# Foxboro Evo™ Process Automation System

**Product Specifications**

Foxboro®

by Schneider Electric

**PSS 31H-2Y6**

## Intrinsically Safe I/O Subsystem

ISCM Base Unit for LB (Zone 2) Applications

Redundant Zone 1 GRP Enclosure for FB (Zone 1) Applications

*The Intrinsically Safe I/O Subsystem provides integration between the Pepperl+Fuchs™ (P+F) modular intrinsically safe remote I/O systems and the Foxboro Evo™ Process Automation System. The Intrinsically Safe Communications Module (ISCM) enables Foxboro control processors to view the P+F I/O modules as equivalent 200 Series Fieldbus Modules (FBMs), which can be monitored with standard Foxboro Evo blocks and Foxboro Evo system/control configurators such as the Foxboro Evo Control Editors and the Integrated Control Configurator.*

### FEATURES

- Intrinsically safe - supports Zone 2, Div. 2 or Zone 22 (LB-style) environments or Zone 1, or Zone 21 (FB-style) environments
- ISCMs interface the 2 Mbps HDLC Module Fieldbus to the FCP280, FCP270, or ZCP270
- Up to 46 (for LB-style Zone 2 Applications) or 48 (for FB-style Zone 1 Applications) P+F intrinsically safe I/O modules supported per optionally redundant ISCM
- Up to 16 ISCMs supported per Foxboro control processor (FCP280, FCP270 or ZCP270)

- Maximum of 204 modules (ISCMs, I/O modules and 200 Series FBMs) supported on the four Fieldbus ports for the FCP280, provided the maximum CP Fieldbus load and intrinsically safe I/O power supply load is not exceeded. 200 Series FBMs may be connected to any of the four Fieldbus ports but cannot be connected to the same port as any of the ISCMs. Up to 16 ISCMs can be connected to a single Fieldbus port.
- Maximum of 204 modules (ISCMs, I/O modules and 200 Series FBMs) supported per FCP270 and a maximum of 128 modules supported per ZCP270, provided the maximum CP Fieldbus load and intrinsically safe I/O power supply load is not exceeded.
- Redundant ISCMs allow either module to control the process. Role reversal is automatic on detected failures
- Station or module name set through a special module with rotary switch plugged into the ISCM.
- Monitored by standard System Manager, Foxboro Evo Control HMI, or SMDH and FoxView™ displays
- "CE" logo marked on product.

## OVERVIEW

The Intrinsically Safe I/O Subsystem provides integration between the Pepperl+Fuchs (P+F) modular intrinsically safe remote I/O systems and the Foxboro Evo Process Automation System. The Intrinsically Safe Communications Module (ISCM) communicates between the two systems, as it enables Foxboro control processors to view supported P+F intrinsically safe I/O modules as equivalent 200 Series Fieldbus Modules (FBMs) over the Foxboro Evo 2 Mbps HDLC Fieldbus. This allows the I/O modules to be monitored with standard Foxboro Evo blocks and standard Control Core Services or Foxboro Evo Control Software applications such as the Foxboro Evo Control Editors, Foxboro Evo Control HMI, IACC, and ICC.

This subsystem supports both the P+F intrinsically safe I/O modules and their associated base, extension or redundancy units for Zone 2, Div. 2 or Zone 22 (LB-style(1)) environments or Zone 1 or Zone 21 (FB-style(2)) environments. Optionally redundant ISCMs are mounted directly on the appropriate P+F unit along with the I/O modules and power supplies, as shown in Figure 1 and Figure 2. Only I/O modules can be mounted in the extension units. Each I/O module can be plugged into any desired slot on the base or extension unit. ISCMs and power supplies are required to be plugged into their own dedicated slots.

Depending on the model type used, I/O modules can occupy one or two slots in their unit.

ISCMs are installed as single or redundant. In redundant configurations, both ISCMs are always active. In case of a module's failure, the other provides backup coverage until the failed ISCM is returned to service. An ISCM for Zone 2 applications may support up to 46 LB-style I/O modules, while an ISCM for Zone 1 applications may support up to 48 FB-style I/O modules.

**NOTE**

The following 200 Series FBM features are not supported on the intrinsically safe I/O modules: redundant FBMs, Sequence of Events (SOE), TDR, time synchronization, ladder logic, and the EVENT, MDACT and DPIDA blocks.

(1) Local Bus style.
(2) Field Bus style.

**NOTE**

The limit of sixteen ISCMs per subsystem represents the theoretical maximum if the base, extension or redundancy units are not fully fitted with modules. Sixteen base units with sixteen extension units will connect a total of 16 x 46 I/O modules (736). The controller can handle up to 204. If dual-width modules are used, then the subsystem will have 16 x 23 dual-width I/O modules (368) which is outside the scope of the subsystem. In typical scenarios, eight units can be connected to one FCP280 or FCP270.

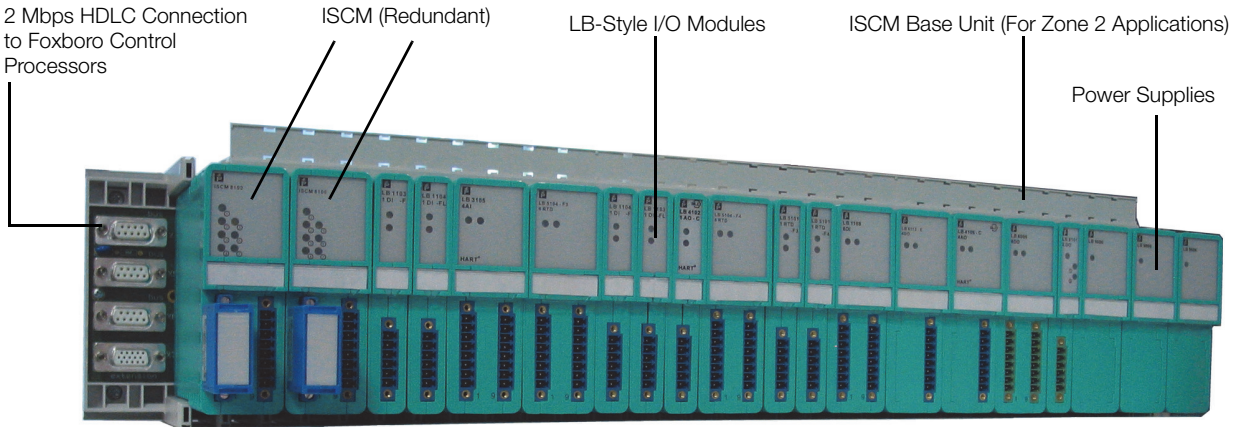



*Figure 1. Redundant ISCM in LB-Style Base Unit (Zone 2 Applications)*

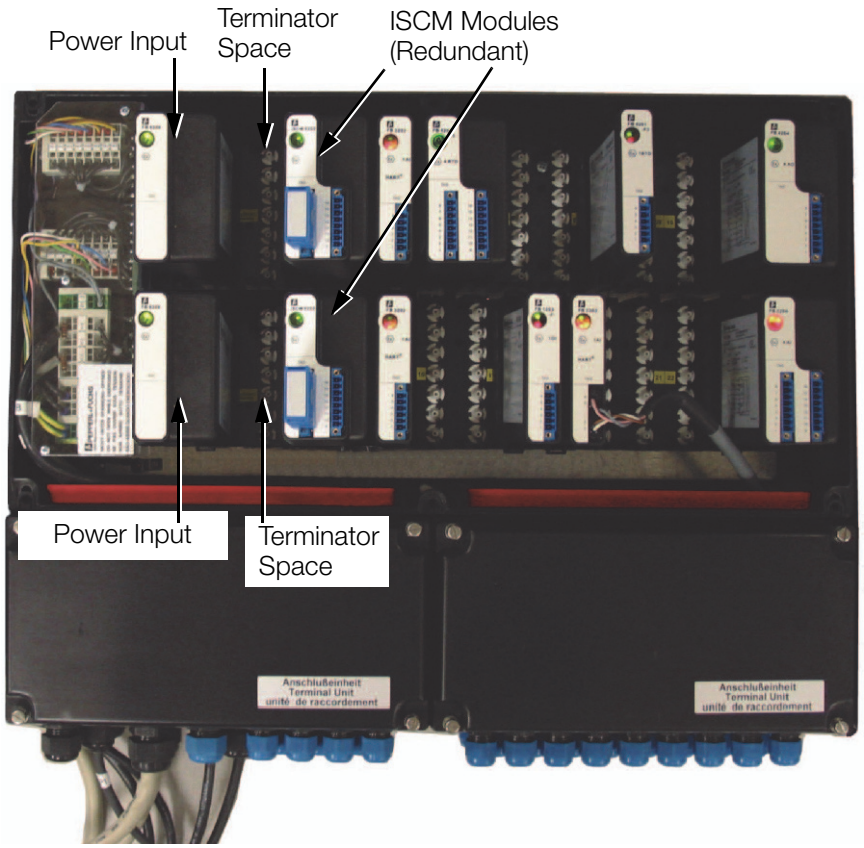



*Figure 2. Redundant ISCMs in FB-Style Redundancy Base Units (Zone 1 Applications)*

## PEPPERL+FUCHS MODULAR REMOTE I/O SYSTEMS

The Pepperl+Fuchs modular remote I/O systems - for Zone 2 or Zone 1 applications - are the cost-effective connection of field signals in the hazardous and the intrinsically safe areas to your process control system via the HDLC Fieldbus. Combinable I/O modules and extension units offer cost-saving installations. The P+F remote I/O systems are characterized by high functionality and simple handling.

Only intrinsically safe I/O modules from P+F that are listed in this PSS are supported by the ISCM. If it is desired to also include non-intrinsically safe signals in the same Foxboro Evo system, then standard 200 Series FBMs must be used for these signals.

For more information on these systems, refer to the website: *http://invensys.pepperl-fuchs.com*

## ISCM DESIGN

ISCM modules support Foxboro Evo and HART® communications over the standard HDLC fieldbus. They have a compact design, with a rugged exterior for physical protection of the electronics in environments with a minimum ingress protection of IP 54. P+F-provided enclosures specially designed for mounting of the P+F intrinsically safe I/O modules provide the appropriate level of environmental protection (for Zone 2/Div 2 or Zone 1 applications).

The ISCM and the supported P+F I/O modules can be removed/replaced from the base or extension unit without removing power. Light-emitting diodes (LEDs) incorporated into the front of the ISCM and I/O modules indicate module status.

## HIGH RELIABILITY

In redundant ISCM configurations, the redundancy of the module pair provides very high subsystem availability time.

Either ISCM may be hot-swapped without upsetting input or output communications to the other module, or removing power from either module. Refer to the B0700DP manual for details.

## IS/IO SYSTEM CONFIGURATION REQUIREMENTS

The requirements in Table 1 must be met to ensure proper system operation.

Table 1. IS/IO System Configuration Requirements

| Requirement | Each FCP280/FCP270 | Each ZCP270 | Each Zone 2 (LB-Style) System | Each Zone 1 (FB-Style) System |
|---|---|---|---|---|
| Install in area(s) | Zone 2[(a)] | Zone 2[(a)] | Zone 2[(a)] | Zone 1 or Zone 2[(a)] |
| I/A Series software or Control Core Services versions | FCP280 - v9.0 (and later)<br>FCP270 - v8.4.3 with QF1012617[(b)] (and later)[(c)] | 8.4.3 with QF1012617[(b)] (and later)[(c)] | 8.4.3 with QF1012617[(b)] (and later)[(c)] | 8.4.3 with QF1012617[(b)] (and later)[(c)] |
| Maximum number of I/O modules, ISCMs and FBMs | 204[(d)] (Redundant ISCM pairs count as 3 modules) | 128 (Redundant ISCM pairs count as 3 modules) | 46 single width, 23 dual width or any supported I/O combination | 40-48 single width, 20-24 dual width or any supported I/O combination |
| Maximum CP Fieldbus load | 75% - Use loading spreadsheet (FCP280 -B0700FY, FCP270 - B0700AV) | 75% - Use loading spreadsheet (B0700AW) | N/A | N/A |
| ISCMs supported | 16 single or redundant pairs[d] | 16 single or redundant pairs | One or two per LB-style system | One or two per FB-style system |
| Power supplies | One or two Foxboro supplied 24 Volt power supplies, power input 24 V dc or 85 - 265 V ac (or 125 V dc) | One or two Foxboro supplied 24 Volt power supplies, power input 24 V dc or 85 - 265 V ac (or 125 V dc) | P+F supplied, two per base or extension unit. Three per unit are required for redundant systems. External optionally redundant 24 V dc power input | P+F supplied, one in main unit, one in redundancy unit, two in extension unit. External power input 24 V dc, 115 V ac or 230 V ac mains |

Table 1. IS/IO System Configuration Requirements (Continued)

| Requirement | Each FCP280/FCP270 | Each ZCP270 | Each Zone 2 (LB-Style) System | Each Zone 1 (FB-Style) System |
|---|---|---|---|---|
| 24 V dc Boost Power | N/A | N/A | Required if 6x10-6x15 modules are installed | Required if 6x10-6x15 modules are installed |
| Analog Inputs and Analog Outputs for P+F I/O Modules | Configuration dependent | Configuration dependent | 80 total, 40 each per base or extension unit | 80 total, 40 each per base or extension unit |
| Digital P+F I/O 2x02 Modules | Configuration dependent | Configuration dependent | 40 total, 20 each per base or extension unit | 40 total, 20 each per base or extension unit |
| Other P+F I/O Modules | Configuration dependent | Configuration dependent | Any other combination if the above two limits are not reached. | Any other combination if the above two limits are not reached. |
| Maximum number of HART devices for P+F I/O Modules | Maximum Fieldbus load cannot be exceeded | Maximum Fieldbus load cannot be exceeded | 80 | 80 |
| Maximum number of HART I/O point connections for P+F I/O Modules | 480 points will use 29% of the fieldbus load capacity[d] | 480 points will use 35% of the fieldbus load capacity | 480 | 480 |
| Maximum number of HART pass through sessions for P+F I/O Modules | 12 | 12 | 4 | 4 |

(a) Be aware that Zone 1 and Zone 2 installations have other special requirements for power consumption and dissipation. These are observed automatically by P+F's ATEX audited factories. Other panel builders would have to obtain their own certificates equivalent to P+F's PTB07ATEX1075 for Zone 1 and PF08CERT1234 for Zone 2.
(b) This Quick Fix is only needed for I/A Series software v8.4.3.
(c) Windows 7®, Windows Server® 2008 R2 Standard, Windows XP® and Windows Server 2003 workstation operating systems only.
(d) For the FCP280, this figure is for one Expanded fieldbus. The FCP280 supports up to four Expanded fieldbuses.

## MODULAR UNIT MOUNTING

The ISCM mounts on supported P+F-supplied LB-style or FB-style base or extension units, which accommodate different quantities of P+F I/O modules, depending on the application.
The ISCM base unit includes signal connectors for the ISCM and P+F I/O modules, redundant independent power connections, and 2 Mbps HDLC module Fieldbus connections for communications to the Foxboro FCP280, FCP270, or ZCP270.

Redundant ISCMs must be located in the left-most two slots in the LB-style base units. One each of the FB-style ISCMs are located in the main and redundancy units.

Table 2 lists the available ISCM modules and available support equipment.

Table 2. ISCM Modules and Support Equipment

| Foxboro Part No. | P+F Model No. | Description |
|---|---|---|
| P0927BV | ISCM8100A | Intrinsically Safe Communication Module for Zone 2 (LB-style) applications (disables line fault detection for select P+F I/O modules) |
| P0924GT | ISCM8100 | Intrinsically Safe Communication Module for Zone 2 (LB-style) applications |
| P0927BW | ISCM8200A | Intrinsically Safe Communication Module for Zone 1 (FB-style) applications (disables line fault detection for select P+F I/O modules) |
| P0924GU | ISCM8200 | Intrinsically Safe Communication Module for Zone 1 (FB-style) applications |
| P0924GV | LTBM8001 | State or module name rotary switch module (plugs into ISCM8100A/8100/8200A/8200) |

The ISCM8100A and ISCM8200A have firmware which disables line fault detection in the standard P+F analog and digital I/O modules (that is, I/O modules with the P+F I/O number of 1*x*01, 1*x*08, 2*xxx*, 3*xxx*, 4*xxx*, or 6*xxx*, where "*x*" is any number - see "P+F INTRINSICALLY SAFE I/O MODULES SUPPORTED" on page 13). These ISCMs do enable line fault detection in the F-type thermocouple and RTD I/O modules (that is, I/O modules with the P+F I/O number of 1*x*03F, 1*x*04F, 5*x*01F3, 5*x*01F4, 5*x*02F, 5*x*04F3, 5*x*04F4, or 5*x*05F, where "*x*" is any number - see "P+F INTRINSICALLY SAFE I/O MODULES SUPPORTED" on page 13).

The ISCM8100 and ISCM8200 do not disable line fault detection on these P+F analog and digital I/O modules.

### Zone 2 (LB-Style) P+F Intrinsically Safe Units and Support Equipment To Support the ISCM

Table 3 lists the supported Zone 2 (LB-Style) I/O base, redundancy and extension units and their associated enclosures and power supplies.

**Table 3. P+F Intrinsically Safe Units and Support Equipment To Support the ISCM (Zone 2, LB-Style)**

| P+F Model No.[a] | Description |
|---|---|
| LB 9022 F | Zone 2 Redundancy Base Unit with 22 slots for Zone 2 (LB-style) applications |
| LB 9024 | Zone 2 Extension Unit with 24 slots |
| LB 9547-S70-F | Zone 2 stainless steel enclosure with 46 slots for Zone 2 (LB-style) applications |
| LB 9006 C | Zone 2 power supply - 24 V dc input<br>NOTE: Two LB 9006 C power supplies are required for each base and extension unit. Where redundant ISCMs are also installed, a third power supply is required in each unit to support redundancy. |

(a) Visit the Invensys Portal (*http://invensys.pepperl-fuchs.com*) to order this equipment as it does not have a Foxboro part number.

### Zone 1 (FB-Style) P+F Intrinsically Safe Units and Support Equipment To Support the ISCM

Table 4 lists the supported Zone 1 (FB-Style) I/O base, redundancy and extension units and their associated enclosures and power supplies.

**Table 4. P+F Intrinsically Safe Units and Support Equipment To Support the ISCM (Zone 1, FB-Style)**

| P+F Model No.[a] | Description |
|---|---|
| FB 9224-PG0 | Zone 1 GRP enclosure with 24 slots |
| FB 9225-PG0 | Zone 1 GRP enclosure with 24 slots (redundant) |
| FB 9248-PG0 | Zone 1 GRP enclosure with 48 slots |
| FB 9249-PG0 | Zone 1 GRP enclosure with 48 slots (redundant) |
| FB 9224-S60 | Zone 1 stainless steel enclosure with 24 slots |
| FB 9225-S70 | Zone 1 stainless steel enclosure with 24 slots (redundant) |
| FB 9248-S70 | Zone 1 stainless steel enclosure with 48 slots |
| FB 9249-S80 | Zone 1 stainless steel enclosure with 48 slots (redundant) |
| FB 9205 D | Zone 1 power supply - 230 V ac / boost power for DO modules FB621x |
| FB 9215 B2 | Zone 1 power supply - 230 V ac input |

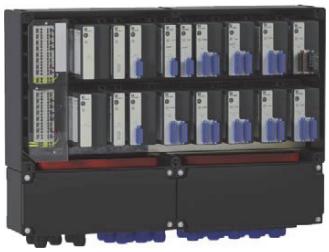
(a) Visit the Foxboro Portal (*http://invensys.pepperl-fuchs.com*) to order this equipment as it does not have a Foxboro part number.

Table 5 details the supported Zone 1 (FB-Style) GRP and stainless steel enclosures. Figure 3 displays examples of these enclosures.

### Table 5. Zone 1 (FB-Style) GRP Enclosures Equipment)

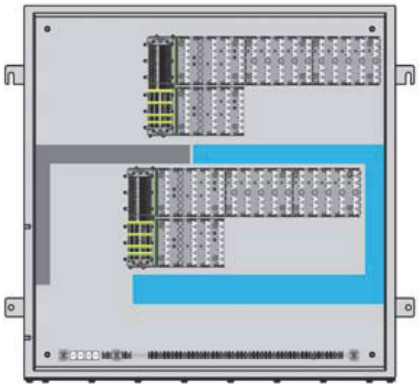
| P+F Model No.(a) | Description |
|---|---|
| FB 9220-PG0 | Zone 1 GRP enclosure with 20 slots (redundant) |
| FB 9240-PG0 | Zone 1 GRP enclosure with 40 slots (redundant) |
| FB 9220-S70 | Zone 1 stainless steel enclosure with 20 slots (redundant) |
| FB 9240-S70 | Zone 1 stainless steel enclosure with 40 slots (redundant) |

(a) Visit the Foxboro Portal (*http://invensys.pepperl-fuchs.com*) to order this equipment as it does not have a Foxboro part number.

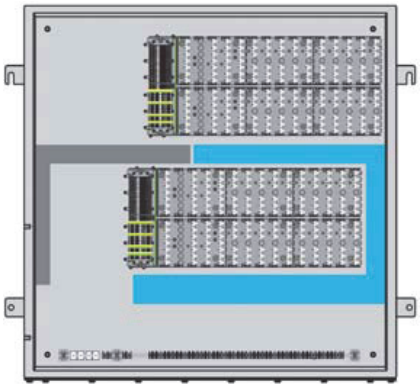


Zone 1 GRP Enclosure with 20 Slots (Redundant) (FB 9220-PG0)

Zone 1 GRP Enclosure with 40 Slots (Redundant) (FB 9240-PG0)



Zone 1 Stainless Steel Enclosure with 20 Slots (Redundant) (FB 9220-S70)



Zone 1 Stainless Steel Enclosure with 40 Slots (FB 9240-S70)

*Figure 3. Loaded Zone 1 (FB-Style) GRP and Stainless Steel Enclosures*

## MODULE FIELDBUS COMMUNICATION

The ISCM supports the redundant 2 Mbps HDLC module Fieldbus to communicate with the FCP280, FCP270, or ZCP270 (via optionally redundant FCM100E/Et modules), as shown in Figure 4 and Figure 5.

The FCP280 and FCP270 can connect to both P+F I/O modules and 200 Series FBMs, provided the appropriate sizing constraints are followed (detailed in the *Field Control Processor 280 (FCP280) Sizing Guidelines and Excel Workbook* (B0700FY), *Field Control Processor 270 (FCP270) Sizing Guidelines and Excel Workbook* (B0700AV)). To connect simultaneously to 200 Series FBMs, the FCP270 must use the FEM100 to add up to three Expanded Fieldbuses for these FBMs.

**NOTE**

The FCP280, FCP270, 200 Series FBMs and their support hardware are suitable for Zone 2 or Class I, Div.2 areas only. Installing this equipment in a Zone 1 area requires the employment of additional protection methods and is your responsibility to implement.

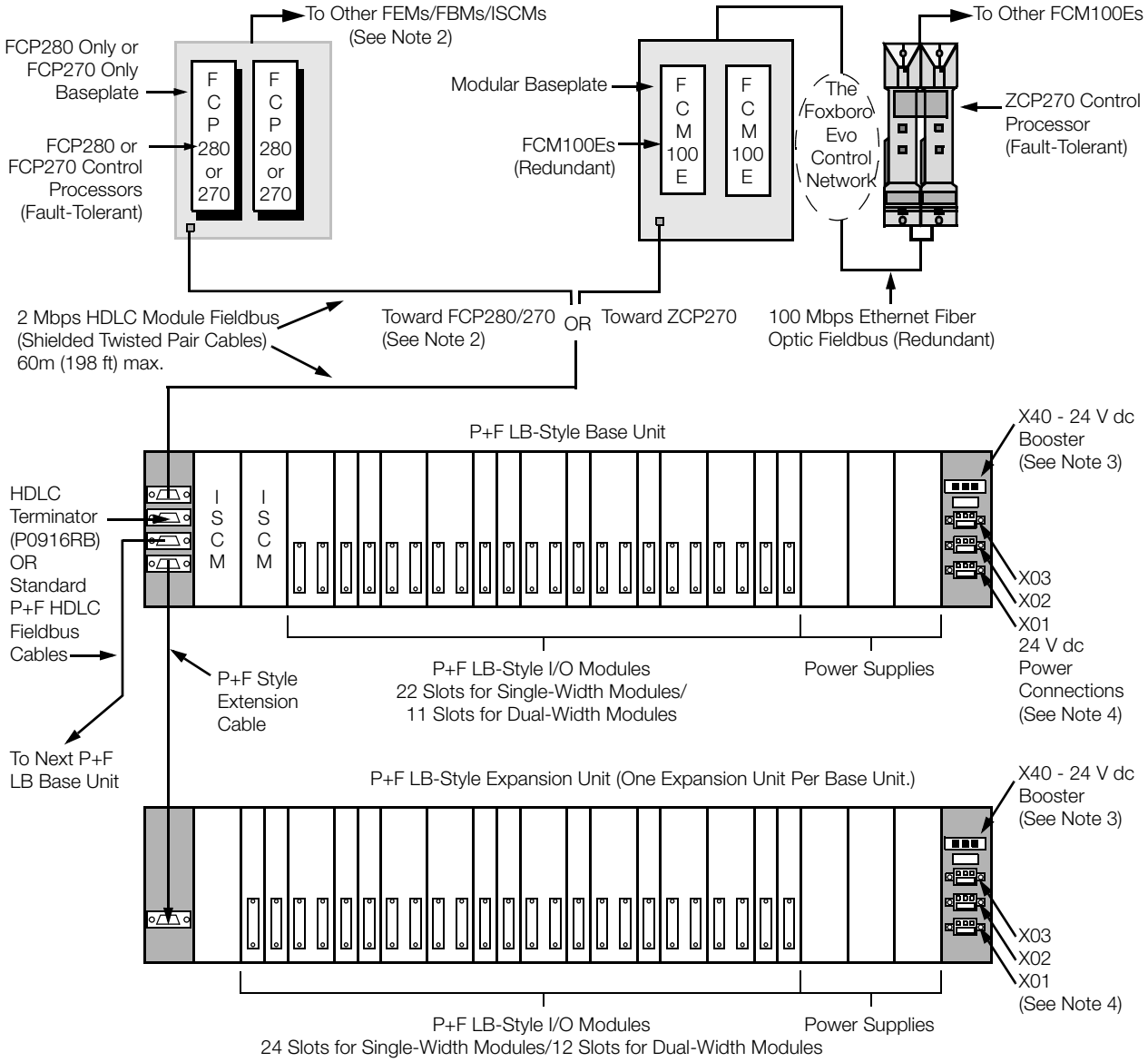
**NOTE**

When an FCP270 (via an FEM100) is connected to both P+F I/O modules and 200 Series FBMs, the Expanded Fieldbus 1 cannot be connected to any FBM baseplates (must be left disconnected), and Expanded Fieldbus 2 can only be used with FBM baseplates addresses 1, 2 and 3 to avoid module name addressing conflicts. Expanded Fieldbus 2 and 3 can connect and address all four baseplates (0 through 3).

For more information on the FEM100 and the Expanded Fieldbus, refer to *FEM100 Fieldbus Expansion Module* (PSS 21H-2Y14 B4).

To connect to a ZCP270, the ISCM connects to an FCM100E/Et module, which in turn connects to the ZCP270 over a 100 Mbps Ethernet fiber optic network (via the Foxboro Evo Control Network).

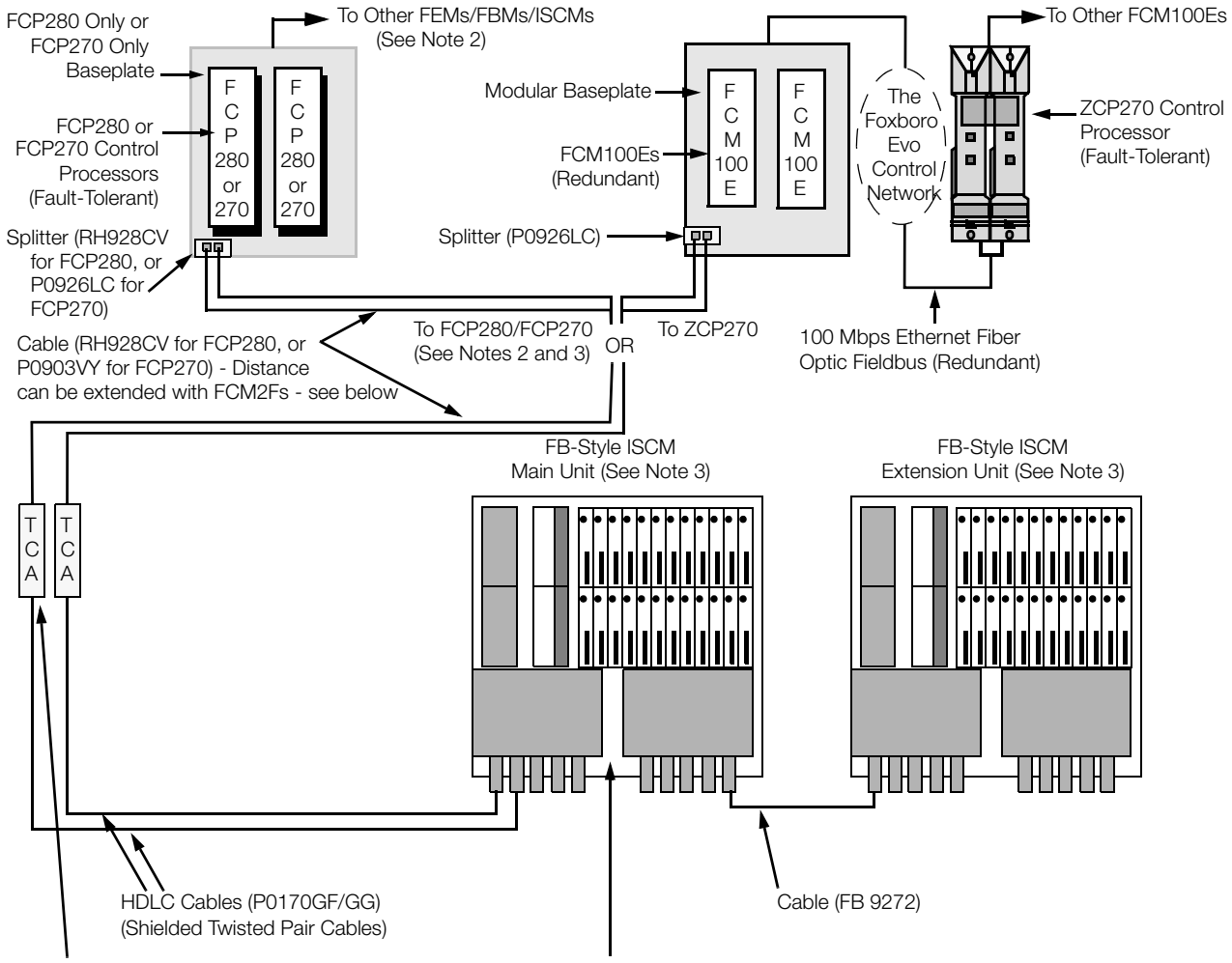
For Zone 2 (LB-style) applications, a maximum of 60 meters (197 ft) of standard fieldbus cable may be used between the FCP280, FCP270, or FCM100E/Et and the remote I/O system. For Zone 1 (FB-Style) applications, a maximum of 152 meters (500 ft) of high quality twinaxial cable may be used between the FCP280, FCP270, or FCM100E/Et and the remote I/O system.




Notes:

1. For sizing constraints, refer to Chapter 1 of the B0700DP manual.
2. If FEM100 is used with an FCP270 connected to a P+F base/extension unit, there are limitations on the Expanded Fieldbus. See Appendix A in the *Intrinsically Safe I/O Subsystem User's Guide* (B0700DP). FEM100s cannot be directly connected to a P+F base/extension unit. However, FCP280 can be connected directly to a P+F base/extension unit.
3. X40 - 24 V dc Booster provides extra auxiliary power for the 4-channel digital outputs for the LB 6110 to LB6115 I/O modules.
4. X03 provides power for the shutdown input. Alternatively, shutdown input can be done by use of a contact closure (contact input) to this connector.
   X02 and X01 are for the 24 V dc input power connections.

*Figure 4. Typical LB-Style (Zone 2) ISCM to FCP280/FCP270/ZCP270 Network Configuration (Simplified)*




Notes:

1. For sizing constraints, refer to the next section below.
2. If FEM100 is used with an FCP270 connected to a P+F base/extension unit, there are limitations on the Expanded Fieldbus. See Appendix A in the B0700DP manual. FEM100s cannot be directly connected to a P+F base/extension unit.
3. For connection information for the FCP280's RH928CV splitter, refer to "Remote Fieldbus Extension, Cable Connections" in *Field Control Processor 280 (FCP280) User's Guide* (B0700FW).

*Figure 5. Typical FB-Style ISCM to FCP280/FCP270/ZCP270 Network Configuration (Simplified)*

## P+F INTRINSICALLY SAFE I/O MODULES SUPPORTED

### Supported P+F Intrinsically Safe I/O Modules and Front Connectors Specifications for Zone 2 or Class I, Div. 2 Environments

The Intrinsically Safe I/O Subsystem supports the following Pepperl+Fuchs intrinsically safe I/O modules in Zone 2 or Class I, Div. 2 environments with a minimum ingress protection of IP 54.

Table 6. Supported P+F Intrinsically Safe I/O Modules (Zone 2 - LB-Style)

| P+F Model No. | I/O Channels | | | | Description | Similar to I/A Series FBM | Unit Slot |
|---|---|---|---|---|---|---|---|
| | Analog Input | Analog Output | Digital Input | Digital Output | | | |
| LB 1101 A | - | - | 2 | - | Digital Input | 207 | 1 |
| LB 1103 F[a] | - | - | 2[b] | - | Frequency + direction of rotation (15 KHz) | 206 | 1 |
| LB 1104 F[a] | - | - | 2[b] | - | Pulse count + direction of rotation (15 KHz) | 206 | 1 |
| LB 1103 FL[a] | - | - | 2[b] | - | Frequency low + direction of rotation (300 Hz) | 206 | 1 |
| LB 1104 FL[a] | - | - | 2[b] | - | Pulse count low + direction of rotation (300 Hz) | 206 | 1 |
| LB 1108 A | - | - | 8 | - | Digital Input | 207 | 2 |
| LB 2101 A | - | - | 2 | 1 | Digital Output with position feedback (22 V, 315 Ω) | 241 | 1 |
| LB 2101 E | - | - | 2 | 1 | Digital Output with position feedback + shutdown input (22 V, 315 Ω) | 241 | 1 |
| LB 2102 A | - | - | 2 | 1 | Digital Output with position feedback (24 V, 210 Ω) | 241 | 1 |
| LB 2103 A | - | - | 2 | 1 | Digital Output with position feedback (24 V, 360 Ω) | 241 | 1 |
| LB 2103 E | - | - | 2 | 1 | Digital Output with position feedback + shutdown input (24 V, 360 Ω) | 241 | 1 |
| LB 2104 A | - | - | 2 | 1 | Digital Output with position feedback (22 V, 220 Ω) | 241 | 1 |
| LB 2105 A | - | - | 2 | 1 | Digital Output with position feedback (22.8 V, 290 Ω) | 241 | 1 |

Table 6. Supported P+F Intrinsically Safe I/O Modules (Zone 2 - LB-Style) (Continued)

| P+F Model No. | I/O Channels | | | | Description | Similar to I/A Series FBM | Unit Slot |
|---|---|---|---|---|---|---|---|
| | Analog Input | Analog Output | Digital Input | Digital Output | | | |
| LB 2105 E | - | - | 2 | 1 | Digital Output with position feedback + shutdown input (22.8 V, 290 Ω) | 241 | 1 |
| LB 2112 A | - | - | 2 | 1 | Digital Output with position feedback (25.3 V, 329 Ω) | 241 | 1 |
| LB 2112 E | - | - | 2 | 1 | Digital Output with position feedback + shutdown input (25.3 V, 329 Ω) | 241 | 1 |
| LB 2113 A | - | - | 2 | 1 | Digital Output with position feedback (26.7 V, 509 Ω) | 241 | 1 |
| LB 2113 E | - | - | 2 | 1 | Digital Output with position feedback + shutdown input (26.7 V, 509 Ω) | 241 | 1 |
| LB 3102 A2 | 1 | - | - | - | HART® input with Transmitter power (15V) | 214 | 1 |
| LB 3104 A2 | 4 | - | - | - | Analog Input Transmitter power (15V) | 201 | 2 |
| LB 3105 A2 | 4 | - | - | - | HART® and Transmitter power | 214 | 2 |
| LB 4102 A2 | - | 1 | - | - | HART® output | 215 | 1 |
| LB 4102 C2 | - | 1 | - | - | HART® output with shutdown input | 215 | 1 |
| LB 4104 A2 | - | 4 | - | - | Analog Output | 237 | 2 |
| LB 4105 A2 | - | 4 | - | - | HART® output with LFD | 215 | 2 |
| LB 4105 C2 | - | 4 | - | - | HART® output with shutdown input | 215 | 2 |
| LB 5101 F3[(a)] | 1 | - | - | - | 3-wire RTD input | 203 | 1 |
| LB 5101 F4[(a)] | 1 | - | - | - | 4-wire RTD input | 203 | 1 |
| LB 5102 F[(a)] | 1 | - | - | - | T/C with internal/external CJC RTD input | 202 | 1 |
| LB 5104 F3[(a)] | 4 | - | - | - | 3 wire RTD input | 203 | 2 |
| LB 5104 F4[(a)] | 4 | - | - | - | 4 wire RTD input | 203 | 2 |
| LB 5105 F[(a)] | 4 | - | - | - | T/C with internal CJC RTD | 202 | 2 |
| LB 5106 A | 1 | - | - | - | 0 - 10 V input | 201 | 1 |
| LB 6005 A | - | - | - | 4 | Digital Relay Output (230 V/24 V) | 242 | 2 |

Table 6. Supported P+F Intrinsically Safe I/O Modules (Zone 2 - LB-Style) (Continued)

| P+F Model No. | I/O Channels | | | | Description | Similar to I/A Series FBM | Unit Slot |
|---|---|---|---|---|---|---|---|
| | Analog Input | Analog Output | Digital Input | Digital Output | | | |
| LB 6006 A | - | - | - | 8 | Digital Relay Output (24 V) | 242 | 2 |
| LB 6101 H | - | - | - | 2 | Digital Relay Output (230 V/24 V) | 242 | 1 |
| LB 6108 A | - | - | - | 8 | 20V/8 mA Digital Output per channel, with shut down input | 242 | 2 |
| LB 6110 A | - | - | - | 4 | Solenoid driver uses boost power (24.5 V, 370 Ω) | 242 | 2 |
| LB 6110 E | - | - | - | 4 | Solenoid driver uses boost power + shutdown input (24.5 V, 370 Ω) | 242 | 2 |
| LB 6111 A | - | - | - | 4 | Solenoid driver uses boost power (24.5 V, 320 Ω) | 242 | 2 |
| LB 6111 E | - | - | - | 4 | Solenoid driver uses boost power + shutdown input (24.5 V, 320 Ω) | 242 | 2 |
| LB 6112 A | - | - | - | 4 | Solenoid driver uses boost power (17 V, 185 Ω) | 242 | 2 |
| LB 6112 E | - | - | - | 4 | Solenoid driver uses boost power + shutdown input (17 V, 185 Ω) | 242 | 2 |
| LB 6113 A | - | - | - | 4 | Solenoid driver uses boost power (23 V, 290 Ω) | 242 | 2 |
| LB 6113 E | - | - | - | 4 | Solenoid driver uses boost power + shutdown input (23 V, 290 Ω) | 242 | 2 |
| LB 6114 A | - | - | - | 4 | Solenoid driver uses boost power (23 V, 355 Ω) | 242 | 2 |
| LB 6114 E | - | - | - | 4 | Solenoid driver uses boost power + shutdown input (23 V, 355 Ω) | 242 | 2 |
| LB 6115 A | - | - | - | 4 | Solenoid driver uses boost power (16.2 V, 78 Ω) | 242 | 2 |
| LB 6115 ES | - | - | - | 4 | Solenoid driver uses boost power + shutdown input (16.2 V, 78 Ω) | 242 | 2 |

(a) Line fault detection is always enabled for this module when used with either ISCM8100 (P0924GT) or ISCM8100A (P0927BV).
(b) Although these modules have two channels, the second channel is for direction detection only.

## Supported P+F Intrinsically Safe I/O Modules and Front Connectors Specifications for Zone 1 Environments

The Intrinsically Safe I/O Subsystem supports the following Pepperl+Fuchs intrinsically safe I/O modules in Zone 1 environments with a minimum ingress protection of IP 54.

**NOTE**

Certain FB-Style (Zone 1) I/O modules supporting Ex-e terminals use cable tails to attach the EX-e connectors. Newer I/O modules are available with plug-in front EX-e connectors instead of cable tails. This simplifies installation and the new EX-e terminals no longer require marshalling. The new cage clamp type plug-in connectors are covered by a hood to ensure IP30 protection. Plastic lugs on the hood ensure that every opening is covered unless occupied by a field wire. Lugs are broken off as more wires are used. Once screwed down, the hood cover secures the connector to the module.

Table 7. Supported P+F Intrinsically Safe I/O Modules (Zone 1 - FB-Style)

| P+F Model No. | I/O Channels | | | | Description | Similar to I/A Series FBM | Unit Slot |
|---|---|---|---|---|---|---|---|
| | Analog Input | Analog Output | Digital Input | Digital Output | | | |
| FB 1201 B | - | - | 2 | - | Digital Input | 207 | 1 |
| FB 1203 F[a] | - | - | 2[b] | - | Frequency + direction of rotation (15 KHz) | 206 | 1 |
| FB 1203 FL[a] | - | - | 2[b] | - | Frequency low + direction of rotation (300 Hz) | 206 | 1 |
| FB 1204 F[a] | - | - | 2[b] | - | Pulse count + direction of rotation (15 KHz) | 206 | 1 |
| FB 1204 FL[a] | - | - | 2[b] | - | Pulse count low + direction of rotation (300 Hz) | 206 | 1 |
| FB 1208 B | - | - | 8 | - | Digital Input | 207 | 2 |
| FB 1301 B200[c] | - | - | 2 | - | Increased safety (NON IS) Digital Input | 207 | 1 |
| FB 1303 F2[c] | - | - | 2[b] | - | Frequency + direction of rotation (15 KHz) | 206 | 1 |
| FB 1303 FL2[c] | - | - | 2[b] | - | Frequency low + direction of rotation (300 Hz) | 206 | 1 |
| FB 1304 F2[c] | - | - | 2[b] | - | Pulse count + direction of rotation (15 KHz) | 206 | 1 |

Table 7. Supported P+F Intrinsically Safe I/O Modules (Zone 1 - FB-Style) (Continued)

| P+F Model No. | I/O Channels | | | | Description | Similar to I/A Series FBM | Unit Slot |
|---|---|---|---|---|---|---|---|
| | Analog Input | Analog Output | Digital Input | Digital Output | | | |
| FB 1304 FL2[c] | - | - | 2[b] | - | Pulse count low + direction of rotation (300 Hz) | 206 | 1 |
| FB 1308 B200[c] | - | - | 8 | - | Digital Input | 207 | 2 |
| FB 2201 B | - | - | 2 | 1 | Digital Output with position feedback (22 V, 315 Ω) | 241 | 1 |
| FB 2201 E | - | - | 2 | 1 | Digital Output with position feedback + shutdown input (22 V, 315 Ω) | 241 | 1 |
| FB 2202 B | - | - | 2 | 1 | Digital Output with position feedback (24 V, 210 Ω) | 241 | 1 |
| FB 2203 B | - | - | 2 | 1 | Digital Output with position feedback (24 V, 360 Ω) | 241 | 1 |
| FB 2203 E | - | - | 2 | 1 | Digital Output with position feedback + shutdown input (24 V, 360 Ω) | 241 | 1 |
| FB 2204 B | - | - | 2 | 1 | Digital Output with position feedback (22 V, 220 Ω) | 241 | 1 |
| FB 2205 B | - | - | 2 | 1 | Digital Output with position feedback (22.8 V, 290 Ω) | 241 | 1 |
| FB 2205 E | - | - | 2 | 1 | Digital Output with position feedback + shutdown input (22.8 V, 290 Ω) | 241 | 1 |
| FB 2212 B | - | - | 2 | 1 | Digital Output with position feedback (25.3 V, 329 Ω) | 241 | 1 |
| FB 2212 E | - | - | 2 | 1 | Digital Output with position feedback + shutdown input (25.3 V, 329 Ω) | 241 | 1 |
| FB 2213 B | - | - | 2 | 1 | Digital Output with position feedback (26.7 V, 509 Ω) | 241 | 1 |
| FB 2213 E | - | - | 2 | 1 | Digital Output with position feedback + shutdown input (26.7 V, 509 Ω) | 241 | 1 |
| FB 3202 B2 | 1 | - | - | - | HART® input with Transmitter power (15V) | 214 | 1 |
| FB 3204 B2 | 4 | - | - | - | Analog Input Transmitter power (15V) | 201 | 2 |

Table 7. Supported P+F Intrinsically Safe I/O Modules (Zone 1 - FB-Style) (Continued)

| P+F Model No. | I/O Channels | | | | Description | Similar to I/A Series FBM | Unit Slot |
|---|---|---|---|---|---|---|---|
| | Analog Input | Analog Output | Digital Input | Digital Output | | | |
| FB 3205 B2 | 4 | - | - | - | HART® and Transmitter power | 214 | 2 |
| FB 3302 B2 | 1 | - | - | - | HART® input with Transmitter power (15V) | 214 | 1 |
| FB 3305 B2 | 4 | - | - | - | HART® and Transmitter power | 214 | 2 |
| FB 4202 B2 | - | 1 | - | - | HART® output | 215 | 1 |
| FB 4202 C2 | - | 1 | - | - | HART® output with shutdown input | 215 | 1 |
| FB 4204 B2 | - | 4 | - | - | Analog Output | 237 | 2 |
| FB 4205 B2 | - | 4 | - | - | HART® output with LFD | 215 | 2 |
| FB 4205 C2 | - | 4 | - | - | HART® output with shutdown input | 215 | 2 |
| FB 4302 C2 | - | 1 | - | - | HART® output with shutdown input | 215 | 1 |
| FB 4305 B2 | - | 4 | - | - | HART® output with Ex-e | 215 | 2 |
| FB 5201 F3[(a)] | 1 | - | - | - | 3 wire RTD input | 203 | 1 |
| FB 5201 F4[(a)] | 1 | - | - | - | 4 wire RTD input | 203 | 1 |
| FB 5202 F[(a)] | 1 | - | - | - | T/C with internal/external CJC RTD input | 202 | 1 |
| FB 5204 F3[(a)] | 4 | - | - | - | 3 wire RTD input | 203 | 2 |
| FB 5204 F4[(a)] | 4 | - | - | - | 4 wire RTD input | 203 | 2 |
| FB 5205 F[(a)] | 4 | - | - | - | T/C with internal CJC RTD | 202 | 2 |
| FB 5206 B | 1 | - | - | - | 0 - 10 V input | 201 | 1 |
| FB 6208 B | - | - | - | 8 | 20V/8mA Digital Output per channel, with shutdown input | 242 | 2 |
| FB 6210 B | - | - | - | 4 | Solenoid driver uses boost power (24.5 V, 370 Ω) | 242 | 2 |
| FB 6210 E | - | - | - | 4 | Solenoid driver uses boost power+ shutdown input (24.5 V, 370 Ω) | 242 | 2 |
| FB 6211 B | - | - | - | 4 | Solenoid driver use boost power (24.5 V, 320 Ω) | 242 | 2 |

Table 7. Supported P+F Intrinsically Safe I/O Modules (Zone 1 - FB-Style) (Continued)

| P+F Model No. | I/O Channels | | | | Description | Similar to I/A Series FBM | Unit Slot |
|---|---|---|---|---|---|---|---|
| | Analog Input | Analog Output | Digital Input | Digital Output | | | |
| FB 6211 E | - | - | - | 4 | Solenoid driver uses boost power+ shutdown input (24.5 V, 320 Ω) | 242 | 2 |
| FB 6212 B | - | - | - | 4 | Solenoid driver uses boost power (17.5 V, 185 Ω) | 242 | 2 |
| FB 6212 E | - | - | - | 4 | Solenoid driver uses boost power+ shutdown input (17.5 V, 185 Ω) | 242 | 2 |
| FB 6213 B | - | - | - | 4 | Solenoid driver uses boost power (23 V, 290 Ω) | 242 | 2 |
| FB 6213 E | - | - | - | 4 | Solenoid driver uses boost power+ shutdown input (23 V, 290 Ω) | 242 | 2 |
| FB 6214 B | - | - | - | 4 | Solenoid driver uses boost power (23 V, 355 Ω) | 242 | 2 |
| FB 6214 E | - | - | - | 4 | Solenoid driver uses boost power+ shutdown input (23 V, 355 Ω) | 242 | 2 |
| FB 6215 B | - | - | - | 4 | Solenoid driver uses boost power (16.2 V, 78 Ω) | 242 | 2 |
| FB 6215 ES | - | - | - | 4 | Solenoid driver uses boost power+ shutdown input (16.2 V, 78 Ω) | 242 | 2 |
| FB 6301 H200 | - | - | - | 2 | Digital Relay Output (230 V/24 V) | 242 | 1 |
| FB 6305 B200 | - | - | - | 4 | Digital Relay Output (230 V/24 V) | 242 | 2 |
| FB 6306 B200(c) | - | - | - | 8 | Digital Relay Output (24 V) | 242 | 2 |
| FB 6308 B2(c) | - | - | - | 8 | 20V/8mA Digital Output per channel, with shutdown input | 242 | 2 |
| FB 9293 F | - | - | - | - | HDLC Bus Termination Module | - | 1 |

(a) Line fault detection is always enabled for this module when used with either ISCM8200 (P0924GU) or ISCM8200A (P0927BW).
(b) Although these modules have two channels, the second channel is for direction detection only.
(c) This FB-style I/O module has front-mounted Ex-e connector with cable tails.

### More Information Regarding Supported P+F Intrinsically Safe I/O Modules

The comparable Fieldbus Modules (FBMs) in the tables listed above are discussed in the Product Specification Sheets listed in the *Standard 200 Series Subsystem Overview*, PSS 31H-2S200.

Full details and specifications for the supported P+F I/O modules are found in “Foxboro/P+F INTRINSICALLY SAFE MODULES SPECIFICATIONS” on page 24.

## LED INDICATORS

Light-emitting diodes (LEDs) on the front of the ISCM and the P+F intrinsically safe I/O modules provide visual indication of the module’s operational status.

## INTRINSICALLY SAFE COMMUNICATION MODULES SPECIFICATIONS

The specifications for the Intrinsically Safe Communication Modules and the Station or Module Name Rotary Switch Module are provided below.

### Intrinsically Safe Communication Module for Zone 2 (LB-Style) Applications (P0927BV/P0924GT)

The ISCM for Zone 2 (LB-style) applications (P0927BV/P0924GT) is designed for installing or mounting in Zone 2 (or in Class 1, Div 2) environments or outside hazardous areas. It supports the following features:

- Self-configurating in a redundant system (plug and play)
- DCS configuration via HDLC bus (plug and play)
- HART communications
- Automatic data exchange
- Supports 1-8 channel I/O modules (multi-channel)
- Hot swappable - plug and play service after replacement
- Optional servicebus for extended diagnostics
- EMC to EN 61326 and NE21

*Figure 6. Intrinsically Safe Communication Module for Zone 2 (LB-Style) Applications (P0927BV/P0924GT)*

Technical data and explosion protection specifications are provided below. For mass and dimensions, refer to “PHYSICAL SPECIFICATIONS” on page 97.

### Technical Data

**FIELDBUS CONNECTION**
HDLC to Foxboro Control Processor

**HART COMMUNICATION**
Supported through HDLC

**TRANSFER RATE**
2 M Baud

**POWER CONSUMPTION**
2 W

**NUMBER OF I/O CHANNELS PER ISCM**
Refer to “IS/IO SYSTEM CONFIGURATION REQUIREMENTS” on page 5.

**BASEPLATE CONNECTIONS**
9-Pole HDLC bus connector, power via power supply modules

**MAXIMUM FIELDBUS EXTENSION (COPPER)**
60 m (197 ft) 2 MBaud

**ADDRESS SETTING**
Via Station or Module Name Rotary Switch Module (P0924GV) plugged into left connector

### Explosion Protection

**CATEGORY**
II 3 G Ex nA II T4

**APPROVAL**
Refer to “Certificates and Marine Certificates (Explosion Protection) (Cont.)” on page 95.

### Intrinsically Safe Communication Module for Zone 1 (FB-Style) Applications (P0927BW/P0924GU)

The ISCM for Zone 1 (FB-style) applications (P0927BW/P0924GU) is designed for installing or mounting in Zone 1 environments (hazardous areas). It supports the following features:

- Self-configurating in a redundant system (plug and play)
- DCS configuration via HDLC bus (plug and play)
- HART communications
- Automatic data exchange
- Supports 1-8 channel I/O modules (multi-channel)
- Hot swappable - plug and play service after replacement
- Optional servicebus for extended diagnostics
- EMC to EN 61326 and NE21


*Figure 7. Intrinsically Safe Communication Module for Zone 1 (FB-Style) Applications (P0927BW/P0924GU)*

Technical data and explosion protection specifications are provided below. For mass and dimensions, refer to “PHYSICAL SPECIFICATIONS” on page 97.

### Technical Data

**FIELDBUS CONNECTION**
HDLC to Foxboro Control Processor

**HART COMMUNICATION**
Supported through HDLC

**TRANSFER RATE**
2 M Baud

**POWER CONSUMPTION**
2 W

**NUMBER OF I/O CHANNELS PER ISCM**
Refer to “IS/IO SYSTEM CONFIGURATION REQUIREMENTS” on page 5.

**BASEPLATE CONNECTIONS**
Ex-e bus terminals to RS-485 HDLC, power via power supply modules

**MAXIMUM FIELDBUS EXTENSION (COPPER)**
152 m (500 ft) 2 MBaud

**ADDRESS SETTING**
Via Station or Module Name Rotary Switch Module (P0924GV) plugged into left connector

### Explosion Protection

**CATEGORY**
II 2 (1) G Ex d [ia] IIC

**APPROVAL**
Refer to “Certificates and Marine Certificates (Explosion Protection)” on page 94.

### Station or Module Name Rotary Switch Module (P0924GV)

The Station or Module Name Rotary Switch Module (P0924GV) has 16 positions (poles) and is plugged into the left-most receptacle on the front of the ISCM, and then screwed down to hold it in place. The fourth character of the ISCM name must be selected by setting the rotary switch on this module. This character must match the fourth character of the FCM, if attached to an FCM.

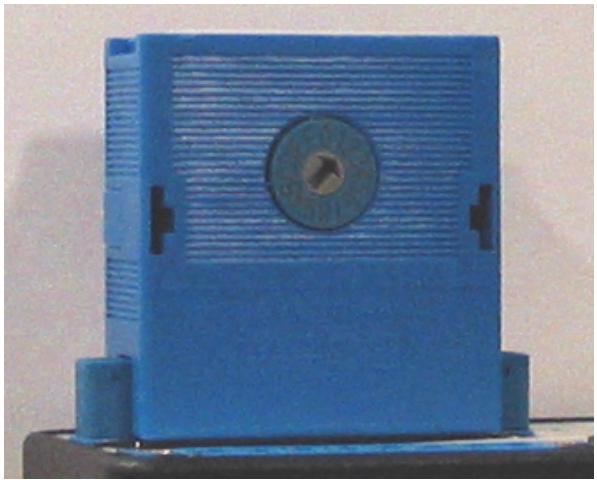


*Figure 8. Station or Module Name Rotary Switch Module (P0924GV)*

**NOTE**

The intrinsic safety parameters for inductance and capacitance, refer to ATEX applications where both inductance and capacitance are present in the loop simultaneously. Improved values apply when one of the values is smaller than the one listed in the tables below.

## FOXBORO/P+F INTRINSICALLY SAFE MODULES SPECIFICATIONS

Specifications for the Pepperl+Fuchs intrinsically safe modules are provided below.

Pepperl+Fuchs intrinsically safe modules support the following features:

- Hot swappable - plug and play service after replacement
- Galvanic isolation between inputs and system/field bus
- Line fault detection (LFD)
- Permanently self-monitoring
- EMC to EN 61326 or NE21
- Input communications only

Their additional specifications are provided below.

### LB 1101 A (Digital Input Module, Two Isolated Channels)

The LB 1101 A digital input module is designed for Zone 2 environments and has inputs for contacts, NAMUR proximity switches and optocouplers.

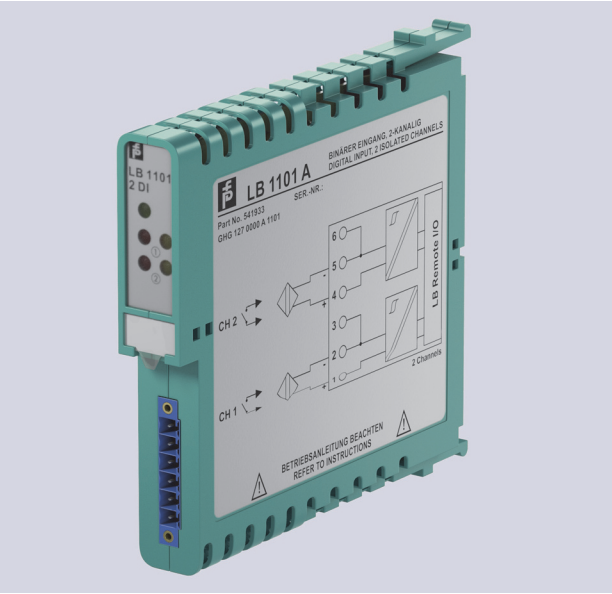



*Figure 9. LB 1101 A (Digital Input, Two Isolated Channels)*

Inputs and explosion protection specifications are provided below.

### Inputs

**SIGNAL TYPE**
Volt-free contacts and 2 wire NAMUR proximity switches

**SWITCHING POINTS**
On > 2.1 mA
Off < 1.2 mA

**HYSTERESIS**
0.2 mA

**MINIMUM PULSE DURATION**
20 ms

**LINE FAULT (LFD)**
≤ 0.05 mA

**SHORT**
≤ 100 Ω

**SCANNING TIME**
6.5 ms

**POWER CONSUMPTION**
Approximately 0.5 W

### Explosion Protection

**CATEGORY**
II (1/2) G [Ex ia] IIC

**APPROVAL**
Refer to “Certificates and Marine Certificates (Explosion Protection) (Cont.)” on page 95.

## LB 1103 F (Frequency Input Module)

The LB 1103 F module supports frequency, and direction of rotation inputs. It is designed for Zone 2 environments and has inputs for contacts, NAMUR proximity switches and optocouplers.


*Figure 10. LB 1103 F (Frequency Input Module)*

Inputs and explosion protection specifications are provided below.

### Inputs

**SIGNAL TYPE**
Volt-free contacts and 2 wire NAMUR proximity switches

**SWITCHING POINTS**
On > 2.1 mA
Off < 1.2 mA

**HYSTERESIS**
0.2 mA

**FREQUENCY**
0 - 15 kHz

**PROCESSING TIME**
Approximately 50 ms mode dependent

**MINIMUM PULSE DURATION**
20 µs

**LINE FAULT (LFD)**
≤ 0.05 mA

**SHORT**
≤ 100 Ω

**SCANNING TIME**
6.5 ms

**POWER CONSUMPTION**
Approximately 0.6 W

### Explosion Protection

**CATEGORY**
II (1/2) G [Ex ia] IIC

**APPROVAL**
Refer to “Certificates and Marine Certificates (Explosion Protection) (Cont.)” on page 95.

## LB 1103 FL (Low Frequency Input Module)

The LB 1103 FL module supports low frequency, and direction of rotation inputs. It is designed for Zone 2 environments and has inputs for contacts, NAMUR proximity switches and optocouplers.

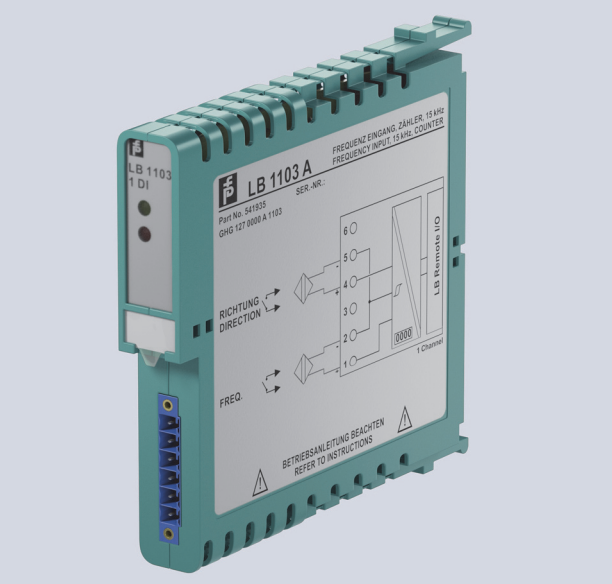



*Figure 11. LB 1103 FL (Low Frequency Input I/O Module)*

Inputs and explosion protection specifications are provided below.

### Inputs

**SIGNAL TYPE**
Volt-free contacts and 2 wire NAMUR proximity switches

**SWITCHING POINTS**
On > 2.1 mA
Off < 1.2 mA

**HYSTERESIS**
0.2 mA

**FREQUENCY**
0 - 300 Hz

**PROCESSING TIME**
Approximately 50 ms mode dependent

**MINIMUM PULSE DURATION**
1 ms

**LINE FAULT (LFD)**
≤ 0.05 mA

**SHORT**
≤ 100 Ω

**SCANNING TIME**
6.5 ms

**POWER CONSUMPTION**
Approximately 0.6 W

### Explosion Protection

**CATEGORY**
II (1/2) G [Ex ia] IIC

**APPROVAL**
Refer to “Certificates and Marine Certificates (Explosion Protection) (Cont.)” on page 95.

## LB 1104 F (Pulse Count Input Module)

The LB 1104 F module supports counter (pulse count) and up/down counting inputs. It is designed for Zone 2 environments and has inputs for contacts, NAMUR proximity switches and optocouplers.

*Figure 12. LB 1104 F (Pulse Count Input Module)*

Inputs and explosion protection specifications are provided below.

### Inputs

**SIGNAL TYPE**
Volt-free contacts and 2 wire NAMUR proximity switches

**SWITCHING POINTS**
On > 2.1 mA
Off < 1.2 mA

**HYSTERESIS**
0.2 mA

**FREQUENCY**
0 - 15 kHz

**COUNTER**
16 Bit

**PROCESSING TIME**
Approximately 50 ms mode dependent

**MINIMUM PULSE DURATION**
20 µs

**LINE FAULT (LFD)**
≤ 0.05 mA

**SHORT**
≤ 100 Ω

**SCANNING TIME**
6.5 ms

**POWER CONSUMPTION**
Approximately 0.6 W

### Explosion Protection

**CATEGORY**
II (1/2) G [Ex ia] IIC

**APPROVAL**
Refer to “Certificates and Marine Certificates (Explosion Protection) (Cont.)” on page 95.

**IIC SAFETY VALUES (LINEAR)**
$U_o \leq 10.5$ V  $I_o \leq 23.3$ mA  $P_o \leq 61.2$mW
$C_o \leq 816$ nF  $L_o \leq 2$ mH

## LB 1104 FL (Low Frequency Pulse Count Input Module)

The LB 1104 FL module supports low frequency counter (pulse count) and up/down counting inputs. It is designed for Zone 2 environments and has inputs for contacts, NAMUR proximity switches and optocouplers.

*Figure 13. LB 1104 FL (Low Frequency Pulse Count Module)*

Inputs and explosion protection specifications are provided below.

## Inputs

**SIGNAL TYPE**
Volt-free contacts and 2 wire NAMUR proximity switches

**SWITCHING POINTS**
On > 2.1 mA
Off < 1.2 mA

**HYSTERESIS**
0.2 mA

**FREQUENCY**
0 - 300Hz

**COUNTER**
16 Bit

**PROCESSING TIME**
Approximately 50 ms mode dependent

**MINIMUM PULSE DURATION**
1 ms

**LINE FAULT (LFD)**
≤ 0.05 mA

**SHORT**
≤ 100 Ω

**SCANNING TIME**
6.5 ms

**POWER CONSUMPTION**
Approximately 0.6 W

## Explosion Protection

**CATEGORY**
II (1/2) G [Ex ia] IIC

**APPROVAL**
Refer to “Certificates and Marine Certificates (Explosion Protection) (Cont.)” on page 95.

**IIC SAFETY VALUES (LINEAR)**
$U_o \leq 10.5$ V  $I_o \leq 23.3$ mA  $P_o \leq 61.2$mW
$C_o \leq 816$ nF  $L_o \leq 2$ mH

## LB 1108 A (Digital Input Module, 8-Channels)

The LB 1108 A digital input module is designed for Zone 2 environments and has inputs for contacts, NAMUR proximity switches and optocouplers.

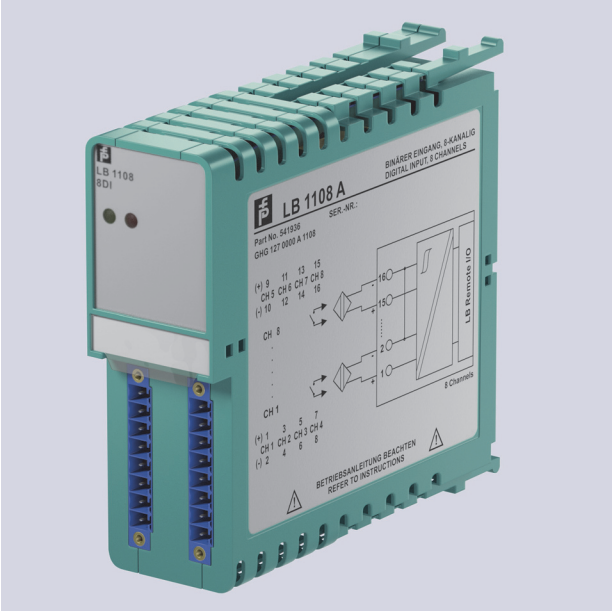



*Figure 14. LB 1108 A (Digital Input Module, 8-Channels)*

Inputs and explosion protection specifications are provided below.

### Inputs

**SIGNAL TYPE**
Volt-free contacts and 2 wire NAMUR proximity switches

**SWITCHING POINTS**
On > 2.1 mA
Off < 1.2 mA

**HYSTERESIS**
0.2 mA

**MINIMUM PULSE DURATION**
10 ms

**LINE FAULT (LFD)**
≤ 0.05 mA

**SHORT**
≤ 100 Ω

**SCANNING TIME**
6.5 ms

**POWER CONSUMPTION**
Approximately 0.7 W

### Explosion Protection

**CATEGORY**
II (1/2) G [Ex ia] IIC

**APPROVAL**
Refer to “Certificates and Marine Certificates (Explosion Protection) (Cont.)” on page 95.

**IIC SAFETY VALUES (LINEAR)**
$U_o \leq 15.3$ V  $I_o \leq 16.1$ mA  $P_o \leq 61.8$ mW
$C_o \leq 450$ nF  $L_o \leq 2$ mH

## LB 2101 A - LB 2113 E (Digital Output Modules with Position Feedback)

The Digital Output Modules with Position Feedback (LB 2101 A - LB 2113 E - see Table 8 and Table 9) are designed for Zone 2 environments. They have two digital inputs for contacts, NAMUR proximity switches and optocouplers. Their digital outputs drive intrinsic safety solenoid valves, indicators or sounders.

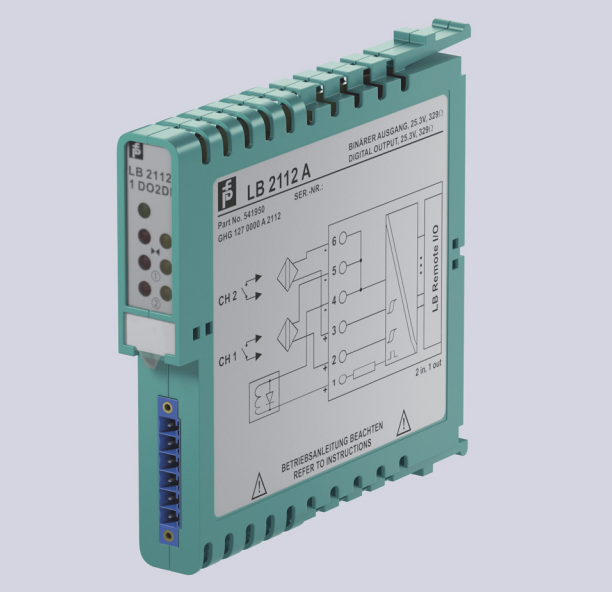



*Figure 15. LB 2101 A - LB 2113 E (Digital Output Modules with Position Feedback)*

Inputs and explosion protection specifications are provided below.

### Inputs

**SIGNAL TYPE**
Volt-free contacts and 2 wire proximity switches acc. to DIN19234 or NAMUR

**SWITCHING POINTS**
On > 2.1 mA
Off < 1.2 mA

**HYSTERESIS**
0.2 mA

**MINIMUM PULSE DURATION**
10 ms

**LINE FAULT (LFD)**
≤ 0.05 mA

**SHORT**
≤ 100 Ω

**OUTPUT**
Short circuit protected

**WATCHDOG**
OSS 0.5 seconds after serious fault

**POWER CONSUMPTION**
Approximately 0.52 W to 1.8 W depending on version

### Explosion Protection

**CATEGORY**
II (1/2) G [Ex ia] IIC

**APPROVAL**
Refer to “Certificates and Marine Certificates (Explosion Protection) (Cont.)” on page 95.

**IIC SAFETY VALUES (LINEAR)**

*Sensor Circuit*
$U_o \leq 14$ V  $I_o \leq 16$ mA  $P_o \leq 55$ mW
$C_o \leq 418$ nF  $L_o \leq 5$ mH

*Output Circuit*
See Table 8 and Table 9 below.

Table 8. LB 2101 A - LB 2113 A Model Variations

| P/N | $U_{out}$ | $R_a/\Omega$ | Limit/mA | LFD/Ω | $U_o$/V | $I_o$/mA | $P_o$/mW | $C_o$/nF | $L_o$/mH |
|---|---|---|---|---|---|---|---|---|---|
| LB 2101 A | 22.0 | 315 | 50 | 20...2000 | 24.9 | 91 | 558 | 79 | 1 |
| LB 2102 A | 24.0 | 210 | 75 | 110...1200 | 27.8 | 183 | 1270 | 227 | 1.9[(a)] |
| LB 2103 A | 24.0 | 360 | 50 | 70...2000 | 27.8 | 91.5 | 636 | 69 | 0.4 |
| LB 2104 A | 22.0 | 220 | 50 | 220...1300 | 24.2 | 145 | 872 | 92 | 0.27 |
| LB 2105 A | 22.8 | 290 | 50 | 150...2000 | 25.2 | 108 | 681 | 74 | 0.5 |
| LB 2112 A | 25.3 | 329 | - | 25-3500 | 27.8 | 108 | 751 | 81 | 0.19 |
| LB 2113 A | 26.7 | 509 | - | 40...7000 | 28.7 | 68 | 485 | 69 | 0.4 |

(a) Only group IIB

Table 9. LB 2101 E - LB 2112 E Model Variations with Bus Independent SIL 2 Shutdown

| P/N | $U_{out}$ | $R_a/\Omega$ | Limit/mA | LFD/Ω | $U_o$/V | $I_o$/mA | $P_o$/mW | $C_o$/nF | $L_o$/mH |
|---|---|---|---|---|---|---|---|---|---|
| LB 2101 E | 22.0 | 315 | 50 | 20...2000 | 24.9 | 91 | 558 | 79 | 1 |
| LB 2103 E | 24.0 | 360 | 50 | 70...2000 | 27.8 | 91.5 | 636 | 69 | 0.4 |
| LB 2105 E | 22.8 | 290 | 50 | 150...2000 | 25.2 | 108 | 681 | 74 | 0.5 |
| LB 2112 E | 25.3 | 329 | - | 25-3500 | 27.8 | 108 | 751 | 81 | 0.19 |
| LB 2113 E | 26.7 | 509 | - | 40...7000 | 28.7 | 68 | 485 | 69 | 0.4 |

## LB 3102 A2 (HART Analog Input Module with Transmitter Power Supply)

The LB 3102 A2 HART analog input module is designed for Zone 2 environments and has an input isolator for separately powered HART devices and a power supply for 2-wire HART transmitters.


*Figure 16. LB 3102 A2 (HART Analog Input Module with Transmitter Power Supply)*

Inputs and explosion protection specifications are provided below.

### Inputs

**FIELD DEVICE POWER SUPPLY**
15 V (20 mA) incl. 250 Ω

**INPUT RANGE**
4 - 20 mA (0 - 26 mA) HART

**INPUT IMPEDANCE**
15 Ω (at 5 - 6), 236 Ω (at 1- 6 HART)

**INTERNAL IMPEDANCE (TERMINAL 2-5)**
315 Ω

**LINEARITY**
< 0.1%

**TEMPERATURE DRIFT**
< 0.1% / 10 K

**LINE MONITOR**
Min. 0.5 mA
Max. 22 mA

**REFRESH TIME**
Approximately 100ms

**POWER CONSUMPTION**
1 W

**POWER LOSS**
0.2 W

### Explosion Protection

**CATEGORY**
II (1/2) G [Ex ia] IIC

**APPROVAL**
Refer to “Certificates and Marine Certificates (Explosion Protection) (Cont.)” on page 95.

## LB 3104 A2 - LB 3105 A2 (Analog Input Modules, 4-Channels)

The LB 3104 A2 and LB 3105 A2 analog input modules are designed for Zone 2 environments and have an input isolator for powered devices. The LB 3105 A2 also has a power supply for HART 2 wire converters. They provide galvanic isolation between their inputs and the fieldbus (group isolation).


*Figure 17. LB 3105 A2 (Analog Input Module with HART Transmitter Power Supply, 4-Channels)*

Inputs and explosion protection specifications are provided below.

### Inputs

**POWER SUPPLY**
15 V (20 mA) incl. 250 Ω

**INPUT IMPEDANCE**
15 Ω (stat.)

**INPUT RANGE**
0/4 - 20 mA (0 - 26 mA)

**LINEARITY**
0.1%

**TEMPERATURE DRIFT**
0.1% / 10 K

**LINE MONITOR**
Min. 0.5 mA
Max. 22 mA

**SCANNING TIME**
6.5 ms

**MEMORY UPDATE TIME**
80 ms (4 channels)
130 ms during HART

**POWER CONSUMPTION**
3 W

**POWER LOSS**
1.2 W

### Explosion Protection

**CATEGORY**
II (1/2) G [Ex ia] IIC

**APPROVAL**
Refer to “Certificates and Marine Certificates (Explosion Protection) (Cont.)” on page 95.

## LB 4102 A2 - LB 4102 C2 (HART Analog Output Modules)

The LB 4102 A2 and LB 4102 C2 HART analog output modules are designed for Zone 2 environments and have an output isolator for HART 4-20 mA signals, indicators, positioners, and I/P converters. They provide galvanic isolation between their outputs and the fieldbus.

*Figure 18. LB 4102 A2 (HART Analog Output Module) and LB 4102 C2 (HART Analog Output Module with Bus Independent SIL 2 Shutdown)*

Outputs and explosion protection specifications are provided below.

### Outputs

**MAXIMUM LOAD**
750 Ω

**OUTPUT CURRENT**
0/4 - 20 mA (short circuit protected)

**$I_{MIN/MAX}$**
0/25 mA (1 mA for LFD)

**LINEARITY**
< 0.1%

**CONVERSION TIME**
≤ 50 msec.

**TEMPERATURE DRIFT**
< 0.1% / 10 K

**LINE MONITOR**
> 850 Ω ... 4 kΩ

**WATCHDOG CIRCUIT**
Output OFF 0.5 sec. after serious faults

**POWER CONSUMPTION**
0.8 W

### Explosion Protection

**CATEGORY**
II (1/2) G [Ex ia] IIC

**APPROVAL**
Refer to “Certificates and Marine Certificates (Explosion Protection) (Cont.)” on page 95

## LB 4105 A2 (HART Analog Output Module, 4-Channels)

The LB 4105 A2 HART analog output module with LFD is designed for Zone 2 environments and have an output isolator for indicators, displays, IP converters, positioners, and valves. It provides galvanic isolation between its outputs and the fieldbus (group isolation).


*Figure 19. LB 4105 A2 (HART Analog Output Module with LFD, 4-Channels with Line Monitor)*

Outputs and explosion protection specifications are provided below.

### Outputs

**MAXIMUM LOAD**
750 Ω

**OUTPUT CURRENT**
4 - 20 mA (0 - 25 mA) short protected

**LINEARITY**
0.1%

**TEMPERATURE DRIFT**
0.1% / 10 K

**LINE MONITOR**
Min. 0.5 mA

**THRESHOLD**
> 850 Ω

**WATCHDOG CIRCUIT**
Output OFF 0.5 sec. after serious faults

**REFRESH TIME**
Approximately 100ms

**POWER CONSUMPTION**
3 W

**POWER LOSS**
1.2 W

### Explosion Protection

**CATEGORY**
II (1/2) G [Ex ia] IIC

**APPROVAL**
Refer to “Certificates and Marine Certificates (Explosion Protection) (Cont.)” on page 95.

## LB 4104 A2 - LB 4105 C2 (HART Analog Output Modules, 4-Channels)

The LB 4104 A2 analog output modules, and the LB 4105 C2 HART analog output modules are designed for Zone 2 environments and have an output isolator for indicators, displays, IP converters, positioners, and valves. They provide galvanic isolation between their outputs and the fieldbus (group isolation).

*Figure 20. LB 4104 A2 (Analog Output Module, 4-Channels) and LB 4105 C2 (HART Analog Output Module, 4-Channels with Line Monitor)*

Outputs and explosion protection specifications are provided below.

### Outputs

**MAXIMUM LOAD**
750 Ω

**OUTPUT CURRENT**
4 - 20 mA (0 - 25 mA) short protected

**LINEARITY**
0.1%

**TEMPERATURE DRIFT**
0.1% / 10 K

**LINE MONITOR**
Min. 0.5 mA

**THRESHOLD**
> 850 Ω

**WATCHDOG CIRCUIT**
Output OFF 0.5 sec. after serious faults

**SCANNING TIME**
6.5 ms

**MEMORY UPDATE TIME**
58 ms (4-channels)
110 ms (during HART communications)

**POWER CONSUMPTION**
3 W

### Explosion Protection

**CATEGORY**
II (1/2) G [Ex ia] IIC

**APPROVAL**
Refer to “Certificates and Marine Certificates (Explosion Protection) (Cont.)” on page 95.

## LB 5101 F3 (2 or 3-Wire RTD Input Module)

The LB 5101 F3 RTD input module supports 2 or 3-wire RTD (temperature) inputs. It is designed for Zone 2 environments.


*Figure 21. LB 5101 F3 (2 or 3-Wire RTD Input Module)*

Inputs and explosion protection specifications are provided below.

### Inputs

**RANGE**
0-320 Ω

**WIRE RESISTANCE**
50 Ω maximum each wire

**RTD LINE FAULT (LFD)**
> 500 Ω

**LINEARITY**
< 0.02 %

**TEMPERATURE DRIFT**
< 0.02 %/10 K

**SENSOR CURRENT**
200 µA

**CONVERSION TIME**
< 150 ms with LFD

**POWER CONSUMPTION**
Approximately 0.45 W

### Explosion Protection

**CATEGORY**
II (1/2) G [Ex ia] IIC

**APPROVAL**
Refer to “Certificates and Marine Certificates (Explosion Protection) (Cont.)” on page 95.

## LB 5101 F4 (4-Wire RTD Input Module)

The LB 5101 F4 module supports 4-wire RTD (temperature) inputs. It is designed for Zone 2 environments.


*Figure 22. LB 5101 F4 (4-Wire RTD Input Module)*

Inputs and explosion protection specifications are provided below.

### Inputs

**RANGE**
0-320 Ω

**WIRE RESISTANCE**
50 Ω maximum each wire

**RTD LINE FAULT (LFD)**
> 500 Ω

**LINEARITY**
< 0.02 %

**TEMPERATURE DRIFT**
< 0.02 %/10 K

**SENSOR CURRENT**
200 µA

**CONVERSION TIME**
< 150 ms with LFD

**POWER CONSUMPTION**
Approximately 0.45 W

### Explosion Protection

**CATEGORY**
II (1/2) G [Ex ia] IIC

**APPROVAL**
Refer to “Certificates and Marine Certificates (Explosion Protection) (Cont.)” on page 95.

## LB 5102 F (Thermocouple Input Module)

The LB 5102 F module supports thermocouple or mV inputs with cold junction compensation. It is designed for Zone 2 environments.


*Figure 23. LB 5102 F (Thermocouple Input Module)*

Inputs and explosion protection specifications are provided below.

### Inputs

**RANGE**
E.G. TYPE U, B, E, T, K, S, R, L, J, N, PALLAPLAT

**MEASURING RANGE**
-10.5 MV .... + 69.5 MV

**COMPENSATION**
INTERNAL (AT CONNECTOR) OR EXTERNAL

**CJC PT100 SENSOR CURRENT**
200 µA

**CONVERSION TIME FOR INTERNAL CJC**
< 250 MS WITH LFD

**LINEARITY**
< 0.007 %

**TEMPERATURE DRIFT**
< 0.02 %/10 K

**LINE FAULT (LFD)**
> 1 KΩ

**POWER CONSUMPTION**
Approximately 0.45 W

### Explosion Protection

**CATEGORY**
II (1/2) G [EX IA] IIC

**APPROVAL**
Refer to “Certificates and Marine Certificates (Explosion Protection) (Cont.)” on page 95.

## LB 5104 F3 (2 or 3-Wire RTD Input Module, 4-Channels)

The LB 5104 F3 module supports 2 or 3-wire RTD or slide wire sensor inputs (with four channels). It is designed for Zone 2 environments and it has group isolation.

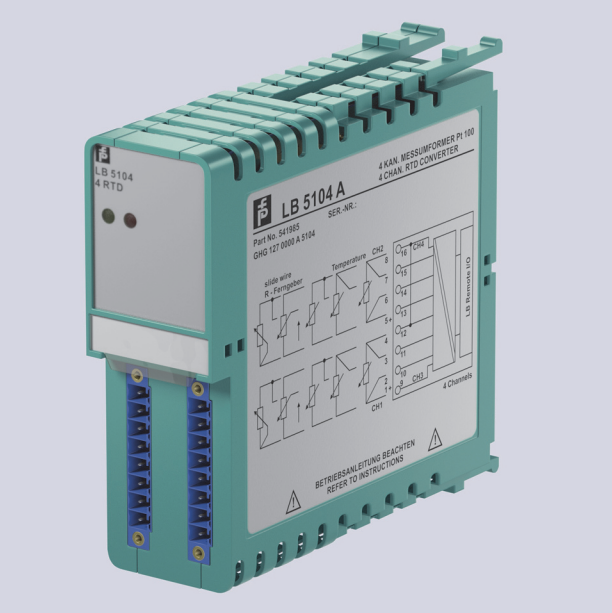



*Figure 24. LB 5104 F3 (2 or 3-Wire RTD Input Module, 4-Channels)*

Inputs and explosion protection specifications are provided below.

### Inputs

**RTD RANGE**
0-320 Ω

**SLIDE WIRE SENSORS**
0-320 Ω

**SENSOR CURRENT**
< 0.22 mA

**WIRE RESISTANCE**
< 50 Ω each wire

**LINE BREAK DETECTION**
> 1 kΩ

**NONLINEARITY**
0.02%

**TEMPERATURE DRIFT**
0.02%/10 K

**SCAN TIME**
6.5 ms

**CONVERSION TIME**
< 1000 ms (4 channels)

**CONNECTION**
Screw plug-in or wire clamp connectors

**POWER CONSUMPTION**
Approximately 0.6W

### Explosion Protection

**CATEGORY**
II (1/2) G [Ex ia] IIC

**APPROVAL**
Refer to “Certificates and Marine Certificates (Explosion Protection) (Cont.)” on page 95.

## LB 5104 F4 (4-Wire RTD Input Module, 4-Channels)

The LB 5104 F4 module supports 4-wire RTD inputs. It is designed for Zone 2 environments and it has group isolation.


*Figure 25. LB 5104 F4 (4-Wire RTD Input Module, 4-Channels)*

Inputs and explosion protection specifications are provided below.

### Inputs

**RTD RANGE**
0-320 Ω

**SENSOR CURRENT**
< 0.22 mA

**WIRE RESISTANCE**
< 50 Ω each wire

**LINE BREAK DETECTION**
> 1 kΩ (break)

**NONLINEARITY**
0.025%

**TEMPERATURE DRIFT**
0.025%/10 K

**SCAN TIME**
6.5 ms

**CONVERSION TIME**
< 500 ms (4 channels)

**CONNECTION**
Screw plug-in or wire clamp connectors

**POWER CONSUMPTION**
Approximately 0.6W

### Explosion Protection

**CATEGORY**
II (1/2) G [Ex ia] IIC

**APPROVAL**
Refer to “Certificates and Marine Certificates (Explosion Protection) (Cont.)” on page 95.

## LB 5105 F (Thermocouple Input Module, 4-Channels)

The LB 5105 F module supports thermocouple or mV inputs with cold junction compensation. It is designed for Zone 2 environments and it has galvanic isolation between channels.

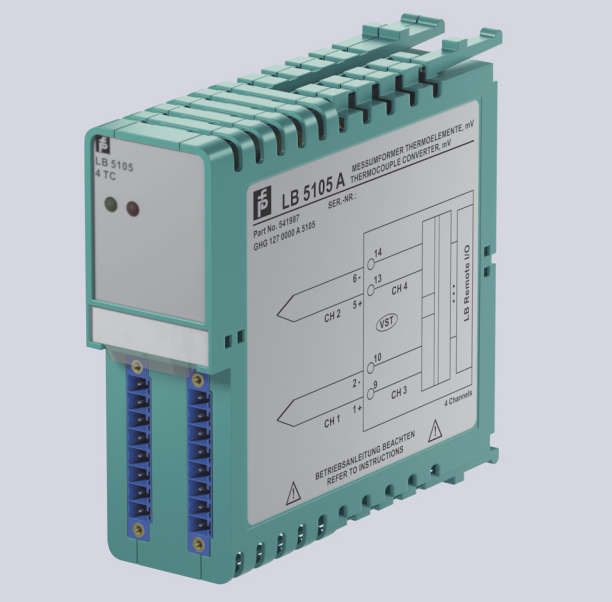



*Figure 26. LB 5105 F (Thermocouple Input Module, 4-Channels)*

Inputs and explosion protection specifications are provided below.

### Inputs

**RANGE**
e.g. Type U, B, E, T, K, S, R, L, J, N, Pallaplat

**MEASURING RANGE**
-10.5 mV .... + 69.5 mV

**COMPENSATION**
Internal (built-in) CJC only

**LINE FAULT DETECTION (LFD)**
> 1 kΩ

**NONLINEARITY**
< 0.007 %

**TEMPERATURE DRIFT**
< 0.025 %/10 K

**CYCLE TIME (COM UNIT)**
6.5 ms

**CONVERSION TIME**
< 600 ms (4 channels) with LFD

**CONNECTION**
Screw plug-in or wire clamp connectors

**TEST VOLTAGE**
0.5 kV input - input
1.5 kV input - bus and power

**POWER CONSUMPTION**
Approximately 1 W

### Explosion Protection

**CATEGORY**
II (1/2) G [Ex ia] IIC

**APPROVAL**
Refer to “Certificates and Marine Certificates (Explosion Protection) (Cont.)” on page 95.

## LB 5106 A (Voltage Converter Module)

The LB 5106 A voltage converter module supports inputs for 0-10V input signals. It is designed for Zone 2 environments and it provides galvanic isolation between its input and the fieldbus.


*Figure 27. LB 5106 A (Voltage Converter Module)*

Inputs and explosion protection specifications are provided below.

### Inputs

**RANGE**
0 - +10 V

**INPUT IMPEDANCE**
100 kΩ

**LINE FAULT DETECTION (LFD)**
None

**LINEARITY**
< 0,1% Typical

**TEMPERATURE DRIFT**
< 0.1% / 10 K

**CONVERSION TIME**
100 ms

**POWER CONSUMPTION**
< 0.45 W

### Explosion Protection

**CATEGORY**
II (1/2) G [Ex ia] IIC

**APPROVAL**
Refer to “Certificates and Marine Certificates (Explosion Protection) (Cont.)” on page 95.

## LB 6005 A (Digital Relay Output Module, 4-Channels)

The LB 6005 A digital relay output module is designed for Zone 2 environments and supports outputs with relay-contacts for LEDs, annunciators and valves. It provides galvanic isolation between its outputs.

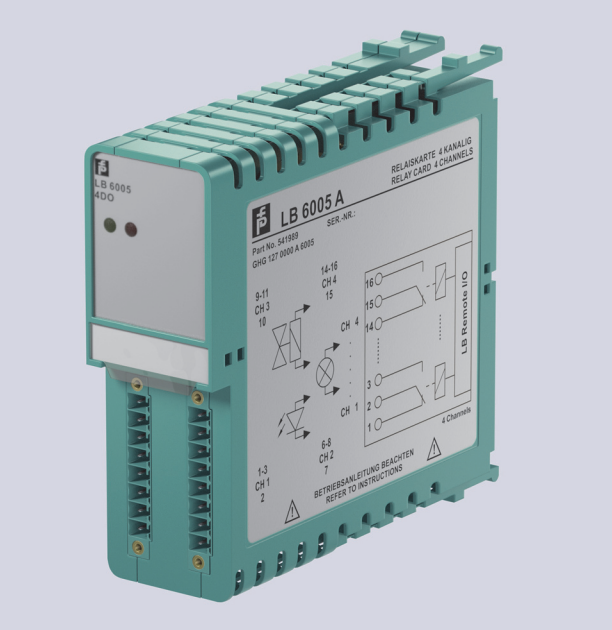



*Figure 28. LB 6005 A (Digital Relay Output Module, 4-Channels)*

Outputs and explosion protection specifications are provided below.

### Outputs

**RELAY CONTACT/CHANNEL**
20 V dc, 1 A, 30 W (resistive load)
230 V ac, 1 A, 250 vA (resistive load)

**CONTACT MATERIAL**
AgPd gold plated

**ELECTRICAL LIFETIME**
0.1 Mio. cycles

**MIN. SWITCHING CAPABILITY**
> 1 V, > 1 mA

**RESPONSE TIME**
Approximately 20 ms (depending on bus cycle time)

**SCANNING TIME**
6.5 ms

**WATCHDOG CIRCUIT**
Relay OFF 0.5 sec. after serious faults

**POWER CONSUMPTION**
1.2 W

### Explosion Protection

**CATEGORY**
II 3 G Ex nA CII T4

**APPROVAL**
Refer to Table 10 and Table 11 below.

Table 10. Certificates (Explosion Protection) for LB 6005 A

| Certificates | Certificate Number |
|---|---|
| Europe Pepperl+Fuchs II 3 G Declaration of Conformity | PF 08 CERT 1234 |
| Europe Pepperl+Fuchs 94/9/EC - 2004/108/EC Declaration of Conformity | PF 08 CERT 1263 |
| DEKRA EXAM IECEx Certificate of Conformity | IECEx BVS 09.0037X |
| Russia NANIO “CCVE” GOST-R | RUSS.IT.GB 05.03171 |
| Brasil CERTUSP Zone 2 nAc | 2010EC02CP018X |
| China NEPSI nAc | GYJ101410X |

Table 11. Marine Certificates (Explosion Protection) for LB 6005 A

| Marine Certificates | Certificate Number |
|---|---|
| Bureau Veritas Marine | 22449 / A0 BV |
| Det Norske Veritas Marine | A-11866 |
| American Bureau of Shipping (ABS) Marine | 10-HG639253-PDA |

## LB 6006 A (Digital Relay Output Module, 8-Channels)

The LB 6006 A digital relay output module is designed for Zone 2 environments and supports outputs with relay-contacts for LEDs, annunciators or valves. It provides galvanic isolation between its outputs.

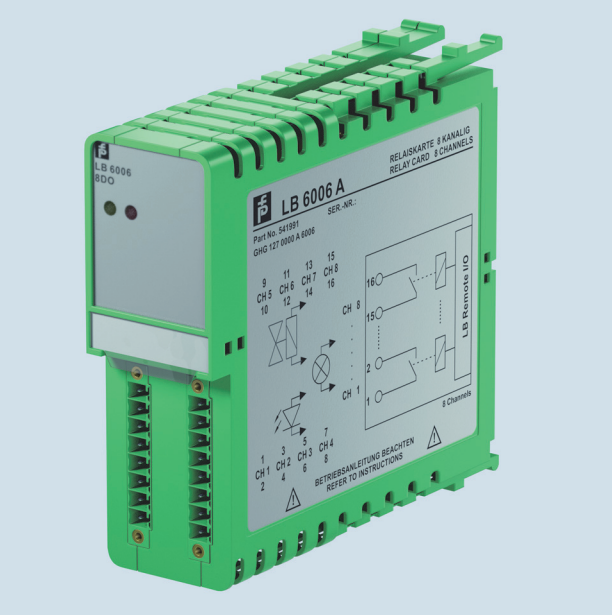



*Figure 29. LB 6006 A (Digital Relay Output Module, 8-Channels)*

Outputs and explosion protection specifications are provided below.

### Outputs

**RELAY CONTACT/CHANNEL**
24 V ac/dc, 1 A, 30 W, 30 vA (resistive load)

**CONTACT MATERIAL**
AgPd gold plated

**ELECTRICAL LIFETIME**
0.5 Mio. cycles

**MIN. SWITCHING CAPABILITY**
> 1 V, > 1 mA

**RESPONSE TIME**
Approximately 20 ms (depending on bus cycle time)

**SCANNING TIME**
6.5 ms

**WATCHDOG CIRCUIT**
Relay OFF 0.5 sec. after serious faults

**CONNECTION**
Screw plug-in or wire clamp

**POWER CONSUMPTION**
1.6 W

### Explosion Protection

**CATEGORY**
II 3 G Ex nA CII T4

**APPROVAL**
Refer to Table 12 and Table 13 below.

Table 12. Certificates (Explosion Protection) for LB 6006 A

| Certificates | Certificate Number |
|---|---|
| Europe Pepperl+Fuchs II 3 G Declaration of Conformity | PF 08 CERT 1234 |
| Europe Pepperl+Fuchs 94/9/EC - 2004/108/EC Declaration of Conformity | PF 08 CERT 1263 |
| DEKRA EXAM IECEx Certificate of Conformity | IECEx BVS 09.0037X |
| Russia NANIO “CCVE” GOST-R | RUSS.IT.GB 05.03171 |
| Brasil CERTUSP Zone 2 nAc | 2010EC02CP018X |
| China NEPSI nAc | GYJ101410X |

Table 13. Marine Certificates (Explosion Protection) for LB 6006 A

| Marine Certificates | Certificate Number |
|---|---|
| Bureau Veritas Marine | 22449 / A0 BV |
| Det Norske Veritas Marine | A-11866 |
| American Bureau of Shipping (ABS) Marine | 10-HG639253-PDA |

## LB 6101 H (Digital Relay Output Module, 2-Channels)

The LB 6101 H digital relay output module is designed for Zone 2 environments and supports relay outputs for Ex-d valves, trip points, indicators, and general purpose switching functions. It provides galvanic isolation between its outputs and the fieldbus.


*Figure 30. LB 6101 H (Digital Relay Output Module, 2-Channels)*

Outputs and explosion protection specifications are provided below.

### Outputs

**RELAY RATINGS**

*Voltage Rating (Nominal)*
24 V dc/ac (30 Vmax.) / 230 V ac
*Current Rating*
1 A dc/ac (resistive load)
*Switch Power $P_{max.}$*
30 W/VA

**ELECTRICAL LIFETIME**
0.5 Mio. cycles

**MIN. SWITCHING CAPABILITY**
> 1 V, > 1 mA

**CONTACT MATERIAL**
AgPd gold plated

**WATCHDOG CIRCUIT**
Output OFF 0.5 sec. after serious faults

**RESPONSE TIME**
< 20 ms (depending on bus cycle time)

**POWER CONSUMPTION**
< 0.65 W

### Explosion Protection

**CATEGORY**
II 3 G Ex nA CII T4

**APPROVAL**
Refer to Table 14 and Table 15 below.

Table 14. Certificates (Explosion Protection) for LB 6101 H

| Certificates | Certificate Number |
|---|---|
| Europe Pepperl+Fuchs II 3 G Declaration of Conformity | PF 08 CERT 1234 |
| Europe Pepperl+Fuchs 94/9/EC - 2004/108/EC Declaration of Conformity | PF 08 CERT 1263 |
| DEKRA EXAM IECEx Certificate of Conformity | IECEx BVS 09.0037X |
| Russia NANIO “CCVE” GOST-R | RUSS.IT.GB 05.03171 |
| Brasil CERTUSP Zone 2 nAc | 2010EC02CP018X |
| China NEPSI nAc | GYJ101410X |

Table 15. Marine Certificates (Explosion Protection) for LB 6101 H

| Marine Certificates | Certificate Number |
|---|---|
| Bureau Veritas Marine | 22449 / A0 BV |
| Det Norske Veritas Marine | A-11866 |
| American Bureau of Shipping (ABS) Marine | 10-HG639253-PDA |

## LB 6108 A (Digital Output Module, 8-Channels, Low Power)

The LB 6108 A digital output module is designed for Zone 2 environments and supports active 20 V outputs to switch LEDs, indicators, or low power solenoid valves. It provides galvanic isolation between its outputs and the fieldbus (group isolation).

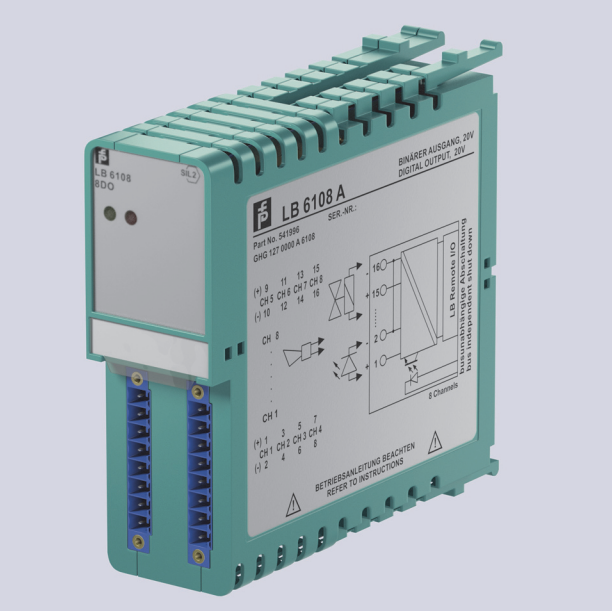



*Figure 31. LB 6108 A (Digital Output Module, 8-Channels, Low Power)*

Outputs and explosion protection specifications are provided below.

### Outputs

**DIGITAL OUTPUT (ACTIVE/SHORT PROTECTED)**
20 V, 8 mA per channel

**SCANNING TIME**
6.5 ms

**LFD TEST CURRENT**
0.33 mA

**WATCHDOG CIRCUIT**
Output volt-free 0.5 sec. after serious faults

**POWER CONSUMPTION**
2.2 W

### Explosion Protection

**CATEGORY**
II (2) G [Ex ib] IIC

**APPROVAL**
Refer to “Certificates and Marine Certificates (Explosion Protection) (Cont.)” on page 95.

## LB 6110 A - LB 6115 ES (Digital Output Module, 4-Channels, Intrinsically Safe Power)

The LB 6110 A to LB 6115 ES digital output modules are designed for Zone 2 environments and support outputs for intrinsically safe solenoid valves, and for sounders and LEDs. They provide galvanic isolation between their outputs and the fieldbus (group isolation).

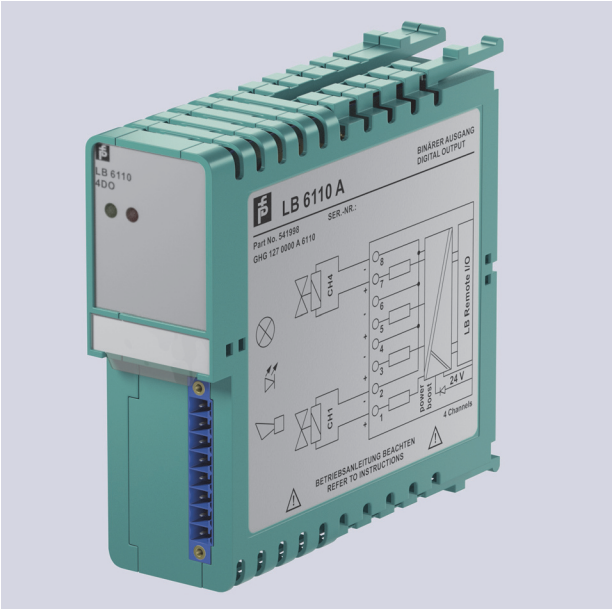



*Figure 32. LB 6110 A - LB 6115 ES (Digital Output Module, 4-Channels, Intrinsically Safe Power)*

Power supply, outputs and explosion protection specifications are provided below.

### Power Supply

**EXTERNAL POWER**
24 V dc, 5 W via Booster connection on backplanes LB 9022, 9023, ..25, ..26, ..27, ..29

### Outputs

**DRIVE CAPABILITY**
See Table 16 and Table 17 below.

**LINE MONITOR (2MS TEST PULSE)**
Every 2.5 sec (LFD)

**LFD REACTION TIME**
10 s (worst case)

**OUTPUT RESPONSE TIME**
> 10 ms (depending on the master)

**SCAN RATE**
6.5 ms

**WATCHDOG CIRCUIT**
Output OFF 0.5 sec. after serious faults

**CONNECTION**
Screw plug-in or wire clamp connectors

**POWER CONSUMPTION**
0.6 W

### Explosion Protection

**CATEGORY**
II (2/1) G [Ex ia/ib] IIC

**APPROVAL**
Refer to “Certificates and Marine Certificates (Explosion Protection) (Cont.)” on page 95.

**SAFETY VALUES**
See Table 16 and Table 17 below.

Table 16. LB 6110 A - LB 6115 A Model Variations

| P/N | U/V | $R_a/\Omega$ | Limit/mA | LFD/Ω | $U_o$/V | $I_o$/mA | $P_o$/mW | $C_o$/nF | $L_o$/mH |
|---|---|---|---|---|---|---|---|---|---|
| LB 6110 A | 24.5 | 370 | 55 | 90 ... 12000 | 27.8 | 90.4 | 629 | 81 | 0.2 |
| LB 6111 A | 24.5 | 320 | 60 | 110 ... 12000 | 27.8 | 107 | 744 | 81 | 0.2 |
| LB 6112 A | 17.0 | 185 | 70 | 95 ... 8000 | 19.8 | 142 | 705 | 117 | 0.5 |
| LB 6113 A | 23.0 | 290 | 60 | 110 ... 10000 | 26 | 110 | 714 | 96 | 0.2 |
| LB 6114 A | 23.0 | 355 | 55 | 90 ... 10000 | 26 | 88.7 | 578 | 96 | 0.2 |
| LB 6115 A | 16.2 | 78 | 80 | 100 ... 8500 | 18.9 | 286 | 1350 | 150 | 0.17 |

Table 17. LB 6110 E - LB 6115 ES Model Variations

| P/N | U/V | $R_a/\Omega$ | Limit/mA | LFD/Ω | $U_o$/V | $I_o$/mA | $P_o$/mW | $C_o$/nF | $L_o$/mH |
|---|---|---|---|---|---|---|---|---|---|
| LB 6110 E | 24.5 | 370 | 55 | 90 ... 12000 | 27.8 | 90.4 | 629 | 81 | 0.2 |
| LB 6111 E | 24.5 | 320 | 60 | 110 ... 12000 | 27.8 | 107 | 744 | 81 | 0.2 |
| LB 6112 E | 17.0 | 185 | 70 | 95 ... 8000 | 19.8 | 142 | 705 | 117 | 0.5 |
| LB 6113 E | 23.0 | 290 | 60 | 110 ... 10000 | 26 | 110 | 714 | 96 | 0.2 |
| LB 6114 E | 23.0 | 355 | 55 | 90 ... 10000 | 26 | 88.7 | 578 | 96 | 0.2 |
| LB 6115 ES | 16.2 | 78 | 80 | 100 ... 8500 | 18.9 | 286 | 1350 | 150 | 0.17 |

## FB 1201 B (Digital Input Module, 2-Isolated Channels)

The FB 1201 B digital input module is designed for Zone 1 environments and supports inputs for NAMUR initiators, mechanical contacts and opto-couplers. It provides galvanic isolation between its inputs and the fieldbus.


*Figure 33. FB 1201 B (Digital Input Module, 2-Isolated Channels)*

Inputs and explosion protection specifications are provided below.

### Inputs

**SIGNAL TYPE**
Volt-free contacts and 2 wire NAMUR proximity switches

**SWITCHING POINTS**
On > 2.1 mA
Off < 1.2 mA

**HYSTERESIS**
0.2 mA

**LINE FAULT (LFD)**
≤ 0.05 mA

**SHORT**
≤ 100 Ω

**POWER CONSUMPTION**
0.5 W

### Explosion Protection

**CATEGORY**
II 2 (1/2) G Ex d [ia/ib] IIC

**APPROVAL**
Refer to “Certificates and Marine Certificates (Explosion Protection)” on page 94.

## FB 1203 F (Frequency Input Module)

The FB 1203 F module supports frequency, and direction of rotation inputs. It is designed for Zone 1 environments and has inputs for mechanical contacts, NAMUR proximity switches and optocouplers.


*Figure 34. FB 1203 F (Frequency Input Module)*

Inputs and explosion protection specifications are provided below.

### Inputs

**SIGNAL TYPE**
Volt-free contacts and 2 wire NAMUR proximity switches

**SWITCHING POINTS**
On > 2.1 mA
Off < 1.2 mA

**HYSTERESIS**
0.2 mA

**FREQUENCY**
0 - 15 kHz

**PROCESSING TIME**
Approximately 50 ms mode dependent

**MINIMUM PULSE DURATION**
20 µs

**LINE FAULT (LFD)**
≤ 0.05 mA

**SHORT**
≤ 100 Ω

**CONNECTION**
Screw terminals or cage clamp connectors

**POWER CONSUMPTION**
Approximately 0.6 W

### Explosion Protection

**CATEGORY**
II 2 (1/2) G Ex d [ia/ib] IIC

**APPROVAL**
Refer to “Certificates and Marine Certificates (Explosion Protection)” on page 94.

## FB 1203 FL (Low Frequency Input Module)

The FB 1203 FL module supports low frequency, and direction of rotation inputs. It is designed for Zone 1 environments and has inputs for mechanical contacts, NAMUR proximity switches and optocouplers.


*Figure 35. FB 1203 FL (Low Frequency Input Module)*

Inputs and explosion protection specifications are provided below.

### Inputs

**SIGNAL TYPE**
Volt-free contacts and 2 wire NAMUR proximity switches

**SWITCHING POINTS**
On > 2.1 mA
Off < 1.2 mA

**HYSTERESIS**
0.2 mA

**FREQUENCY**
0 - 300 Hz

**PROCESSING TIME**
Approximately 50 ms mode dependent

**MINIMUM PULSE DURATION**
1 ms

**LINE FAULT (LFD)**
≤ 0.05 mA

**SHORT**
≤ 100 Ω

**CONNECTION**
Screw terminals or cage clamp connectors

**POWER CONSUMPTION**
Approximately 0.6 W

### Explosion Protection

**CATEGORY**
II 2 (1/2) G Ex d [ia/ib] IIC

**APPROVAL**
Refer to “Certificates and Marine Certificates (Explosion Protection)” on page 94.

## FB 1204 F (Pulse Count Input Module)

The FB 1204 F module supports counter (pulse count) and up/down counting inputs. It is designed for Zone 1 environments and has inputs for mechanical contacts, NAMUR proximity switches and optocouplers.

*Figure 36. FB 1204 F (Pulse Count Input Module)*

Inputs and explosion protection specifications are provided below.

### Inputs

**SIGNAL TYPE**
Volt-free contacts and 2 wire NAMUR proximity switches

**SWITCHING POINTS**
On > 2.1 mA
Off < 1.2 mA

**HYSTERESIS**
0.2 mA

**FREQUENCY**
0 - 15 kHz

**COUNTER**
16 Bit

**PROCESSING TIME**
Approximately 50 ms mode dependent

**MINIMUM PULSE DURATION**
20 µs

**LINE FAULT (LFD)**
≤ 0.05 mA

**SHORT**
≤ 100 Ω

**CONNECTION**
Screw terminals or cage clamp connectors

**POWER CONSUMPTION**
Approximately 0.6 W

### Explosion Protection

**CATEGORY**
II 2 (1/2) G Ex d [ia/ib] IIC

**APPROVAL**
Refer to “Certificates and Marine Certificates (Explosion Protection)” on page 94.

## FB 1204 FL (Low Frequency Pulse Count Input Module)

The FB 1204 FL module supports low frequency counter (pulse count) and up/down counting inputs. It is designed for Zone 1 environments and has inputs for mechanical contacts, NAMUR proximity switches and optocouplers.

*Figure 37. FB 1204 FL (Low Frequency Pulse Count Input Module)*

Inputs and explosion protection specifications are provided below.

### Inputs

**SIGNAL TYPE**
Volt-free contacts and 2 wire NAMUR proximity switches

**SWITCHING POINTS**
On > 2.1 mA
Off < 1.2 mA

**HYSTERESIS**
0.2 mA

**FREQUENCY**
0 - 300 Hz

**COUNTER**
16 Bit

**PROCESSING TIME**
Approximately 50 ms mode dependent

**MINIMUM PULSE DURATION**
1 ms

**LINE FAULT (LFD)**
≤ 0.05 mA

**SHORT**
≤ 100 Ω

**CONNECTION**
Screw terminals or cage clamp connectors

**POWER CONSUMPTION**
Approximately 0.6 W

### Explosion Protection

**CATEGORY**
II 2 (1/2) G Ex d [ia/ib] IIC

**APPROVAL**
Refer to “Certificates and Marine Certificates (Explosion Protection)” on page 94.

## FB 1208 B (Digital Input Module, 8-Channels)

The FB 1208 B digital input module is designed for Zone 1 environments and has inputs for contacts, NAMUR-proximity switches and optocouplers. It provides galvanic isolation between its inputs and the fieldbus (group isolation).


*Figure 38. FB 1208 B (Digital Input Module, 8-Channels)*

Inputs and explosion protection specifications are provided below.

### Inputs

**SIGNAL TYPE**
Volt-free contacts and 2 wire NAMUR proximity switches

**SWITCHING POINTS**
On > 2.1 mA
Off < 1.2 mA
1.65 mA +/– 0.25 mA

**HYSTERESIS**
0.2 mA

**LINE FAULT (LFD)**
≤ 0.05 mA

**SHORT**
≤ 100 Ω

**SCANNING TIME**
6.5 ms

**POWER CONSUMPTION**
0.7 W

### Explosion Protection

**CATEGORY**
II 2 (1/2) G Ex d [ia/ib] IIC

**APPROVAL**
Refer to “Certificates and Marine Certificates (Explosion Protection)” on page 94.

### FB 1301 B200 (Digital Input Module, 2-Channels, Ex-e)

The FB 1301 B200 digital input module is designed for Zone 1 environments and has inputs for contacts, NAMUR-proximity switches and optocouplers. It provides galvanic isolation between its inputs as well as its input and the fieldbus, and have Ex-e connections.

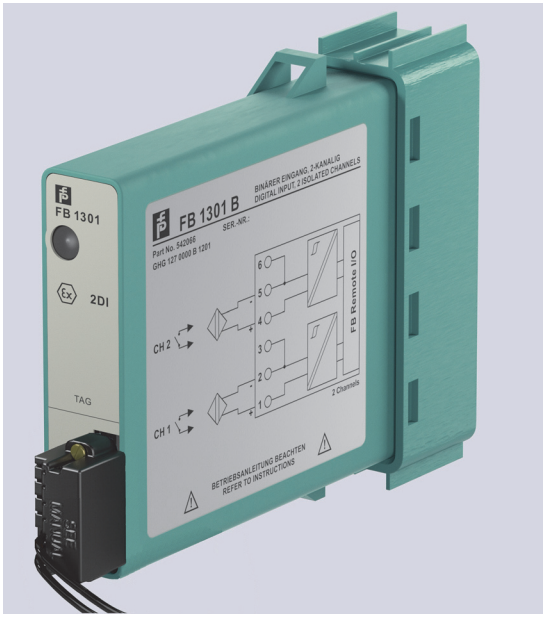



*Figure 39. FB 1301 B200 (Digital Input Module, 2-Channels Ex-e)*

Inputs and explosion protection specifications are provided below.

#### Inputs

**SIGNAL TYPE**
Volt-free contacts and 2 wire NAMUR proximity switches

**SWITCHING POINTS**
On > 2.1 mA
Off < 1.2 mA

**HYSTERESIS**
0.2 mA

**LINE FAULT (LFD)**
≤ 0.05 mA

**SHORT**
≤ 100 Ω

**SCANNING TIME**
Approximately 6.5 ms

**CONNECTION**
2 m cable tails to Ex-e terminals

**POWER CONSUMPTION**
0.5 W

#### Explosion Protection

**CATEGORY**
II 2 G Ex d IIC

**APPROVAL**
Refer to “Certificates and Marine Certificates (Explosion Protection)” on page 94.

## FB 1303 F2 (Frequency Ex-e Input Module)

The FB 1303 F2 module supports frequency and direction of rotation inputs (1 channel, Ex-e). It is designed for Zone 1 environments and has inputs for contacts, NAMUR proximity switches and optocouplers. Access to Ex-e connections is possible when volt-free.

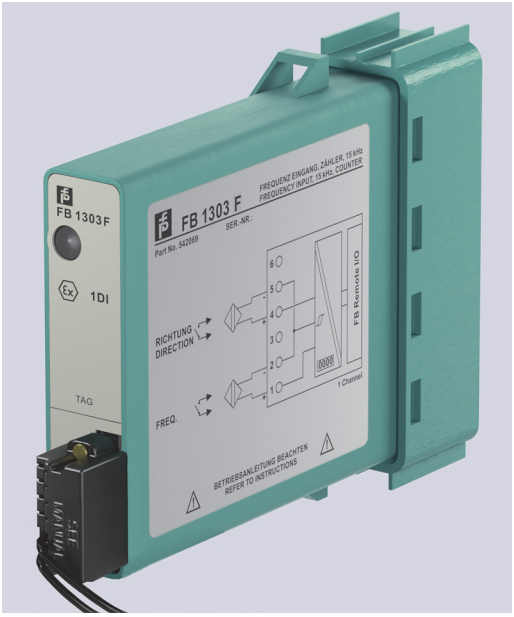



*Figure 40. FB 1303 F2 (Frequency Ex-e Input Module)*

Inputs and explosion protection specifications are provided below.

### Inputs

**SIGNAL TYPE**
Volt-free contacts and 2 wire NAMUR proximity switches

**SWITCHING POINTS**
On > 2.1 mA
Off < 1.2 mA

**HYSTERESIS**
0.2 mA

**FREQUENCY**
0 - 15 kHz

**PROCESSING TIME**
Approximately 50 ms mode dependent

**MINIMUM PULSE DURATION**
20 µs

**LINE FAULT (LFD)**
≤ 0.05 mA

**SHORT**
≤ 100 Ω

**SCANNING TIME**
Approximately 6.5 ms

**CONNECTION**
2 m cable tails to Ex-e terminals

**POWER CONSUMPTION**
0.6 W

### Explosion Protection

**CATEGORY**
II 2 G Ex d IIC

**APPROVAL**
Refer to “Certificates and Marine Certificates (Explosion Protection)” on page 94.

## FB 1303 FL2 (Low Frequency Ex-e Input Module)

The FB 1303 FL2 module supports low frequency and direction of rotation inputs (1 channel, Ex-e). It is designed for Zone 1 environments and has inputs for contacts, NAMUR proximity switches and optocouplers. Access to Ex-e connections is possible when volt-free.

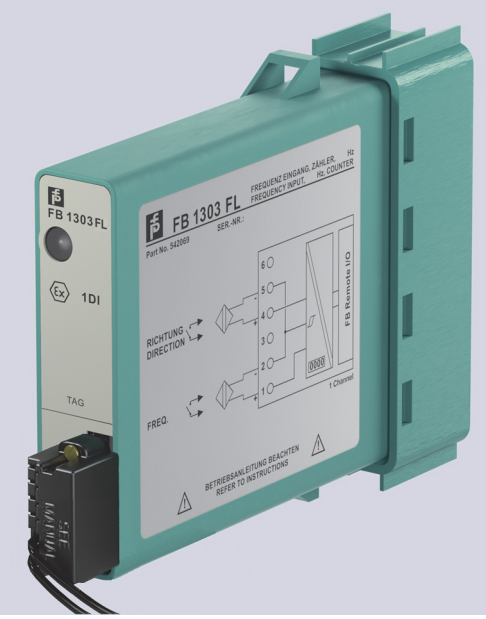



*Figure 41. FB 1303 FL2 (Low Frequency Ex-e Input Module)*

Inputs and explosion protection specifications are provided below.

### Inputs

**SIGNAL TYPE**
Volt-free contacts and 2 wire NAMUR proximity switches

**SWITCHING POINTS**
On > 2.1 mA
Off < 1.2 mA

**HYSTERESIS**
0.2 mA

**FREQUENCY**
0 - 300 Hz

**PROCESSING TIME**
Approximately 50 ms mode dependent

**MINIMUM PULSE DURATION**
1 ms

**LINE FAULT (LFD)**
≤ 0.05 mA

**SHORT**
≤ 100 Ω

**SCANNING TIME**
Approximately 6.5 ms

**CONNECTION**
2 m cable tails to Ex-e terminals

**POWER CONSUMPTION**
0.6 W

### Explosion Protection

**CATEGORY**
II 2 G Ex d IIC

**APPROVAL**
Refer to “Certificates and Marine Certificates (Explosion Protection)” on page 94.

## FB 1304 F2 (Pulse Count Ex-e Input Module)

The FB 1304 F2 module supports counter (pulse count) and up/down counting inputs (1 channel, Ex-e). It is designed for Zone 1 environments and has inputs for contacts, NAMUR proximity switches and optocouplers. Access to Ex-e connections is possible when volt-free.

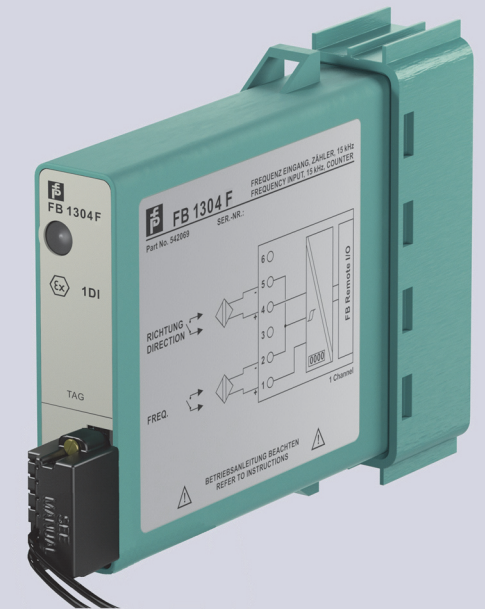



*Figure 42. FB 1304 F2 (Pulse Count Ex-e Input Module)*

Inputs and explosion protection specifications are provided below.

### Inputs

**SIGNAL TYPE**
Volt-free contacts and 2 wire NAMUR proximity switches

**SWITCHING POINTS**
On > 2.1 mA
Off < 1.2 mA

**HYSTERESIS**
0.2 mA

**FREQUENCY**
0 - 15 kHz

**COUNTER**
16 Bit

**PROCESSING TIME**
Approximately 50 ms mode dependent

**MINIMUM PULSE DURATION**
20 µs

**LINE FAULT (LFD)**
≤ 0.05 mA

**SHORT**
≤ 100 Ω

**SCANNING TIME**
Approximately 6.5 ms

**CONNECTION**
2 m cable tails to Ex-e terminals

**POWER CONSUMPTION**
0.6 W

### Explosion Protection

**CATEGORY**
II 2 G Ex d IIC

**APPROVAL**
Refer to “Certificates and Marine Certificates (Explosion Protection)” on page 94.

## FB 1304 FL2 (Low Frequency Pulse Count Input Module)

The FB 1304 FL2 module supports low frequency counter (pulse count) and up/down counting inputs (1 channel, Ex-e). It is designed for Zone 1 environments and has inputs for contacts, NAMUR proximity switches and optocouplers. Access to Ex-e connections is possible when volt-free.

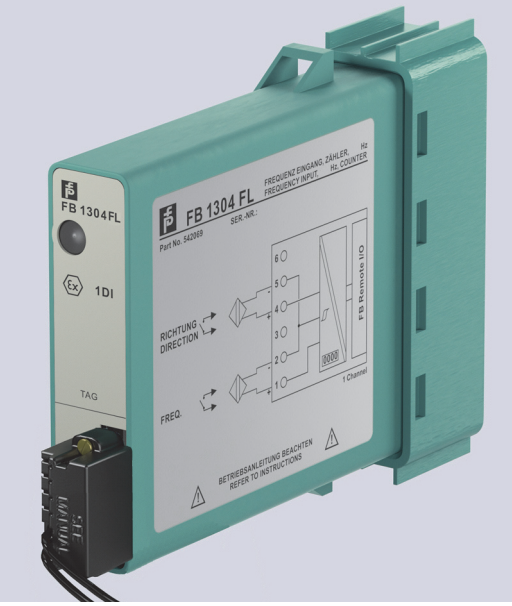



*Figure 43. FB 1304 FL2 (Low Frequency Pulse Count Input Module)*

Inputs and explosion protection specifications are provided below.

### Inputs

**SIGNAL TYPE**
Volt-free contacts and 2 wire NAMUR proximity switches

**SWITCHING POINTS**
On > 2.1 mA
Off < 1.2 mA

**HYSTERESIS**
0.2 mA

**FREQUENCY**
0 - 300 Hz

**COUNTER**
16 Bit

**PROCESSING TIME**
Approximately 50 ms mode dependent

**MINIMUM PULSE DURATION**
1 ms

**LINE FAULT (LFD)**
≤ 0.05 mA

**SHORT**
≤ 100 Ω

**SCANNING TIME**
Approximately 6.5 ms

**CONNECTION**
2 m cable tails to Ex-e terminals

**POWER CONSUMPTION**
0.6 W

### Explosion Protection

**CATEGORY**
II 2 G Ex d IIC

**APPROVAL**
Refer to “Certificates and Marine Certificates (Explosion Protection)” on page 94.

## FB 1308 B200 (Digital Input Module, 8-Channels)

The FB 1308 B200 digital input module is designed for Zone 1 environments and has inputs for mechanical contacts and optocouplers. It provides galvanic isolation between its inputs and the fieldbus (group isolation). Access to Ex-e connections is possible when volt-free.

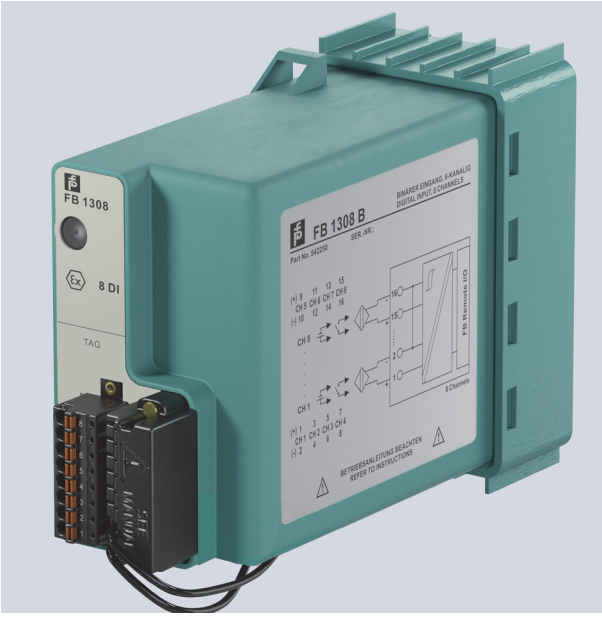



*Figure 44. FB 1308 B200 (Digital Input Module, 8-Channels)*

Inputs and explosion protection specifications are provided below.

### Inputs

**SIGNAL TYPE**
Volt-free contacts and 2 wire NAMUR proximity switches

**SWITCHING POINTS**
On > 2.1 mA
Off < 1.2 mA
1.65 mA +/– 0.25 mA

**HYSTERESIS**
0.2 mA

**LINE FAULT (LFD)**
≤ 0.05 mA

**SHORT**
≤ 100 Ω

**SCANNING TIME**
6.5 ms

**CONNECTION**
2 m cable tails to Ex-e terminals

**POWER CONSUMPTION**
0.7 W

### Explosion Protection

**CATEGORY**
II 2 G Ex d IIC

**APPROVAL**
Refer to “Certificates and Marine Certificates (Explosion Protection)” on page 94.

## FB 2201 B - FB 2213 E (Digital Output Module with Position Feedback)

The FB 2201 B - FB 2213 E modules are designed for Zone 1 environments and have two digital inputs for contacts, NAMUR proximity switches and optocouplers. Their digital outputs drive intrinsic safety solenoid valves, indicators or sounders.


*Figure 45. FB 2201 B - FB 2213 E (Digital Output Module with Position Feedback)*

Inputs, outputs and explosion protection specifications are provided below.

### Inputs

**SIGNAL TYPE**
Volt-free mechanical contacts or 2-wire proximity 2-wire-initiators (EN/IEC 60947-5-6 / NAMUR)

**SWITCHING POINTS**
On > 2.1 mA
Off < 1.2 mA

**HYSTERESIS**
0.2 mA

**LINE FAULT (LFD)**
≤ 0.05 mA

**SHORT**
≤ 100 Ω

### Outputs

**WITH LINE MONITOR (LFD)**
Short circuit protected (see Table 18 and Table 19 below)

**WATCHDOG CIRCUIT**
Output OFF 0.5 sec. after serious faults

**POWER CONSUMPTION**
0.52 W - 1.8 W depending on version

### Explosion Protection

**CATEGORY**
II 2 (1/2) G Ex d [ia] IIC

**APPROVAL**
Refer to “Certificates and Marine Certificates (Explosion Protection)” on page 94.

**IIC SAFETY VALUES (LINEAR)**

*Output Circuit*
See Table 18 and Table 19 below

Table 18. FB 2201 B - FB 2213 B Model Variations

| P/N | U/V | $R_a/\Omega$ | Limit/mA | LFD/Ω | $U_o$/V | $I_o$/mA | $P_o$/mW | $C_o$/nF | $L_o$/mH |
|---|---|---|---|---|---|---|---|---|---|
| FB 2201 B | 22.0 | 315 | 50 | 20 ... 2000 | 24.9 | 91 | 558 | 79 | 1 |
| FB 2202 B | 24.0 | 210 | 75[(a)] | 110 ... 1200 | 27.8 | 183 | 1270 | 227 | 1.9[(a)] |
| FB 2203 B | 24.0 | 360 | 50 | 70 ... 2000 | 27.8 | 91.5 | 636 | 69 | 0.4 |
| FB 2204 B | 22.0 | 220 | 50 | 220 ... 1300 | 24.2 | 145 | 872 | 92 | 0.27 |
| FB 2205 B | 22.8 | 290 | 50 | 150 ... 2000 | 25.2 | 108 | 681 | 74 | 0.5 |
| FB 2212 B | 25.3 | 329 | - | 25 ... 3500 | 27.8 | 108 | 751 | 81 | 0.19 |
| FB 2213 B | 26.7 | 509 | - | 40 ... 7000 | 26.7 | 68 | 485 | 69 | 0.4 |

(a) Only Group II B

Table 19. FB 2201 E - FB 2213 E Model Variations with Bus Independent SIL 2 Shutdown

| P/N | U/V | $R_a/\Omega$ | Limit/mA | LFD/Ω | $U_o$/V | $I_o$/mA | $P_o$/mW | $C_o$/nF | $L_o$/mH |
|---|---|---|---|---|---|---|---|---|---|
| FB 2201 E | 22.0 | 315 | 50 | 20 ... 2000 | 24.9 | 91 | 558 | 79 | 1 |
| FB 2203 E | 24.0 | 360 | 50 | 70 ... 2000 | 27.8 | 91.5 | 636 | 69 | 0.4 |
| FB 2205 E | 22.8 | 290 | 50 | 150 ... 2000 | 25.2 | 108 | 681 | 74 | 0.5 |
| FB 2212 E | 25.3 | 329 | - | 25 ... 3500 | 27.8 | 108 | 751 | 81 | 0.19 |
| FB 2213 E | 26.7 | 509 | - | 40 ... 7000 | 26.7 | 68 | 485 | 69 | 0.4 |

### FB 3202 B2 (HART Analog Input Module with Transmitter Power Supply)

The FB 3202 B2 HART analog input module is designed for Zone 1 environments and has an input isolator supporting HART communication for separately powered field devices and a power supply for 2- and 3-wire 4-20 mA transmitters. It provides galvanic isolation.

*Figure 46. FB 3202 B2 (HART Analog Input Module with Transmitter Power Supply)*

Inputs and explosion protection specifications are provided below.

#### Inputs

**FIELD DEVICE POWER SUPPLY**
15 V (20 mA) incl. 250 Ω

**INPUT RANGE**
4 - 20 mA (0 - 26 mA) HART

**INPUT IMPEDANCE**
15 Ω (at 5 - 6), 236 Ω (at 1- 6 HART)

**INTERNAL IMPEDANCE (TERMINAL 2-5)**
315 Ω

**LINEARITY**
< 0.1%

**TEMPERATURE DRIFT**
< 0.1% / 10 K

**LINE MONITOR**
Min. 0.5 mA
Max. 22 mA

**CONVERSION TIME**
≤ 50 msec.

**POWER CONSUMPTION**
1.2 W

#### Explosion Protection

**CATEGORY**
II 2 (1/2) G Ex d [ia/ib] IIC

**APPROVAL**
Refer to “Certificates and Marine Certificates (Explosion Protection)” on page 94.

## FB 3204 B2 (Analog Input Modules with HART Transmitter Power Supply, 4-Channels)

The FB 3204 B2 analog input module is designed for Zone 1 environments and has an input isolator for powered devices and a power supply for HART 2 wire converters. It provides galvanic isolation between their inputs and the fieldbus (group isolation).

*Figure 47. FB 3204 B2 (Analog Input Module with Transmitter Power Supply, 4-Channels)*

Inputs and explosion protection specifications are provided below.

### Inputs

**POWER SUPPLY**
15 V (20 mA)

**INPUT IMPEDANCE**
15 Ω (stat.), non-HART

**INPUT RANGE**
0/4 - 20 mA (0 - 26 mA)

**LINEARITY**
0.1%

**TEMPERATURE DRIFT**
0.1% / 10 K

**LINE MONITOR**
Min. 0.5 mA
Max. 22 mA

**SCANNING TIME**
6.5 ms

**MEMORY UPDATE TIME**
80 ms (4 channels)
130 ms during HART

**POWER CONSUMPTION**
3 W

### Explosion Protection

**CATEGORY**
II 2 (1/2) G Ex d [ia/ib] IIC

**APPROVAL**
Refer to “Certificates and Marine Certificates (Explosion Protection)” on page 94.

### FB 3205 B2 (Analog Input Modules with HART Transmitter Power Supply, 4-Channels)

The FB 3205 B2 analog input module is designed for Zone 1 environments and has an input isolator for powered devices and a power supply for HART 2 wire converters. It provides galvanic isolation between its inputs and the fieldbus (group isolation).


*Figure 48. FB 3205 B2 (Analog Input Modules with HART Transmitter Power Supply, 4-Channels)*

Inputs and explosion protection specifications are provided below.

#### Inputs

**POWER SUPPLY**
15 V (20 mA)

**INPUT IMPEDANCE**
15 Ω (stat.), non-HART

**INPUT RANGE**
0/4 - 20 mA (0 - 26 mA)

**LINEARITY**
0.1%

**TEMPERATURE DRIFT**
0.1% / 10 K

**LINE MONITOR**
Min. 0.5 mA
Max. 22 mA

**REFRESH TIME**
100 ms

**POWER CONSUMPTION**
3 W

**POWER LOSS**
1.2 W

#### Explosion Protection

**CATEGORY**
II 2 (1/2) G Ex d [ia/ib] IIC

**APPROVAL**
Refer to “Certificates and Marine Certificates (Explosion Protection)” on page 94.

## FB 3302 B2 (HART Input Isolator Module with HART Transmitter Power Supply, Ex-e)

The FB 3302 B2 module is designed for Zone 1 environments and has an input isolator for HART 2-wire transmitters. It provides galvanic isolation between its inputs and the fieldbus. Access to Ex-e connections is possible when volt-free.

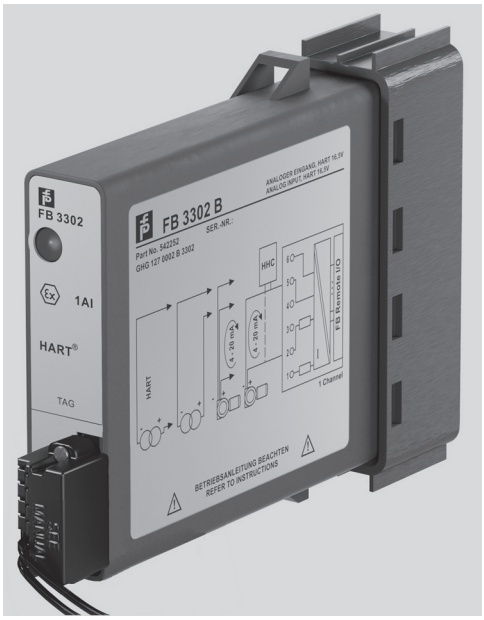



*Figure 49. FB 3302 B2 (HART Input Isolator Module with HART Transmitter Power Supply, Ex-e)*

Inputs and explosion protection specifications are provided below.

### Inputs

**FIELD DEVICE POWER SUPPLY**
15 V (20 mA) incl. 250 Ω

**INPUT RANGE**
4 - 20 mA (0 - 26 mA)

**INPUT IMPEDANCE**
236 Ω (1-6), 15 Ω (5-6)

**LINEARITY**
0.1%

**TEMPERATURE DRIFT**
0.1% / 10 K

**LINE MONITOR**
Min. 0.5 mA
Max. 22 mA

**REFRESH TIME**
Approximately 100 ms

**CONNECTION**
Plug-in Ex-e front connectors with IP30 hood; field wiring goes directly to the connector; connector and hood supplied with I/O module (recommended for new installations)

**NOTE**

A hot work permit is required for access to the connector under the hood.

**POWER CONSUMPTION**
1 W

**POWER LOSS**
0.2 W

### Explosion Protection

**CATEGORY**
II 2 G Ex d IIC

**APPROVAL**
Refer to “Certificates and Marine Certificates (Explosion Protection)” on page 94.

### FB 3305 B2 (Analog Input Module with HART Transmitter Power Supply, 4-Channels)

The FB 3305 B2 analog input module is designed for Zone 1 environments and has an input isolator for separately powered devices and a power supply for HART 2 wire converters. It provides galvanic isolation between their inputs and the fieldbus (group isolation). It can be unplugged when their Ex-e circuits are volt-free.

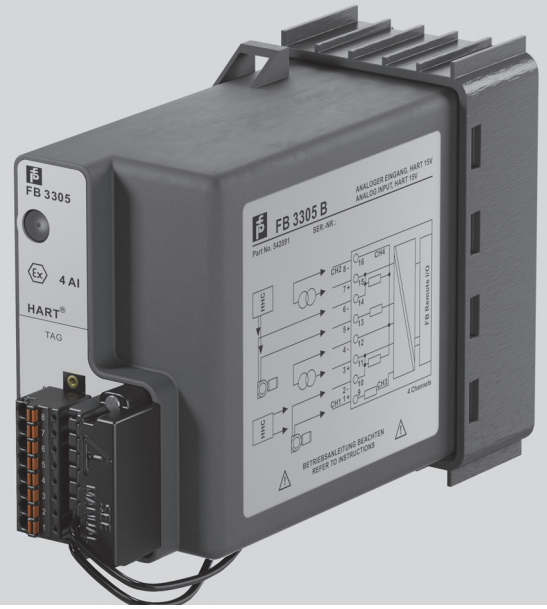



*Figure 50. FB 3305 B2 (Analog Input Module with HART Transmitter Power Supply, 4-Channels)*

For this module, be aware of the following:

- Channels for supply circuits:1-2, 5-6, 9-10, 13-14
- Channels for active inputs: 3-4, 7-8, 11-12, 15-16, no HART

Inputs and explosion protection specifications are provided below.

#### Inputs

**POWER SUPPLY**
15 V (20 mA) offering HART communications

**INPUT IMPEDANCE**
15 Ω (stat.), non-HART

**INPUT RANGE**
0/4 - 20 mA (0 - 26 mA)

**CURRENT LIMIT**
Approximately 26 mA

**LINEARITY**
0.1%

**TEMPERATURE DRIFT**
0.1% / 10 K

**LINE MONITOR**
Min. 0.5 mA
Max. 22 mA

**CONNECTION**
Plug-in Ex-e front connectors with IP30 hood; field wiring goes directly to the connector; connector and hood supplied with I/O module (recommended for new installations)

**NOTE**
A hot work permit is required for access to the connector under the hood.

**REFRESH TIME**
Approximately 100ms

**POWER CONSUMPTION**
3 W

**POWER LOSS**
1.2 W

#### Explosion Protection

**CATEGORY**
II 2 G Ex d IIC

**APPROVAL**
Refer to “Certificates and Marine Certificates (Explosion Protection)” on page 94.

## FB 4202 B2 - FB 4202 C2 (HART Analog Output Modules)

The FB 4202 B2 and FB 4202 C2 analog output modules are designed for Zone 1 environments and each have output isolators for HART 4-20 mA signals, indicators, positioners, and I/P converters. They provide galvanic isolation.


*Figure 51. FB 4202 B2 (HART Analog Output Module) and FB 4202 C2 (HART Analog Output Module with Bus Independent SIL 2 Shutdown)*

Outputs and explosion protection specifications are provided below.

### Outputs

**MAXIMUM LOAD**
750 Ω

**OUTPUT CURRENT**
0/4 - 20 mA (short circuit protected)

**$I_{MIN/MAX}$**
0/25 mA (1 mA for LFD)

**LINEARITY**
< 0.1%

**TEMPERATURE DRIFT**
< 0.1% / 10 K

**LINE MONITOR**
> 850 Ω ... 4 kΩ

**REFRESH TIME**
Approximately 100ms

**WATCHDOG CIRCUIT**
Output OFF 0.5 sec. after serious faults

**POWER CONSUMPTION**
1 W

**POWER LOSS**
0.2 W

### Explosion Protection

**CATEGORY**
Ex d [ia/ib] IIC

**APPROVAL**
Refer to “Certificates and Marine Certificates (Explosion Protection)” on page 94.

## FB 4204 B2 (HART Analog Output Modules, 4-Channels)

The FB 4204 B2 analog output module is designed for Zone 1 environments and have an output isolator for HART indicators, displays, and IP converters. It provides galvanic isolation between its input and the fieldbus (group isolation) and an optional bus independent shutdown input.

*Figure 52. FB 4204 B2 (Analog Output Modules, 4-Channels)*

Inputs and explosion protection specifications are provided below.

### Inputs

**MAXIMUM LOAD**
750 Ω

**OUTPUT CURRENT**
4 - 20 mA (0 - 25 mA) short protected

**LINEARITY**
0.1%

**TEMPERATURE DRIFT**
0.1% / 10 K

**LINE MONITOR**
Min. 0.5 mA

**THRESHOLD**
> 850 Ω

**WATCHDOG CIRCUIT**
Output OFF 0.5 sec. after serious faults

**SCANNING TIME**
6.5 ms

**MEMORY UPDATE TIME**
58 ms (4-channels)
110 ms (during HART communications)

**POWER CONSUMPTION**
3 W

### Explosion Protection

**CATEGORY**
II 2 (1/2) G Ex d [ia/ib] IIC

**APPROVAL**
Refer to “Certificates and Marine Certificates (Explosion Protection)” on page 94.

## FB 4205 B2 and FB 4205 C2 (HART Analog Output Modules, 4-Channels)

The FB 4205 B2 HART analog output module with LFD and the FB 4205 C2 HART analog output module with shutdown input are designed for Zone 1 environments and have an output isolator for HART indicators, displays, and IP converters. They provide galvanic isolation between their input and the fieldbus (group isolation) and an optional bus independent shutdown input. Some versions support line monitoring (LFD).


*Figure 53. FB 4205 B2 (HART Analog Output Modules, 4-Channels with LFD) and FB 4205 C2 (HART Analog Output Modules, 4-Channels with Bus Independent Shutdown)*

Inputs and explosion protection specifications are provided below.

### Inputs

**MAXIMUM LOAD**
750 Ω

**OUTPUT CURRENT**
4 - 20 mA (0 - 25 mA) short protected

**LINEARITY**
0.1%

**TEMPERATURE DRIFT**
0.1% / 10 K

**LINE MONITOR**
Min. 0.5 mA

**THRESHOLD**
> 850 Ω

**WATCHDOG CIRCUIT**
Output OFF 0.5 sec. after serious faults

**REFRESH TIME**
Approximately 100ms

**POWER CONSUMPTION**
3 W

**POWER LOSS**
1.2 W

### Explosion Protection

**CATEGORY**
II 2 (1/2) G Ex d [ia/ib] IIC

**APPROVAL**
Refer to “Certificates and Marine Certificates (Explosion Protection)” on page 94.

## FB 4302 C2 (HART Analog Output Modules)

The FB 4302 C2 HART analog output module is designed for Zone 1 environments and has an output isolator for HART 4-20 mA signals, indicators, positioners, and I/P converters. It provides galvanic isolation, Ex-e terminals accessible when volt-free and an optional bus independent shutdown feature.

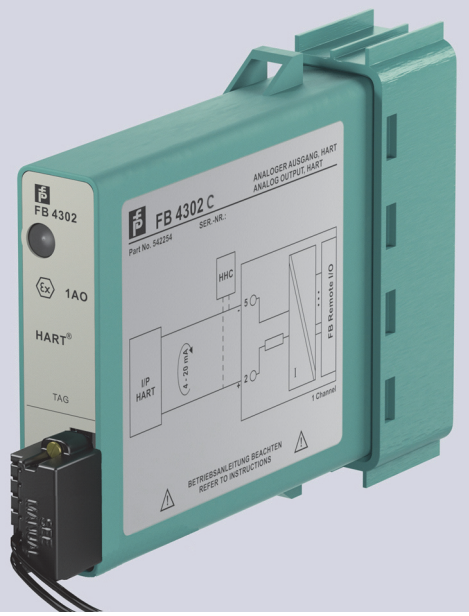



*Figure 54. FB 4302 C2 (HART Analog Output Modules)*

Outputs and explosion protection specifications are provided below.

### Outputs

**MAXIMUM LOAD**
750 Ω

**OUTPUT CURRENT**
0/4 - 20 mA (short circuit protected)

**$I_{MIN/MAX}$**
0/25 mA (1 mA for LFD)

**LINEARITY**
< 0.1%

**TEMPERATURE DRIFT**
< 0.1% / 10 K

**LINE MONITOR**
> 850 Ω ... 4 kΩ

**WATCHDOG CIRCUIT**
Output OFF 0.5 sec. after serious faults

**CONNECTION**
2 m cable tails to Ex-e terminals

**CONVERSION TIME**
≤ 50 msec.

**POWER CONSUMPTION**
1 W

### Explosion Protection

**CATEGORY**
II 2 G Ex d IIC

**APPROVAL**
PTB 97 ATEX 1074 U

## FB 4305 B2 (HART Analog Output Module, 4-Channels)

The FB 4305 B2 HART analog output module is designed for Zone 1 environments and has an output isolator for proportional valves, displays or IP converters. It provides galvanic isolation between their inputs and the fieldbus. It can be unplugged when its Ex-e circuits are volt-free.


*Figure 55. FB 4305 B2 (HART Analog Output Module, 4-Channels)*

Inputs and explosion protection specifications are provided below.

### Inputs

**MAXIMUM LOAD**
750 Ω (at 22 mA)

**OUTPUT RANGE**
4 - 20 mA (0 - 25 mA) short protected

**CURRENT LIMIT**
Approximately 25 mA

**LINEARITY**
0.1%

**TEMPERATURE DRIFT**
0.1% / 10 K

**LINE MONITOR (LFD)**
Min. 0.5 mA

**WATCHDOG CIRCUIT**
Output OFF 0.5 sec. after serious faults

**REFRESH TIME**
Approximately 100ms

**CONNECTION**
Plug-in Ex-e front connectors with IP30 hood; field wiring goes directly to the connector; connector and hood supplied with I/O module (recommended for new installations)

**NOTE**

A hot work permit is required for access to the connector under the hood.

**POWER CONSUMPTION**
3 W

**POWER LOSS**
1.2 W

### Explosion Protection

**CATEGORY**
II 2 G Ex d IIC

**APPROVAL**
Refer to “Certificates and Marine Certificates (Explosion Protection)” on page 94.

## FB 5201 F3 (2 or 3-Wire RTD Input Module)

The FB 5201 F3 module supports 2 or 3-wire RTD (temperature) inputs. It is designed for Zone 1 environments.


*Figure 56. FB 5201 F3 (2 or 3-Wire RTD Input Module)*

Inputs and explosion protection specifications are provided below.

### Inputs

**RANGE**
0-320 Ω

**WIRE RESISTANCE**
50 Ω maximum each wire

**RTD LINE FAULT (LFD)**
> 500 Ω

**LINEARITY**
< 0.02 %

**TEMPERATURE DRIFT**
< 0.02 %/10 K

**SENSOR CURRENT**
200 µA

**CONVERSION TIME**
< 150 ms with LFD

**POWER CONSUMPTION**
Approximately 0.45 W

### Explosion Protection

**CATEGORY**
II 2 (1/2) G Ex d [ia/ib] IIC

**APPROVAL**
Refer to “Certificates and Marine Certificates (Explosion Protection)” on page 94.

## FB 5201 F4 (4-Wire RTD Input Module)

The FB 5201 F4 module supports 4-wire RTD (temperature) inputs. It is designed for Zone 1 environments.


*Figure 57. FB 5201 F4 (4-Wire RTD Input Module)*

Inputs and explosion protection specifications are provided below.

### Inputs

**RANGE**
0-320 Ω

**WIRE RESISTANCE**
50 Ω maximum each wire

**RTD LINE FAULT (LFD)**
> 1 kΩ (Break), < 10Ω (short)

**LINEARITY**
< 0.02 %

**TEMPERATURE DRIFT**
< 0.02 %/10 K

**SENSOR CURRENT**
200 µA

**CONVERSION TIME**
< 150 ms with LFD

**POWER CONSUMPTION**
Approximately 0.45 W

### Explosion Protection

**CATEGORY**
II 2 (1/2) G Ex d [ia/ib] IIC

**APPROVAL**
Refer to “Certificates and Marine Certificates (Explosion Protection)” on page 94.

## FB 5202 F (Thermocouple Input Module)

The FB 5202 F module supports thermocouple or mV inputs with cold junction compensation. It is designed for Zone 1 environments.


*Figure 58. FB 5202 F (Thermocouple Input Module)*

Inputs and explosion protection specifications are provided below.

### Inputs

**RANGE**
e.g. Type U, B, E, T, K, S, R, L, J, N, Pallaplat

**MEASURING RANGE**
-10.5 mV .... + 69.5 mV

**COMPENSATION**
Internal (at connector) or external

**CJC PT100 SENSOR CURRENT**
200 µA

**CONVERSION TIME FOR EXTERNAL CJC**
< 80 ms with LFD

**CONVERSION TIME FOR INTERNAL CJC**
< 250 ms with LFD

**LINEARITY**
< 0.007 %

**TEMPERATURE DRIFT**
< 0.02 %/10 K

**LINE FAULT (LFD)**
> 1 kΩ

**POWER CONSUMPTION**
Approximately 0.45 W

### Explosion Protection

**CATEGORY**
II 2 (1/2) G Ex d [ia/ib] IIC

**APPROVAL**
Refer to “Certificates and Marine Certificates (Explosion Protection)” on page 94.

## FB 5204 F3 (2 or 3-Wire RTD Input Module, 4-Channels)

The FB 5204 F3 module supports 2 or 3-wire RTD or slide wire sensor inputs. It is designed for Zone 1 environments and it has group isolation.


*Figure 59. FB 5204 F3 (2 or 3-Wire RTD Input Module, 4-Channels)*

Inputs and explosion protection specifications are provided below.

### Inputs

**RTD RANGE**
0-320 Ω

**SLIDE WIRE SENSORS**
0-320 Ω

**SENSOR CURRENT**
< 0.22 mA

**WIRE RESISTANCE**
< 50 Ω each wire

**LINE BREAK DETECTION**
> 1 kΩ (Break)

**NONLINEARITY**
0.02%

**TEMPERATURE DRIFT**
0.02%/10 K

**SCAN TIME**
6.5 ms

**CONVERSION TIME**
< 1000 ms (4 channels)

**CONNECTION**
Screw plug-in or wire clamp connectors

**POWER CONSUMPTION**
Approximately 0.6W

### Explosion Protection

**CATEGORY**
II 2 (1/2) G Ex d [ia/ib] IIC

**APPROVAL**
Refer to “Certificates and Marine Certificates (Explosion Protection)” on page 94.

### FB 5204 F4 (4-Wire RTD Input Module, 4-Channels)

The FB 5204 F4 module supports 4-wire RTD inputs. It is designed for Zone 1 environments and it has group isolation.


*Figure 60. FB 5204 F4 (4-Wire RTD Input Module, 4-Channels)*

Inputs and explosion protection specifications are provided below.

#### Inputs

**RTD RANGE**
0-320 Ω

**SENSOR CURRENT**
< 0.22 mA

**WIRE RESISTANCE**
< 50 Ω each wire

**LINE BREAK DETECTION**
> 1 kΩ (Break)

**NONLINEARITY**
0.02%

**TEMPERATURE DRIFT**
0.02%/10 K

**SCAN TIME**
6.5 ms

**CONVERSION TIME**
< 500 ms (4 channels)

**CONNECTION**
Screw plug-in or wire clamp connectors

**POWER CONSUMPTION**
Approximately 0.6W

#### Explosion Protection

**CATEGORY**
II 2 (1/2) G Ex d [ia/ib] IIC

**APPROVAL**
Refer to “Certificates and Marine Certificates (Explosion Protection)” on page 94.

**IIC SAFETY VALUES (TRAPEZE $R_I$ = 103Ω)**

$U_o \leq 6.8$ V  $I_o \leq 70$ mA  $P_o \leq 118$ mW
$C_o \leq 1$ µF  $L_o \leq 5$ mH  $C_i \leq 100$ nF

## FB 5205 F (Thermocouple Input Module, 4-Channels)

The FB 5205 F module supports thermocouple or mV inputs with cold junction compensation. It is designed for Zone 1 environments and it has galvanic isolation between channels.


*Figure 61. FB 5205 F (Thermocouple Input Module, 4-Channels)*

Inputs and explosion protection specifications are provided below.

### Inputs

**RANGE**
e.g. Type U, B, E, T, K, S, R, L, J, N, Pallaplat

**MEASURING RANGE**
-10.5 mV .... + 69.5 mV

**COMPENSATION**
Internal (built-in) CJC only

**LINE FAULT DETECTION (LFD)**
> 1 kΩ

**NONLINEARITY**
< 0.007 %

**TEMPERATURE DRIFT**
< 0.02 %/10 K

**CYCLE TIME (COM UNIT)**
6.5 ms

**CONVERSION TIME**
< 600 ms (4 channels) with LFD

**CONNECTION**
Screw plug-in or wire clamp connectors

**TEST VOLTAGE**
0.5 kV input - input
1.5 kV input - bus and power

**POWER CONSUMPTION**
Approximately 1 W

### Explosion Protection

**CATEGORY**
II 2 (1/2) G Ex d [ia/ib] IIC

**APPROVAL**
Refer to “Certificates and Marine Certificates (Explosion Protection)” on page 94.

## FB 5206 B (Voltage Converter Module)

The FB 5206 B voltage converter module supports inputs for 0-10V input signals. It is designed for Zone 1 environments and it provides galvanic isolation between its input and the fieldbus.


*Figure 62. FB 5206 B (Voltage Converter Module)*

Inputs and explosion protection specifications are provided below.

### Inputs

**RANGE**
0 -/+10 V

**SMALLEST SPAN FOR 0,1%**
500 mV

**INPUT IMPEDANCE**
100 kΩ

**LINE FAULT DETECTION (LFD)**
None

**LINEARITY**
< 0,1% Typical

**TEMPERATURE DRIFT**
< 0.1% / 10 K

**CONVERSION TIME**
100 ms

**POWER CONSUMPTION**
< 0.45 W

### Explosion Protection

**CATEGORY**
II 2 1) G Ex d [ia/ib] IIC

**APPROVAL**
Refer to “Certificates and Marine Certificates (Explosion Protection)” on page 94.

## FB 6208 B (Digital Output Module, 8-Channels, Low Power)

The FB 6208 B digital output module is designed for Zone 1 environments and supports active 20 V outputs to switch LEDs, indicators, or low power solenoid valves. It provides galvanic isolation between its outputs and the fieldbus (group isolation).


*Figure 63. FB 6208 B (Digital Output Module, 8-Channels, Low Power with Bus Independent Shutdown)*

Outputs and explosion protection specifications are provided below.

### Outputs

**DIGITAL OUTPUT (ACTIVE/SHORT PROTECTED)**
20 V, 8 mA per channel

**SCANNING TIME**
6.5 ms

**LFD TEST CURRENT**
0.33 mA

**WATCHDOG CIRCUIT**
Output volt-free 0.5 sec. after serious faults

**POWER CONSUMPTION**
2.2 W

### Explosion Protection

**CATEGORY**
II 2 (2) G Ex d [ib] IIC

**APPROVAL**
Refer to “Certificates and Marine Certificates (Explosion Protection)” on page 94.

## FB 6210 B - FB 6215 ES (Digital Output Module, 4-Channels, Intrinsically Safe Power)

The FB 6210 B to FB 6215 ES digital output modules are designed for Zone 1 environments and support outputs for intrinsically safe solenoid valves, and for sounders and LEDs. They provide galvanic isolation between their outputs and the fieldbus (group isolation).

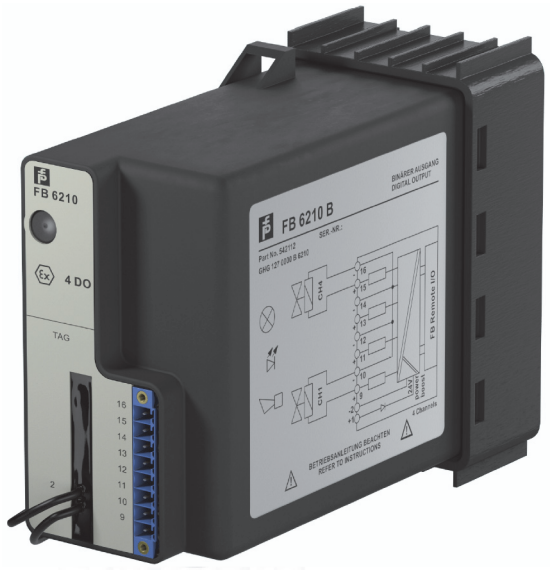



*Figure 64. FB 6210 B - FB 6215 ES (Digital Output Module, 4-Channels, Intrinsically Safe Power)*

Power supply, outputs and explosion protection specifications are provided below.

### Power Supply

**EXTERNAL POWER**
24 V dc, 5 W via Booster Ex-e module front end connection.

### Outputs

**DRIVE CAPABILITY**
See Table 20 and Table 21 below.

**LINE MONITOR (2MS TEST PULSE)**
Every 2.5 sec

**LFD REACTION TIME**
10 s (worst case)

**OUTPUT RESPONSE TIME**
> 10 ms (depending on the master)

**SCAN RATE**
6.5 ms

**WATCHDOG CIRCUIT**
Output OFF 0.5 sec. after serious faults

**CONNECTION**
Screw plug-in or wire clamp connectors for intrinsically safe circuits, and wire ends for Booster Ex-e

**POWER CONSUMPTION**
0.6 W

**BOOST POWER**
5 W

### Explosion Protection

**CATEGORY**
II 2 (2/1) G Ex de [ia/ib] IIC

**APPROVAL**
Refer to “Certificates and Marine Certificates (Explosion Protection)” on page 94.

**SAFETY VALUES**
See Table 20 and Table 21 below.

Table 20. FB 6210 B - FB 6215 B Model Variations

| P/N | U/V | $R_a$/Ω | Limit/mA | LFD/Ω | $U_o$/V | $I_o$/mA | $P_o$/mW | $C_o$/nF | $L_o$/mH |
|---|---|---|---|---|---|---|---|---|---|
| FB 6210 B | 24.5 | 370 | 55 | 90 ... 12000 | 27.8 | 90.4 | 629 | 81 | 0.2 |
| FB 6211 B | 24.5 | 320 | 60 | 110 ... 12000 | 27.8 | 107 | 744 | 81 | 0.2 |
| FB 6212 B | 17.0 | 185 | 70 | 95 ... 8000 | 19.8 | 142 | 705 | 117 | 0.5 |
| FB 6213 B | 23.0 | 290 | 60 | 110 ... 10000 | 26 | 110 | 714 | 96 | 0.2 |
| FB 6214 B | 23.0 | 355 | 55 | 90 ... 10000 | 26 | 88.7 | 578 | 96 | 0.2 |
| FB 6215 B | 16.2 | 78 | 80 | 100 ... 8500 | 18.9 | 286 | 1350 | 150 | 0.17 |

Table 21. FB 6210 E - FB 6215 ES Model Variations

| P/N | U/V | $R_a$/Ω | Limit/mA | LFD/Ω | $U_o$/V | $I_o$/mA | $P_o$/mW | $C_o$/nF | $L_o$/mH |
|---|---|---|---|---|---|---|---|---|---|
| FB 6210 E | 24.5 | 370 | 55 | 90 ... 12000 | 27.8 | 90.4 | 629 | 81 | 0.2 |
| FB 6211 E | 24.5 | 320 | 60 | 110 ... 12000 | 27.8 | 107 | 744 | 81 | 0.2 |
| FB 6212 E | 17.0 | 185 | 70 | 95 ... 8000 | 19.8 | 142 | 705 | 117 | 0.5 |
| FB 6213 E | 23.0 | 290 | 60 | 110 ... 10000 | 26 | 110 | 714 | 96 | 0.2 |
| FB 6214 E | 23.0 | 355 | 55 | 90 ... 10000 | 26 | 88.7 | 578 | 96 | 0.2 |
| FB 6215 ES | 16.2 | 78 | 80 | 100 ... 8500 | 18.9 | 286 | 1350 | 150 | 0.17 |

### FB 6301 H200 (Digital Relay Output Module, 2-Channels, Ex-e)

The FB 6301 H200 digital relay output module is designed for Zone 1 environments and supports switches with 24 V or 230 V power circuits and Ex-d solenoid valves. It provides galvanic isolation between its outputs and the fieldbus, as well as other outputs, and provides access to Ex-e connections when volt-free.


*Figure 65. FB 6301 H200 (Digital Relay Output Module, 2-Channels, Ex-e)*

Outputs and explosion protection specifications are provided below.

#### Outputs

**VOLTAGE RATING (NOMINAL)**
24 V dc, 24 V ac (30 V max.) / 230 V ac

**CURRENT RATING**
1 A, ac/dc (resistive load)

**SWITCH POWER**
30 vA, 30 W, 230 vA

**ELECTRICAL LIFETIME**
0.5 Mio. cycles

**MIN. SWITCHING CAPABILITY**
> 1 V, > 1 mA

**CONTACT MATERIAL**
AgPd gold plated

**WATCHDOG CIRCUIT**
Output OFF 0.5 sec. after serious faults

**RESPONSE TIME**
Approximately < 20 ms (depending on bus cycle time)

**SCANNING TIME**
Approximately < 6.5 ms

**CONNECTION**
2 m cable tails to Ex-e terminals

**POWER CONSUMPTION**
0.65 W

#### Explosion Protection

**CATEGORY**
II 2 G Ex d IIC

**APPROVAL**
Refer to “Certificates and Marine Certificates (Explosion Protection)” on page 94.

## FB 6305 B200 (Digital Relay Output Module, 4-Channels)

The FB 6305 B200 digital relay output module is designed for Zone 1 environments and supports outputs with relay-contacts for LEDs, annunciators and valves. It provides galvanic isolation between its outputs and the fieldbus. It can be unplugged when Ex-e circuits are volt-free.

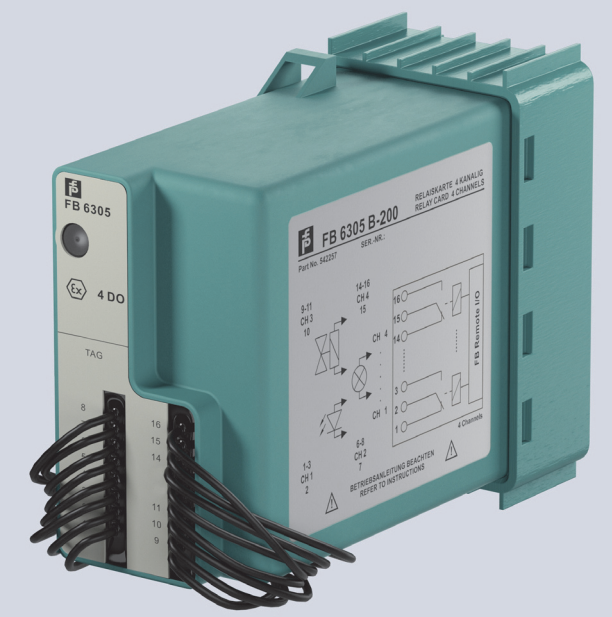



*Figure 66. FB 6305 B200 (Digital Relay Output Module, 4-Channels)*

Outputs and explosion protection specifications are provided below.

### Outputs

**RELAY CONTACT/CHANNEL**
30 V dc, 1 A, 30 W (resistive load)
230 V ac, 1 A, 230 vA (resistive load)

**CONTACT MATERIAL**
AgPd gold plated

**ELECTRICAL LIFETIME**
0.1 Mio. cycles

**MIN. SWITCHING CAPABILITY**
> 1 V, > 1 mA

**RESPONSE TIME**
Approximately 20 ms (depending on bus cycle time)

**SCANNING TIME**
6.5 ms

**WATCHDOG CIRCUIT**
Relay OFF 0.5 sec. after serious faults

**CONNECTION**
2 m cable tails to Ex-e terminals

**POWER CONSUMPTION**
1.2 W

### Explosion Protection

**CATEGORY**
II 2 G Ex d IIC

**APPROVAL**
Refer to “Certificates and Marine Certificates (Explosion Protection)” on page 94.

## FB 6306 B200 (Digital Relay Output Module, 8-Channels)

The FB 6306 B200 digital relay output module is designed for Zone 1 environments and supports outputs with relay-contacts for LEDs, annunciators, or valves. It provides galvanic isolation between its outputs and the fieldbus. It can be unplugged when Ex-e circuits are volt-free.


*Figure 67. FB 6306 B200 (Digital Relay Output Module, 8-Channels)*

Outputs and explosion protection specifications are provided below.

### Outputs

**RELAY CONTACT/CHANNEL**
24 V ac/dc, 1 A, 30 W, 30 vA (resistive load)

**CONTACT MATERIAL**
AgPd gold plated

**ELECTRICAL LIFETIME**
0.5 Mio. cycles

**MIN. SWITCHING CAPABILITY**
> 1 V, > 1 mA

**RESPONSE TIME**
Approximately 20 ms (depending on bus cycle time)

**SCANNING TIME**
6.5 ms

**WATCHDOG CIRCUIT**
Relay OFF 0.5 sec. after serious faults

**CONNECTION**
2 m cable tails to Ex-e terminals

**POWER CONSUMPTION**
1.6 W

### Explosion Protection

**CATEGORY**
II 2 G Ex d IIC

**APPROVAL**
Refer to “Certificates and Marine Certificates (Explosion Protection)” on page 94.

## FB 6308 B2 (Digital Output Module, 8-Channels, Low Power)

The FB 6308 B2 digital output module is designed for Zone 1 environments and supports active outputs for low power loads, such as inputs of control stations. It provides galvanic isolation between its outputs and the fieldbus (group isolation) and a shutdown input. It can be unplugged when their Ex-e circuits are volt-free.


*Figure 68. FB 6308 B2 (Digital Output Module, 8-Channels)*

Outputs and explosion protection specifications are provided below.

### Outputs

**DIGITAL OUTPUT (ACTIVE/SHORT PROTECTED)**
20 V, 8 mA per channel

**SCANNING TIME**
6.5 ms

**LFD TEST CURRENT**
0.33 mA

**WATCHDOG CIRCUIT**
Output volt-free 0.5 sec. after serious faults

**CONNECTION**
2 m cable tails to Ex-e terminals

**POWER CONSUMPTION**
2.2 W

### Explosion Protection

**CATEGORY**
II 2 G Ex d IIC

**APPROVAL**
Refer to “Certificates and Marine Certificates (Explosion Protection)” on page 94.

### FB 9293 F (HDLC Bus Termination Module)

The FB 9293 F module terminates the Intrinsically Safe I/O Subsystem's fieldbus, and must be installed in the unit at the end of the fieldbus. It is designed for Zone 1 environments.


*Figure 69. FB 9293 F (HDLC Bus Termination Module)*

Inputs and explosion protection specifications are provided below.

## Technical Data

**BUS TERMINATION**
Absolutely necessary for each last station of a busline for field enclosures and cabinets

## Explosion Protection

**CATEGORY**
II 2 G Ex d IIC

**APPROVAL**
Refer to "Certificates and Marine Certificates (Explosion Protection)" on page 94.

## FUNCTIONAL SPECIFICATIONS

### Process I/O Communications

#### MODULE FIELDBUS COMMUNICATIONS

*ISCM Transmission Rate*

2 Mbps

### Process I/O Capacity

#### 2 Mbps FIELDBUS

*Cable Length*

Zone 2 Applications Between FCP280/FCP270/FCM100E/Et and Intrinsically Safe I/O Subsystem

60 m (197 ft) maximum, standard module Fieldbus cable

Zone 1 Applications Between FCP280/FCP270/FCM100E/Et and Intrinsically Safe I/O Subsystem

152 m (500 ft) maximum, high quality twinaxial cable

*P+F I/O Modules*

Up to 46 (for Zone 2 applications) or 48 (for Zone 1 applications) supported P+F intrinsically safe I/O modules per ISCM

*ISCMs*

Refer to "IS/IO SYSTEM CONFIGURATION REQUIREMENTS" on page 5.

**NOTE**

When using the ISCM together with 200 Series FBMs under the same FCP270, the FEM100 module must be used to separate the fieldbus for the 200 Series FBMs from the FCP fieldbus. 100 Series FBMs are supported on an FCP270 as long as the FBI200 (Fieldbus Isolator) is used to separate the 100 Series FBMs modules from the FCP fieldbus. When using a ZCP270 with the ISCM, each ISCM must have a dedicated FCM100E/Et pair. 200 Series FBMs may also be supported on another FCM100E/Et pair. 100 Series FBMs may also be supported on yet another FCM100E pair.

**NOTE**

For use with FCP280s, the fieldbus on which the ISCM resides must only have 200 Series FBMs - any 100 Series FBMs must be on a separate fieldbus connected to one of the FCP280 baseplate's other Fieldbus ports. See PSS 31H-1B11 B3 for details.

**NOTE**

100 Series FBMs are only supported by the FCM100E.

### ISCM Name Assignment

ISCM name is set through a Station or Module Name module with rotary switch which is plugged into the ISCM.

### Power Requirements

#### ISCM

2 W

#### P+F I/O MODULES

Refer to "Foxboro/P+F INTRINSICALLY SAFE MODULES SPECIFICATIONS" on page 24.

### Input Specifications(3)

#### ZONE 1 POWER SUPPLIES FB 9215 B2 (230 V AC)

50 to 60 Hz nominal

#### ZONE 2 POWER SUPPLY LB 9006 C (24 V DC)

18 to 30 V dc, 24 V dc nominal

### Regulatory Compliance

#### ISCM - EXPLOSION PROTECTION

*ISCM for Zone 2 (LB-Style) Applications (P0927BV)*

See "Certificates and Marine Certificates (Explosion Protection) (Cont.)" on page 95.

*ISCM for Zone 1 (FB-Style) Applications (P0927BW)*

See "Certificates and Marine Certificates (Explosion Protection)" on page 94.

#### P+F I/O MODULES

Refer to "Foxboro/P+F INTRINSICALLY SAFE MODULES SPECIFICATIONS" on page 24.

(3) For full specifications on all P+F power supplies, see P+F data sheets listed in "FOR MORE INFORMATION" on page 98.

## FUNCTIONAL SPECIFICATIONS (CONTINUED)

### Certificates and Marine Certificates (Explosion Protection)

#### ZONE 1 (FB-STYLE) APPLICATIONS

Table 22. Certificates (Explosion Protection) for Zone 1 (FB-Style) Applications

| Certificates | Certificate Number |
|---|---|
| Europe PTB ATEX Category 2 G | PTB 97 ATEX 1074U |
| Europe PTB ATEX Category 2 G | PTB 97 ATEX 1075 |
| Europe Pepperl+Fuchs 94/9/EC - 2004/108/EC Declaration of Conformity | PF 08 CERT 1263 |
| Brasil CERTUSP | 2008EC02CP010U |
| Russia NANIO “CCVE” GOST-R | RUSS.IT.GB 05.03171 |

Table 23. Marine Certificates (Explosion Protection) for Zone 1 (FB-Style) Applications

| Marine Certificates | Certificate Number |
|---|---|
| Bureau Veritas Marine | 22449 / A0 BV |
| Det Norske Veritas Marine | A-11866 |
| American Bureau of Shipping (ABS) Marine | 10-HG639253-PDA |

## FUNCTIONAL SPECIFICATIONS (CONTINUED)

### Certificates and Marine Certificates (Explosion Protection) (Cont.)

#### ZONE 2 (LB-STYLE) APPLICATIONS

Table 24. Certificates (Explosion Protection) for Zone 2 (LB-Style) Applications

| Certificates | Certificate Number |
|---|---|
| USA UL | E106378 UL (QUZW) |
| Canada UL | E106378 cUL (QUZW7) |
| Europe PTB ATEX Category (1/2) G | PTB 03 ATEX 2042 |
| Europe Pepperl+Fuchs II 3 G Declaration of Conformity | PF 08 CERT 1234 |
| Europe Pepperl+Fuchs 94/9/EC - 2004/108/EC Declaration of Conformity | PF 08 CERT 1263 |
| BVS IECEx Certificate of Conformity | IECEx BVS 08.0011X |
| DEKRA EXAM IECEx Certificate of Conformity | IECEx BVS 09.0037X |
| Brasil CERTUSP | 2008EC02CP012 |
| Russia NANIO “CCVE” GOST-R | RUSS.IT.GB 05.03171 |
| Brasil CERTUSP Zone 2 nAc | 2010EC02CP018X |
| China NEPSI Ex ib Ex ia | GYJ101409 |
| China NEPSI nAc | GYJ101410X |

Table 25. Marine Certificates (Explosion Protection) for Zone 2 (LB-Style) Applications

| Marine Certificates | Certificate Number |
|---|---|
| Bureau Veritas Marine | 22449 / A0 BV |
| Det Norske Veritas Marine | A-11866 |
| American Bureau of Shipping (ABS) Marine | 10-HG639253-PDA |

## ENVIRONMENTAL SPECIFICATIONS(4)

### Operating

**ZONE 2 (LB-STYLE) APPLICATIONS**

Category 3 equipment to EC regulations 94/9EC, mounted in Zone 2 or Zone 22 applications

*Temperature*

-20 to +70°C (-4 to +158°F)
(in intrinsically safe applications, for explosion protection, 60°C (140°F) maximum)

*Relative Humidity*

5 to 95% (noncondensing), <75% annual average

*Altitude*

-300 to +3,000 m (-1,000 to +10,000 ft)

*Degree of Protection Required*

IP 54 in Zone 2 environments
IP 6* for flammable dust environments

**ZONE 1 (FB-STYLE) APPLICATIONS**

Category 2 equipment to EC regulations 94/9EC, mounted in Zone 1 or 21 applications

*Temperature (Outside Enclosure)*

(T4) -20 to +55°C (-4 to +131°F)

*Relative Humidity*

5 to 95% (noncondensing), <75% annual average

*Altitude*

-300 to +3,000 m (-1,000 to +10,000 ft)

*Degree of Protection Required*

IP 54 in Zone 1 environments
IP 6* for flammable dust environments

### Storage

**TEMPERATURE**

-20 to +80°C (-4 to +176°F)

**RELATIVE HUMIDITY**

5 to 95% (noncondensing), <75% annual average

**ALTITUDE**

-300 to +12,000 m (-1,000 to +40,000 ft)

### Contamination

**POLLUTION TEST FOR PLUGS**

acc IEC 68-2-42
21 days with 25ppm $SO_2$ at +25°C (+77°F) and 75% relative humidity

**ENVIRONMENTAL TEST**

Nb acc DIN IEC 68 part 2-14
Cb acc DIN IEC 68 part 2-56

**G3 MIXED GAS CORROSION TEST**

To ISA-S71.04.1985 G3 Harsh Group A (Zone 2 LB-Style)

(4) The environmental limits of the ISCM may be enhanced by the type of enclosure containing the module. Refer to the *FB Remote I/O Bus System Hardware* or *LB Remote I/O Bus System Hardware* documents (listed in "FOR MORE INFORMATION" on page 98) which describes the specific type of enclosure that is to be used.
Be aware that Zone 1 power and bus cables must conform to increased safety requirements. Also consider the voltage drop which may occur across long power cables. Ensure that the remaining voltage does not drop below the minimum required for the power supply.

## PHYSICAL SPECIFICATIONS

### Mounting

The redundant installation consists of two ISCMs. A single ISCM can also be used.
ISCM mounts on an intrinsically safe I/O base or extension unit and/or P+F enclosure (part numbers listed in "PEPPERL+FUCHS MODULAR REMOTE I/O SYSTEMS" on page 4). Refer to the *FB Remote I/O Bus System Hardware* or *LB Remote I/O Bus System Hardware* documents (listed in "FOR MORE INFORMATION" on page 98) for details.

### ISCM Part Numbers

**FOR ZONE 2 (LB-STYLE) APPLICATIONS**
P0927BV (P+F P/N ISCM8100A) and
P0924GT (P+F P/N ISCM8100) - see page 21

**FOR ZONE 1 (FB-STYLE) APPLICATIONS**
P0927BW (P+F P/N ISCM8200A) and
P0924GU (P+F P/N ISCM8200) - see page 22

### Accessory Part Numbers

**STATION OR MODULE NAME ROTARY SWITCH MODULE (PLUGS INTO P0927BV/P0924GT/P0927BW/P0924GU)**
P0924GV (P+F P/N LTBM8001) - see page 23

### Mass

**ISCM (P0927BV/P0924GT) FOR ZONE 2 (LB-STYLE) APPLICATIONS**
0.1 kg (0.2 lb)

**ISCM (P0927BW/P0924GU) FOR ZONE 1 (FB-STYLE) APPLICATIONS**
1.0 kg (2.2 lb)

### Dimensions

**FOR ZONE 2 (LB-STYLE) APPLICATIONS**

*Double-Width Modules*
Height
96 mm (3.78 in)
Width
32 mm (1.26 in)
Depth
100 mm (3.91 in)

*Single-Width Modules*
Height
96 mm (3.78 in)
Width
16 mm (0.63 in)
Depth
100 mm (3.91 in)

**FOR ZONE 1 (FB-STYLE) APPLICATIONS**

*Double-Width Modules*
Height
107 mm (4.21 in)
Width
57 mm (2.24 in)
Depth
132 mm (5.20 in)

*Single-Width Modules*
Height
107 mm (4.21 in)
Width
29 mm (1.14 in)
Depth
132 mm (5.20 in)

## FOR MORE INFORMATION

For more information, refer to the following Product Specification Sheets (PSS) and documentation:

| Document Number | Title |
|---|---|
| PSS 21H-1B9 B3 | Field Control Processor 270 (FCP270) |
| PSS 21H-1B10 B3 | Z-Module Control Processor 270 (ZCP270) |
| PSS 31H-1FCP280 | Field Control Processor 280 (FCP280) |
| PSS 31H-2S200 | Standard 200 Series Subsystem Overview |
| PSS 21H-2Y10 B4 | FCM100Et Redundant Fieldbus Communications Module |
| PSS 21H-2Y11 B4 | FCM100E Redundant Fieldbus Communications Module |
| PSS 21H-2Y14 B4 | FEM100 Fieldbus Expansion Module |
| (Not Foxboro-supplied) | FB Remote I/O Bus System Hardware (Revision B and earlier revisions of this document are titled “Operating Instructions for FB Remote I/O Housings Model FB92xx, FB9224, FB 9225, FB9248, FB9249 Base Unit, Extension Unit, Redundancy Unit”) - available at Pepperl+Fuchs website: *www.pepperl-fuchs.com* |
| (Not Foxboro-supplied) | LB Remote I/O Bus System Hardware - available at Pepperl+Fuchs website: *www.pepperl-fuchs.com* |
| (Not Foxboro-supplied) | LB 9006 24 V DC Power Supply Data Sheet - available at Pepperl+Fuchs website: *www.pepperl-fuchs.com* |
| (Not Foxboro-supplied) | FB 9205 - FB 9216 Power Supply Data Sheet - available at Pepperl+Fuchs website: *www.pepperl-fuchs.com* |

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