The 937x-FB2-Px-SS range of Fieldbus Barriers are field-mounted wiring hubs that create up to 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 Barriers 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.

Unlike conventional Fieldbus Barrier products that are based on stand-alone modules, the 937x-FB2-Px range is supplied as complete, factory-assembled systems in stainless steel (SS) enclosures that do not require additional wiring, customised housing or complex ancillary components. Electrical and mechanical aspects of the design are integrated for an ergonomic solution for ‘High Energy Trunk’ applications in hazardous areas.

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.

Optional features include pluggable surge protection components for the fieldbus trunk and individual spurs. Connection facilities with generous room for cable management are provided within the Fieldbus Barrier enclosure for the trunk and spur wiring. Where appropriate, the trunk wiring may be extended from one Fieldbus Barrier enclosure to another.

Enclosure systems for 6 or 12 spurs are supported. For added flexibility, the 12-spur enclosure can be specified part-populated with one 6-spur barrier module installed. This permits future expansion from six to twelve spurs simply by plugging in an additional module.

The 937x-FB2-PC-SS range of Fieldbus Barriers are bus-powered and requires no additional power supply in the field. When used with a fieldbus host control system, power for the trunk may be provided by MTL F800 or 9180 range of fieldbus power supplies in redundant or non-redundant format.
## SPECIFICATION

### SPURS

<table>
<thead>
<tr>
<th>9371-FB2</th>
<th>9373-FB2</th>
<th>9374-FB2* (expandable)</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of spurs</td>
<td>6</td>
<td>12</td>
</tr>
<tr>
<td>No. of 9377-FB-R modules installed</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Current per spur</td>
<td>0 - 32mA</td>
<td>0 - 32mA</td>
</tr>
<tr>
<td>Total current all spurs (max.)</td>
<td>192mA</td>
<td>384mA</td>
</tr>
</tbody>
</table>

**Current limit per spur (max.):** 45mA  
**Spur short circuit current (max.):** 4.5mA  
**Spur voltage @ 20°C:** ≥ 10V @ 40mA  
**No-load voltage:** 12V min.  
**Number of field devices:** 1 per spur  
**Maximum spur length:** 120m (depending on the number of spurs per fieldbus segment)

### Galvanic isolation (to EN 60079-11)

- **Trunk to spurs:** 1.5kV (test voltage)
- **Spur to spur:** no isolation
- **Module to module:** 30V

### Spur surge protection

Plug-in module (part number FS32) - see separate specification

## TRUNK

### Data rate

31.25kBaud

### Data transmission between trunk and spurs

Passive, no repeater function

### Number of trunk connections

2 (in & out), internally connected  
Spare trunk in

### Maximum number of 9377-FB-R modules per segment

3 (total 18 spurs)

### Input voltage range (trunk)

16–32V DC

### Voltage drop (trunk in to trunk out)

0V

### Maximum rated current (trunk in to trunk out)

5A

### Low voltage monitoring

Input voltage < 16V, spurs de-energized

### DC current consumption, mA

<table>
<thead>
<tr>
<th>@ 16V</th>
<th>@ 24V</th>
<th>@ 32V</th>
</tr>
</thead>
<tbody>
<tr>
<td>9371</td>
<td>9373</td>
<td>9371</td>
</tr>
<tr>
<td>No load on each spur typ.</td>
<td>35.3</td>
<td>70.6</td>
</tr>
<tr>
<td>max.</td>
<td>37.0</td>
<td>73.0</td>
</tr>
<tr>
<td>1 spur @ 20mA typ.</td>
<td>62.4</td>
<td>97.7</td>
</tr>
<tr>
<td>max.</td>
<td>75.0</td>
<td>150.0</td>
</tr>
<tr>
<td>All spurs @ 20mA typ.</td>
<td>158.8</td>
<td>317.6</td>
</tr>
<tr>
<td>max.</td>
<td>164.0</td>
<td>328.0</td>
</tr>
<tr>
<td>All spurs @ 20mA 1 short circuit typ.</td>
<td>146.0</td>
<td>304.3</td>
</tr>
<tr>
<td>max.</td>
<td>150.0</td>
<td>314.0</td>
</tr>
<tr>
<td>All spurs @ 32mA typ.</td>
<td>233.9</td>
<td>467.8</td>
</tr>
<tr>
<td>max.</td>
<td>244.0</td>
<td>487.0</td>
</tr>
</tbody>
</table>

### Power dissipation (max.) All spurs at 32mA

<table>
<thead>
<tr>
<th>9371-FB2</th>
<th>9373-FB2</th>
<th>9374-FB2*</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.8W</td>
<td>3.6W</td>
<td>1.8 (+1.8)W</td>
</tr>
</tbody>
</table>

* See ordering information

---

**Fieldbus terminator**  
Plug-in module (part number F93-XE) supplied with each 937x-FB2 enclosure. Provides 100Ω + 1µF according to IEC 61158-2 - see separate specification

**Trunk surge protection**  
Plug-in module (part number 9376-SP) - see separate specification

**Reverse polarity protection**  
Yes

## ELECTRICAL CONNECTIONS

### Trunk wiring terminals

**Type:** Ex e  
**Colour:** Black

### Cable types and capacity

<table>
<thead>
<tr>
<th>Cable cross-section, mm²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rigid cable</td>
</tr>
<tr>
<td>Flexible cable</td>
</tr>
</tbody>
</table>

### Spur field wiring terminals

**Type:** 3-way, pluggable  
**Colour:** Blue

### Cable types and capacity

<table>
<thead>
<tr>
<th>Cable cross-section, mm²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rigid cable</td>
</tr>
<tr>
<td>Flexible cable</td>
</tr>
</tbody>
</table>

**Grounding of cable screens (trunk & spurs)**  
(Configure with wire link in the Trunk Terminal Area)

### Options

<table>
<thead>
<tr>
<th>1</th>
<th>Trunk</th>
<th>Spurs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single point grounding</td>
<td>Grounded at host</td>
<td>Trunk &amp; spur screens joined</td>
</tr>
<tr>
<td>Local grounding of spurs</td>
<td>Grounded at host</td>
<td>Grounded at field enclosure</td>
</tr>
</tbody>
</table>

Trunk and spur cable shields are not inter interconnected within 9377-FB2 module itself.

### Equipotential earth/ground connection facility

M10 earth/grounding stud on bottom face of enclosure

## BARRIER LED INDICATORS

### Trunk Power (PWR)

<table>
<thead>
<tr>
<th>ON</th>
<th>OFF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Green</td>
<td>Supply voltage &gt; 16V, internal supply healthy</td>
</tr>
<tr>
<td>Red</td>
<td>Internal fault</td>
</tr>
<tr>
<td>Yellow</td>
<td>Short to shield</td>
</tr>
</tbody>
</table>

### Spurs (tri-colour, per spur)

<table>
<thead>
<tr>
<th>Colour</th>
<th>Steady</th>
<th>Flashing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Green</td>
<td>Channel powering spur - spur OK</td>
<td></td>
</tr>
<tr>
<td>Red</td>
<td>Internal fault</td>
<td></td>
</tr>
<tr>
<td>Yellow</td>
<td>Short circuit or current limit</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Off</th>
<th>Supply &lt; 16V or no supply</th>
</tr>
</thead>
<tbody>
<tr>
<td>Green</td>
<td>Supply voltage &lt; 16V</td>
</tr>
<tr>
<td>Red</td>
<td>N.A.</td>
</tr>
<tr>
<td>Yellow</td>
<td>N.A.</td>
</tr>
</tbody>
</table>
PHYSICAL NETWORKS
IEC61158-2
FOUNDATION™ fieldbus H1

Profile type (according to FF-816)
Type 163 (isolated device coupler)
Compliant with FF-846

HAZARDOUS AREA APPROVALS
Location of equipment
Safe area or Zone 1 IIC T4 or Zone 21 hazardous area

Location of connected spur equipment
Safe area or Zone 0 IIC hazardous area

Certification codes

Certificate numbers
Baseefa 14ATEX0112X
IECEEx BAS 14.0058X

Safety description (spurs)

Spurs in accordance with FISCO standard IEC 60079-11

ENVIRONMENTAL
Ambient temperature (system)

<table>
<thead>
<tr>
<th>Operation</th>
<th>Storage</th>
</tr>
</thead>
<tbody>
<tr>
<td>–40°C ... +70°C</td>
<td>–40°C ... +75°C</td>
</tr>
</tbody>
</table>

Ambient temperature (9377-FB-R module)
–40°C ... +75°C

Relative humidity
< 95%, non-condensing

Electromagnetic compatibility
EN 61326 – 1:2013
NAMUR NE 21

Shock & Vibration
Vibration:
BS EN 60068-2-6: 2008 Test Fc: 1g
BS EN 60068-2-64: 1995 Test Fh: 1g

Shock:
BS EN 60068-2-27: 1993 Test Ea: 15g

MECHANICAL
Enclosure Materials
Silver, Stainless Steel (SS)

Mounting position (recommended)
On vertical plane, with glands and breather on underside

Cable/Breather entries
Trunk:
2 x M20
Spurs:
6 or 12 x M20, depending on model
Breather
1 x M20

Enclosures can be shipped with no stopping plugs or pre-fitted with an Ex e nickel-plated brass breather and Ex e nickel-plated brass plugs in all cable gland holes. The gland plugs must be replaced only with Ex e equipment certified cable glands capable of maintaining the IP level of the enclosure type.

Ingress Protection
Enclosure: IP66
Intrinsically safe terminals: IP20
Ex e terminals: IP30

Enclosure sizes - see dimension drawing for details
9371-FB2-Px-SS (6 spurs) 271 x 306 x 139mm
9373-FB2-Px-SS (12 spurs) 271 x 443 x 139mm

Enclosure Weights

<table>
<thead>
<tr>
<th>MTL Part number</th>
<th>Weight (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>9371-FB2-Px-SS</td>
<td>5.7</td>
</tr>
<tr>
<td>9373-FB2-Px-SS</td>
<td>8.5</td>
</tr>
<tr>
<td>9374-FB2-Px-SS</td>
<td>7.6</td>
</tr>
</tbody>
</table>

† excludes any cable glands or surge protection items

ORDERING INFORMATION
Order as:
9371-FB2-Px-SS 6-spur Fieldbus Barrier enclosure with one 6-spur 9377-FB-R module installed.
9373-FB2-Px-SS 12-spur Fieldbus Barrier enclosure system with two 6-spur 9377-FB-R modules installed.
9374-FB2-Px-SS 12-spur Fieldbus Barrier enclosure system with one 6-spur 9377-FB-R module installed. (Expandable to 12-spur by addition of a second 9377-FB-R module)
(Note: All enclosures are pre-wired and include a F93-XE Fieldbus terminator module)
Where Px = PS (pluggable screw terminal connectors) or PC (pluggable spring clamp connectors)
9377-FB-R Fieldbus Barrier 6-spur, pluggable module
F93-XE Fieldbus terminator
9376-SP Trunk surge protection module
FS32 Spur surge protection module

ASSOCIATED LITERATURE
Instruction Manual
INM937x-FB2-Px-SS
The 937x-FB2-Px-PP range of Fieldbus Barriers are field-mounted wiring hubs that create up to 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 Barriers 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.

Unlike conventional Fieldbus Barrier products that are based on stand-alone modules, the 937x-FB2-PC-PP range are supplied as a complete, factory-assembled systems in a glass reinforced plastic (GRP) enclosures that does not require additional wiring, customised housing or complex ancillary components. Electrical and mechanical aspects of the design are integrated, providing the industry’s first complete, ergonomic solution for ‘High Energy Trunk’ applications in hazardous areas.

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.

Optional features include pluggable surge protection components for the fieldbus trunk and individual spurs. Connection facilities with generous room for cable management are provided within the Fieldbus Barrier enclosure for the trunk and spur wiring. Where appropriate, the trunk wiring may be extended from one Fieldbus Barrier enclosure to another.

Enclosure systems for 6 or 12 spurs are supported. For added flexibility, the 12-spur enclosure can be specified part-populated with one 6-spur barrier module installed (model no. 9374-FB2-PC-PP-001). This permits future expansion from six to twelve spurs simply by plugging in an additional module.

The 937x-FB2-PC-PP range of Fieldbus Barriers are bus-powered and requires no additional power supply in the field. When used with a fieldbus host control system, power for the trunk may be provided by MTL F800 or 9180 range of fieldbus power supplies in redundant or non-redundant format.
SPECIFICATION

SPURS

<table>
<thead>
<tr>
<th>No. of spurs</th>
<th>9371-FB2</th>
<th>9373-FB2</th>
<th>9374-FB2* (expandable)</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of 9377-FB-R modules installed</td>
<td>1</td>
<td>2</td>
<td>1 (+1)</td>
</tr>
<tr>
<td>Current per spur</td>
<td>0 - 32mA</td>
<td>0 - 32mA</td>
<td>0 - 32mA</td>
</tr>
<tr>
<td>Total current all spurs (max.)</td>
<td>192mA</td>
<td>384mA</td>
<td>192 (+192)mA</td>
</tr>
<tr>
<td>Current limit per spur (max.)</td>
<td>45mA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spur short circuit current (max.)</td>
<td>4.5mA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spur voltage @ 20°C</td>
<td>≥ 10V @ 40mA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No-load voltage</td>
<td>12V min.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Number of field devices
1 per spur

Maximum spur length
120m (depending on the number of spurs per fieldbus segment)

Galvanic isolation (to EN 60079-11)
- Trunk to spurs: 1.5kV (test voltage)
- Spur to spur: no isolation
- Module to module: 30V

Spur surge protection
Plug-in module (part number FS32) - see separate specification

TRUNK

Data rate
31.25kBaud

Data transmission between trunk and spurs
passive, no repeater function

Number of trunk connections
- 2 (in & out), internally connected
- Spare trunk in

Maximum number of 9377-FB-R modules per segment
3 (total 18 spurs)

Input voltage range (trunk)
16–32V DC

Voltage drop (trunk in to trunk out)
0V

Maximum rated current (trunk in to trunk out)
5A

Low voltage monitoring
Input voltage < 16V, spurs de-energized

DC current consumption, mA

<table>
<thead>
<tr>
<th>@ 16V</th>
<th>@ 24V</th>
<th>@ 32V</th>
</tr>
</thead>
<tbody>
<tr>
<td>9371</td>
<td>9373</td>
<td>9373</td>
</tr>
<tr>
<td>typ.</td>
<td>35.3</td>
<td>70.6</td>
</tr>
<tr>
<td>max.</td>
<td>37.0</td>
<td>73.0</td>
</tr>
<tr>
<td>1 spur @ 20mA</td>
<td>37.0</td>
<td>70.6</td>
</tr>
<tr>
<td>typ.</td>
<td>62.4</td>
<td>97.7</td>
</tr>
<tr>
<td>max.</td>
<td>75.0</td>
<td>150.0</td>
</tr>
<tr>
<td>All spurs @ 20mA</td>
<td>158.8</td>
<td>317.6</td>
</tr>
<tr>
<td>typ.</td>
<td>164.0</td>
<td>328.0</td>
</tr>
<tr>
<td>All spurs @ 20mA</td>
<td>233.9</td>
<td>467.8</td>
</tr>
<tr>
<td>1 short circuit</td>
<td>typ.</td>
<td>324.9</td>
</tr>
<tr>
<td>max.</td>
<td>324.9</td>
<td>649.8</td>
</tr>
</tbody>
</table>

Power dissipation (max.) All spurs at 32mA

9371-FB2 | 9373-FB2 | 9374-FB2*
1.8W | 3.6W | 1.8 (+1.8)W

* See ordering information

Fieldbus terminator
Plug-in module (part number F93-XE) supplied with each 937x-FB2 enclosure.
Provides 100Ω + 1μF according to IEC 61158-2 - see separate specification

Trunk surge protection
Plug-in module (part number 9376-SP) - see separate specification

Reverse polarity protection
Yes

ELECTRICAL CONNECTIONS

Trunk wiring terminals
Type: Ex e
Colour: Black

Cable types and capacity

<table>
<thead>
<tr>
<th>Cable cross-section, mm²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rigid cable</td>
</tr>
<tr>
<td>Flexible cable</td>
</tr>
</tbody>
</table>

Spur field wiring terminals
Type: 3-way, pluggable
Colour: Blue

Cable types and capacity

<table>
<thead>
<tr>
<th>Cable cross-section, mm²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rigid cable</td>
</tr>
<tr>
<td>Flexible cable</td>
</tr>
</tbody>
</table>

Grounding of cable screens (trunk & spurs)
( Configured with wire link in the Trunk Terminal Area)

<table>
<thead>
<tr>
<th>Options</th>
<th>Trunk</th>
<th>Spurs</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Single point grounding</td>
<td>Grounded at host</td>
</tr>
<tr>
<td></td>
<td>Trunk &amp; spur screens joined</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Local grounding of spurs</td>
<td>Grounded at host</td>
</tr>
<tr>
<td></td>
<td>Grounded at field enclosure</td>
<td></td>
</tr>
</tbody>
</table>

Trunk and spur cable shields are not interconnected within 9377-FB-R module itself.

Equipotential earth/ground connection facility
M10 earth/grounding stud on bottom face of enclosure

BARRIER LED INDICATORS

Trunk Power (PWR)
ON
Off

<table>
<thead>
<tr>
<th>Colour</th>
<th>Steady</th>
<th>Flashing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Green</td>
<td>Channel powering spur - spur OK</td>
<td>Channel powering spur - spur open</td>
</tr>
</tbody>
</table>

Spurs (tri-colour, per spur)

<table>
<thead>
<tr>
<th>Colour</th>
<th>Steady</th>
<th>Flashing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Red</td>
<td>Internal fault</td>
<td>N.A.</td>
</tr>
</tbody>
</table>

Yellow | Short to shield | Short circuit or current limit |

Off | Supply < 16V or no supply | N.A.
PHYSICAL NETWORKS
IEC61158-2
FOUNDATION™ fieldbus H1

Profile type (according to FF-816)
Type 163 (isolated device coupler)
Designed to comply with FF-846

HAZARDOUS AREA APPROVALS

Location of equipment
Safe area or Zone 1 IIC T4 or Zone 21 hazardous area

Location of connected spur equipment
Safe area or Zone 0 IIC hazardous area

Certification codes
Ex e mb mb [ia Ga] IIC T4 Gb
Ex tb IIC T80°C Db

Certificate numbers
Baseefa 14ATEX0112X
IECEx BAS 14.0058X

Safety description (spurs) pending

- U_o = 17.5V
- I_o peak = 249.5mA
- I_o continuous = 113mA
- P_o = 982mW
- U_i = 17.5V
- C_i = 0
- L_i = 0

Spurs in accordance with FISCO standard IEC 60079-11

ENVIRONMENTAL

Ambient temperature (system)

<table>
<thead>
<tr>
<th>Operation</th>
<th>Storage</th>
</tr>
</thead>
<tbody>
<tr>
<td>–20°C ... +65°C</td>
<td>–40°C ... +75°C</td>
</tr>
</tbody>
</table>

Ambient temperature (9377-FB-R module)
–40°C ... +75°C

Relative humidity
< 95%, non-condensing

Electromagnetic compatibility
EN 61326 – 1:2013
NAMUR NE 21

Shock & Vibration

Vibration:
BS EN 60068-2-6: 2008 Test Fc: 1g
BS EN 60068-2-64: 1995 Test Fh: 1g

Shock:
BS EN 60068-2-27: 1993 Test Ea: 15g

MECHANICAL

Enclosure Materials
Black, Glass Reinforced Plastic (GRP)

Mounting position (recommended)
On vertical plane, with glands and breather on underside

Cable/Breather entries

- Trunk: 2 x M20
- Spurs: 6 or 12 x M20, depending on model
- Breather: 1 x M20

Enclosures are pre-fitted with an Ex e nickel-plated brass breather and Ex e nickel-plated brass plugs in all cable gland holes. The gland plugs must be replaced only with Ex e equipment certified cable glands capable of maintaining the IP level of the enclosure type.

Ingress Protection

Enclosure: IP66
Intrinsically safe terminals: IP20
Ex e terminals: IP30

Enclosure sizes - see dimension drawing for details

<table>
<thead>
<tr>
<th>Enclosure</th>
<th>Dimensions</th>
</tr>
</thead>
<tbody>
<tr>
<td>9373-FB2-Px-PP (6 spurs)</td>
<td>271 x 271 x 136mm</td>
</tr>
<tr>
<td>9373-FB2-Px-PP (12 spurs)</td>
<td>554 x 271 x 136mm</td>
</tr>
</tbody>
</table>

Enclosure Weights

<table>
<thead>
<tr>
<th>MTL Part number</th>
<th>Weight (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>9371-FB2-Px-PP</td>
<td>4.5</td>
</tr>
<tr>
<td>9373-FB2-Px-PP</td>
<td>8.10</td>
</tr>
<tr>
<td>9374-FB2-Px-PP</td>
<td>7.15</td>
</tr>
</tbody>
</table>

† excludes any cable glands or surge protection items

Labels

Internal wiring diagram is attached to inside of enclosure cover. An adhesive backed, Traffolyte (phenolic plastic) tag label is supplied loose and can be engraved with the tag number if details are supplied when ordering

ORDERING INFORMATION

Order as:

- 9371-FB2-Px-PP 6-spur Fieldbus Barrier enclosure with one 6-spur 9377-FB-R module installed, spring clamp connectors.
- 9373-FB2-Px-PP 12-spur Fieldbus Barrier enclosure system with two 6-spur 9377-FB-R modules installed, spring clamp connectors.
- 9374-FB2-Px-PP 12-spur Fieldbus Barrier enclosure system with one 6-spur 9377-FB-R module installed, spring clamp connectors. (Expandable to 12-spur by addition of a second 9377-FB-R module)

(Note: All enclosures are pre-wired and include a F93-XE Fieldbus terminator module)

Where Px = PS (pluggable screw terminal connectors or PC (pluggable spring clamp connectors)

- 9377-FB-R Fieldbus Barrier 6-spur, pluggable module
- F93-XE Fieldbus terminator
- 9376-SP Trunk surge protection module
- FS32 Spur surge protection module

ASSOCIATED LITERATURE

Instruction Manual
IMM937x-FB2-Px-PP
DIMENSIONS (mm)
Mounting holes: 6.5mm slot, 12mm head max.

9373-FB2-Px-PP
9374-FB2-Px-PP

9371-FB2-Px-PP

Note: (F) dimensions are for inclusion in mounting hole centres.
9387-FB2, 9388-FB2

6/12-Spur, Open-Frame, Fieldbus barrier

- For Foundation™ fieldbus networks in hazardous areas
- Pre-assembled system components for 6 or 12 intrinsically safe spur connections
- For assembly into user-specified field enclosures
- Spurs compatible with FISCO and “Entity-certified” fieldbus instruments
- Ergonomic mechanical design
- Pluggable system components without “gas free” constraints
- Optional, integrated surge protection for trunk and spurs

The 9387-FB2 (6-spur) and 9388-FB2 (12-spur) Fieldbus Barrier assemblies provide intrinsically safe spur connections from a high-energy trunk, for connection to suitably certified Foundation™ fieldbus H1 instruments. Each unit comprises pre-wired and assembled system components on a stainless steel baseplate, for installation into a suitably certified field enclosure. Connection facilities are provided for the trunk and spur wiring, as well as all electronic modules needed to support a fully-working Fieldbus Barrier. In a typical application, an Ex e (increased safety) certified field enclosure will be selected to allow installation in a Zone 1 hazardous area; third-party approval of the enclosure and contents is normally required. Alternative uses include applications that are not satisfied by the 9370-FB2 range of Fieldbus Barriers in standard enclosures, such as the installation of multiple fieldbus segments inside a single field enclosure.

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 units are bus powered and require no additional power supply in the field. When used with a fieldbus host control system, power for the trunk may be provided by MTL power supplies in redundant or non-redundant format.

The 9387-FB2 and 9388-FB2 share the unique features of Eaton’s class-leading 9370-FB range of Fieldbus Barrier system. The key modular components of the system (Fieldbus Barrier, Terminator 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. Optional features include pluggable surge protection components for the fieldbus trunk and individual spurs.
**SPECIFICATION**

**SPURS**

<table>
<thead>
<tr>
<th># of spurs</th>
<th>9387-FB2</th>
<th>9388-FB2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current per spur</td>
<td>0 - 40mA</td>
<td>0 - 40mA</td>
</tr>
<tr>
<td>Total current</td>
<td>240mA</td>
<td>480mA</td>
</tr>
</tbody>
</table>

**Galvanic isolation (to EN 60079-11)**

- **Trunk to spurs:** 1.5kV (test voltage)
- **Spur to spur:** no isolation
- **Module to module:** 30V

**Spur surge protection**
Plug-in module (part number FS32) - see separate specification

**Trunk wiring terminals**

<table>
<thead>
<tr>
<th>Type</th>
<th>Screw cage clamp - mm²</th>
<th>Spring cage clamp - mm²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rigid cable</td>
<td>0.5 to 2.5</td>
<td>0.5 to 2.5</td>
</tr>
<tr>
<td>Flexible cable</td>
<td>0.2 to 2.5</td>
<td>0.2 to 2.5</td>
</tr>
</tbody>
</table>

**Spur field wiring terminals**

<table>
<thead>
<tr>
<th>Type</th>
<th>Screw cage clamp - mm²</th>
<th>Spring cage clamp - mm²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rigid cable</td>
<td>0.25 to 2.5</td>
<td>0.25 to 2.5</td>
</tr>
</tbody>
</table>

**Grounding of cable screens (trunk & spurs)**

- Options:
  - 1 Single point grounding
  - 2 Local grounding of spurs

**Equipotential earth/ground connection facility**
M10 earth/grounding stud on baseplate

**BARRIER LED INDICATORS**

**Trunk Power (PWR)**

<table>
<thead>
<tr>
<th>Colour</th>
<th>Steady</th>
<th>Flashing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Green</td>
<td>Channel powering spur - spur OK</td>
<td>Channel powering spur - spur open</td>
</tr>
<tr>
<td>Red</td>
<td>Internal fault</td>
<td>Internal fault</td>
</tr>
<tr>
<td>Yellow</td>
<td>Short to shield</td>
<td>Short circuit, current limit</td>
</tr>
</tbody>
</table>

**Spurs (tri-colour, per spur)**

- Supply voltage < 16V or no supply

**Power dissipation (max.)**

<table>
<thead>
<tr>
<th>9387-FB2</th>
<th>9388-FB2</th>
</tr>
</thead>
<tbody>
<tr>
<td>@ 16V</td>
<td>9.8W</td>
</tr>
<tr>
<td>@ 24V</td>
<td>14.7W</td>
</tr>
<tr>
<td>@ 32V</td>
<td>19.6W</td>
</tr>
</tbody>
</table>

MTL 9380-FB2 range
November 2016

www.mtl-inst.com
PHYSICAL NETWORKS
IEC61158-2
FOUNDATION™ fieldbus H1
Profile type (according to FF-816)
Type 163 (isolated device coupler)
Designed to comply with FF-846

HAZARDOUS AREA APPROVALS
Location of equipment
Zone 1 IIC T4 hazardous area when mounted inside a suitably certified Ex e enclosure
Location of connected spur equipment
Zone 0 IIC hazardous area
Certification codes
E II 2(I) G
Ex d e ib mb [ia Ga] IIC T4 Gb (-40°C ≤ Ta ≤ 75°C)
Certificate numbers
Baseefa 14ATEX0111U
IECEx BAS14.0057U
Note: 9387-FB2 and 9388-FB2 are product ordering codes. The certification documents refer to the 937x components that comprise these assemblies. 'U' denotes a unit that requires further equipment for use in hazardous areas, i.e. a suitably certified enclosure.

Safety description (spurs)
\[ U_0 = 16.4V \]
\[ I_{0\text{ peak}} = 249.5mA \]
\[ I_{0\text{ continuous}} = 109mA \]
\[ P_0 = 898mW \]
\[ U_i = 16.4V \]
\[ C_i = 0 \]
\[ L_i = 0 \]
Spurs in accordance with FISCO standard IEC 60079-27

ENVIRONMENTAL
Ambient temperature (inside selected enclosure)
<table>
<thead>
<tr>
<th>Operating</th>
<th>Storage</th>
</tr>
</thead>
<tbody>
<tr>
<td>−40°C ... +75°C</td>
<td>−40°C ... +75°C</td>
</tr>
</tbody>
</table>

Relative humidity
< 95%, non-condensing

Electromagnetic compatibility
EN61326–1 12013
NAMUR NE 21

Shock & Vibration
Vibration:
BS EN 60068-2-6: 2008 Test Fc: 1g
BS EN 60068-2-64: 1995 Test Fh: 1g
Shock:
BS EN 60068-2-27: 1993 Test Ea: 15g

MECHANICAL
Mounting position (recommended)
On to a vertical plane. The component must be mounted in an appropriately certified enclosure typically rated to IP66 when used in hazardous areas.
When used in safe areas, the enclosure must provide ingress protection of at least IP20.

Protection
Intrinsically safe terminals IP20
Non-IS terminals IP30

Weights 1

<table>
<thead>
<tr>
<th>MTL Part number</th>
<th>Weight (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>9387-FB2</td>
<td>2.7</td>
</tr>
<tr>
<td>9388-FB2</td>
<td>4.5</td>
</tr>
</tbody>
</table>

† includes barrier(s) and terminator but excludes any surge protection items

ORDERING INFORMATION
Order as:

9387-FB2-xx 6-spur Fieldbus Barrier system with one 6-spur 9377-FB-R module installed.
9388-FB2-xx 12-spur Fieldbus Barrier system with two 6-spur 9377-FB-R modules installed.
Where xx =
PS (pluggable screw terminal connectors) PC (pluggable spring clamp connectors)
(Note: All assemblies are pre-wired and include a F93-XE Fieldbus terminator module)

9377-FB-R Fieldbus Barrier 6-spur, pluggable module
F93-XE Fieldbus terminator
9376-SP Trunk surge protection module
FS32 Spur surge protection module

Weights †

<table>
<thead>
<tr>
<th>MTL Part number</th>
<th>Weight (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>9387-FB2</td>
<td>2.7</td>
</tr>
<tr>
<td>9388-FB2</td>
<td>4.5</td>
</tr>
</tbody>
</table>

† includes barrier(s) and terminator but excludes any surge protection items
MTL 9380-FB2 range
November 2016

DIMENSIONS (mm)

9387-FB2-xx
6-way baseplate assembly

9388-FB2-xx
12-way baseplate assembly
(showing two, spur surge protection modules)

The given data is only intended as a product description and should not be regarded as a legal warranty of properties or guarantee. In the interest of further technical developments, we reserve the right to make design changes.
9372-FB range
Redundant fieldbus barrier enclosures, 5/6 spur

- For FOUNDATION™ fieldbus networks in hazardous areas
- Redundant configuration for super-high system availability
- Complete enclosure systems for up to 6 intrinsically safe spur connections
- Failure alarm direct to host control system via integrated fieldbus device
- Mount in Zone 1 (gas) or Zone 21 (dust) with spurs connected into Zone 0
- Compatible with FISCO and Entity certified fieldbus instruments
- Ergonomic mechanical design
- Pluggable system components, without ‘gas free’ constraints
- Optional, integrated surge protection for trunk and spurs

The 9372-FB Redundant Fieldbus Barriers are field-mounted wiring hubs that create up to six intrinsically safe spur connections from a high-energy trunk, for connection to suitably certified FOUNDATION™ fieldbus H1 instruments. They 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 enclosure system uses duplicated Fieldbus Barrier modules in a redundant configuration to achieve significantly higher system availability than equivalent ‘simplex’ units. The 9372-FB may therefore be selected for critical process applications where failure of the Fieldbus Barrier would otherwise result in unacceptable downtime or lost production. It is also ideal for use in Fieldbus Safety Instrumented Function (SIF) networks in which nuisance trips cannot be tolerated. Failure announcement to the host control system is provided by means of an integrated FOUNDATION™ fieldbus device with Digital Input Function Block capability.

In common with conventional Fieldbus Barriers, 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 9372-FB redundant fieldbus barrier is based on our revolutionary 9370-FB range of products, which are supplied as complete, factory-assembled enclosure systems that do not require additional wiring, customised housings or complex ancillary components. Electrical and mechanical aspects of the design are integrated, providing the industry’s first complete, ergonomic solution for ‘High Energy Trunk’ applications in hazardous areas.

Uniquely, the key modular components of the system (Fieldbus Barrier, Terminator 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.

Optional features include pluggable surge protection components for the fieldbus trunk and individual spurs. Connection facilities with generous room for cable management are provided within the Fieldbus Barrier enclosure for the trunk and spur wiring.

For added flexibility, a redundant-capable enclosure can be specified part-populated with one 6-spur module (model no. 9375-FB). This permits future upgrading from simplex to redundant mode simply by plugging in an additional Fieldbus Barrier module and optional alarm module.

The 9372-FB Fieldbus Barrier is bus powered and requires no additional power supply in the field. When used with a fieldbus host control system, power for the trunk may be provided by redundant power supplies.
SPECIFICATION

SPURS

<table>
<thead>
<tr>
<th></th>
<th>9372-FB* Redundant 5-spur</th>
<th>9375-FB* Redundant-enabled 6-spur</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of spur(s)</td>
<td>5 (6th spur allocated to alarm module)</td>
<td>6</td>
</tr>
<tr>
<td>No. of 9377-FB modules installed</td>
<td>2</td>
<td>1 (upgradable to 2)</td>
</tr>
<tr>
<td>Current per spur</td>
<td>0 - 32mA</td>
<td>0 - 32mA</td>
</tr>
<tr>
<td>Total current</td>
<td>160mА</td>
<td>192mА</td>
</tr>
<tr>
<td>Current limit per spur (max.)</td>
<td>45mA</td>
<td>4.5mA</td>
</tr>
<tr>
<td>Spur voltage @ 20°C</td>
<td>≥ 10V @ 40mA</td>
<td></td>
</tr>
<tr>
<td>No-load voltage</td>
<td>12V min.</td>
<td></td>
</tr>
<tr>
<td>Number of field devices</td>
<td>1 per spur</td>
<td></td>
</tr>
<tr>
<td>Maximum spur length</td>
<td>120m (depending on the number of spurs per fieldbus segment)</td>
<td></td>
</tr>
<tr>
<td>Galvanic isolation (to EN 60079-11)</td>
<td>Trunk to spurs: 1.5kV (test voltage) Spur to spur: no isolation</td>
<td></td>
</tr>
<tr>
<td>Spur surge protection</td>
<td>Plug-in module (part number FS32) - see separate specification</td>
<td></td>
</tr>
</tbody>
</table>

TRUNK

Data rate
31.25kBaud

Data transmission between trunk and spurs
passive, no repeater function

Number of trunk connections
2 (in & out), internally connected

Maximum number of 9377-FB-R modules per segment
2 redundant pairs (total 10 spurs**)

Input voltage range (trunk)
16–32V DC

Voltage drop (trunk in to trunk out)
0V

Maximum rated current (trunk in to trunk out)
5A

Low voltage monitoring
Input voltage < 16V, spurs de-energized

Typical DC current consumption for 9372-FB (mA)

<table>
<thead>
<tr>
<th></th>
<th>@ 16V</th>
<th>@ 24V</th>
<th>@ 32V</th>
</tr>
</thead>
<tbody>
<tr>
<td>No load on each spur</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>typ.</td>
<td>77.9</td>
<td>62.9</td>
<td>49.6</td>
</tr>
<tr>
<td>max.</td>
<td>80.0</td>
<td>65.0</td>
<td>51.0</td>
</tr>
<tr>
<td>1 spur @ 20mA</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>typ.</td>
<td>102.8</td>
<td>81.1</td>
<td>64.3</td>
</tr>
<tr>
<td>max.</td>
<td>120.0</td>
<td>84.0</td>
<td>80.6</td>
</tr>
<tr>
<td>All spurs @ 20mA</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>typ.</td>
<td>201.7</td>
<td>144.1</td>
<td>114.2</td>
</tr>
<tr>
<td>max.</td>
<td>208.0</td>
<td>149.0</td>
<td>118.0</td>
</tr>
<tr>
<td>All spurs @ 32mA</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>typ.</td>
<td>185.0</td>
<td>135.6</td>
<td>106.5</td>
</tr>
<tr>
<td>max.</td>
<td>191.0</td>
<td>140.0</td>
<td>110.0</td>
</tr>
<tr>
<td>1 short-circuit</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>typ.</td>
<td>276.5</td>
<td>191.3</td>
<td>143.4</td>
</tr>
<tr>
<td>max.</td>
<td>288.0</td>
<td>198.0</td>
<td>154.0</td>
</tr>
</tbody>
</table>

Power dissipation (max.)
2.5W (all spurs at 32mA)

Fieldbus terminator
Plug-in module (part number 9378-FT) supplied with each 9372-FB or 9375-FB enclosure.
Provides 100Ω + 1μF according to IEC 61158-2 - see separate specification

Trunk surge protection
Plug-in module (part number 9376-SP) - see separate specification

Reverse polarity protection
Yes

Failure alarm
Failure of either 9377-FB-R barrier module in redundant mode is annunciated over Foundation™ fieldbus via state change of DI Function Block in 9379-ALM alarm module (standard in 9372-FB enclosure)

ELECTRICAL CONNECTIONS

Trunk wiring terminals
Type: Ex e

<table>
<thead>
<tr>
<th>Cable types and capacity</th>
<th>Screw cage clamp - mm²</th>
<th>Spring cage clamp - mm²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rigid cable</td>
<td>0.5 to 4.0</td>
<td>0.5 to 4.0</td>
</tr>
<tr>
<td>Flexible cable</td>
<td>0.5 to 2.5</td>
<td>0.5 to 2.5</td>
</tr>
</tbody>
</table>

Spur field wiring terminals
Type: 3-way, pluggable

<table>
<thead>
<tr>
<th>Cable types and capacity</th>
<th>Screw cage clamp - mm²</th>
<th>Spring cage clamp - mm²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rigid cable</td>
<td>0.2 to 2.5</td>
<td>0.2 to 2.5</td>
</tr>
<tr>
<td>Flexible cable</td>
<td>0.25 to 2.5</td>
<td>0.25 to 2.5</td>
</tr>
</tbody>
</table>

Grounding of cable screens (trunk & spurs)
(Configured with wire connections in the Trunk Terminal Assembly)

<table>
<thead>
<tr>
<th>Options</th>
<th>Trunk</th>
<th>Spurs</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Single point grounding</td>
<td>Grounded at host Trunk &amp; spur screens joined</td>
</tr>
<tr>
<td>2</td>
<td>Local grounding of spurs</td>
<td>Grounded at host Grounded at field enclosure</td>
</tr>
</tbody>
</table>

Trunk and spur cable shields are not interconnected within 9377-FB-R module.

Equipotential earth/ground connection facility
M10 earth/grounding stud on side wall of enclosure

BARRIER LED INDICATORS

Trunk Power (PWR)

<table>
<thead>
<tr>
<th></th>
<th>ON</th>
<th>OFF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Green</td>
<td>Supply voltage &gt; 16V, internal supply healthy</td>
<td>Supply voltage &lt; 16V or no supply</td>
</tr>
</tbody>
</table>

* See ordering information

** 9372-FB supports 5 spurs, 9375-FB supports 5 spurs when alarm module is fitted or 6 spurs, when alarm module not fitted. Total of 12 spurs supported for 2 x 9375-FB with no alarm module fitted.

*** The FF-846 Isolated Device Coupler registration does not include tests for hardware redundancy. Although operation of the redundant mechanism has been thoroughly tested, registration of the redundant capability is not implied by the application of the Foundation’s checkmark.
9372-FB range
November 2016

HAZARDOUS AREA APPROVALS
Location of equipment
Safe area or Zone 1 IIC T4 or Zone 21 hazardous area
Location of connected spur equipment
Safe area or Zone 0 IIC hazardous area

Certification marking

<table>
<thead>
<tr>
<th>II 2(1)GD</th>
<th>Ex de ib mb (ia Ga) IIC T4 Gb</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ex tb IIC T80°C Db</td>
<td></td>
</tr>
</tbody>
</table>

Certificate numbers
Baseefa09ATEX0185X
IECEx BAS09.0082X

Safety description (spurs)

** See footnote on page 2

Enclosure sizes - see dimension drawings for details
GRP, 5 spurs**: 554 x 271 x 130mm
Stainless steel, 5 spurs**: 428 x 271 x 130mm
** See footnote on page 2

Mounting position (recommended)
On vertical plane, with glands and breather on underside

Cable/Breather entries
Trunk: M20 x 2  Spur: M20 x 6  Breather: M20 x 1

Enclosures are pre-fitted with a breather and Ex e nickel-plated brass plugs in all cable gland holes. These must be replaced only with Ex e equipment certified cable glands capable of maintaining the IP level of the enclosure type. See ordering information for gland options.

Protection
Stainless steel enclosures (937x-FB-xx-SS): IP66
GRP enclosures (937x-FB-xx-PP): IP66
Intrinsically safe terminals: IP20
Ex e terminals: IP30

PHYSICAL NETWORKS

IEC61158-2
FOUNDATION™ fieldbus H1

Profile type (according to FF-816)
Type 163 (isolated device coupler) FF-846***

ORDERING INFORMATION

Order as:
9372-FB-xx-XX  5-spur Redundant Fieldbus Barrier enclosure system with two 9377-FB-R Fieldbus Barrier modules and one 9379-ALM alarm module installed.
9375-FB-xx-XX  5/6-spur Fieldbus Barrier enclosure system with one 9377-FB-R Fieldbus Barrier module installed. (Upgradable to redundant operation by addition of a second 9377-FB-R module and optional 9379-ALM alarm module).

Where xx = SS – 316L Stainless Steel
Where xx = PS (pluggable screw terminal connectors) PC

9377-FB-R  Fieldbus Barrier module, 6-spur, pluggable
9378-FT  Fieldbus terminator module, pluggable
9376-SP  Trunk surge protection module, pluggable
FS32  Spur surge protection module, pluggable

CABLE GLANDS

The following M20 cable glands are Ex e equipment certified, better than IP65 rated and suitable for use with the 9370-FB range of Fieldbus Barriers. They can be supplied separately and are available to order using the following part numbers.

<table>
<thead>
<tr>
<th>Order No.</th>
<th>Manufacturer and Type</th>
<th>Description (Qty 1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>FCS-1000-P20</td>
<td>Jacob 50-620 PASWL/Ex</td>
<td>Plastic gland</td>
</tr>
<tr>
<td>FCS-1000-C20</td>
<td>Capri 816684</td>
<td>Nickel-plated brass gland</td>
</tr>
<tr>
<td>FCS-1000-A20</td>
<td>Capri 846694</td>
<td>Armoured nickel-plated brass gland</td>
</tr>
<tr>
<td>FCS-1000-S20</td>
<td>Capri 816699</td>
<td>Stainless steel gland</td>
</tr>
<tr>
<td>FCS-1000-R20</td>
<td>Capri 846699</td>
<td>Armoured stainless steel gland</td>
</tr>
</tbody>
</table>

ASSOCIATED LITERATURE

Instruction Manual - GRP enclosures
Instruction Manual - stainless steel enclosures

Figure 1 - Illustrating spur redundancy and use of optional Alarm module
DIMENSIONS (mm)

Stainless Steel Enclosure
Mounting holes: Ø 10.8mm

9372-FB-xx-SS
9375-FB-xx-SS

GRP Enclosure
Mounting holes: 6.5mm slot, 12mm head max.

9372-FB-xx-PP
9375-FB-xx-PP

Note: (F) dimensions are for enclosure mounting hole centres

The given data is only intended as a product description and should not be regarded as a legal warranty of properties or guarantee. In the interest of further technical developments, we reserve the right to make design changes.
The 9387-FB-R (5-spur) Open-frame redundant fieldbus barrier provides intrinsically safe spur connections from a high-energy trunk, for connection to suitably certified Foundation™ fieldbus H1 instruments. The unit comprises pre-wired and assembled system components on a stainless steel baseplate, for installation into a suitably certified field enclosure. Connection facilities are provided for the trunk and spur wiring, as well as all electronic modules needed to support a fully-working Fieldbus Barrier. In a typical application, an Ex e (increased safety) certified field enclosure will be selected to allow installation in a Zone 1 hazardous area; third-party approval of the enclosure and contents is normally required.

The assembly uses duplicated fieldbus barrier modules in a redundant configuration to achieve significantly higher system availability than equivalent ‘simplex’ units. The 9387-FB-R may therefore be selected for critical process applications where failure of the Fieldbus Barrier would otherwise result in unacceptable downtime or lost production. It is also ideal for use in Fieldbus Safety Instrumented Function (SIF) networks in which nuisance trips cannot be tolerated. Failure annunciation to the host control system is provided by means of an integrated Foundation™ fieldbus device with Digital Input Function Block capability.

In common with conventional fieldbus barriers, 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 9387-FB-R redundant fieldbus barrier assembly is based on the 9370-FB range of products, which are supplied as complete, factory-assembled systems that do not require additional wiring or complex ancillary components. The electrical and mechanical aspects of this design have been integrated to provide the industry’s first complete, ergonomic solution for ‘High Energy Trunk’ applications in hazardous areas.

Uniquely, the key modular components of the system (Fieldbus Barrier, Terminator 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. Further optional features include pluggable surge protection components for the fieldbus trunk and individual spurs.

The 9387-FB-R Fieldbus barrier assembly is bus powered and requires no additional power supply in the field. When used with a fieldbus host control system, power for the trunk may be provided by redundant MTL power supplies.
SPECIFICATION

SPURS
Number of spurs
5 (6th spur allocated to alarm module)
Number of 9377-FB-R modules
2
Current per spur
0 - 32mA
Total current all spurs (max.)
160mA
Current limit per spur (max.)
45mA
Spur short circuit current (max.)
4.5mA
Spur voltage
≥ 10V @ 40mA
No-load voltage
12V min.
Number of field devices
1 per spur
Maximum spur length
120m (depending on the number of spurs per fieldbus segment)
Galvanic isolation (to EN 60079-11)
Trunk to spurs: 1.5kV (test voltage)
Spur to spur: no isolation
Module to module: 30V
Spur surge protection
Plug-in module (part number FS32) - see separate specification
* See ordering information

TRUNK
Data rate
31.25kBaud
Data transmission between trunk and spurs
passive, no repeater function
Number of trunk connections
2 (in & out), internally connected
Input voltage (trunk)
16–32V DC
Voltage drop (trunk in to trunk out)
0V
Maximum rated current (trunk in to trunk out)
5A
Low voltage monitoring
Input voltage < 16V, spurs de-energized

Typical DC current consumption for 9387-FB

<table>
<thead>
<tr>
<th></th>
<th>@ 16V</th>
<th>@ 24V</th>
<th>@ 32V</th>
</tr>
</thead>
<tbody>
<tr>
<td>No load on each spur</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>typ.</td>
<td>77.9</td>
<td>62.9</td>
<td>49.6</td>
</tr>
<tr>
<td>max.</td>
<td>80.0</td>
<td>65.0</td>
<td>51.0</td>
</tr>
<tr>
<td>1 spur @ 20mA</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>typ.</td>
<td>102.8</td>
<td>81.1</td>
<td>64.3</td>
</tr>
<tr>
<td>max.</td>
<td>120.0</td>
<td>84.0</td>
<td>80.6</td>
</tr>
<tr>
<td>All spurs @ 20mA</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>typ.</td>
<td>185.0</td>
<td>135.6</td>
<td>106.5</td>
</tr>
<tr>
<td>max.</td>
<td>191.0</td>
<td>140.0</td>
<td>110.0</td>
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<tr>
<td>All spurs @ 20mA 1 short-circuit</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>typ.</td>
<td>276.5</td>
<td>191.9</td>
<td>149.4</td>
</tr>
<tr>
<td>max.</td>
<td>288.0</td>
<td>198.0</td>
<td>154.0</td>
</tr>
</tbody>
</table>

Power dissipation (max.)
2.5W (all spurs at 32mA)

Fieldbus terminator
Plug-in module (part number 9378-FT) supplied with each 9387-FB-R or 9388-FB-R assembly.
Provides 100Ω + 1μF according to IEC 61158-2 - see separate specification

Trunk surge protection
Plug-in module (part number 9376-SP) - see separate specification

Reverse polarity protection
Yes
Failure alarm
Failure of either 9377-FB-R barrier module in redundant mode is annunciated over FOUNDATION™ fieldbus via state change of DI Function Block in 9379-ALM alarm module

ELECTRICAL CONNECTIONS

Trunk wiring terminals
Type:  Ex e
Cable types and capacity
<table>
<thead>
<tr>
<th>Screw cage clamp - mm²</th>
<th>Spring cage clamp - mm²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rigid cable</td>
<td>0.5 to 4.0</td>
</tr>
<tr>
<td>Flexible cable</td>
<td>0.5 to 2.5</td>
</tr>
</tbody>
</table>

Spur field wiring terminals
Type:  3-way, pluggable
Cable types and capacity
<table>
<thead>
<tr>
<th>Screw cage clamp - mm²</th>
<th>Spring cage clamp - mm²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rigid cable</td>
<td>0.2 to 2.5</td>
</tr>
<tr>
<td>Flexible cable</td>
<td>0.25 to 2.5</td>
</tr>
</tbody>
</table>

Grounding of cable screens (trunk & spurs)
(Configured with wire connections in the Trunk Terminal Assembly)
Options
Trunk Spurs
1 Single point grounding Grounded at host Trunk & spur screens joined
2 Local grounding of spurs Grounded at host Grounded at field enclosure

Equipotential earth/ground connection facility
M10 earth/grounding stud on baseplate

BARRIER LED INDICATORS

Trunk Power (PWR)

<table>
<thead>
<tr>
<th>Colour</th>
<th>ON</th>
<th>OFF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Green</td>
<td>Supply voltage &gt; 16V, internal supply healthy</td>
<td>Supply voltage &lt; 16V or no supply</td>
</tr>
</tbody>
</table>

Spurs (tri-colour, per spur)

<table>
<thead>
<tr>
<th>Colour</th>
<th>Steady</th>
<th>Flashing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Green</td>
<td>Channel powering spur - spur OK</td>
<td>Channel powering spur - spur open</td>
</tr>
<tr>
<td>Red</td>
<td>Internal fault</td>
<td>N.A.</td>
</tr>
<tr>
<td>Yellow</td>
<td>Short to shield</td>
<td>Short circuit, current limit</td>
</tr>
<tr>
<td>Off</td>
<td>Supply &lt; 16V or no supply</td>
<td>N.A.</td>
</tr>
</tbody>
</table>
PHYSICAL NETWORKS
IEC61158-2
FOUNDATION™ fieldbus H1

Profile type (according to FF-816)
Type 163 (isolated device coupler) FF-846*

HAZARDOUS AREA APPROVALS
Location of equipment
Zone 1 IIC T4 hazardous area when mounted inside a suitably certified enclosure

Location of connected spur equipment
Zone 0 IIC hazardous area

Certification codes

Certificate numbers
Baseefa 09 ATEX0184U
IECEx BAS09.0081U

Note: 9387-FB-R is a product ordering code. The certification documents refer to the 937x components that comprise the 9387-FB-R.

‘U’ denotes a unit that requires further equipment for use in hazardous areas, i.e. a suitably certified enclosure.

Safety description (spurs)

Electromagnetic compatibility
EN 61326 – 1: 2013
NAMUR NE 21

Shock & Vibration
Vibration:
BS EN 60068-2-6: 2008  Test Fc: 1g
BS EN 60068-2-64: 1995 Test Fh: 1g

Shock:
BS EN 60068-2-27: 1993 Test Ea: 15g

MECHANICAL
Mounting position (recommended)
On to a vertical plane

Protection
Intrinsically safe terminals  IP20
Non-IS terminals  IP30

Weight
4.8kg
(includes two barrier(s) and the trunk terminator but excludes any surge protection items)

ORDERING INFORMATION
Order as:

9387-FB-xx-R  5-spur Redundant Fieldbus Barrier assembly with two 9377-FB-R Fieldbus Barrier modules and one 9379-ALM alarm module installed.

Where xx = PS = pluggable screw terminal connectors
PC = pluggable spring-clamp connectors
(Note: All assemblies are pre-wired and include a 9376-FT Fieldbus terminator module)

9377-FB-R Fieldbus Barrier module, 6-spur, pluggable
9379-ALM Alarm module
9378-FT Fieldbus terminator, pluggable
9376-SP Trunk surge protection module, pluggable
FS32 Spur surge protection module, pluggable

ASSOCIATED LITERATURE
Instruction Manual  INM9380-RD

* The FF-846 Isolated Device Coupler registration does not include tests for hardware redundancy. Although operation of the redundancy mechanism has been thoroughly tested, registration of the redundant capability is not implied by the application of the Foundation’s checkmark.

Figure 1 - Illustrating spur redundancy and use of optional Alarm module

Figure 1 - Illustrating spur redundancy and use of optional Alarm module
DIMENSIONS (mm)

9387-FB-xx-R
5-spur baseplate assembly

9387-FB-xx-R

Mounting slot size 14 x 6
9376-SP
Trunk Surge Protector

- Designed for use with MTL9370-FB range of fieldbus barrier system for FOUNDATION™ fieldbus networks in hazardous areas
- Effective protection against adjacent lightning strikes and power-induced surges
- 10kA surge protection level
- ±32V operating voltage range
- Transparent to fieldbus signals
- Fast reaction time
- ‘Live pluggable’ in Zone 1 hazardous areas without gas clearance

The 9376-SP Trunk surge protector is designed for use in the MTL 9370-FB range of fieldbus barrier system. It prevents surges and transient over-voltages induced on the trunk of the fieldbus network from damaging the system's internal components such as the fieldbus barrier module and terminator. Designed specifically for installation on the trunk terminal assembly inside the system enclosure, its pluggable construction allows it to be installed either during initial installation or later in the life of the apparatus.

The use of specially certified connectors allows the 9376-SP module to be removed and replaced in the fieldbus barrier enclosure in a Zone 1 hazardous area while the fieldbus trunk remains energised and without gas clearance procedures.

The 9376-SP’s multi-stage hybrid surge protection network uses a combination of solid state electronics and a gas-filled discharge tube (GDT) to provide surge protection up to 10kA. It is completely transparent to the operation of the fieldbus, and allows the signals to pass without attenuation while diverting surge currents safely to ground and clamping output voltages to safe levels.

Fully automatic in operation, the 9376-SP reacts immediately to make sure that the protected equipment is never exposed to damaging surges between the fieldbus lines or between the lines and ground. It resets automatically without manual intervention.

When combined with a similar performance device at the host end (e.g. MTL FP32 surge protector), there is effective protection for equipment at both ends of the fieldbus trunk.

Devices are also available to provide surge protection for the intrinsically safe spurs of MTL 9370-FB fieldbus barrier system - refer to product type FS32.

The 9376-SP meets IEC 61158-2 for 31.25kb/s systems such as FOUNDATION™ fieldbus and PROFIBUS-PA.
SPECIFICATION

Maximum surge current
10kA (8/20μs waveform) per line

Leakage current
<1mA @ working voltage

Working voltage
±32Vdc

Maximum continuous operating voltage
±32V peak normal mode
±225V peak common mode

Limiting voltage
62V @ 3kA 8/20μs

Capacitance
Line — Line — 40pF
Line — Earth (Ground) — 80pF

Attenuation
–1dB — 7kHz to 7.5MHz

Electrical connections
Ex de subminiature plugs, compatible with sockets of Trunk Terminal Assembly in 9370-FB range fieldbus barrier systems

ENVIRONMENTAL

Ambient temperature limits
–40°C to +75°C — working
–40°C to +85°C — storage

Relative humidity
5% to 95% RH (non-condensing)

Vibration
BS EN 60068-2-6: 2008 Test Fc: 1g
BS EN 60068-2-64: 1995 Test Fh: 1g

Shock
BS EN 60068-2-27: 1993 Test Ea: 15g

Ratings in accordance with IEC 61643-21

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal voltage U_n</td>
<td>32V</td>
</tr>
<tr>
<td>Rated voltage (MCOV) U_r</td>
<td>36V</td>
</tr>
<tr>
<td>Nominal current I_n</td>
<td>1.6A</td>
</tr>
<tr>
<td>Nominal discharge current (8/20μs) I_sn</td>
<td>3kA</td>
</tr>
<tr>
<td>Max discharge current (8/20μs) I_max</td>
<td>10kA</td>
</tr>
<tr>
<td>Lightning impulse current (10/350μs) I_imp</td>
<td>1.5kA</td>
</tr>
<tr>
<td>Residual voltage @ I_imp U_r</td>
<td>62V</td>
</tr>
<tr>
<td>Voltage protection level @ 1kV/μs U_p</td>
<td>&lt;45V</td>
</tr>
<tr>
<td>Bandwidth</td>
<td>73MHz</td>
</tr>
<tr>
<td>Capacitance</td>
<td>40pF</td>
</tr>
<tr>
<td>Series resistance R</td>
<td>0.5Ω</td>
</tr>
<tr>
<td>Operating Temperature Range</td>
<td>–40°C to +75°C</td>
</tr>
<tr>
<td>Category tested</td>
<td>A2, B2, C1, C2, C3, D1</td>
</tr>
<tr>
<td>Overstressed fault mode (I_n = 3kA)</td>
<td>12kA</td>
</tr>
<tr>
<td>Impulse durability (8/20μs) I_imp</td>
<td>5kA</td>
</tr>
<tr>
<td>Degree of protection (when installed)</td>
<td>IP40</td>
</tr>
<tr>
<td>AC durability 1A_r</td>
<td>5T</td>
</tr>
<tr>
<td>Service conditions 80kPa - 160kPa</td>
<td>5% - 95% RH</td>
</tr>
</tbody>
</table>

HAZARDOUS AREA APPROVALS

Declaration of conformity
MTL14AOC9376SP

Certification code
Baseefa 09ATEX0324U
@ II 2 G Ex d e mb IIC Gb (-40°C ≤ Ta ≤ 75°C)
IECEEx BAS10.0005U
Ex d e mb IIC Gb (-40°C ≤ Ta ≤ 75°C)

MECHANICAL

Weight
165g approx.

Dimensions
See diagram

ORDERING INFORMATION

Order code - 9376-SP

Figure 1: Fitting the 9376-SP module to the Trunk Termination Assembly (TTA) inside the system enclosure
Figure 2: Application of the 9376-SP in the 937x-FB Fieldbus Barrier Enclosure

DIMENSIONS (mm)
The MTL F93-XE fieldbus barrier terminator should be used where the fieldbus barrier is the last (or only) device coupler on the segment. The segment must be terminated correctly to ensure that optimum signal quality is maintained.

The Trunk Termination Area has provision for a fieldbus terminator to be fitted when required. Terminator model F93-XE is used with these fieldbus barriers to provide the correct termination on the trunk segment.

Outline technical specification

<table>
<thead>
<tr>
<th>Model number F93-XE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Description</strong></td>
</tr>
<tr>
<td><strong>Intended application</strong></td>
</tr>
<tr>
<td><strong>Technical compliance</strong></td>
</tr>
<tr>
<td><strong>Electrical characteristics</strong></td>
</tr>
<tr>
<td><strong>Hazardous area approval</strong></td>
</tr>
<tr>
<td><strong>Construction</strong></td>
</tr>
<tr>
<td><strong>Reliability</strong></td>
</tr>
<tr>
<td><strong>Means of connection</strong></td>
</tr>
<tr>
<td><strong>Marking</strong></td>
</tr>
<tr>
<td><strong>Dimensions (body)</strong></td>
</tr>
<tr>
<td><strong>Colour</strong></td>
</tr>
</tbody>
</table>

Notes:
1. Removal and replacement must not be undertaken unless the area in which the equipment is installed is known to be non-hazardous, or the circuit to which it is connected has been de-energised.
2. Fieldbus termination maintained in event of internal open-circuit component fault.
MTL FS32 range
Surge protection for fieldbus components

- Protects intrinsically safe spurs on MTL 937x-FB range fieldbus
- 20kA maximum surge current per line
- Plug connectors for quick and easy connection or rewiring
- Meets the requirements of IEC61158-2:2004
- Can be used on MTL Megablocks or other fieldbus equipment
- 10 year product warranty

The FS32 surge protection device prevents surges and transient over-voltages 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 Eaton’s latest MTL fieldbus barrier product to protect spurs the FS32 can also be used to protect spurs on Megablock wiring hubs. This space saving design helps to reduce the size of junction boxes and ease installation.

The multi-stage hybrid surge protection network at the heart of the FS32 uses a combination of solid state electronics and a gas-filled discharge tube (GDT) to provide surge protection up to 20kA. This impressive surge protection circuit is designed to exhibit exceptionally low line resistance and has negligible voltage drop to the spurs.

In operation the FS32 does not adversely affect the performance or operation of the fieldbus or connected equipment, it allows signals to pass with little attenuation while diverting surge currents safely to earth (ground) and clamping output voltages to safe levels.

Fully automatic in operation the FS32 devices react immediately to make sure that the equipment is never exposed to damaging surges between lines or the lines to earth (ground). Reacting instantaneously the FS32 redirects surges safely to earth (ground) and then resets automatically.

The FS32 represents the next generation of surge protection to be fitted on FOUNDATION™ fieldbus Systems. The space saving form factor allows the FS32 to be connected directly to the terminal receptacle on the module carrier of the 9370 fieldbus barrier. The earth (ground) is connected through the mounting screw in one simple operation. The field spur cable termination block plugs directly into the FS32 allowing fast and effective retro fitting if desired with no additional hardware being required.

For general purpose Megablock wiring hubs FCS-MBx, FCS-MBx-SG, FCS-MBx-SG-T, F300 Range and Intrinsically Safe Megablock wiring hubs F240 - F273 the FS32 represents a simple solution for the fitting of surge protection with the addition of the FS32-BAR earthing (grounding) arrangement. Furthermore the FS32 can also be used on fieldbus power supplies such as the F800 to protect the trunk.

A 10 year no fuss warranty is available as standard for the FS32, so if a correctly connected device should fail for any reason simply return it for a free replacement.
MTL FS32 range
September 2016

SPECIFICATION

All figures typical at 25°C (77°F) unless otherwise stated

Maximum surge current
20kA (8/20µs waveform) per line

Leakage current
0.1µA @ working voltage

Working voltage
±32Vdc

Maximum continuous operating voltage
±38V peak normal mode
±225V peak common mode

Limiting voltage
62V @ 3kA 8/20µs

Line resistance
0.1 Ohm per line

Capacitance
Line — Line — 40pF
Line — Earth (Ground) — 80pF

Attenuation
-1dB — 7kHz to 7.5MHz

Ambient temperature limits
-40°C to +75°C
(-40°F to +167°F) (working)
-40°C to +80°C
(-40°F to +176°F) (storage)

Humidity
5% to 95% RH (non-condensing)

Electrical connections
Plug/header screw terminal

Weight
40g

Dimensions
See figure 1

EMC compliance
BS EN 61326-1:2013

Electrical Safety
BS EN 61643-21:2001

INSTALLATION
Directly plugs into MTL 934x-FB and Relcom mega-blocks.

ORDERING INFORMATION
FS32
FS32-BAR

TO ORDER SPECIFY - Order by module, as listed in the specification table below.

<table>
<thead>
<tr>
<th>Model</th>
<th>FS32</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal voltage</td>
<td>Un</td>
<td>±32V</td>
</tr>
<tr>
<td>Rated voltage</td>
<td>(MCV)</td>
<td>±36V</td>
</tr>
<tr>
<td>Nominal current</td>
<td>In</td>
<td>1.6A</td>
</tr>
<tr>
<td>Nominal discharge current (8/20µs)</td>
<td>sin</td>
<td>3kA</td>
</tr>
<tr>
<td>Max discharge current (8/20µs)</td>
<td>max</td>
<td>20kA</td>
</tr>
<tr>
<td>Lightning impulse current (10/350µs)</td>
<td>Imp</td>
<td>≤5kA</td>
</tr>
<tr>
<td>Residual voltage</td>
<td>Ures</td>
<td>≤62V</td>
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<tr>
<td>Voltage protection level @ 1kV/µs</td>
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<td>≤450V</td>
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<td>Bandwidth</td>
<td>fG</td>
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<td>Capacitance</td>
<td>C</td>
<td>40pF</td>
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<td>Series resistance</td>
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<td>Operating temperature range</td>
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<td>-40°C to +75°C</td>
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<td>Category tested</td>
<td>A2, B2, C1, D1</td>
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<tr>
<td>Overstressed fault mode</td>
<td>In=3kA</td>
<td>22kA</td>
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<tr>
<td>Impulse durability (820µs)</td>
<td></td>
<td>10kA</td>
</tr>
<tr>
<td>Degree of protection</td>
<td>IP30</td>
<td></td>
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<tr>
<td>AC durability</td>
<td></td>
<td>1Amp. 5T</td>
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<tr>
<td>Service conditions</td>
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<td>80kPa - 160kPa, 5% - 95% RH</td>
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Tested in accordance to IEC 61643-21

HAZARDOUS AREA APPROVALS

<table>
<thead>
<tr>
<th>Standard/Authority</th>
<th>Certificate/File No.</th>
<th>Approved for</th>
<th>Product</th>
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<tbody>
<tr>
<td>ATEX Directive 2014/34/EU</td>
<td>Baseefa09ATEX0180X</td>
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<td>FISCO (Baseefa)</td>
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<td>IECEx BAS 09.0083X</td>
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</table>

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The given data is only intended as a product description and should not be regarded as a legal warranty of properties or guarantee. In the interest of further technical developments, we reserve the right to make design changes.