

# 1. Introduction

*This chapter describes the main features, operation, and network configuration for the Intrinsically Safe I/O Subsystem hardware, including the Intrinsically Safe Communications Module (ISCM), Pepperl+Fuchs's I/O modules and associated base/extension units.*

## Overview

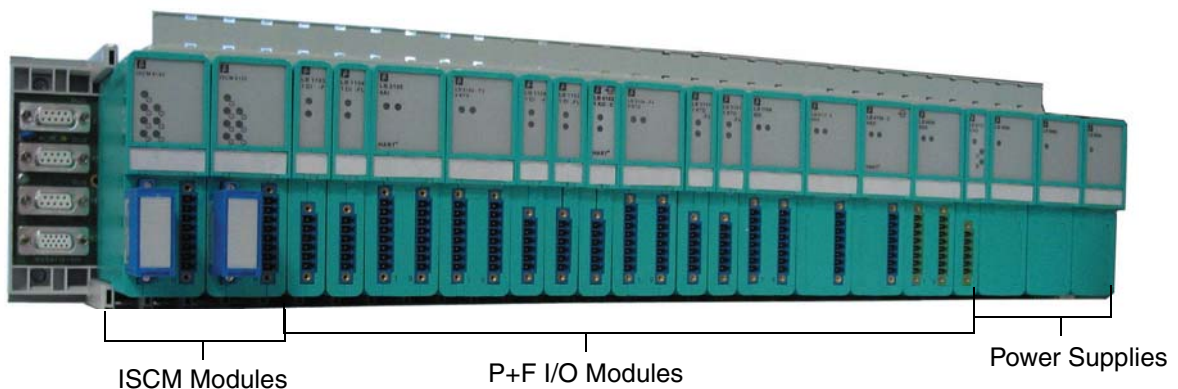
The Intrinsically Safe I/O Subsystem uses the Intrinsically Safe Communications Module (ISCM) to provide integration between the Pepperl+Fuchs (P+F) modular intrinsically safe remote I/O systems and the I/A Series system. The ISCM enables I/A Series control processors to view the intrinsically safe I/O 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 the InFusion Engineering Environment or I/A Series ICC.

— **NOTE** —

The IACC and FoxCAE configurator applications do not support the Intrinsically Safe I/O Subsystem.

Optionally redundant ISCMs can be installed in an ISCM base or extension unit which can be mounted on a DIN rail along with I/O modules as shown in Figure 1-1 and Figure 1-2. Different versions of P+F base/extension units and I/O modules may be installed in potentially explosive atmospheres in Zone 1/Zone 21, or Zone 2/Zone 22 environments. Each I/O module can be plugged into any desired slot on the base/extension unit. ISCMs are required to be plugged into their own dedicated slots.

Two versions of the ISCM are available for installation in Zone 1 or Zone 2 environments (listed in Table 1-2). Depending on the sizing guidelines, a single or redundant pair of ISCMs for Zone 2 applications support up to 46 intrinsically safe LB-style I/O modules, while a single or redundant pair of ISCMs for Zone 1 applications supports up to 48 intrinsically safe FB-style I/O modules.



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



Figure 1-2. Base and Extension Units for FB-Style (Zone 1) Applications

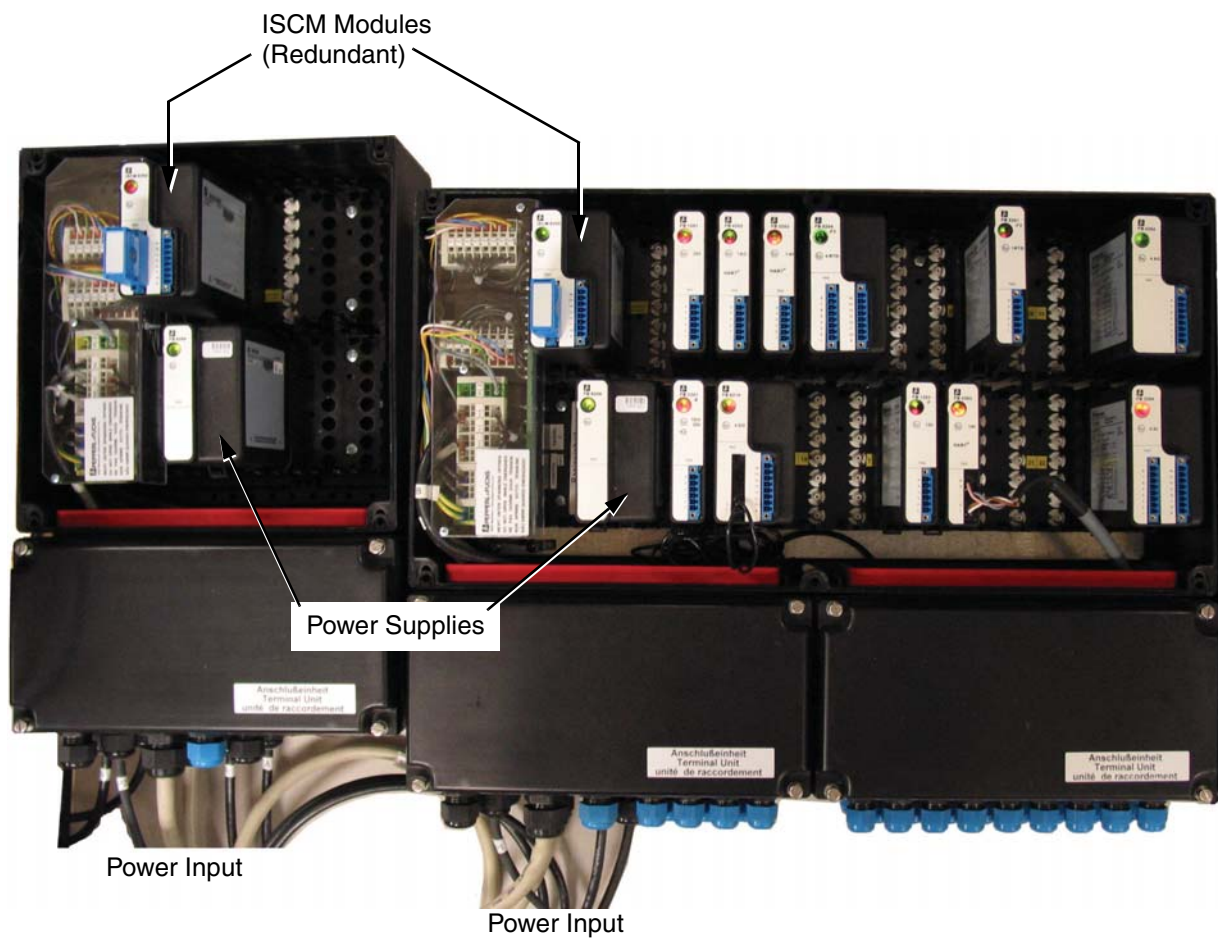


Figure 1-3. Redundant ISCMs in FB-Style Base and Redundancy Units (Zone 1 Applications)

The following I/A Series control processors support the ISCM:

- ◆ Field Control Processor 270 (FCP270) - with I/A Series version 8.4.3 with Quick Fix QF1012617 installed (and later)
- ◆ Z-Module Control Processor 270 (ZCP270) - with I/A Series version 8.4.3 with Quick Fix QF1012617 installed (and later)

Both LB- and FB-style applications support a total of 16 ISCMs per I/A Series control processor (FCP270, ZCP270 or later); a maximum of 204 modules (ISCMs, I/O modules and 200 Series FBMs) is supported per FCP270 and a maximum of 128 modules is supported per ZCP270, provided the maximum CP Fieldbus load and intrinsically safe I/O power supply load is not exceeded. Refer to Table 1-1 for a complete list of requirements.

To communicate with a ZCP270, the ISCM(s) must link to an optionally redundant FCM100E/Et module (shown in Figure 1-5 and Figure 1-6). Using a ZCP270 and multiple FCM100E/Ets may reduce the fieldbus loading but will not increase the maximum number of supported letterbugs over 128.

Connection diagrams are shown in Appendix A “CP270 to ISCM Connection Diagrams”.

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— **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.

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— **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. (100 Series FBMs are only supported by the FCM100E.)

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— **NOTE** —

The FCP270, 200 Series modules and their support hardware are suitable for Zone 2 areas only. Installing this equipment in a Zone 1 area requires the employment of additional protection methods and is the customer’s responsibility to implement.

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## IS/IO System Configuration Requirements

### — CAUTION —

The FCP270 cannot support more than 204 I/O modules, ISCMs and FBMs. Significant operational issues and communication failures may occur if more than 204 modules are configured for this subsystem. Note that redundant ISCMs and redundant FBMs count as three modules; all others count as one.

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

**Table 1-1. 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 <sup>1</sup>	Zone 2 <sup>1</sup>	Zone 2 <sup>1</sup>	Zone 1 or Zone 2 <sup>1</sup>
I/A Series software versions	8.4.3 with QF1012617 (and later) <sup>2</sup>	8.4.3 with QF1012617 (and later) <sup>2</sup>	8.4.3 with QF1012617 (and later) <sup>2</sup>	8.4.3 with QF1012617 (and later) <sup>2</sup>
Maximum number of I/O modules, ISCMs and FBMs	204 (Redundant ISCM pairs count as three modules)	128 (Redundant ISCM pairs count as three 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
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 input
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

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

Requirement	Each FCP270	Each ZCP270	Each Zone 2 (LB-Style) System	Each Zone 1 (FB-Style) System
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

1. 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.
2. Windows XP and Windows Server 2003 workstation operating systems only.

## Supported ISCMs, P+F Baseplates, P+F I/O Modules and Equipment

Table 1-2 lists the available ISCM modules and available support equipment.

**Table 1-2. 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)

Table 1-3 lists the supported P+F I/O base, redundancy and extension units and their associated enclosures and power supplies.

**Table 1-3. P+F I/O Base/Extension Units, Enclosures and Power Supplies to Support the ISCM**

P+F Model No. <sup>1</sup>	Description
LB 9022 F	Zone 2 Redundancy Base Unit with 22 slots for ISCM for Zone 2 (LB-style) applications (P0924GT)
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 (P0924GT)
LB 9006 C	Zone 2 power supply - 24 V dc input
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

<sup>1</sup>. Visit the IPS Portal ([www.ips.invensys.pepperl-fuchs.com](http://www.ips.invensys.pepperl-fuchs.com)) to order this equipment as it does not have an Invensys part number.

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

The comparable Fieldbus Modules (FBMs) are discussed in the *DIN Rail Mounted FBM Subsystem User's Guide* (B0400FA).

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

Table 1-4 lists the Pepperl+Fuchs intrinsically safe I/O modules supported by the ISCM in Zone 2 or Class I, Div. 2 environments.

**Table 1-4. Supported P+F Intrinsically Safe I/O Modules (Zone 2)**

P+F Model No.	I/O Channels				Description	Similar to FBM	BP Slot
	AI	AO	DI	DO			
LB 1101 A	-	-	2	-	Digital Input	207	1
LB 1103 F	-	-	2 <sup>1</sup>	-	Frequency + direction of rotation (15 KHz)	206	1
LB 1104 F	-	-	2 <sup>1</sup>	-	Pulse count + direction of rotation (15 KHz)	206	1
LB 1103 FL	-	-	2 <sup>1</sup>	-	Frequency low + direction of rotation (300 Hz)	206	1
LB 1104 FL	-	-	2 <sup>1</sup>	-	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
LB 2105 E	-	-	2	1	Digital Output with position feedback + shutdown input (22.8 V, 290 Ω)	241	1

**Table 1-4. Supported P+F Intrinsically Safe I/O Modules (Zone 2) (Continued)**

P+F Model No.	I/O Channels				Description	Similar to FBM	BP Slot
	AI	AO	DI	DO			
LB 2112 A	-	-	2	1	Digital Output with position feedback (25.3 V, 329 $\Omega$ )	241	1
LB 2112 E	-	-	2	1	Digital Output with position feedback + shutdown input (25.3 V, 329 $\Omega$ )	241	1
LB 2113 A	-	-	2	1	Digital Output with position feedback (26.7 V, 509 $\Omega$ )	241	1
LB 2113 E	-	-	2	1	Digital Output with position feedback + shutdown input (26.7 V, 509 $\Omega$ )	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
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 $\Omega$ )	242	2
LB 6110 E	-	-	-	4	Solenoid driver uses boost power + shutdown input (24.5 V, 370 $\Omega$ )	242	2
LB 6111 A	-	-	-	4	Solenoid driver uses boost power (24.5 V, 320 $\Omega$ )	242	2
LB 6111 E	-	-	-	4	Solenoid driver uses boost power + shutdown input (24.5 V, 320 $\Omega$ )	242	2

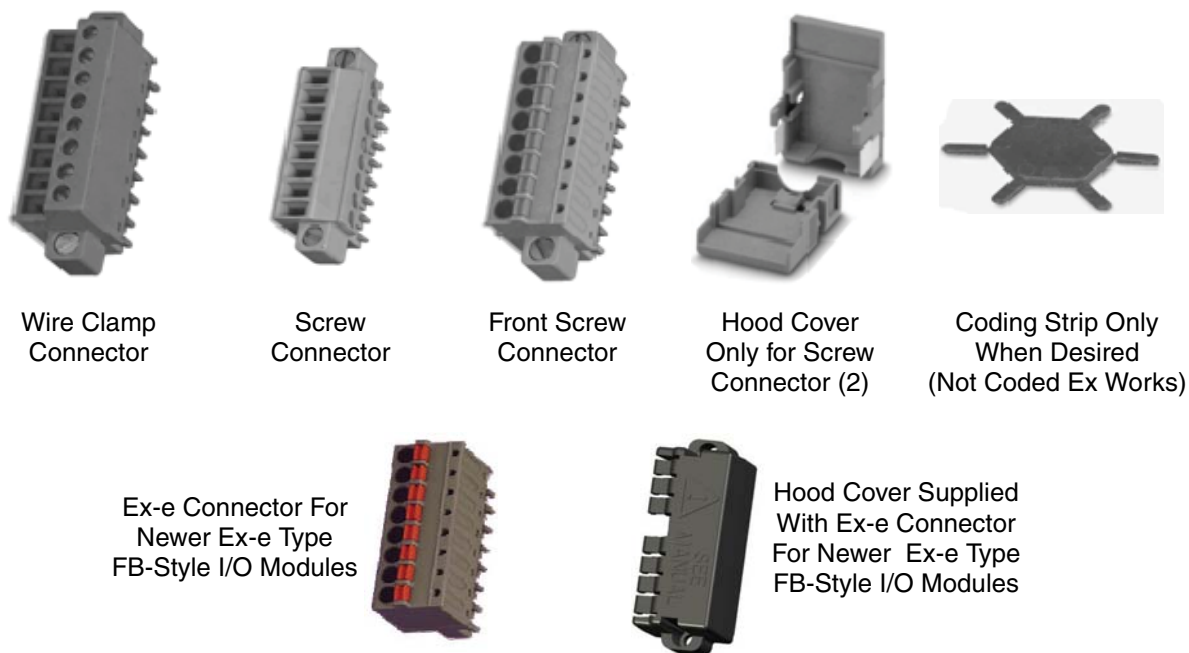


**Table 1-4. Supported P+F Intrinsically Safe I/O Modules (Zone 2) (Continued)**

P+F Model No.	I/O Channels				Description	Similar to FBM	BP Slot
	AI	AO	DI	DO			
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

<sup>1</sup>. Although these modules have two channels, the second channel is for direction detection only.

Table 1-5 lists the front connectors used with the Pepperl+Fuchs intrinsically safe I/O modules listed in Table 1-4. These front connector types are shown in Figure 1-4.



**Figure 1-4. Front Connector Types for Supported P+F Intrinsically Safe I/O Modules (Zones 1 and 2)**

**Table 1-5. Front Connectors for Supported P+F Intrinsically Safe I/O Modules (Zone 2)**

P+F Model No.	Description	Signal Type
<b>6 Pole Front Connectors</b>		
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
LB 9117 A	Front screw connector, blue, 6-pole	Intrinsically Safe
<b>8 Pole Front Connectors</b>		
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

Table 1-6 lists the Pepperl+Fuchs intrinsically safe I/O modules supported by the ISCM in Zone 1 environments.

### — 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 1-4. 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 1-4. 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 1-6. Supported P+F Intrinsically Safe I/O Modules (Zone 1)**

P+F Model No.	I/O Channels				Description	Similar to FBM	BP Slot
	AI	AO	DI	DO			
FB 1201 B	-	-	2	-	Digital Input	207	1
FB 1203 F	-	-	2 <sup>1</sup>	-	Frequency + direction of rotation (15 KHz)	206	1
FB 1204 F	-	-	2 <sup>1</sup>	-	Pulse count + direction of rotation (15 KHz)	206	1
FB 1203 FL	-	-	2 <sup>1</sup>	-	Frequency low + direction of rotation (300 Hz)	206	1
FB 1204 FL	-	-	2 <sup>1</sup>	-	Pulse count low + direction of rotation (300 Hz)	206	1
FB 1208 B	-	-	8	-	Digital Input	207	2
FB 1301 B FB 1301 B200 <sup>2</sup>	-	-	2	-	Increased safety (NON IS) Digital Input	207	1
FB 1303 F FB 1303 F2 <sup>2</sup>	-	-	2 <sup>1</sup>	-	Frequency + direction of rotation (15 KHz)	206	1
FB 1303 FL FB 1303 FL2 <sup>2</sup>	-	-	2 <sup>1</sup>	-	Frequency low + direction of rotation (300 Hz)	206	1
FB 1304 F FB 1304 F2 <sup>2</sup>	-	-	2 <sup>1</sup>	-	Pulse count + direction of rotation (15 KHz)	206	1
FB 1304 FL FB 1304 FL2 <sup>2</sup>	-	-	2 <sup>1</sup>	-	Pulse count low + direction of rotation (300 Hz)	206	1
FB 1308 B FB 1308 B200 <sup>2</sup>	-	-	8	-	Digital Input	207	2
FB 2201 B	-	-	2	1	Digital Output with position feedback (22 V, 315 Ω)	241	1

**Table 1-6. Supported P+F Intrinsically Safe I/O Modules (Zone 1) (Continued)**

P+F Model No.	I/O Channels				Description	Similar to FBM	BP Slot
	AI	AO	DI	DO			
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
FB 3204 B	4	-	-	-	Transmitter power	201	2
FB 3205 B	4	-	-	-	HART® and Transmitter power	214	2
FB 3302 B FB 3302 B200 <sup>2</sup>	1	-	-	-	HART® input with Transmitter power (16.5V)	214	1
FB 3305 B FB 3305 B200 <sup>2</sup>	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 <sup>2</sup>	-	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 <sup>2</sup>	-	4	-	-	HART® output with Ex-e	215	2

**Table 1-6. Supported P+F Intrinsically Safe I/O Modules (Zone 1) (Continued)**

P+F Model No.	I/O Channels				Description	Similar to FBM	BP Slot
	AI	AO	DI	DO			
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 $\Omega$ )	242	2
FB 6210 E	-	-	-	4	Solenoid driver uses boost power+ shutdown input (24.5 V, 370 $\Omega$ )	242	2
FB 6211 B	-	-	-	4	Solenoid driver use boost power (24.5 V, 320 $\Omega$ )	242	2
FB 6211 E	-	-	-	4	Solenoid driver uses boost power+ shutdown input (24.5 V, 320 $\Omega$ )	242	2
FB 6212 B	-	-	-	4	Solenoid driver uses boost power (17.5 V, 185 $\Omega$ )	242	2
FB 6212 E	-	-	-	4	Solenoid driver uses boost power+ shutdown input (17.5 V, 185 $\Omega$ )	242	2
FB 6213 B	-	-	-	4	Solenoid driver uses boost power (23 V, 290 $\Omega$ )	242	2
FB 6213 E	-	-	-	4	Solenoid driver uses boost power+ shutdown input (23 V, 290 $\Omega$ )	242	2
FB 6214 B	-	-	-	4	Solenoid driver uses boost power (23 V, 355 $\Omega$ )	242	2
FB 6214 E	-	-	-	4	Solenoid driver uses boost power+ shutdown input (23 V, 355 $\Omega$ )	242	2
FB 6215 B	-	-	-	4	Solenoid driver uses boost power (16.2 V, 78 $\Omega$ )	242	2
FB 6215 ES	-	-	-	4	Solenoid driver uses boost power+ shutdown input (16.2 V, 78 $\Omega$ )	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 <sup>2</sup>	-	-	-	8	Digital Relay Output (24 V)	242	2

**Table 1-6. Supported P+F Intrinsically Safe I/O Modules (Zone 1) (Continued)**

P+F Model No.	I/O Channels				Description	Similar to FBM	BP Slot
	AI	AO	DI	DO			
FB 6308 B FB 6308 B200 <sup>2</sup>	-	-	-	8	20V/8mA Digital Output per channel, with shutdown input	242	2
FB 9293 F	-	-	-	-	HDLC Bus Termination Module	-	1

1. Although these modules have two channels, the second channel is for direction detection only.
2. 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 1-7 lists the front connectors used with the Pepperl+Fuchs intrinsically safe I/O modules listed in Table 1-6. These front connector types are the same as shown in Figure 1-4 on page 9.

**Table 1-7. Front Connectors for Supported P+F Intrinsically Safe I/O Modules (Zone 1)**

P+F Model No.	Description	Signal Type
<b>6 Pole Front Connectors</b>		
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
<b>8 Pole Front Connectors</b>		
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

## Intrinsically Safe I/O Modules Specifications

Full details and specifications for the supported P+F I/O modules are found in *Intrinsically Safe I/O Subsystem* (PSS 21H-2Y6 B4).

## I/O Communications

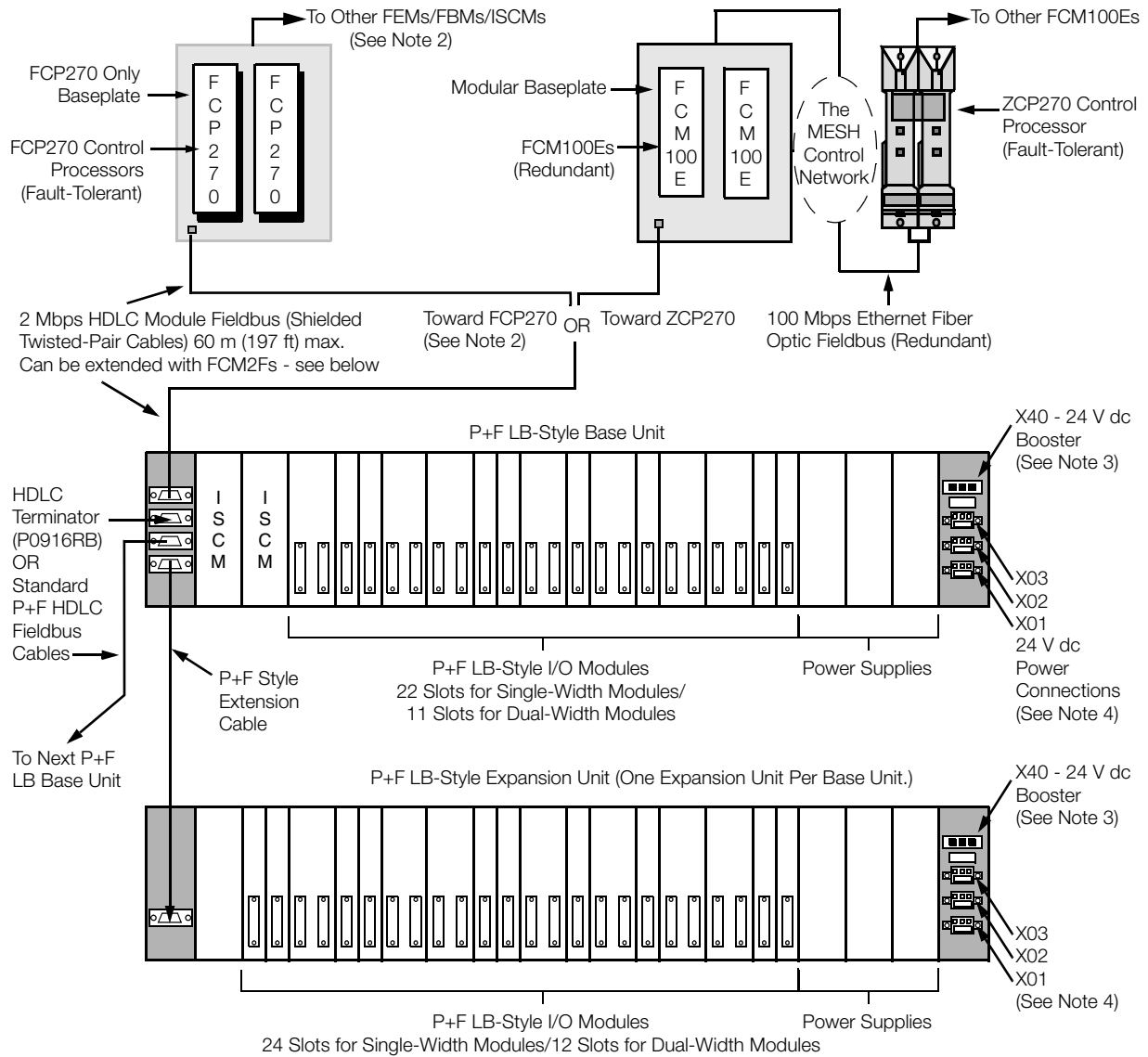
The ISCM communicates with the I/A Series control processor via a 2 Mbps HDLC fieldbus shown in Figure 1-5 and Figure 1-6, via the standard protocols supported by these control processors (HART®, FOUNDATION™ fieldbus, Profibus, Modbus, FoxCom™, FDSI and standard 200 Series FBMs). The 2 Mbps HDLC fieldbus is connected to both paths of the redundant fieldbus network, providing continuous communication in the event one path fails.

The ISCM may connect directly to a FCP270 over the 2 Mbps HDLC fieldbus. 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.

I/O communications support the following multiple data streams:

- ◆ Real-time I/O
- ◆ I/O maintenance activity
- ◆ Pass-through activity for HART device configuration.

Figure 1-5 and Figure 1-6 provide a simplified overview of communications to/from the LB-style and FB-style base/extension units. For more detailed illustrations, refer to Appendix A “CP270 to ISCM Connection Diagrams” on page 131.

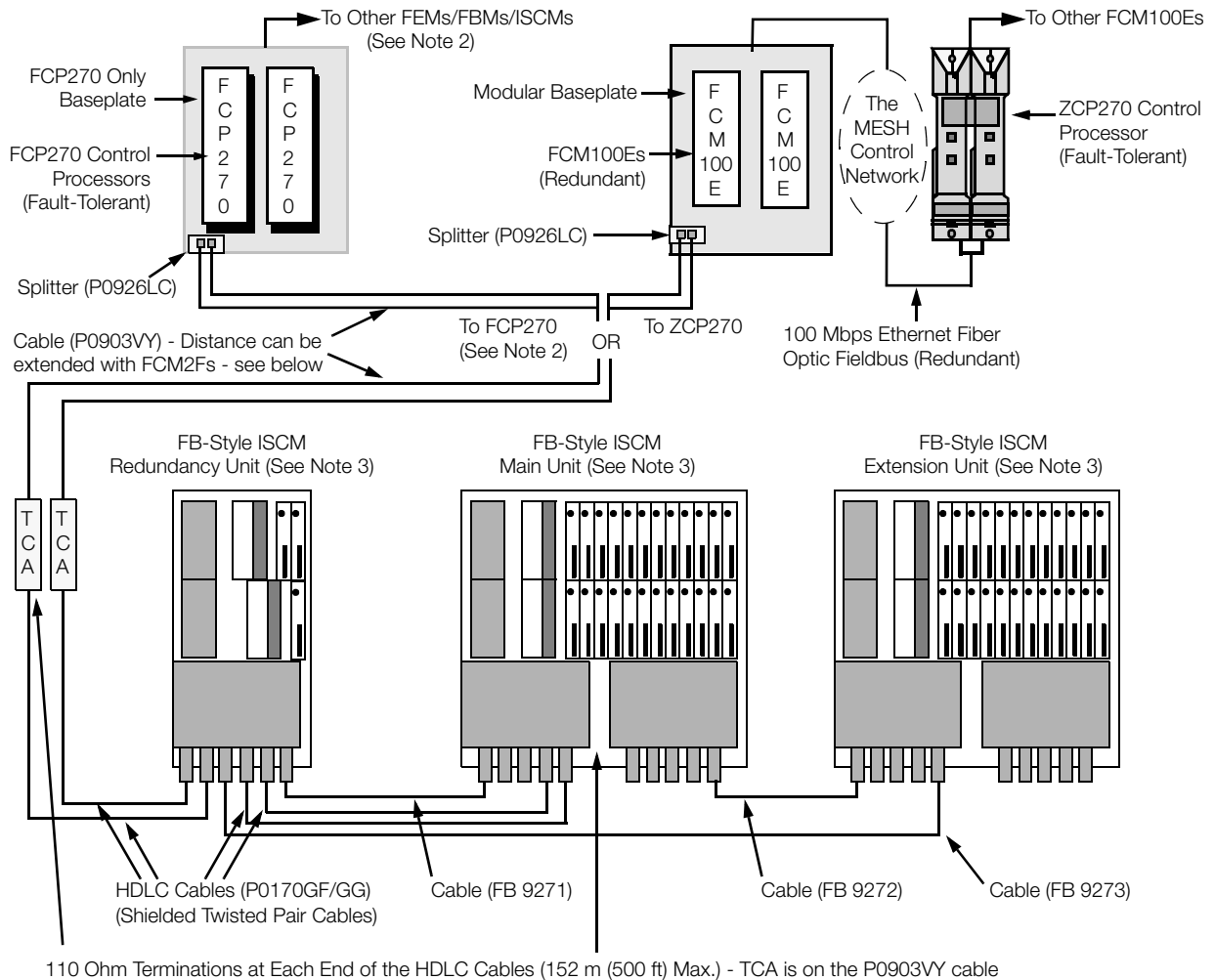


Notes:

1. For sizing constraints, refer to the next section below.
2. If FEM100 is used with an FCP270 connected to a P+F base/extension unit, there are limitations on the Expansion Fieldbus. See Appendix A. 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 1-5. LB-Style ISCM to FCP270/ZCP270 I/O Communications (Simplified)**





Notes:

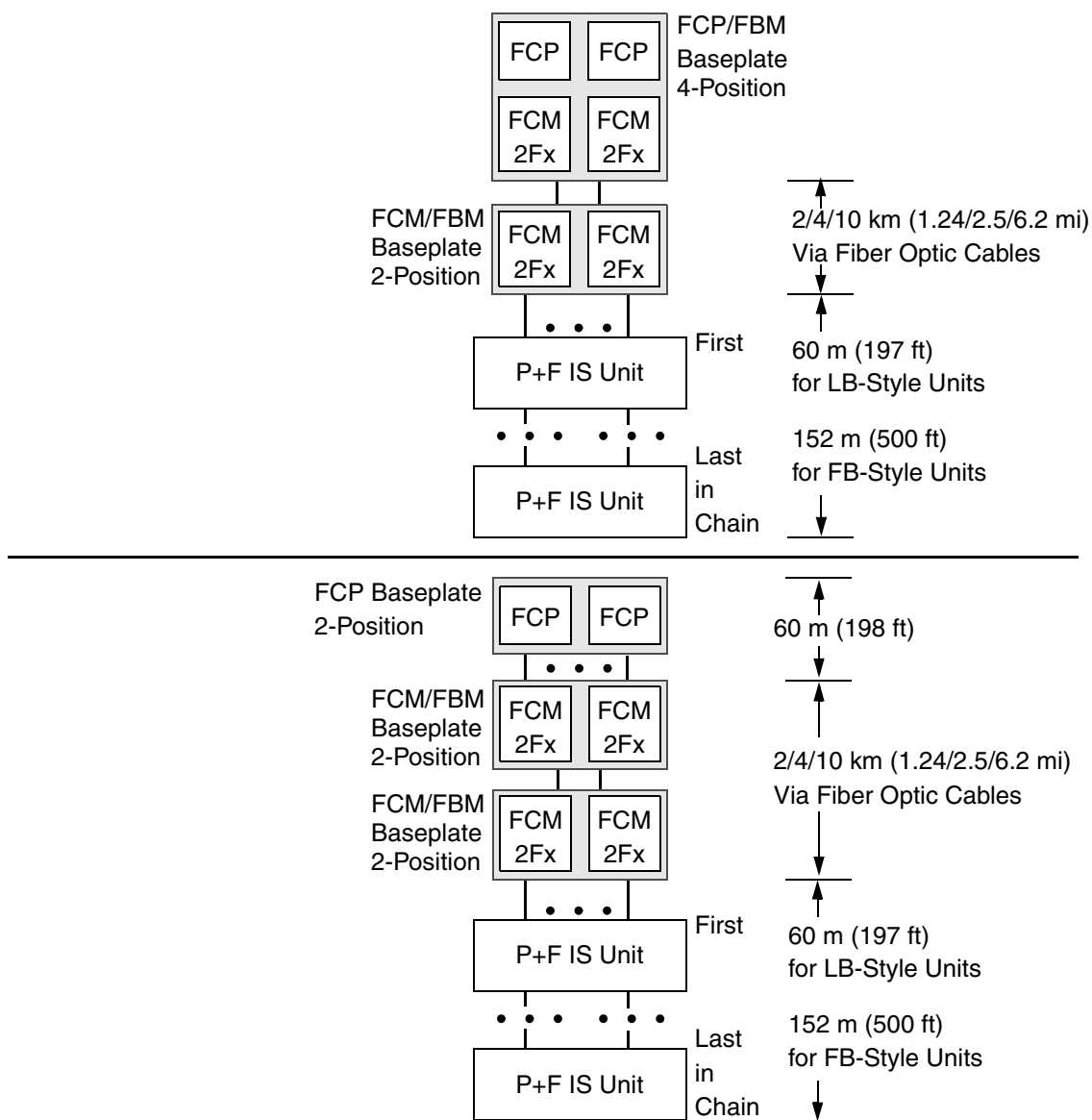
1. For sizing constraints, refer to the next section below.
2. If FEM100 is used with an FCP270 connected to a P+F base/extension unit, there are limitations on the Expansion Fieldbus. See Appendix A. FEM100s cannot be directly connected to a P+F base/extension unit.
3. FB 9249-PG0 enclosure configuration is shown in this figure. Additional enclosure configurations are available. ISCMs are plugged into the Main or Redundancy Unit.

**Figure 1-6. FB-Style ISCM to FCP270/ZCP270 I/O Communications (Simplified)**

The distance between the FCP270 and the LB-style and FB-style units can be extended up to 10 km (6.2 mi) using fiber optic cabling and the FCM2F Fieldbus Communications modules, as shown in Figure 1-7. The three versions of the FCM2Fs – FCM2F2 (P0914YZ), FCM2F4 (P0917JA), and FCM2F10 (P0916TQ) – offer three different maximum fiber optic cabling distances: up to 2 km (1.24 mi), up to 4 km (2.48 mi), and up to 10 km (6.2 mi), respectively. FCM2F2 and FCM2F4 are used with multimode graded-index fiber cable, and FCM2F10 is used with single-mode fiber cable. They are discussed in *Fieldbus Communications Module, FCM2F2/FCM2F4/FCM2F10* (PSS 21H-2Y3 B3) and *DIN Rail Mounted Subsystem User's Guide* (B0400FA).

**— NOTE**

The FCP270, 200 Series modules 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 the customer’s responsibility to implement.



**Figure 1-7. LB-Style and FB-Style ISCM to FCP270 I/O Communications via FCM2Fs (Simplified)**

The FCP270 can connect to both P+F I/O modules and 200 Series FBMs, provided the appropriate sizing constraints are followed. The FCP270 must use the FEM100 to add up to three Expanded Fieldbuses for the 200 Series FBMs, while it connects directly to the ISCM base/extension unit. This is shown in Appendix A “CP270 to ISCM Connection Diagrams”.

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**— NOTE**

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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).

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For more information on the FEM100 and the Expanded Fieldbus, refer to *FEM100 Fieldbus Expansion Module* (PSS 21H-2Y16 B4) and “FEM100 Fieldbus Expansion Module” in *DIN Rail Mounted Subsystem User’s Guide* (B0400FA).

As well, the ZCP270 can connect to both P+F I/O modules and 200 Series FBMs using a dedicated FCM100E/Et pair, provided the appropriate sizing constraints are followed.

A maximum of 48 P+F I/O modules are allowed per ISCM, with a total of 16 ISCMs per FCP270/ZCP270; subject to the standard Fieldbus load limits (discussed in *DIN Rail Mounted Subsystem User’s Guide* (B0400FA)).

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**— NOTE**

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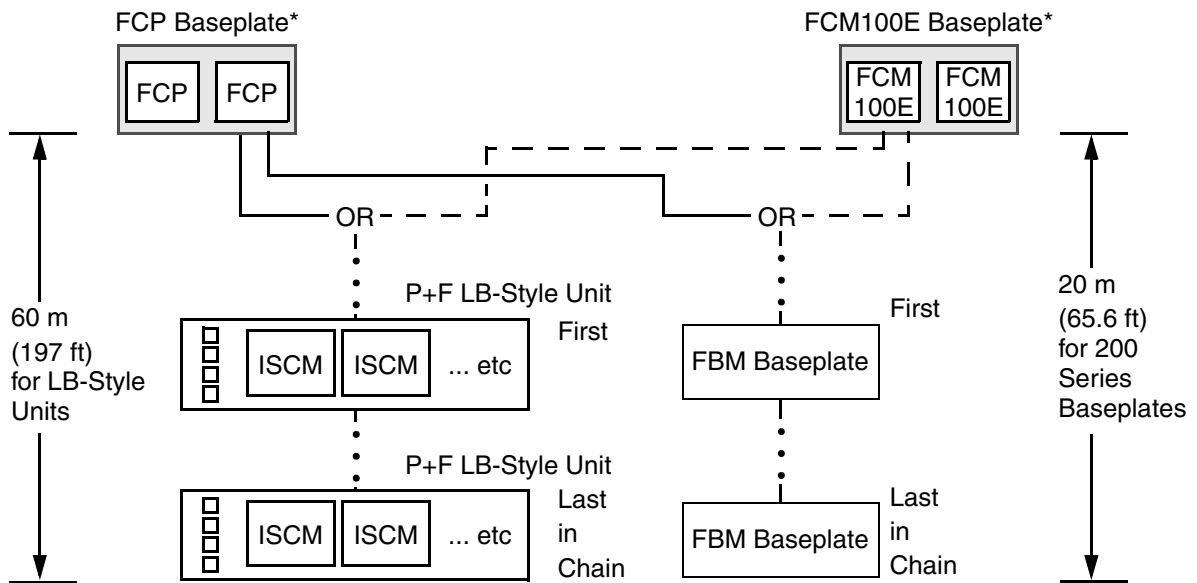
Sixteen ISCMs represent the theoretical maximum if the units are not fully fitted with modules. Sixteen base units with sixteen extension units will connect a total of 16 x 46 I/O modules (736). The controller can handle up to 204. If dual-width modules are used, then the subsystem will have 16 x 23 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.

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## Fieldbus Cabling for Intrinsically Safe I/O Subsystem

Cabling lengths for the Intrinsically Safe I/O Subsystem with an FCP270/ZCP270 differ slightly from those used in the typical 200 Series subsystem, as follows:

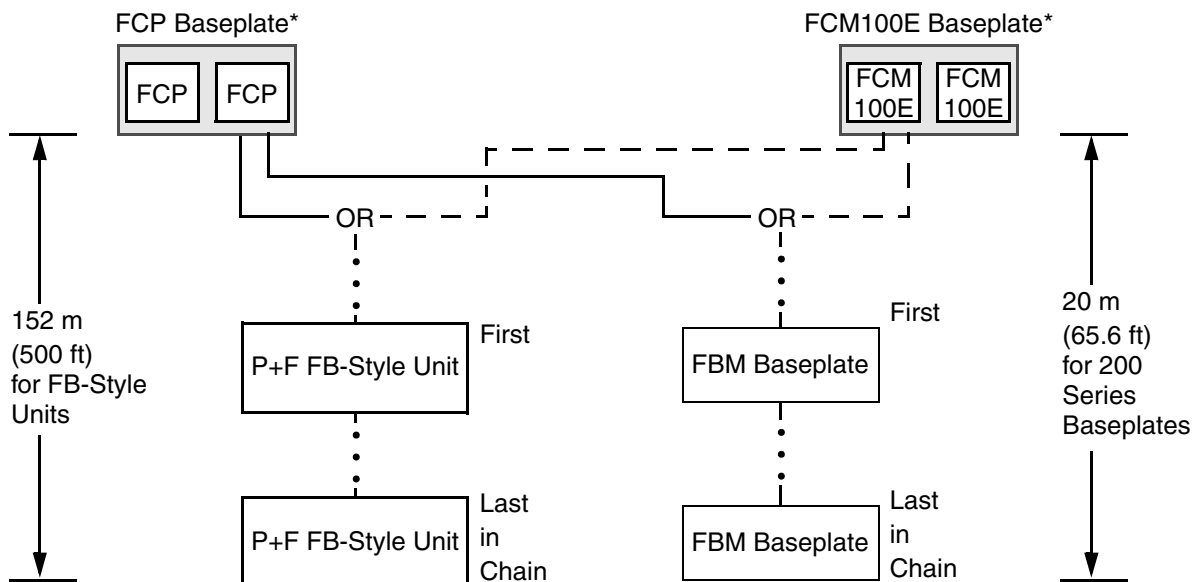
- ◆ For Zone 2 applications, a maximum of 60 meters (197 ft) of standard HDLC fieldbus cable may be used between the FCP270 or FCM100E/Et and the last P+F LB-style unit in an Intrinsically Safe I/O Subsystem, as shown in Figure 1-8.
- ◆ Fieldbus cables which run from 200 Series FBM baseplates to the FCP270 or FCM100E/Et can be up to 20 m (65.6 ft) end to end, as shown in Figure 1-8, using standard fieldbus cables listed in Table 3-1 on page 35



\* FCP Baseplate cannot connect to both Intrinsically Safe Units and 200 Series FBM Baseplates, while FCM100E Baseplate can connect only to one or the other.

**Figure 1-8. Fieldbus Cable Length Restrictions for FCP270, FCM100E and LB-Style Intrinsically Safe Units**

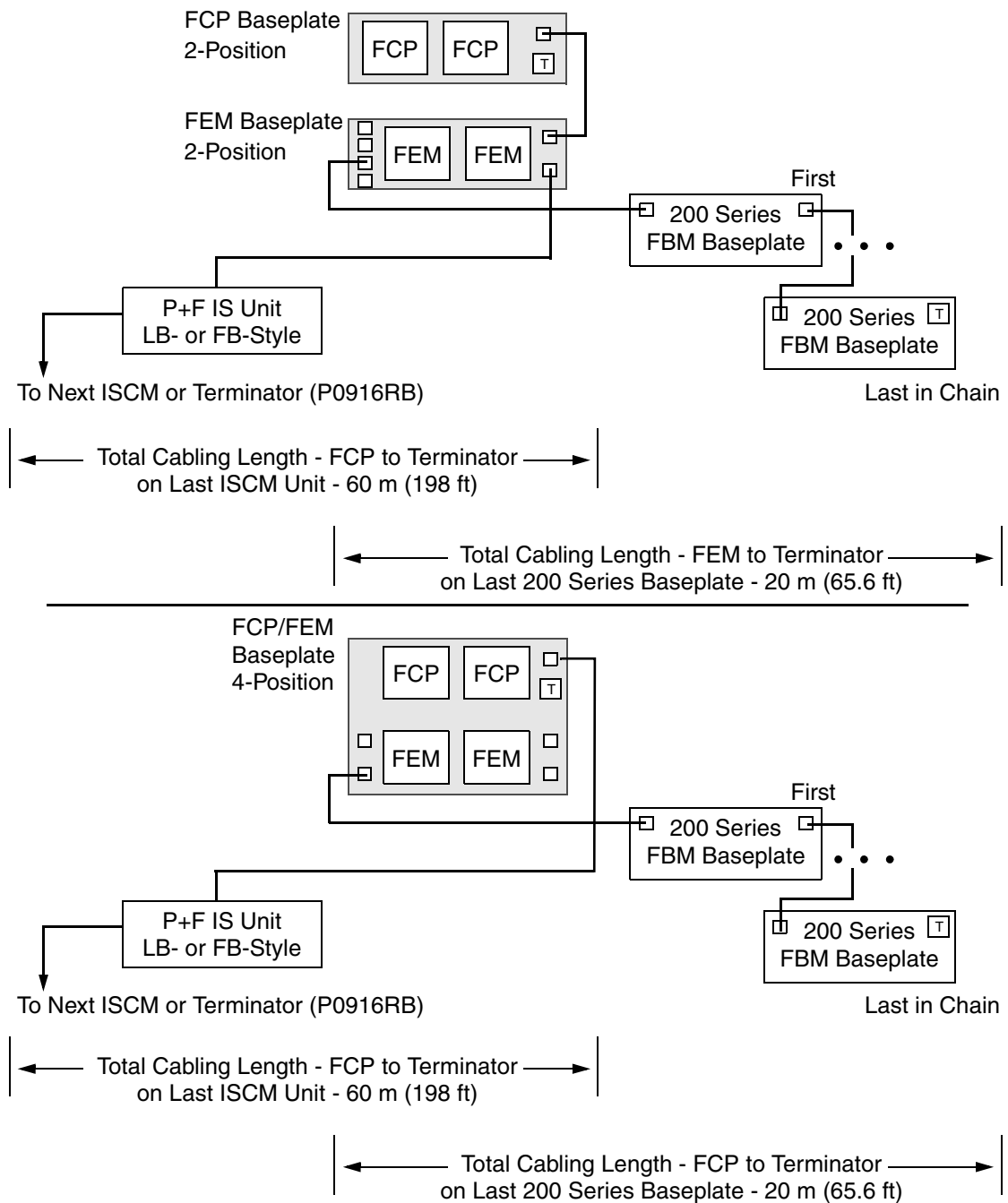
- ◆ For Zone 1 applications, a maximum of 152 meters (500 ft) of high quality twinaxial cable may be used between the FCP270 or FCM100E/Et (with the P0926LC Splitter) and the last P+F FB-style unit in an Intrinsically Safe I/O Subsystem, as shown in Figure 1-9.



\* FCP Baseplate cannot connect to both Intrinsically Safe Units and 200 Series FBM Baseplates, while FCM100E Baseplate can connect only to one or the other.

**Figure 1-9. Fieldbus Cable Length Restrictions for FCP270, FCM100E and FB-Style Intrinsically Safe Units**

- ◆ Fieldbus cable length between an FBI100 and 100 Series FBMs, when used with an FCP270 connected to the Intrinsically Safe I/O Subsystem, can be up to 1829 m (6000 ft) end to end using twinaxial (shielded twisted-pair) cables
- ◆ Fieldbus cable length from an FCP270/FEM input to an ISCM's unit (LB-style or FB-style) can be up to 60 m (197 ft) end to end. The FCP270 can be at an end or in the middle of this length (if multiple P+F units are connected to one FCP270). See Figure 1-10.



**Figure 1-10. Fieldbus Cable Length Restrictions for FCP270, FEM100 and Intrinsically Safe Units without FCM2Fs**

- ◆ When used with FCM2Fs to connect the FCP270/FEM to the ISCM's unit, the Fieldbus cable length from the nearest FCM2F pair input to ISCM's unit (LB-style or FB-style) can be up to 60 m (197 ft) end to end. See Figure 1-11. The nearest FCM2F pair can be at an end or in the middle of this length (if multiple P+F units are connected to one FCP270), as shown in Figure 1-11.