

A large, complex industrial facility, likely a refinery or chemical plant, is shown at night. The scene is illuminated by numerous bright lights, creating a dramatic, high-contrast environment. The structure is composed of multiple levels of platforms, walkways, and large cylindrical vessels, all interconnected by a dense network of pipes and ladders. The overall color palette is dominated by deep blues and purples, with bright white and yellow highlights from the lights. The background is dark, making the illuminated structures stand out prominently.

# Delivering high reliability in Fieldbus Networks

**Crouse-Hinds**  
by **EAT•N**

# The safety you rely on

Delivering world-class reliability and safety in high consequence harsh and hazardous environments

**Crouse-Hinds**  
by **EAT•N**



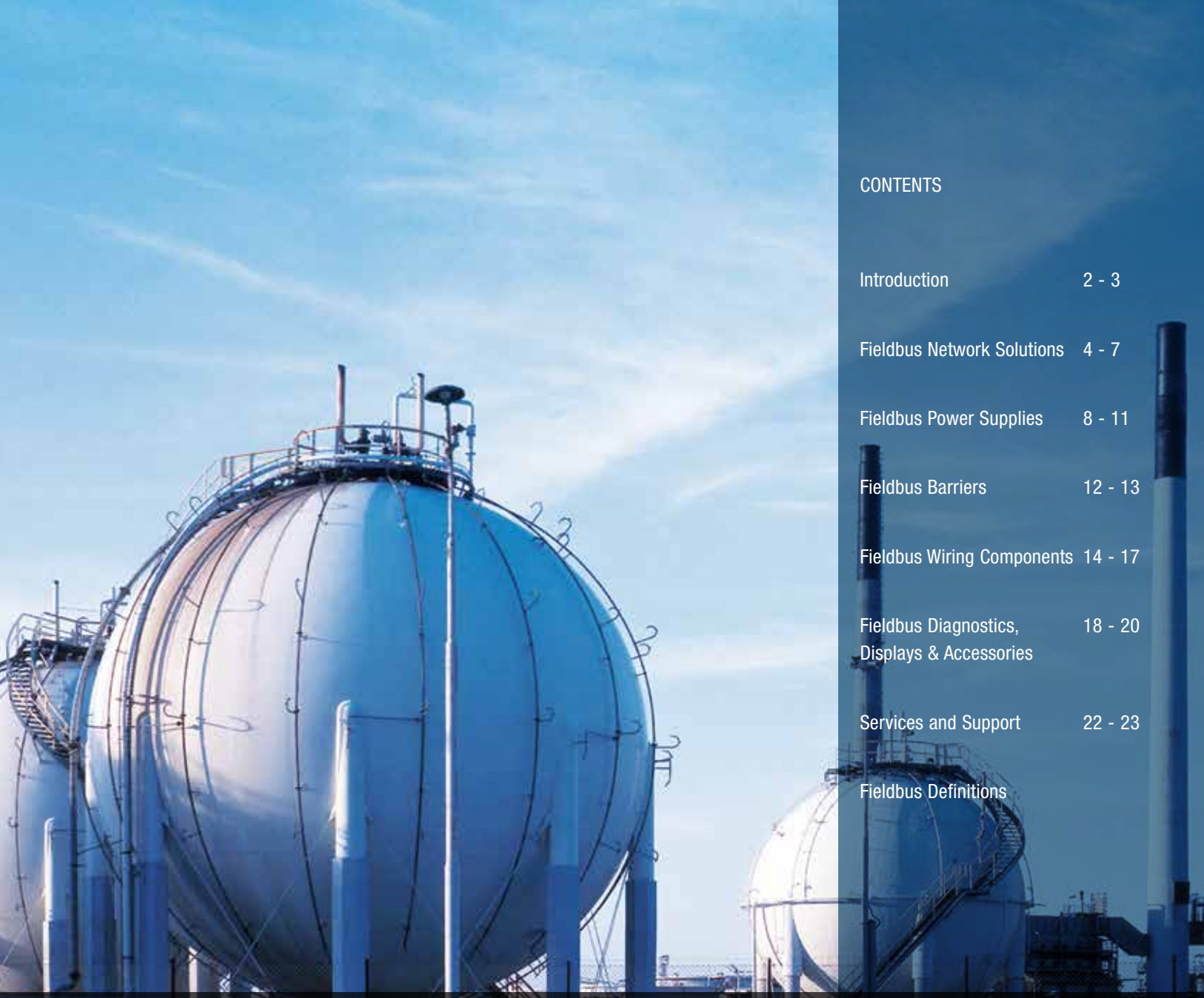
MTL is a part of Eaton's Crouse-Hinds business and remains a brand that stands for safety in the harshest of environments. Whilst we began with the MTL100 series zener barrier, MTL alongside Crouse-Hinds, has grown into the premier name for a comprehensive portfolio of solutions for high-consequence harsh and hazardous environments.

As we continue to evolve, so does our brand. Our products are now united with Eaton's leading range of reliable, efficient and safe electrical power management solutions. MTL has a new look alongside Crouse-Hinds by Eaton, but the products and technology you trust remain unchanged.

**More protection. More technology.  
Expect more.**

## Only Eaton's Crouse-Hinds Business can deliver...

- Protection and safety of people and assets around the world with unsurpassed reliability and quality in every product we offer
- Industry leading innovation and product efficiency
- Product solutions designed and certified for global specifications
- Best-in-class, global sales, and customer service teams that provide local support
- Over forty years of industry knowledge and expertise



## CONTENTS

Introduction	2 - 3
Fieldbus Network Solutions	4 - 7
Fieldbus Power Supplies	8 - 11
Fieldbus Barriers	12 - 13
Fieldbus Wiring Components	14 - 17
Fieldbus Diagnostics, Displays & Accessories	18 - 20
Services and Support	22 - 23
Fieldbus Definitions	

# Fieldbus Network Solutions

Minimising Risk. Maximising Efficiency.



MTL, part of Eaton's Crouse-Hinds business is a world leader in the development and supply of system infrastructure products and protection equipment to the Process Industries. As a leading provider of physical layer components for FOUNDATION fieldbus™ networks, MTL has established a reputation for innovative, high reliability products and world-class technical support. Close co-operation with influential fieldbus users has contributed to the company's product development programme, leading to MTL's products being specified for many of the world's largest fieldbus installations.

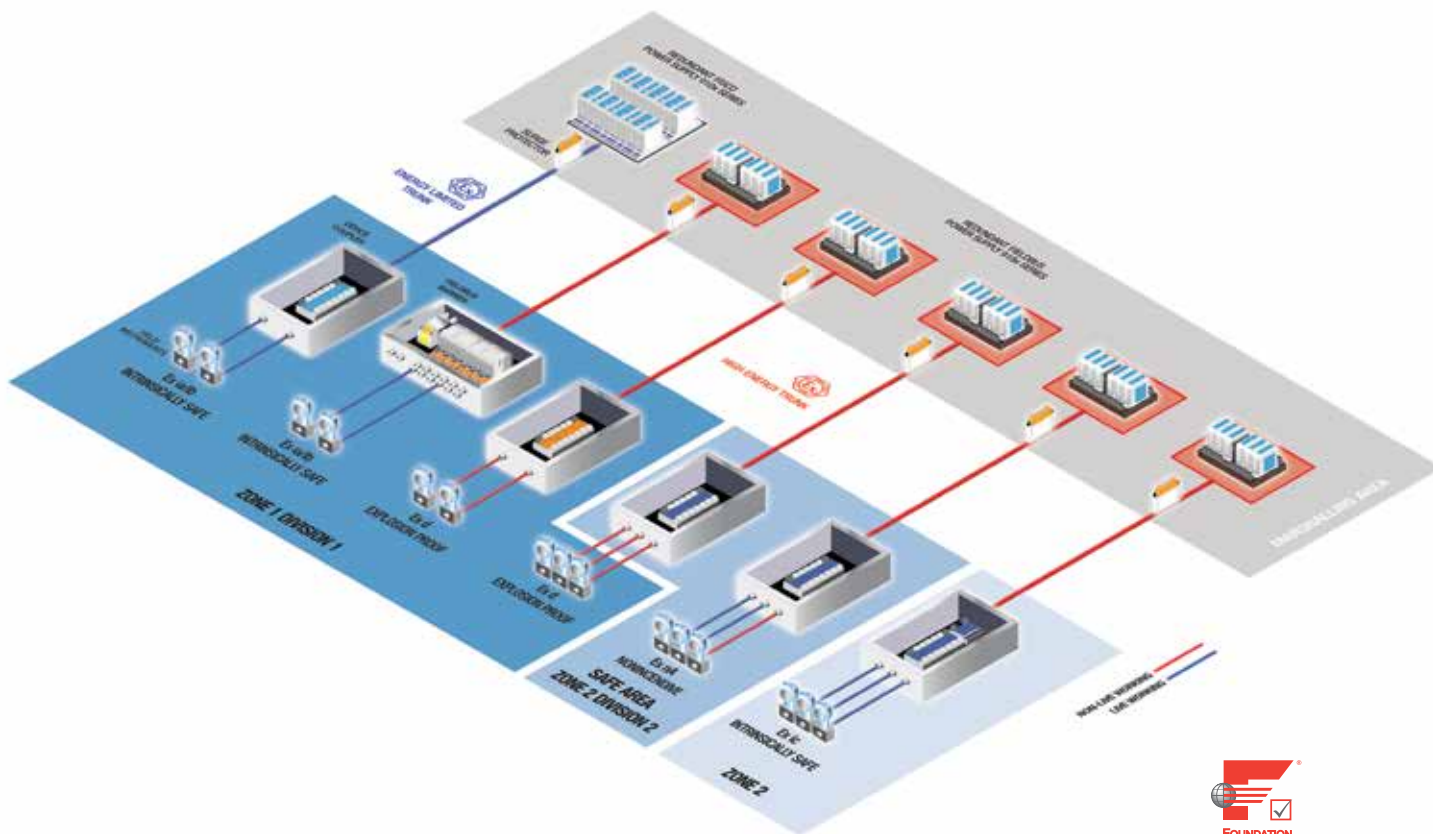
**FieldPlus** consolidates MTL's fieldbus leadership and delivers a range of solutions to meet even the most demanding requirements in today's fieldbus applications. **FieldPlus** brings together MTL's complete range of fieldbus physical layer components - including power supplies, wiring components, field instruments and diagnostic tools - to deliver an unrivalled source for system specifiers, integrators, end users, and all parties involved in the design, installation and commissioning of FOUNDATION fieldbus™ networks.

# MTL make fieldbus easy in safe and hazardous areas



## FIELDBUS... TELL ME MORE

FOUNDATION fieldbus™ H1 provides an open, nonproprietary fieldbus network for control systems and field instruments. FOUNDATION™ H1 is intended primarily for process control, field-level interface and device integration. Running at 31.25 kbit/s, the technology interconnects devices such as transmitters and actuators on a field network and also supports Intrinsically Safe (IS) applications. MTL provides a comprehensive range of power supplies, wiring components, diagnostic tools and displays for FOUNDATION fieldbus™ H1 networks. Many of these products are also suitable for use in Profibus PA networks, which share the same 'physical layer' specification.



### Two technically different approaches have emerged for taking fieldbus networks into hazardous areas:



- Energy-Limited Trunk networks** - where the fieldbus trunk and spurs are live-workable in a hazardous area. A typical implementation is FISCO (Fieldbus Intrinsically Safe Concept), which offers the highest levels of explosion protection safety by reducing the energy in the whole network to a level that is incapable of causing ignition.



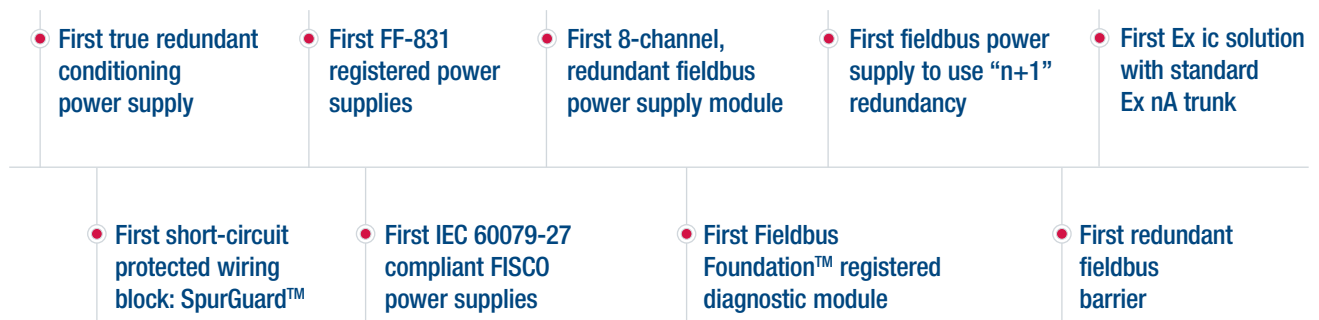
- High Energy Trunk networks** - where the voltage and current in the trunk circuit can support heavily loaded segments and long cable lengths. For applications requiring intrinsically safe spurs, in Zone 1 field-mounted 'Fieldbus Barriers' provide multiple spur connections to suitably certified field instruments and an Ex ic device coupler delivers a similar solution for devices mounted in Zone 2. Other device coupler types can be selected to connect to non-incendive and flameproof/explosionproof fieldbus devices.

## WHY CHOOSE MTL?

MTL FOUNDATION fieldbus™ physical layer components make it easy to complete any fieldbus installation between control system and field instruments. Conditioned power supplies, fieldbus barriers and Megablock™ wiring hubs cover every application in safe and hazardous areas, providing the highest levels of availability, whilst maintaining a common architecture that is independent of the Zone or Division of use.

The MTL fieldbus range delivers unprecedented value to plant operators, offering flexible and innovative, integrated solutions

### Fieldbus leadership - MTL firsts



### Worldwide installed base

Adopting the newest technology doesn't mean that risks have to be taken when selecting system components. MTL has many years of fieldbus experience, meaning users can specify with confidence.

- Supplier to the fieldbus market for over 15 years
- Over 5,000 fieldbus installations
- Used on the world's largest fieldbus projects
- Third generation power supplies and wiring components
- More than 500,000 Megablock™ fieldbus device connections

### Global hazardous-area approvals

With over 40 years of experience in designing explosion-protected equipment for the process industries, MTL knows how to achieve utmost safety for fieldbus installations in hazardous areas. MTL's established fieldbus component ranges carry comprehensive approvals to satisfy installation requirements world-wide, and all new products are subject to a rigorous certification programme.

### FOUNDATION Fieldbus™ approvals

All MTL fieldbus products are registered to relevant Fieldbus Foundation™ test specifications, which are the guarantee of performance and interoperability.





### Integrated, approved fieldbus solutions

MTL works closely with all major fieldbus control system vendors to develop integrated fieldbus power supply systems and compatible field wiring components. Power supply solutions typically support multiple fieldbus segments, and have a direct connection to the host controller via system cables. They provide a range of benefits such as lower engineering costs, faster assembly, cabinet space savings and reduced hardware costs. MTL's fieldbus power supplies and wiring components are tested and approved according to rigorous control system vendor programmes, demonstrating compatibility and allowing the user to select system components with confidence.



### Train with the experts

The process automation industry is constantly changing. It can be a challenge trying to keep abreast of the latest developments & standards at the same time as you are commissioning a plant or designing a control system. MTL recognises these challenges and offers you the opportunity to have your staff trained by industry leaders who have a wealth of experience and product knowledge in hazardous area connectivity solutions, offering a cost effective, flexible course structure to meet your specific needs.

To find out more about MTL training, available course dates, costs or to arrange an on-site course please call:


**+44 (0)1582 723633** or email: [mtltrainingchlu@eaton.com](mailto:mtltrainingchlu@eaton.com)



### MTL Technical Support now available on-line

MTL Customers can visit our website at: [www.mtl-inst.com/onlineforms/product\\_support](http://www.mtl-inst.com/onlineforms/product_support) and submit their technical questions via email to: [mtlsupport@cooperindustries.com](mailto:mtlsupport@cooperindustries.com)

MTL undertakes continuous product development, providing applications support and a wealth of diagnostic experience



Achieving high availability for fieldbus systems

## Fieldbus Power Supplies

MTL's extensive range of fieldbus power supplies covers a wide range of applications in both safe and hazardous areas. Ranging from single-segment units for small-scale installations to high-density integrated power supply systems, each type is designed for reliability and ease of use.

Innovation is key to MTL's development philosophy, resulting in unique products that deliver value to all parties involved in the design, installation and use of fieldbus networks. Large-scale fieldbus networks are served by compact, multi-segment power supplies that reduce per-segment capital costs and associated cabinet 'footprint'. For hazardous area applications, solutions include the industry's only true redundant FISCO power supply, and hybrid systems for live-workable spur connections.







918X SERIES



Ex ic solution now available when used in conjunction with the new MTL F30 Ex ic adapter. For more information see Fieldbus Wiring Components

Redundant fieldbus power for FOUNDATION Fieldbus™ systems



MTL's 918x Series Fieldbus power supplies are the first in the market to use an "N+1" architecture to provide redundant power for FOUNDATION fieldbus™ networks, reducing the capital cost per segment by up to 25%. In contrast with conventional redundancy schemes that use power supply modules in a 1:1 arrangement regardless of actual segment loading, the 918x uses two or three modules per segment depending on the maximum demand current. For segments requiring redundant power up to 250mA - representing a significant proportion of segments in typical fieldbus projects - only two modules are required. The addition of a third module provides redundant power at 500mA. The range also supports the full feature set required for today's large fieldbus projects, including small footprint, low power dissipation, on-line physical layer diagnostics and the option of integrated, pluggable surge protection.

- **Unique "N+1" redundancy** - can reduce initial capital cost by 25%
- **Fully isolated hot-swappable power modules**
- **Integrated versions for major host control systems**
- **Reliable, screw secured pluggable field and power feed connections**
- **Choice of rising cage screw clamp or spring clamp terminals**
- **Screen pass-through or ground option without accessories**
- **On-line physical layer diagnostics option**
- **Pluggable trunk surge protection option**

The removal of the 'Ex nL' (energy limited) Ex protection method from the IEC 60079-15 standard, and the introduction of intrinsic safety protection level Ex ic, is driving installers of fieldbus networks to adopt solutions that support Ex ic spurs

## FIELDBUS POWER SUPPLIES

### Multi-segment power systems

**F800 SERIES** Launched as the industry's first 8-segment fieldbus power supply, the F800 Series set the standard for high-density installation in marshalling and system cabinets. Using a component-free mounting base and unique two-module redundant architecture, the product line continues to serve applications that demand high system availability.

- 1+1 redundancy scheme
- On-line physical layer diagnostic option
- Full range of DCS integrated versions



### Single-segment Fieldbus power supplies

**F10x** The F101, F102 and F104 fieldbus power supplies, each provide power for a single FOUNDATION fieldbus™ H1 segment. Galvanic isolation, power conditioning and segment termination are incorporated. The F10x Series modules should be adopted for all new installations requiring single-segment, non-redundant power in small to medium scale applications such as batch processing.

- Compact design
- Fully isolated
- Low power dissipation
- DIN rail power bus option





910x SERIES



FISCO POWER SUPPLIES

The definitive solution for intrinsically safe fieldbus

MTL's FISCO power supplies have become established as the industry-standard solution for FOUNDATION fieldbus™ installations in which a fully intrinsically safe field network is required. The key benefits of intrinsic safety in fieldbus applications are the ability to carry out live maintenance on any part of the field wiring, and the elimination of complex mixed-protection techniques in the field junction box.

The introduction of power supply redundancy extends the benefits of FISCO into critical hazardous area applications requiring the highest levels of reliability. Such redundancy is routinely specified by end users and engineering companies for fieldbus installations in which failure could result in consequential damage or severe loss of production.

- Simplex (912x Series) and redundant (910x Series) options
- Safest possible technique in hazardous areas
- Fully live-workable field network
- Up to 265mA segment current
- Field junction box contains simple, highly reliable Megablock™ wiring hub
- Integrated versions for major host control systems
- Redundant power supply option provides unique combination of high system availability and operator safety





Modularity  
Means  
Maintainability

Fieldbus  
Barriers

## Fieldbus Barriers

A revolution in safety, reliability and maintainability for fieldbus networks in hazardous areas... taking 'high-energy' FOUNDATION fieldbus™ networks into Zone 1.

Fieldbus Barriers are an effective means of connecting field instruments in Zone 1 or Zone 0 hazardous areas to FOUNDATION fieldbus™ host control systems. They provide the field-mounted interface between the fieldbus trunk and intrinsically safe spurs, allowing heavily loaded segments and long cable lengths, irrespective of the Gas/Apparatus Group. The spur connections are compatible with 'IS' certified fieldbus devices complying with 'Entity' or 'FISCO' specifications.



937X-FB2 SERIES



The **937x-FB2** Fieldbus Barrier Series are field-mounted wiring hubs that creates six or twelve intrinsically safe spur connections from a high-energy trunk, for connection to suitably certified FOUNDATION™ fieldbus H1 instruments. Capable of supporting heavily loaded fieldbus segments and long trunk cable lengths, the Fieldbus Barrier may be installed in Zone 1 (gas) or Zone 21 (dust) hazardous areas, with the trunk wiring implemented using suitably protected cable and increased safety (Ex e) connection facilities.

Each intrinsically safe spur is capable of supporting a FISCO or ‘Entity’ certified fieldbus device located in a Zone 0 or 1 hazardous area. The short-circuit protected spurs are galvanically isolated from the trunk and require no protective ground connection in the field.

The key modular components of the system (Fieldbus Barriers and Surge Protectors) may be ‘hot-plugged’ by design and without gas-clearance procedures or separate isolating switches. This virtually eliminates the risk associated with hazardous area maintenance activities, speeds module replacement and avoids the need for specialist operator training.

- For FOUNDATION™ fieldbus networks in hazardous areas
- Complete enclosure system for 6 or 12 intrinsically safe spur connections
- Mount in Zone 1 (gas) or 21 (dust) with spurs connected into Zone 0
- Compatible with FISCO and Entity certified fieldbus instruments
- Compact, modular construction
- Ergonomic mechanical design
- Pluggable system components, without ‘gas free’ constraints
- Optional, integrated surge protection for trunk and spurs




**Available with Redundant capability**

Redundancy is routinely selected for fieldbus physical layer components, to avoid downtime and lost production. MTL gives users the choice of specifying redundant Fieldbus Barriers for segments that are critical to the ‘up-time’ of the process.

By duplicating the barrier function in the remote field enclosure, hardware failures are tolerated without interrupting the operation of the fieldbus segment. When used in conjunction with redundant fieldbus power supplies, the redundant barriers deliver significant improvements in ‘system availability’ that will allow their use even in the most critical applications.





Low cost safety in  
hazardous areas  
with high reliability

## Fieldbus Wiring Components

Wiring components make it easy to connect individual field instruments to the fieldbus trunk cable and are essential for reliable operation. The inclusion of simple electronic current limitation protects the entire network from spur short-circuits.

MTL's Megablock™ Series established the benchmark for passive wiring hubs and has been widely adopted worldwide. Latest generation products combine traditional features - such as two-part pluggable connectors and SpurGuard™ short-circuit protection - with new features such as flexible bus termination.

A broad range of product types satisfy a wide choice of safe and hazardous area applications.





## F300 SERIES



DIN rail mounted  
passive hubs



The F300 Series represents the latest technology in fieldbus wiring hubs, building on an enviable installed base of three generations of Megablock™ products. Providing a simple and reliable means of connecting individual fieldbus instruments to the field network, Megablocks™ protect against spur short-circuits and allow instruments to be easily added to or removed from the segment without disrupting communications.

- Single-piece Trunk In/Trunk Out connector simplifies installation and maintenance
- Spur short circuit protection
- Removable Terminator
- Choice of rising cage screw clamp or spring clamp terminals for spurs
- Unique pluggable trunk and spur surge protection option
- Can be installed in Zone 2 or Division 2 with connections to non-incendive, Ex n or Ex ic field instruments

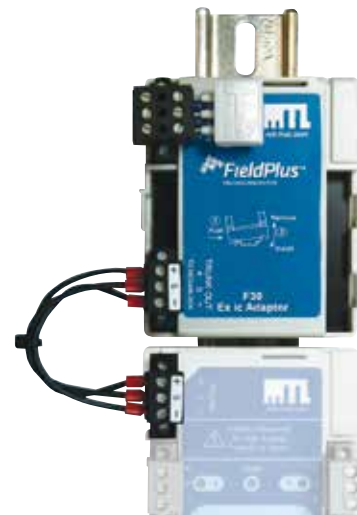


### NEW Fieldbus Ex ic Adapter for Ex ic spurs

F30

The F30 Ex ic adaptor enables intrinsic safety protection level Ex ic networks to be assembled, when used in conjunction with 9180 Series 8-segment redundant power supplies and F300 Series Megablock device couplers. Typically, one F30 adaptor is used with each fieldbus segment, and is installed with the Megablock in the field enclosure.

- Simple compliance with Ex ic certification requirements from control room to field
- No need to assess energy contribution of host H1 card
- Architecture supports Ex nA, Ex d devices and Ex i devices on the same segment
- Satisfies FISCO and Entity spur applications
- Supports longer trunk cable lengths for FISCO spur applications



### Intrinsic Safety Megablock™ wiring hubs

F200 SERIES

F200 Series Megablocks™ are specifically designed and certified for use in intrinsically safe fieldbus networks. When used with MTL's 912x or 910x Series FISCO power supplies, they allow complete IS segments to be assembled, for connection to field instruments carrying intrinsic safety FISCO certification. 'Entity' certified devices can also be supported using simple adaptors in each spur circuit. As the F200 Megablocks™ are part of an intrinsically safe circuit, no special certifications are required for the field enclosure - although the MTL range of Process Junction Boxes provide excellent environmental protection.

- Certified intrinsically safe for use in FISCO networks
- Compatible with simplex or redundant FISCO power supplies
- Spur short circuit protection
- Choice of rising cage screw clamp or spring clamp terminals for spurs

### Increased Safety Megablocks™

F200-XE SERIES

The F200-XE Series Megablocks™ carry certification to the Increased Safety (Ex e) standard to allow installation in IEC Zone 1 hazardous areas. When mounted inside suitably certified Ex e field enclosures such as the MTL range of Process Junction Boxes, they avoid the need for heavy and expensive 'flameproof' (Ex d) field enclosures. They are compatible with conventional simplex or redundant fieldbus power supplies as part of 'High Energy Trunk' networks, with spur connections to Ex d certified field instruments.

- Installation in Zone 1 hazardous areas in suitably certified Ex e enclosures
- For connection to 'flameproof' (Ex d) field instruments
- Spur short circuit protection
- Choice of rising cage screw clamp or spring clamp terminals for spurs







## Process Junction Boxes

**FCS SERIES** As part of Eaton's Crouse-Hinds business, MTL has access to the complete range of stainless steel and GRP enclosures and is able to supply complete, engineered solutions for Megablocks™ and other field wiring components.

MTL Process Junction Boxes are designed to accommodate Megablock™ wiring components, together with accessories such as terminators, spur connectors and surge protection devices. They can be supplied either pre-fitted with a wide choice of stainless steel, nickel-plated brass and plastic cable glands, or drilled for user-specified glands. The enclosures carry hazardous area certification for applications in all Zones and Divisions.



## Fieldbus Surge Protection

**SURGE PROTECTION DEVICES** The design and manufacture of Surge Protection devices has always been an MTL strength, providing the highest level of protection for complete networks, to defend control systems and associated fieldbus instruments from surges entering through the fieldbus trunk or spurs. Many MTL fieldbus products are supplied as standard with the ability to accommodate optional surge protectors, with the benefit of reduced engineering and wiring costs, providing comprehensive system-wide protection for fieldbus networks.

### FS32

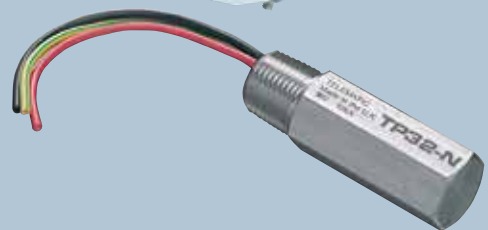
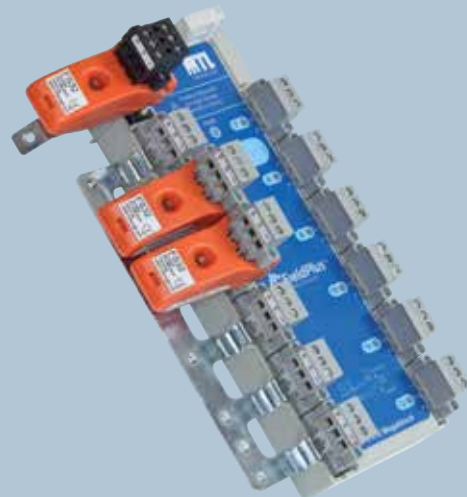
The FS32 surge protection device prevents surges and transient overvoltages conducted along the Trunk or Spurs of fieldbus systems from damaging the associated electronics such as terminators, spur blocks and the bus control equipment. Designed to fit MTL's latest fieldbus products the FS32's space saving design helps to reduce the size of junction boxes and ease installation.

### FP32

The FP32 surge protection device prevents surges and transient overvoltages conducted along the trunk or spur cables from damaging the associated electronics such as terminators, Megablock™ wiring components and fieldbus interface cards. It is designed to be used at both ends of the trunk.

### TP32 & TP32T

The TP32 transmitter protection device is specifically designed to protect process transmitters on fieldbus systems. In a design pioneered by MTL, it can be easily installed in new or existing installations by fitting into the spare threaded conduit entry on field instruments. It is capable of diverting surge currents up to 10kA, exceeding the capability of 'built-in' field device surge protection. The TP32T adds a terminator to the protection circuit of the TP32.



A man wearing a white hard hat and safety glasses is looking down at a document he is holding. He is in an industrial setting with large pipes and structures in the background. The image has a blue color cast.

Designed to meet even  
the most demanding  
requirements in today's  
fieldbus applications

## Fieldbus Diagnostics, Displays & Accessories

Innovation and differentiation creating compelling features and benefits - nobody offers as much proven experience in the field as MTL.

The MTL range of components makes it easy to complete any fieldbus installation between the fieldbus instruments and the Fieldbus Interface Module. As an established leader in the supply and development of fieldbus power supplies, wiring components and associated network devices, MTL can supply everything required to get your fieldbus infrastructure up and running and keep it running.





Diagnostic Module

F809F-PLUS

The F809F-Plus Fieldbus diagnostics module monitors the performance of up to eight fieldbus segments providing information on network health. During commissioning, the F809F-Plus collects data on the performance of the physical layer, provides alarms if any parameter is outside the preset limits, and stores a baseline segment performance within the Instrument Management Software.

- Monitors 8 fieldbus segments
- Minimises total cost of ownership by reporting parameters via FOUNDATION fieldbus™ H1
- Open system solution: compatible with all major DCS systems
- NE107 compliant status symbols via DTM & eEDDL user interfaces



TEST EQUIPMENT

Fieldbus Diagnostic Monitor



FBT-6/5

The Fieldbus Monitor, FBT-6, is used to examine the operation of a live FOUNDATION fieldbus™ network without interfering with its operation. The FBT-6-PA Profibus PA Diagnostic Monitor can be used to examine the operation of a live Profibus-PA segment without interfering with its operation. These monitors are intended for maintenance personnel to verify network operation or to troubleshoot an errant network. Data collected can be saved into the FBT-6 and saved as a Microsoft® Excel formatted report that can be used to document commissioning or periodic monitoring.

The Fieldbus Wiring Validator, FBT-5, is used in combination with the Fieldbus Monitor, FBT-6, to test new or existing field wiring to determine its suitability for use in a FOUNDATION fieldbus™ network.



Fieldbus H1 and Profibus PA Displays

BAX SERIES

MTL supplies a wide range of fieldbus displays from single to multi-variable, field and panel mount variants, safe and hazardous area versions as well as FOUNDATION fieldbus™ H1 and Profibus PA communications. All units are bus powered to simplify installation.

The 8 variable BA-x8x version provides a large 86 x 45 mm backlit display with 9 standard screen options displaying 1 to 8 variables, measurement units and tags as well as bar graphs. The operator can select the displayed screen via the front panel push-buttons, or these buttons may be disabled. The instrument can be supplied with six isolated alarm outputs, each of which may be linked to any of the displayed fieldbus variables. Alarm setpoints can be entered via the front panel push-buttons, which in turn may be protected by a security code.



SOFTWARE TOOLS



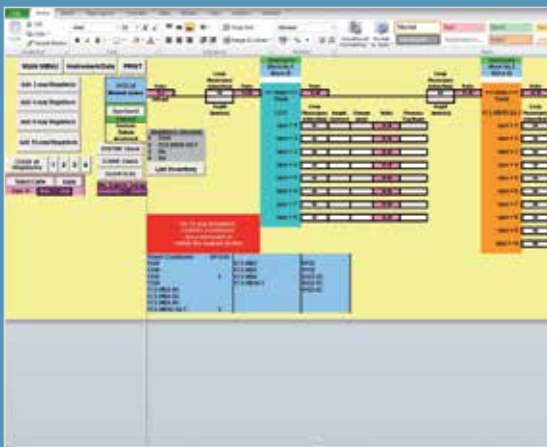
Fieldbus Software Tools

SOFTWARE TOOLS

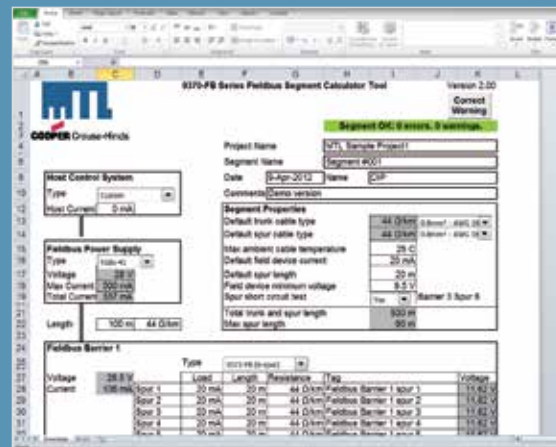
MTL is no newcomer to the fieldbus environment. From involvement in defining the earliest standards through to representation on today's industry bodies, MTL has attained a distinguished profile in fieldbus technology. To maximise efficiency we have produced various software packages designed to help fieldbus engineering:

- MTL SmartPlant Instrumentation (SPI) symbol library for FOUNDATION fieldbus™ components
- 9370-FB Series Fieldbus Barrier Segment Calculator
- Fieldbus Segment Calculator

For more information on the Fieldbus Software Tools available from MTL please visit our website at [www.mtl-inst.com](http://www.mtl-inst.com)



Fieldbus Segment Calculator



9370-FB Series Fieldbus Barrier Segment Calculator

MTL's *FieldPlus* products have technical features and benefits that differentiate them from competing brands in ways that bring genuine value to plant operators





Providing instant value to your project

## Services & Support

With our years of FOUNDATION™ fieldbus experience the staff of MTL can provide instant value to your project - at any time in its lifecycle and at all stages of the project from Front

End Engineering Design (FEED) to construction and commissioning right through to post-project network integrity maintenance.



# Crouse-Hinds

by **EAT·N**

## Services Tailored For Your Needs

Getting it right from the start is the key to the success of any project and MTL is here to help you select the right solution for your applications. Regardless of whether you are designing a “traditional” analogue system, HART® based system or a complete digital system incorporating FOUNDATION™ fieldbus, Industrial Ethernet and Wireless systems, MTL can add value tailored to your specific needs for Project Definition, Network Services and Knowledge Capture.

With our global network of Sales associates, help is never far away because it is the local sales person with whom you have been dealing for years, who will continue to be your interface to the complete MTL organisation, helping you get your project completed on budget and on time, with real and sustainable benefits.

## Project Definition & Scope

Generate the rewards and synergies of early involvement of MTL at the front end of your project activities. In today’s demanding environment finding the right skills at the right time is often as big a challenge as doing the work itself. MTL can help by either taking on responsibility for the Industrial network scope of your project or simply providing those “extra bodies,” that are so hard to find today.

MTL’s team of professionals provide you with unbiased expertise starting with FEED and specification development to commissioning and check out. Whether you want to handover complete responsibility for the industrial network to MTL - single source solution; have someone coach you through the process; help you over a hump; be there in the background, or simply have an impartial outsider give you the confidence that you are “on track”, our team is here to help.

## Integrity & Availability

With security as a ‘Top of Mind’ issue and the ever increasing cost of network downtime, capitalise on the real benefits of a thorough and periodic ‘Health Check’ of your network infrastructure.

As we all embrace the new world of IP and Ethernet based technologies we must also face the challenges of the network security. MTL and its partners have several leading world authorities on this subject as part of our team. So not only do you get a well designed network, the solution will be secure as well. Of course, if you already have a system installed and need a third party audit to confirm that you really are as secure as you believe, rest assured, MTL can help.

## Knowledge Capture

Enjoy the benefits of improved education and awareness of network support staff leading to smooth and efficient operations as well as a more structured approach to troubleshooting with time and cost savings.

## Documentation

MTL will also review the project specifications and Control Narratives. This will help identify potential savings opportunities and any non-compliances from the original design and specification, through more efficient network layout/design.

Another key deliverable of the Engineering design is the documents to verify that what is delivered meets the design intent. MTL can help here as well with preparation of the FAT, SAT, and Commissioning check sheets. Then when you actually are in the field, MTL again comes to your aid with support services including a person to assist with collection and verification of the baseline data and signal integrity between devices and host system.

## Training

The key to a successful project is knowledge. Our MTL industry experts can provide the necessary knowledge to you and your team at all stages of your project whether they be the engineering design team, installation contractor, maintenance team, or plant operators. Our programs are custom tailored to meet the needs of your project and your facility.

Our training classes combine both theory and practice with extensive demonstrations and hands-on opportunities to quickly implement the new skills being transferred to your team. Since not all training is done in the classroom, as part of MTL’s solution, we can also mentor your team on a consultancy basis by providing design templates, worked examples and reviews throughout the project, not just key milestones.

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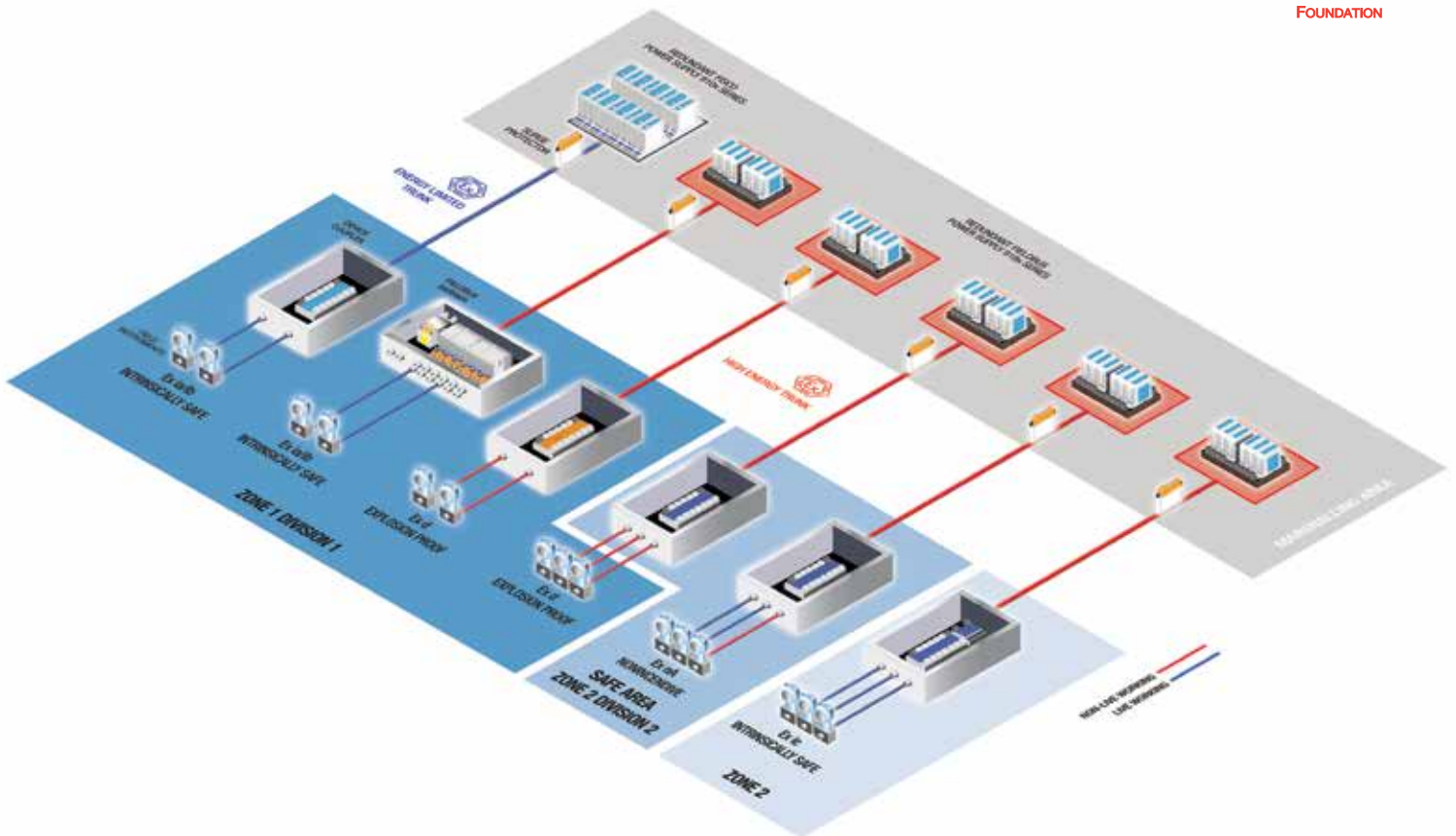
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MTL delivering our customers unprecedented value throughout a complete range of fieldbus solutions:

- Power supply/device coupler combinations for high system availability in safe and hazardous areas
- ‘High Energy Trunk’ and ‘Energy Limited Trunk’ options for hazardous area applications
- Choice of technologies according to Zone or Division of use







## FOUNDATION Fieldbus™

Fieldbus protocol defined by the Fieldbus Foundation™.

### H1

The low-speed version of FOUNDATION fieldbus™, operating at 31,25kb/s. H1 fieldbus has been widely adopted in the process industries and is suitable for use in regulatory control and monitoring applications in safe and hazardous areas.

### PHYSICAL LAYER

The first layer in the OSI model for fieldbus which defines the electrical characteristics of the fieldbus, such as speed and signalling levels. The Physical Layer receives messages from the 'communications stack' and converts them into signals on the transmission medium.

### NETWORK

One or more fieldbus segments connected to a fieldbus interface card in a host system.

### SEGMENT

A section of fieldbus that is terminated in its characteristic impedance, meaning a cable and fieldbus devices installed between a pair of terminators. Segments can be linked by repeaters to form longer fieldbuses. The standard allows each H1 segment to support up to 32 fieldbus devices, but many systems limit this to 16 fieldbus devices.

### TRUNK

The main communication cable on a fieldbus segment. It is the cable path between the two fieldbus terminators.

### SPUR

A branch cable connecting a fieldbus device to the fieldbus trunk. H1 Spurs can be up to 120m in length.

### POWER CONDITIONER

A fieldbus power supply that provides DC power onto a fieldbus trunk without interfering with the communications signals. Combined with the two terminators, it conditions the trunk impedance to be compatible with fieldbus instruments.

### TERMINATOR

Network components that are used at each end of a fieldbus segment to match the characteristic impedance of the cable.

### HOME RUN

Same as TRUNK.

### TOPOLOGY

Shape and design of the fieldbus network (for example, "tree", "daisy chain", "chicken-foot", "point-to-point", "bus with spurs").

### HOST

The fieldbus control system, including the fieldbus interface card.

### REPEATER

An active device that may be used to extend the length of a fieldbus. A maximum of four repeaters can be used in a single network. Repeaters may also be connected in parallel to create multiple segments as part of a larger network.

### LINKING DEVICE

A device capable of converting from one fieldbus physical layer to another, such as H1 to High Speed Ethernet (HSE).

## FIELDBUS INSTRUMENT

A field instrument that has been tested against the Fieldbus Interoperability Test and is capable of communicating in a fieldbus network. Typical H1 fieldbus instruments are valves and transmitters.

## FISCO

Fieldbus Intrinsically Safe Concept, as defined in IEC 60079-11. FISCO simplifies the safety documentation required compared with the earlier 'Entity' concept for intrinsically safe fieldbus, and permits a larger number of fieldbus devices to be connected in the hazardous area.

## ENTITY

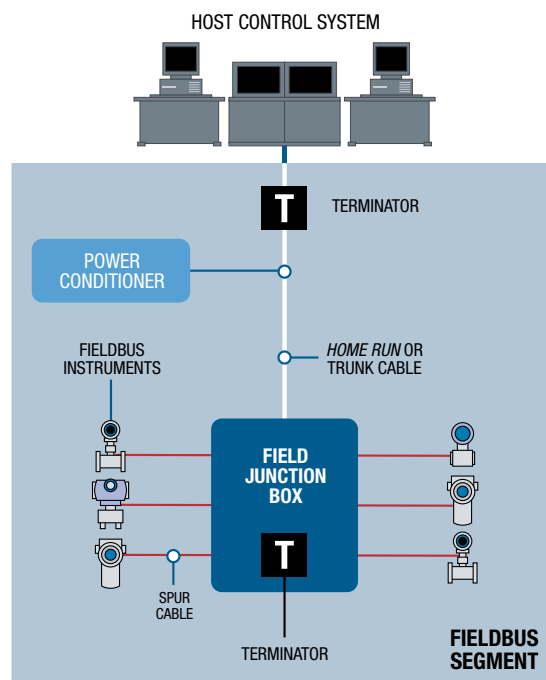
The original concept for intrinsically safe fieldbus as defined in Fieldbus Foundation™ document FF-816.

## HSE

High-Speed Ethernet. The high-speed version of FOUNDATION fieldbus™, operating at up to 100Mbps/s. HSE is based on industrial ethernet specifications and forms a 'backbone' network for connecting equipment such as controllers, linking devices and remote I/O.

## PROFIBUS PA

The low-speed version of Profibus, operating at 31.25kb/s. Profibus-PA shares the same 'physical layer' specification as FOUNDATION fieldbus™ H1.



Fieldbus physical layer components





Eaton's Crouse-Hinds

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