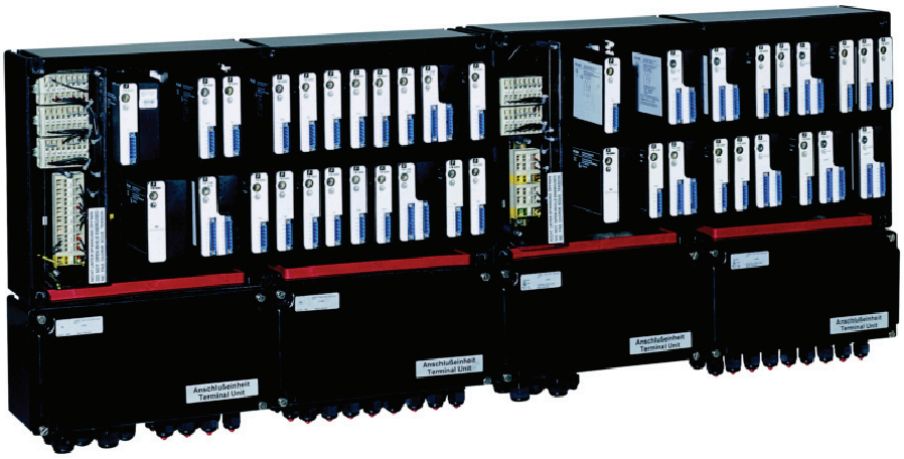
I/A Series® HARDWARE
Product Specifications

invensys
Foxboro®

PSS 21H-2Y6 B4

Intrinsically Safe I/O Subsystem

ISCM Base Unit for LB (Zone 2) Applications



ISCM Base, Extension and Redundancy Units 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 I/A Series® system. The Intrinsically Safe Communications Module (ISCM) enables I/A Series control processors to view the P+F I/O modules as equivalent 200 Series Fieldbus Modules (FBMs), which can be monitored with standard I/A Series blocks and standard InFusion™ or I/A Series system/control configurator applications such as the InFusion Engineering Environment 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 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, with a total of 16 ISCMs supported per I/A Series control processor (FCP270 or ZCP270); a 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
- Letterbug set through a letterbug module with rotary switch plugged into the ISCM.
- Monitored by standard System Manager or I/A Series SMDH and FoxView™ displays
- "CE" logo marked on product.

OVERVIEW

The Intrinsically Safe I/O Subsystem provides integration between the PepperI+Fuchs (P+F) modular intrinsically safe remote I/O systems and the I/A Series system. The Intrinsically Safe Communications Module (ISCM) communicates between the two systems, as it enables I/A Series control processors to view supported P+F intrinsically safe I/O modules as equivalent 200 Series Fieldbus Modules (FBMs) over the I/A Series 2 Mbps HDLC Fieldbus. This allows the I/O modules to be monitored with standard I/A Series blocks and standard I/A Series or InFusion system/control configurator applications such as InFusion Engineering Environment 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: Sequence of Events (SOE), TDR, time synchronization, ladder logic, and the EVENT, MDACT and DPIDA blocks.

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 FCP270.

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

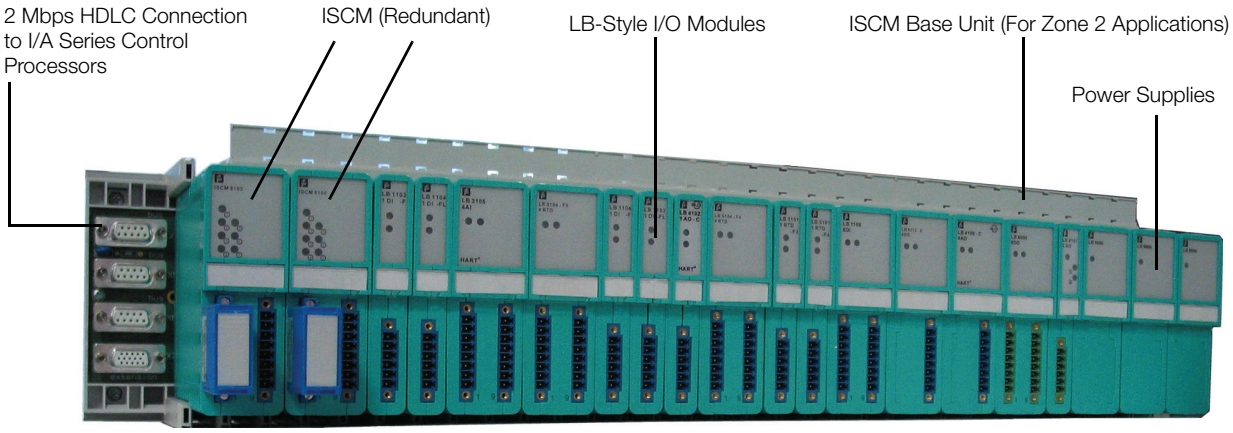


Figure 1. Redundant ISCM in LB-Style Base Unit (Zone 2 Applications)

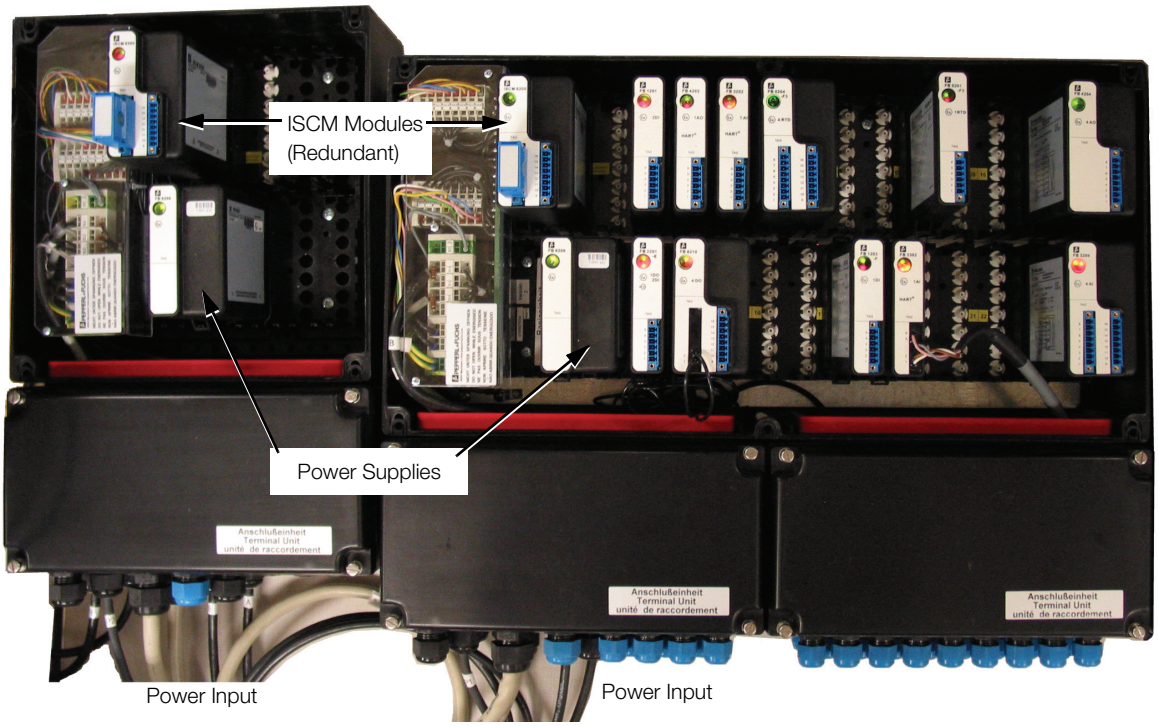


Figure 2. Redundant ISCMs in FB-Style Base and Redundancy Units (Zone 1 Applications)

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 high modularity offers 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-IS signals in the same I/A Series system, then standard 200 Series FBMs must be used for these signals.

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

ISCM DESIGN

ISCM modules support I/A Series 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.

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 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 versions	8.4.3 with QF1012617 (and later)[(b)]	8.4.3 with QF1012617 (and later)[(b)]	8.4.3 with QF1012617 (and later)[(b)]	8.4.3 with QF1012617 (and later)[(b)]
Maximum number of I/O modules, ISCMs and FBMs	204 (Redundant ISCM pairs count as 3 modules)	128 (Redundant ISCM pairs count as 3 modules)	46 single width, 23 dual width or any I/O combination	48 single width, 24 dual width or any I/O combination
Maximum CP Fieldbus load	75% - Use loading spreadsheet (B0700AV)	75% - Use loading spreadsheet (B0700AW)	N/A	N/A

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

Requirement	Each FCP270	Each ZCP270	Each Zone 2 (LB-Style) System	Each Zone 1 (FB-Style) System
ISCMs supported	16 single or redundant pairs	16 single or redundant pairs	One or two per LB-style system	One or two per FB-style system
Power supplies	One or two Invensys supplied 24 Volt power supplies, power input 24 V dc or 85 - 265 V ac (or 125 V dc)	One or two Invensys 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
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	Configuration dependent	Configuration dependent	80 total, 40 each per base or extension unit	80 total, 40 each per base or extension unit
Digital 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 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	Maximum Fieldbus load cannot be exceeded	Maximum Fieldbus load cannot be exceeded	80	80
Maximum number of HART I/O point connections	480 points will use 29% of the fieldbus load capacity	480 points will use 35% of the fieldbus load capacity	480	480
Maximum number of HART pass through sessions	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) Windows XP and Windows Server 2003 workstation operating systems only.

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 I/A Series 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

Invensys Part No.	P+F Model No.	Description
P0924GT	ISCM8100	Intrinsically Safe Communication Module for Zone 2 (LB-style) applications
P0924GU	ISCM8200	Intrinsically Safe Communication Module for Zone 1 (FB-style) applications
P0924GV	LTBM8001	Letterbug rotary switch module (plugs into ISCM8100/8200)

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 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 IPS Portal (www.ips.invensys.pepperl-fuchs.com) to order this equipment as it does not have an Invensys 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 9206 D	Zone 1 power supply - 24 V dc input
FB 9215 B	Zone 1 power supply - 230 V ac input
FB 9216 B	Zone 1 power supply - 115 V ac input

(a) Visit the IPS Portal (*www.ips.invensys.pepperl-fuchs.com*) to order this equipment as it does not have an Invensys part number.

Table 5 details the units and equipment provided with each Zone 1 (FB-Style) GRP enclosure. Figure 3 displays examples of these enclosures loaded.

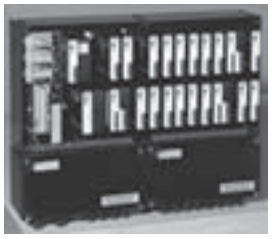
Table 5. Zone 1 (FB-Style) GRP Enclosures Equipment)

P+F Model No.[(a)]	Description	Contents
FB 9224-PG0	Zone 1 GRP enclosure with 24 slots	1 socket for communication interface FB 820X 1 socket for power supply FB 92XX 24 sockets for I/O modules Cable glands (plastic) 2 x M20 for power supply 2 x M20 for bus cable 1 x M20 for service bus cable 1 x M20 for later expansion for redundancy 24 x M16 for 24 I/O cables 24 x M16 blanking plugs Terminals for mains connection and bus VBG4 protected.
FB 9225-PG0	Zone 1 GRP enclosure with 24 slots (redundant)	2 sockets for communication interface FB 820X 2 sockets for power supply FB 92XX 24 sockets for I/O modules Cable glands (plastic) 2 x M20 for power supply 2 x M20 for bus cable 1 x M20 for service bus cable 1 x M20 for expansion for redundancy 24 x M16 for 24 I/O cables 24 x M16 blanking plugs Terminals for mains connection and bus VBG4 protected.

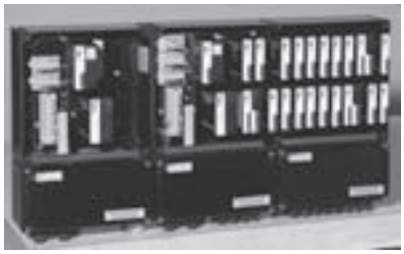
Table 5. Zone 1 (FB-Style) GRP Enclosures Equipment) (Continued)

P+F Model No.[(a)]	Description	Contents
FB 9248-PG0	Zone 1 GRP enclosure with 48 slots	1 socket for communication interface FB 820X 2 sockets for power supply FB 92XX 48 sockets for I/O modules Cable glands (plastic) per basic and expansion unit 2 x M20 for power supply 2 x M20 for bus cable 1 x M20 for service bus cable 1 x M20 for later expansion for redundancy 24 x M16 for 24 I/O cables 24 x M16 blanking plugs Terminals for mains connection and bus VBG4 protected.
FB 9249-PG0	Zone 1 GRP enclosure with 48 slots (redundant)	2 sockets for communication interface FB 820X 4 sockets for power supply FB 92XX 48 sockets for I/O modules Cable glands (plastic) per basic and expansion unit 2 x M20 for power supply 2 x M20 for bus cable 1 x M20 for service bus cable 1 x M20 for expansion for redundancy 24 x M16 for 24 I/O cables 24 x M16 blanking plugs Terminals for mains connection and bus VBG4 protected.

(a) Visit the IPS Portal (*www.ips.invensys.pepperl-fuchs.com*) to order this equipment as it does not have an Invensys part number.

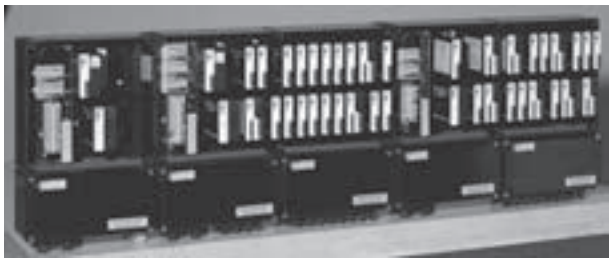


Zone 1 GRP Enclosure with 24 Slots
(FB 9224-PG0)



Zone 1 GRP Enclosure with 24 Slots (Redundant)
(FB 9225-PG0)

Zone 1 GRP Enclosure with 48 Slots (FB 9248-PG0)



Zone 1 GRP Enclosure with 48 Slots (Redundant) (FB 9249-PG0)

Dimensional Drawings

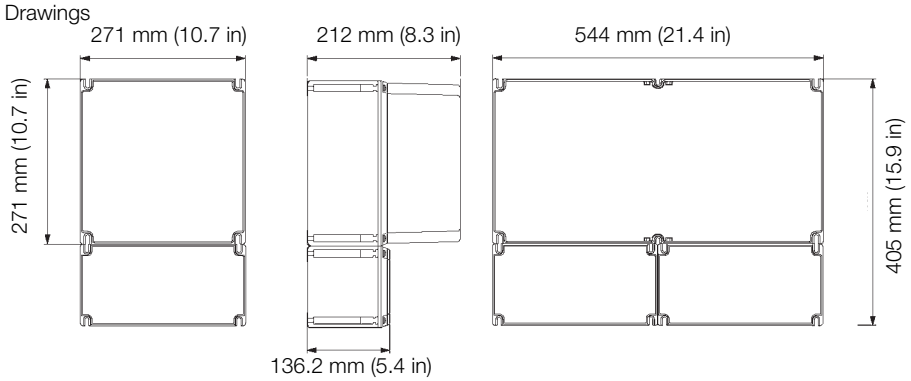
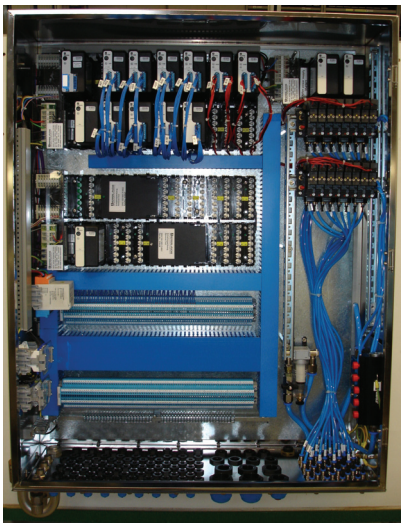


Figure 3. Loaded Zone 1 (FB-Style) GRP Enclosures with Example Units

Figure 4 displays examples of the Zone 1 (FB-Style) stainless steel enclosures loaded with the appropriate units and equipment.

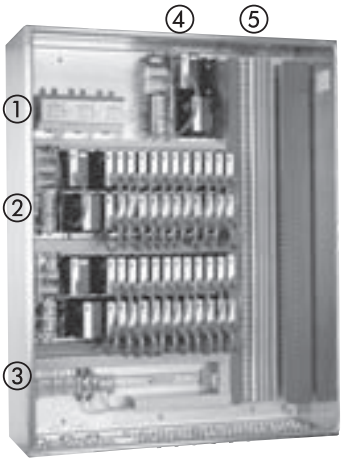
Zone 1 stainless steel FB Remote I/O enclosure with optional prewired marshalling to terminals supports one IS unit with 24 slots (FB 9224-S60) for I/O modules or 12 slots for dual-width I/O modules.
Also includes screen rail.

Available field enclosure dimensions
600 x 600 x 400 mm



Zone 1 stainless steel FB Remote I/O enclosure with optional valve banks, and optional marshalling terminals supports one redundant IS unit (FB 9249-S80) with 48 slots for I/O modules or 24 slots for dual-width I/O modules.
Also includes screen rail.

Available field enclosure dimensions
1000 x 800 x 400 mm



Stainless steel enclosure supports one redundant IS unit (FB 9249-S80) with 48 slots for I/O modules or 24 slots for dual-width I/O modules.

Legend:

(1) FOL Coupler (Optical fibre)
(2) Busstation
(3) Option screen rails
(4) Redundancy unit
(5) Optional marshalling terminals

Available field enclosure dimensions
800 x 1000 x 300 mm
800 x 600 x 300 mm

NOTE: Visit the IPS Portal (www.ips.invensys.pepperl-fuchs.com) for more details on these field enclosures, including the field enclosures available and how to order them.

Figure 4. Loaded Zone 1 (FB-Style) Stainless Steel Enclosures with Example Units

MODULE FIELDBUS COMMUNICATION

The ISCM supports the redundant 2 Mbps HDLC module Fieldbus to communicate with the FCP270 or ZCP270 (via optionally redundant FCM100E/Et modules), as shown in Figure 5 and Figure 6.

The 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 270 (FCP270) Sizing Guidelines and Excel Workbook* (B0700AV) and *Z-Module Control Processor 270 (ZCP270) Sizing Guidelines and Excel Workbook* (B0700AW)). 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 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.

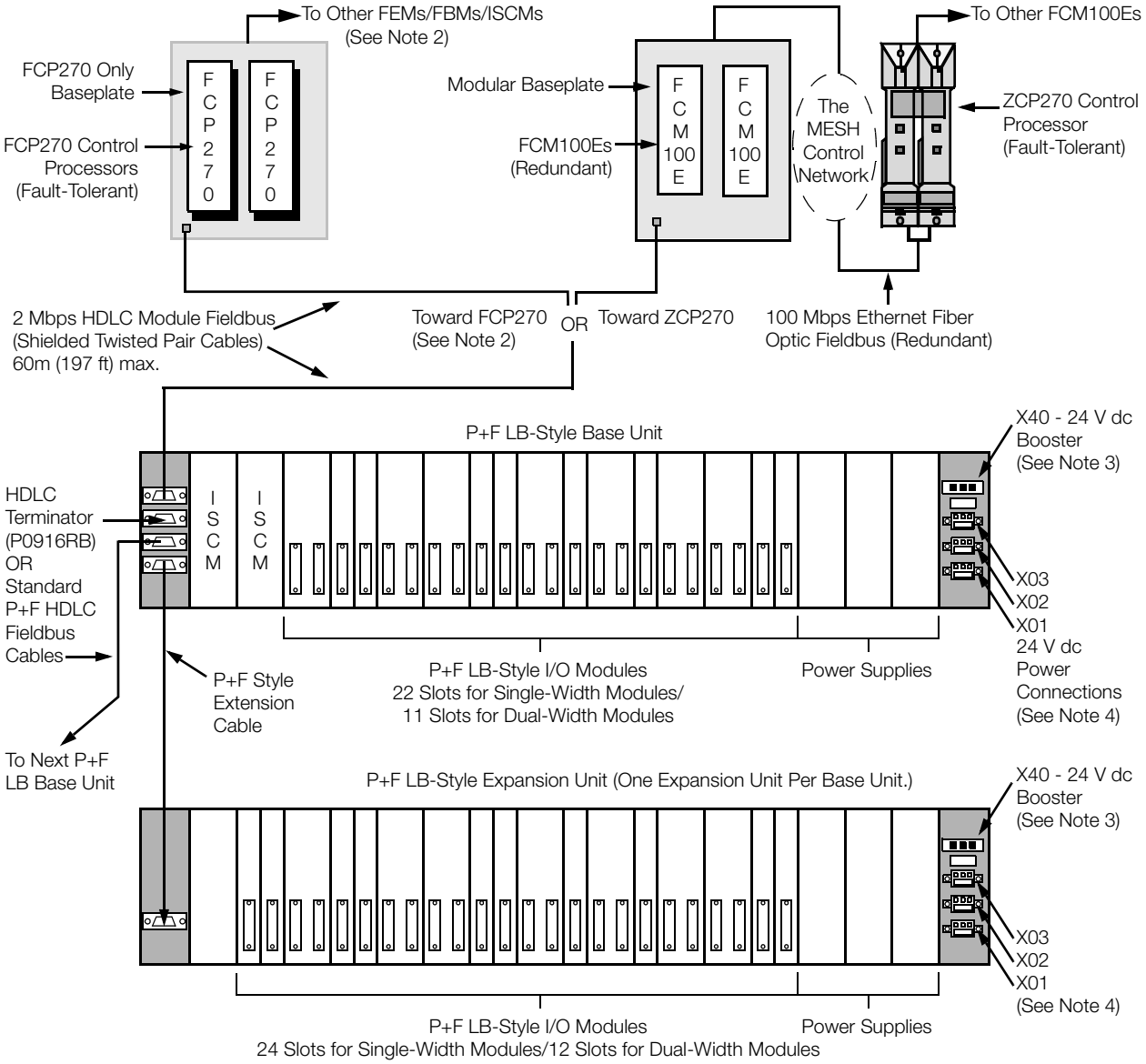
NOTE

When an FCP270 is connected to both P+F I/O modules and 200 Series FBMs via an FEM100, 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 letterbug 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-2Y16 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 MESH control network).

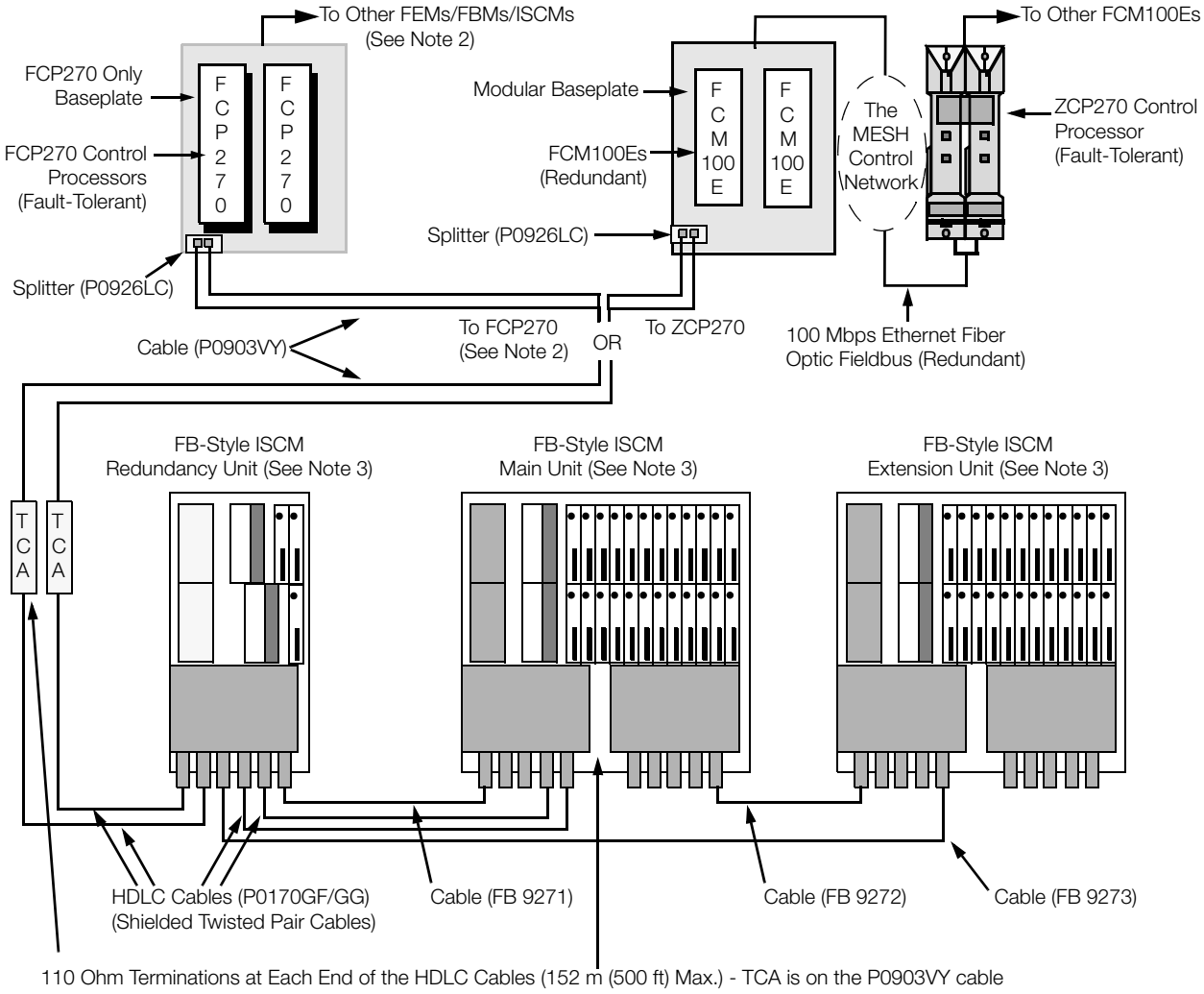
For Zone 2 (LB-style) applications, a maximum of 60 meters (197 ft) of standard fieldbus cable may be used between the FCP270 or FCM100E/Et and the remote I/O system. For Zone 1 (FB-Style) applications, a maximum of 152 meters (500 ft) of high quality twinaxial cable may be used between the FCP270 or 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 Expansion 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.
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 5. Typical LB-Style (Zone 2) ISCM to FCP270/ZCP270 Network Configuration (Simplified)



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 Expansion Fieldbus. See Appendix A of the B0700DP manual for details. FEM100s cannot be directly connected to a P+F base/extension unit.
3. FB 9249-PG0 enclosure configuration is shown in this figure. Additional enclosure configurations are available. ISCMs are plugged into the Main or Redundancy Unit.

Figure 6. Typical FB-Style ISCM to 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	-	-	2[(a)]	-	Frequency + direction of rotation (15 KHz)	206	1
LB 1104 F	-	-	2[(a)]	-	Pulse count + direction of rotation (15 KHz)	206	1
LB 1103 FL	-	-	2[(a)]	-	Frequency low + direction of rotation (300 Hz)	206	1
LB 1104 FL	-	-	2[(a)]	-	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 A	1	-	-	-	HART® input with Transmitter power (16.5V)	214	1
LB 3104 A	4	-	-	-	Transmitter power	201	2
LB 3105 A	4	-	-	-	HART® and Transmitter power	214	2
LB 4102 A	-	1	-	-	HART® output	215	1
LB 4102 C	-	1	-	-	HART® output with shutdown input	215	1
LB 4104 A	-	4	-	-	Analog Output	237	2
LB 4105 C	-	4	-	-	HART® output with shutdown input	215	2
LB 4105 D	-	4	-	-	HART® output with LFD	215	2
LB 5101 F3	1	-	-	-	3-wire RTD input	203	1
LB 5101 F4	1	-	-	-	4-wire RTD input	203	1
LB 5102 F	1	-	-	-	T/C with internal/external CJC RTD input	202	1
LB 5106 A	1	-	-	-	0 - 10 V input	201	1
LB 5104 F3	4	-	-	-	3 wire RTD input	203	2
LB 5104 F4	4	-	-	-	4 wire RTD input	203	2
LB 5105 F	4	-	-	-	T/C with internal CJC RTD	202	2
LB 6101 H	-	-	-	2	Digital Relay Output (230 V/24 V)	242	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 6005 A	-	-	-	4	Digital Relay Output (230 V/24 V)	242	2
LB 6006 A	-	-	-	8	Digital Relay Output (24 V)	242	2
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) Although these modules have two channels, the second channel is for direction detection only.

Table 7 lists the front connectors used with the Pepperl+Fuchs intrinsically safe I/O modules listed in Table 6. These front connector types are shown in Figure 7.

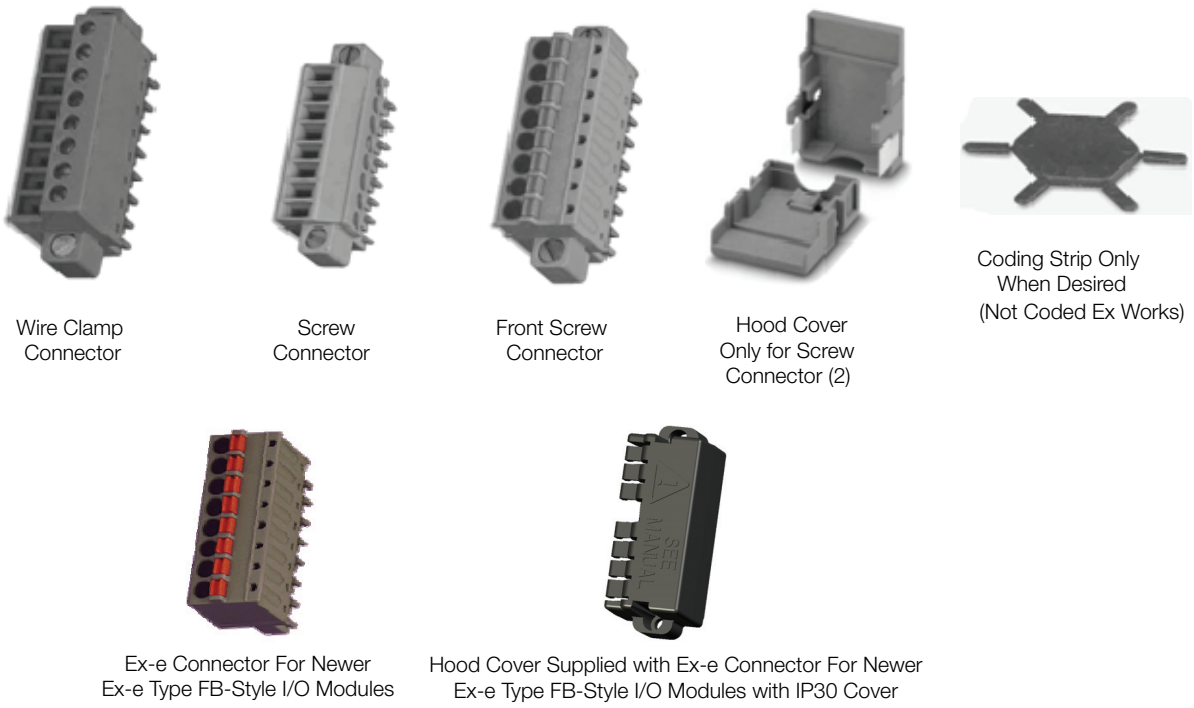


Figure 7. Front Connector Types for Supported P+F Intrinsically Safe I/O Modules (Zones 1 and 2)

Table 7. Front Connectors for Supported P+F Intrinsically Safe I/O Modules (Zone 2)

P+F Model No.	Description	Signal Type
6 Pole Front Connectors		
LB 9007 A	Screw terminals connector, green, 6-pole	Non-Intrinsically Safe
LB 9008 A	Cover for connector green, 6-pole	Non-Intrinsically Safe
LB 9009 A	Wire clamp connector green, 6-pole	Non-Intrinsically Safe
LB 9107 A	Screw terminals connector blue, 6-pole	Intrinsically Safe
LB 9107 P	Wire clamp connector blue, 6-pole	Intrinsically Safe
LB 9108 A	Cover for connector blue, 6-pole	Intrinsically Safe
LB 9111 A	Cold junction module with hood, blue, 6-pole	Intrinsically Safe

Table 7. Front Connectors for Supported P+F Intrinsically Safe I/O Modules (Zone 2) (Continued)

P+F Model No.	Description	Signal Type
LB 9117 A	Front screw connector, blue, 6-pole	Intrinsically Safe
8 Pole Front Connectors		
LB 9013 A	Screw terminals connector green, 8-pole	Non-Intrinsically Safe
LB 9014 A	Screw terminals connector green, 2 x 8-pole, with label 1-8 and 9-16	Non-Intrinsically Safe
LB 9015 A	Wire clamp connector green, 8-pole	Non-Intrinsically Safe
LB 9016 A	Wire clamp connector green, 2 x 8-pole, with label 1-8 and 9-16	Non-Intrinsically Safe
LB 9018 A	Front screw connector 1-8, green	Non-Intrinsically Safe
LB 9019 A	Front screw connector 1-8 and 9-16, green	Non-Intrinsically Safe
LB 9113 A	Screw terminals connector blue, 8-pole	Intrinsically Safe
LB 9124 A	Screw terminals connector blue, 2 x 8-pole, with label 1-8 and 9-16	Intrinsically Safe
LB 9115 A	Wire clamp connector blue, 8-pole	Intrinsically Safe
LB 9116 A	Wire clamp connector blue, 2 x 8-pole, with label 1-8 and 9-16	Intrinsically Safe
LB 9118 A	Front screw connector 1-8, blue	Intrinsically Safe
LB 9119 A	Front screw connector, 2 x 8-pole. 1-8 and 9-16, blue	Intrinsically Safe
LB 9120 A	Cover for connector blue, 8-pole	Intrinsically Safe
LB 9020 A	Coding strip for coding the male connector (100 pcs.)	n/a

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 - as shown in Figure 7. 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, as shown in Figure 7. 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 8. 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	-	-	2[a]	-	Frequency + direction of rotation (15 KHz)	206	1
FB 1204 F	-	-	2[a]	-	Pulse count + direction of rotation (15 KHz)	206	1
FB 1203 FL	-	-	2[a]	-	Frequency low + direction of rotation (300 Hz)	206	1
FB 1204 FL	-	-	2[a]	-	Pulse count low + direction of rotation (300 Hz)	206	1
FB 1208 B	-	-	8	-	Digital Input	207	2
FB 1301 B FB 1301 B200[b]	-	-	2	-	Increased safety (NON IS) Digital Input	207	1
FB 1303 F FB 1303 F2[b]	-	-	2[a]	-	Frequency + direction of rotation (15 KHz)	206	1
FB 1303 FL FB 1303 FL2[b]	-	-	2[a]	-	Frequency low + direction of rotation (300 Hz)	206	1
FB 1304 F FB 1304 F2[b]	-	-	2[a]	-	Pulse count + direction of rotation (15 KHz)	206	1

Table 8. 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 FL FB 1304 FL2[b]	-	-	2[a]	-	Pulse count low + direction of rotation (300 Hz)	206	1
FB 1308 B FB 1308 B200[b]	-	-	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 B	1	-	-	-	HART® input with Transmitter power (16.5V)	214	1

Table 8. 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 3204 B	4	-	-	-	Transmitter power	201	2
FB 3205 B	4	-	-	-	HART® and Transmitter power	214	2
FB 3302 B FB 3302 B200[b]	1	-	-	-	HART® input with Transmitter power (16.5V)	214	1
FB 3305 B FB 3305 B200[b]	4	-	-	-	HART® and Transmitter power	214	2
FB 4202 B	-	1	-	-	HART® output	215	1
FB 4202 C	-	1	-	-	HART® output with shutdown input	215	1
FB 4302 C FB 4302 C200[b]	-	1	-	-	HART® output with shutdown input	215	1
FB 4204 B	-	4	-	-	Analog Output	237	2
FB 4205 C	-	4	-	-	HART® output with shutdown input	215	2
FB 4205 D	-	4	-	-	HART® output with LFD	215	2
FB 4305 B FB 4305 B200[b]	-	4	-	-	HART® output with Ex-e	215	2
FB 5201 F3	1	-	-	-	3 wire RTD input	203	1
FB 5201 F4	1	-	-	-	4 wire RTD input	203	1
FB 5202 F	1	-	-	-	T/C with internal/external CJC RTD input	202	1
FB 5204 F3	4	-	-	-	3 wire RTD input	203	2
FB 5204 F4	4	-	-	-	4 wire RTD input	203	2
FB 5205 F	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

Table 8. 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 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
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 B FB 6306 B200[b]	-	-	-	8	Digital Relay Output (24 V)	242	2
FB 6308 B FB 6308 B200[b]	-	-	-	8	20V/8mA Digital Output per channel, with shutdown input	242	2
FB 9293 F	-	-	-	-	HDLC Bus Termination Module	-	1

(a) Although these modules have two channels, the second channel is for direction detection only.
(b) This FB-style I/O module has front-mounted Ex-e connector with cable tails. A newer I/O module, listed above this I/O module in the same table cell, is available for this I/O module with a plug-in front EX-e connector instead of cable tails.

Table 9 lists the front connectors used with the Pepperl+Fuchs intrinsically safe I/O modules listed in Table 8. These front connector types are the same as shown in Figure 7 on page 18.

Table 9. Front Connectors for Supported P+F Intrinsically Safe I/O Modules (Zone 1)

P+F Model No.	Description	Signal Type
6 Pole Front Connectors		
LB 9107 A	Screw terminals connector blue, 6-pole	Intrinsically Safe
LB 9107 P	Wire clamp connector blue, 6-pole	Intrinsically Safe
LB 9108 A	Cover for connector blue, 6-pole, (watch enclosure depth)	Intrinsically Safe
LB 9111 A	Cold junction module with hood, blue, 6-pole (watch enclosure depth)	Intrinsically Safe
LB 9112 A	Cold junction module without hood, blue, 6-pole	Intrinsically Safe
LB 9117 A	Front screw connector, blue, 6-pole	Intrinsically Safe
8 Pole Front Connectors		
LB 9113 A	Screw terminals connector blue, 8-pole	Intrinsically Safe
LB 9124 A	Screw terminals connector blue, 2 x 8-pole, with label 1-8 and 9-16	Intrinsically Safe
LB 9115 A	Wire clamp connector blue, 8-pole	Intrinsically Safe
LB 9116 A	Wire clamp connector blue, 2 x 8-pole, with label 1-8 and 9-16	Intrinsically Safe
LB 9118 A	Front screw connector 1-8, blue	Intrinsically Safe
LB 9119 A	Front screw connector, 2 x 8-pole. 1-8 and 9-16, blue	Intrinsically Safe
LB 9120 A	Cover for connector blue, 8-pole, (watch enclosure depth)	Intrinsically Safe
LB 9020 A	Coding strip for coding the male connector (100 pcs.)	n/a

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 *DIN Rail Mounted Subsystem Overview*, PSS 21H-2W1 B3.

Full details and specifications for the supported P+F I/O modules are found in “INVENSYS/P+F INTRINSICALLY SAFE MODULES SPECIFICATIONS” on page 28.

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 Letterbug Rotary Switch Module are provided below.

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

The ISCM for Zone 2 (LB-style) applications (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 8. Intrinsically Safe Communication Module for Zone 2 (LB-Style) Applications (P0924GT)

Technical data and explosion protection specifications are provided below. For mass and dimensions, refer to “PHYSICAL SPECIFICATIONS” on page 92.

Technical Data

FIELDBUS CONNECTION
HDLC to I/A Series 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 4.

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 Letterbug Rotary Switch Module (P0924GV) plugged into left connector

Explosion Protection

CATEGORY
II 3 G Ex nA II T4

APPROVAL
PF 08 CERT 1234

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

The ISCM for Zone 1 (FB-style) applications (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 9. Intrinsically Safe Communication Module for Zone 1 (FB-Style) Applications (P0924GU)

Technical data and explosion protection specifications are provided below. For mass and dimensions, refer to “PHYSICAL SPECIFICATIONS” on page 92.

Technical Data

FIELDBUS CONNECTION
HDLC to I/A Series 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 4.

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 Letterbug Rotary Switch Module (P0924GV) plugged into left connector

Explosion Protection

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

APPROVAL
PTB 97 ATEX 1074 U

Letterbug Rotary Switch Module (P0924GV)

The Letterbug 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 letterbug must be selected by setting the rotary switch on the letterbug module. This character must match the fourth character of the FCM, if attached to an FCM.

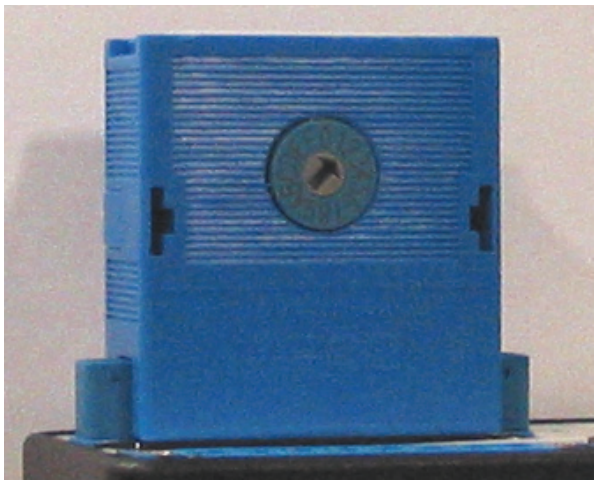


Figure 10. Letterbug Rotary Switch Module (P0924GV)

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.

INVENSYS/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 11. 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 µs

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
PTB 03 ATEX 2042

IIC SAFETY VALUES (LINEAR)
$U_o \leq 12.6$ V $I_o \leq 12.8$ mA $P_o \leq 40.1$ mW
$C_o \leq 720$ nF $L_o \leq 2$ mH

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 12. 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
PTB 03 ATEX 2042

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 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 13. 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
PTB 03 ATEX 2042

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 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 14. 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
PTB 03 ATEX 2042

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 15. 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
PTB 03 ATEX 2042

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 16. 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
1 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
PTB 03 ATEX 2042

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 A (Digital Output Modules with Position Feedback)

The Digital Output Modules with Position Feedback (LB 2101 A - LB 2113 A - see Table 10 and Table 11) 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 17. LB 2101 A - LB 2113 A (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
1 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
PTB 03 ATEX 2042

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 10 and Table 11 below.

Table 10. LB 2101 A - LB 2113 A Model Variations

P/N	U_{out}	R_a/Ω	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 11. LB 2101 E - LB 2112 E Model Variations with Bus Independent SIL 2 Shutdown

P/N	U_{out}	R_a/Ω	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 3102 A (HART Analog Input Module with Transmitter Power Supply)

The LB 3102 A 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 18. LB 3102 A (HART Analog Input Module with Transmitter Power Supply)

Inputs and explosion protection specifications are provided below.

Inputs

FIELD DEVICE POWER SUPPLY
16.5 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 (1/2) G [Ex ia] IIC

APPROVAL
PTB 03 ATEX 2042

IIC SAFETY VALUES (LINEAR)
$U_o \leq 27$ V $I_o \leq 92$ mA $P_o \leq 619$ mW
$C_o \leq 73$ nF $L_o \leq 0.4$ mH

IIC SAFETY VALUES (TRAPEZE R_I = 8.28 K) FOR INPUT 5-6
$U_o \leq 0.7$ V $I_o \leq 3$ mA $P_o \leq 2$ mW
$C_o \leq 53$ µF $L_o \leq 50$ mH $C_i \leq 1.65$ nF

IIC SAFETY VALUES (TRAPEZE R_I = 447 Ω) FOR INPUT 1-6
$U_o \leq 8.2$ V $I_o \leq 56$ mA $P_o \leq 310$ mW
$C_o \leq 1.1$ µF $L_o \leq 1$ mH $C_i \leq 1.65$ nF

LB 3104 A - LB 3105 A (Analog Input Modules with HART Transmitter Power Supply, 4-Channels)

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

Figure 19. LB 3104 A (Analog Input Module with Transmitter Power Supply, 4-Channels) and LB 3105 A (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

Explosion Protection

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

APPROVAL
PTB 03 ATEX 2042

IIC SAFETY VALUES (LINEAR)
$U_o \leq 28$ V $I_o \leq 90$ mA $P_o \leq 626$ mW
$C_o \leq 69$ nF $L_o \leq 0.4$ mH

IIC SAFETY VALUES (TRAPEZE R_I = 7.1 KΩ)

FOR INPUTS 3-4, 7-8, 11-12, 15-16 (NO HART)
$U_o \leq 0.7$ V $I_o \leq 2.3$ mA $P_o \leq 2$ mW
$C_o \leq 53$ µF $L_o \leq 50$ mH $C_i \leq 1.2$ nF

LB 4102 A - LB 4102 C (HART Analog Output Modules)

The LB 4102 A and LB 4102 C 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 20. LB 4102 A (HART Analog Output Module) and LB 4102 C (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
PTB 03 ATEX 2042

IIC SAFETY VALUES (LINEAR)
$U_o \leq 27.3$ V $I_o \leq 87$ mA $P_o \leq 595$ mW
$C_o \leq 72$ nF $L_o \leq 0.4$ mH

LB 4104 A - LB 4105 D (HART Analog Output Modules, 4-Channels)

The LB 4104 A analog output module, and the LB 4105 C and LB 4105 D 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 21. LB 4104 A (Analog Output Module, 4-Channels) and LB 4105 D (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
PTB 03 ATEX 2042

IIC SAFETY VALUES (LINEAR)
$U_O \leq 27.3$ V $I_O \leq 93$ mA $P_O \leq 635$ mW
$C_O \leq 74$ nF $L_O \leq 0.4$ mH

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 22. 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
PTB 03 ATEX 2042

IIC SAFETY VALUES (TRAPEZE R_I = 330Ω)

$U_o \leq 2.7$ V $I_o \leq 43$ mA $P_o \leq 93$ mW
$C_o \leq 3$ µF $L_o \leq 10$ mH $C_i \leq 1.25$ µF

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 23. 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
PTB 03 ATEX 2042

IIC SAFETY VALUES (TRAPEZE R_I = 330Ω)

$U_o \leq 2.7$ V $I_o \leq 43$ mA $P_o \leq 93$ mW
$C_o \leq 3$ µF $L_o \leq 10$ mH $C_i \leq 1.25$ µF

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 24. 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
PTB 03 ATEX 2042

IIC SAFETY VALUES (TRAPEZE R_I = 330Ω)
$U_O \leq 1.8$ V $I_O \leq 43$ MA $P_O \leq 67$ MW
$C_O \leq 8.7$ µF $L_O \leq 10$ MH $C_I \leq 100$ NF

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 25. 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
PTB 03 ATEX 2042

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

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 26. 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
PTB 03 ATEX 2042

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

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 27. 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
PTB 03 ATEX 2042

IIC SAFETY VALUES (TRAPEZE R_I = 500Ω)

$U_O \leq 1$ V $I_O \leq 71$ mA $P_O \leq 62$ mW
$C_O \leq 33$ µF $L_O \leq 5$ mH $C_i \leq 100$ nF

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 28. 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
PTB 03 ATEX 2042

IIC SAFETY VALUES (LINEAR)
$U_o \leq 0.9$ V $I_o \leq 0.2$ mA $P_o \leq 0.2$ mW
$C_o \leq 53$ µF $L_o \leq 100$ mH $C_i \leq 52$ nF

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 29. 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
PF 08 CERT 1234

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 30. 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
PF 08 CERT 1234

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 31. 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
PF 08 CERT 1234

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 32. 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 (model LB 6108 A)
21.6 V/5.2 mA (model LB 6108 C)

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
PTB 03 ATEX 2042

IIC SAFETY VALUES (RECTANGULAR) MODEL A6108
$U_o \leq 28$ V $I_o \leq 13.5$ mA $P_o \leq 376$ mW
$C_o \leq 76$ nF $L_o \leq 0.5$ mH

IIC SAFETY VALUES (RECTANGULAR) MODEL C6108
$U_o \leq 30$ V $I_o \leq 13.5$ mA $P_o \leq 404$ mW
$C_o \leq 62$ nF $L_o \leq 0.5$ mH

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 33. 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 12 and Table 13 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
PTB 03 ATEX 2042

SAFETY VALUES
See Table 12 and Table 13 below.

Table 12. LB 6110 A - LB 6115 A 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
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 13. LB 6110 E - LB 6115 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
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 34. 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
PTB 97 ATEX 1074 U

IIC SAFETY VALUES (LINEAR)
$U_o \leq 12.6$ V $I_o \leq 12.8$ mA $P_o \leq 40.1$ mW
$C_o \leq 720$ nF $L_o \leq 2$ mH

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 35. 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
PTB 97 ATEX 1074 U

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

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 36. 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
PTB 97 ATEX 1074 U

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

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 37. 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
PTB 97 ATEX 1074 U

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

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 38. 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
PTB 97 ATEX 1074 U

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

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 39. 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
PTB 97 ATEX 1074 U

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

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

The FB 1301 B and FB 1301 B200 digital input modules are designed for Zone 1 environments and have inputs for contacts, NAMUR-proximity switches and optocouplers. They provide galvanic isolation between their inputs as well as their input and the fieldbus, and have Ex-e connections.

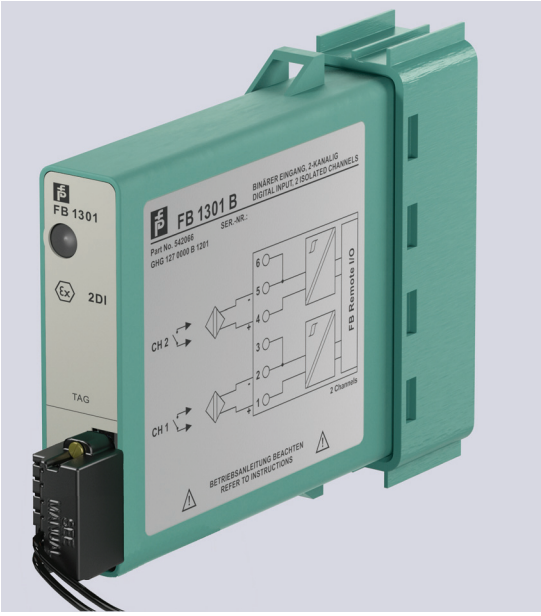


Figure 40. FB 1301 B (Digital Input Module, 2-Channels Ex-e)

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

FB 1301 B
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.

FB 1301 B200
2 m cable tails to Ex-e terminals

POWER CONSUMPTION
0.5 W

Explosion Protection

CATEGORY
II 2 G Ex d IIC

APPROVAL
PTB 97 ATEX 1074 U

FB 1303 F and FB 1303 F2 (Frequency Ex-e Input Module)

The FB 1303 F and FB 1303 F2 modules support frequency and direction of rotation inputs (1 channel, Ex-e). They are designed for Zone 1 environments and have inputs for contacts, NAMUR proximity switches and optocouplers. Access to Ex-e connections is possible when volt-free.

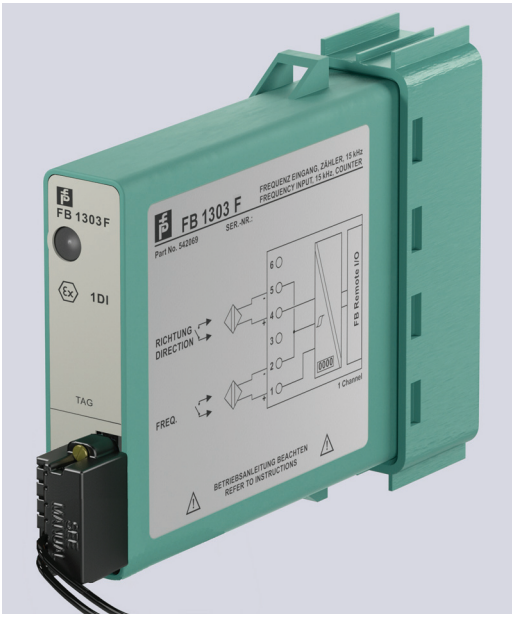


Figure 41. FB 1303 F (Frequency Ex-e Input Module)

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

FB 1303 F
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.

FB 1303 F2
2 m cable tails to Ex-e terminals

POWER CONSUMPTION
0.6 W

Explosion Protection

CATEGORY
II 2 G Ex d IIC

APPROVAL
PTB 97 ATEX 1074 U

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

The FB 1303 FL and FB 1303 FL2 modules support low frequency and direction of rotation inputs (1 channel, Ex-e). They are designed for Zone 1 environments and have inputs for contacts, NAMUR proximity switches and optocouplers. Access to Ex-e connections is possible when volt-free.

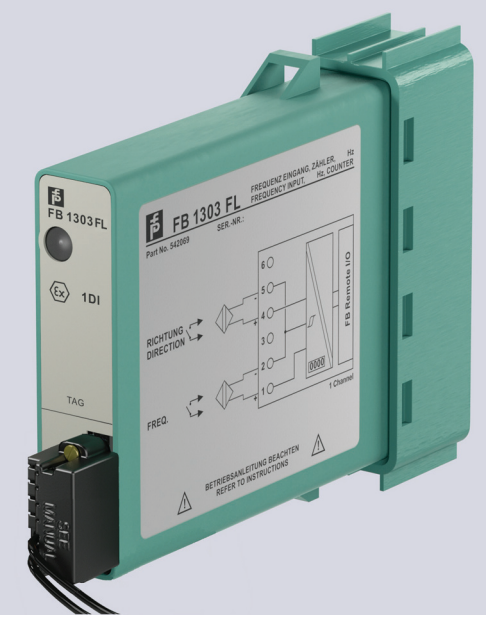


Figure 42. FB 1303 FL (Low Frequency Ex-e Input Module)

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

FB 1303 FL
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.

FB 1303 FL2
2 m cable tails to Ex-e terminals

POWER CONSUMPTION
0.6 W

Explosion Protection

CATEGORY
II 2 G Ex d IIC

APPROVAL
PTB 97 ATEX 1074 U

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

The FB 1304 F and FB 1304 F2 modules support counter (pulse count) and up/down counting inputs (1 channel, Ex-e). They are designed for Zone 1 environments and have inputs for contacts, NAMUR proximity switches and optocouplers. Access to Ex-e connections is possible when volt-free.

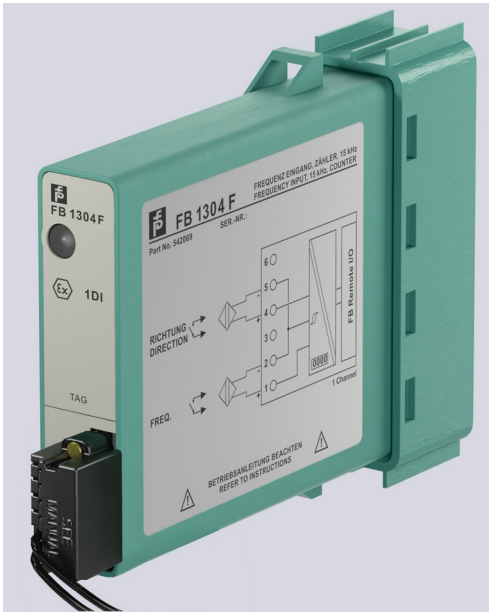


Figure 43. FB 1304 F (Pulse Count Ex-e Input Module)

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

FB 1304 F
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.

FB 1304 F2
2 m cable tails to Ex-e terminals

POWER CONSUMPTION
0.6 W

Explosion Protection

CATEGORY
II 2 G Ex d IIC

APPROVAL
PTB 97 ATEX 1074 U

FB 1304 FL and FB 1304 FL2 (Low Frequency Pulse Count Input Module)

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

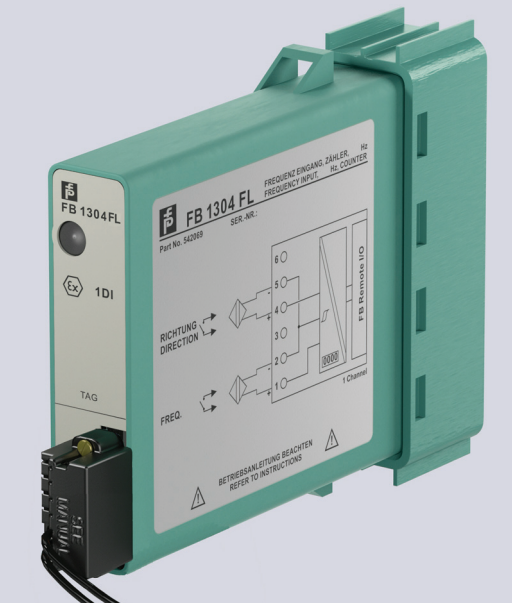


Figure 44. FB 1304 FL (Low Frequency Pulse Count Input Module)

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

SCANNING TIME
Approximately 6.5 ms

CONNECTION

FB 1304 FL
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.

FB 1304 FL2
2 m cable tails to Ex-e terminals

POWER CONSUMPTION
0.6 W

Explosion Protection

CATEGORY
II 2 G Ex d IIC

APPROVAL
PTB 97 ATEX 1074 U

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

The FB 1308 B and FB 1308 B200 digital input modules are designed for Zone 1 environments and have inputs for mechanical contacts and optocouplers. They provide galvanic isolation between their inputs and the fieldbus (group isolation). Access to Ex-e connections is possible when volt-free.

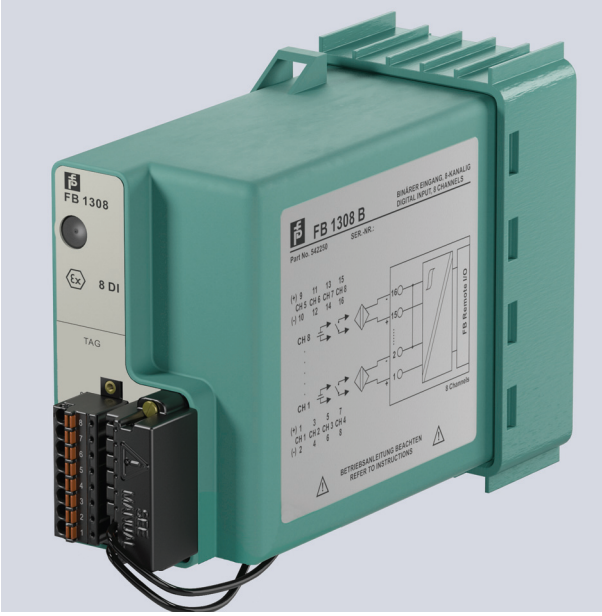


Figure 45. FB 1308 B (Digital Input Module, 8-Channels)

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

CONNECTION

FB 1308 B
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.

FB 1308 B200
2 m cable tails to Ex-e terminals

POWER CONSUMPTION
0.7 W

Explosion Protection

CATEGORY
II 2 G Ex d IIC

APPROVAL
PTB 97 ATEX 1074 U

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 46. 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 14 and Table 15 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
PTB 97 ATEX 1047 U

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 14 and Table 15 below

Table 14. FB 2201 B - FB 2213 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 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 15. FB 2201 E - FB 2213 E Model Variations with Bus Independent SIL 2 Shutdown

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 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 B (HART Analog Input Module with Transmitter Power Supply)

The FB 3202 B 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 47. FB 3202 B (HART Analog Input Module with Transmitter Power Supply)

Inputs and explosion protection specifications are provided below.

Inputs

FIELD DEVICE POWER SUPPLY
16.5 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
PTB 97 ATEX 1074 U

IIC SAFETY VALUES (LINEAR)
$U_o \leq 27$ V $I_o \leq 92$ mA $P_o \leq 619$ mW
$C_o \leq 73$ nF $L_o \leq 0.4$ mH

IIC SAFETY VALUES (TRAPEZE R_I = 8.28 K) FOR INPUT 5-6
$U_o \leq 0.7$ V $I_o \leq 3$ mA $P_o \leq 2$ mW
$C_o \leq 53$ µF $L_o \leq 50$ mH $C_i \leq 1.65$ nF

IIC SAFETY VALUES (TRAPEZE R_I = 447 Ω) FOR INPUT 1-6
$U_o \leq 8.2$ V $I_o \leq 56$ mA $P_o \leq 310$ mW
$C_o \leq 1.1$ µF $L_o \leq 1$ mH $C_i \leq 1.65$ nF

FB 3204 B - FB 3205 B (Analog Input Modules with HART Transmitter Power Supply, 4-Channels)

The FB 3204 B and FB 3205 B analog input modules are designed for Zone 1 environments and have an input isolator for powered devices and a power supply for HART 2 wire converters. They provide galvanic isolation between their inputs and the fieldbus (group isolation).

Figure 48. FB 3204 B (Analog Input Module with Transmitter Power Supply, 4-Channels) and FB 3205 B (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

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
PTB 97 ATEX 1074 U

IIC SAFETY VALUES (LINEAR)
$U_o \leq 28$ V $I_o \leq 90$ mA $P_o \leq 626$ mW
$C_o \leq 69$ nF $L_o \leq 0.4$ mH

IIC SAFETY VALUES (TRAPEZE $R_I = 7.1$ KΩ)

FOR INPUTS 3-4, 7-8, 11-12, 15-16 (NO HART)
$U_o \leq 0.7$ V $I_o \leq 2.3$ mA $P_o \leq 2$ mW
$C_o \leq 53$ µF $L_o \leq 50$ mH $C_i \leq 1.2$ nF

FB 3302 B and FB 3302 B200 (HART Input Isolator Module with HART Transmitter Power Supply, Ex-e)

The FB 3302 B and FB 3302 B200 modules are designed for Zone 1 environments and have an input isolator for HART 2-wire transmitters. They provide galvanic isolation between their inputs and the fieldbus. Access to Ex-e connections is possible when volt-free.

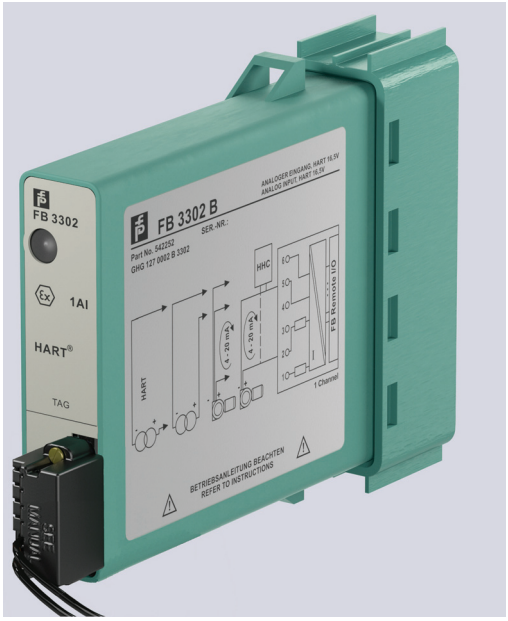


Figure 49. FB 3302 B (HART Input Isolator Module with HART Transmitter Power Supply, Ex-e)

Inputs and explosion protection specifications are provided below.

Inputs

FIELD DEVICE POWER SUPPLY
16.5 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

SCANNING TIME
Approximately 6.5 ms

CONVERSION TIME
Approximately 50 ms

PROCESSING TIME
Approximately 50 ms

CONNECTION

FB 3302 B
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.

FB 3302 B200
2 m cable tails to Ex-e terminals

POWER CONSUMPTION
1.2 W

Explosion Protection

CATEGORY
II 2 G Ex d IIC

APPROVAL
PTB 97 ATEX 1074 U

FB 3305 B and FB 3305 B200 (Analog Input Module with HART Transmitter Power Supply, 4-Channels)

The FB 3305 B and FB 3305 B200 analog input modules are designed for Zone 1 environments and have an input isolator for separately powered devices and a power supply for HART 2 wire converters. They provide galvanic isolation between their inputs and the fieldbus (group isolation). They can be unplugged when their Ex-e circuits are volt-free.

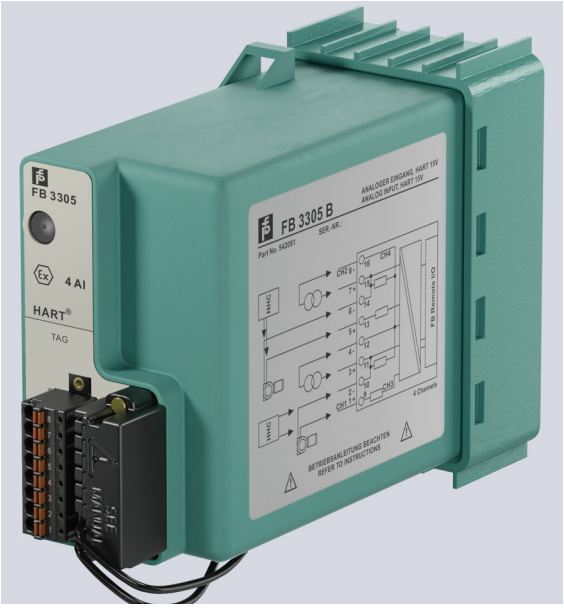


Figure 50. FB 3305 B (Analog Input Module with HART Transmitter Power Supply, 4-Channels)

For these modules, 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

FB 3305 B
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.

FB 3305 B200
2 m cable tails to Ex-e terminals

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

POWER CONSUMPTION
3 W

Explosion Protection

CATEGORY
II 2 G Ex d IIC

APPROVAL
PTB 97 ATEX 1074 U

FB 4202 B - FB 4202 C (HART Analog Output Modules)

The FB 4202 B and FB 4202 C 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 B (HART Analog Output Module) and FB 4202 C (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

CONVERSION TIME
≤ 50 msec.

WATCHDOG CIRCUIT
Output OFF 0.5 sec. after serious faults

POWER CONSUMPTION
0.8 W

Explosion Protection

CATEGORY
Ex d [ia/ib] IIC

APPROVAL
PTB 97 ATEX 1074 U

IIC SAFETY VALUES (LINEAR)
$U_o \leq 27.3$ V $I_o \leq 87$ mA $P_o \leq 595$ mW
$C_o \leq 72$ nF $L_o \leq 0.4$ mH

FB 4204 B - FB 4205 D (HART Analog Output Modules, 4-Channels)

The FB 4204 B analog output module and the FB 4205 C and FB 4205 D HART analog output modules 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 52. FB 4204 B (Analog Output Modules, 4-Channels), FB 4205 C (HART Analog Output Modules, 4-Channels with Bus Independent Shutdown) and FB 4205 D (HART Analog Output Modules, 4-Channels with LFD)

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
PTB 97 ATEX 1074 U

IIC SAFETY VALUES (LINEAR)
$U_o \leq 27.3$ V $I_o \leq 93$ mA $P_o \leq 635$ mW
$C_o \leq 74$ nF $L_o \leq 0.4$ mH

FB 4302 C and FB 4302 C200 (HART Analog Output Modules)

The FB 4302 C and FB 4302 C200 HART analog output modules are designed for Zone 1 environments and have an output isolator for HART 4-20 mA signals, indicators, positioners, and I/P converters. They provide galvanic isolation, Ex-e terminals accessible when volt-free and an optional bus independent shutdown feature.

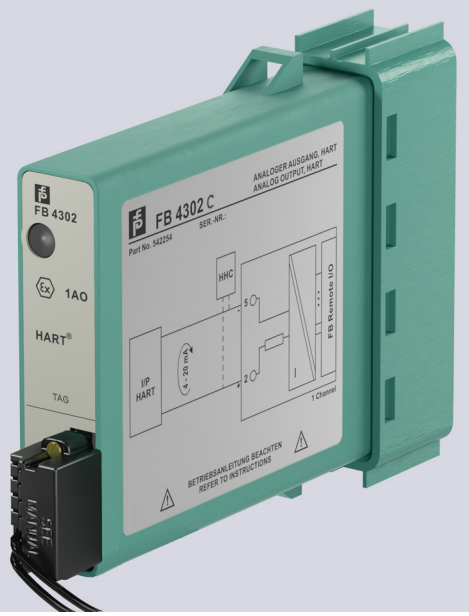


Figure 53. FB 4302 C (HART Analog Output Modules)

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

FB 4302 C
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.

FB 4302 C200
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 B and FB 4305 B200 (HART Analog Output Module, 4-Channels)

The FB 4305 B and FB 4305 B200 HART analog output modules are designed for Zone 1 environments and has an output isolator for proportional valves, displays or IP converters. They provide galvanic isolation between their inputs and the fieldbus. They can be unplugged when their Ex-e circuits are volt-free.

Figure 54. FB 4305 B (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

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

CONNECTION

FB 4305 B
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.

FB 4305 B200
2 m cable tails to Ex-e terminals

POWER CONSUMPTION
3 W

Explosion Protection

CATEGORY
II 2 G Ex d IIC

APPROVAL
PTB 97 ATEX 1074 U

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 55. 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
PTB 97 ATEX 1074 U

IIC SAFETY VALUES (TRAPEZE R_I = 330Ω)

$U_O \leq 2.7$ V $I_O \leq 43$ mA $P_O \leq 93$ mW
$C_O \leq 3$ µF $L_O \leq 10$ mH $C_i \leq 1.25$ µF

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 56. 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
PTB 97 ATEX 1074 U

IIC SAFETY VALUES (TRAPEZE R_I = 330Ω)

$U_o \leq 2.7$ V $I_o \leq 43$ mA $P_o \leq 93$ mW
$C_o \leq 3$ µF $L_o \leq 10$ mH $C_i \leq 1.25$ µF

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 57. 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
PTB 97 ATEX 1074 U

IIC SAFETY VALUES (TRAPEZE R_I = 330Ω)
$U_O \leq 1.8$ V $I_O \leq 43$ mA $P_O \leq 67$ mW
$C_O \leq 8.7$ µF $L_O \leq 10$ mH $C_i \leq 100$ nF

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 58. 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
PTB 97 ATEX 1074 U

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 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 59. 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
PTB 97 ATEX 1074 U

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 60. 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
PTB 97 ATEX 1074 U

IIC SAFETY VALUES (TRAPEZE R_I = 500Ω)

$U_o \leq 1$ V $I_o \leq 71$ mA $P_o \leq 62$ mW
$C_o \leq 33$ µF $L_o \leq 5$ mH $C_i \leq 100$ nF

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 61. 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
PTB 97 ATEX 1074 U

IIC SAFETY VALUES (LINEAR)
$U_o \leq 0.9$ V $I_o \leq 0.2$ mA $P_o \leq 0.2$ mW
$C_o \leq 53$ µF $L_o \leq 100$ mH $C_i \leq 52$ nF

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 62. 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
PTB 97 ATEX 1074 U

IIC SAFETY VALUES (RECTANGULAR) MODEL A6108
$U_o \leq 28$ V $I_o \leq 13.5$ mA $P_o \leq 376$ mW
$C_o \leq 76$ nF $L_o \leq 0.5$ mH

IIC SAFETY VALUES (RECTANGULAR) MODEL C6108
$U_o \leq 30$ V $I_o \leq 13.5$ mA $P_o \leq 404$ mW
$C_o \leq 62$ nF $L_o \leq 0.5$ mH

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 63. 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 16 and Table 17 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

Explosion Protection

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

APPROVAL
PTB 97 ATEX 1074U

SAFETY VALUES
See Table 16 and Table 17 below.

Table 16. 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 17. 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 64. 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
PTB 97 ATEX 1074 U

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 65. 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
PTB 97 ATEX 1074 U

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

The FB 6306 B and FB 6306 B200 digital relay output modules are designed for Zone 1 environments and support outputs with relay-contacts for LEDs, annunciators or valves. They provide galvanic isolation between their outputs and the fieldbus. They can be unplugged when Ex-e circuits are volt-free.

Figure 66. FB 6306 B (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

FB 6306 B
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.

FB 6306 B200
2 m cable tails to Ex-e terminals

POWER CONSUMPTION
1.6 W

Explosion Protection

CATEGORY
II 2 G Ex d IIC

APPROVAL
PTB 97 ATEX 1074 U

FB 6308 B and FB 6308 B200 (Digital Output Module, 8-Channels, Low Power)

The FB 6308 B and FB 6308 B200 digital output modules are designed for Zone 1 environments and support active outputs for low power loads, such as inputs of control stations. They provide galvanic isolation between their outputs and the fieldbus (group isolation) and a shutdown input. They can be unplugged when their Ex-e circuits are volt-free.

Figure 67. FB 6308 B (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

CONNECTION

FB 6308 B
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.

FB 6308 B200
2 m cable tails to Ex-e terminals

POWER CONSUMPTION
2.2 W

Explosion Protection

CATEGORY
II 2 G Ex d IIC

APPROVAL
PTB 97 ATEX 1074 U

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 68. 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
PTB 97 ATEX 1074 U

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 FCP270/FCM100E/Et and Intrinsically Safe I/O Subsystem

60 m (197 ft) maximum, standard fieldbus cable

Zone 1 Applications Between 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 4.

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 FBI100 (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

100 Series FBMs are only supported by the FCM100E.

ISCM Letterbug Assignment

ISCM letterbug is set through a letterbug module with rotary switch which is plugged into the ISCM.

Power Requirements

ISCM

2 W

P+F I/O MODULES

Refer to "INVENSYS/P+F INTRINSICALLY SAFE MODULES SPECIFICATIONS" on page 28.

Input Specifications(3)

ZONE 1 POWER SUPPLIES FB 9215 B (230 V AC) AND FB 9216 B (115 V AC)

50 to 60 Hz nominal

ZONE 1 POWER SUPPLY FB 9206 D (24 V DC)

20 to 30 V dc, 24 V dc 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 (P0924GT)

See "Explosion Protection" on page 25.

ISCM for Zone 1 (FB-Style) Applications (P0924GU)

See "Explosion Protection" on page 26.

P+F I/O MODULES

Refer to "INVENSYS/P+F INTRINSICALLY SAFE MODULES SPECIFICATIONS" on page 28.

(3) For full specifications on all P+F power supplies, see P+F data sheets listed in "FOR MORE INFORMATION" on page 93.

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)

(T6) -20 to +40°C (-4 to +104°F)
(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 93) 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 93) for details.

ISCM Part Numbers

FOR ZONE 2 (LB-STYLE) APPLICATIONS
P0924GT (P+F P/N ISCM8100) - see page 25

FOR ZONE 1 (FB-STYLE) APPLICATIONS
P0924GU (P+F P/N ISCM8200) - see page 26

Accessory Part Numbers

LETTERBUG ROTARY SWITCH MODULE (PLUGS INTO P0924GT/P0924GU)
P0924GV (P+F P/N LTBM8001) - see page 27

Mass

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

ISCM (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 (FCP270)
PSS 21H-1B10 B3	Z-Module Control Processor 270 (ZCP270)
PSS 21H-2W1 B3	DIN Rail Mounted Subsystem Overview
PSS 21H-2Y10 B4	FCM100Et Redundant Fieldbus Communications Module
PSS 21H-2Y11 B4	FCM100E Redundant Fieldbus Communications Module
PSS 21H-2Y16 B4	FEM100 Fieldbus Expansion Module
(Not Invensys-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 Invensys-supplied)	LB Remote I/O Bus System Hardware - available at Pepperl+Fuchs website: *www.pepperl-fuchs.com*
(Not Invensys-supplied)	LB 9006 24 V DC Power Supply Data Sheet - available at Pepperl+Fuchs website: *www.pepperl-fuchs.com*
(Not Invensys-supplied)	FB 9206 24 V DC Power Supply Data Sheet - available at Pepperl+Fuchs website: *www.pepperl-fuchs.com*
(Not Invensys-supplied)	FB 9204 - FB 9216 Power Supply Data Sheet - available at Pepperl+Fuchs website: *www.pepperl-fuchs.com*

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