F610A - Foxboro I/A Series™ redundant fieldbus power system

Instruction Manual

INM F610A

CONTENTS

PAGE

F610-A - Foxboro I/A Series™ redundant fieldbus power system

INM F610A-1
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Figure 1.1 - F610A assembly

1 OVERVIEW

This manual explains the installation of the F610A 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 F610A system comprises the following components, as described below.

F610A-CL	Qty 1
FPS-IPM	Qty 8
FPS-ALM	Qty 1

It does not include the Foxboro FBM228 Foundation Fieldbus™ Interfaces.

PART No	DESCRIPTION
F610A-CL	F610A baseplate
FPS-IPM	Power module
FPS-ALM	Alarm module
FPS-BLK10	Blanking module, pack of 10 (see text)

3 DESCRIPTION

The system comprises a baseplate that accommodates a redundant pair of Foxboro FBM228 modules, and two MTL-Relcom FPS-IPM power modules for each of the 4 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 four 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'.

An alarm module (type FPS-ALM) is fitted to monitor the state of the four 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 the alarm module gives clear visual indication that the components are functioning properly.

The baseplate has a rigid metal back plate, which proivdes excellent mechanical security and is supplied ready to be mounted onto horizontal DIN rails. Alternatively, the DIN rail fixings may be removed to enable it to be fitted directly onto a flat panel. A DIL switch on the circuit board allows 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.

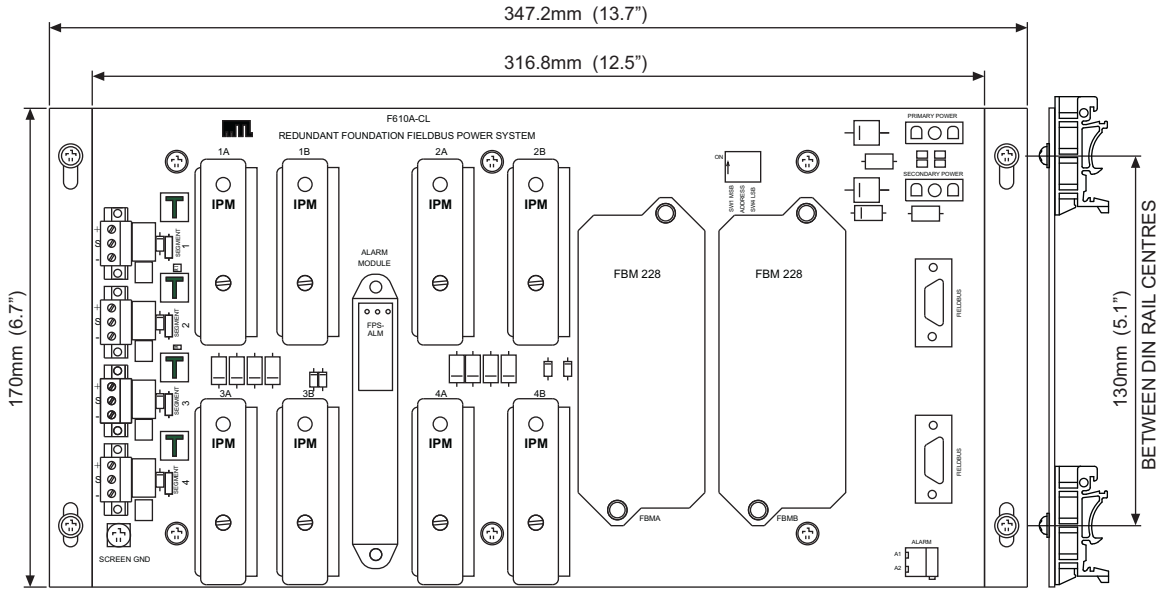

Figure 4.1 - F610A baseplate dimensions and mounting hole locations - see text for height dimension

4 MECHANICAL INSTALLATION

Important dimensions for the F610A baseplate are shown in Figure 4.1. The absolute maximum height from the underside of the mounting plate to the top of an FM228 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 F610A 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.

Four DIN-rail mounting feet (MTL mounting kit type DMK01) are fitted as standard, but can be removed to enable the 5mm diameter elongated mounting holes to be used for surface mounting. Surface mounting can be simplified by the use of MTL mounting kit type SMS01.

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 DIN-rail mounting

DIN-rail mountings are fitted to the metal backing baseplate before shipping. These will enable fitting to T- or G- section rail.

4.3.1 Prepare DIN rail

Select two pieces of DIN-rail (T- or G-section) of the appropriate length for each F610A baseplate to be mounted and mount the lengths of DIN-rail horizontally and in parallel, with a distance of 130 mm between their centre lines. See Figure 4.1.

4.3.2 Mount on DIN rail - see Figure 4.3

a) Remove the mounting foot from each of the lower fixings, leaving the fixing screws and spacers in place.

b) Hook the baseplate's upper mounting feet over the DIN rail and press them onto it to lock these feet in position. Then, loosen the screws on these feet by around 3 mm to provide some adjustment for the next step.

c) Fit the lower mounting feet on to the lower DIN rail, one each side of the baseplate, then slide them towards and under the mounting holes

d) Relocate the fixing screws in these feet then tighten all four mounting screws to secure the baseplate.

4.3.3 DIN rail mounting fixings

Spare DIN rail fixing components are available from MTL as mounting kit types DMK01 and DMK04. DMK04 contains 4 individual sets of the components shown in Figure 4.3 and DMK01 contains 40 sets.

Figure 4.4 shows the recommended method of assembling the mounting feet to the metal baseplate using the parts shown in Figure 4.2.

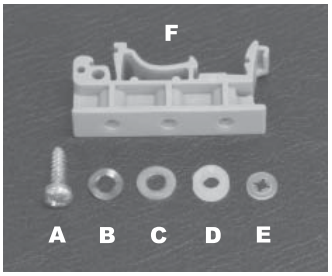

Figure 4.2 - DIN rail mounting components

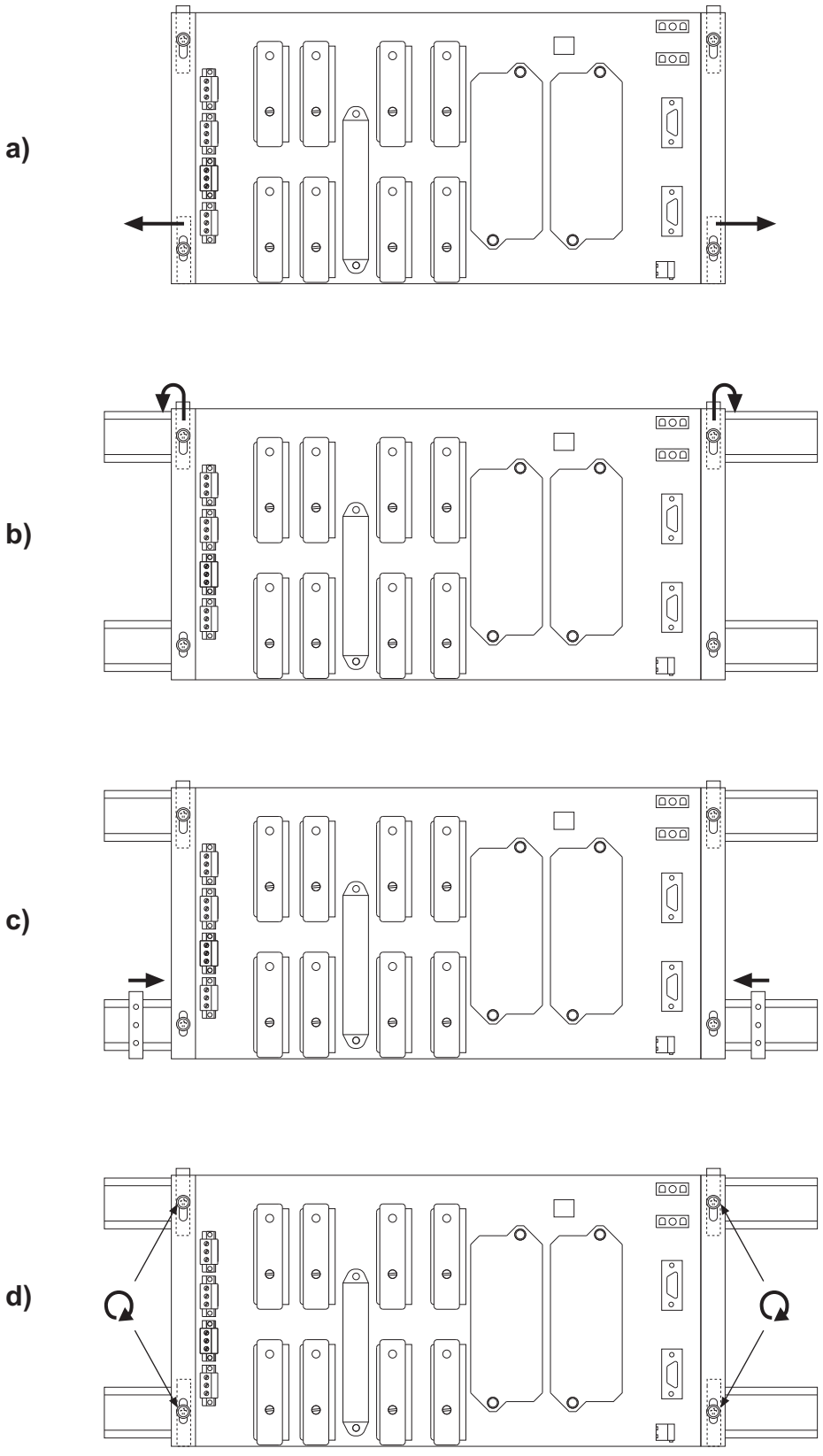

Figure 4.3 - DIN rail mounting procedure

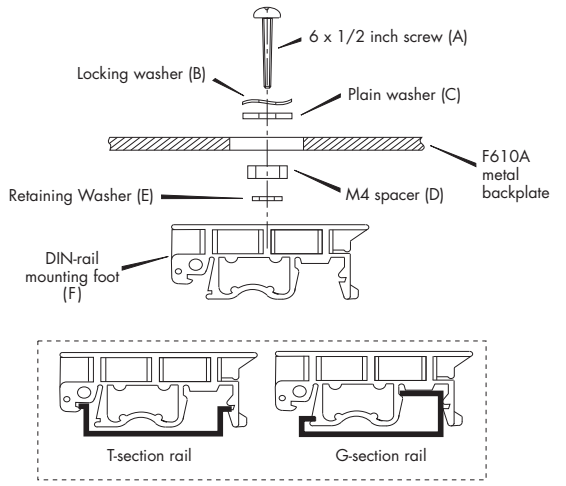

Figure 4.4 - Fitting DIN rail mounting feet

4.4 Surface mounting

Surface mounting kit (type SMS01) is available for this purpose. SMS01 contains 40 sets of the components shown in Figure 4.5.

4.4.1 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.

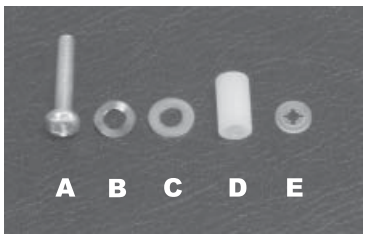

Figure 4.5 - SMS01 mounting kit components

4.4.2 Fit baseplate

Refer to figures 4.5 and 4.6.

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 three (3) mounting holes.
f) Attach the baseplate using the prepared panel holes. Retain each screw with a suitable nut if the holes are not tapped.

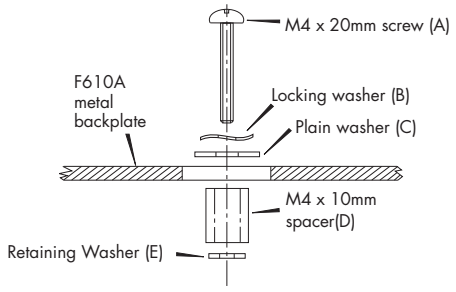

Figure 4.6 - Surface mounting details

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 shall be limited to a maximum of 30 metres.

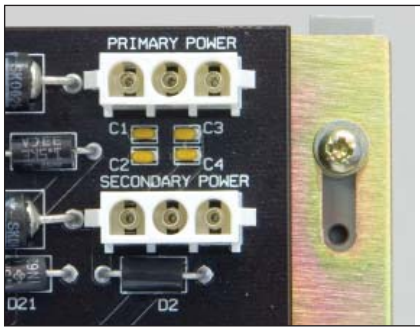

Figure 5.1 Redundant power connectors

5.1.1 Over-current protection

A fully populated F610A baseplate (including all FPS-IPM power modules, FPS-ALM alarm module and FBM228 fieldbus interface modules) typically draws a current of 2.4A at 24V DC input. Suitably rated fuses or circuit breakers must be installed in the primary and secondary 24V DC power supply connections. For example, a rating of 5A is suitable for protection of a single F610A 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.

5.2 FPS-ALM alarm modules

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

5.3 Alarm contacts

The alarm module fitted to the baseplate responds to the failure of individual IPM power conditioners.

In addition, it will 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,

Figure 5.2 Alarm connections

will cause relay contacts in the alarm module to open. Two screw terminals A1 & A2 are provided on the baseplate (see Figure 5.2) to make connection to the alarm relay's switch contacts. The alarm

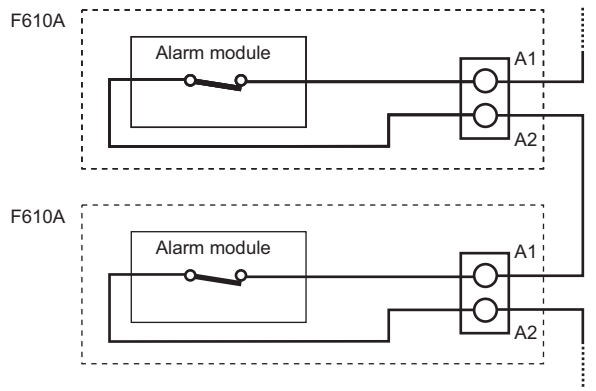

Figure 5.3 - Alarm contacts (normal condition)

contacts may be daisy-chained with the alarm contacts on other F610A baseplates - as shown in Figure 5.3.

5.4 FPS-IPM power modules

5.4.1 Fitting working modules

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

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

b) 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.

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

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

e) Check that there is continuity between alarm relay terminals A1 and A2, to confirm there is no fault 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 - see Figure 5.4) should be inserted in the baseplate connector in place of an FPS-IPM module.

This module provides continuity for the alarm circuit, preventng an alarm from being signalled when an FPS-IPM module is absent.

Figure 5.4
FPS-BLK blanking module

5.5 Module Fieldbus connections

Two 9-pin D-type terminals are provided on the righthand side of the baseplate (see Figure 5.5). These accept standard Foxboro

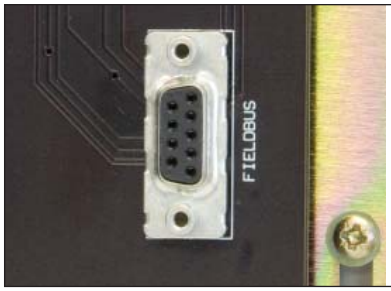

Figure 5.5
A fieldbus connector

Module Fieldbus cables. The two connectors provide a through path to onward link the fieldbus LAN.

5.6 Segment connections

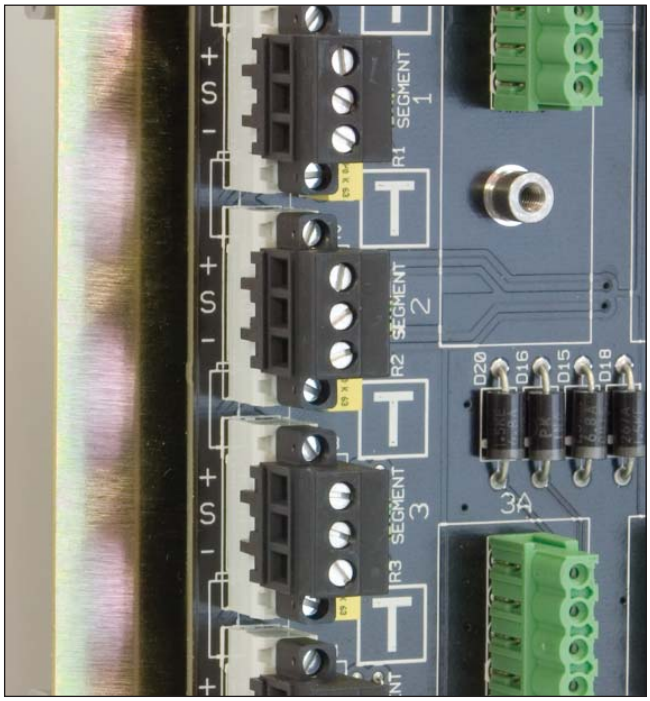

Figure 5.6 - Fieldbus segment connectors

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

Prepare the cables (permitted conductor size 0.14 to 2.5mm^2) and connect to each segment connector as shown in Figure 5.6.

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 5.7
Fieldbus segment screen ground terminal

Figure 5.7).

Figure 5.8 - Fieldbus address switches

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

Baseplate I.D.			FBM I.D.		
	Sw.1	**Sw.2**		**Sw.3**	**Sw.4**
0	ON	ON	**A**	ON	ON
1	OFF	ON	**B**	ON	OFF
2	ON	OFF	**C**	OFF	ON
3	OFF	OFF	**D**	OFF	OFF

5.7 Address switch settings

The address of the FBM228 Fieldbus Interface Modules is set using address switches S1 to S4, according to the following tables:

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 the 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 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*

MTL Instruments Pty Limited
1/30 Canvale Road
Canning Vale
Perth, WA 6155
Australia
Tel: +61 (0)8 9455 2994 Fax: +61 (0)8 9455 2805
E-mail: enquiries@mtlaus.com.au

MTL Canada Safety Instrumentation
#102, 4249 97 Street
Edmonton, Alberta
Canada T6E 5Y7
Tel: +1 780 485 3132 Fax: +1 780 485 3122
E-mail: cinfo@mtlnh.com

MTL Instruments Pte
Room 1002A, The Gateway
No 10 Yabao Road, Chaoyang District
Beijing 100020
China
Tel: +86 010 8562 5718/5720/5721 Fax: +86 010 8562 5725
E-mail: bjsales@mtl-inst.cn

MTL Instruments sarl
Les Carrés du Parc
10 rue des Rosiéristes
69410 Champagne au Mont d'Or
France
Tel: +33 (0)4 78 64 98 32 Fax: +33 (0)4 78 35 79 41
E-mail: info@mtl-inst.fr

MTL Instruments GmbH
An der Gümpgesbrücke 17
D-41564 Kaarst
Germany
Tel: +49 (0)2131 718930 Fax: +49 (0)2131 7189333
E-mail: info@mtl.de

MTL India Pvt. Limited
No. 36, Nehru Street
Off Old Mahabalipuram Road
Sholinganallur
Chennai - 600 119
India
Tel: + 91 (0)44 24501660/24501857 Fax: + 91 (0)44 24501463
E-mail: sales@mtlindia.com

MTL Italia srl
Via Cantù 11
I - 20092 Cinisello Balsamo MI
Italy
Tel: +39 (0)2 61802011 Fax: +39 (0)2 61294560
E-mail: info@mtl-inst.it

MTL Instruments KK
3rd Floor, Gotanda Masujima Building
1-8-13 Higashi-Gotanda, Shinagawa-Ku
Tokyo 141-0022
Japan
Tel: +81 (0)3 5420 1281 Fax: +81 (0)3 5420 2405
E-mail: sales@mtlkk.co.jp

MTL Instruments BV
de Houtakker 36, 6681 CW Bemmel
The Netherlands
Tel: +31 (0)481 450250 Fax: +31 (0)481 450260
E-mail: info@mtlbenelux.com

MTL Instruments Pte Limited
31 Ubi Road 1
#04-01 Aztech Building
Singapore 408694
Tel: +65 6 487 7887 Fax: +65 6 487 7997
E-mail: sales@mtlsing.com.sg

MTL Instruments
Villa No. 4, Sector 2-17,
Street 6
PO Box 53234,
Abu Dhabi, UAE
Tel: +971 2 446 6840 Fax: +971 2 446 6841
E-mail: mtlgulf@mtl-inst.com

MTL Instruments Limited
Power Court, Luton, Bedfordshire
England LU1 3JJ
Tel: +44 (0)1582 723633 Fax: +44 (0)1582 422283
E-mail: enquiry@mtl-inst.com

MTL Incorporated
9 Merrill Industrial Drive, Hampton NH 03842
USA
Tel: +1 800 835 7075 Fax: +1 603 926 1899
E-mail: info@mtlnh.com

Group Internet home page http://www.mtl-inst.com/

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