

High-Performance Process Manager Planning

HP02-500

Section 2 – HPM Description

2.1 Overview

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HPM major assemblies The High-Performance Process Manager subsystem (HPM) consists of major assemblies described in the following subsections. The major High-Performance Process Manager assemblies are

- High-Performance Process Manager Module (HPMM) card file
- Input/Output Processor (IOP) card file
- Input/Output Processor (IOP) card
- I/O Link Extender
- Field Termination Assembly (FTA)
- Power System

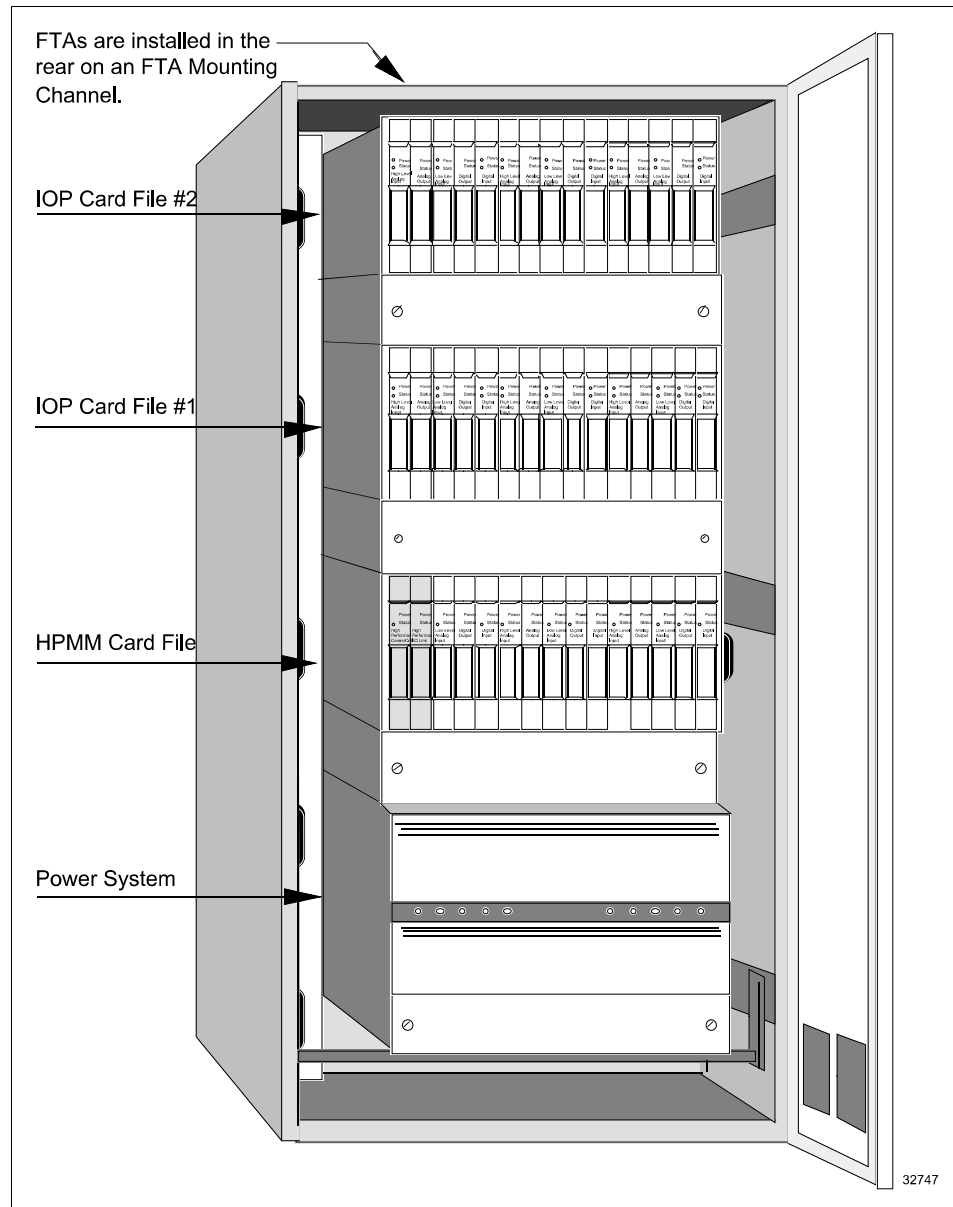
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2.1 Overview, Continued

Nonredundant HPM cabinet layout

Figure 2-1 is an illustration of a single High-Performance Process Manager cabinet containing a nonredundant High-Performance Process Manager Module (HPMM) with supporting assemblies. The HPMM cards (2) and the IOPs cards are installed in 15-Slot HPMM card files. IOP cards occupy the IOP card files.

Figure 2-1 Nonredundant HPMM Cabinet Layout



2.2 Card Files

Introduction

There are nine card file models. Three models are not CE Compliant and six models are CE Compliant. Table 2-1 lists the nine card file models. All models are also available with conformal coating (a model number with a prefix of MC, rather than MU).

Table 2-1 Card File Models

Card File Description	CE Compliant	Non-CE Compliant
Left 7-Slot HPMM or IOP	N/A	MU-HPFH01
Right 7-Slot HPMM or IOP	N/A	MU-HPFH11
15-Slot HPMM or IOP	N/A	MU-HPFX02
Left 7-Slot HPMM	MU-HPFH03	N/A
Right 7-Slot HPMM	MU-HPFH13	N/A
15-Slot HPMM	MU-HPFX03	N/A
Left 7-Slot IOP	MU-HPFI03	N/A
Right 7-Slot IOP	MU-HPFI13	N/A
15-Slot IOP	MU-HPFI23	N/A

Non-CE Compliant card file models

The non-CE Compliant card file models can be designated as an HPMM card file or an IOP card file by either installing an HPMM card set in the two left-most card slots or installing IOP cards.

CE Compliant card file models

Unlike the non-CE Compliant card file models, the CE Compliant card file models are designated either an HPMM card file or an IOP card file because even though there is no electrical difference in the backpanel, they differ mechanically. The addition of a ground plate and filtered IOP connectors in the two left-most slots prohibits the installation of an HPMM card set.

The card file is designated an IOP card file when the ground plate and filtered connectors are present.

The card file is designated an HPMM card file when the ground plate and filtered connectors are absent.

Conversion kit

A CE Compliant HPMM card file can be converted to an IOP card file with a model MU-ZPFI03 upgrade kit. The kit adds 2 filtered IOP adapter connectors to the two left-most card slots and a ground plate extension.

2.2.1 HPMM Card Files

Three types of HPM card files

There are three types of HPMM card files. The two left-most slots of each type are populated by the three assemblies that comprise the HPMM. The remaining slots accommodate IOPs.

If the card file is a non-CE Compliant card file, the two left-most slots of each type can also accommodate IOPs with no alterations. The card file is then designated an IOP card file.

HPMM description

The High-Performance Process Manager Module (HPMM) is composed of two card assemblies that install in the two left-most slots in a 7-Slot or 15-Slot card file, and a UCN interface module that mounts and connects to the 50-pin connector that is directly below the left-most card.

The three HPMM assemblies are identified as follows:

- High-Performance Communications/Control (High-Performance Comm/Control) card
- High-Performance I/O Link Interface (High-Performance I/O Link) card
- High-Performance UCN Interface (HPM UCN Interface) module

The HPM UCN Interface module connects to the 50-pin connector below the High-Performance Comm/Control card.

Left 7-Slot HPMM card file description

The Left 7-Slot card file accepts the two HPMM cards and the HPM UCN Interface module that comprise the HPMM, and accommodates up to five IOP cards. The card slots are numbered 1 through 7, starting at the left-most position.

The High-Performance Comm/Control and High-Performance I/O Link cards occupy slots 1 and 2, while the HPM UCN Interface module mounts below slot 1 and connects to its 50-pin connector.

Slots 3 through 7 can accommodate IOP cards. The IOP card slots assume numerical I/O Link Interface addresses of 3 through 7 and binary I/O Link Interface addresses of 2 through 6.

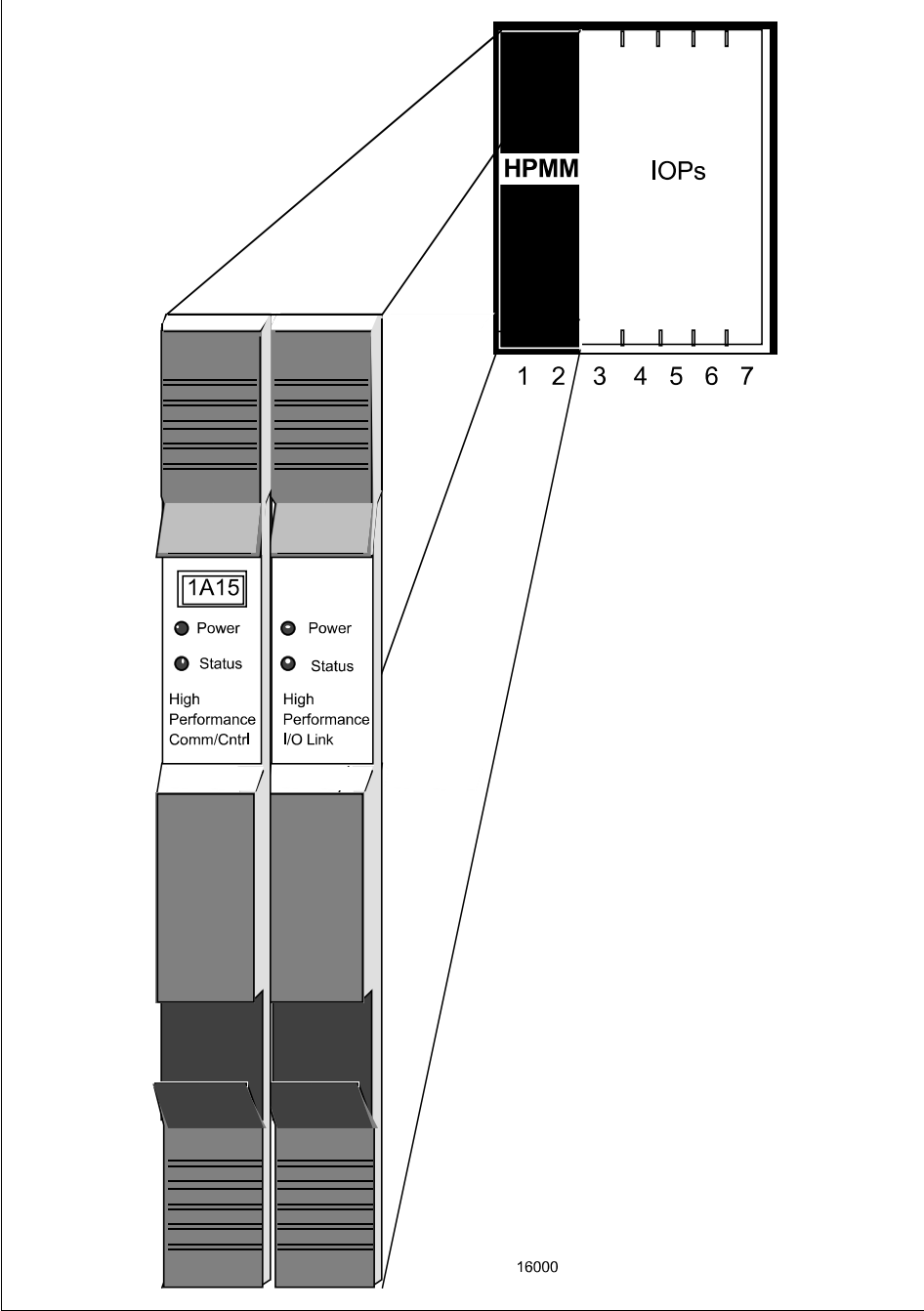
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2.2.1 HPMM Card Files, Continued

Left 7-Slot HPMM card file illustration

Figure 2-2 is an illustration of a Left 7-Slot HPMM card file and the two HPMM cards that occupy slots 1 and 2.

Figure 2-2 Left 7-Slot HPMM Card File



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2.2.1 HPMM Card Files, Continued

Right 7-Slot HPMM card file description

The description of the Right 7-Slot HPMM card file is identical to the Left 7-Slot HPMM card file, except the two HPMM cards and the UCN interface module occupy slots 9 and 10. The card slots are numbered 9 through 15.

Slots 11 through 15 accommodate IOP cards. The IOP card slots assume numerical I/O Link Interface addresses of 11 through 15 and binary I/O Link Interface addresses of 10 through 14.

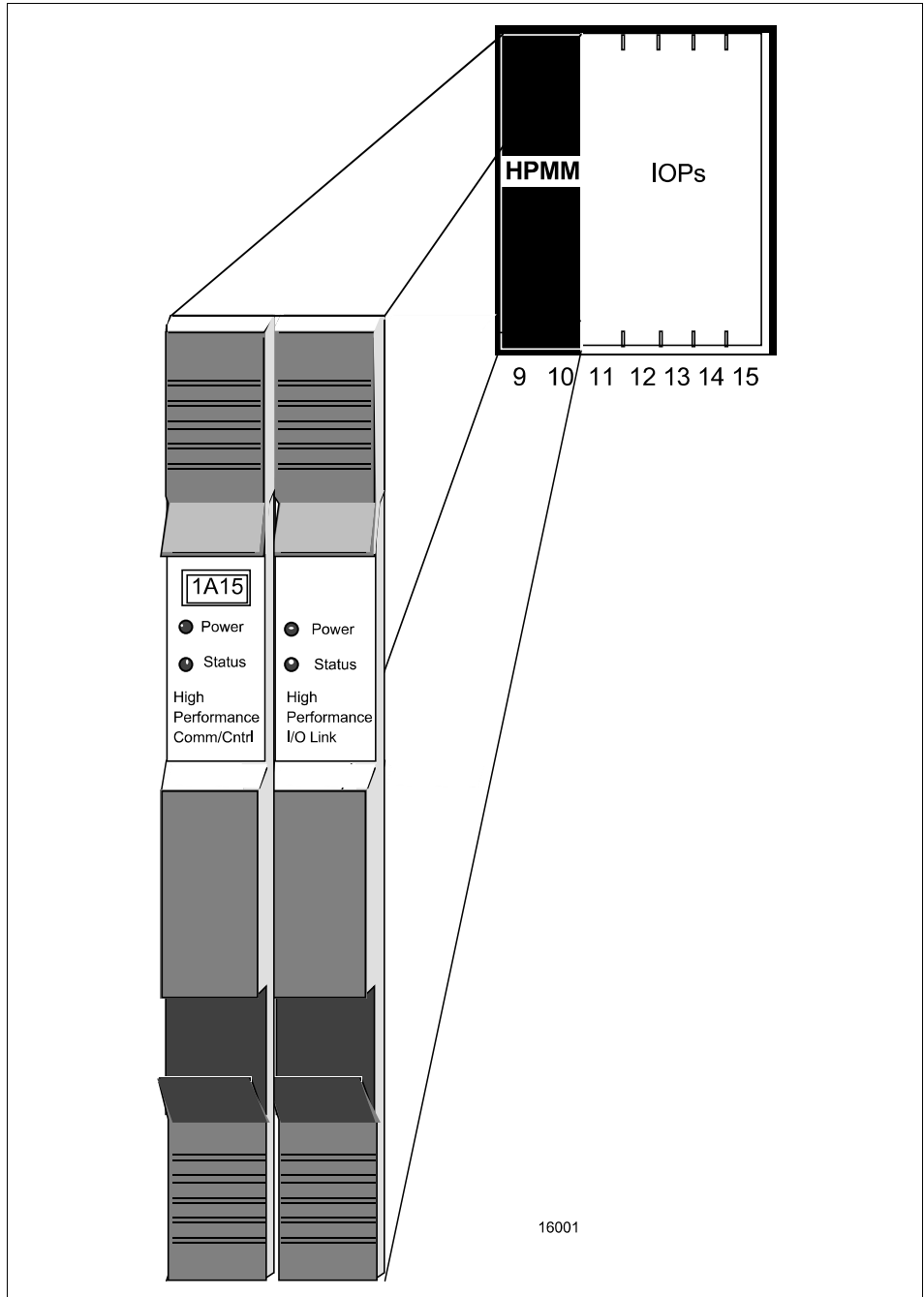
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2.2.1 HPMM Card Files, Continued

Right 7-Slot HPMM card file illustration

Figure 2-3 is an illustration of a Right 7-Slot HPMM card file and the two HPMM cards that occupy slots 9 and 10.

Figure 2-3 Right 7-Slot HPMM Card File



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2.2.1 HPMM Card Files, Continued

15-Slot HPMM card file description

The 15-Slot card file accepts the two HPMM cards and the UCN interface module that comprise the HPMM, and accommodates up to thirteen IOP cards. The card slots are numbered 1 through 15, starting at the left-most position.

The High-Performance Comm/Control and High-Performance I/O Link cards occupy slots 1 and 2, while the HPM UCN Interface module mounts below slot 1 in its 50-pin connector.

Slots 3 through 15 can accommodate IOP cards. The IOP card slots assume numerical I/O Link Interface addresses of 3 through 15 and binary I/O Link Interface addresses of 2 through 14.

When populated with the HPMM cards, the card file is designated a 15-Slot HPMM card file.

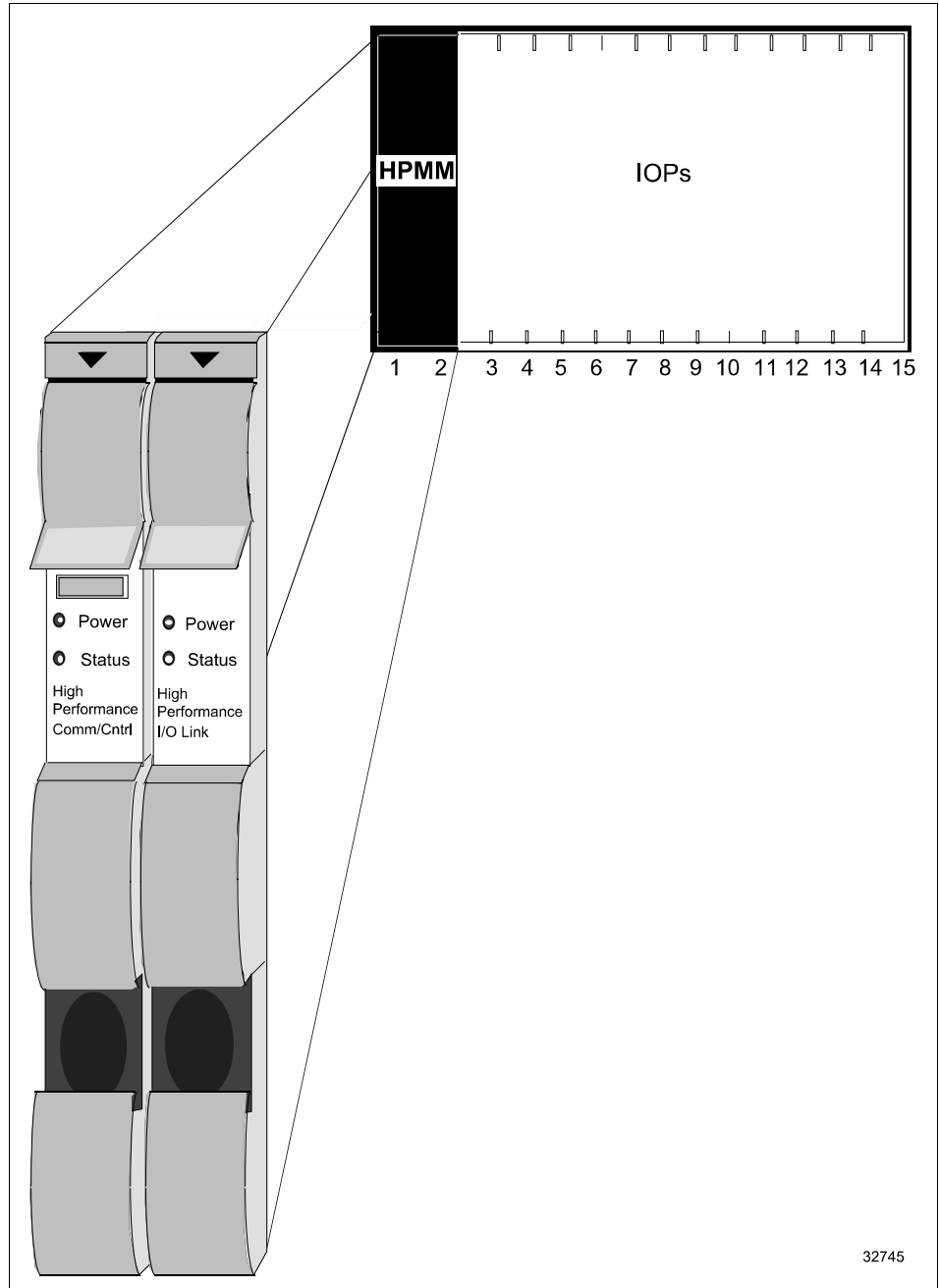
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2.2.1 HPMM Card Files, Continued

15-Slot HPMM card file illustration

Figure 2-4 is an illustration of a 15-Slot HPMM card file and the two HPMM cards that occupy slots 1 and 2.

Figure 2-4 15-Slot HPMM Card File



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2.2.1 HPMM Card Files, Continued

7-Slot HPMM card file usage	<p>The two types of 7-Slot HPMM card files are intended to be used in a small HPM subsystem.</p> <p>When the subsystem consists of nonredundant HPMMs, a Left 7-Slot HPMM card file must be installed. For a subsystem that requires redundant HPMMs, Left and Right 7-Slot HPMM card files are installed. Both card files are assigned the same the same I/O Link Interface address. There is no slot 8 because the card file slots are numbered 1 through 7 and 9 through 15.</p>
15-Slot HPMM card file usage	<p>The 15-Slot HPMM card file is intended for use in a larger HPM subsystem, either with nonredundant or redundant HPMMs. Unlike the 7-Slot HPMM card file, there is no “loss” of a card slot.</p>
HPMM functionality	<p>The HPMM provides the following functions:</p> <ul style="list-style-type: none">• Communications with the Local Control Network (LCN) Network Interface Module (NIM) through the Universal Control Network (UCN)• A Communications processor (Motorola 68LC040)• Communications through the I/O Link Interface with Input/Output Processors (IOPs) and I/O Link Extenders• A Control processor (Motorola 68040)• Separate and shared memory for the Communications and Control processors• An I/O Link processor (Intel 80C32) with SRAM• HPMM redundancy control

2.2.2 Input/Output Processor (IOP) Card Files

IOP card file descriptions	<p>The 7-Slot and 15-Slot IOP card files are electrically identical to the HPMM card files, except that an HPMM card set is not installed in the card file. IOPs can be installed in the two left-most card slots.</p>
Non-CE Compliant card files	<p>Non-CE Compliant HPMM and IOP card files differ only in the application. Electrically and mechanically, their backpanels are the same. The card file model numbers are the same.</p>
CE Compliant card files	<p>CE Compliant HPMM and IOP card files differ mechanically. IOP card files have filtered IOP connectors and connector ground plates. Electrically, their backpanels are the same. The card file model numbers are different.</p>

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6.2 Model Numbers, Continued

Conformally coated model list, continued

Table 6-3 Conformally Coated Assembly Model Numbers, Continued

Model Number	Non CE Compliant Part Number	CE Compliant Part Number	Description
Standard FTAs, continued			
MC-TAIH53	N/A	51309138-275	High Level Analog Input with screw terminals
MC-TAIH62	80366192-150	N/A	High Level Analog Input/STI with screw terminals
MC-TSTX03	N/A	51309140-175	Smart Transmitter Interface with Compression Term
MC-TSTX13	N/A	51309142-175	Smart Transmitter Interface with Compression Term
MC-TSTX53	N/A	51309142-275	Smart Transmitter Interface with Screw Terminals
MC-TAIL02	51304437-150	N/A	Low Level Analog Input with compression terminals
MC-TAIL03	N/A	51309202-175	Low Level Analog Input with compression terminals
MC-TAMR02	51304477-150	N/A	LLMux Analog Input RTD with compression terminals
MC-TAMR03	N/A	51309218-175	LLMux Analog Input RTD with compression terminals
MC-TAMT02	51401491-150	N/A	LLMux Analog Input TC with compression terminals
MC-TAMT03	N/A	51301491-175	LLMux Analog Input TC with compression terminals
MC-TAMT12	51401573-150	N/A	LLMux Analog Input TC with remote CJR, comp term
MC-TAMT13	N/A	51301573-175	LLMux Analog Input TC with remote CJR, comp term
MC-TAOX02	51304476-150	51304476-175	Analog Output with compression terminals
MC-TAOX12	51304335-150	51304335-175	Analog Output with compression terminals
MC-TAOX52	51304335-250	51304335-275	Analog Output with screw terminals
MC-TAOY22	80366177-150	80366177-175	Analog Output with compression terminals
MC-TAOY23	80366177-250	80366177-275	Analog Output with compression terminals
MC-TAOY52	80364007-150	80364007-175	Analog Output with screw terminals
MC-TAOY53	80364007-250	80364007-275	Analog Output with screw terminals
MC-TDIA12	51304439-150	51304439-175	120 Vac Digital Input with compression terminals
MC-TDIA52	51304439-250	51304439-275	120 Vac Digital Input with fixed-screw terminals
MC-TDIA72	51303930-150	N/A	120 Vac Digital Input with removable-screw terminals
MC-TDIA22	51304431-150	51304431-175	240 Vac Digital Input with compression terminals

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7.5 FTAs, Continued

Conformally coated FTAs

Table 7-5 is a list of CE Compliant and non-CE Compliant FTAs that are conformally coated. Model numbers and part numbers identify the assemblies.

Table 7-5 Field Termination Assemblies—Conformally Coated

FTA Type	Model Number	Non-CE Compliant Part Number	CE Compliant Part Number
LLAI	MC-TAIL02	51304437-150	N/A
LLAI	MC-TAIL03	N/A	51309202-175
LLMux RTD	MC-TAMR02	51304477-150	N/A
LLMux RTD	MC-TAMR03	N/A	51309218-175
LLMux TC	MC-TAMT02	51401491-150	N/A
LLMux TC	MC-TAMT03	N/A	51309223-175
LLMux TC Remote	MC-TAMT12	51401573-150	N/A
LLMux TC Remote	MC-TAMT13	N/A	51309213-175
RHMUX TC Local CJR	MC-GRMT01	N/A	51404106-175
RHMUX GI/IS Power Adapter	MC-GRPA01	N/A	51304724-175
RHMUX GI/NI Power Adapter	MC-TRPA01	N/A	51304722-175
HLAI/STI	MC-TAIH02	51304453-150	N/A
HLAI/STI	MC-TAIH12	51304337-150	N/A
HLAI/STI	MU-TAIH22	80366195-150	N/A
HLAI/STI	MU-TAIH52	51304337-250	N/A
HLAI/STI	MU-TAIH62	80366192-150	N/A
HLAI	MC-TAIH03	N/A	51309136-175
HLAI	MC-TAIH13	N/A	51309138-175
HLAI	MU-TAIH23	N/A	80369165-175
HLAI	MC-TAIH53	N/A	51309138-275
STI	MC-TSTX03	N/A	51309136-175
STI	MC-TSTX13	N/A	51309138-175
STI	MC-TSTX53	N/A	51309138-275

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Section 12 – Low Level Multiplexer Planning

12.1 Overview

Section contents

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Introduction

Low Level Analog Input Multiplexer (LLMux) is comprised of three assemblies. They are:

- an IOP
- a Power Adapter
- an FTA

There are two versions of the LLMux and their assemblies are not compatible with each other.

For clarity, the two versions are described as an LLMux and a Remote Hardened Multiplexer (RHMUX). The RHMUX is Approved as Intrinsically Safe and Nonincendive for use in hazardous locations. However, the RHMUX assemblies can also be used in areas that are classified as nonhazardous.

The RHMUX subsystem has the added advantage that the FTA can be located up to 2 kilometers from its Power Adapter.

12.2 LLMux Version

12.2.1 LLMux Configurations

CE Compliance

All models of the Low Level Analog Input Multiplexer (LLMux) Field Termination Assemblies (FTAs), the Power Adapter, and its IOP can be used in a CE Compliant application. However, they must be used with the model MU-KFTSxx IOP to FTA cable and the IOP must be installed in a CE Compliant card file. Table 12-1 lists FTA, Power Adapter, and IOP model and part numbers.

Table 12-1 LLMux Assemblies

Model Number	Description	Part Number
MU-TAMR03	LLMux RTD FTA	51309218-125
MC-TAMR03	LLMux RTD FTA – Conformally Coated	51309218-175
MU-TAMT03	LLMux TC FTA	51309223-125
MC-TAMT03	LLMux TC FTA – Conformally Coated	51309223-175
MU-TAMT13	LLMux TC FTA with Remote CJR	51309213-125
MC-TAMT13	LLMux TC FTA with Remote CJR – Conformally Coated	51309213-175
MU-TLPA02	Power Adapter	51309204-125
MC-TLPA02	Power Adapter – Conformally Coated	51309204-175
MU-PLAM02	LLMux IOP	51304362-100
MC-PLAM02	LLMux IOP – Conformally Coated	51304362-150

Compatibility

The LLMux assemblies are compatible only with each other. The assemblies are not compatible with the RHMUX assemblies that are discussed in subsection 12.3.

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12.2.1 LLMux Configurations, Continued

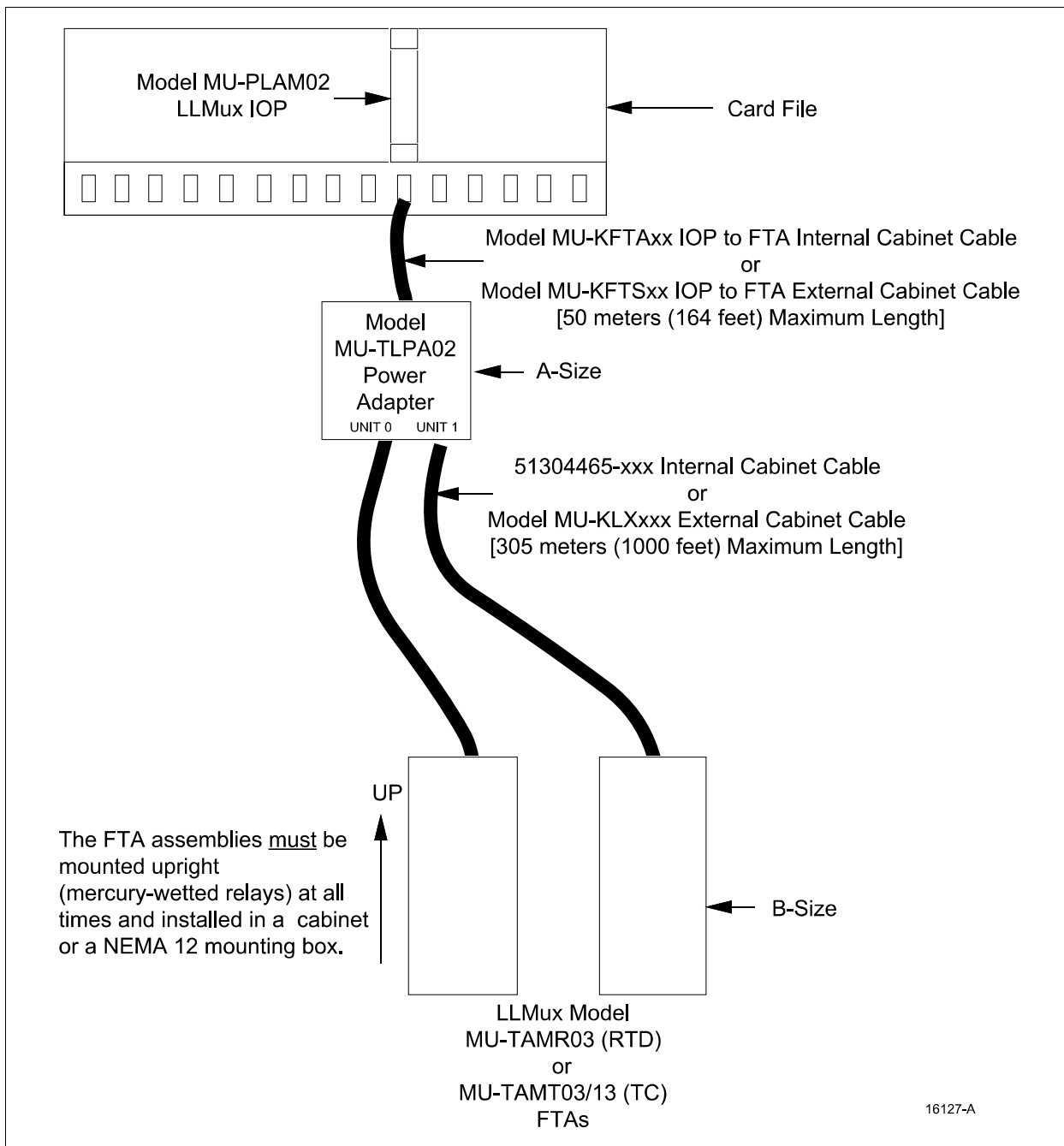
Non-CE Compliance	The FTAs and the Power Adapter can also be used for a non-CE Compliant applications.
Conformal coating	The LLMux FTA, Power Adapter, and IOP assemblies are available with conformal coating. See Table 12-1.
Power Adapter	A CE Compliant version of the model MU-TLPA02 Power Adapter (part number 51309204-125 or 51309204-175) must be used with the LLMux FTA models for CE Compliant applications.
Description	<p>Figure 12-1 illustrates a Low Level Analog Input Multiplexer (LLMux) configuration.</p> <p>In Figure 12-1, the LLMux FTA, model MU-TAMR03 or MU-TAMT03/13, communicates with a model MU-PLAM02 LLMux IOP through the model MU-TLPA02 Power Adapter. This can be a non-CE Compliant or CE-Compliant application depending upon the model of the card file that is used.</p>
Two types of LLMux FTAs	<p>The LLMux FTAs that connect to the Power Adapter can be either of two types of FTAs; the model MU-TAMT03/13 Thermocouple (TC) FTA or the model MU-TAMR03 Resistive Temperature Device (RTD) FTA. The combination of the FTA mother board and the daughter board determines the type of FTA.</p> <p>The two LLMux FTAs that connect to the Power Adapter can be the same type, or different types.</p>
Two thermocouple LLMux FTAs	There are two versions of the Thermocouple LLMux FTA. The model MU-TAMT03 FTA has a single local Cold Junction Reference (CJR) interface, while the model MU-TAMT13 FTA has a remote CJR interface. This allows the CJR to be located up to 50 meters (164 feet) from the FTA with the use of appropriate cabling.
16 LLMux FTA channels	Each type of LLMux FTA has 16 channels that accept low level analog inputs. Two LLMux FTAs connected to a Power Adapter provide 32 channel inputs to the LLMux IOP. This concept causes the LLMux to be known also as the 32 point LLMux.

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12.2.1 LLMux Configurations, Continued

CE Compliant LLMux configuration

Figure 12-1 LLMux Configuration Interconnections – CE Compliant



12.2.2 LLMux IOP Placement

Install the IOP in any card file

The LLMux IOP can be installed in any available slot in an HPMM or IOP card file.

12.2.3 LLMux Power Adapter Placement

Within 50 meters of IOP

The LLMux Power Adapter can be installed on any available FTA Mounting Channel that is within 50 meters (164 feet) of the LLMux IOP. The restriction is that the longest IOP to FTA cable cannot exceed 50 meters.

IOP to Power Adapter cable

The IOP to Power Adapter interconnection is provided by a model MU-KFTAxx nonshielded cable (the suffix “xx” represents the length of the cable in meters) in 12 sizes, up to 50 meters (164 feet) in length for internal cabinet applications. A model MU-KFTSxx shielded cable is used for external cabinet applications. See the *High-Performance Manager Service* or *Process Manager/Advanced Process Manager Installation* manual for the lengths that are available.

Power Adapter size

The Power Adapter has the same dimensions as an A-size (6 inches) FTA.

12.2.4 LLMux FTA Placement

FTA size

The LLMux FTA is a B-size (12 inches) FTA

EMI sensitivity

The LLMux FTA is designed to be mounted in a shielded enclosure. This can be accomplished in either of two ways.

- Install the FTA in a standard High-Performance Process Manager cabinet on an FTA Mounting Channel. The FTA must be grounded to the cabinet and the cabinet must be grounded to Safety Ground (building ground).
 - Install the FTA in a NEMA 12 box with the FTA Mounting Channel grounded to the box, and the box connected to Safety Ground.
-

WARNING

WARNING—The practice of mounting an FTA on panel rails is not acceptable because the installed FTA can not be adequately shielded. The FTA must mount on an FTA Mounting Channel.

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12.2.4 LLMux FTA Placement, Continued

Within 305 meters of Power Adapter

The remote LLMux FTA cabinet or NEMA 12 box can be located up to 305 meters (1000 feet) from the Power Adapter. The restriction is that the longest Power Adapter to FTA cable cannot exceed 305 meters (1000 feet).

CAUTION

CAUTION—The remotely-installed FTA’s environment must meet the same environmental conditions imposed on equipment installed in Process Manager or Advanced Process Manager cabinets. See Section 5 in this manual and the *TPS System Site Planning* and *Process Manager I/O Installation* manuals for additional information.

Mercury-wetted relay contacts

LLMux FTAs contain relays with mercury-wetted contacts and must be positioned with the LLMux power connector-side up.

Local FTA to Power Adapter cabling

When the LLMux FTA is installed in the same cabinet, or cabinet complex, as the Power Adapter FTA, a 51304465-xxx cable (“xxx” represents five sizes – 30, 66, 100, 200, and 300 centimeters) with stripped wire ends is used for the interconnection. See the *High-Performance Process Manager Service* manual for part numbers.

The cable can be used for both non-CE Compliant and CE Compliant applications.

The cable has two individually shielded, twisted-pair wires. For non-CE Compliant applications, the shields must be connected to ground at the Power Adapter end only, and for CE Compliant applications, the shields must be connected to ground at both ends of the cable. The wire connections are made using the compression terminals in a 6-pin connector at the Power Adapter end and in a 4-pin or 6-pin connector at the FTA end.

External Power Adapter to FTA cabling

When LLMux FTA is not installed in the same cabinet, or cabinet complex, as the Power Adapter and up to 305 meters (1000 feet) from the Power Adapter, a model MU-KLXxxx cable (“xxx” represents three sizes – 76, 152, and 305 meters for external cabinet installation). This is a single-twist, four-conductor Belden type 83654 cable with a braided shield and must be used for the interconnection for a CE Compliance application. See the *High-Performance Process Manager Service* manual for part numbers.

References

For additional LLMux IOP and FTA information, see the *Process Manager I/O Installation* or *High-Performance Process Manager Service* manual.

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12.2.4 LLMux FTA Placement, Continued

Power Adapter to FTA cable specifications

The 51304465-xxx (internal cabinet) and model MU-KLXxxx (external cabinet) cables have the following specifications.

51304465-xxx power cable (internal cabinet use)

- Manufacturer Type – Belden 9406
 - Configuration – Shielded double pair
 - Flame Resistance Conformity – CSA FT 4
 - CSA Type – CMG
 - NEC Type – CMG
-

Model MU-KLXxxx power cable (external cabinet use)

- Manufacturer Type—Belden 83654
 - Cable Configuration—Shielded 18-gauge four-conductor single twist (TEFLON jacket)
 - Flame Resistance Conformity—CSA FT4/FT6 and UL910
 - CSA Type—CMP
 - NEC Type—CMP
 - Temperature Rating: -70°C to +200°C
-

Model MU-KRCJ00 remote CJR cable

- Manufacturer Type – Belden model 83653
 - Conductors – Three 1.0 mm² (18 AWG) conductors
 - Insulation and Jacket – Teflon conductor insulation and jacket
 - Shielding – Braid over foil
 - Flame Resistance Conformity – CSA PCC FT4/FT 6 and UL910
 - NEC Type – CMP
 - Use – Air plenum
-

12.2.5 Remote CJR Installation

Installation requirements

Figure 12-2 illustrates remote CJR installation requirements. Model MU-KRCJ00 cable must be used between the remote CJR sensor and the model MU-TAMT13 or MC-TAMT13 FTA. Its length is restricted to 50 meters (164 feet). The cable shield must be connected to Safety Ground at both ends of the cable.

The installation as illustrated is CE Compliant.

Figure 12-2 Remote CJR Installation

