F690A Redundant fieldbus power system

Instruction Manual

INM F690A

Contents

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COMPONENT PART NUMBERS

PART No	DESCRIPTION
F690A-CL-PA	F690A carrier, Left Hand
F690A-CR-PA	F690A carrier, Right Hand
F690A-CL-PB	F690A carrier, Left Hand
F690A-CR-PB	F690A carrier, Right Hand
F690A-CL-PC	F690A carrier, Left Hand, Pluggable spring clamp
F690A-CR-PC	F690A carrier, Right Hand, Pluggable spring clamp
F690A-CL-PS	F690A carrier, Left Hand, Pluggable screw terminals
F690A-CR-PS	F690A carrier, Right Hand, Pluggable screw terminals

PART No	DESCRIPTION
FPS-IPM	Power Module
FPS-ALM	Alarm Module
DMK01	DIN-rail m ounting kit, T or G section (pack of 40)†
SMS01	Surface mounting kit, (pack of 40)†
BMK08	Mounting kit for one F690A
FPS-BLK10	Blanking Module (pack of 10)*

† Sufficient to mount 10 x F690A systems

** Segments that do not require the high availability provided by redundant power conditioning may be operated with only a single FPS-IPM. In this event, a blanking module should be fitted to the unused slot to prevent an alarm condition.*

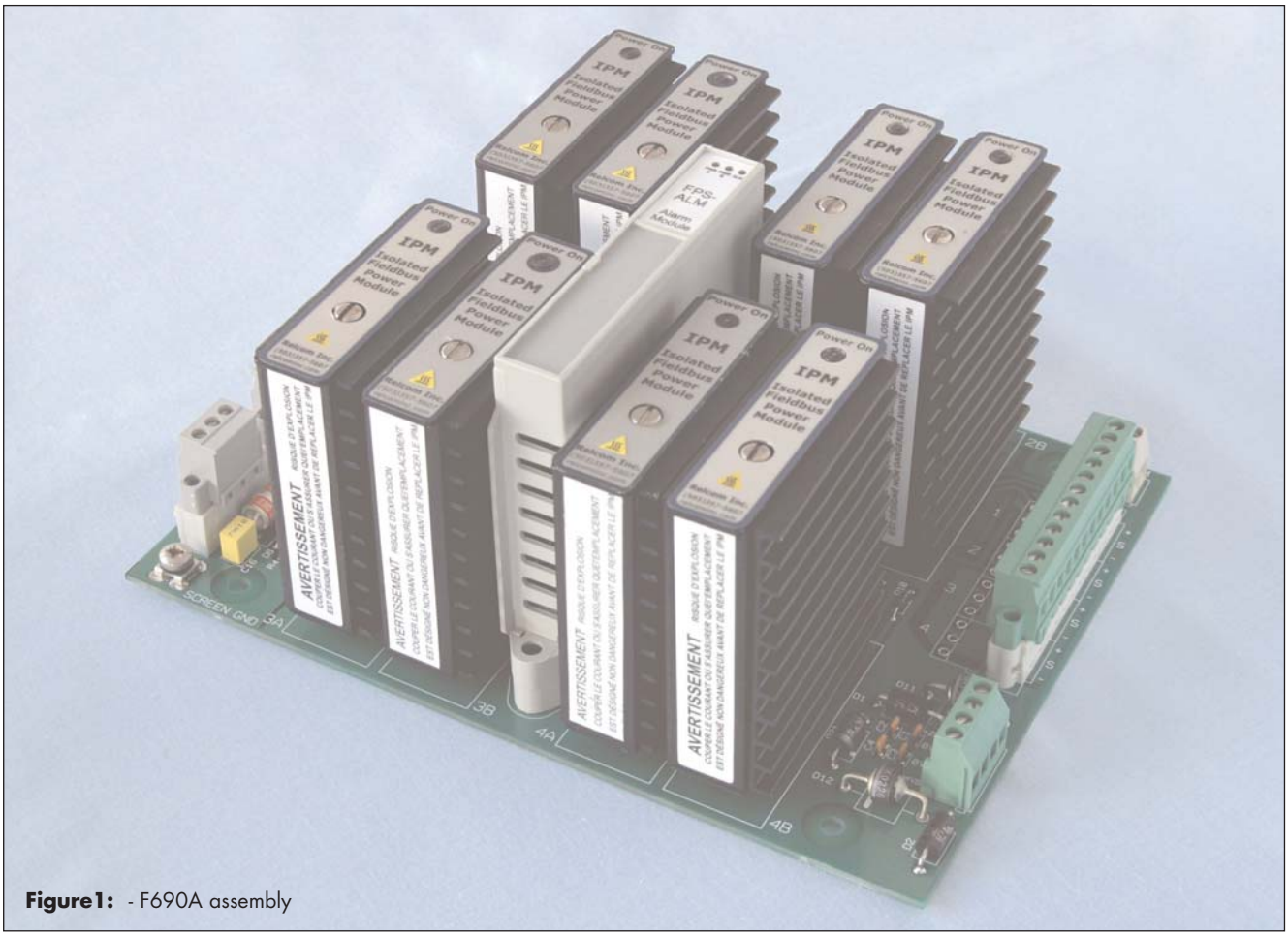

Figure1: - F690A assembly

1 OVERVIEW

The MTL-Relcom F690A redundant fieldbus power system provides redundant power conditioning for fieldbus network segments and facilitates the connection of redundant input power supplies. The system is fully 'hot-swappable' meaning that individual power conditioning modules and input power supplies can be replaced without interrupting power or communication on the fieldbus segment. An alarm circuit provides warning in case of a power conditioning module or input power supply failure. The system is designed so that power for several fieldbus segments can be provided from a single cabinet with minimal wiring.

2 DESCRIPTION

This manual describes the installation of a FOUNDATION Fieldbus H1 four segment backplane with alarm monitoring designed to accommodate four redundant pairs of Relcom IPM power supply and conditioner modules.

The backplanes are available in a left hand or right hand version, one being a mirror image of the other, and with or without a redundant host connection. It is intended to be located in the safe area. Host trunk input connections for all four segments are provided in a 12-way connector. The single host option provides a choice of pluggable spring clamp or screw-terminals, whereas the redundant host option uses a double-height, offset, screw terminal connection.

Host Connection	**Redundant host connection to host card** Fixed screw terminal				**Single host connection to host card** Pluggable spring clamp		Pluggable screw terminal	
Segment Connection	Pluggable spring clamp		Pluggable screw terminal		Pluggable spring clamp		Pluggable screw terminal	
	Left hand	Right hand	Left hand	Right hand	Left hand	Right hand	Left hand	Right hand
System No.	**F690A-LA**	**F690A-RA**	**F690A-LB**	**F690A-RB**	**F690A-LC**	**F690A-RC**	**F690A-LS**	**F690A-RS**
FPS-IPM	x 8	x 8	x 8	x 8	x 8	x 8	x 8	x 8
FPS-ALM	x 1	x 1	x 1	x 1	x 1	x 1	x 1	x 1
F690A-CL-PA	x 1							
F690A-CR-PA		x 1						
F690A-CL-PB			x 1					
F690A-CR-PB				x 1				
F690A-CL-PC					x 1			
F690A-CR-PC						x 1		
F690A-CL-PS							x 1	
F690A-CR-PS								x 1

Table 1: The system types and their individual components (see part numbers on opposite page)

The field trunk output on each segment, which is directly connected to its respective host, uses a 3-way screw terminal or a spring clamp connector.

The input power for all four segments is commoned, but is derived from two independent (bulk) power supplies, diode "OR"ed to provide redundancy. These power inputs are galvanically isolated from the output fieldbus circuitry by the IPM modules.

Alarm circuitry is housed in a separate module which plugs onto the backplane. This module monitors both the power inputs and the outputs and will indicate an alarm condition, via relay contacts, if any one fails.

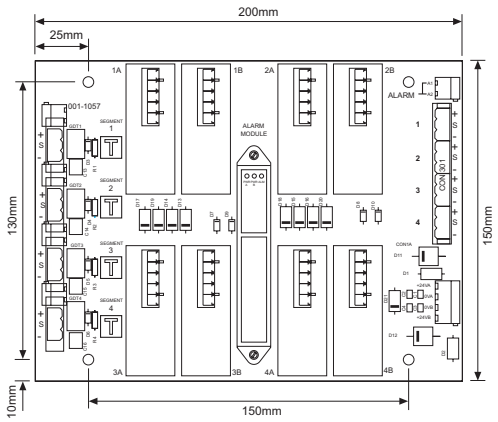

Figure 2: - F690A-L – Left handed circuit board

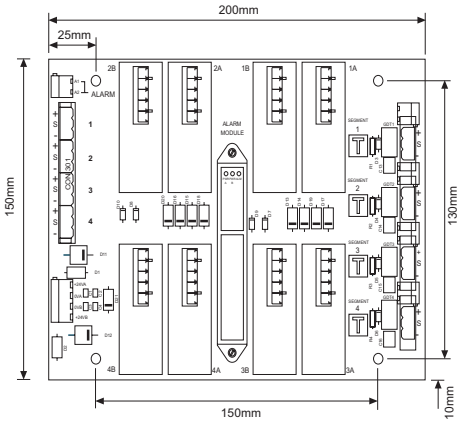

Figure 3: - F690A-R – Right handed circuit board

3 MECHANICAL

Board dimensions and hole positions for the left-handed (i.e. F690A-Lx models) and right-handed (i.e. F690A-Rx models) are shown in figures 2 and 3 above.

3.1 Mounting

It is recommended that the F690A assembly be mounted on a vertical surface with the orientation of the IPM modules as shown in figures 2 and 3 above.

Four 5mm diameter mounting holes are provided for surface mounting or dual DIN rail mounting. MTL SMS01 surface, or DMK01 DIN rail, kits may be used for this purpose. When DIN rail mounting, two vertically aligned rails are required with a spacing of 150mm between their centre lines.

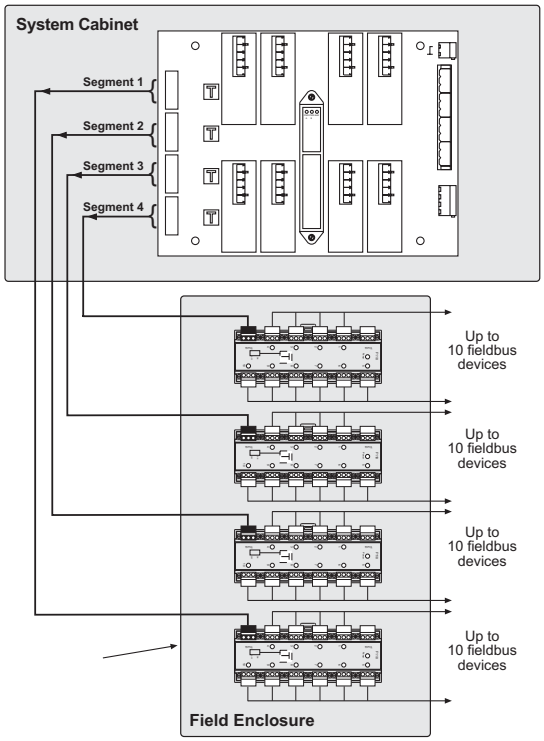

Figure 4: - Typical system connections - LH variant shown

4 INSTALLATION

4.1 Mounting & enclosure requirements

4.1.1 General

These power supplies may be mounted in safe areas only and wherever they are located, the mounting conditions must:

(a) prevent any form of pollution that could compromise the operation of the unit. For example, an unpolluted location or a suitable enclosure could be chosen.

(b) provide an adequate level of mechanical protection. This can be achieved by selecting a protected location, a suitable enclosure, or a combination of both.

(c) ensure that all cable entries and connections are secure by making provision for the careful routing and securing of all cables.

(d) provide adequate security against unauthorised interference.

(e) ensure that the permitted ambient temperature range of the units (–40°C to + 65°C) is not exceeded. Power dissipation within the enclosure and the use of shading against direct sunlight should be considered.

4.1.2 Outdoor mounting

Where power supplies are to be mounted in outdoor locations, a suitable enclosure with a minimum of IP54 ingress protection is required. However, in some locations, a higher degree of ingress protection rating is recommended since corrosion resistance may be necessary or desirable and the emphasis should be placed on the suitability for the application.

4.2 Surface mounting - with kit SMS01

Refer to figures 2, 3, 5 and 6.

a) Select four M4 x 20mm screws.

b) Prepare holes in the mounting surface at centres as shown in figures 2 and 3, tapping these if retaining nuts are not required.

c) Place a locking washer (2) and a plain washer (3) over each M4 x 20mm screw (1) (figure 5).

d) Insert the screws through the carrier at each mounting centre (figures 2 and 3).

e) Fit M4 x 10mm spacers (5), retaining them with retaining washers (6) (figure 5).

f) Attach the carriers into the pre-drilled surface holes, retaining the screws with a suitable nut if the holes are not tapped.

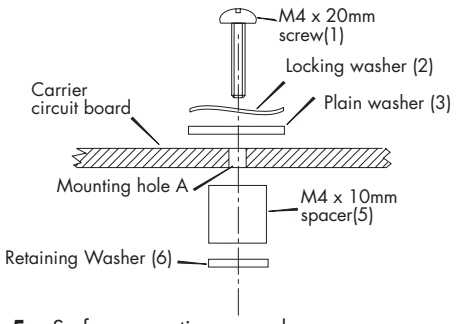

Figure 5: - Surface mounting procedure

4.3 T- or G-section DIN-rail mounting – with kit DMK01 or DMK04

Refer to figures 2, 3, 6, 7 and 8.

a) Select two pieces of T- or G-section DIN-rail of the appropriate lengths for the number of F690A carriers to be mounted.

b) Mount the two lengths of DIN-rail side-by-side at 150mm centres (figure 6).

c) Clip the four mounting feet (7) to the DIN rail (8) at the centres shown in figures 2 and 3.

d) Select four No.6 x ½-inch screws.

e) Place a locking washer (2) and a plain washer (3) onto each No.6 x ½-inch screw (1) (figure 7).

f) Insert the assemblies through the mounting holes on the carrier (figure 7).

g) Fit spacers (5), retaining them with the washers (6) (figure 7).

h) Locate the assemblies over the mounting feet and attach the screws (1) to the feet (figure 7).

i) For vertically orientated backplanes attach one end stop (11) to the lower end of each DIN-rail supporting a column of carriers by clipping the stops into place and tightening the appropriate screw [(12) for T-section and (13) for G-section DIN-rails] (figure 8).

j) Additional end stops should be attached between carriers to increase the stability of tall columns of carriers.

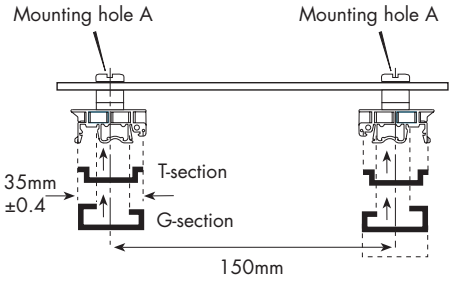

Figure 6: - T-section and G-section DIN-rail positioning

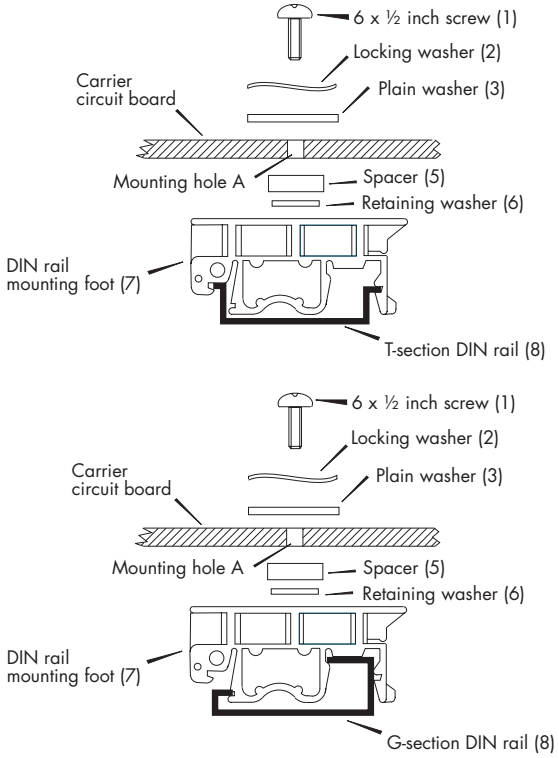

Figure 7: - DIN-rail mounting procedure

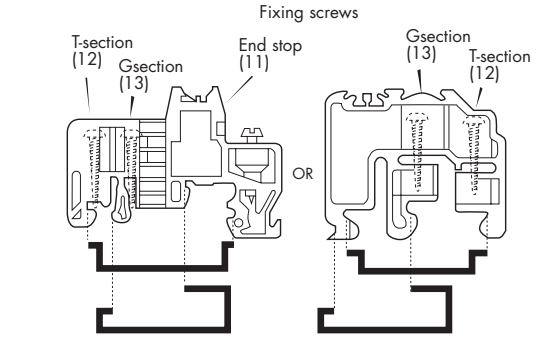

Figure 8: - Mounting end stops onto DIN-rail

4.4 Power Requirements

Dual redundant power terminals requiring a nominal input voltage of 24V dc are provided allowing the use of bulk power supplies with a supply range of 18-30V dc. The cable length to the bulk supply shall be limited to a maximum of 30 metres.

4.5 Connections

The board connections are located on the left and right-hand edges of the board. Refer to figures 2 & 3 for details and positions.

4.5.1 Host/system input

Each segment is marked with a (+ S –) . The segments are numbered, from the alarm connector end, 1, 2, 3 and 4. The length of each host cable should not exceed 30 metres.

4.5.1.1 Single host

A 12-way two part connector (CON301) receives the host/system connections for up to four segments. The plugs may be screw-terminal type or spring clamp type.

4.5.1.2 Redundant host

A dual 12-way screw terminal connector receives the two host/system connections for up to four segments.

One host is wired to the bottom layer of the connector, and the other host is wired to the upper layer. The two host connections are combined on the board.

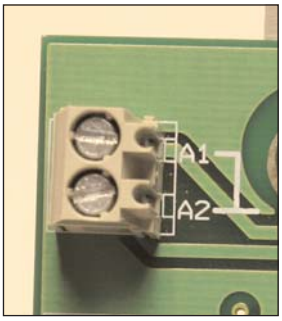

Figure 9: - Alarm contacts

4.5.2 Alarm contacts

The incoming supplies, and the outputs of the individual power modules, are monitored by the alarm module, which contains a relay. While all of these supplies are "healthy" the relay is energised to hold a pair of contacts closed. If any one of the supplies fails, the relay opens the contacts. If all of the F690A alarm contacts are connected in series, a single failure will create a "change of state" alarm.

The isolated, alarm relay contacts are available via connections A1 & A2.

4.5.3 Fieldbus segments

The F690A is available with two output connector options for the four fieldbus segments.

a) Pluggable screw terminals (-PB & -PS versions)
Conductor size: 0.14 to 2.5mm^2

b) Pluggable spring clamp terminals (-PA & -PC versions)
Conductor size: 0.2 to 2.5mm^2 flexible or rigid

Each segment terminal is marked +, – and S (Screen). The spring clamp terminals have test points built in to them.

When connecting to spring-clamp terminals, use a screwdriver with a 3–4 mm blade and depress the spring-clamp button before inserting the termination cable. See Figure 10.

4.5.4 Grounding cable screens

A grounding terminal is provided adjacent to the Segment 4 output. This terminal should be connected locally to the system ground plane.

4.5.4.1 Field segment trunk cable screens

It is recommended that the field segment trunk cables have their screens connected to the 'S' terminals on the F690A; this grounds the cable screens at the power conditioner. In this case, *the screen must not be connected to ground at the field end.*

4.5.4.1 Host trunk cable screens

It is recommended that the cables from the host to the F690A have their screens connected to its 'S' terminals, grounding the cable screens at the power conditioner. In this case, *do not ground the screens at the host end.*

If the cable screen *is* grounded at the host end, the screen should not then be connected to the 'S' terminal at the F690A.

Grounding at the F690A is the preferred method, but *never ground the screens at both ends.*

4.5.5 Terminators

Terminators are built-in to each fieldbus segment connection to avoid the need for additional wiring.

4.6 Inputs

Terminals are provided for dual-redundant input supplies A & B.

Input voltage
18 - 30V dc

Current consumption (4 segments each with 350mA output load)
3.4A (typical) at 18V
2.4A (typical) at 24V
2.1A (typical) at 28V

Power dissipation (4 segments each with 350mA output load)
20.3W (typical)

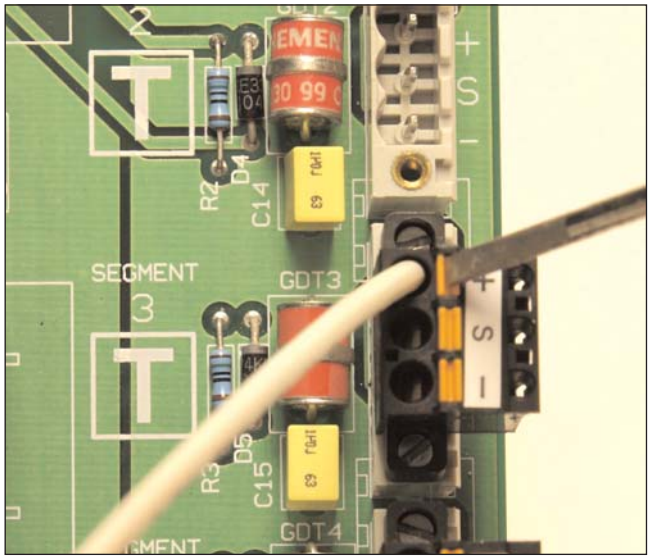

Figure 10: - Spring clamp terminal connectors on right-hand board

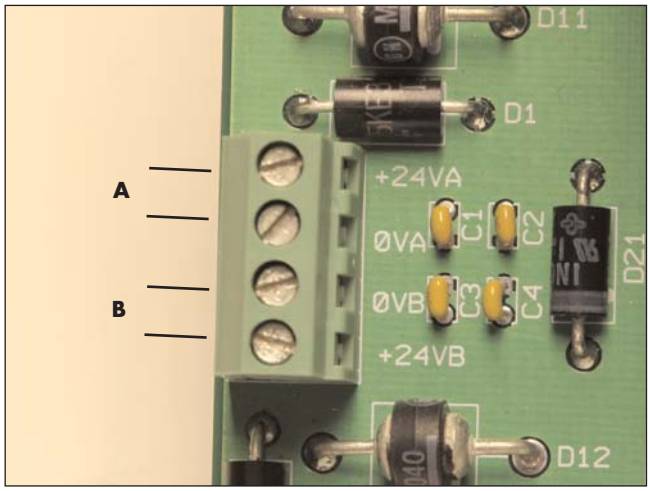

Figure 11: - Input power terminals on right-hand board

4.7 Alarms

Alarm contact rating: 1A max @ 30V dc max
Alarm contact status: Normally closed (when powered)
Alarm thresholds: Input <18V dc
Output <22V dc

4.8 Outputs

Number of channels
Four

Voltage
Minimum 25.0V dc

Current
0 to 350mA

Output ripple
Complies with clause 22.6.2 of the fieldbus standard IEC61158—2

Minimum load
No load

Isolation
Fieldbus to power supply: 250V ac rms withstand.
Segment to segment: 50V ac isolation and 1500V dc withstand

4.9 Environmental

Location of equipment

Safe area

Ambient temp

Operating, optimum orientation*

–40°C to +65°C

Storage

–40°C to +85°C

Ingress Protection

IP20 to BS EN 60529 (Additional protection by means of enclosure)

**Optimum orientation is when the carrier is mounted on a vertical surface as shown in figures 2 and 3.*

4.10 Testing

Remove and replace each power module in turn to confirm that the alarm LED illuminates and that the alarm chain gets broken. Disconnecting each power input in turn should also cause the alarm condition, and extinguish the associated alarm green power LED. Check to see that all of the green LEDs on the power modules are lit.

Note: The spring-clamp terminals have their own test points built-in in to the terminal assembly

5 ROUTINE MAINTENANCE

Check the general condition of the installation occasionally to make sure that no deterioration has occurred. At least every two years (and more frequently for particularly harsh environments) check:

a) the condition of wire connection/terminations/screens.

b) the dc output voltage on each of the four fieldbus segments is >25V. This can be performed using a multimeter or a Relcom FBT-3 or FBT-6 fieldbus tester.

c) that the Power A and Power B LEDs on the FPS-ALM module are functioning.

d) that the LEDs on all 8 FPS-IPM modules are on.

e) that all of the retaining screws are tight.

f) that there are no signs of damage or corrosion.

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