symphony™

Instruction
Harmony Series

Harmony Power System

ABB

Preface

The Harmony power system provides 24 VDC operating and field power to Harmony devices in the Symphony Enterprise Management and Control System. The power system includes Harmony power supplies and the hardware needed for AC input distribution to each Harmony power supply, the DC output distribution from the power supplies, and alarm status monitoring.

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GENERAL WARNINGS

Equipment Environment
All components, whether in transportation, operation or storage, must be in a noncorrosive environment.

Electrical Shock Hazard During Maintenance
Disconnect power or take precautions to insure that contact with energized parts is avoided when servicing.

SPECIFIC WARNINGS

Verify the cabinet AC power is turned off at the AC mains disconnect before starting installation procedures. Failure to do so could result in severe or fatal shock. Do not turn the power on until the installation is complete. (p. 3-2)

Verify the cabinet AC power is turned off at the AC mains disconnect or the AC power is turned off using the AC input assembly switches as indicated in the replacement flowchart before starting the replacement procedure. Failure to do so could result in severe or fatal shock. Do not turn the power on until the replacement procedure is complete. (p. 7-1)

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Verify AC power is turned off at the source (AC mains disconnect) before starting the AC input source wiring procedure. Failure to do so could result in severe or fatal shock. (p. PR7-1)

Turn off all internal cabinet power and external field device power before attempting the connections check maintenance procedure. Failure to do so could result in severe or fatal shock, or equipment damage. (p. PR14-1)

Support Services

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Introduction

Section 1

Overview

The Harmony power system provides 24 VDC block logic power (BLP) and 24 VDC field power (IFP) to Harmony devices in the Symphony Enterprise Management and Control System. The power system components mount on standard DIN rail. All the necessary AC filtering, transient protection, input voltage monitoring, and output voltage monitoring circuitry are included with the various individual assemblies that are part of the complete power system.

The power system includes Harmony power supplies and the hardware needed for AC input distribution to each Harmony power supply, the DC output distribution from the power supplies, and alarm status monitoring. The main power system components that make up the Harmony power system include:

- Harmony power supplies (up to five). The power supplies provide 24 VDC and are available in two power ratings: 480 watts and 240 watts.
- AC input assembly. This assembly distributes AC input power to the power supplies.
- DC output assembly. This assembly distributes 24 VDC BLP and IFP power to Harmony devices and other power system assemblies.
- MMU power assembly. This assembly distributes 24 VDC power to module mounting units to power IEPDS01 power supplies. The IEPDS01 supply provides Harmony rack module power (i.e., 5 VDC, 15 VDC, and -15 VDC).
- Alarm assembly. This assembly provides 24 VDC to column fans (P-HA-MSC-FAN11 and P-HA-MSC-FAN21), and monitors voltages, column fans, door fans, and the IEPDS01 supply.

The power system accepts both 120 VAC and 240 VAC input power.

Intended User

Personnel installing, operating, or maintaining the Harmony power system should read this instruction before performing any installation, operation, or maintenance procedures. Installation requires an engineer or technician with experience handling electronic circuitry and familiarity with AC and DC power systems and distribution.

Features

The Harmony power system has the following features:

Versatility. Flat panel and DIN-rail mounting design allows use in front-access-only cabinets as well as front and rear access enclosures.

Serviceability. Status indicators, disconnects, and plug-in cable assemblies facilitate online fault isolation and repair.

Reliability. Built-in power distribution schemes support single and dual primary power feeds as well as N, N+1, and 2N DC power distribution.

Safety. Complies with worldwide recognized safety standards (i.e., CSA, ANSI/ISA, and IEC).

Industrial quality. Designed for operating temperatures as high as 60° C (140° F) inside the cabinet as well as MIL-STD ratings for vibration, IEC standards for EMI and RFI, and UL ratings for flammability.

Systems integration. Alarm circuitry can detect power supply and fan abnormalities and generate a status output alarm (SOA) that can be communicated via the system to alert operators of the Harmony power system anomaly.

Price and performance. High MTBF, power factor correction, electronic output detection, and lower costs are inherent features of the Harmony power system.

Instruction Content

This instruction consists of the following sections:

Introduction	Contains a brief overview of the Harmony power system and describes the content and intended user of this instruction. It also highlights features, lists reference documents, and contains system specification information.
Description and Operation	Provides a functional description of the various Harmony power system assemblies.
Installation	Covers handling guidelines and describes the Harmony power system installation and connection sequence.
Operating Procedures	Provides information about Harmony power system operation, specifically LED indications.
Troubleshooting	Gives some troubleshooting information and suggested corrective actions for the Harmony power system.
Maintenance	Contains a maintenance schedule for the Harmony power system.
Repair and Replacement	Provides replacement procedures for the individual assemblies that make up the Harmony power system.
Replacement and Spare Parts	Provides a list of part numbers and nomenclatures that can be used to order spare parts and replacement parts.
Procedures	Individual procedure sections (e.g., PR1, PR6, PR10, etc.) detail installation, maintenance, and replacement actions. A procedure section typically gives the steps for a single task. Installation flowcharts and replacement flowcharts indicate the order in which these procedures are to be performed.

How to Use this Instruction

To use the instruction:

1. Read the introduction section and the description and operation section to gain an understanding of the Harmony power system and its functionality.

2. Perform all steps in the installation section. The section provides an installation flowchart.

3. Refer to the operating procedures section for Harmony power system LED indications.

4. Refer to the troubleshooting section if a problem occurs.

5. Refer to the maintenance section for scheduled maintenance requirements.

6. Refer to the repair and replacement section for Harmony power system assembly replacement procedures. The section provides a replacement flowchart.

Glossary of Terms and Abbreviations

Table 1-1 contains those terms and abbreviations that are unique to ABB Automation or have a definition that is different from standard industry usage.

Table 1-1. Glossary of Terms and Abbreviations

Term	Definition
BLP	Block logic power; operates the internal circuitry of Harmony block devices such as the Harmony area controller and I/O blocks.
Control network (Cnet)	Symphony system advanced data communication highway.
Harmony network (Hnet)	Redundant serial communications system that allows data to be transmitted between Harmony devices.
IFP	Internal field power; 24 VDC field power distributed using internal block distribution methods such as the block mounting column.
Module mounting unit (MMU)	Card cage that provides electrical and communication support for Harmony rack modules.

Document Conventions

The ? in a nomenclature, part number, or document number indicates a variable for that position (e.g., IMMFP1?).

Reference Documents

Table 1-2 lists the documents that provide additional information for related hardware. Refer to them as needed.

Table 1-2. Reference Documents

Number	Title
I-E96-508	DC Modular Power System
WBPEEUI200502??	Module Mounting Unit (IEMMU11, IEMMU12, IEMMU21, IEMMU22)

Table 1-2. Reference Documents

Number	Title
WBPEEUI200505??	Site Planning
WBPEEUI230017??	Harmony Bridge Controller (BRC-100)
WBPEEUI230023??	Harmony Area Controller
WBPEEUI240760??	Block Power and Mounting Hardware, Harmony Input/Output System

Related Nomenclature

Table 1-3 lists nomenclature directly related to the Harmony power system.

Table 1-3. Related Nomenclature

Nomenclature	Description
IEMMU11, IEMMU12	Module mounting unit
IEPDS01	DC system power module

Design Standards

Table 1-4 lists the design standards for the Harmony power system.

Table 1-4. Design Standards

Category	Standard	Description
Safety	CSA C22.2 No. 142	Safety standards for process control equipment
	ANSI/ISA S82.01-1994	
	IEC 61010-1	Safety standards for process control equipment
	CSA C22.2 No. 1010.1	
Environmental	IEC 60068-2-1,2,14	Operating temperature
	IEC 60068-2-3,30	Operating relative humidity
	MIL-STD-810E 502.3 & 501.3	Storage/transportation temperature
	ISA S71.04 (level 1 liquids, solids, gases)	Air quality
	IEC 60068-2-6	Operating vibration (sinusoidal)
	MIL-STD-810E 514.4	Storage/transportation vibration Category 1, basic transportation

Table 1-4. Design Standards *(continued)*

Category	Standard	Description
Vibration	MIL-STD-810E 514.4	Transportation
	IEC 60068-2-27	Shock
	IEC 61298-3	Endurance
EMI, RFI, and electrical surge	IEC 61000-4-2 (level 3)	ESD
	IEC 61000-4-3 (level 3)	EMI susceptibility
	IEC 61000-4-4 (level 3)	Electrical fast transient
	IEC 61000-4-5 (level 3)	Electrical surges
	IEC 61000-4-6 (level 3)	Conducted immunity
	IEC 61000-4-8 (level 3)	Magnetic fields
	CISPR-11	Radiated emissions
Flammable atmospheres	CSA C22.2 No. 213	Nonincendive equipment
	ISA S12.12	Nonincendive equipment
	FM Class 3611	Division 2 equipment
Flammability of product components	IEEE 383	Intercabinet cables
	UL rating VW-1	Intracabinet cables
	UL 94 V-0, V-1, V-2, or V5	Flammability of plastic materials
CE Mark directives	73/23/EEC	Low voltage directive
	89/336/EEC	EMC directive
	92/31/EEC	
	90/683/EEC	CE marking directives
	93/68/EEC	
	93/465/EEC	
Certifications *pending*	CSA	Certified for use as process control equipment in an ordinary (nonhazardous) location
	Factory Mutual (FM)	Approved for use in Class I; Division 2; Groups A, B, C, D; hazardous locations.

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Specifications

Table 1-5 contains Harmony power system specifications.
Table 1-6 contains IEPDS01 power supply specifications.

Table 1-5. Harmony Power System Specifications

Property	Characteristic/Value
AC Input Assembly	
Current capacity	
Input (P2, P6, P9)	20 A
Switches (SW1-SW5)	10 A at 120 VAC 6 A at 240 VAC
Switch inrush current	30 A
Output (P1, P3, P4, P5, P8)	10 A at 120 VAC 6 A at 240 VAC
Fuse	2 A, 250 V
Overvoltage category 120 VAC 240 VAC	 III II
Dimensions	128.2 mm × 190.2 mm × 78.8 mm 5.05 in. × 7.49 in. × 3.10 in.
Weight	0.34 kg (0.74 lb.)
Mounting	Mounts on standard DIN rail.
Power Supply[1]	
Input current	Note 1
Input voltage	120 VAC at 50/60 Hz; 240 VAC at 50/60 Hz
Output power	480 W, 240 W
Output voltage	24 VDC at 20 A (480 W) or 10 A (240 W)
Overvoltage category 120 VAC 240 VAC	 III II
DC Output Assembly	
Current capacity	
Input (P19, P20)	20 A per connector; total BLP A and BLP B bus current should not exceed 20 A
Input (P21, P22, P23)	20 A per connector; total common IFP bus current should not exceed 20 A
Output (P1-P12)	11 A: BLP A, BLP B, IFP 15 A: BLP A, BLP B only
Output (P36, P37)	5 A per output (+, -); total current through each connector should not exceed 15 A
Fuse	15 A, 125 V

Table 1-5. Harmony Power System Specifications *(continued)*

Property	Characteristic/Value
Dimensions	128.2 mm × 393.4 mm × 80.4 mm 5.05 in. × 15.49 in. × 3.16 in.
Weight	0.66 kg (1.46 lb.)
Mounting	Mounts on standard DIN rail.
MMU Power Assembly	
Current capacity Input (P3) Output (P1, P2)	 15 A 15 A per connector; total current drawn through both connectors cannot not exceed 15 A
Fuse	15 A, 125 V
Dimensions	128.2 mm × 103.8 mm × 75.6 mm 5.05 in. × 4.09 in. × 2.98 in.
Weight	0.21 kg (0.46 lb.)
Mounting	Mounts on standard DIN rail.
Alarm Assembly	
Operating power Voltage Current	 24 VDC BLP: 60 mA maximum; IFP: 5 A maximum (8 fans)
Fuse	0.375 A, 125 V; 1.0 A, 250 V
Dimensions	128.2 mm × 190.2 mm × 78.8 mm 5.05 in. × 7.49 in. × 2.98 in.
Weight	0.30 kg (0.66 lb.)
Mounting	Mounts on standard DIN rail.
Mounting Panel	
Dimensions	248.0 mm × 785.0 mm × 26.7 mm 9.76 in. × 30.91 in. × 1.05 in.
Weight	2.73 kg (6.02 lb.)
Operating Environment	
Temperature (inside enclosure)	0° to 60°C (32° to 140°F)
Relative humidity	5% to 90%, up to 55°C (131°F), noncondensing 5% to 45%, above 55°C (131°F) up to 70° C (140° F), noncondensing
Altitude	Sea level to 3 km (1.86 mi)
Air quality	Noncorrosive

Table 1-5. Harmony Power System Specifications *(continued)*

Property	Characteristic/Value
Storage/Transportation Environment	
Temperature	-15° to 70°C (5° to 158°F)
Relative humidity	0% to 95%, noncondensing
Altitude	Sea level to 9 km (5.59 mi)
Air quality	Noncorrosive
Shock	15 G, 11 msec

NOTE:
1. Refer to the power supply manufacturer's documentation for complete power supply specifications.

SPECIFICATIONS ARE SUBJECT TO CHANGE WITHOUT NOTICE

Table 1-6. IEPDS01 Specifications

Property	Characteristic/Value
Input requirements Voltage Current Power	 21.0 VDC minimum, 24.0 VDC nominal, 28 VDC maximum 7.6 A maximum 117 W nominal
Outputs	5.1 VDC (±3.0%) at 10.0 A; 51.0 W 15.0 VDC (±2.3%) at 0.5 A; 7.5 W -15.0 VDC (±2.3%) at 0.5 A; 7.5 W
Line regulation	0.5%
Hold up time	≥6 msec (output fully loaded)
Heat dissipation	120 BTU per hr
Mounting	Power supply modules occupy one slot in a module mounting unit.
Operating environment Temperature (inside enclosure) Relative humidity Operating altitude Air quality	 0° to 70°C (32° to 158°F) 5% to 90%, up to 55°C (131°F), noncondensing 5% to 45%, above 55°C (131°F) up to 70° C (140° F), noncondensing Sea level to 3 km (1.86 mi) Noncorrosive

Table 1-6. IEPDS01 Specifications *(continued)*

Property	Characteristic/Value
Storage/transportation environment	
Temperature	-40° to 85°C (-40° to 185°F)
Relative humidity	0% to 95%, noncondensing
Altitude	Sea level to 9 km (5.59 mi)
Air quality	Noncorrosive

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Description and Operation

Section 2

Introduction

This section describes power distribution for the Harmony power system and provides descriptions of the various assemblies that combine to create the Harmony power system:

- AC input assembly.
- Power supplies.
- DC output assembly.
- Alarm assembly.
- MMU power assembly.

It also describes power system mounting using a power system mounting panel.

Power Distribution

Figure 2-1 shows the power distribution and alarm statuses for the Harmony power system. The power system accepts 120 VAC and 240 VAC input power. The AC input power to the power system can be provided by one source (single source) or two sources (dual source) depending on the system requirements.

The power distribution scheme incorporates three separate 24 VDC busses needed for Harmony devices: BLP A, BLP B, and internal field power (IFP). One power supply is dedicated to the BLP A bus, while another power supply is dedicated to the BLP B bus. The IFP bus is generated from one or more power supplies connected in parallel providing power to the single isolated 24 VDC field power bus.

The power system provides 12 output connectors that allow 24 VDC power to be distributed directly to Harmony control unit devices such as the Harmony area controller (HAC), Harmony network communications coupler (HNCC), and Harmony I/O blocks (i.e., block mounting columns). The HAC and HNCC devices require BLP power only, while I/O blocks require both BLP and IFP power. 24 VDC field power is also made available to power field and other cabinet devices.

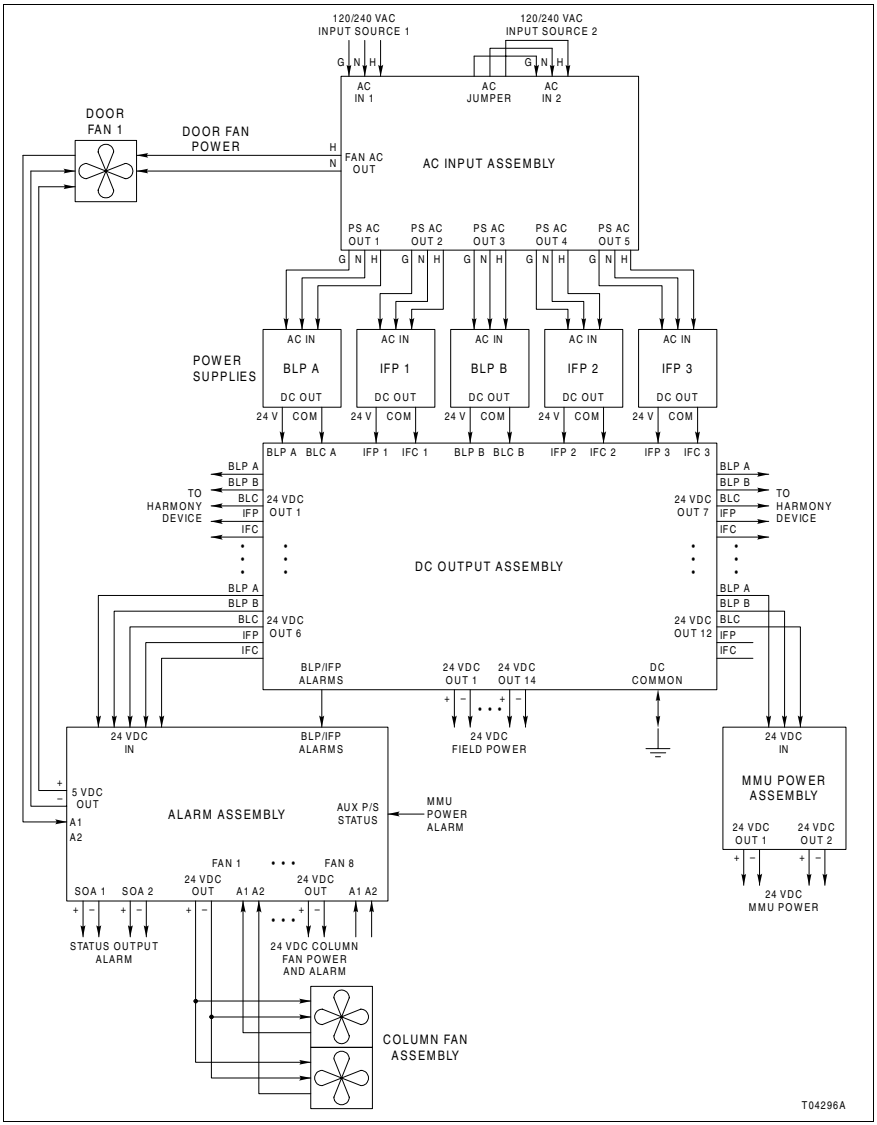

Figure 2-1. Harmony Power Distribution

AC Input Assembly

The AC input assembly shown in Figure 2-2 distributes AC power to the Harmony power supplies. It also provides fused power to the enclosure door fan (supports two door fans). Figure 2-3 is a simplified schematic diagram of the AC input assembly.

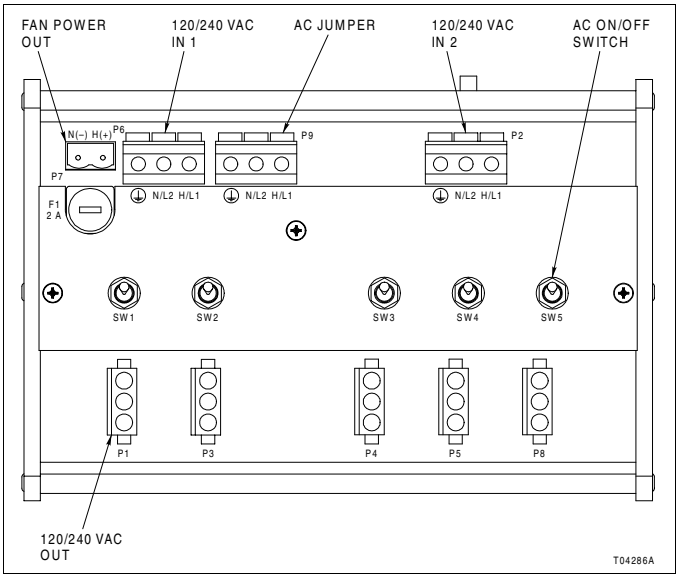

Figure 2-2. AC Input Assembly

AC Input

NOTES:

1. This instruction provides only general information for AC input power connection. Refer to the ***Site Planning*** instruction for detailed system AC distribution information.

2. An AC mains disconnect (e.g., circuit breaker in a distribution panel) must be used on the AC input lines prior to entering the enclosure.

Before the main AC input power can be connected to the Harmony power system, it must be terminated inside the cabinet

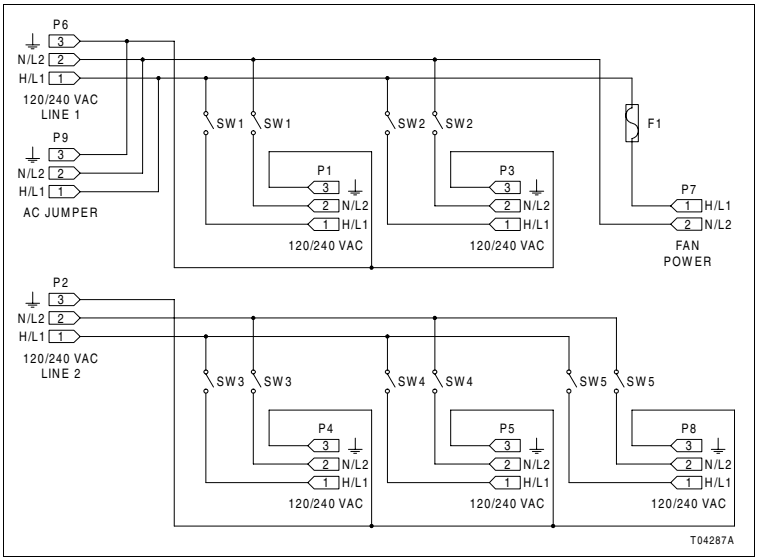

Figure 2-3. AC Input Assembly Schematic

at an AC mains terminal block or through an AC mains fuse assembly (Fig. 2-4). If a fuse assembly is used, refer to Table 2-1 for recommended AC input fuse ratings. Refer to Table 8-4 for fuse part numbers and the part number of a recommended fuse assembly.

Table 2-1. AC Input Fuse

AC Source		Power Supply	Fuse
120 VAC	Single	1 or 2	10 A
	Single	3 or 4	20 A
	Dual	1 to 4	10 A
240 VAC	Single	1 or 2	10 A
	Single	3 or 4	15 A
	Dual	1 to 4	10 A

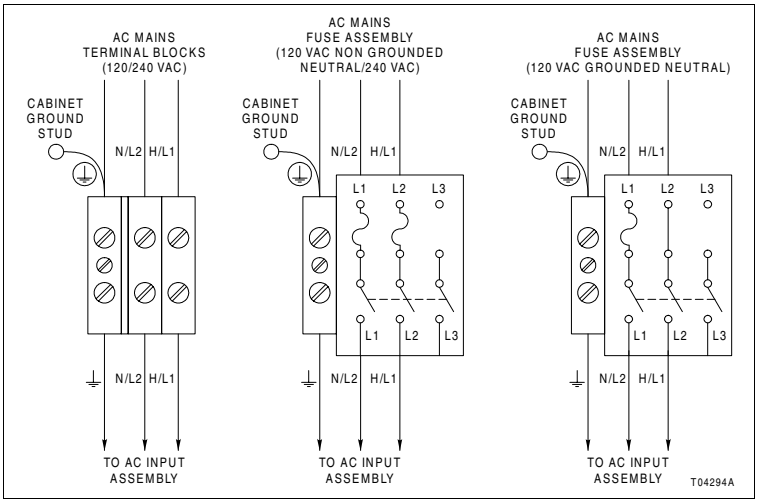

Figure 2-4. AC Mains Termination

The AC input assembly provides no fusing or transient protection for a Harmony power supply. All fusing and transient protection is provided by the Harmony power supply itself.

Dual Sources

When using dual AC input sources, AC input one is brought into the AC input assembly at connector P6 (Figs. 2-2 and 2-3). Input connector P6 provides power to output connector P1 through switch SW1, connector P3 through switch SW2, and connector P7 through fuse F1. AC input two is then brought into the AC input assembly at input connector P2. Input connector P2 provides power to output connector P4 through switch SW3, connector P5 through switch SW4, and connector P8 through switch SW5.

Single Source

When using a single AC input source, the AC input is brought into the AC input assembly at connector P6 (Figs. 2-2 and 2-3). Then AC input one power is transferred over to input connector P2 by externally wiring P2 to P9.

Transient Suppressor

If Overvoltage Category II rating at 240 VAC is not sufficient for the Harmony system application, a transient suppressor can be installed between the AC mains terminal block or AC mains fuse assembly and the AC input assembly to achieve the desired overvoltage category rating (Fig. 2-5). Refer to Table 8-4 for the part number of a recommended transient suppressor.

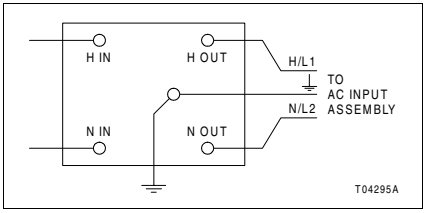

Figure 2-5. Transient Suppressor

The transient suppressor is an isolated package that can be mounted to any flat surface. Locate the suppressor between the input terminators and the AC input assembly.

Power Supply Options

When using one input power source, up to five power supplies can be used: BLP A, BLP B, and three IFP power supplies. In this case, all power supplies connected receive input power from this one source.

When using two input power sources to achieve redundancy, up to four power supplies can be used: BLP A, BLP B, and two IFP power supplies. In this case, the BLP A power supply and one IFP power supply use AC input one, and the BLP B power supply and the second IFP power supply use AC input two.

Refer to ***Power Supplies*** in this section for additional information.

AC Output

Cables connect AC power from output connectors P1, P3, P4, P5, and P8 of the AC input assembly to each power supply

(Figs. 2-2 and 2-3). Separate on/off switches SW1 through SW5 allow individually toggling power to each power supply. Refer to Table 1-5 for switch power ratings.

Door Fan Power

The AC input assembly provides 120 VAC or 240 VAC power to the enclosure door fan from connector P7. This power is supplied by AC input one on connector P6. Fuse F1 provides overcurrent protection for connector P6.

NOTE: The door fan must be rated for division 2, hazardous locations.

For a 240 VAC powered fan, fuse F1 provides overcurrent protection for line one (L1) only. It is recommended that an external fuse be placed between the line two (L2) input and the door fan. Refer to Table 8-4 for the part number of a recommended fused terminal block that can be used to provide the external fusing.

Ground

The cover plate on the AC input assembly is a ground panel that makes the common earth ground connection for AC input one (P6) and AC input two (P2). The ground panel also makes the earth ground connection for switches SW1 through SW5.

Power Supplies

The 24 VDC power supplies come in two different power ratings: 480 watt and 240 watt. The power system supports five power supplies, two designated for BLP power and three for IFP power. On the input side, the power supplies provide:

- Full isolation, input to output.
- Power factor correction.
- Transient protection.
- Input filtering.
- Hot-swap capability.
- Input over and under voltage protection.

On the output side, the power supplies provide:

- Short circuit protection.
- Overload protection.

- No minimum load requirement.
- Current share capabilities.

NOTES:

1. Power supplies are ordered separately. Refer to Table 8-2 for part numbers.

2. When using dual AC input sources, two supplies are powered from AC input one and two are powered from AC input two.

Using single or dual AC input sources and the individual power supply output power ratings affect the maximum number of power supplies. Table 2-2 lists some valid power supply configurations for a single Harmony power system.

Table 2-2. Power Supply Configurations

Option	AC Input Source[1]	Power Rating[2]	
		240 W	480 W
1	Single	5	—
2	Single	—	4
3	Single	3	2
4	Dual	4	—
5	Dual	—	4

NOTES:
1. When using dual AC input sources, two supplies are powered from AC input 1 and two are powered from AC input 2.
2. Maximum total current for BLP and for IFP is not to exceed 20 amperes.

DC Output Assembly

The DC output assembly shown in Figure 2-6 distributes 24 VDC power to various power system devices and to various Harmony control unit devices. The assembly supports 12 DC output connections.

Figure 2-7 is a simplified schematic diagram of the DC output assembly. The assembly has three isolated 24 VDC power buses: BLP A, BLP B, and IFP. Also, fused 24 VDC field power is available at 14 terminal blocks on the assembly.

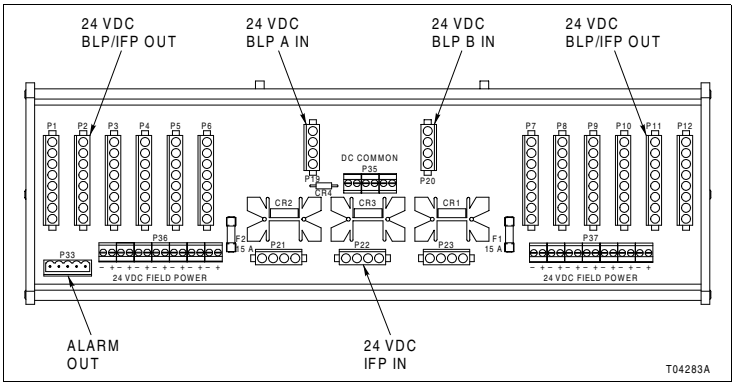

Figure 2-6. DC Output Assembly

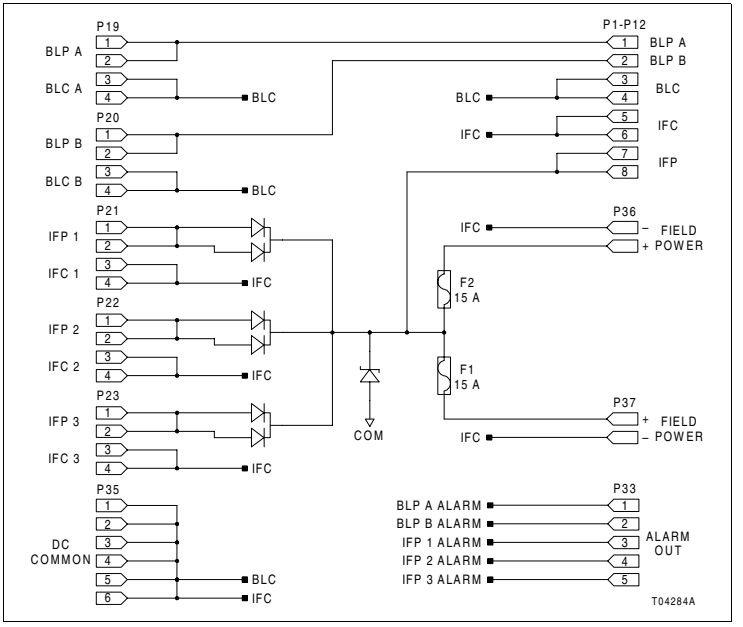

Figure 2-7. DC Output Assembly Schematic

Block Logic Power

BLP A power connects to the DC output assembly at input connector P19 and BLP B power connects to the DC output assembly at input connector P20. Cables connect the BLP power between the DC output assembly and the BLP A and BLP B power supplies. The maximum total current drawn through connectors P19 and P20 is not to exceed 20 amperes or 480 watts each.

BLP A power is available on pin one and BLP B power is available on pin two of output connectors P1 through P12 (Fig. 2-7). The BLP A and BLP B busses share a common return path, block logic common (BLC). This BLC common is available on pins three and four of output connectors P1 through P12.

Internal Field Power

IFP power connects to the DC output assembly at input connectors P21, P22, and P23. Cables connect the IFP power between the DC output assembly and the IFP power supplies. The total current drawn through these connectors cannot exceed 20 amperes or 480 watts. The DC output assembly diode auctioneers (i.e., ORs) the 24 VDC outputs of the IFP power supplies into one common IFP bus.

IFP power is available on pins seven and eight of output connectors P1 through P12 (Fig. 2-7). The common return for IFP is internal field bus common (IFC). This IFC common is available on pins five and six of output connectors P1 through P12.

24 VDC Field Power

The DC output assembly provides fused 24 VDC field power for external device connection. It has two banks of seven connectors: bank one P36 and bank two P37 (Fig. 2-6). The field power is derived from the IFP power supplies. The total maximum current drawn through each bank of field power connectors cannot exceed 15 amperes. Each connector will accept up to 3.3 square-millimeter (12 AWG) wire.

DC Common

Grounding issues must be considered at the system level and are not discussed in detail in this instruction. Refer to the ***Site Planning*** instruction for system grounding information and considerations.

Connector P35 provides a common reference point for the BLC and IFC commons (Fig. 2-7). This is the only location in the enclosure where both the BLC and IFC commons are connected. In a single enclosure system, this point should be tied to a cabinet earth ground stud. In a multibay enclosure, DC common connections (P35) for all DC output assemblies within the enclosure must be daisy-chained together using 3.3 square-millimeter (12 AWG) wire, then tied to a cabinet earth ground stud at one location.

In Harmony systems that have module mounting units (MMU) with Harmony rack modules, the MCOM and I/O COM on the MMU backplane must be connected to DC common on the DC output assembly using 3.3 square-millimeter (12 AWG) wire.

Alarm Outputs

The alarm outputs at output connector P33 shown in Figure 2-7 are used to monitor the BLP A voltage level at connector P19, BLP B voltage level at connector P20, and IFP voltage levels at connectors P21, P22, and P23. If any of these voltage levels drop below 21.6 VDC, the alarm assembly will activate an alarm signal. Refer to ***Alarm Assembly*** in this section for further explanation.

Short Circuit Protection

All Harmony power supplies have short circuit and overvoltage protection on their outputs. The DC output assembly does not provide any additional protection for the power supplies that are connected to it. The assembly does, however, have protection for the IFP auctioneering diodes. A transient voltage suppressor is included to insure that the IFP bus never exceeds 45.7 VDC if a transient fault occurs.

MMU Power Assembly

The Harmony power system provides 24 VDC power to the module mounting unit for Harmony rack module power. This power is then used by a rack-mounted IEPDS01 power supply to develop the 5 VDC, 15 VDC, and -15 VDC voltages required by rack modules. Refer to Appendix B and the ***DC Modular Power System*** instruction for additional IEPDS01 information.

NOTE: Do not use the 24 VDC output of the MMU power assembly as field power for any other type of external device.

The MMU power assembly shown in Figure 2-8 distributes the 24 VDC power to the module mounting units. The MMU power assembly supports two module mounting units each with its own connection point on the assembly. Figure 2-9 is a simplified schematic diagram of the MMU power assembly.

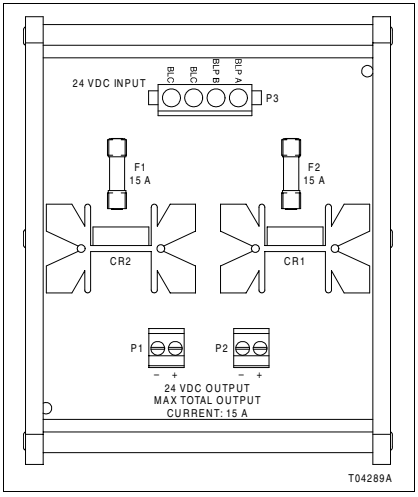

Figure 2-8. MMU Power Assembly

A cable connects BLP A and BLP B power from any one of output connectors P1 through P12 on the DC output assembly to input connector P3 on the MMU power assembly. The MMU power assembly diode auctioneers (i.e., ORs) the DC output assembly 24 VDC outputs into one common 24 VDC bus. This

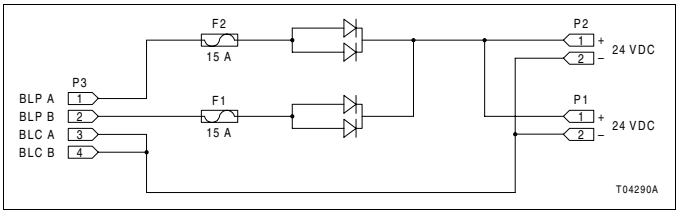

Figure 2-9. MMU Power Assembly Schematic

24 VDC bus is connected to pin one of connectors P1 and P2. BLC common is connected to pin two of these connectors. The connection between the MMU power assembly (P1-1, P1-2 or P2-1, P2-2) and the MMU backplane (P39 and P40) is wired using 3.3 square-millimeter (12 AWG) wire.

Alarm Assembly

The alarm assembly shown in Figure 2-10 performs the following functions:

- Provides 24 VDC power to column fans.
- Monitors column fan status.
- Monitors voltages on the DC output assembly.
- Monitors enclosure door fans.
- Provides 5 VDC power to door fan status circuitry.
- Monitors the IEPDS01 power supply status.

Figure 2-11 is a simplified functional block diagram of the alarm assembly. The alarm assembly receives its power from the DC output assembly. A cable connects BLP A, BLP B, and IFP power and the BLC and IFC commons from the DC output assembly to the alarm assembly at input connector P12. BLP A and BLP B are fused and diode auctioneered (i.e., ORed) on the alarm assembly.

The column fan power and column fan monitoring circuitry is powered by IFP power. The voltage (BLP/IFP) monitoring, door fan monitoring, and the auxiliary power supply (i.e., IEPDS01 power supply) monitoring circuitry is powered by 5 VDC developed onboard the assembly. An onboard voltage regulator develops the 5 VDC from a single diode auctioneered 24 VDC. BLP A and BLP B power supplies provide the 24 VDC in this case.

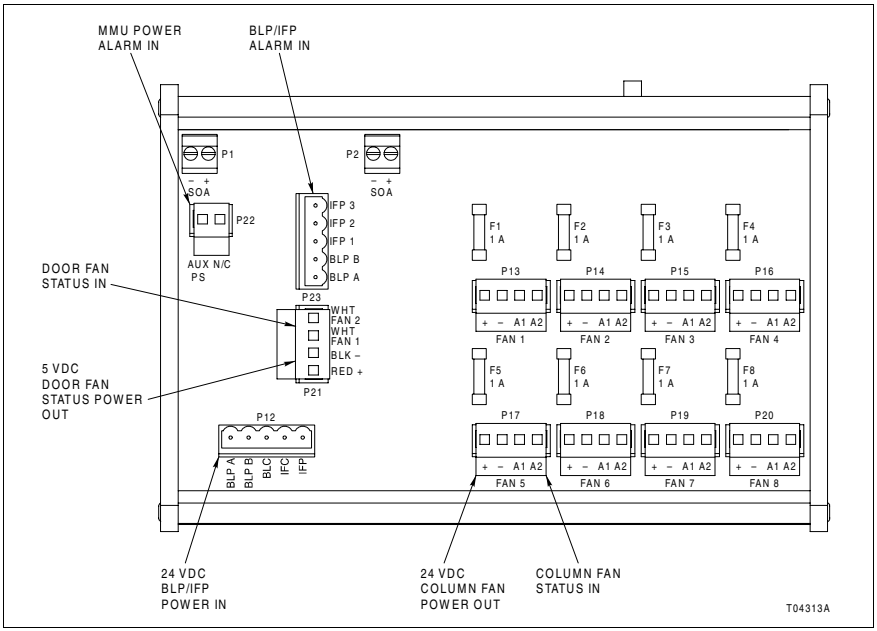

Figure 2-10. Alarm Assembly

The monitoring circuits on the alarm assembly have jumpers to enable or disable their function. The jumpers affect column fan status, voltage, and door fan status monitoring.

The alarm assembly has fusing to protect the bus voltages that power the monitoring and alarm circuitry. Fuses F9 and F10 provide protection for the BLP A and BLP B power while fuses F1 through F8 protect the IFP power for the column fans.

Status Output Alarm

If any device being monitored by the alarm assembly fails, the alarm assembly will warn the system operator by pulling the 5 VDC status output alarm (SOA) signal to a low logic level (0 VDC). A Harmony controller monitors the SOA signal line and will communicate this alarm to the rest of the system over Control Network (Cnet). Once sent on Cnet it can be seen on a human system interface. The SOA signal allows tracing a

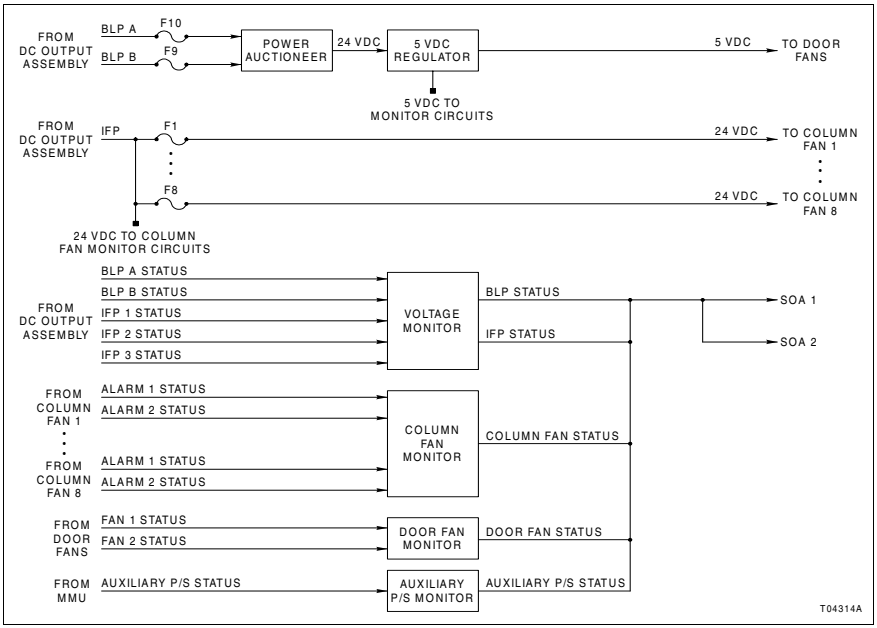

Figure 2-11. Alarm Assembly Block Diagram

problem to a particular enclosure. The assembly connects to the SOA lines (SOA 1 and SOA 2) at connectors P1 and P2.

Voltage (BLP/IFP) Status

The alarm assembly monitors the BLP A and BLP B power supplies and the individual power supplies providing the IFP power. The voltages that the alarm assembly monitors enter the alarm assembly at input connector P23. The alarm assembly monitors these voltages for low levels only.

The voltage monitor circuit is a basic non inverting comparator. If any of the power supply voltages fall below 21.6 VDC, the alarm assembly will recognize this as a bad power supply status and alert the system using the SOA signal. In order for the status to return to a good state, the power supply voltage must rise above 24 VDC.

The voltage monitoring circuits on the alarm assembly also provide LEDs to help recognize which power supply is bad (refer to ***Power System LEDs*** in Section 4). Each power supply has an LED that indicates good or bad output status.

Column Fan Power and Status

The alarm assembly provides IFP power for up to eight nonredundant column fans (P-HA-MSC-FAN11) or four redundant column fans (P-HA-MSC-FAN21). A nonredundant column fan contains two 24 VDC fans and a redundant column fan contains four 24 VDC fans. A single six conductor cable connects power and status for each pair of fans in the column fan assembly. The nonredundant column fan assembly uses one cable and one connection point while the redundant column fan assembly uses two cables and two connection points on the alarm assembly. Refer to the ***Block Power and Mounting Hardware*** instruction for a complete description of the column fans.

Each pair of fans in a column fan assembly is powered in parallel from one connector. Both positive (+) lead wires and both negative (-) lead wires from a pair of fans connect at the positive and negative terminals on the alarm assembly. Each fan, however, has its own status line.

The fan status signal is an open-collector, low true signal. Its return is the negative (-) power input or IFC common. The fan status circuitry monitors each of the fan status lines and as long as the status lines remain at a low logic level, the fan is considered good. If the status line rises to a high logic level, the alarm assembly will recognize this as bad fan status and alert the system using the SOA signal.

In order to help identify which fan in the column fan assembly is causing a problem, the monitoring circuitry provides each status line with its own LED labeled A1 and A2 (refer to ***Power System LEDs*** in Section 4).

Door Fan Status

The alarm assembly can monitor two enclosure door fans. Each enclosure door fan has a hall-effect circuit that returns a pulse-train signal for the alarm assembly to monitor. The door fan returns one pulse per second if the fan assembly is func-

tioning properly. If the pulses from the door fan stop, the alarm assembly will recognize this as a bad door fan status and alert the system using the SOA signal.

The door fan status circuitry also provides LEDs to help identify which door fan is bad (refer to ***Power System LEDs*** in Section 4).

MMU Power Status

The IEPDS01 supplies connect their status output pins to a common status bus on the MMU backplane. This internal status bus is available at connector P41 on the MMU backplane (located on the back of the module mounting unit). The common return for the status bus on the MMU backplane is I/O COM (connector P42) tied to DC common.

The auxiliary power supply status circuitry does ***not*** have an associated LED. The IEPDS01 power supply in the module mounting unit has an LED on its front panel that indicates good or bad output status.

Mounting

All Harmony power system assemblies except the power supplies come already attached to the power system mounting panels when ordered using the P-HA-HPS-KIT nomenclature (Table 8-1). Figure 2-12 shows the standard locations for the various assemblies on the mounting panel. Because the different assemblies, except the power supplies, use DIN-rail mounting, assemblies can be easily rearranged from this standard configuration.

The mounting panel is intended for standard 800-millimeter (31.5-inch) enclosures. The mounting panel has mounting holes that accommodate either 762-millimeter (30-inch) or 483-millimeter (19-inch) and side rails.

Cooling

The Harmony power system does not require any cooling fans for internal enclosure temperatures up to 60° C (140° F). Cooling accessories such as door fans are required if internal temperatures exceed 60° C (140° F).

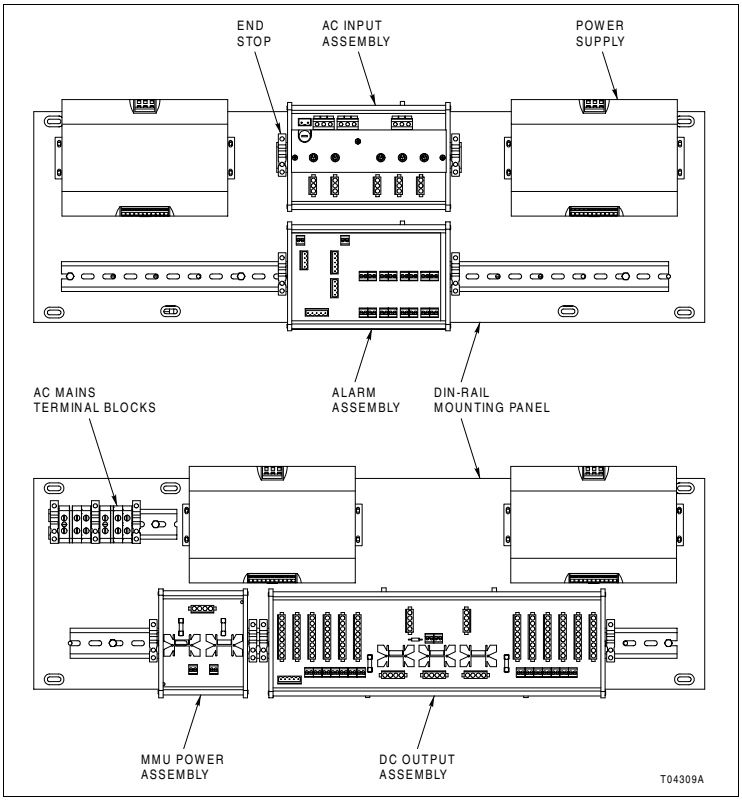

Figure 2-12. Standard Power System Configuration

Installation

Section 3

Introduction

This section explains the steps necessary to install and connect the Harmony power system. It discusses only power system installation requirements. The instruction does not provide any planning information and assumes all components have already been purchased and are ready to be installed.

Special Handling

Observe these steps when handling electronic circuitry:

1. ***Use Static Shielding Bag.*** Keep an assembly in its static shielding bag until ready to install it in the system. Save the bag for future use.

2. ***Ground Bags before Opening.*** Before opening a bag containing an assembly with static sensitive devices, touch it to the equipment housing or ground to equalize charges.

3. ***Avoid Touching Circuitry***. Handle assemblies by the plastic outer packaging; avoid touching the circuitry.

4. ***Ground Test Equipment***.

5. ***Use an Antistatic Field Service Vacuum.*** Remove dust from assemblies if necessary.

6. ***Use a Grounded Wrist Strap.*** Use the ABB Automation field static kit (part number 1948385A1 - consisting of two wrist straps, ground cord assembly, alligator clip, and static dissipative work surface) when working with assemblies. The kit grounds a technician and the static dissipative work surface to the same ground point to prevent damage to the circuitry by electrostatic discharge. Connect the wrist strap to an unpainted portion of the enclosure with the alligator clip. The wrist strap must be effectively connected to the earth grounding electrode system through the AC safety ground.

7. ***Do Not Use Lead Pencils to Set Switches.*** To avoid contamination of switch contacts that can result in unnecessary circuit board malfunction, do not use a lead pencil to set a switch.

Unpacking and Inspection

1. Examine the hardware immediately to verify that it has not been damaged in transit.

2. Notify the nearest ABB sales office of any damage.

3. File a claim for any damage with the transportation company that handled the shipment.

4. Use the original packing material and container to store the hardware.

5. Store the hardware in an environment of good air quality, free from temperature and moisture extremes and corrosives.

Installation and Connection Sequence

WARNING	**Verify the cabinet AC power is turned off at the AC mains disconnect before starting installation procedures. Failure to do so could result in severe or fatal shock. Do not turn the power on until the installation is complete.**

Figure 3-1 is the Harmony power system installation and connection flowchart. In the flowchart, each flowchart block represents a single task. The PR code in the flowchart block identifies the procedure section that describes the steps to complete the indicated task. For example, turn to section PR3 to read about power system assembly installation. Some steps are self-explanatory and have no related procedure section. Complete all steps given in a procedure section before continuing to the next flowchart block. The procedure sections are located towards the back of the instruction.

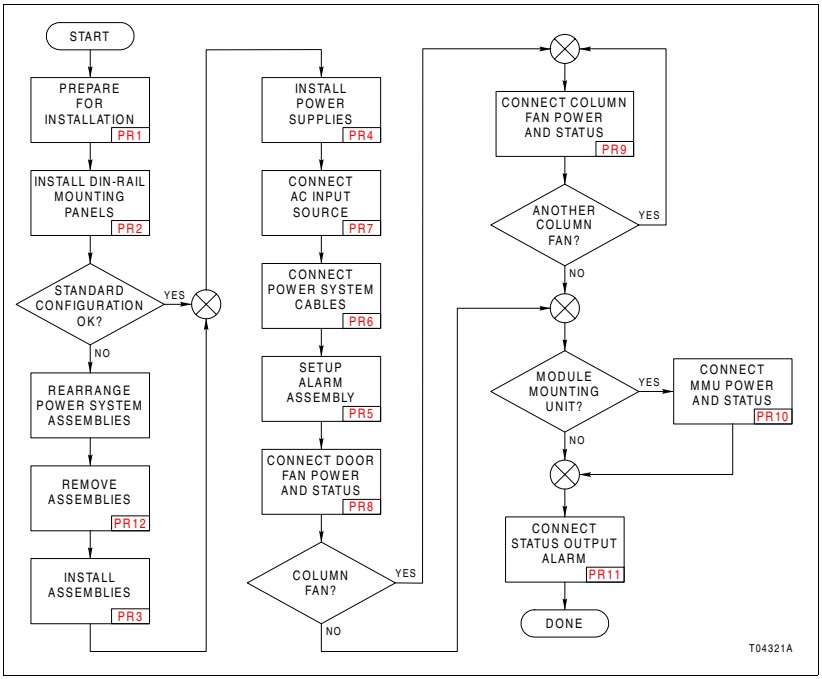

Figure 3-1. Installation and Connection Flowchart

Operating Procedures

Section 4

Introduction

This section describes Harmony power system start up, and describes the LED indications for the power system. Both the power supplies and the alarm assembly have LED status indicators to help isolate power system problems.

Start Up

There are no special startup procedures for the Harmony power system. To turn on the power system after installation is complete:

1. Verify that each AC power switch (SW1 through SW5) on the AC input assembly is turned off (Fig. 2-2).

2. If an AC mains fuse assembly is installed, verify the proper fuses are installed and it is switched on. Refer to ***AC Input*** in Section 2 for a description of the AC mains fuse assembly.

3. Verify that the AC input cables and the DC output cables are properly connected to the power supplies.

4. Turn on the main AC input power at the AC mains disconnect.

5. Turn on (up position) each AC power switch SW1 through SW5 that has an associated power supply connected. Make sure any AC power switch that does not have an associated power supply connected remains in the off position.

Power System LEDs

Table 4-1 summarizes the power system status LED indications. Figure 4-1 shows the LED locations on the alarm assembly.

NOTE: Refer to Section 5 for troubleshooting information for bad status indications.

Table 4-1. Power System Status LED Summary

Assembly/Status	LED	Indication
Power supply output status	Front panel	Green = good Off = bad
IEPDS01 power supply status	Front panel	Green = good Red = bad
Alarm assembly voltage status	BLP: CR39	Off = good On = bad
	IFP: CR40	
Alarm assembly column fan status	FAN1: CR17 (A1), CR18 (A2)	
	FAN2: CR20 (A1), CR19 (A2)	
	FAN3: CR21 (A1), CR22 (A2)	
	FAN4: CR23 (A1), CR24 (A2)	
	FAN5: CR25 (A1), CR26 (A2)	
	FAN6: CR27 (A1), CR28 (A2)	
	FAN7: CR29 (A1), CR30 (A2)	
	FAN8: CR31 (A1), CR32 (A2)	
Alarm assembly door fan status	Door fan 1: CR33	
	Door fan 2: CR34	

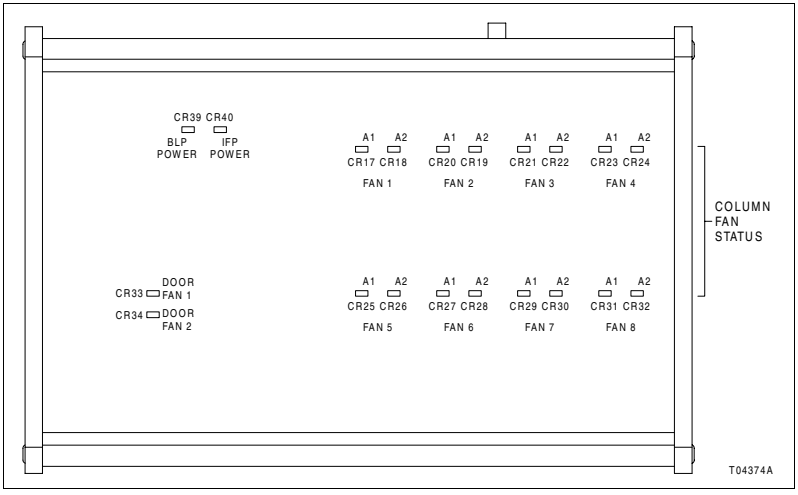

Figure 4-1. Alarm Assembly LED Indicators

Troubleshooting

Section 5

Introduction

This section provides troubleshooting information necessary to isolate Harmony power system problems. It is not meant to be all inclusive. If a problem exists that cannot be corrected using the information provided in this instruction, contact a local ABB service office for assistance.

Status Indications

Troubleshooting of the Harmony power system is performed mainly by observing LED indications. The alarm assembly provides LED indications for the BLP power, IFP power, column fans, and door fans. Power supplies also have good/bad status LEDs. Refer to ***Alarm Assembly*** in Section 2 for additional information.

Table 5-1 summarizes the bad status indications for the alarm summary and provides some corrective actions.

Table 5-1. Alarm Assembly Bad Status Indications and Corrective Actions

Status	LED[1]	Corrective Action
Voltage	BLP: CR39	Check BLP power supplies connected at P19 and P20 of the DC output assembly
	IFP: CR40	Check IFP power supplies connected at P21, P22, and P23 of the DC output assembly
Column fan	FAN1: CR17 (A1)	Check fan connected at P4-A1 of the alarm assembly
	FAN1: CR18 (A2)	Check fan connected at P4-A2 of the alarm assembly
	FAN2: CR20 (A1)	Check fan connected at P6-A1 of the alarm assembly
	FAN2: CR19 (A2)	Check fan connected at P6-A2 of the alarm assembly
	FAN3: CR21 (A1)	Check fan connected at P8-A1 of the alarm assembly
	FAN3: CR22 (A2)	Check fan connected at P8-A2 of the alarm assembly
	FAN4: CR23 (A1)	Check fan connected at P10-A1 of the alarm assembly
	FAN4: CR24 (A2)	Check fan connected at P10-A2 of the alarm assembly
	FAN5: CR25 (A1)	Check fan connected at P13-A1 of the alarm assembly
	FAN5: CR26 (A2)	Check fan connected at P13-A2 of the alarm assembly

Table 5-1. Alarm Assembly Bad Status Indications and Corrective Actions *(continued)*

Status	LED[1]	Corrective Action
Column fan *(continued)*	FAN6: CR27 (A1)	Check fan connected at P15-A1 of the alarm assembly
	FAN6: CR28 (A2)	Check fan connected at P15-A2 of the alarm assembly
	FAN7: CR29 (A1)	Check fan connected at P17-A1 of the alarm assembly
	FAN7: CR30 (A2)	Check fan connected at P17-A2 of the alarm assembly
	FAN8: CR31 (A1)	Check fan connected at P19-A1 of the alarm assembly
	FAN8: CR32 (A2)	Check fan connected at P19-A2 of the alarm assembly
Door fan	Door fan 1: CR33	Check fan connected at P21-FAN1 of the alarm assembly
	Door fan 2: CR34	Check fan connected at P21-FAN2 of the alarm assembly

NOTE:
1. An LED on indicates bad status.

SOA Alarm

The alarm assembly can monitor and report a problem with BLP power, IFP power, a column fan, and additionally MMU power within a single Harmony control unit (HCU) by activating an SOA alarm. This assumes the monitoring circuitry has been enabled and status signals have been properly connected to the assembly. Refer to ***Status Output Alarm*** in Section 2 for additional information.

The SOA signal line is monitored by a Harmony controller. SOA status reported to the system by the controller provides a means to narrow a problem down to a specific HCU cabinet. After the specific HCU cabinet with a problem has been identified, LED indications can be observed to further narrow the problem down.

> **NOTE:** If there is an active SOA alarm and the alarm assembly does not show any bad status, check the IEPDS01 power supply located in a monitored module mounting unit. Also, other Harmony devices such as Harmony controllers and Harmony blocks can activate an SOA alarm for local power problems.

AC Input Assembly Connectors

Table 5-2 lists the pin assignments for the AC output cable connectors of the AC input assembly. The assignments for the screw terminals are silk-screened on the board.

Table 5-2. P1, P3 AC Output One and P4, P5, P8 AC Output Two

Pin	Connection
1	Hot/line 1 (H/L1)
2	Neutral/line 2 (N/L2)
3	Ground

DC Output Assembly Connectors

Tables 5-3 through 5-6 list the pin assignments for the DC input, DC output, and alarm output cable connectors of the DC output assembly. The assignments for the screw terminals are silk-screened on the board.

Table 5-3. P19 BLP A Input and P20 BLP B Input

Pin	Connection
1	BLP
2	BLP
3	BLC
4	BLC

Table 5-4. P21 IFP One Input, P22 IFP Two Input, and P23 IFP Three Input

Pin	Connection
1	IFP
2	IFP
3	IFC
4	IFC

Table 5-5. P1 - P12 BLP/IFP Output

Pin	Connection
1	BLP A
2	BLP B
3	BLC
4	BLC
5	IFC
6	IFC

Table 5-5. P1 - P12 BLP/IFP Output *(continued)*

Pin	Connection
7	IFP
8	IFP

Table 5-6. P33 Voltage Status Output

Pin	Connection
1	BLP A status
2	BLP B status
3	IFP 1 status
4	IFP 2 status
5	IFP 3 status

MMU Power Assembly Connectors

Table 5-7 lists the pin assignments for the DC input cable connector of the MMU power assembly. The assignments for the screw terminals are silk-screened on the board.

Table 5-7. P3 BLP Input

Pin	Connection
1	BLP A
2	BLP B
3	BLC
4	BLC

Alarm Assembly Connectors

Tables 5-8 and 5-9 list the pin assignments for the DC input and alarm input cable connectors of the alarm assembly. The assignments for the screw terminals are silk-screened on the board.

Table 5-8. P12 BLP/IFP Input

Pin	Connection
1	BLP A
2	BLP B

Table 5-8. P12 BLP/IFP Input *(continued)*

Pin	Connection
3	BLC
4	IFC
5	IFP

Table 5-9. P23 Voltage Status Input

Pin	Connection
1	BLP A status
2	BLP B status
3	IFP 1 status
4	IFP 2 status
5	IFP 3 status

Maintenance

Section 6

Introduction

The reliability of any stand-alone product or control system is affected by the maintenance of the equipment. ABB Automation recommends that all equipment users practice a preventive maintenance program that will keep the equipment operating at an optimum level.

This section presents procedures that can be performed on-site. These preventive maintenance procedures should be used as guidelines to assist in establishing good preventive maintenance practices. Select the minimum steps required to meet the cleaning needs of your system.

Personnel responsible for maintenance should be familiar with the Harmony power system, have experience working with process control systems, and know what precautions to take when working on live AC systems.

Preventive Maintenance Schedule

Table 6-1 is the preventive maintenance schedule for the Harmony power system. The table lists the preventive maintenance tasks in groups according to their specified maintenance interval. Some tasks in Table 6-1 are intuitive or self explanatory. Instructions for tasks that require further explanation are covered in the indicated procedure section.

NOTE: The preventive maintenance schedule is for general purposes only. Your application may require special attention.

Table 6-1. Preventive Maintenance Schedule

Task	Procedure	Frequency
General cleaning. Use a lint-free cloth and mild, all-purpose, non-flammable, commercial spray cleaner to remove dirt, fingerprints, and grease from equipment. Spray the cleaner on the cloth and not directly on the equipment.	N/A	As required

Table 6-1. Preventive Maintenance Schedule *(continued)*

Task	Procedure	Frequency
Check equipment for dust. Clean as necessary using an antistatic vacuum. Insure air vents are free of dust and lint.	N/A	3 months
Check all signal, power, ground, and cable connections associated with the modules; verify they are secure.	PR14	
Complete all tasks in this table.	N/A	Shutdown

Repair and Replacement

Section 7

Introduction

This section explains repair and replacement procedures for individual Harmony power system assemblies.

Repair

Power system repair is limited to assembly replacement. If an assembly fails, remove and replace it with another. Do ***not*** attempt to replace discrete components in any Harmony system device.

Replacement

WARNING

Verify the cabinet AC power is turned off at the AC mains disconnect or the AC power is turned off using the AC input assembly switches as indicated in the replacement flowchart before starting the replacement procedure. Failure to do so could result in severe or fatal shock. Do not turn the power on until the replacement procedure is complete.

The replacement procedures for most parts and assemblies are intuitive. Figure 7-1 is the Harmony power system assembly replacement flowchart, which contains replacement procedures for those parts and assemblies that need explanation.

In the flowchart, each flowchart block represents a single task. The PR code in the flowchart block identifies the procedure section that describes the steps to complete the indicated task. Some steps are self-explanatory and have no related procedure section. Complete all steps given in a procedure section before continuing to the next flowchart block. The procedure sections are located towards the back of the instruction.

Important

Be sure all cables and wiring are clearly marked before removing them from any assembly so they can be easily reattached. If necessary refer to the appropriate cable connection and wiring procedure sections.

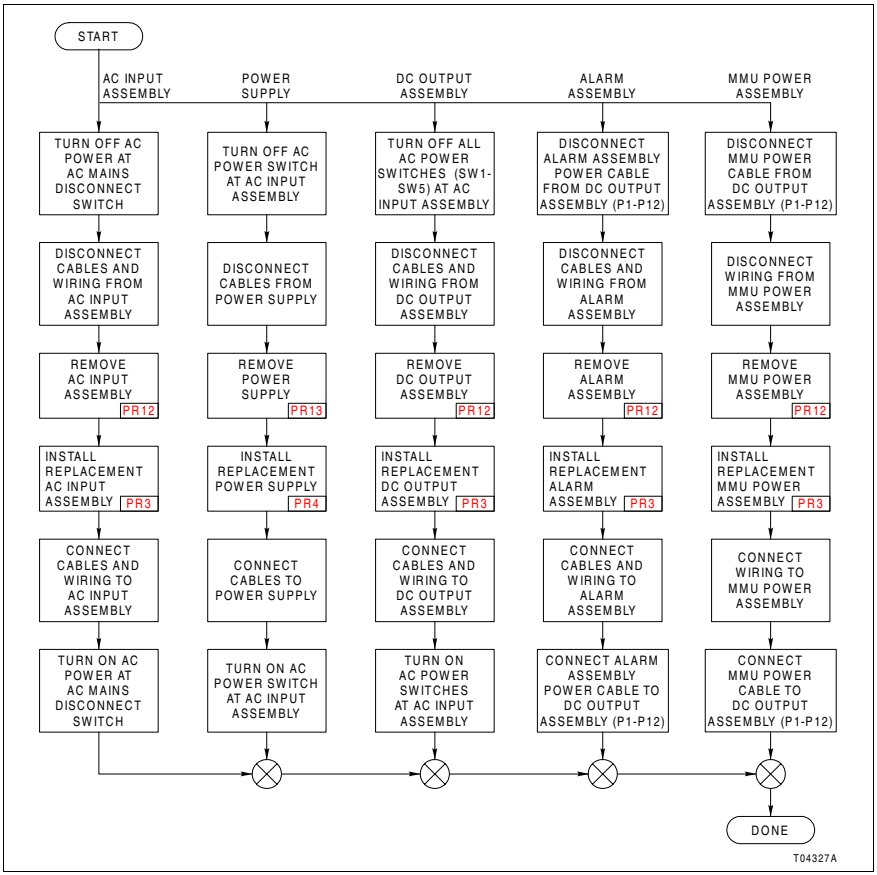

Figure 7-1. Replacement Flowchart

Replacement and Spare Parts

Section 8

Introduction

Order parts without commercial descriptions from the nearest ABB sales office. Contact ABB Automation for help determining the quantity of spare parts to keep on hand for your particular system.

Nomenclature

Table 8-1 lists the Harmony power system kit nomenclature. A kit contains the various power system assemblies, cables, and mounting panels but does not include the power supplies.

Table 8-1. Harmony Power System Kit Nomenclature

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	
P	**-**	**H**	**A**	**-**	**H**	**P**	**S**	**-**	**K**	**I**	**T**	**A**	**C**	_	_	_	**Base Nomenclature[1]**
																	Assembly Options
														0	0	0	Without MMU power assembly and cables
														5	0	0	With MMU power assembly and cables

NOTE:
1. Power supplies are ordered separately. Refer to Table 8-2 for power supply part numbers.

Parts

Tables 8-2 through 8-4 list Harmony power system part numbers.

Table 8-2. Assembly Part Numbers

Number	Description
1949779A1024240	240 W power supply
1949779A1024480	480 W power supply
6644177A1	DC output assembly
6644178A1	AC input assembly
6644179A1	Alarm assembly
6644184A1	Mounting panel
6644259A1	MMU power assembly

Table 8-3. Cable Part Numbers

Number	Description
6644260A1	Power cable, DC output assembly to MMU power assembly
6644263A1	Power cable, DC output assembly to alarm assembly
6644264A1	Alarms cable, DC output assembly to alarm assembly
6644411A1Nxxx	Power cable, power supply to DC output assembly. xxx = 400 mm (15.75 in.) 800 mm (31.5 in.)
6644412A1Nxxx	Power cable, AC input assembly to power supply. xxx = 400 mm (15.75 in.) 800 mm (31.5 in.)

Table 8-4. Miscellaneous Part Numbers

Number	Description
1910549A13750	Fuse, 0.375 A, 125 V, fast (for alarm assembly)
1941399A11	No. 8 terminal lug
1944265A10	Fuse, 20 A, 600 V (AC main)
1945861A5	Faston lug, 0.25 in. (for MMU status wiring)
1948182A21502	Fuse, 15 A, 125 V, fast (for MMU power assembly and DC output assembly)
1948182A22001	Fuse, 2 A, 250 V, fast (for AC input assembly)
1948182A31001	Fuse, 1.0 A, 250 V, slow (for alarm assembly)
1948470A1	Connector receptacle, red (for MMU power wiring)
1948470A2	Connector receptacle, black (for MMU power wiring)
1948471A2	Connector solderless contacts (for MMU power wiring)
1948501A5	Transient suppressor
1948714A11002	Fuse, 10 A, 125 V, fast (for IEPDS01 supply)
1948900A1	DIN-rail end stop
1949048A1	DIN-rail terminal block (ground)
1949123A1	DIN-rail terminal block, 40 A, 600 V (AC mains)
1949164A1	DIN-rail terminal block end cap
1949702A3	AC mains fuse assembly
1949703A1001	Fuse, 10 A, 600 V (AC main)
1949703A1501	Fuse, 15 A, 600 V (AC main)
197942A1	Power supply mounting bracket (2)

Hardware Drawings

Appendix A

Dimensions

This section provides drawings showing dimensions for Harmony power system assemblies (Figs. A-1 through A-5).

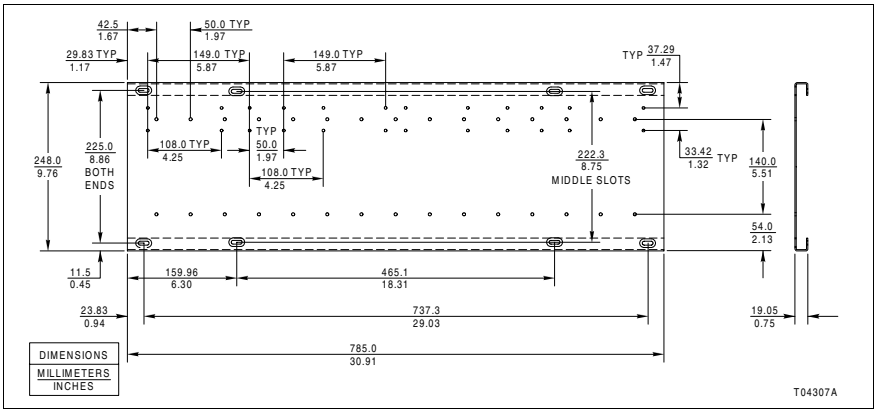

Figure A-1. Mounting Panel Dimensions

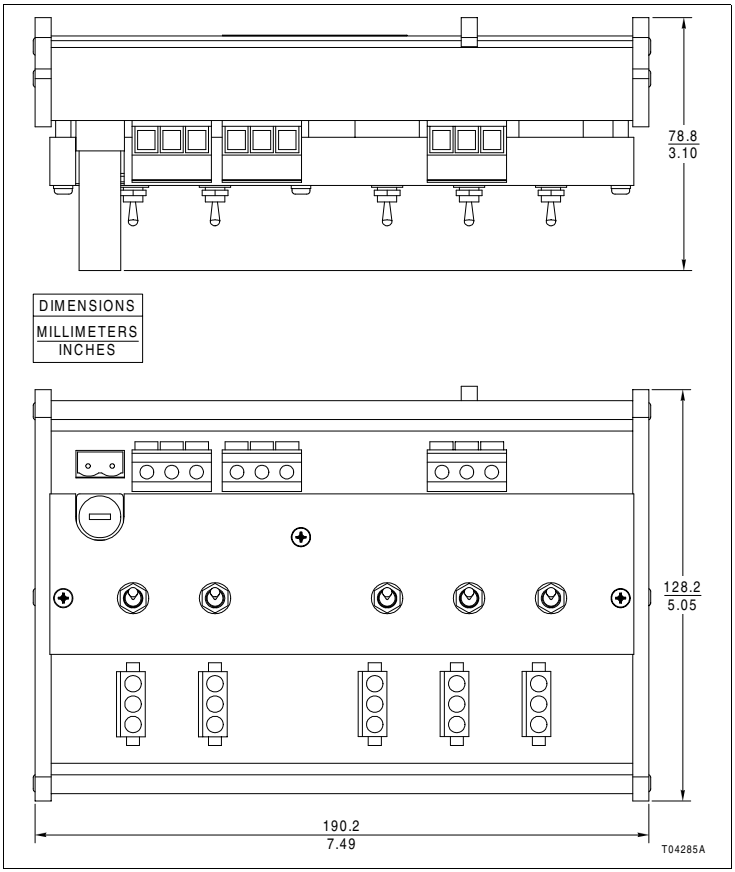

Figure A-2. AC Input Assembly Dimensions

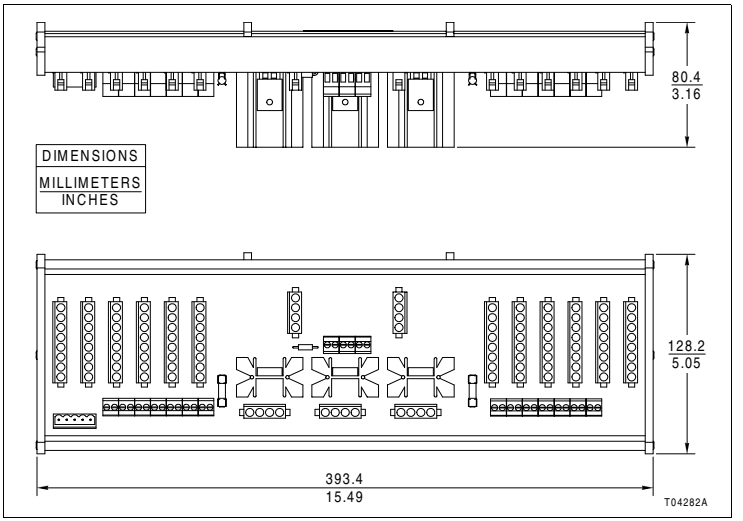

Figure A-3. DC Output Assembly Dimensions

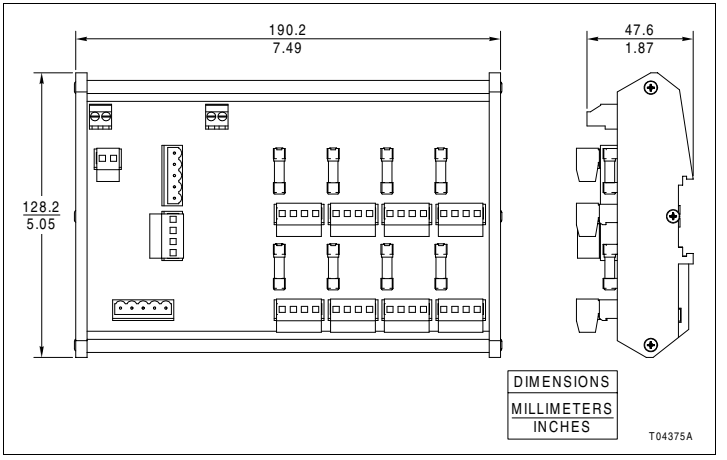

Figure A-4. Alarm Assembly Dimensions

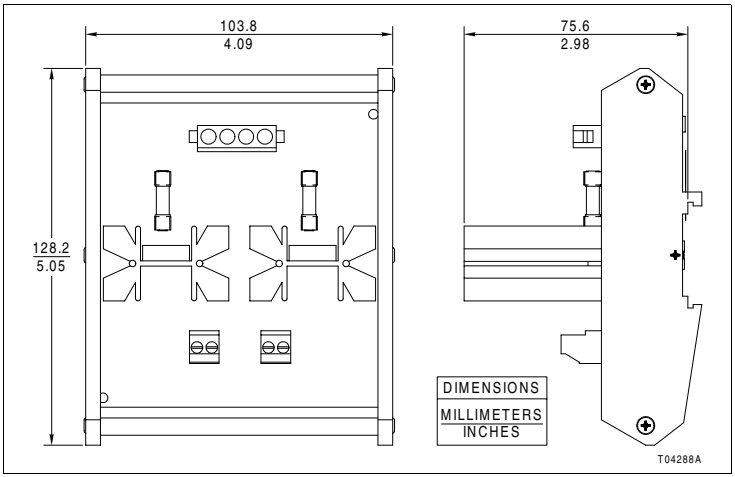

Figure A-5. MMU Power Assembly Dimensions

IEPDS01 Power Supply

Appendix B

Introduction

The IEPDS01 power supply module receives 24 VDC input power from the module mounting unit (MMU) backplane. DC-to-DC converters develop the regulated output voltages of 5 VDC, 15 VDC, -15 VDC, and 24 VDC. These voltages are available at the MMU backplane for distribution to Harmony rack modules. Refer to the ***DC Modular Power System*** instruction for complete information.

Installation

The IEPDS01 power module mounts directly in the module mounting unit. Any slot except the right-most slot (slot 12) can be used. Figure B-1 shows the power supply jumper and fuse locations. Table B-1 describes the IEPDS01 jumper settings. Verify a 10 ampere, 125 volt fuse is present in fuse holder F1. Refer to Table 8-4 for the fuse part number.

NOTE: For optimum heat dissipation and power distribution, do not exceed more than two IEPDS01 modules in any module mounting unit.

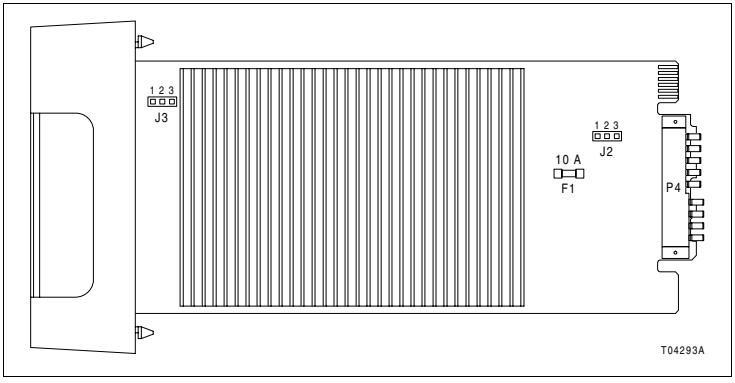

Figure B-1. IEPDS01 Board Layout

Table B-1. IEPDS01 Jumper Settings

Jumper	J1	Description
J2	1 [2 3]	Must be set to this position
J3	[1 2] 3	Disable voltage monitoring
	1 [2 3]	Enable voltage monitoring

Installation Preparation

PR1

Purpose/Scope

15 min.

This procedure gives steps that should be performed in preparation for Harmony power system installation and connection.

Parts None.

Tools None.

This instruction provides only general information for AC input power connection. Refer to the ***Site Planning*** instruction for detailed system AC distribution information.

NOTE: An AC mains disconnect (e.g., circuit breaker in a distribution panel) must be used on the AC input lines prior to entering the enclosure.

Safety Considerations

WARNING	**1. Verify the cabinet AC power is turned off at the AC mains disconnect before starting installation procedures. Failure to do so could result in severe or fatal shock. Do not turn the power on until the installation is complete.**

Procedure

☐ 1. Before the main AC input power can be connected to the the Harmony power system, it must be terminated inside the cabinet at the AC mains terminal blocks or through an AC mains fuse assembly. Refer to ***AC Input Assembly*** in Section 2 for further explanation. Verify the AC input power has been properly terminated inside the cabinet.

☐ 

2. Verify the AC mains disconnect switch is in the off position so there is no AC power being supplied to the enclosure.

☐ 3. Verify the proper fuses are present in the fuse holders of the various power system assemblies (refer to Table PR1-1).

Table PR1-1. Assembly Fuses

Assembly	Fuse[1]	Fuse Holder
AC input	2 A, 250 V	F1
Alarm	1 A, 250 V slow	F1 - F8
	0.375 A, 125 V fast	F9, F10
DC output	15 A, 125 V fast	F1, F2
MMU power	15 A, 125 V fast	F1, F2

NOTE:
1. Refer to Table 8-4 for fuse part numbers.

Mounting Panel Installation

PR2

Purpose/Scope

30 min.

This procedure describes power system mounting panel installation. When the power system is ordered using the P-HA-HPS-KIT nomenclature (Table 8-1), the AC input, DC output, and alarm assemblies, and optionally the MMU power assembly, are already installed on the mounting panels. The power system uses two mounting panels. Figure 2-12 shows the standard power system assembly arrangement.

Parts

Number	Qty	Description
200013A050T100	8	M5 × 10-mm, hex-head, thread-forming screw

Tools

- M5 nut driver.

Procedure

☐ 1. Locate the appropriate mounting panel at the top of the enclosure. Typically, the mounting panel that contains the AC input assembly mounts in the front side of the enclosure and the mounting panel that contains the DC output assembly mounts in the back.

☐ 2. Align then attach the mounting panel to the enclosure rails using four M5 screws as shown in Figure PR2-1. Refer to Figure A-1 for mounting hole spacing dimensions.

☐ 3. Repeat the previous steps for the second mounting panel.

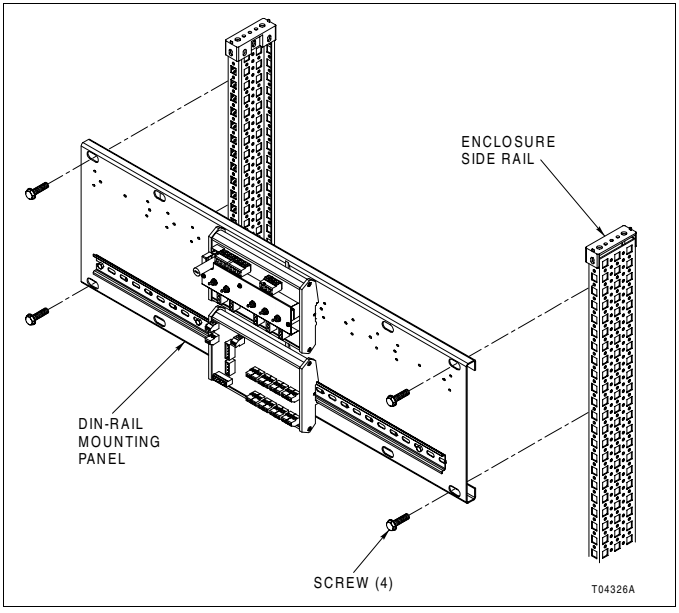

Figure PR2-1. Mounting Panel Installation

Power System Assembly Installation

PR3

Purpose/Scope

1 min.

This procedure describes how to mount a power system assembly on the mounting panel. This procedure applies when installing the AC input, DC output, alarm, or MMU power assemblies.

Parts

Number	Qty	Description
1948900A1	2	Din-rail end stop

Tools

- Flat-blade screwdriver.

Procedure

☐ 1. Hang the assembly on the DIN rail as shown in Figure PR3-1.

☐ 2. Push the front, bottom of the assembly until it snaps into place.

☐ 3. Insert a DIN-rail end stop on each side of the assembly to secure it in place (Fig. PR3-2).

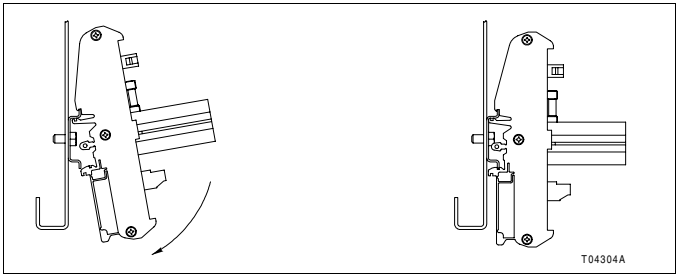

Figure PR3-1. Power System Assembly Installation

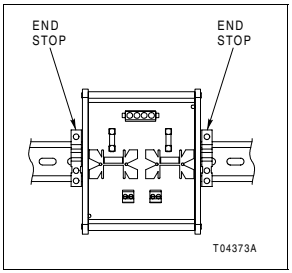

Figure PR3-2. End Stop Installation

Power Supply Installation

PR4

Purpose/Scope

1 min.

This procedure describes how to mount a power supply on the mounting panel.

Parts

Number	Qty	Description
197942A1	2	Power supply mounting bracket

Tools

- Phillips screwdriver.

NOTE: The minimum spacing around the power supply is 30 millimeters (1.2 inches) at the top and bottom, and 10 millimeters (0.4 inches) at left and right sides.

Procedure

☐ 1. Determine the location of the power supply on the mounting panel. Figure 2-12 shows the standard power system assembly arrangement.

☐ 2. Attach one power supply mounting bracket, left or right, to the mounting panel using the screws and washers provided (Fig. PR4-1).

☐ 3. Position the power supply on the mounting panel so that the tabs on the mounting bracket insert into the holes located on the side of the power supply.

☐ 4. Position the second mounting bracket on the other side of the power supply and attach it to the mounting panel using the screws and washers provided.

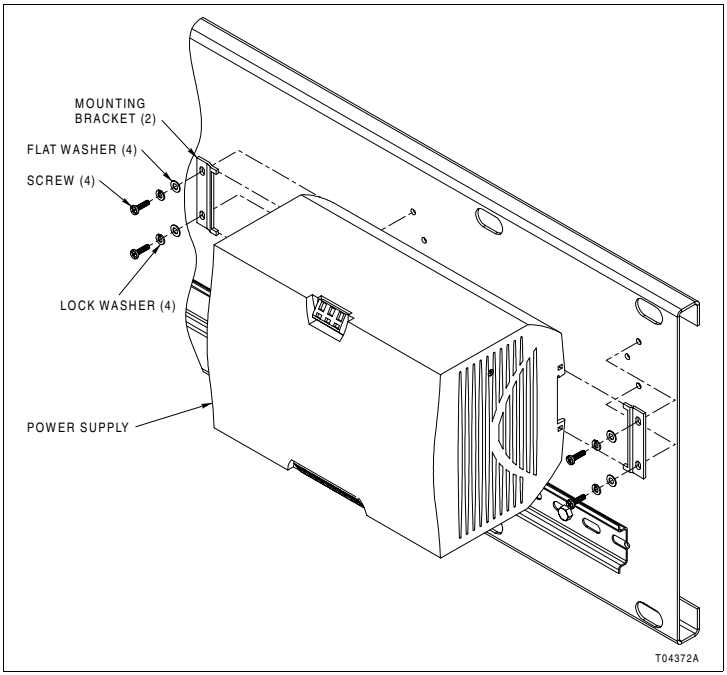

Figure PR4-1. Power Supply Installation

Alarm Assembly Setup

PR5

Purpose/Scope

5 min.

This procedure describes alarm assembly setup which involves setting various jumpers to enable or disable alarm statuses. Refer to ***Alarm Assembly*** in Section 2 for a description of the various alarm statuses the alarm assembly can monitor.

Parts None.

Tools
- Needlenose pliers (optional).

Procedure

☐ 1. Determine the desired alarm statuses to monitor: voltage (BLP/IFP), column fan, and door fan statuses.

☐ 2. Set the alarm jumpers J1 through J15 located on the alarm assembly according to Tables PR5-1 through PR5-3. Refer to Figure PR5-1 for jumper locations.

Table PR5-1. Column Fan Status Jumpers

Jumper	Enable	Disable	Description
J1	1 2 3	1 2 3	FAN1 status (P23)
J2	1 2 3	1 2 3	FAN2 status (P14)
J3	1 2 3	1 2 3	FAN3 status (P15)
J4	1 2 3	1 2 3	FAN4 status (P16)
J5	1 2 3	1 2 3	FAN5 status (P17)

Table PR5-1. Column Fan Status Jumpers *(continued)*

Jumper	Enable	Disable	Description
J6	[1 2] 3	1 [2 3]	FAN6 status (P18)
J7	[1 2] 3	1 [2 3]	FAN7 status (P19)
J8	[1 2] 3	1 [2 3]	FAN8 status (P20)

Table PR5-2. Door Fan Status Jumpers

Jumper	Enable	Disable	Description
J9	[1 2] 3	1 [2 3]	FAN2 status (P21)
J15	[1 2] 3	1 [2 3]	FAN1 status (P21)

Table PR5-3. Voltage Status Jumpers

Jumper	Enable	Disable	Description
J10	1 [2 3]	[1 2] 3	BLP A status (P23)
J11	1 [2 3]	[1 2] 3	BLP B status (P23)
J12	1 [2 3]	[1 2] 3	IFP 1 status (P23)
J13	1 [2 3]	[1 2] 3	IFP 2 status (P23)
J14	1 [2 3]	[1 2] 3	IFP 3 status (P23)

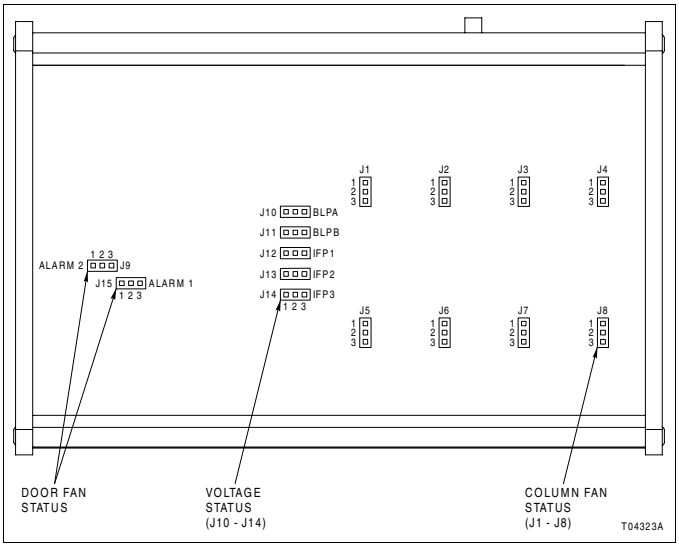

Figure PR5-1. Alarm Assembly Layout (Jumpers)

Power System Cable Connection

PR6

Purpose/Scope

30 min.

This procedure describes the cable connections needed between the power system assemblies and to the power supplies.

Parts Refer to Table PR6-1.

Tools None.

Procedure

☐ Figure PR6-1 shows the required power system cable connections and Table PR6-1 lists the cables. The circled numbers shown in Figure PR6-1 correspond to the numbers listed in the ***Cable No.*** column of Table PR6-1. Make the necessary cable connections according to Table PR6-1 and Figure PR6-1.

Table PR6-1. Power System Cables

Cable No.	Part Number	Description
1	6644412A1	Power cable, AC input assembly to power supply
2	6644411A1	Power cable, power supply to DC output assembly
3	6644263A1	Power cable, DC output assembly to alarm assembly
4	6644264A1	Alarms cable, DC output assembly to alarm assembly
5	6644260A1	Power cable, DC output assembly to MMU power assembly

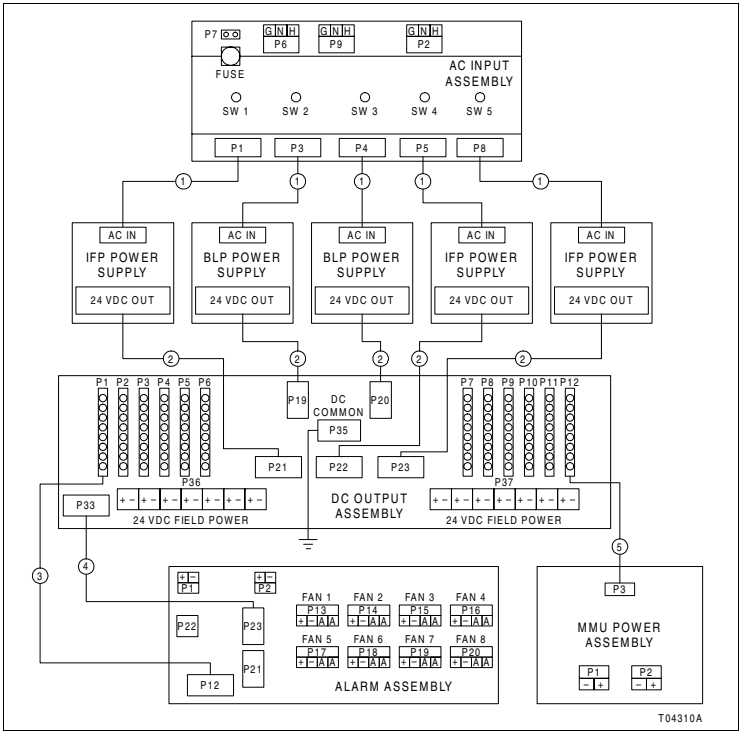

Figure PR6-1. Power System Cable Connections

AC Input Source Wiring

PR7

Purpose/Scope

10 min.

This procedure describes AC input source connection to the Harmony power system. The AC input connects at the AC input assembly. This section contains two procedures: one for connection of a single AC input source, and the other for connection of dual AC input sources. Follow the procedure that is appropriate to your particular site. Refer to ***AC Input Assembly*** in Section 2 for additional information.

NOTES:

1. Before the main AC input power can be connected to the Harmony power system, it must be terminated at the AC mains terminal blocks or through an AC mains fuse assembly. Refer to ***AC Input Assembly*** in Section 2 for further explanation.

2. This section describes AC mains termination using the terminal blocks.

Parts

Number	Qty	Description
1941399A11	3 (single source) 6 (dual source)	No. 8 terminal lug

Tools

- Flat-blade screwdriver.
- Site Planning instruction.

Safety Considerations

WARNING	**1. Verify AC power is turned off at the source (AC mains disconnect) before starting the AC input source wiring procedure. Failure to do so could result in severe or fatal shock.**

Single AC Input Source Procedure

☐ 1. Refer to the ***Site Planning*** instruction for recommended AC power wiring practices.

☐ W1 2. Connect AC input one to the AC mains terminal blocks as shown in Figure PR7-1. Terminate the wires using No. 8 terminal lugs.

☐ 3. Connect the AC input wires from the terminal blocks to connector P6 of the AC input assembly as shown in Figure PR7-1. The assembly terminals accept stripped wires up to 3.3 square-millimeter (12 AWG).

☐ 4. Jumper the AC input from connector P9 to connector P2 using the same rated wires as were used for the AC input source wiring (Fig. PR7-1).

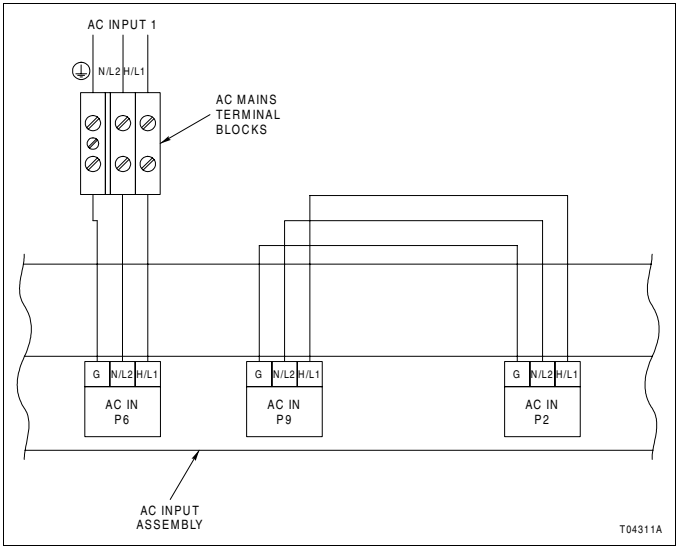

Figure PR7-1. Single AC Input Source Wiring

Dual AC Input Source Procedure

☐ 1. Refer to the ***Site Planning*** instruction for recommended AC power wiring practices.

☐ W1 2. Connect AC input one and AC input two to the AC mains terminal blocks as shown in Figure PR7-2. Terminate the wires using No. 8 terminal lugs.

☐ 3. Connect AC input source one to connector P6 of the AC input assembly as shown in Figure PR7-2. The assembly terminals accept stripped wires up to 3.3 square-millimeter (12 AWG).

☐ 4. Connect AC input two to connector P2 of the AC input assembly.

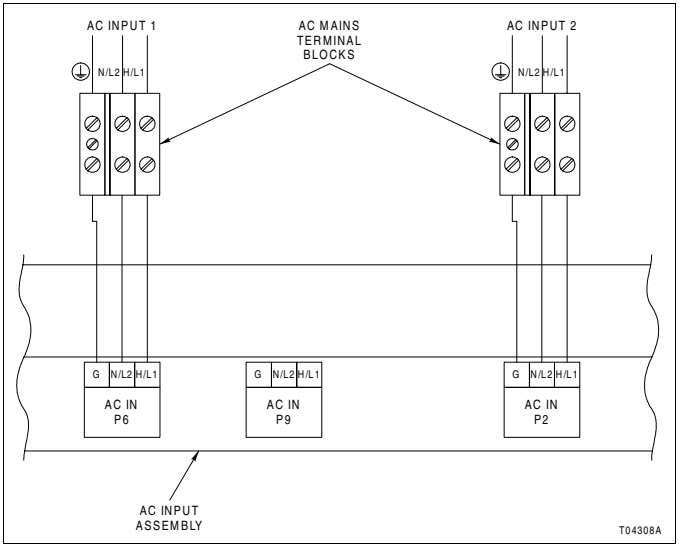

Figure PR7-2. Dual AC Input Source Wiring

Door Fan Power and Status Wiring

PR8

Purpose/Scope

10 min.

This procedure describes the power wiring connections needed between the AC input assembly and a door fan. This section also describes door fan status connection to the alarm assembly. The alarm assembly supports two door fan status connections.

Parts None.

Tools
- Flat-blade screwdriver.

Procedure

☐ 1. Connect the AC power wires from the door fan to connector P7 of the AC input assembly as shown in Figure PR8-1. The terminals accept stripped wires up to 3.3 square-millimeter (12 AWG). If there are two door fans, the AC power inputs for the fans should connect in parallel then connect to the AC input assembly.

☐ 2. Connect the red (+) and black (-) wires from door fan one to connector P21 of the alarm assembly as shown in Figure PR8-1. The alarm assembly provides 5 VDC on the positive wire and BLC common on the negative wire.

☐ 3. If there are two door fans, connect the red (+) and black (-) wires from door fan two to connector P21 in parallel with door fan one.

☐ 4. Connect the white status wire from door fan one to connector P21-FAN1 of the alarm assembly as shown in Figure PR8-1.

☐ 5. If there are two door fans, connect the white status wire from door fan two to connector P21-FAN2 of the alarm assembly as shown in Figure PR8-1.

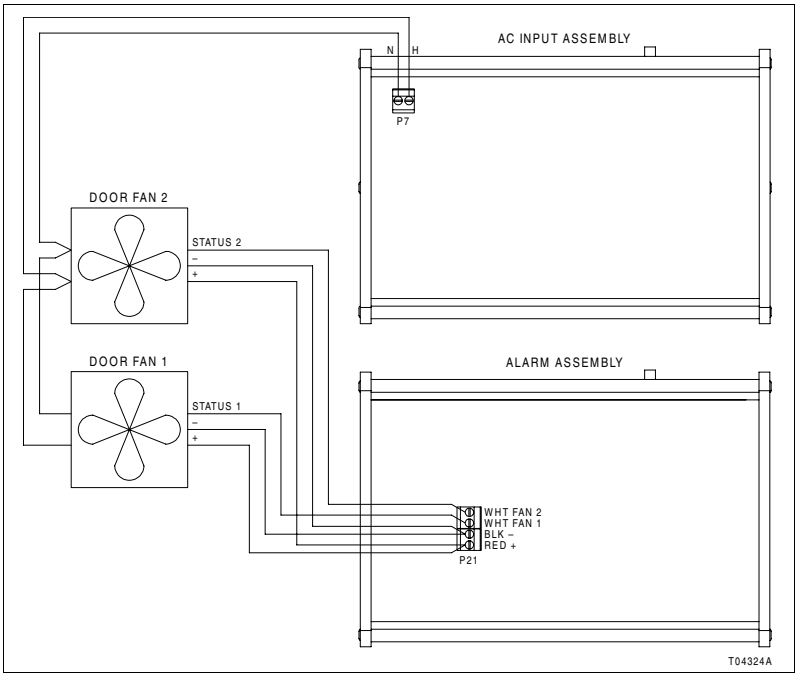

Figure PR8-1. Door Fan Power and Status Wiring

Column Fan Power and Status Wiring

PR9

Purpose/Scope

10 min.

This procedure describes the power wiring connections needed between the alarm assembly and a column fan (P-MSC-FAN11 and P-MSC-FAN21). This section also describes column fan status connections to the alarm assembly.

Parts None.

Tools
- Flat-blade screwdriver.
- Block Power and Mounting instruction.

Each column fan cable has six wires to connect a pair of fans in a column fan assembly. Each fan in a column fan assembly connects using a 24 VDC positive (+) wire, a 24 VDC common (-) wire, and a status wire. Power to a pair of fans connects in parallel to the alarm assembly. The status of each fan is monitored separately, and each fan has its own status line connection point to the alarm assembly.

Procedure

1. Connect both 24 VDC positive (+) wires from a pair of column fans to the alarm assembly according to Table PR9-1 and Figures PR9-1 and PR9-2. For example, when connecting a nonredundant column fan assembly to FAN1 of the alarm assembly, connect both positive lead wires for the two fans to P13-4.

2. Connect both 24 VDC common (-) wires from a pair of column fans to the alarm assembly according to Table PR9-1 and Figures PR9-1 and PR9-2. For example, when connecting a nonredundant column fan assembly to FAN1, connect both negative lead wires to P13-3.

3. Each fan in the column fan assembly has its own fan status line, and each is connected separately. Connect the fan status lines to the alarm assembly according to Table PR9-1 and Figures PR9-1 and PR9-2. For example, when connecting a nonredundant column fan assembly to FAN1, connect the

fan status line of one fan to P13-2 (A1) and the fan status line of the other fan to P13-1 (A2).

Table PR9-1. Column Fan Wiring

Wire	Signal	Pins			
		FAN 1	FAN 2	FAN 3[1]	FAN 4[1]
Red	24 VDC (+)	4	—	4	—
Black	Common (-)	3	—	3	—
White	Status (A1)	2	—	2	—
Brown	24 VDC (+)	—	4	—	4
Blue	Common (-)	—	3	—	3
Green	Status (A2)	—	1	—	1

NOTE:
1. Second pair of fans in a redundant column fan assembly.

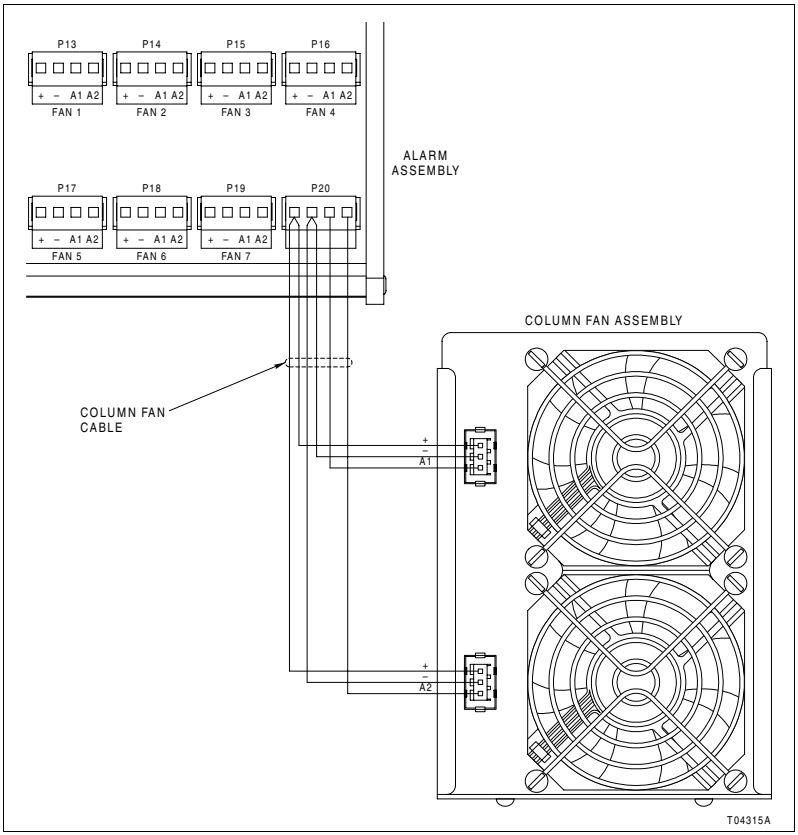

Figure PR9-1. Column Fan Wiring (P-HA-MSC-FAN11)

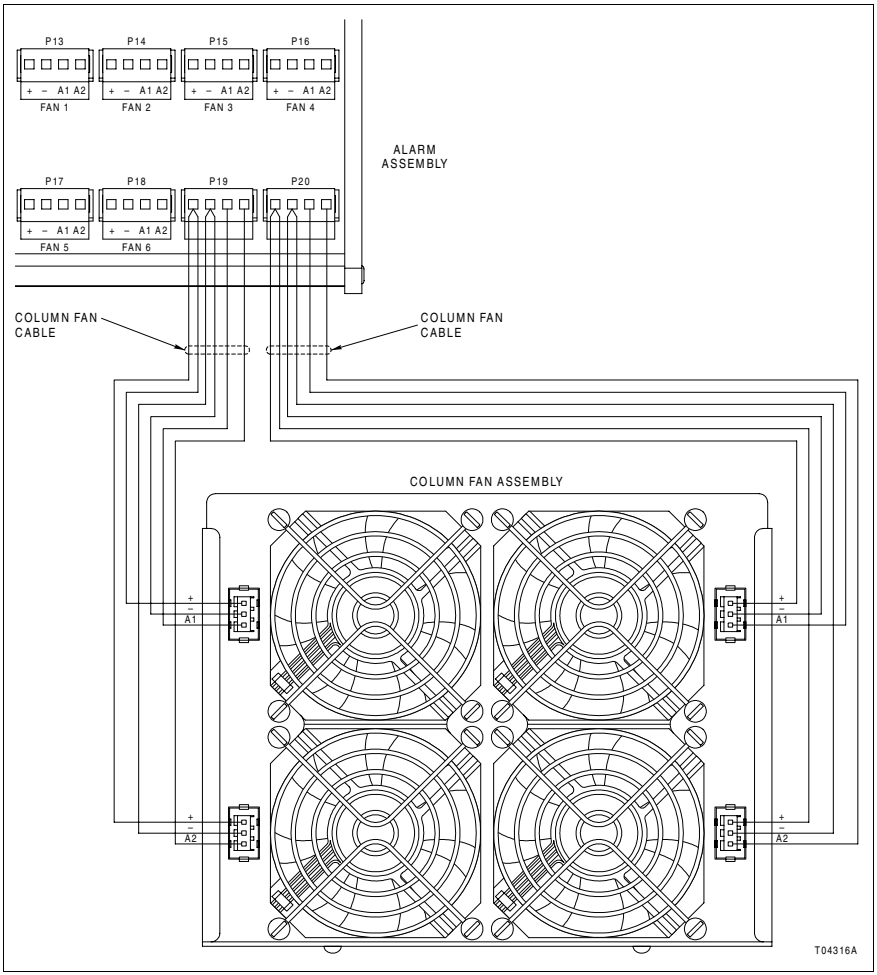

Figure PR9-2. Column Fan Wiring (P-HA-MSC-FAN21)

MMU Power and Status Wiring

PR10

Purpose/Scope

15 min.

This procedure describes the power wiring connections needed between the MMU power assembly and a module mounting unit (MMU). The MMU power assembly supports two module mounting unit power connections. This section also describes MMU power status connection to the alarm assembly.

Parts

Number	Qty	Description
1945861A5	1 for single MMU 3 for dual MMUs	Faston lug, 0.25 in.
1948470A1	1 per MMU	Connector receptacle, red
1948470A2	1 per MMU	Connector receptacle, black
1948471A2	2 per MMU	Connector solderless contacts

Tools

- Flat-blade screwdriver.
- Module Mounting Unit instruction.

There are separate 24 VDC power connection points on the MMU power assembly for each module mounting unit. A single status wire connects from module mounting unit one to the alarm assembly, and a jumper then connects the status line between two module mounting units.

NOTE: Do not use the 24 VDC output of the MMU power assembly as field power for any other type of external device.

Procedure

☐ 1. Cut an appropriate length of 3.3 square-millimeter (12 AWG) wire to be used for the 24 VDC positive (+) wire. Terminate one end with a red connector receptacle and solderless (crimp-on) contact.

☐ 2. Cut an appropriate length of 3.3 square-millimeter (12 AWG) wire to be used for the 24 VDC common, or negative (-), wire. Terminate one end with a black connector receptacle and solderless contact.

☐ 3. Connect the wires according to Table PR10-1 and Figure PR10-1.

Table PR10-1. MMU Power Wiring

MMU	MMU Power Assembly	MMU Backplane
1	P1 (+)	P40 (+)
	P1 (-)	P39 (-)
2	P2 (+)	P40 (+)
	P2 (-)	P39 (-)

NOTE:
1. P39 and P40 are located on the back of the module mounting unit.

☐ 4. Cut an appropriate length of 0.83 square-millimeter (18 AWG) wire to be used for the MMU power status signal. Terminate one end with a faston lug (crimp-on).

☐ 5. Connect the status wire from P22 (AUX P/S) on the alarm assembly to P41 (STAT) on the back of the module mounting unit (Fig. PR10-1).

☐ 6. If connecting a second module mounting unit, repeat Steps 1 through 3, and additionally connect a jumper wire between the P41 (STAT) terminals of the two module mounting units.

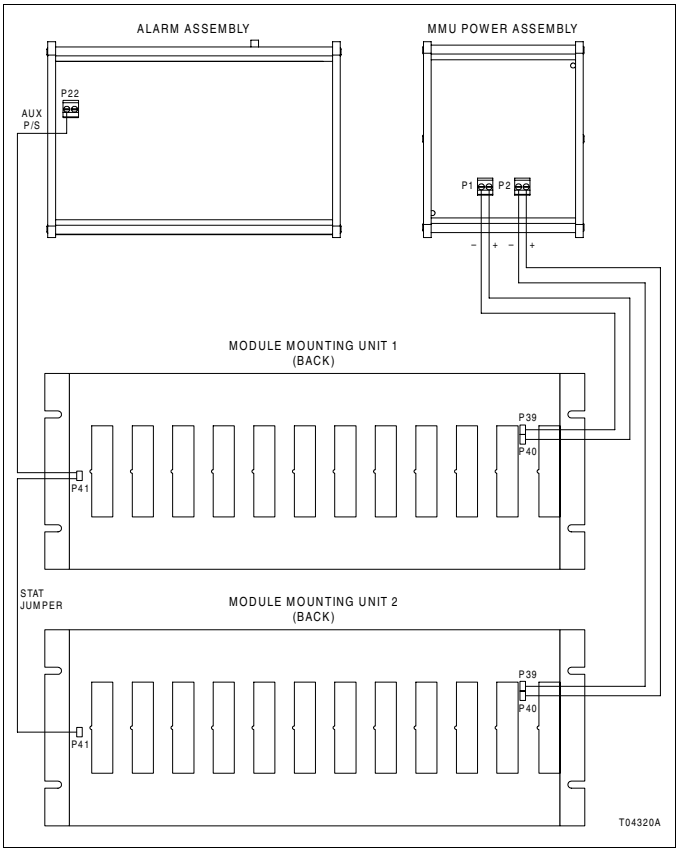

Figure PR10-1. MMU Power and Status Wiring

SOA Wiring

PR11

Purpose/Scope

10 min.

This procedure describes the SOA wiring connections to the alarm assembly. Refer to ***Status Output Alarm*** in Section 2 for an explanation of the status output alarm signal.

Parts None.

Tools
- Harmony Area Controller (HAC) instruction.
- BRC-100 Harmony Bridge Controller instruction.
- Block Power and Mounting instruction.

The SOA signal connects between the SOA terminals of the alarm assembly and the SOA terminals on an Hnet terminator or on a HAC docking station. An Hnet terminator is located on a BRC-100 controller and on a block mounting column. In a multibay enclosure, each alarm assembly can connect to a terminator or docking station, or one alarm assembly can connect to a terminator or docking station, then the SOA line daisy-chains to other alarm assemblies. At least one alarm assembly in the daisy-chain must connect to a terminator or docking station.

Procedure

☐ 1. Connect SOA 1 (P1) of the alarm assembly to the SOA terminals of an Hnet terminator or HAC docking station. Use 0.83 square-millimeter (18 AWG) red (+) and black (-) wires to connect the SOA signal (Fig. PR8-1).

☐ 2. In a multibay enclosure, connect SOA 2 (P2) to P1 of the next alarm assembly. Continue the daisy-chain connection until all alarm assemblies within the enclosure connect to the SOA line.

NOTE: Optionally, each alarm assembly can connect directly to an Hnet terminator or HAC docking station rather than using daisy-chain connection.

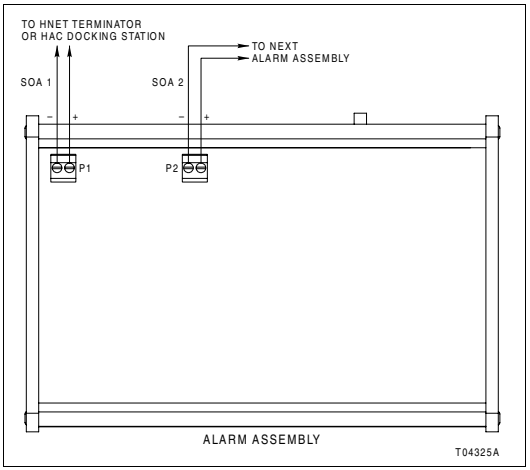

Figure PR11-1. SOA Wiring

Power System Assembly Removal

PR12

Purpose/Scope

1 min.

This procedure describes how to remove a power system assembly from the mounting panel. This procedure applies to the AC input, DC output, alarm, and MMU power assemblies.

Parts None.

Tools
- Flat-blade screwdriver.

Procedure

☐ 1. Insert the screwdriver as shown in Figure PR12-1.

☐ 2. Pry up with the screwdriver to unlatch the snap-fit mechanism, and at the same time pull the front, bottom of the assembly away from the mounting panel.

NOTE: It should not require excessive force to unlatch the snap-fit mechanism.

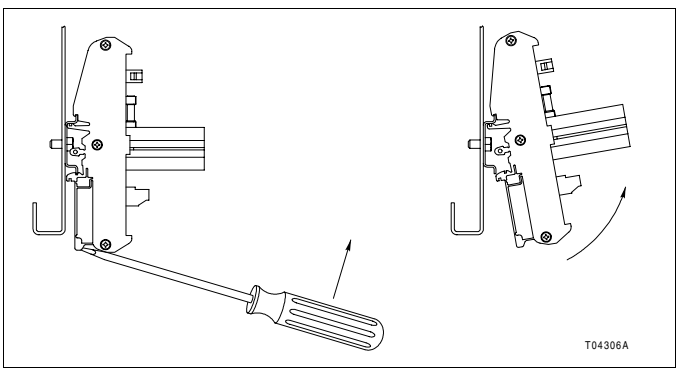

Figure PR12-1. Power System Assembly Removal

Power Supply Removal

PR13

Purpose/Scope

1 min.

This section describes how to remove a power supply from the mounting panel.

Parts None.

Tools
- Phillips screwdriver.

Procedure

☐ 1. Hold the power supply firmly.

☐ 2. Remove one of the mounting brackets from the side of the power supply (Fig. PR13-1).

☐ 3. Remove the power supply.

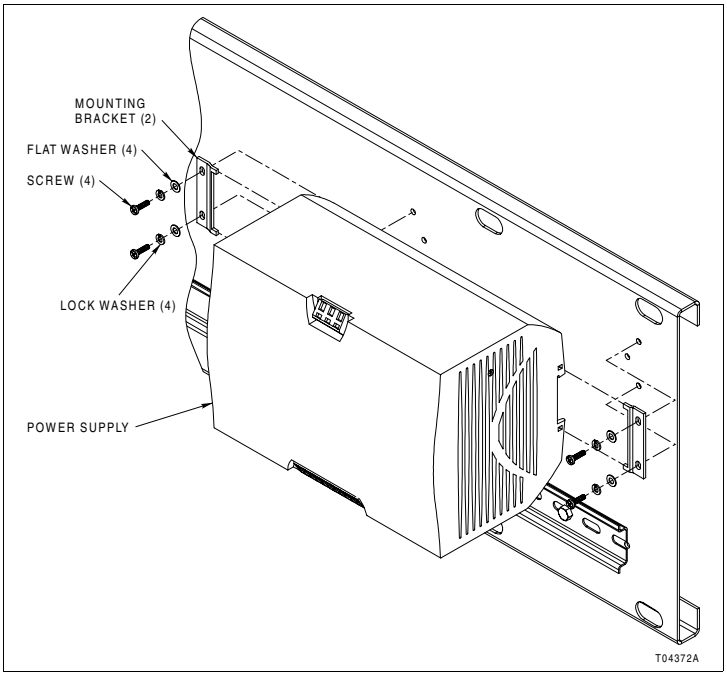

Figure PR13-1. Power Supply Removal

Connections Check

PR14

Purpose/Scope

30 min.

This procedure describes the connections check maintenance procedure. Check all signal wiring, power, ground, and cable connections within the enclosure to verify their integrity.

Parts None.

Tools
- Flat-blade screwdriver.
- Phillips screwdriver.

Safety Considerations

WARNING	**1. Turn off all internal cabinet power and external field device power before attempting the connections check maintenance procedure. Failure to do so could result in severe or fatal shock, or equipment damage.**

Procedure

When checking connections, always turn a screw, nut, or other fastening device in the direction to tighten only. If the connection is loose, it will be tightened. If the connection is tight, the tightening action will verify that it is secure. There should ***not*** be any motion done to loosen the connection.

NOTE: ABB Automation recommends this preventive maintenance task be performed during power supply preventive maintenance while the power to the enclosure is off.

☐ 

1. Verify that power is turned off before checking any connections for tightness.

☐ 2. Verify that all wire connections are secure.

☐ 3. Check that all cable connections are secure.

☐ 4. Verify that the grounding terminal block is securely fastened to the DIN-rail of the mounting panel.

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Telefax 65-756-7309

Germany
Industriestrasse 28
D-65760 Eschborn
Germany
Telephone 49-6196-800-0
Telefax 49-6196-800-1119

Europe, Africa, Middle East
Via Puccini 2
16154 Genoa, Italy
Telephone 39-010-6584-943
Telefax 39-010-6584-941

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