APPENDIX 2

Hart Interface Solutions

1 INTRODUCTION

This appendix provides the required guidelines about the installation, usage and maintenance as for the applicable HIS (HART Interface Solutions) termination boards. The HIS boards make possible to easily integrate an Hart communication capability on an existing system or installation.

HART is a digital communication protocol superimposed to a standard 4/20 mA field loop, so to permit a wide set of configuration and maintenance activities on the connected HART-compliant field device. The HART access is effectively obtained by a 32-channel HART multiplexer which in turn connects with a PC running a suitable, maintenance SW package.

We recommend to fully read this Appendix before installation, so to avoid any possible damage or misbehaviour of the relevant units.

The Appendix organisation is as in the following:

- section 2 is about the recommended acceptance procedure;
- section 3 comprises a product description with all relevant specifications;
- section 4 deals with the installation procedure;
- section 5 describes the required electrical connections;
- section 6 outlines the main troubleshooting within actions.

As a complement to the information provided this Appendix, please also refer to the User Manual of the Mux2700 Hart Multiplexer module (IM-ENG-116/GB).

2 ACCEPTANCE PROCEDURE

When you receive the material, we recommend to immediately verify the package and the content integrity. When any damage should be detected, please urgently notify it – with all the applicable ancillary information – to the relevant delivery service.

You should also check as soon as possible that the received material is in line with your original order and with the real application requirements. When needed, please urgently refer to your P+F contact point so that any required corrective action can be immediately implemented.

When you store the material, please use the original package and check that it is properly sealed. This is especially important for areas with relevant humidity, temperatures or corrosive atmosphere. Strong mechanical stress or vibration should also be avoided.

3 PRODUCT DESCRIPTION

3.1 GENERAL FEATURES

- Supply connection by screw terminals;
- Supply is fuse protected and with LED indication;
- Dedicated terminal to connect to earth the metal chassis;
- Dedicated terminal to connect the RS485 communication cable shield;
- RS485 interface terminals to communicate with the MUX2700 HART multiplexer module;
- Hart loop interface connectors (depending on version);
- Optional DIN-rail mounting kit ("T" or "G" rail mounting is possible).

The HIS boards make possible the remote monitoring of any HART- compatible 4/20 mA field-loop. This is obtained by one (or more) locally mounted HART multiplexer modules (MUX2700) and by interface connectors to access the relevant loops. Each MUX2700 plug-in module can manage up to 32 HART channels, with optional Hart multi-drop capability.

Hot plug in is fully supported, you don't need to switch off the power supply to insert/remove a MUX unit. The same is true as for the interface connectors used to access the relevant Hart loops. The MUX2700 connects, via the RS485 interface, with an external PC running a suitable maintenance SW package. Each PC can communicate with many MUX2700, located on the same or on different HIS boards, in a multi-drop RS-485 mode (each MUX 2700 must be set to a different slave address). For all additional functional details about the MUX2700 module, please refer to the relevant Instruction Manual (IM-ENG-116/GB). The HIS boards are equipped with a rugged metal chassis to properly support – and protect – the PCB (printed circuit board) and, when required, to permit an easy and reliable DIN-rail mounting by the optional kits (both "top hat" T-section and "omega" G-section rails are supported).

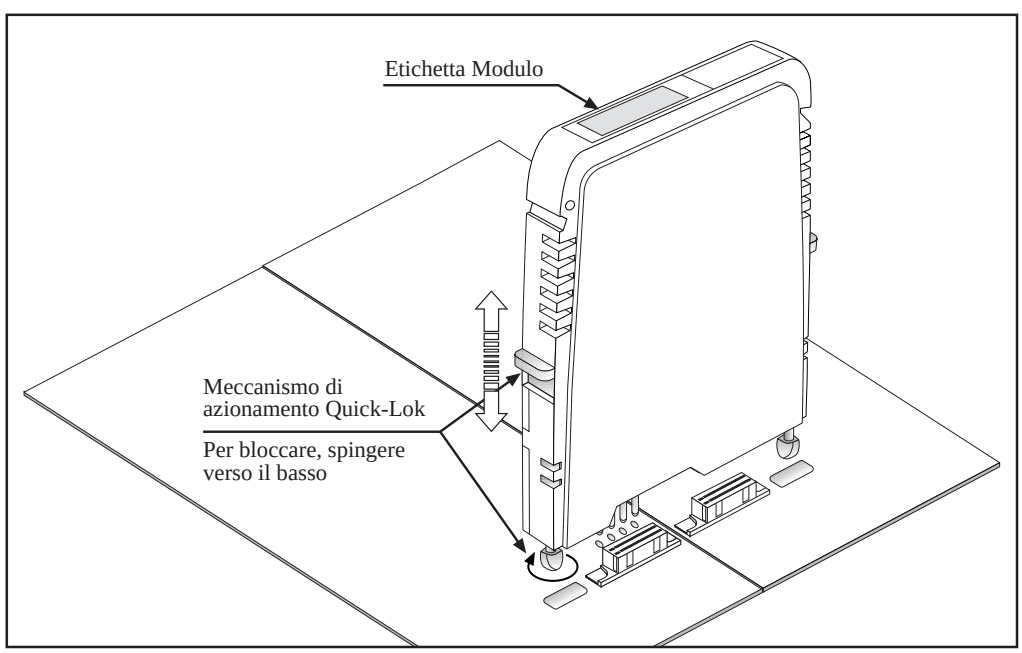

FIG. A

3.2 PRODUCT VERSIONS

By the following table, the available HIS product versions can be easily identified.

MODEL	Resident MUX units/ number of HART channels	HART interface connector type
2108/64-HART-D	2 / 64	SUB-D 37pole Female
2108/64-HART-F	2 / 64	FLAT 34poli Male

3.3 TECHNICAL SPECIFICATIONS

Power supply: 24 Vdc, –15% +25%, green LED as "power ON" indication

Supply terminals: redundant with diode separation and polarity-inversion protection

Supply fuse: single fuse, user serviceable

Fuse specs: 2A, 5x20 (glass-type), delayed intervention

- As for other general environmental specifications, please refer to what applicable for the HiD 2000 series termination boards.
- For all the technical specifications of the MUX2700 module, please refer to the relevant Instruction Manual (IM-ENG-116/GB).

4 INSTALLATION

4.1 SAFETY GUIDELINE

As for the general, installation-related safety guidelines, please refer to what applicable for the HiD 2000 series termination boards.

4.2 MECHANICAL DRAWINGS

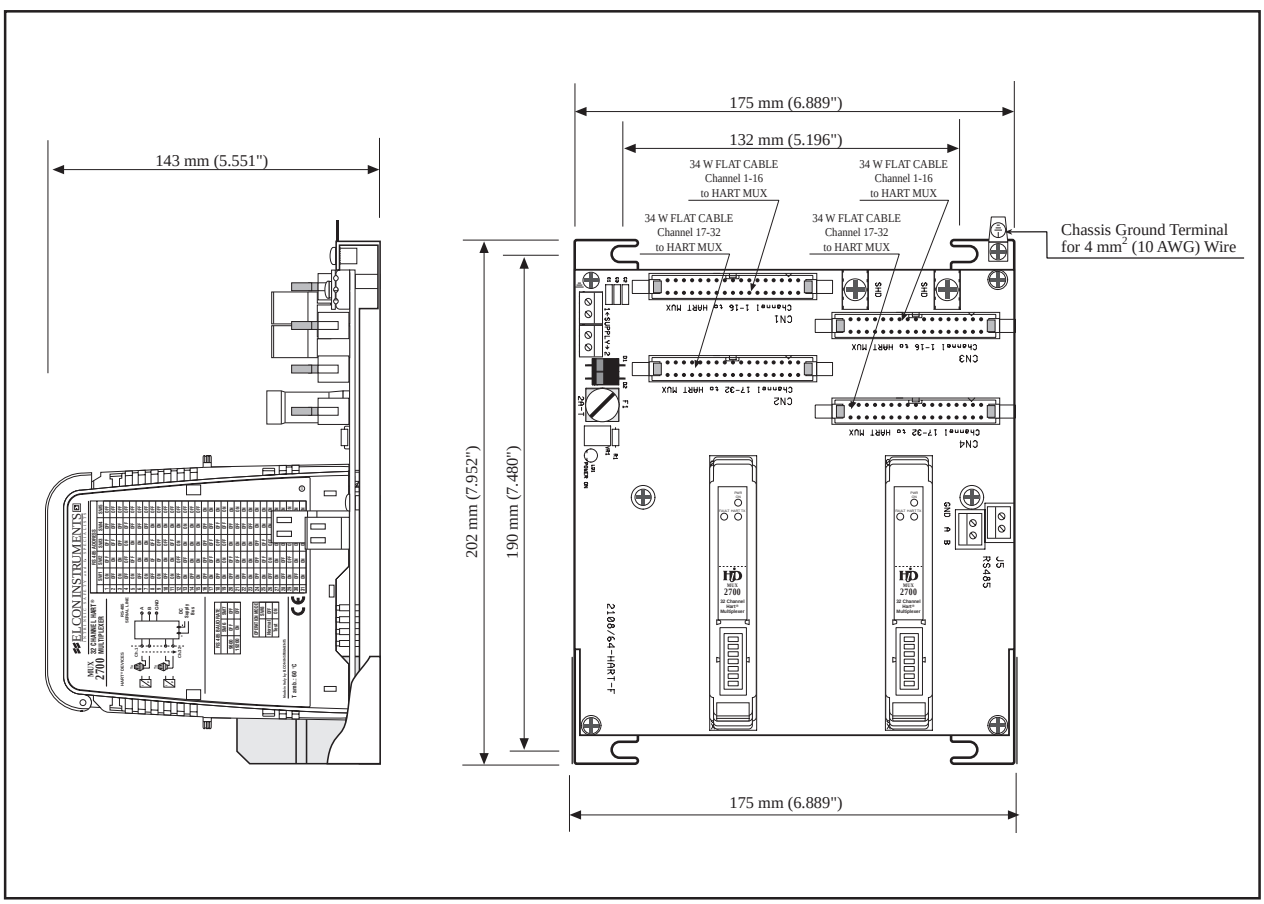

FIG. B

4.3 SURFACE MOUNTING

At the corners of the HIS board metal chassis, you can find four fixing holes. To mount the board on a panel (i.e. a suitable flat surface) proceed as in the following:

a) drill four holes on the panel as shown in fig, C (the holes spacing depends on the board) ;

b) tap holes M4 (or # 8-32), use equivalent flat head screws ;

c) mount the board and tighten the screws to firmly fix it.

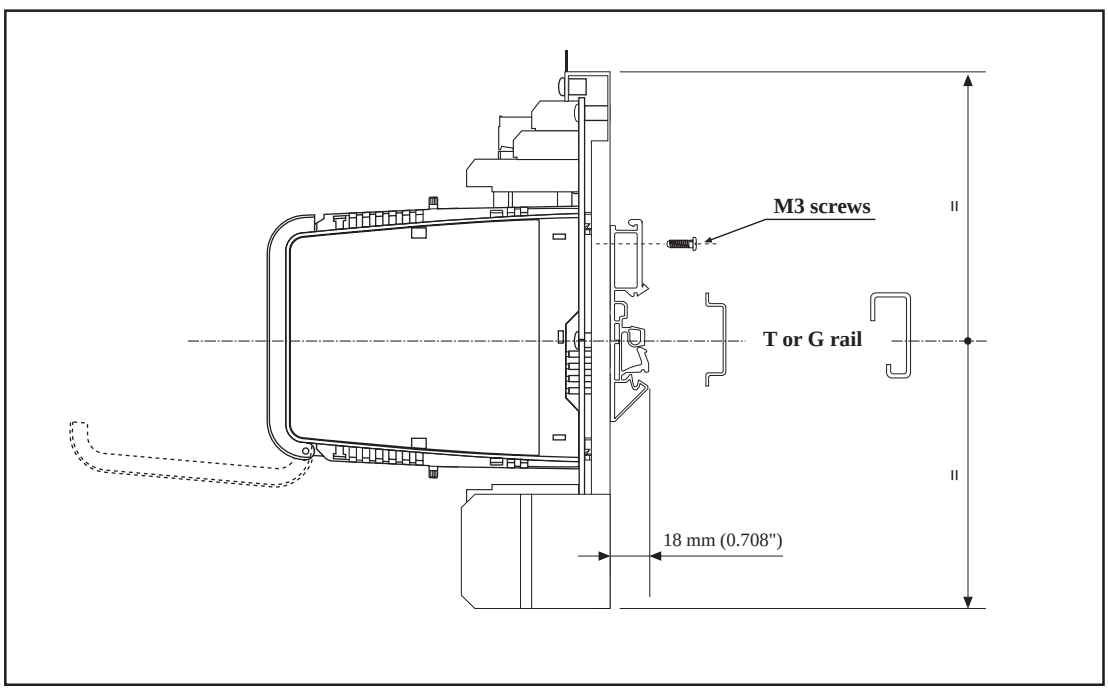

FIG. C

4.4 DIN RAIL MOUNTING

DIN rail adapter assembly are optionally available, suitable for usage with T and G rail sections.

The kit (code DINK 1) comprises two plastic rail adapters, one end stop and four M3 screws. The kit (code DINK 8) comprises two plastic adapters, one end stop and two M3 screws.

Proceed as follows:

a) Attach the plastic adapters to the metal chassis positioning it into the openings present on the rear. Secure it by the use of the M3 screws, positioning them into the threaded inserts present on the chassis. (Fig. C)

b) position the DIN rail at the middle of the board and clip the board onto it

c) Prevent the board from sliding along the rail by mounting – and fixing – at its lower end the available END STOP accessories (Fig. D).

d) To remove the board from the rail, simply pull-it with your hands at both sides.

Note that the rail adapter kit will add some millimetres both in depth (18 mm; see Fig. C) and in width (10 mm) to the overall board size. This should be considered when sizing tightly-packed cabinets.

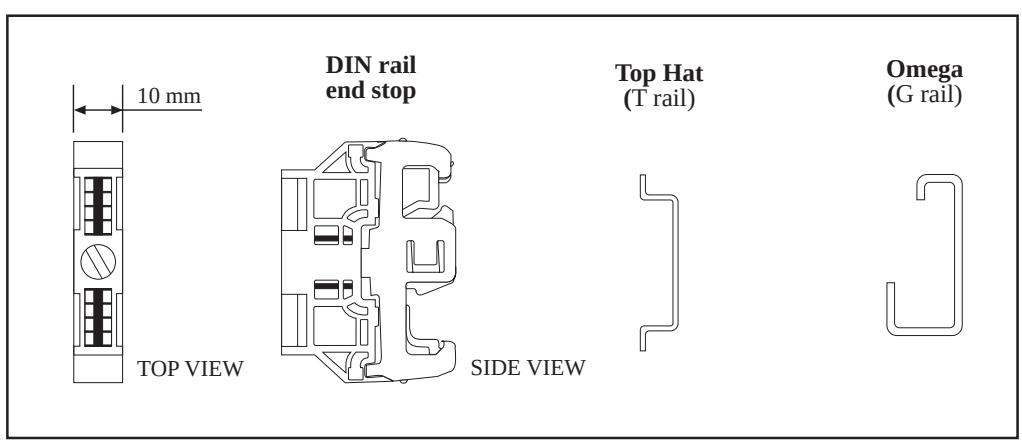

FIG. D

5 ELECTRICAL CONNECTIONS

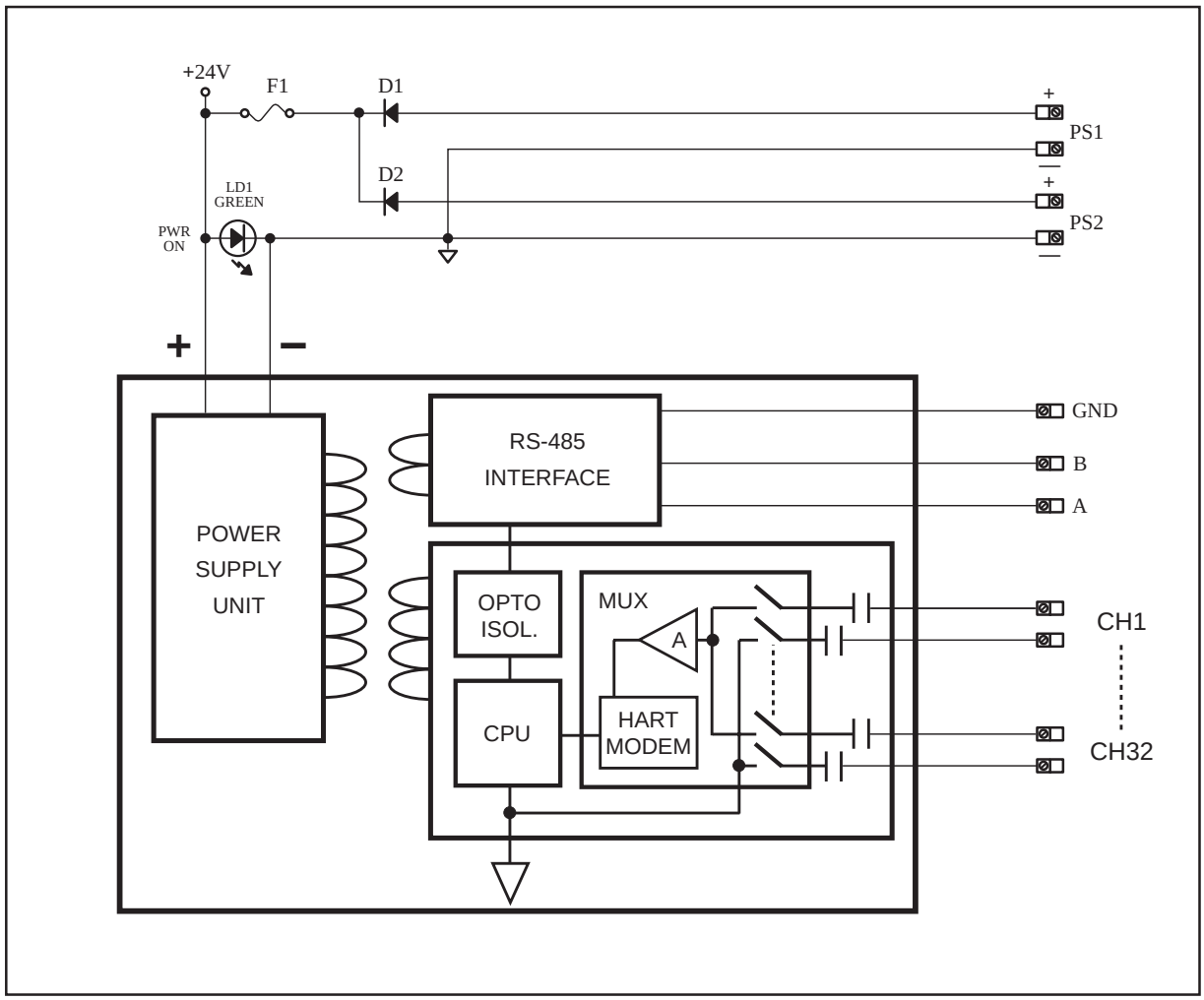

FIG. E

5.1 CHASSIS GROUND CONNECTION

The termination board metal chassis has a standard terminal for conductors of up to 4 mm^2 (10 AWG) to be connected to the relevant ground point.

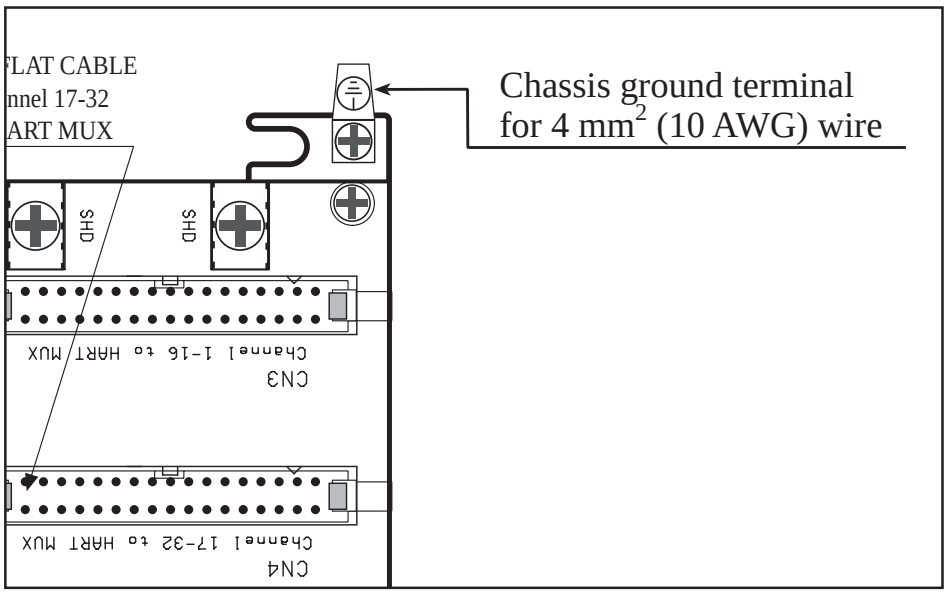

FIG. F

5.2 POWER SUPPLY CONNECTIONS

Redundant, removable screw-terminals are available to connect the 24 Vdc supply. The two supply inputs are coupled by diodes to a common internal supply bus, so that reverse polarity protection is also obtained. A single protection fuse (user-serviceable) is also available. A green LED on the board indicates the supply presence.

Note: some board versions could be equipped with fixed supply terminals.

To connect the supply, proceed as in the following:

- Connect the primary and/or the secondary supply to the plug-in connector (Fig. G), using conductors up to 2.5mm2 (12 AWG).
- Plug the connectors into the supply socket of the board.
- The supply fuse rating is 2A.

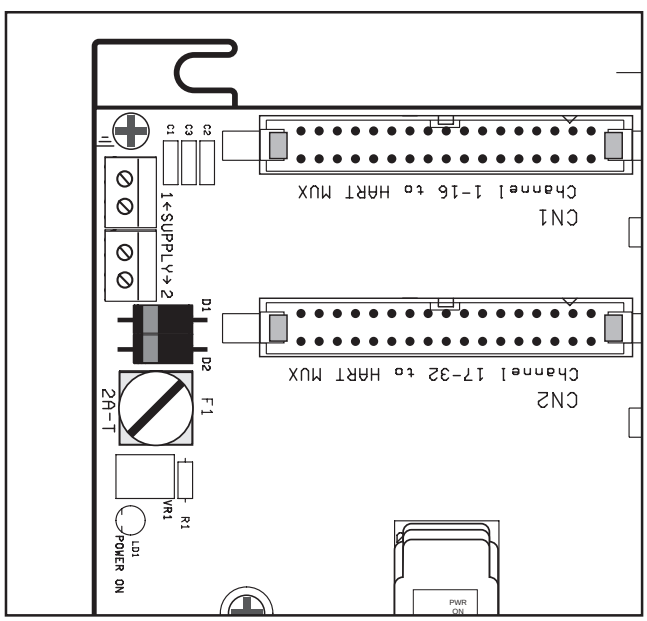

FIG. G

5.3 RS-485 INTERFACE CONNECTIONS

Each HIS board is equipped with an RS485 terminal block. This is the interface point to connect an external PC (equipped with a suitable RS-485 interface) to the HART multiplexer modules located on the board.

- For all details about RS-485 connections, please refer to the relevant Hart Mux Instruction Manual (IM-ENG-116/GB).

What makes the various HIS boards different is the type of connectors used to interface with the 4/20 Hart loops to be monitored. A single connector always interfaces to only 16 of the channels of one Hart multiplexer.

Interface connectors pin-out

	2108/64-HART-D model: SUB-D 37 pole female connector	2108/64-HART-F model: FLAT 34 pole male connector
Ch1+ / Ch17+	3	1
Ch1- / Ch17-	2	2
Ch2+ / Ch18+	22	3
Ch2- / Ch18-	21	4
Ch3+ / Ch19+	5	5
Ch3- / Ch19-	4	6
Ch4+ / Ch20+	24	7
Ch4- / Ch20-	23	8
Ch5+ / Ch21+	7	9
Ch5- / Ch21-	6	10
Ch6+ / Ch22+	26	11
Ch6- / Ch22-	25	12
Ch7+ / Ch23+	9	13
Ch7- / Ch23-	8	14
Ch8+ / Ch24+	28	15
Ch8- / Ch24-	27	16
Ch9+ / Ch25+	11	17
Ch9- / Ch25-	10	18
Ch10+ / Ch26+	30	19
Ch10- / Ch26-	29	20
Ch11+ / Ch27+	13	21
Ch11- / Ch27-	12	22
Ch12+ / Ch28+	32	23
Ch12- / Ch28-	31	24
Ch13+ / Ch29+	15	25
Ch13- / Ch29-	14	26
Ch14+ / Ch30+	34	27
Ch14- / Ch30-	33	28
Ch15+ / Ch31+	17	29
Ch15- / Ch31-	16	30
Ch16+ / Ch32+	36	31
Ch16- / Ch32-	35	32

When using the 2108/64-HART-F HIS board, you can directly use a FLAT pin-to-pin cable to directly connect with many compatible HiD2000 Termination Boards. Please contact P+F Elcon for more details.

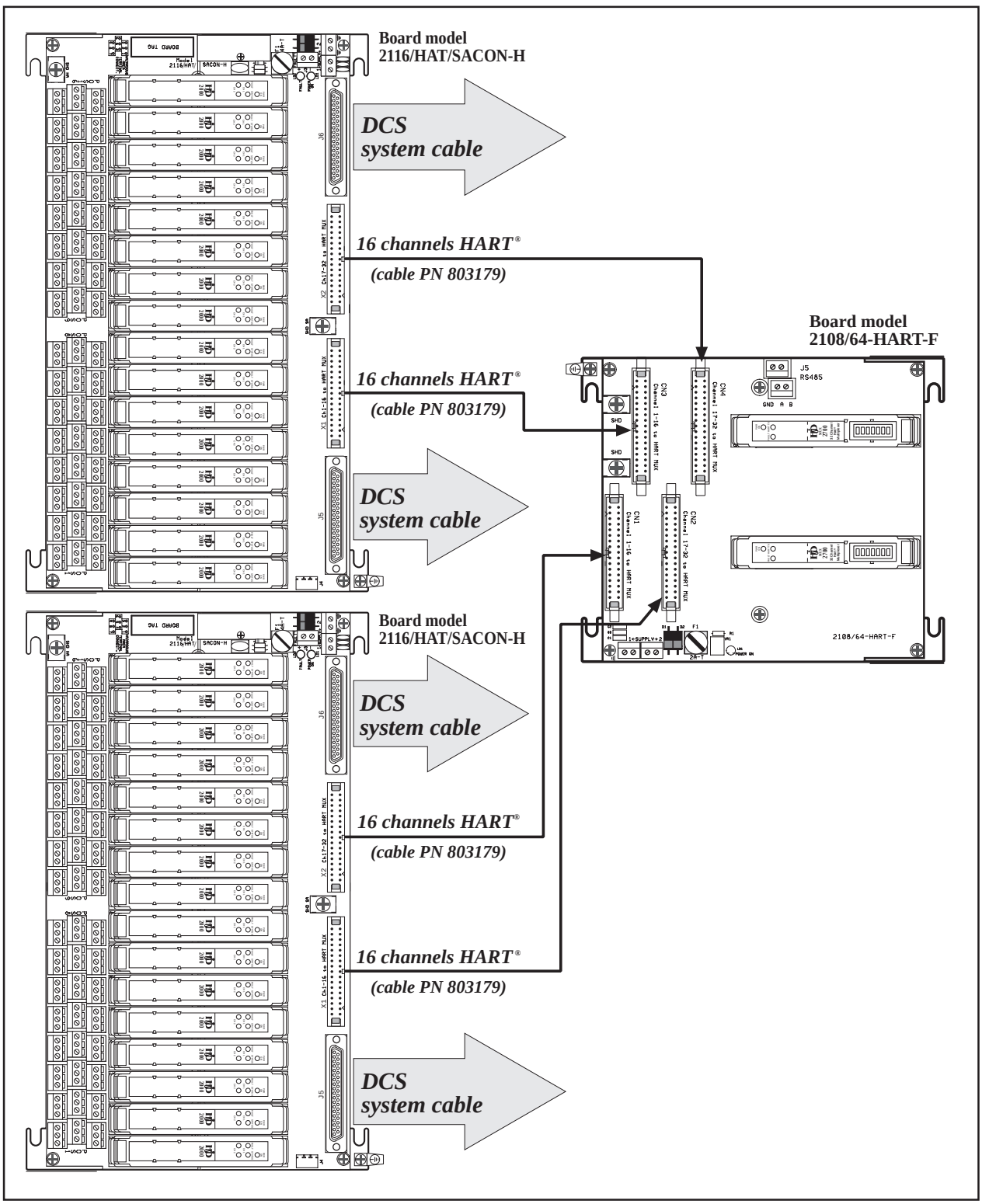

FIG. H

6 TROUBLE-SHOOTING

- On the board, check the supply LED (green); if the LED is off:
  - check the supply voltage value and polarity
  - check the protection fuse integrity
- Measure the voltage level at the supply terminals,
  (the acceptable range is from 20,4 Vdc to 30 Vcc)
- On each Hart multiplexer module, check the supply LED (green); if the supply voltage is O.K. and the LED is off, the Hart Multiplexer is faulty and must be returned for repair.
- For more detailed troubleshooting information about the Hart Multiplexer module, please refer to the relevant Instruction Manual (IM-ENG-116/GB).
- When you need to substitute the protection fuse, be sure to be in line with the applicable specifications

N.B.: there is no serviceable part within the Hart Multiplexer module. Trying to open it will likely damage the plastic enclosure and make any warranty null and void.

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