F618D - Foxboro I/A Series™ redundant fieldbus power system

Instruction Manual

INM F618D

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INM F618D-2
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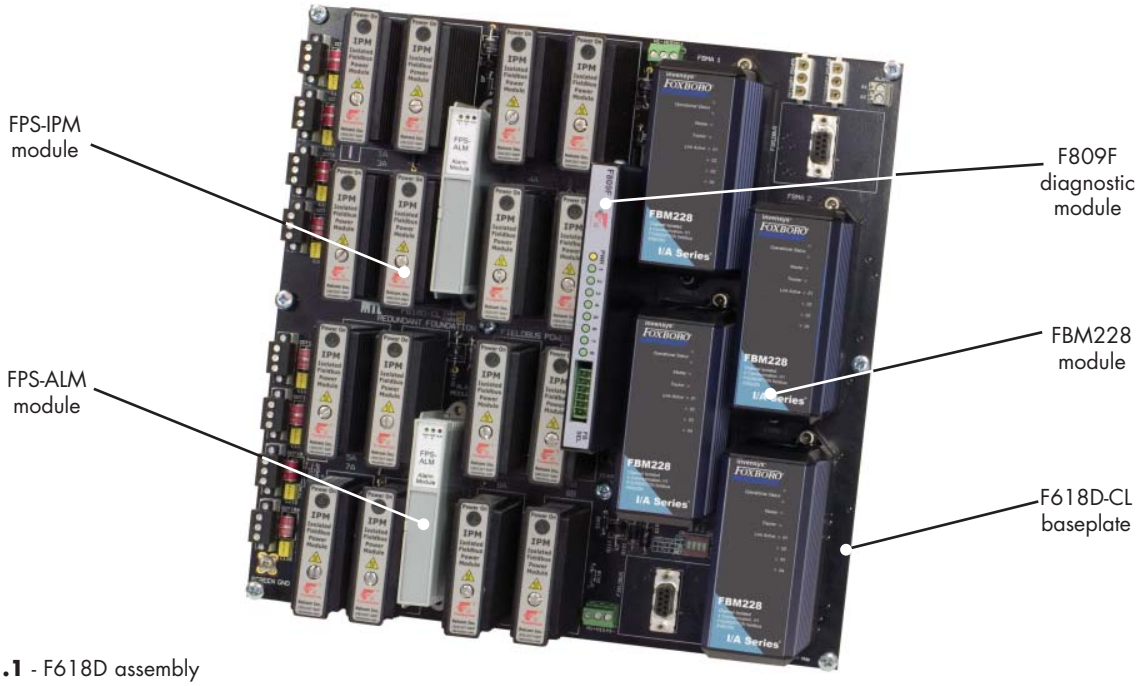

Figure 1.1 - F618D assembly

1 OVERVIEW

This manual explains the installation of the F618D redundant FOUNDATION fieldbus™ power system specifically designed for a Foxboro I/A Series® Control System using FBM228 modules.

The MTL-Relcom redundant fieldbus power system (FPS-Series) provides redundant power conditioning for fieldbus network segments and facilitates the connection of redundant input power supplies.

In general purpose, safe area applications, 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 assembly with minimal wiring.

2 COMPONENTS AND ACCESSORIES

An F618D system comprises the following components, as described below.

F618D-CL	Qty 1
FPS-IPM	Qty 16
FPS-ALM	Qty 2

It does not include the Foxboro FBM228 FOUNDATION fieldbus™ Interface, or the optional F809F Fieldbus Diagnostic module.

PART No	DESCRIPTION
F618D-CL	F618D baseplate
FPS-IPM	Power module
FPS-ALM	Alarm module
F809F	Fieldbus Diagnostic module
FPS-BLK10	Blanking module, pack of 10 (see text)

3 DESCRIPTION

The system comprises a baseplate that accommodates two redundant pairs of Foxboro FBM228 modules, and two MTL-Relcom FPS-IPM power modules for each of the eight fieldbus segments. The FPS-IPM modules function as redundant power conditioners, providing isolation and impedance between the input DC power supply and the fieldbus.

A fieldbus terminator is provided on the baseplate for each of the eight fieldbus segments.

Primary and secondary 24V DC input power is applied through two connectors provided on the baseplate and each fieldbus segment is provided with two-part pluggable terminals.

Two sub-minature 9-way 'D' connectors provide the means of connection for the Foxboro 'fieldbus'.

Two alarm modules (type FPS-ALM) are fitted. Each one monitors the state of 4 redundant pairs of power conditioning modules and also the power inputs. If a fault is detected in any of these components, the alarm relay opens and an LED provides visual indication of the fault. This enables failed components to be identified and replaced, so that the integrity of the power system is maintained. The alarm relay output is galvanically isolated from the fieldbus segments and input power supplies.

Green LEDs on the power modules and two LEDs on each alarm module gives clear visual indication that the components are functioning properly.

The baseplate may be mounted onto either vertical DIN rails or a flat panel. DIL switches on the circuit board allow the address of each baseplate to be set in accordance with Foxboro requirements.

Available accessories include blanking modules that allow the baseplate to be operated in non-redundant powered mode with a single FPS-IPM module per segment.

A separate, physical layer, fieldbus diagnostics module, type F809F, may be installed on the baseplate to automatically collect and distribute additional diagnostic information for each of the eight fieldbus segments.

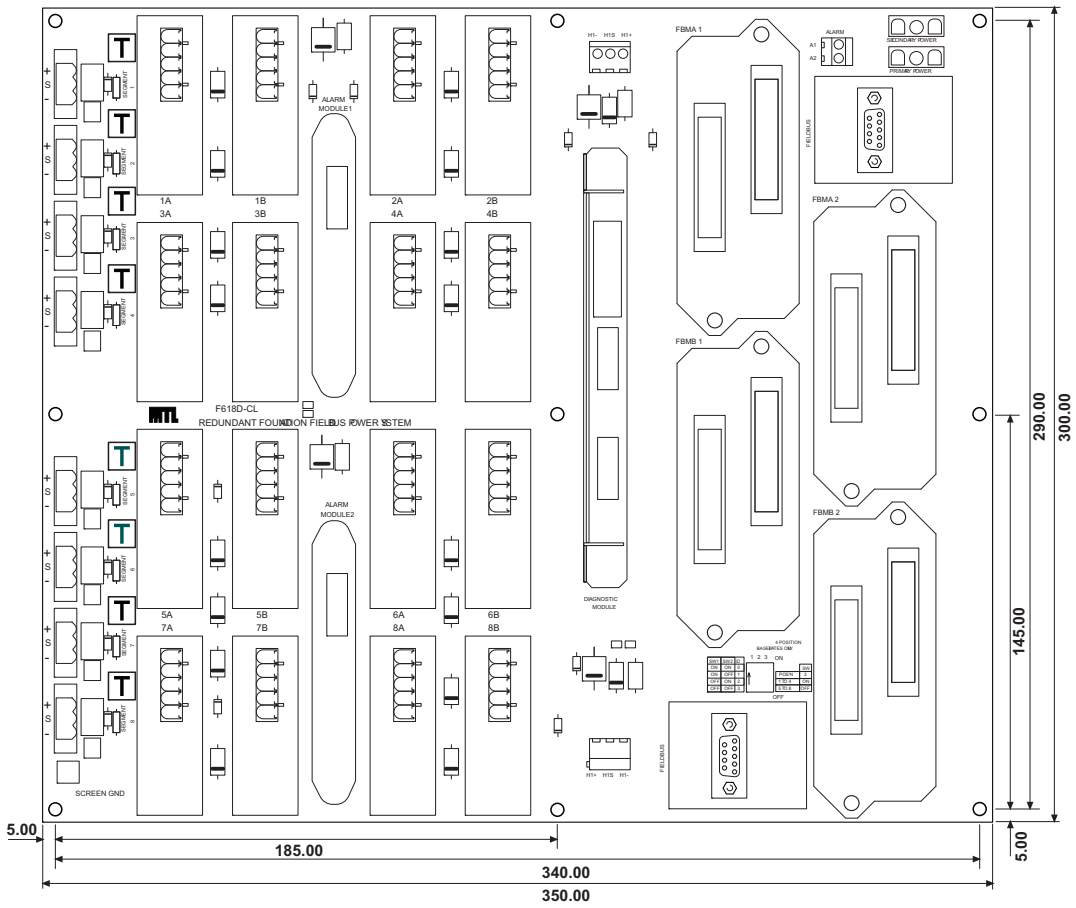

Figure 4.1 - F618D baseplate dimensions and mounting hole locations - see text for height dimension

4 MECHANICAL INSTALLATION

Important dimensions for the F618D baseplate are shown in Figure 4.1. The absolute maximum height from the underside of the board, including the front mounted connector on the F809F module, is 155mm.

4.1 General

These power systems may be mounted only in safe areas 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 cabinet or 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 + 60°C) is not exceeded. Power dissipation within the cabinet or enclosure and the use of shading against direct sunlight should be considered.

4.2 Mounting overview

It is recommended that the F618D baseplate is mounted on a vertical surface with the orientation of the IPM modules as shown in Figure 4.1 above. Any other orientation will not provide optimum airflow for the FPS-IPM power conditioning modules. Nine 5mm diameter mounting holes are provided for surface or DIN-rail mounting.

MTL mounting kits - type SMS01 for surface mounting or DMK01 for DIN rail mounting - may be used for this purpose.

4.2.1 Outdoor mounting

If the assembly is to be mounted in an outdoor location, 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 as corrosion resistance may be necessary or desirable and the emphasis should be placed on the suitability for the application.

4.3 Surface mounting

Surface mounting kit (type SMS01) is available for this purpose. SMS01 contains 40 sets of the components shown in Figure 4.2.

4.3.1 Prepare panel

Refer to figure 4.1.

a) Prepare holes in the mounting surface at the centres shown. Thread these (M4) if retaining nuts will not be used.

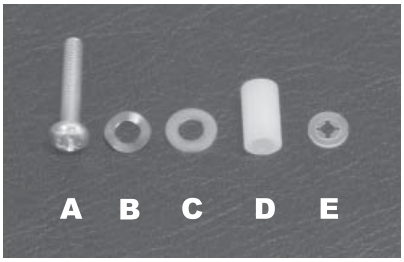

Figure 4.2 - SMS01 mounting kit components

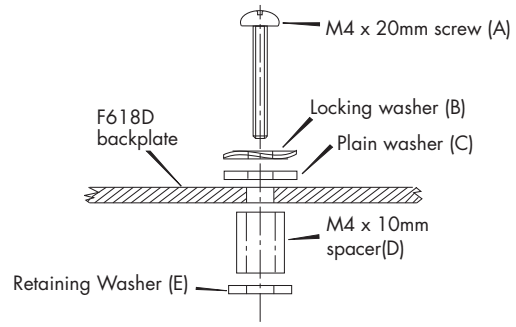

Figure 4.3 - Surface mounting details

4.3.2 Fit baseplate

Refer to figures 4.1 and 4.3.

a) Select an M4 x 20mm screw (A).
b) Place a locking washer (B) and a plain washer (C) over it.
c) Insert the screw through a fixing hole on the baseplate.
d) Fit a 10mm spacer (D) and retain it with washer (E).
e) Repeat steps a) to d) for the other eight (8) mounting holes.
f) Attach the baseplate using the prepared panel holes. Retain the screws with a suitable nut if the holes are not tapped.

4.4 DIN-rail mounting

DIN-rail mounting kits (type DMK01 or DMK04) are available for this purpose. DMK01 contains 40 sets of the components shown in Figure 4.4, while DMK04 contains 4 sets of these components.

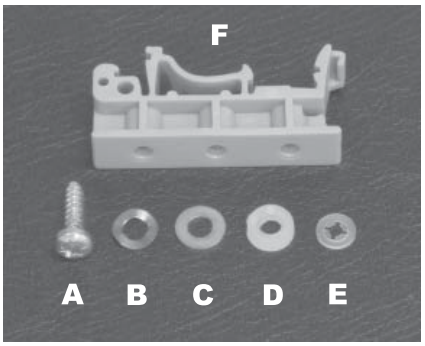

Figure 4.4 - DMK0x mounting kit components

4.4.1 Prepare DIN rail (Refer to Figure 4.1 & 4.5)

a) Select three pieces of DIN-rail (T- or G-section) of the appropriate length for the number of F618D baseplates to be mounted.
b) Mount the lengths of DIN-rail vertically and in parallel. Measuring from the lefthand rail, mount the other two rails on 185mm and 340mm centres. See Figure 4.5.

4.4.2 Fit baseplate

Refer to figures 4.1 and 4.6.

a) Select a mounting screw (A).
b) Place a locking washer (B) and a plain washer (C) over it.
c) Insert the screw through a fixing hole on the baseplate.
d) Fit a spacer (D) and retain it with washer (E).
e) Attach a DIN-rail mounting foot (F) to the baseplate using the screw.
f) Repeat steps a) to e) for the other eight (8) mounting holes.
g) Align the baseplate's mounting feet with the DIN rail then press them onto it and finally, tighten the mounting-foot screws.

Additional notes:

h) For vertically orientated baseplates use an end stop at the lower end of each DIN-rail to help support a column of carriers.
i) Additional end stops, attached between baseplates, will increase the stability of tall columns of baseplates.

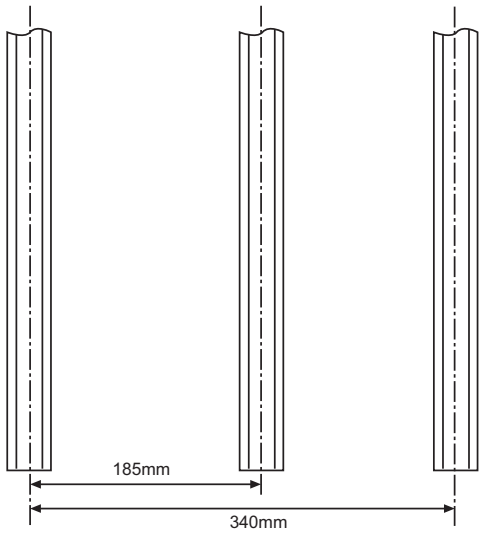

Figure 4.5 - DIN rail spacing

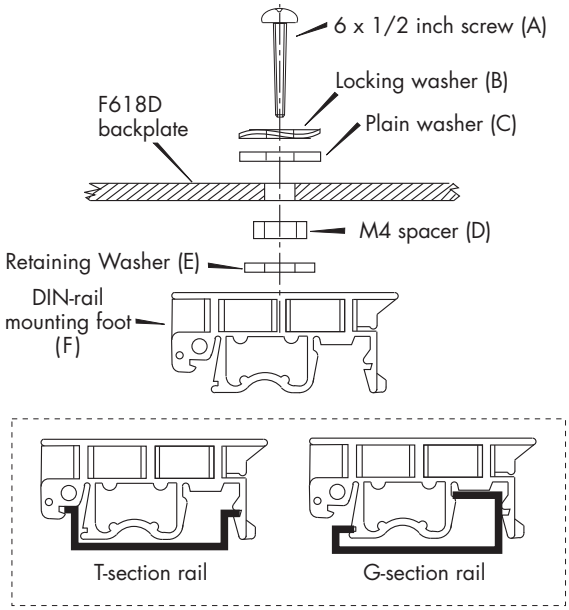

Figure 4.6 - DIN rail mounting details

5 ELECTRICAL INSTALLATION

IMPORTANT

In order to ensure the correct operation of the system power and alarm functions, it is recommended that the procedure explained in Section 5.4 is followed when fitting the FPS-IPM power conditioning modules.

Other stages of the installation may be carried out in the order of the installer's choosing.

5.1 Redundant Power Connections

Primary and secondary power terminals are located at the top righthand corner of the baseplate (see Figure 5.1). These accept standard Foxboro (P0926Kx) style power cables supplying redundant inputs of nominally 24V dc. The cable length to these bulk supply inputs will ideally be limited to a few metres within a single cabinet, but never to exceed a maximum of 30 metres.

5.1.1 Over-current protection

A fully populated F618D baseplate (including all FPS-IPM power modules, FPS-ALM alarm modules, F809F Fieldbus diagnostic module and FBM228 Fieldbus interface modules) draws a maximum current of 6.1A at 24V DC input (5.6A typical). Suitably rated fuses or circuit breakers must be installed in the primary and secondary 24V DC power supply connections. For example, a rating of 10A is suitable for protection of a single F618D baseplate. This rating is required in the primary and secondary sources of supply, to ensure continued operation in the event of a failure of one supply. If a single means of over-current protection is provided for multiple baseplates, the power supply wiring must be capable of sustaining the short-circuit current.

Figure 5.1 - Alarm and Power connections

5.2 FPS-ALM alarm modules

The two FPS-ALM alarm modules should be fitted at this stage prior to the fitting of the FPS-IPM modules. Identify their locations on the baseplate (refer to Figures 1.1 and 4.1), fit and secure them with their two fixing screws.

5.3 Alarm contacts

The two alarm modules fitted to the baseplate respond to the failure of individual IPM power conditioners for which they are responsible. In addition, they will respond create an alarm condition if the voltage of the bulk supplies drops below 18V.

A "failure" of an IPM module, or one of the bulk power supplies, will cause relay contacts in the appropriate alarm module to open. Two screw terminals A1 & A2 are provided on the baseplate (see Figure 5.1) to make connection to the alarm relay's switch contacts. These terminals are the ends of a series connection of both alarm modules (see Figure 5.2). The alarm contacts may be daisy-chained with the alarm contacts on other F618D baseplates.

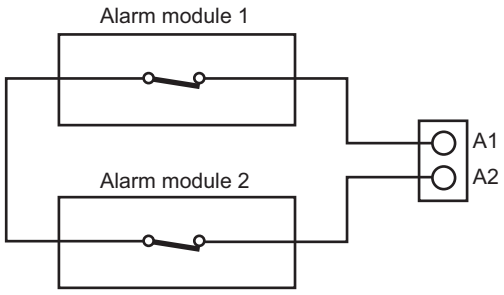

Figure 5.2 - Alarm contacts (normal condition)

5.4 FPS-IPM power modules

5.4.1 Fitting working modules

The IPM modules should be fitted in a particular order and checks carried out after the addtion of each module. The following procedure is recommended.

1 Ensure that the primary and secondary 24V DC power is connected and applied.

2 Install an FPS-IPM module in location '1A', and check for a voltage in the range 25.0 to 27.5V between the + and - terminals of the Segment 1 field wiring connector.

3 Install a second (redundant) FPS-IPM module in location '1B', and repeat the measurement.

4 Install the remaining FPS-IPM modules for segments 2 - 8 (in locations 2A through to 8B), checking output voltage at the appropriate field wiring connectors.

5 Check for a short-circuit between the alarm relay terminals A1 and A2, indicating that no fault is present. A fault may be simulated by removing any FPS-IPM power module or by removing the primary or secondary power, in which case an open circuit will appear between terminals A1 and A2.

5.4.2 Fitting blanking modules

If redundancy for the power conditioning is not required, or an FPS-IPM module has been temporarily removed, a "blanking module" (part number FPS-BLK) may be inserted in the baseplate connector in place of an FPS-IPM module.

The purpose of this module is to provide continuity for the alarm circuit so that an alarm is not signalled when an FPS-IPM module is absent.

Figure 5.3 - FPS-BLK blanking module

5.5 Module Fieldbus connections

Nine-pin D-type terminals are provided top (see Figure 5.4) and bottom on the the righthand side of the baseplate. These accept standard Foxboro Module Fieldbus cables. The two connectors provide a through path to onward link the fieldbus LAN.

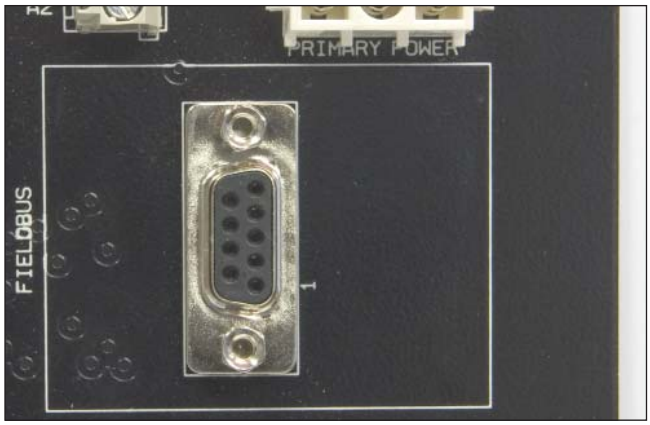

Figure 5.4 - Alarm and Power connections

5.6 Segment connections

The eight fieldbus segments connections are provided via pluggable, rising cage clamp, screw terminals located on the lefthand side of the baseplate.

Prepare the cables and connect to each segment connector (permitted conductor size 0.14 to 2.5mm^2) as shown in Figure 5.5.

Segment cable screens should be connected to the 'S' terminal on each connector. These 'S' terminals are connected via the baseplate to a screen ground terminal at the bottom left of the baseplate (see Figure 5.6).

Fixed terminators are provided across the terminals of each fieldbus segment. The '**T**' symbol on the board is used to indicate this.

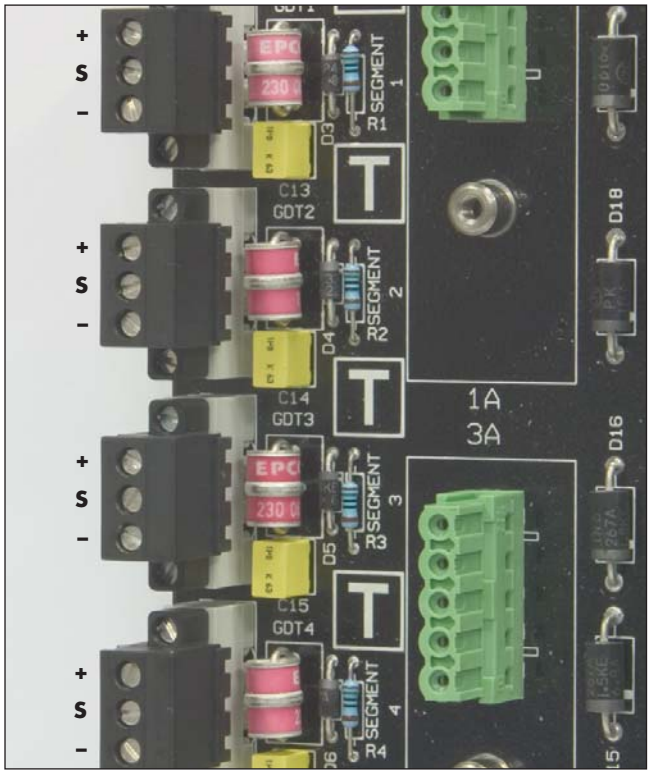

Figure 5.5 - Fieldbus segment connectors

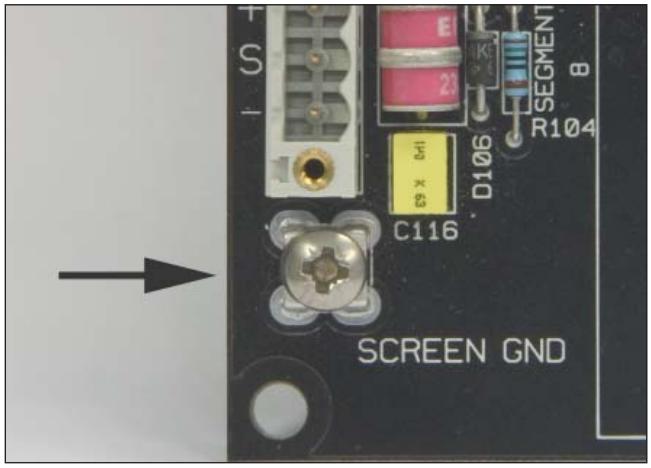

Figure 5.6 - Fieldbus segment screen ground terminal

5.7 F809F diagnostic module

A Fieldbus Diagnostic Module, type F809F, can be fitted on the F618D baseplate. It may be assigned as a participant fieldbus device on segments 1 or 8 or, alternatively, it can communicate with the Foxboro I/A control system by means of a dedicated FOUNDATION fieldbus H1 segment. Refer to the separate instruction manual for the F809F (**INM F809F**) for further details.

If an F809F is mounted on the F618D, its ground reference switch should be set to position '0' (up) - see Figure 5.7.

Figure 5.7 - Ground reference switch at '0'

This ensures that the F809F ground connection, used for its "short -to-shield" test, is made through the module mounting screws.

If desired, for additional ground integrity, a wire can be connected between the ground of the F809F case and the 'SCREEN GND' connector on the F618D, as shown in Figure 5.8.

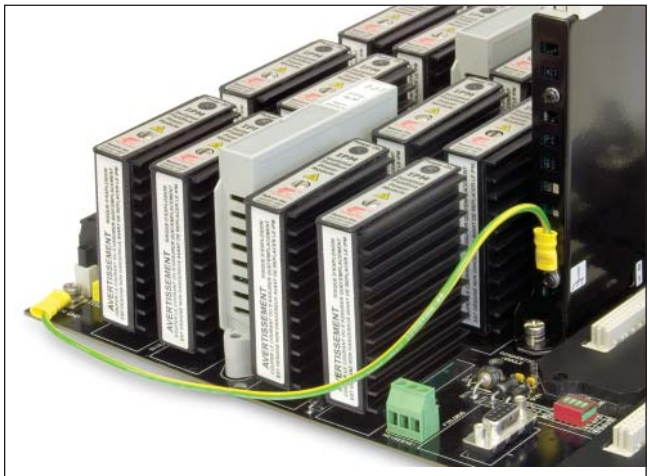

Figure 5.8 - Optional ground link wire

5.7.1 Dedicated diagnostic segment

Figure 5.9 shows how a dedicated diagnostic segment, comprising multiple F618D baseplates, is interlinked, powered and terminated. Where baseplates are installed in vertical columns, connect the H1+, H1- and S terminals of adjacent baseplates as shown. A segment may support a number of F809F modules. The actual number is based on a number of factors:

- the logical device limit of the host,
- the fieldbus power supply capacity,
- operational constraints such as bandwidth and
- the overall (system) impact of the loss of that diagnostic segment

If the baseplates are confined to a single equipment cabinet, unshielded instrument cable may be used; for longer distances (for example, between adjacent cabinets), shielded twisted pair cable complying with FOUNDATION fieldbus 'Type A' construction shall be used.

5.7.2 Diagnostics module power supply

The diagnostic segment must be powered by a conditioned fieldbus power supply (see Figure 5.9), such that a voltage in the range 9–32V DC is available at each F809F fieldbus diagnostic module. This power supply may be either simplex or redundant, depending on the application, and be capable of providing sufficient current for the entire diagnostic segment. Each F809F module draws approximately 15mA, so a segment comprising 10 modules will, for example, require an output current of at least 150mA. A suitable redundant fieldbus power supply is MTL-Relcom type FPS-I, which provides 350mA at 25.0V DC. Alternatively, type FPS-DT provides two segments of non-redundant power.

5.7.3 Diagnostics module segment termination

The diagnostic segment must be terminated at both ends to maintain the bus impedance within FOUNDATION fieldbus limits. A terminator must therefore be connected between the H1+ and H1- terminals of the diagnostic bus connector at the far end of the segment (see Figure 5.9). A suitable terminator for this purpose is MTL type FBT1-IS. Termination of the bus at the opposite end may be provided by an integrated terminator within the power supply (such as exists within the FPS-I and FPS-DT types) or by means of a separate terminator.

5.8 Address switch settings

The address of the FBM228 Fieldbus Interface Modules is set using address switches S1 to S3, according to the following tables:

SW1	SW2	ID
ON	ON	0
ON	OFF	1
OFF	ON	2
OFF	OFF	3

	SW3
POSN.	
1 – 4	ON
5 – 8	OFF

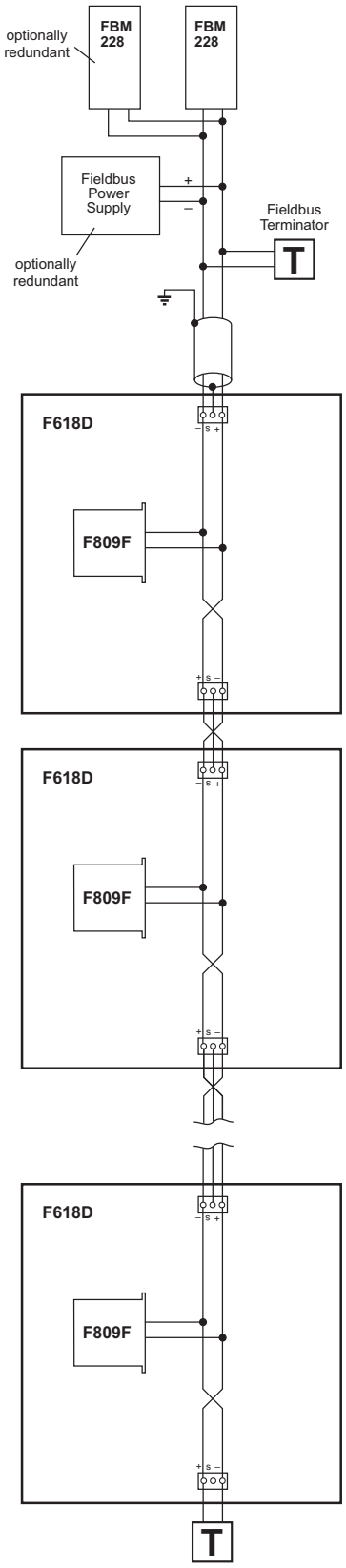

Figure 5.9 - Diagnostic module fieldbus links

6 TESTING

Check that all the FPS-IPM power module green LEDs are lit.

Remove each FPS-IPM power module (and replace in turn) and check that its associated FPS-ALM alarm module LED illuminates. Check also that the alarm chain is broken, i.e. the connection between A1 and A2 should go open circuit when a module is removed. The red alarm LED on the corresponding FPS-ALM alarm module will also illuminate. Disconnecting the primary and secondary power inputs, in turn, should also cause the alarm condition, and extinguish the power modules' green LED. On completion of the testing, check once again that all power module green LEDs are lit.

7 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:

- *the condition of wire connection/terminations/screens*
- *that the dc output voltage on each of the four fieldbus segments is >25V. This can be performed using a multimeter or a MTL-Relcom FBT-3 or FBT-6 fieldbus tester*
- *that the Power A and Power B LEDs on the FPS-ALM module are functioning*
- *that the LEDs on all 16 FPS-IPM modules are on*
- *that all of the retaining screws are tight*
- *that there are no signs of damage or corrosion*

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