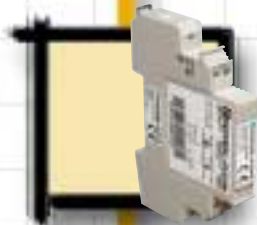
**Tools, Software  
and Services**

page **26**

### **Surge Protection**

Protect your fieldbus equipment against power surges and lightning strikes

page **25**



**Field Devices**

### **Field Devices**

Realize the benefits of modern, sophisticated instrumentation

# PROCESS AUTOMATION WITH FIELDBUS

Digital communication has almost completely penetrated the world of office communication. E-mails are the main media of communication and the world wide web is rapidly becoming the number one information source. When looking into automated production factories, most of the control and measurement signals are communicated digitally today.

Due to the specific requirements of process automation, especially in view of continuous production, plant complexity and availability as well as explosion protection, the acceptance of digital signal communication has been comparably slow.

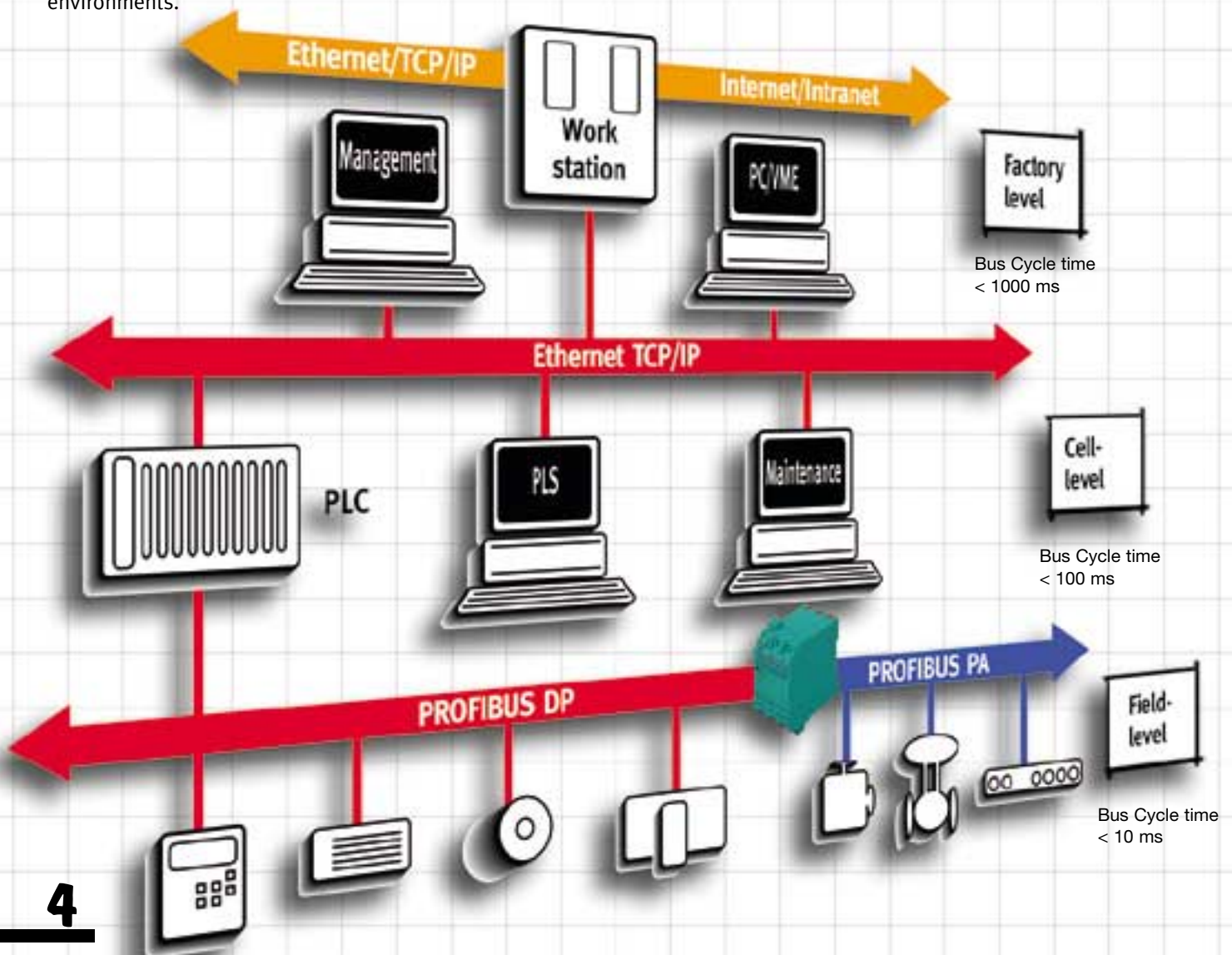
The international standard IEC 61158 "Fieldbus for use in Industrial Control Systems" defines a set of eight fieldbus protocols out of which the FOUNDATION Fieldbus H1 and PROFIBUS PA became rather dominant in the processing industry. These fieldbusses comply with IEC 61158-2 which defines the physical layer of these so-called H1 fieldbusses. The main requirements are transmission of data signals and field device power over the same two-wire cable, the flexibility to design various topology structures, interoperability of the field devices and safety when dealing with hazardous environments.

In general, the digital communication throughout the factory is depicted as a three-level hierarchy (see figure).

In process automation, the digital revolution has succeeded on the upper levels: The plant management and control is done by computers which communicate easily with the business management and ERP systems at the factory level. At the field level, however, there still is dominance of conventional point-to-point cabling between control units and field devices, using the analog 4-20 mA technology for data and power transmission.

This technology has almost reached its limits in terms of optimization and future development capabilities. In order to design an efficient and long lasting process plant communication network, one has to look into fieldbus technology.

For further information on fieldbus in general, please refer to the documentation offered under [www.profibus.com](http://www.profibus.com) and [www.fieldconnex.info](http://www.fieldconnex.info).







## CONNECTING FIELDBUS POWER AND KNOWLEDGE

"The Fieldbus is ready for practical use" was the conclusion at the general assembly 2004 of NAMUR Association of Users of Process Automation after the presentation of several fieldbus experience reports. Two years prior, the FuRIOS study recommended High-Power Trunk Concepts and Fieldbus Process Interfaces as major conditions to efficiently realize the advantages of fieldbus technology, such as advanced diagnosis, less downtime, increased quality and reduced Process C&I points. In the meantime, major process production plants with several thousand fieldbus devices started operation and confirmed the thesis of FuRIOS.

The FuRIOS study as well as the experience reports can be found at [www.fieldconnex.info](http://www.fieldconnex.info).

Sophisticated, comprehensive installation concepts allow the design of fieldbus networks to meet the exact requirements of the specific process production plant, often even at a better price than with previous technologies. The Integrated advanced diagnostic system can shorten possible plant downtime, by enabling users to proactively monitor the fieldbus to prevent faults.

FieldConnex® offers these installation concepts to optimize the live cycle costs of your plant, increase the reliability of your Process C&I and build the base for the process automation technology of the future.



- THE** technology to establish the communication between fieldbus host and the field devices throughout the plant.
- ONE** comprehensive installation system
- MANY** solutions to meet all your requirements
- ALL** the options for your future process automation needs

Fieldbus communication in general requires the functionalities shown in the picture on page 2 of this document. FieldConnex® offers several system components for each function, thus allowing you to design your fieldbus topology in an optimal way for your specific application.

Every plant and environment has its special requirements. So we have created a set of basic concepts which will help you to design your optimum communication topology.

Please note that the realization of these concepts depends on the local and national rules and standards.

Our experienced project engineers will gladly support you. A copy of the updated FuRIOS study with interesting implementation reports, comments and opinions from key users and experts is available from your Pepperl+Fuchs representative.

# HIGH-POWER TRUNK FIELDBUS TOPOLOGY

Depending on the level of explosion hazard, FieldConnex® allows you to tailor the topology exactly to the requirements of your specific plant.

The following examples show the basic Power Supply Concepts that follow the general recommendation of keeping a clear, straight-forward structure with one trunk per fieldbus segment and connecting the field devices to this trunk by means of fieldbus distribution modules.

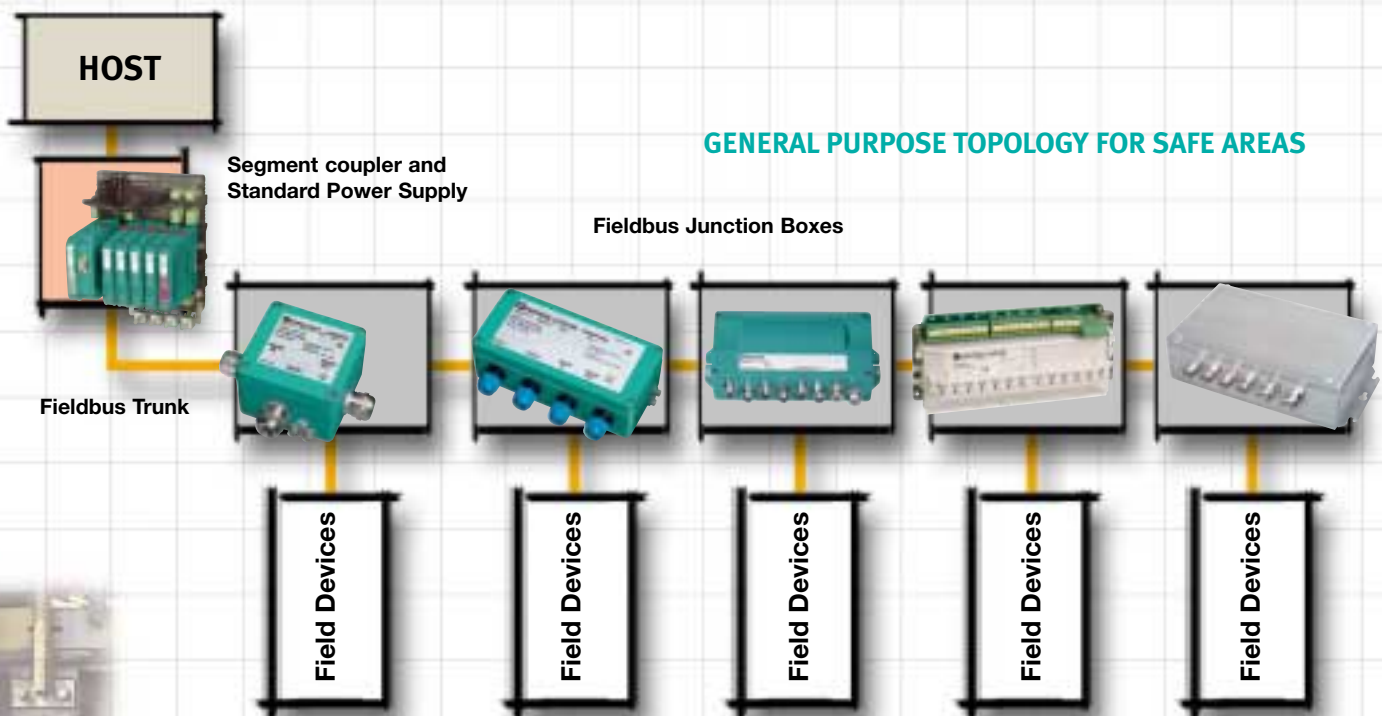
In order to gain the optimum benefit in terms of plant availability and long-term live cycle costs, each field device should have its individual connection point at the trunk.

High-Power Trunk utilizes a mix of robust power supplies and a combination of Ex protection concepts in the field. This allows for longer cable runs and more field devices compared to systems where only one protection concept is used.



As depicted on page 2, FieldConnex includes a large variety of Fieldbus Power Supplies, Cables, Terminators, Surge Protection Modules, Fieldbus Process Interfaces and Fieldbus Distribution Modules. To meet all the requirements of the specific plant, Fieldbus Distribution Modules such as Junction Boxes, Segment Protectors and FieldBarriers are available in different housing versions and cable connection methods.

To design the optimum topology for your specific application, please contact your Pepperl+Fuchs representative. Our experienced project engineers will gladly put their expertise to your best use.



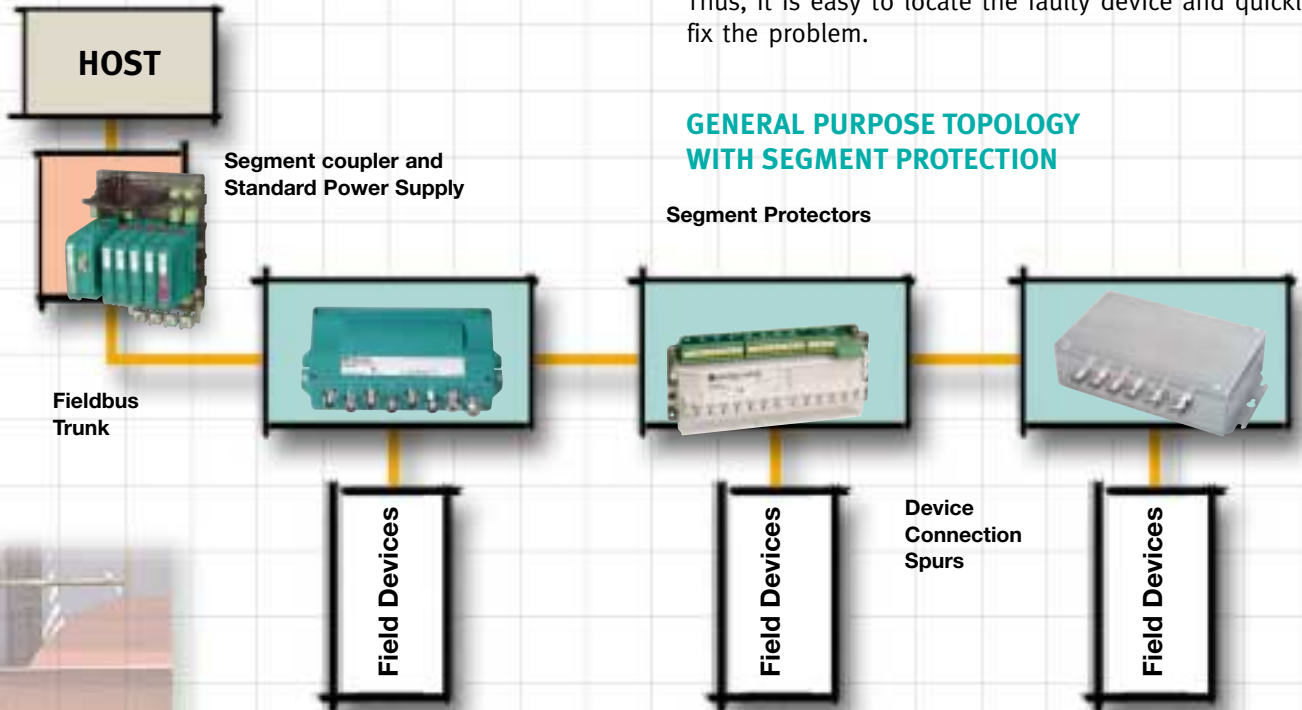
The above picture shows the typical fieldbus topology for non-hazardous environments. The FieldConnex system offers several versions of Junction Boxes to connect the field devices to the trunk, with connection points from one through twelve field devices per box. Since the reduction of cables offers a major cost saving possibility the choice of the Junction Box and its location as close to the field device as possible allows the installer to minimize the lengths of the drop lines.





A disadvantage of simple Junction Boxes is that faults at any one spur will disable communication of the whole segment.

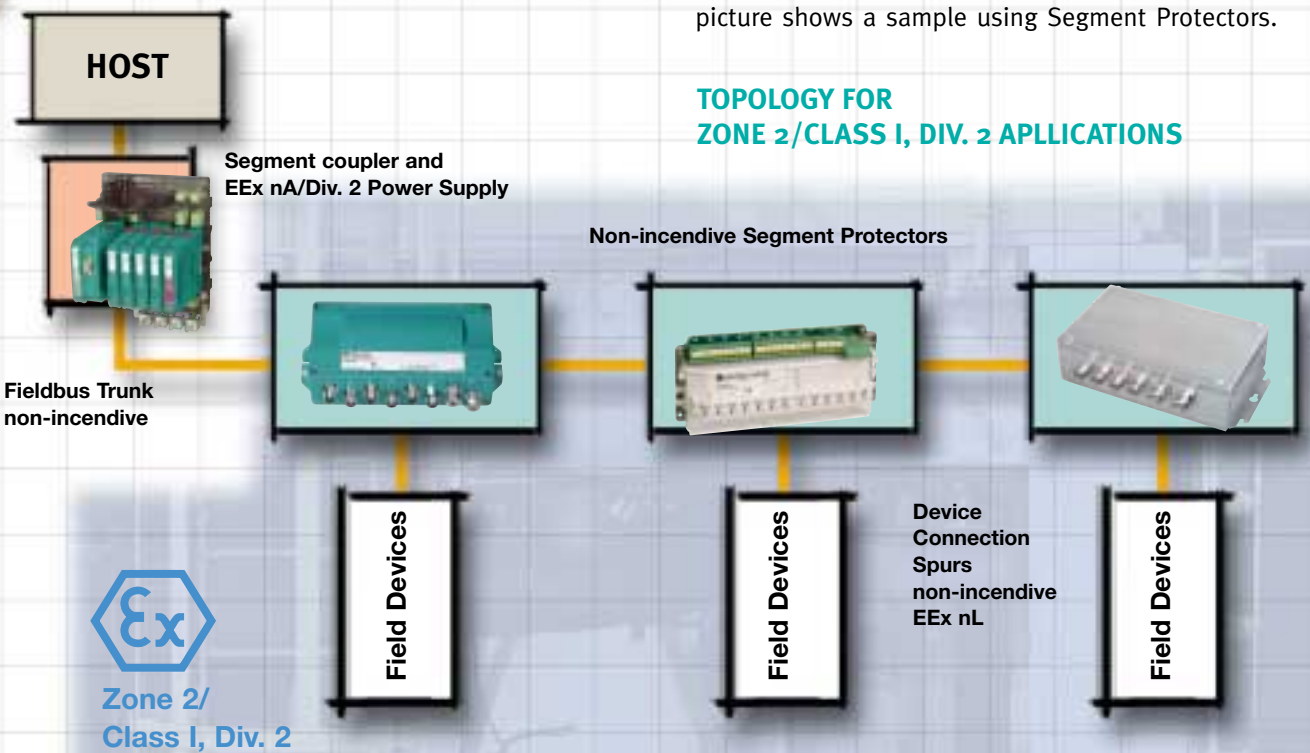
To prevent the negative feedback of a short-circuit at one drop line, FieldConnex® features an advanced fieldbus distribution module under the name Segment Protector. The following picture shows a topology sample using Segment Protectors. In such a topology, only the individual faulty spur will be out of the communication, the remaining segment will keep on working. Thus, it is easy to locate the faulty device and quickly fix the problem.



### GENERAL PURPOSE TOPOLOGY WITH SEGMENT PROTECTION



For applications in Zone 2 / Class I, Div. 2, FieldConnex® offers the appropriate modules to design the topology energy limited Ex nL, non-incendive or according to the Fieldbus Non-Incendive Concept FNICO. The following picture shows a sample using Segment Protectors.



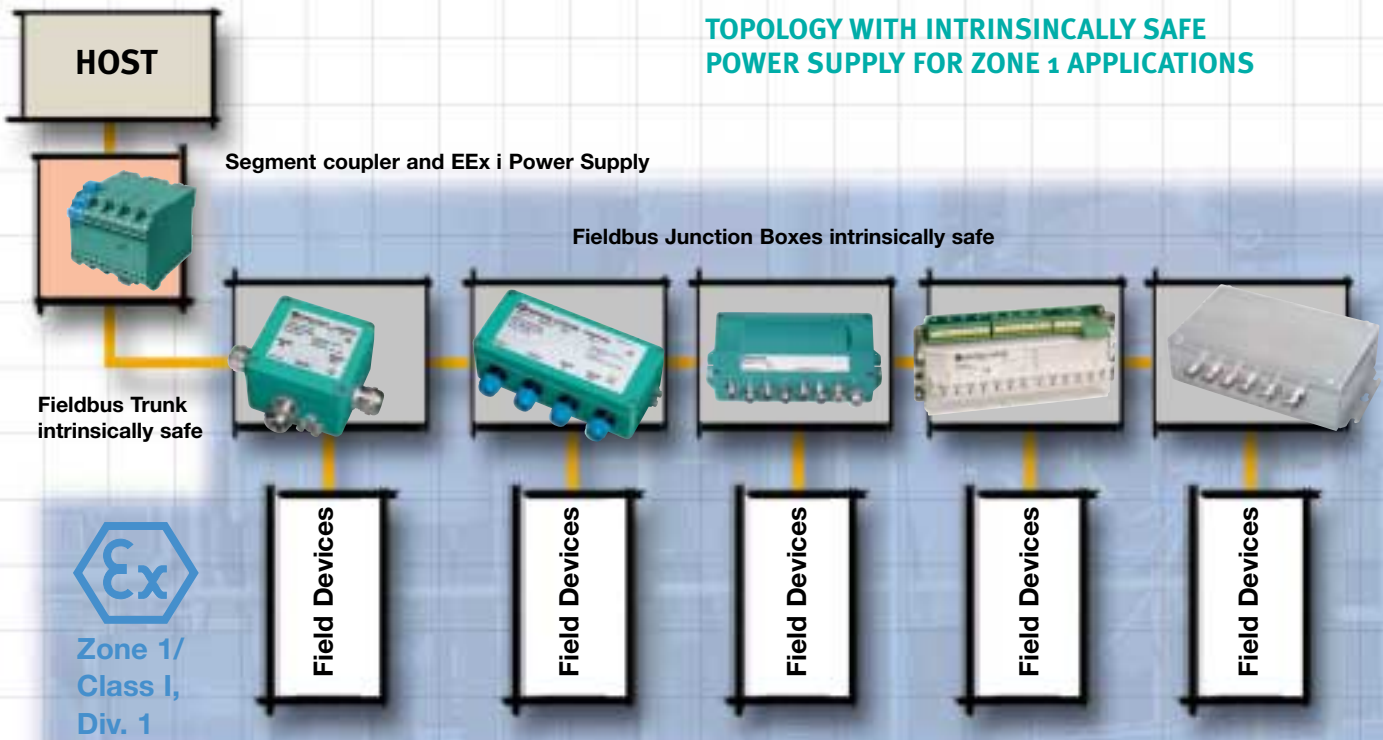
### TOPOLOGY FOR ZONE 2/CLASS I, DIV. 2 APPLICATIONS



Zone 2/  
Class I, Div. 2

In explosion hazardous areas Zone 1 / Class I, Div. 1, the protection method "intrinsic safety" EEx i allows live working on the field devices under operating conditions. FieldConnex offers the appropriate modules to design the fieldbus topology following the requirements of either the Fieldbus Intrinsically Safe Concept FISCO or the Entity Concept. The Picture shows a topology sample utilizing an EEx i Power Supply and Junction Boxes.

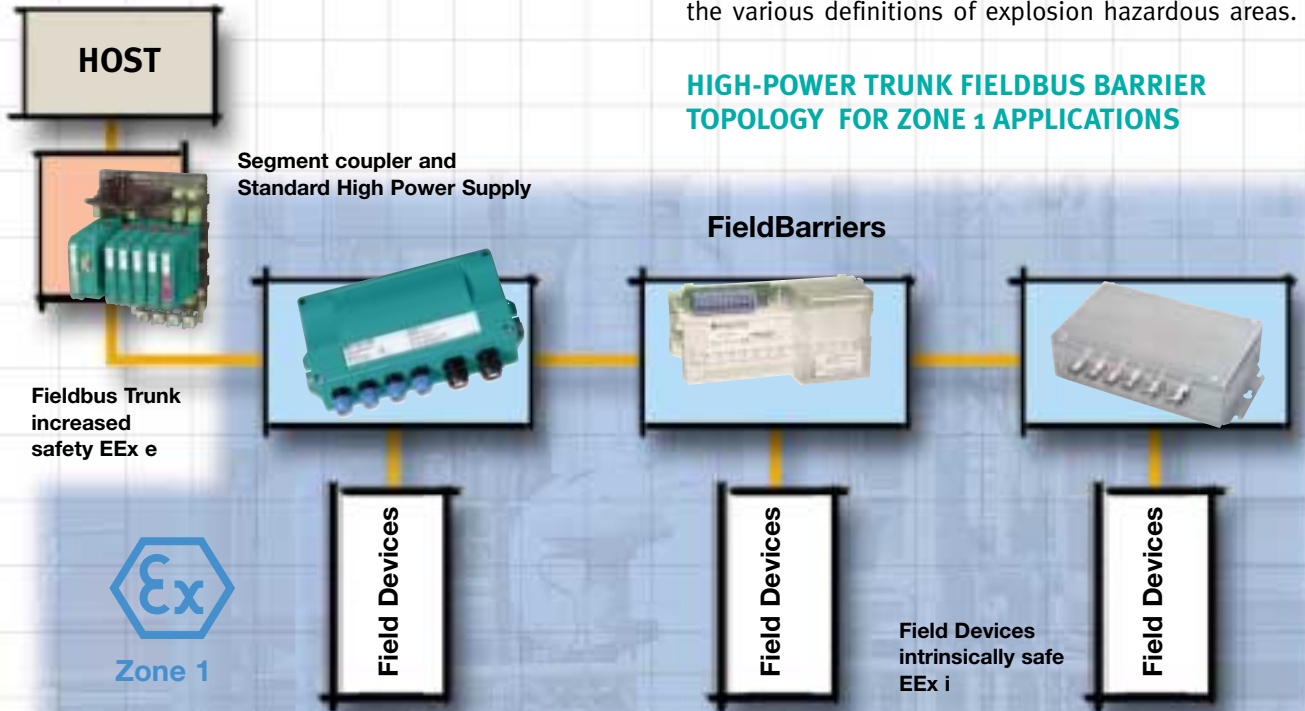
### TOPOLOGY WITH INTRINSICALLY SAFE POWER SUPPLY FOR ZONE 1 APPLICATIONS



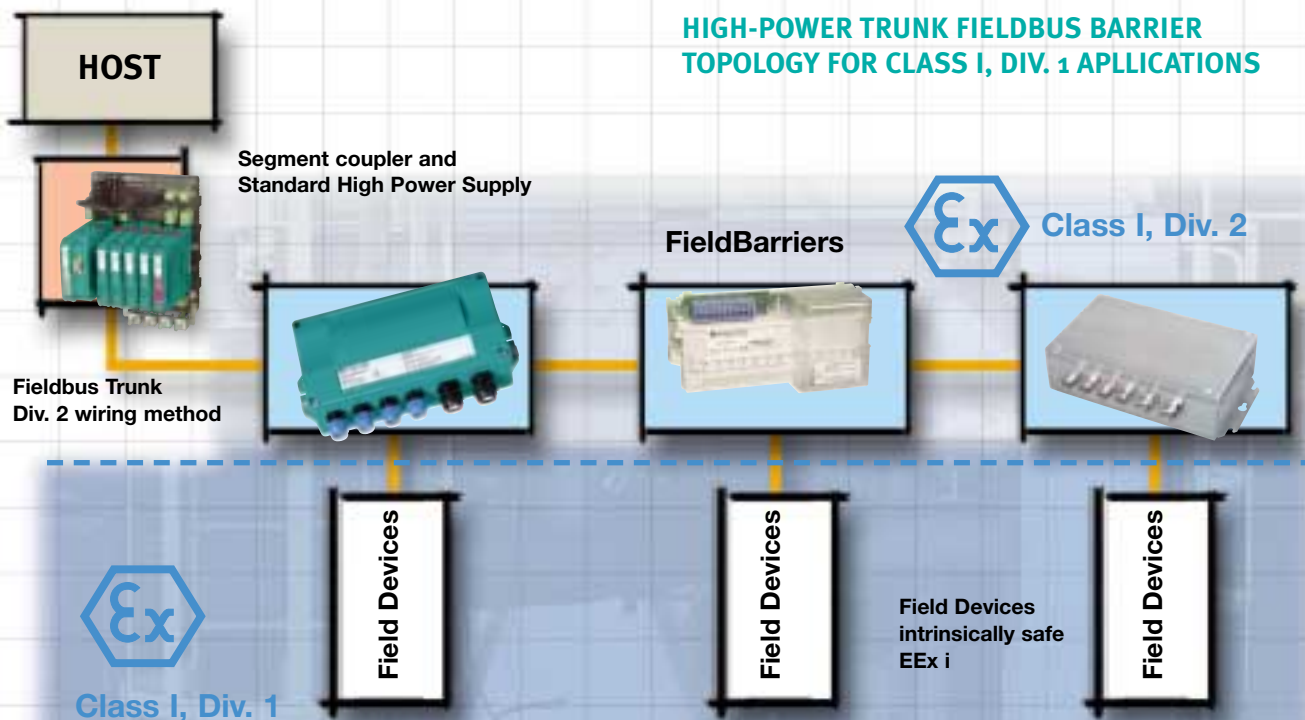




In order to overcome the limitations of intrinsic safety, Pepperl+Fuchs developed, in close cooperation with major users, the advanced FieldBarrier Power Supply Concept. This concept combines the explosion protection methods "increased safety" EEx e and "intrinsic safety" EEx i, thus allowing the connection of as many field devices as possible to the fieldbus segment while still maintaining the benefits of intrinsic safety at the devices. Furthermore the trunk and drop line cables can now be run to the maximum lengths specified in the fieldbus standard. The following pictures show topology samples with FieldConnex® FieldBarriers according to the various definitions of explosion hazardous areas.

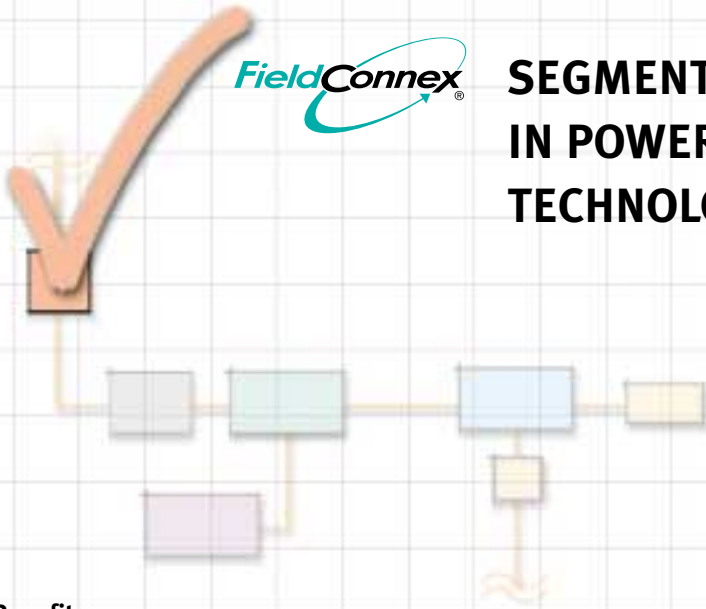


**HIGH-POWER TRUNK FIELDBUS BARRIER TOPOLOGY FOR ZONE 1 APPLICATIONS**



**HIGH-POWER TRUNK FIELDBUS BARRIER TOPOLOGY FOR CLASS I, DIV. 1 APPLICATIONS**

# SEGMENT COUPLER IN POWER HUB TECHNOLOGY



Power Hub, simplex for 4 PROFIBUS PA Segments

## Benefits

- Modular Motherboard system simplifies wiring and allows for easy connection to any DCS via PROFIBUS DP
- Choice of redundancy for gateways and power modules ensures optimal plant availability.
- Four channels, each segment with local PA Master for faster transmission of critical data
- Drop-in replacement of Segment Coupler 2
- CREST-Technology minimizes signal distortion and crosstalk
- High efficiency and maximum availability through passive current conditioning
- Self supervision with local display and signalling
- Advanced Diagnostics for troubleshooting and optimal plant availability
- Installation in Zone 2 / Class I, Div 2. EEx nA, certified by TÜV



## Function

The FieldConnex® Power Hub by Pepperl+Fuchs is a unified system platform for transparent connection of PROFIBUS DP and PROFIBUS PA. It consists of motherboards and standard plug-in modules for communication, power supply and extensive diagnostic functions. The Power Hub's modular design accommodates different power requirements and DCS connections. The Power Hub is certified for installation in Zone 2 / Class I, Div. 2.

Passive components and extensive isolation guarantee minimal signal distortion and maximum system availability. Power loss less than 2 W per module results in very low heat dissipation and contributes to packing density in the marshalling cabinet, benefiting the component life cycle. Power Module, DP-Master and Gateway redundancy add backup protection to ensure system availability.

Each Power Hub features CREST: Crosstalk and Resonance Suppression Technology suppresses crosstalk between fieldbus segments and prevents electronic interference of other sources such as frequency converters.



Fully redundant Power Hub for  
4 PROFIBUS PA Segments



## Motherboards,

the base of the modular Power Hub are mounted on DIN-Rails. All connections are pluggable: fieldbus segments, DCS, bulk power, self supervision and diagnosis relay.

## The Segment Coupler/Gateway

translates data telegrams from PROFIBUS DP to four PROFIBUS PA segments. It operates transparent for DP-Master and field devices: Each device is engineered, configured and operated as PROFIBUS DP slave, based on its native GSD-file.

## Power Modules

feed up to 500 mA current per segment. Simple design and passive current conditioning contribute to very high availability. They are available in two versions:

- Power Supply Module with galvanic isolation and a choice of output voltages for topologies in safe areas and for explosion protection methods according to FISCO and FNICO. Segment protectors and FieldBarriers from FieldConnex® installation technology is used in the field.
- Power Conditioner Modules feature current limitation without galvanic isolation.

## Diagnostic Functions

monitor operation of power modules and communication. Conditions such as short circuit, overload or under voltage are reported via potential-free contact and LEDs. Power Hubs in redundant configuration also check redundancy status and proper combination of power modules.

## Advanced Diagnostics

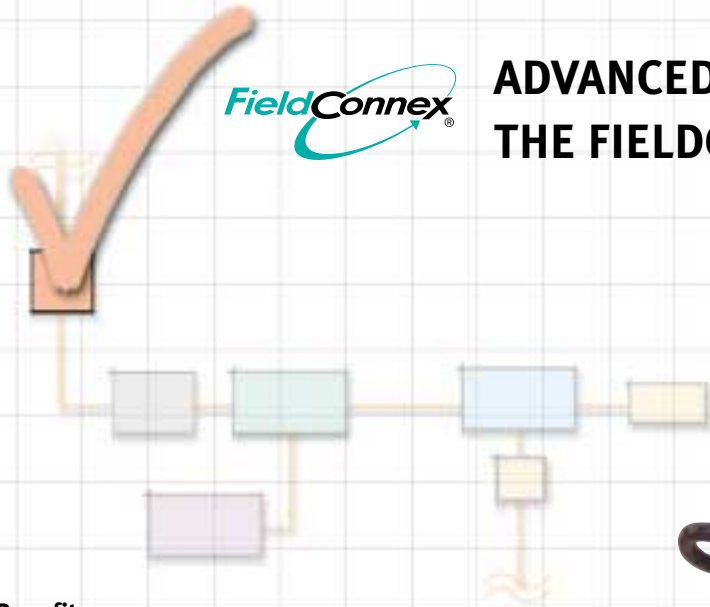
provides commissioning and maintenance personnel with important analysis of fieldbus communications. The various functions are described in more detail on the following pages.

## Technical Data

<b>Profibus Gateway</b>	<b>HD2-GTR-4PA</b>
	PROFIBUS DP/PA Gateway for 4 PA-Segments
<b>Host</b>	Profibus DP 45,45 kbps ... 12 Mbps, automatic adaptation RS 485, Sub-D9-plug
<b>Segments</b>	Profibus PA 31,25 kbps Manchester Bus Powered Up to 31 field devices addressable per segment

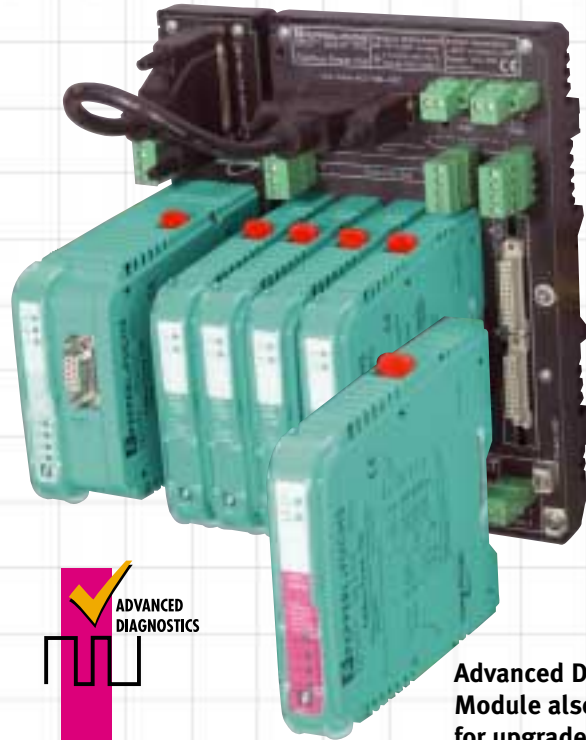
<b>Motherboards</b>	Motherboards for DIN-Rail mounting One Gateway-Motherboard is connected to one power supply motherboard Selectable termination per segment
<b>MB-FB-GT</b>	Motherboard for Gateway
<b>MB-FB-GTR</b>	Motherboard for redundant Gateways
<b>MB-FB-4.GEN</b>	Motherboard for 4 PA-Segments
<b>MB-FB-4R.GEN</b>	Motherboard for 4 PA-Segments and redundant power modules

Power Modules	Output Current max.	Output Voltage max.	Power Loss Typical	Galvanic isolation	Safe Area/ Zone 2/Div. 2	Field Device Protection
<b>HD2-FBCL-1.500</b>	500 mA	30 V	0.8 W		X	Zone 0, 1/Div. 1 FISCO in connection with FieldBarrier
<b>HD2-FBPS-1.500</b>		30 V	2.0 W	X	X	
<b>HD2-FBPS-1.23.500</b>		23 V	1.8 W	X	X	Zone 2/EEx nL Energy limited
<b>HD2-FBPS-1.17.500</b>		17 V	1.6 W	X	X	Zone 2/FNICO

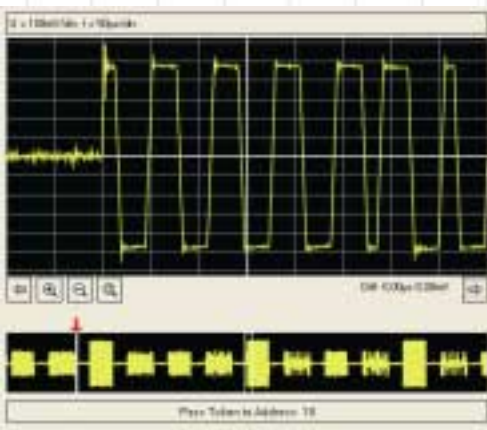


## Benefits

- In-depth Physical-layer Diagnostics with remote access capabilities
- Simplified segment commissioning with network documentation
- Real-time monitoring, alarming and trending detects performance degradation for pro-active maintenance
- Troubleshooting from the control room and from off-site for increased system availability



**Advanced Diagnostic Module also available for upgrade of existing systems**



Oscilloscope visualizes fieldbus communication from remote. A wide selection of trigger events enables pinpointing occasionally occurring events.

In fieldbus applications, monitoring the physical layer maximizes system availability. Fieldbus applications employ complex data communication signals that allow for up to 32 devices to communicate on a single cable. Communications can be adversely effected by such things as water ingress, loose wire strands, corrosion and line noise. Over time these factors compound and can degrade the communication signal leading to network instability. Handheld diagnostic tools do not offer a detailed look into the physical layer or real-time monitoring for system integrity.

The Advanced Diagnostics Module (ADM) for the FieldConnex® Power Hub system provides both monitoring and local data storage of physical layer for up to four fieldbus segments. This patent pending technology provides the user with easy node commissioning, real-time monitoring/alarming and remote accessibility for troubleshooting.



### Commissioning is Simplified:

The Advanced Diagnostic Module measures device signal level, termination, cable continuity, and duplicate node addressing. Commissioning personnel can now perform cable checks and efficiently validate nodes. This module will also generate network documentation, all reducing start-up time and cost.

### Real-time Monitoring and Trending:

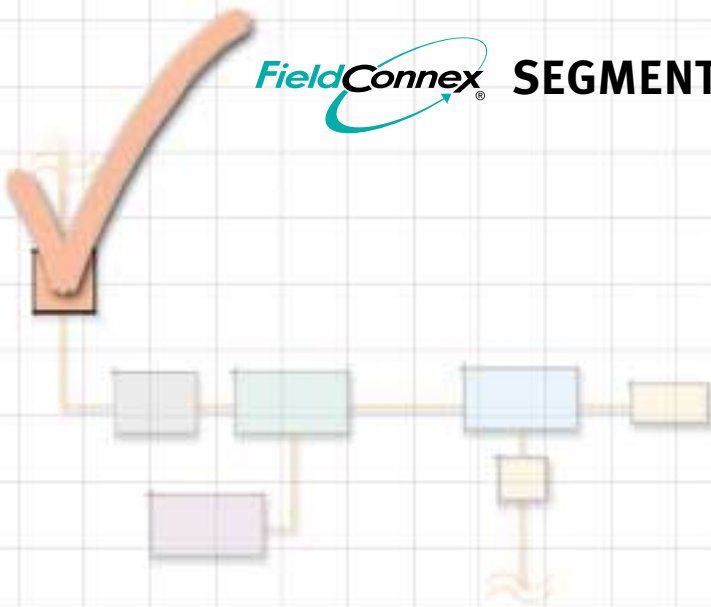
A snapshot of communication taken during commissioning establishes a baseline status of each fieldbus segment. Pre-set, adjustable alarm levels are set to indicate deviations from the initial baseline conditions. The network can now be maintained from a pro-active standpoint, increasing the overall system availability and reducing maintenance cost.

### Remote Access and In-depth Troubleshooting:

The Advanced Diagnostic Module allows for live monitoring from the control room or remotely by an off-site fieldbus expert. To aid in troubleshooting the ADM offers specifics on network characteristics such as crosstalk, signal jitter, resonance and can pinpoint exact node problems. A powerful integrated oscilloscope provides a detailed view on network communication and significantly enhances troubleshooting. The tool supplies everything necessary for quick diagnosis and a faster time to repair.

## Technical Data and Detail

Features	
	Plug-in module for FieldConnex Power Hub system
	Continuous long-term data storage
	Advanced Diagnostic Module supporting four segments
	FDT/DTM-based interface
	Integrated oscilloscope
	Remote access
	The Segment Monitor displays physical layer and communication data per segment and device conveniently on one screen. Each item is classified as excellent, good or out of spec with color indication. The report generator creates a measurement report thereby documenting fieldbus segment validation.
	Mobile Advanced Diagnostic Module available for single segment supervision
Selection of Physical Layer Diagnostics	
	Bulk power health
	Segment voltage and current
	Segment unbalance (signal to earth leakage)
	Segment noise
	Device communication signal level
	Signal polarity
	Signal jitter
Selection of Communication Statistics	
	Segment live list
	CRC error counter (Cyclic Redundancy Check)
	Frame error counter
	Number of received frames



### Segment Coupler SK1

FieldConnex® Segment Coupler SK1 connects PROFIBUS DP and PROFIBUS PA. SK1 is based on the well-known K-System housing and mountable on DIN-Rails, Power Rails or plain on the wall. Different models exist for safe areas and intrinsic safety applications. SK1 is well suited for small applications with only one segment and a limited number of field devices. SK1 is transparent to the DCS and field devices. The SK1 does not require configuration or node addressing.



### Technical Data

<b>SK1</b>	
<b>Host</b>	Profibus DP 93.75 kbps. Connecting terminals Termination 100 Ohm, switchable
<b>Segment</b>	Profibus PA 31.25 kbps Manchester Bus Powered Bus termination 100 Ohm switchable

	<b>Output Current</b>	<b>Output Voltage</b>	<b>Field Device Protection</b>
<b>KFD2-BR-Ex1.3PA.93</b>	max. 100 mA	12.6 V ... 13.4 V	Intrinsically safe according to FISCO
<b>KFD2-BR-1.PA.93</b>	max. 400 mA	24 V ... 26 V	Safe areas

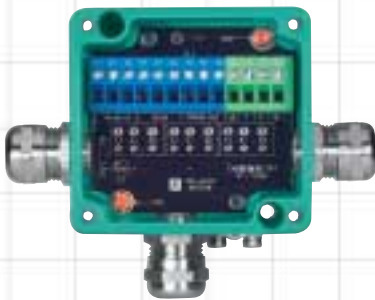


# FIELD BUS DISTRIBUTION: JUNCTION BOX



### Benefits

- Easy connection of devices to the fieldbus segment
- Topologies can be designed exactly to the plant's requirements
- Sturdy housings for harsh environments
- Versions for all hazardous areas
- Several cable connection options
- Various numbers of spur connections allow minimization of installed cables
- A choice of shielding concepts can be implemented



**Junction Box 1-spur, intrinsically safe,  
with terminals and cable glands**  
Housing type: F4

### Fieldbus Distribution

The recommended communication topologies for PROFIBUS PA are clear, easy-to-manage tree or chicken-foot structures. Each field device should have its own connection spur to the trunk of the fieldbus segment. Thus a faulty device can easily be located and the disconnection of a device does not have any influence on the communication of the remaining devices.

FieldConnex® Fieldbus Distributors are available in a huge variety of housing and cable connection types. In conjunction with various numbers of connection points per distributor this allows the flexible planning of the topology exactly to the requirements of the respective plant. The distributors allow the implementation of several shielding and grounding concepts.



**Junction Box 2-spur  
with cable glands**  
Housing type: F3

### Junction Boxes

FieldConnex® Junction Boxes are available for applications in hazardous areas and for general purpose applications. The latter feature an integrated, switchable fieldbus terminator. Besides the connections for pass-through of the trunk, they offer connection points for 1 to 8 spurs. Various types of screening can be employed.

For technical data please see page 17.



**Junction Box 6-spur,  
trunk cable glands,  
spurs connectors M12x1**  
Housing type: F2

# SEGMENT PROTECTOR SHORT-CIRCUIT PROTECTION AT THE SPUR



### Benefits

- Increased plant reliability due to short circuit and overload protection
- Quick and efficient fault localisation and rectification



Segment Protector 12-spur  
DIN Rail mount  
Housing type: R



Segment Protector 8-spur,  
connectors 7/8"  
Housing type: F2



Segment Protector 8-spur  
DIN Rail mount  
Housing type: R



Segment Protector 4-spur,  
stainless steel housing  
Housing type: F6

## Segment Protectors

Built upon the functionality of the Junction Boxes, FieldConnex® Segment Protectors offer short circuit current limitation and overload protection for each spur. This ensures that a fault at any spur does not have any negative feedback on the remaining segment. The unaffected devices continue communicating and the faulty spur can easily be located. The short circuit is indicated by LED and after rectification of the problem, the Segment Protector resets resumes normal operation of the spur.

For chicken-foot topologies, Segment Protectors are available with connection points for up to twelve spurs.

## Technical Data

	Junction Boxes					Segment Protectors		
	F2	F3	F4	F6	R	F2	F6	R
<b>Available housing types</b>								
details see mechanical data								
Number of outputs	4, 6, 8	2	1	4, 6, 8	8	4, 6, 8	4, 6, 8	8, 12
<b>Application, explosion protection</b>								
general purpose, none	x	x	x	x	x			
Non-incendive for 32 V/45 mA Zone 2 / Class I Div. 2, Ex nA[nL]						x	x	x
For flameproof Ex d devices, Zone 1 / Class I Div. 2, Ex me								x
Intrinsically safe, Zone 1 / Class I, Div. 1, Ex i	x	x	x	x	x			
<b>Electrical data</b>								
<b>Supply, trunk</b>								
Rated voltage	max. 35 V DC					max. 35 V DC		
Rated current	max. 4.5 A					max. 4.5 A		
Rated current Ex i versions	max. 3 A					n.a.		
<b>Outputs</b>								
Rated voltage	max. 35 V DC					max. 35 V DC		
Rated current	max. 4.5 A					max. 40 mA		
Rated current Ex i versions	max. 3 A					n.a.		
Short circuit current	n.a.					max. 45 mA		

## Mechanical Data for Junction Boxes and Segment Protectors

Housing types	F2	F3	F4	F6	R
Material	Field mountable aluminium housing			Field mountable stainless steel housing	Housing for cabinet installation on DIN rail
Protection degree	IP67			IP66	IP20
Dimensions (WxLxH)	258 x 160 x 84 mm	175 x 102 x 58 mm	125 x 97 x 58 mm	320 x 220 x 86 mm	217 x 100 x 74 mm
<b>Cable connections</b>					
Terminals 2.5 mm <sup>2</sup> cross-section	x	x	x	x	x
Cable glands (*)	x	x	x	x	
Plug connectors (**)	x	x	x	x	

For detailed information please refer to the data sheets and the electronic configuration tool at [www.fieldconnex.info](http://www.fieldconnex.info)

(\*) cable gland materials: plastic, nickel plated brass, stainless steel, also available in nickel plated brass for armored cables

(\*\*) plug connectors M12x1 or 7/8", each available in nickel plated brass or stainless steel

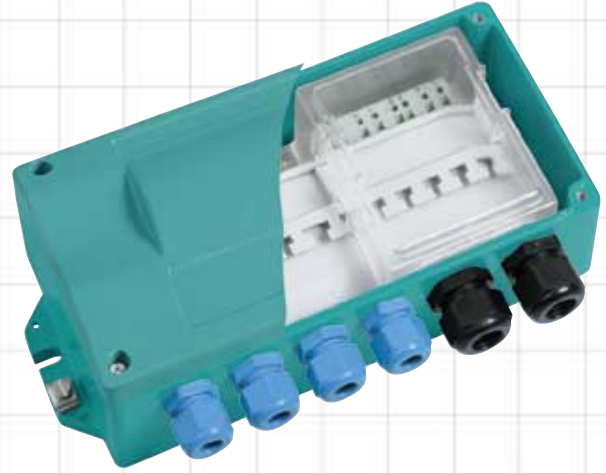


# FIELD BARRIER: HIGH-POWER TRUNK, INTRINSICALLY SAFE SPURS



### Benefits

- Allows the maximum number of field devices per segment even in hazardous areas
- Connects intrinsically safe field devices to standard power supplies
- Protects fieldbus segments against influences from short circuits at the spur
- Installation in Zone 1 / Class I, Div. 2, close to the devices, saves on cabling
- Huge variety of housing and cable connection types meet every plant's requirements



**FieldBarrier with cable glands**  
Housing type: F2

### System solution – three FieldBarriers in customized stainless steel cabinet



**FieldBarrier with stainless steel housing**  
Housing type: F6

## Function

The FieldConnex® FieldBarrier is a highly sophisticated fieldbus distribution module that combines three essential physical layer functions:

- Distributes the fieldbus trunk to as many as four field devices
- Short circuit limitation for each individual device connection
- Use of the reliable explosion protection method 'Intrinsic Safety' for the field devices.

The FieldBarrier is the central element of the High-Power Trunk Concept. It allows the user to utilize the benefits of intrinsically safe field devices while doing away with the limitations in terms of supply power and topology size one typically encounters in hazardous areas.

The power for the field devices is fed into the fieldbus segment by standard fieldbus power supplies without energy limitation for explosion protection. The trunk cable leading into the hazardous area can be installed in explosion protection method 'increased safety' Ex e or Div. 2 wiring methods.

Several FieldBarriers can be daisy-chained on the trunk, each one offering four outputs to connect field devices in explosion protection method 'intrinsic safety' Ex i. This allows servicing field devices without the need for a hot work permit. Each output provides 40 mA of supply current and is in accordance with the FISCO and Entity concept. Up to 120 m of cable can be connected to an output and can be operated without an individual fieldbus terminator. A fault at one output line has no negative influence on the trunk or the other outputs due to the individual short circuit and overload protection of each output. The fault is indicated by LED. Normal operation of the output is resumed after the problem is fixed.

The design of the FieldBarrier ensures high reliability and long-term secure operation. To meet the various requirements of all the different applications, even in harsh environments, the FieldBarrier is available in most housing variants mentioned with the FieldConnex® Junction Boxes.

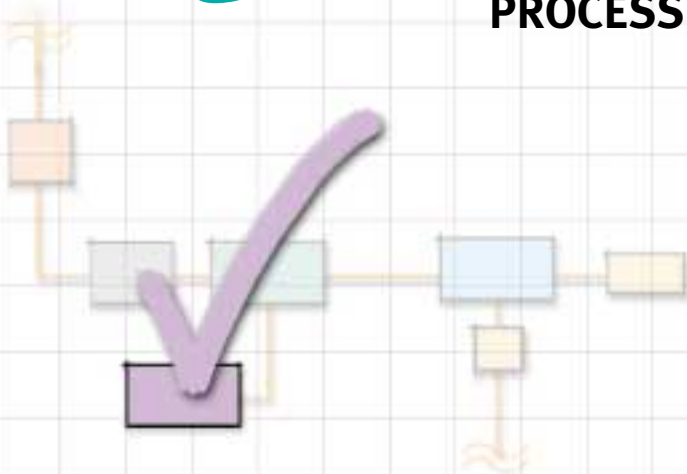
You can plan a fieldbus network with only a few mouse clicks using our Segment Checker software. Segment Checker software is a simple to use planning tool for fieldbus topologies utilizing the High-Power Trunk concept for safe and hazardous areas. It automatically audits the network topology for energy balance and network integrity. Segment Checker is a free download available at [www.segmentchecker.com](http://www.segmentchecker.com).

## Technical Data

	F2D0-FB-Ex4.*	F6D0-FB-Ex4.*	RD0-FB-Ex4
<b>Housing type (*)</b>	field mountable aluminium housing	field mountable stainless steel housing	housing for cabinet installation on DIN rail
<b>Electrical data</b>			
<b>Trunk</b>			
Rated voltage	16 ... 32 V DC	16 ... 32 V DC	16 ... 32 V DC
Terminating impedance	100 Ohm, switchable	100 Ohm, switchable	100 Ohm, switchable
<b>Four outputs, each</b>			
Rated voltage	min. 10 V at 40 mA	min. 10 V at 40 mA	min. 10 V at 40 mA
Rated current	max. 40 mA	max. 40 mA	max. 40 mA
Short circuit current	max. 50 mA	max. 50 mA	max. 50 mA
<b>Mechanical data (*)</b>			
Cable connections	terminals 2.5 mm <sup>2</sup> cross-section or plug connectors		
Housing (WxLxH)	258 x 160 x 84 mm	320 x 220 x 86 mm	217 x 100 x 74 mm
Protection degree	IP 67	IP 66	IP 20

Detailed information, data sheets and our planning tool Segment Checker are available for download at [www.fieldconnex.info](http://www.fieldconnex.info)

# FIELDBUS PROCESS INTERFACES



**Binary Interface for four intrinsically safe solenoid valves or twelve binary input signals**

### Benefits

- Easy integration of almost all conventional signals into the fieldbus communication
- Safe installation in Zone 1 / Class I, Div. 1 due to intrinsic safety according to FISCO and Entity
- Lead breakage and short circuit monitoring for each conventional signal cable
- Galvanic isolation between PROFIBUS PA segment and conventional connections
- Power supply for most Interfaces via the fieldbus cable
- **Valve Coupler:** Efficient control of four solenoid valves with end position detection by means of one fieldbus address, comfortable software functions integrated
- **Fieldbus-Pneumatic Interface:** Up to 32 heavy-duty control valves are fed and controlled by just one fieldbus cable and one compressed air supply
- **MiniRIO:** flexible fieldbus integration of a multitude of signals, including temperature and frequency inputs, due to modular concept

**MiniRIO for integration of almost all conventional signals into PROFIBUS PA communication**



**Fieldbus-Pneumatic Interface for 12 pneumatic control valves**





## Function

The wide range of FieldConnex® Fieldbus Process Interfaces are designed to integrate most of the conventional signals existing in a plant into the PROFIBUS PA communication. All Interfaces are intrinsically safe and can be installed in Zone 1 / Class I, Div. 1 of an explosion hazardous area. They record lead breakage or short circuits on the binary signal cables and generate appropriate alarm messages. With most interfaces the operation power is supplied over the fieldbus cable. Valves and sensors can be located in Zone 1 / Class I, Div. 1.

### The Sensor Interface

allows connection of up to twelve binary sensors such as NAMUR sensors or mechanical contacts to one fieldbus address.

### The Valve Coupler

can be installed close to the valves in a Zone 1 / Class I, Div. 2 hazardous area. The valves themselves can be located in Zone 0 / Class I, Div. 1. Power is supplied to the Valve Coupler via the fieldbus cable which is also used for data exchange, parameter assignments, alarms and return messages. No additional devices or wiring are needed. In accordance with the fieldbus philosophy, monitoring and diagnostic measurements are included in the field device.

### The Fieldbus-Pneumatic Interface

is a system solution from the FieldConnex portfolio, combining the Valve Coupler with solenoid and amplifier valves in one convenient housing. The only required connections on the supply side are the PROFIBUS fieldbus and the pressure air line. The connection to the heavy-duty pneumatic control valves is done quickly and easily by attaching the pneumatic hoses and signal lines to the pre-fabricated connection points.

The Valve Coupler forms the communication interface by connecting four valves to one fieldbus address. Thus, the number of connectable valves can be increased in groups of four. The Valve Coupler actuates the integrated solenoid valves which in turn opens or closes the pneumatic control valves. 3/2-way and 5/2-way solenoid valves can be combined as desired. For larger installations, the FieldConnex FieldBarrier can be incorporated into the interface housing, thus controlling a multitude of pneumatic valves via just one fieldbus cable.

### The MiniRIO

is based on the modular IS-RPI system and connects a multitude of conventional signals to one fieldbus address, such as binary and analogue in- and outputs as well as temperature and frequency inputs. The power supply and pre-configured connection points for the conventional signal leads are combined in one stainless steel field mountable housing. The only connections required are the intrinsically safe fieldbus line and the power line in increased safety Ex e.

## Technical Data

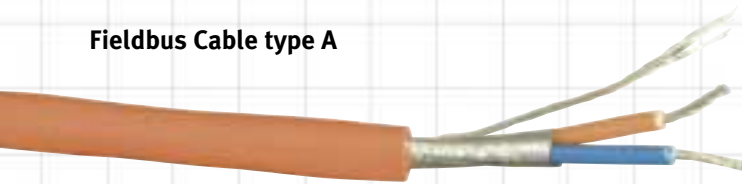
	Sensor Interface FD0-BI-Ex12.PA	Valve Coupler FD0-VC-Ex4.PA	Fieldbus-Pneumatic Interface
<b>Electrical data</b>			
<b>Fieldbus Connection</b>			
Rated voltage	9 ... 32 V	9 ... 32 V	9 ... 32 V
Rated current	max. 23 mA	max. 23 mA	Depending on no. of Valve Couplers
<b>Binary inputs</b>			
Sensor supply voltage	max. 5 V	5 V	5 V
Sensor supply current	max. 5 mA	5 mA	5 mA
Max. cycle time	Depending on no. of sensors	8 x 12.5 ms	8 x 12.5 ms per Valve Coupler
<b>Binary outputs</b>			
Output voltage	n.a.	6.4 ... 7.9 V	–
Operating current	n.a.	1 mA	–
<b>Explosion Protection</b> Intrinsically safe according to FISCO and Entity			
<b>Pneumatical data</b>			
Solenoid valve type	–	–	SAMSOMATIC 3756 / 3964
Switching	–	–	3/2-way and 5/2-way combinable
Central compressed air supply			max. 6 bar
<b>Mechanical</b>			
Housing	Field mountable	Field mountable	Customizable stainless steel field housing
Dimensions (WxLxH)	187 x 150 x 46 mm	187 x 150 x 46 mm	Depending on housing type
Protection degree	IP65	IP65	IP66

For information on modular MiniRIO please refer to documentation of IS-RPI

For detailed information please refer to data sheets and documentation at [www.fieldconnex.info](http://www.fieldconnex.info)



**Fieldbus Cable type A**



**Fieldbus Cable type A with additional armor**



**Benefits Fieldbus cables**

- Type A fieldbus cable as recommended in the PROFIBUS PA technical guideline
- Meets requirements of IEC 61158-2 as well as FISCO
- For indoor and outdoor applications
- Resistant against sunlight and UV radiation
- Armored versions for harsh environments
- Available in recommended colors:
  - orange for Non-IS applications
  - blue for IS applications
- Available as bulk cable on reels in standard lengths

**Mini Cord Set with 7/8" connector**



**Benefits Cord Sets**

- Pre-configured fieldbus type A cables with either male or female connector on one side and flying leads on the other side
- Sturdy connectors for all environments with either stainless steel or epoxy coated coupling nuts
- Solid termination at the fieldbus distribution module
- Enables quick disconnection of field device by means of connectors
- Available in different colors and lengths of 2 m, 5 m or 10 m as versions:
  - FieldConnex™ Mini Cord Set (4-pin 7/8" connector)
  - FieldConnex™ Micro Cord Set (4-pin M12x1 connector)

## Function

The FieldConnex® Fieldbus Cables are designed specifically for use in fieldbus installations according to IEC 61158-2. They feature two 0.8 mm (18 AWG) conductors with a drain wire and overall foil shield. They meet all requirements of the PROFIBUS PA technical guideline as well as FISCO and FNICO. Cables, Cord Sets and Extension cables can be used for indoor and outdoor installations. The sheathing materials are safe against UV radiation and have low toxic emissions according to fire safety regulations. They are available in all recommended colors for different applications and explosion protection methods.

Fieldbus bulk cables are available in higher wire gauges, too, to reduce attenuation in extended topologies. They come on reels in standard lengths for efficient trunk installations as well as hard wiring of spurs on both field device and fieldbus distribution modules such as Junction Box, Segment Protector or FieldBarrier. For enhanced safety and harsh environments there are versions with additional armoring.

FieldConnex® Cord sets will be used for the interconnection of a field device with a connector to a Junction Box, Segment Protector or FieldBarrier with cable glands. Thus it is easy to quickly disconnect the field device while the passive communication topology remains solidly terminated. The connector can be either male or female, all recommended sheathing colors are available.

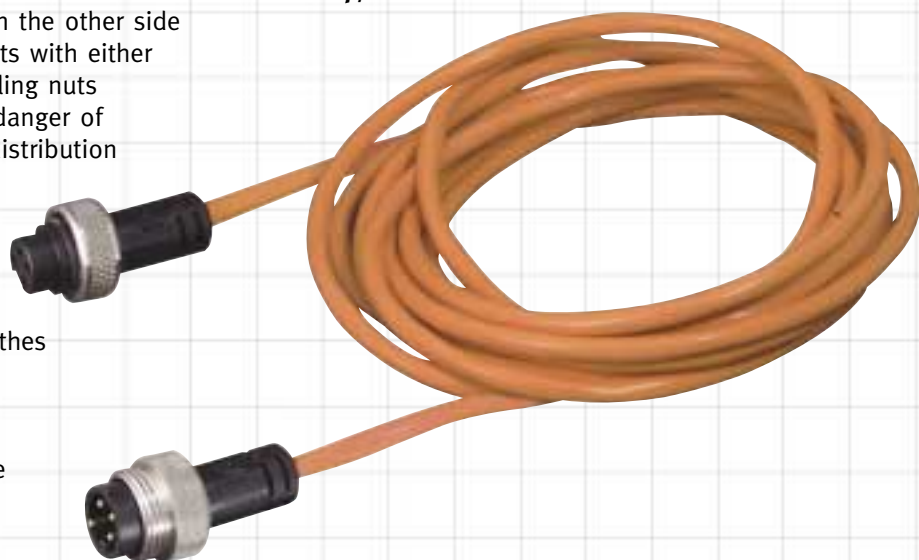
FieldConnex® Extension Cables allow a quick and easy installation of the fieldbus topology by reducing the need for cable terminations. They feature pre-configured male and female connectors, thus guaranteeing faultless connections by omitting the danger of wrong wire terminations. Extension Cables are the best choice for modifications or elongations of existing networks.

For detailed information please refer to documentation and electronic configuration tool at [www.fieldconnex.info](http://www.fieldconnex.info)

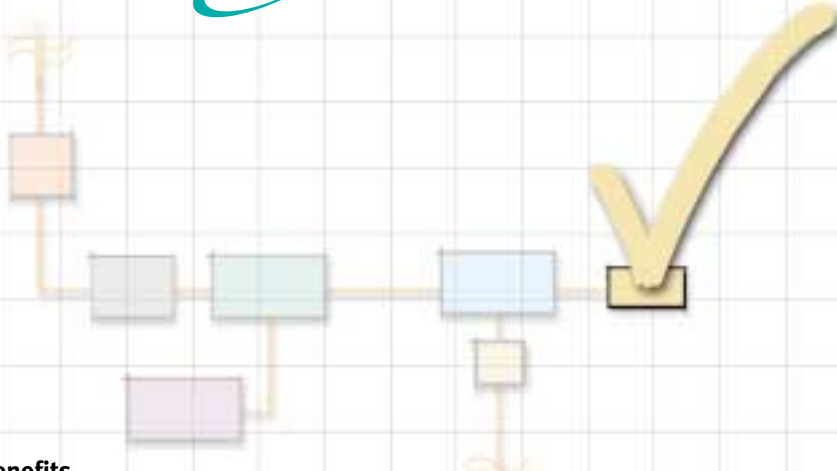
## Benefits Extension Cables

- Pre-configured fieldbus type A cables with male connector on one side and female on the other side
- Sturdy connectors for all environments with either stainless steel or epoxy coated coupling nuts
- Quick and easy installation with no danger of wrong termination at both fieldbus distribution module and field device
- Enables quick disconnection of field device
- Easy modification and elongation of existing installations
- Available in different colors and lengths of 2 m, 5 m or 10 m as versions:
  - FieldConnex® Mini Extension Cable (4-pin 7/8" connectors)
  - FieldConnex® Micro Extension Cable (4-pin M12x1 connectors)

## Mini Extension Cable with 7/8" connectors







**Fieldbus Terminator for cabinet installation on DIN rail**

**Benefits**

- Secure clear fieldbus communication by avoiding signal reflections
- According to fieldbus standard IEC 61158-2
- Intrinsically safe versions according to FISCO and Entity
- Versions for explosion protection flameproof Ex d
- Field mountable versions in sturdy screw-in housings IP67
- Various thread versions to fit in most field devices
- Versions for cabinet installation on DIN rail

**Fieldbus Terminator for field installation in sturdy screw-in housing**



**Function**

To ensure a clear, safe digital fieldbus communication any signal reflections in the fieldbus lines have to be avoided. Therefore each fieldbus segment requires specific terminating impedances at the opposing ends. With the FieldConnex® System the appropriate fieldbus terminators are integrated in the power supply modules. At the field side the termination can be switched on at most of the FieldConnex® modules. In cases where external terminators are required FieldConnex® offers a variety of terminators either for cabinet installation on DIN rail or in sturdy housings for installation in hazardous environments. The latter are available for different explosion protection methods and with various threads for installation at the field device.

**Technical Data**

	<b>KMD0-FT-Ex</b>	<b>F*-FT-I</b>	<b>F*-FT-D</b>
<b>Explosion protection</b>	Intrinsically safe Ex i	Intrinsically safe Ex i	Flameproof Ex d
<b>Housing type</b>	For cabinet installation on DIN Rail	Screw-in housing for field installation	
<b>Electrical</b>			
Rated voltage	max. 32 V DC	max. 32 V DC	max. 32 V DC
<b>Mechanical</b>			
Connections	Terminal 2.5 mm <sup>2</sup>	Cables 0.75 mm <sup>2</sup>	Cables 0.75 mm <sup>2</sup>
Housing (WxLxH)	20 x 93 x 65 mm	23 x 75 x 23 mm	23 x 75 x 23 mm
Protection degree	IP20	IP67	IP67
Thread versions	n.a.	FS: ISO M20 x 1.5 FP: PG 13.5 FN: 1/2" NPT	FS: ISO M20 x 1.5 FP: PG 13.5 FN: 1/2" NPT

For detailed information please refer to data sheets at [www.fieldconnex.info](http://www.fieldconnex.info)



**Modular Surge Protector, complete unit for cabinet installation**



**Benefits**

- Protects fieldbus host system and instruments against voltage surges and spikes
- Versions for general purpose applications as well as intrinsically safe according to FISCO and Entity
- Sturdy field mountable versions for Ex d field devices
- DIN rail versions can serve as marshalling terminal
- Modular DIN rail system with base and protection modules separately for easy exchange and testing
- Can be used for 4...20 mA signal loops with HART, too



**Surge Protector for field installation in sturdy screw-in housing**

**Modular Surge Protector, base module for DIN rail mounting**

**Function**

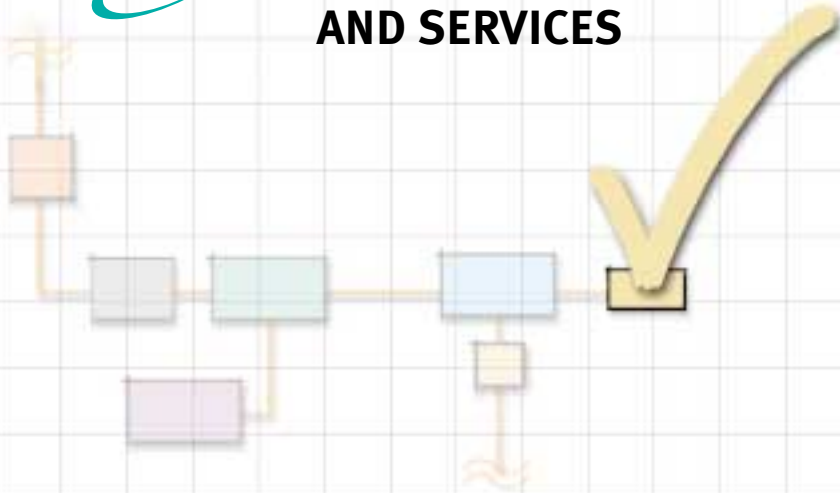
FieldConnex® Surge Protection Devices protect fieldbus devices safely from damages caused by voltage surges and lightning strikes. They allow the coordinated use in the EMC-orientated Lightning Protection Zones Concept in accordance with IEC 61312-1.

The modular Surge Protectors consist of various base and protection modules. The base modules are designed for cabinet installation on DIN rail and hold the removable protection module. Removal of the latter interrupts the signal transmission or leaves it unimpaired, depending on the base module version.

FieldConnex™ Surge Protectors are also available in sturdy screw-in housings for installation at the field devices in harsh environments, either in explosion protection method Ex i or Ex d.

**Technical Data**

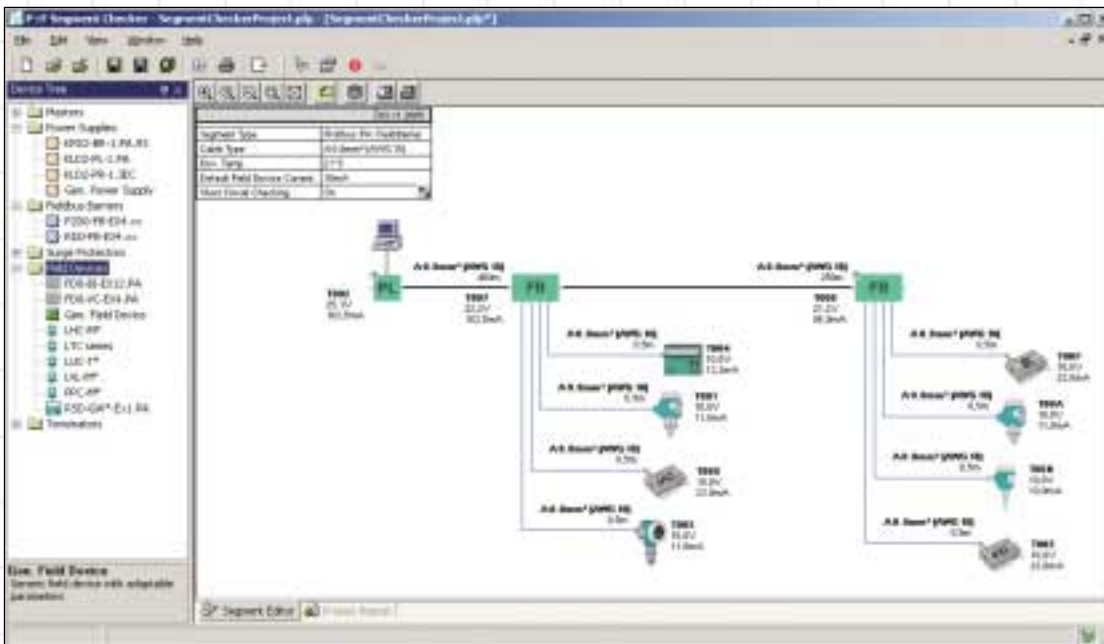
	DP-LBF-*	DP-LBF-I*	F*-LBF-I*	F*-LBF-D*
<b>Explosion protection</b>	None	Intrinsically safe Ex i	Intrinsically safe Ex i	Flameproof Ex d
<b>Housing type</b>	For cabinet installation on DIN Rail		Screw-in housing for field installation	
<b>Electrical</b>				
Rated Voltage	34.8 V	34.8 V	32 V	32 V
Rated Current	1 A	500 mA	550 mA	550 mA
Max. Surge Current	20 kA	20 kA	20 kA	20 kA
Voltage protection level at max. rated current	60 V	60 V	60 V	60 V
<b>Mechanical</b>				
Connections	Terminal 2.5 mm <sup>2</sup>	Terminal 2.5 mm <sup>2</sup>	Cables 1.0 mm <sup>2</sup>	Cables 1.0 mm <sup>2</sup>
Housing (WxLxH)	12 x 90 x 58 mm	12 x 90 x 58 mm	23 x 75 x 23 mm	23 x 75 x 23 mm
Protection degree	IP20	IP20	IP67	IP67
Thread versions	n.a.	n.a.	FS: ISO M20 x 1.5 FP: PG 13.5 FN: 1/2" NPT	FS: ISO M20 x 1.5 FP: PG 13.5 FN: 1/2" NPT



## Segment Checker

Segment Checker software is a simple planning tool for fieldbus topologies utilizing the High-Power Trunk concept for safe and hazardous areas. Combine field devices and distribution modules via drag and drop from an extensive library to create a fieldbus topology. Automatic auditing of energy balance and network integrity helps to optimize your network. Concise presentation via graphs and reports provides information for detailed engineering.

Get the most recent version from your Pepperl+Fuchs representative or online at [www.segmentchecker.com](http://www.segmentchecker.com).







### Mobile Advanced Diagnostic Module

A mobile advanced diagnostics module with USB-port for direct connection to a laptop is available for local diagnostics and troubleshooting.

It provides all functions described on pages 12-13 for a single segment only. Separate power leads are provided for temporary installation inside the marshalling cabinet.



### Anytime – Online

Our products' data sheets, operating instructions, installation guides and certificates are at your disposal anytime via Internet. Configuration files such as GSD or DTM are available for download.

Gain new knowledge from application reports and white papers regarding recent developments and experience about this rapidly developing world of fieldbus technology. A search engine and the menu navigation will support you in your search for details at [www.pepperl-fuchs.com](http://www.pepperl-fuchs.com) and [www.fieldconnex.info](http://www.fieldconnex.info).



### Consulting, Support and Custom Solutions

Our experienced project engineers have the skills and experience to manage fieldbus projects. Our "Systems and Solutions" team tailors fieldbus distribution solutions to your needs.

The Pepperl+Fuchs Support Team is at your disposal for your questions regarding planning, commissioning and operation of fieldbus.



## SIGNALS FOR THE WORLD OF AUTOMATION

For half a century Pepperl+Fuchs has been continually providing new impetus to the world of automation. We develop, manufacture and market electronic sensors and interface modules through our worldwide network. Our global presence and highly flexible production and service organisations enable us to offer you complete individual solutions – right where you need us! We know what we are talking about – because today Pepperl+Fuchs is the company with the largest selection of industrial sensor technology in the world – serving an exceptionally broad spectrum of applications.

**Our signals move the World.**



[www.pepperl-fuchs.com](http://www.pepperl-fuchs.com)

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