

Approvals

Marshallled Termination Assembly	Part Numbers	Agency Approvals
Analog Input 8-Channel 16 bit	6ES7650-1AA50-2XX0	CE EMC in accordance with EN61000-6-2 EN61000-6-4 ATEX in accordance with EN600079-0 EN600079-15
	6ES7650-1AA51-2XX0	
	6ES7650-1AA52-2XX0	
Analog Output 8-Channel 12 bit	6ES7650-1AB50-2XX0	Safety: ⁸⁾ EN 61131-2:2007
	6ES7650-1AB51-2XX0	
RTD Input 8-Channel	6ES7650-1AG50-2XX0	FM Approved: FM3600, FM3611, FM3810
	6ES7650-1AG51-2XX0	
TC Input 8-Channel	6ES7650-1AF50-2XX0	Class I, Division 2, Groups A,B,C,D; Temperature code T4A at Ta = 60°C
	6ES7650-1AF51-2XX0	
Discrete Input 16-Channel 24 VDC	6ES7650-1AC10-3XX0	Class I, Zone 2, Group IIC; Temperature code T4 at Ta = 60°C
	6ES7650-1AC11-3XX0	
F Relay Output ²⁾ 10-Channel 24-150 VDC 120-230 VAC	6ES7650-1AM30-6XX0 ^{6) 7) 10)}	cULus - UL508, CSA C22.2 No.142 cULus haz.loc. - UL1604, CSA C22.2 No.213 ¹¹⁾ ISA 12.12.01, CSA C22.2 No.213
	6ES7650-1AM31-6XX0 ^{6) 7) 10)}	
Relay Output 16-Channel 24-150 VDC 120-230 VAC	6ES7650-1AM30-3XX0 ^{6) 7) 10)}	KEMA ATEX in accordance with EN 60079-15: 2005 and EN 60079-0 : 2006 II 3 G Ex nA II T4 T/C & RTD MTA II 3 G Ex nC IIC T4 All others C-Tick
	6ES7650-1AH50-5XX0	
F Analog Input ²⁾ 6-Channel Failsafe	6ES7650-1AH51-5XX0	
	6ES7650-1AH61-5XX0	
F Analog Input HART ²⁾ 6-Channel Failsafe	6ES7650-1AH62-5XX0 ¹¹⁾	
	6ES7650-1AK10-7XX0	
F Discrete Input ²⁾ 12/24-Channel Failsafe 24 VDC	6ES7650-1AK11-7XX0	Temperature Range -25 to 60°C ²⁾ TÜV (Functional Safety) IEC61508 (SIL3, Relay MTA's SIL 2) ³⁾ Accessory TÜV when used with any Failsafe MTA
	6ES7650-1AL10-6XX0	
F Discrete Output ²⁾ 10-Channel Failsafe 24 VDC	6ES7650-1AL11-6XX0	
	6ES7650-1BA02-0XX0 ⁷⁾	⁴⁾ Accessory - used with F Analog Input ⁵⁾ Accessory - used with F Analog Input MTA
Power Monitor Board ³⁾	6ES7650-1BB50-0XX0 ⁹⁾	
	6ES7650-1BB51-0XX0 ⁹⁾	⁶⁾ UL60079-15 instead of UL1604 ⁷⁾ Class I, Division 2, Groups A,B,C,D; Temperature code T4
6.2V Diode Board ⁵⁾	6ES7650-1BC50-0XX0	
	6ES7650-1BC51-0XX0	⁹⁾ Not for use on MTAs with covers ¹⁰⁾ See manual for special temperature restrictions
FET Switch Adapter ^{4) 5)}	6ES7650-1BD50-0XX0	
	6ES7650-1BD51-0XX0	
Discrete Output 16-Channel 24 VDC	6ES7650-1AD10-2XX0	¹¹⁾
	6ES7650-1AD11-2XX0 ¹¹⁾	
HART Analog Input 8-Channel	6ES7650-1AA61-2XX0 ⁷⁾	
HART Analog Output 8-Channel	6ES7650-1AB61-2XX0 ⁷⁾	

1.2 Marshalled Termination Assemblies (MTAs)

The following table identifies the Siemens Marshalled Termination Assemblies (MTAs) discussed in this manual, including associated SIMATIC PCS 7 ET 200M I/O modules and interconnecting cables.

Table 1–1 Marshalled Termination Assembly and Module Cross-Reference

Marshalled Termination Assembly Part Numbers	PCS 7 ET 200M Module		Redundant
	Description	Part Number	
6ES7650-1AA50-2XX0 6ES7650-1AA51-2XX0	Analog Input 8-Channel 16 bit	6ES7331-7NF00-0AB0, E_Stand 5 or higher	Yes
6ES7650-1AA52-2XX0	Analog Input 8-Channel 16 bit	6ES7331-7NF00-0AB0, E_Stand 5 or higher 6ES7331-7NF10-0AB0, E_Stand 8 or higher	Yes
6ES7650-1AB50-2XX0 6ES7650-1AB51-2XX0	Analog Output 8-Channel 12 bit	6ES7332-5HF00-0AB0, E_Stand 3 or higher	Yes
6ES7650-1AG50-2XX0 6ES7650-1AG51-2XX0	RTD Input 8-Channel	6ES7331-7PF00-0AB0, E_Stand 8 or higher & 6ES7331-7PF01-0AB0	No
6ES7650-1AF50-2XX0 6ES7650-1AF51-2XX0	TC Input 8-Channel	6ES7331-7PF10-0AB0, E_Stand 4 or higher & 6ES7331-7PF11-0AB0	No
6ES7650-1AH50-5XX0 6ES7650-1AH51-5XX0	F Analog Input 6-Channel Failsafe	6ES7336-1HE00-0AB, E_Stand 4 or higher	Yes
6ES7650-1AH61-5XX0 6ES7650-1AH62-5XX0	F Analog Input HART 6-Channel Failsafe HART	6ES7336-4GE00-0AB0	Yes
6ES7650-1AM30-6XX0 6ES7650-1AM31-6XX0	F Relay Output 10-Channel Failsafe 24 VDC	6ES7326-2BF01-0AB0, E_Stand 2 or higher	Yes
6ES7650-1AK10-7XX0 6ES7651-1AK11-7XX0	F Discrete Input 12/24-Channel Failsafe 24 VDC	6ES7326-1BK00-0AB0, & 6ES7326-1BK01-0AB0, E_Stand 1 or higher	Yes
6ES7650-1AC10-3XX0 6ES7650-1AC11-3XX0	Discrete Input 16-Channel 24 VDC	6ES7321-7BH01-0AB0, E_Stand 2 or higher	Yes
6ES7650-1AL10-6XX0 6ES7650-1AL11-6XX0	F Discrete Output 10-Channel Failsafe 24 VDC	6ES7326-2BF01-0AB0, E_Stand 2 or higher	Yes
6ES7650-1AD10-2XX0	Discrete Output 16-Channel 24 VDC	6ES7322-8BH01-0AB0 E_Stand 1 or higher	Yes
6ES7650-1AD11-2XX0	Discrete Output 16-Channel 24 VDC	6ES7322-8BH10-0AB0	Yes
6ES7650-1AM30-3XX0	Relay Output 16-Channel 24 – 150 VDC 120 – 230 VAC	6ES7322-8BH01-0AB0 E_Stand 1 or higher	Yes

11 6-Channel F Analog Input HART MTA

Part No. 6ES7650-1AH62-5XX0

11.1 Description

This section contains installation information and requirements for the Siemens Marshalled Termination Assembly (MTA) (6ES7650-1AH62-5XX0) designed to interface with the Siemens ET 200M 6-Channel F Analog Input HART Module (6ES7336-4GE00-0AB0).

11.2 Features

The following features have been incorporated into this MTA:

- Redundant power connections
- LED indication of redundant power supply condition
- LED indication of reverse polarity
- Power monitor output
- short circuit proofed 2-wire transducer supply per channel
- Dual connectors for redundant I/O Module operation
- Per module power fusing
- Shield connections available for channel cabling
- Ground stud for connecting shield to earth ground
- Connectivity for HART Handheld Terminal (HHT) per channel

11.3 Modification vs 6-Channel F Analog Input MTA 6ES7650-1AH61-5XX0

- electronically short circuit proofed 2-wire transducer supply
- no power supply supported for 4-wire transducer
- Power Monitor System onboard
- no changeable diode boards
- one piece connectors
- housing short version

11.4 Operation

Power is supplied via the two power connectors which are marked **L/A+**, **M/A**, and **L/B+**, **M/B**. Each has a green LED to indicate the presence of voltage over 15 VDC. The case of polarity reversal of the power supply is indicated by the LEDs illuminating red. The LEDs are marked **A POWER** and **B POWER**.

Incoming power from **A** and **B** is diode OR'd to provide the MTA and the module power from either input source. The output from the diodes is sent to the I/O modules via the module fuses and to the channels via the transducer supplies. Module Fuse F110 (**MODULE 1**) supplies the I/O Module plugged into **MODULE 1** and Module Fuse F160 (**MODULE 2**) supplies power to the I/O Module plugged into **MODULE 2**.

An onboard Power Monitor System (PMS) is used to provide an isolated dry contact when redundant power is supplied to MTAs. Only when power is supplied to both power inputs the output contacts **1** and **2** are closed. The Power Monitor System is designed to detect only the presence or absence of power. It is not designed to detect supply voltage which is outside the specification threshold.

Field Terminals, Channel + (**Ix+**), Channel – (**Ix-**), Transducer power (**PWx**) and Shield (**SHx**), connect to the field devices. **PWx** is the +24 VDC power feed for supplying 2-wire transducer and is short circuit proofed on a channel-by-channel basis.

For redundant I/O Modules, the **Ix+/-** connects to the I/O modules input via **MODULE 1** and **MODULE 2**. If both modules are present, then the Zener-diodes which are in parallel to the measuring inputs are passive, but ensure that if one module is removed for maintenance, the input signals to the remaining module are not interrupted. Redundant operation uses the MTA and two FAI modules. A simplified diagram of redundant use of the FAI module and MTA is shown in Figure 10–1

For a non-redundant I/O module, the **Ix+/-** connects to the I/O module input via the upper diodes. These diodes conduct the signal to the non-redundant module plugged into **MODULE 2**. In this case the lower diodes are passive. Non-redundant modules could be plugged into **MODULE 1** or **MODULE 2**. Non-redundant operation uses the MTA and one FAI module. A simplified diagram of Non-redundant use of the FAI module and MTA is shown in Figure 10–2.

Figure 11–1 Redundant FAIH Interface

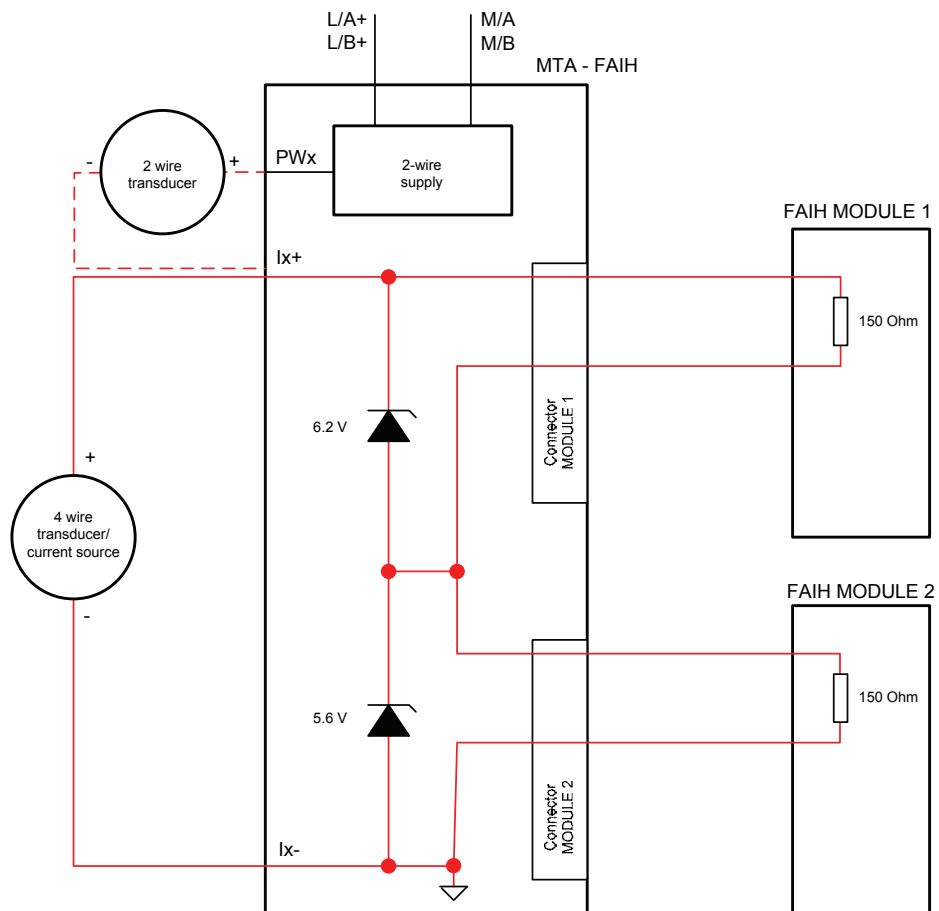
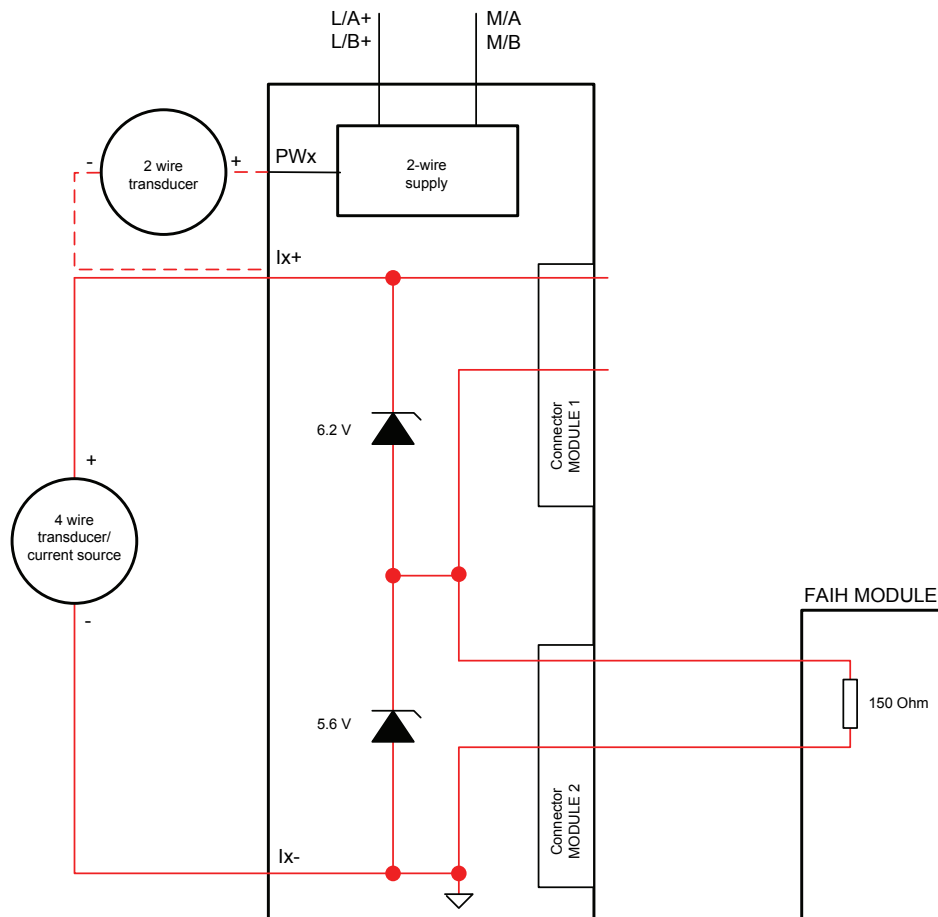


Figure 11-2 Non-Redundant FAI Interface



11.5 Installation Requirements

See Section *Installation*, before performing any installation and observe all warnings.

A common interconnecting cable (6ES7922-3BD00-0AU0 or 6ES7922-3BJ00-0AU0), supporting six analog input channels, interconnects the analog input termination assembly to the 6-channel analog input module (6ES7336-4GE00-0AB0).

It may be necessary to modify the printed circuit board as follows:

To disconnect the interconnecting cable shield from ground at the MTA only, cut and remove the shield disconnect jumper, **X100** and **X101**, for the associated cable.

Note

To separate channel input low from power supply common, cut and remove the jumper **X300**. This will provide isolation between all the inputs and power return.

11.6 Maintenance

See Section *Maintenance* before performing any maintenance and observe all warnings.

Under normal operation, the **A/B Power LED** and the **Module 1/2 Fuse LED** are on. If all are off, check the power supply to MTA. If the **A/B Power LED** is off, check the power supply to the MTA. If the **Module 1/2 Fuse LED** is off, check the module fuse and replace as necessary.

Note

Correct power down and power up of the FAI module is crucial to the proper operation of the system. The proven procedure for removal and re-installation of the FAI module is as follows:

6. Remove the MTA-I/O cable connector from the FAI module.
 7. Remove the FAI module from the backplane.
 8. Perform FAI module maintenance as required.
 9. Reinstall the FAI module into the backplane.
 10. Reinstall the MTA-I/O cable connector onto the FAI module.
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11.6.1 Maintenance for 2-wire transducer supply

The power supply for 2-wire transducer is individually short circuit proofed for each channel. In case of a external short circuit, provided by a faulty wiring, the current is limited up to 40 mA.

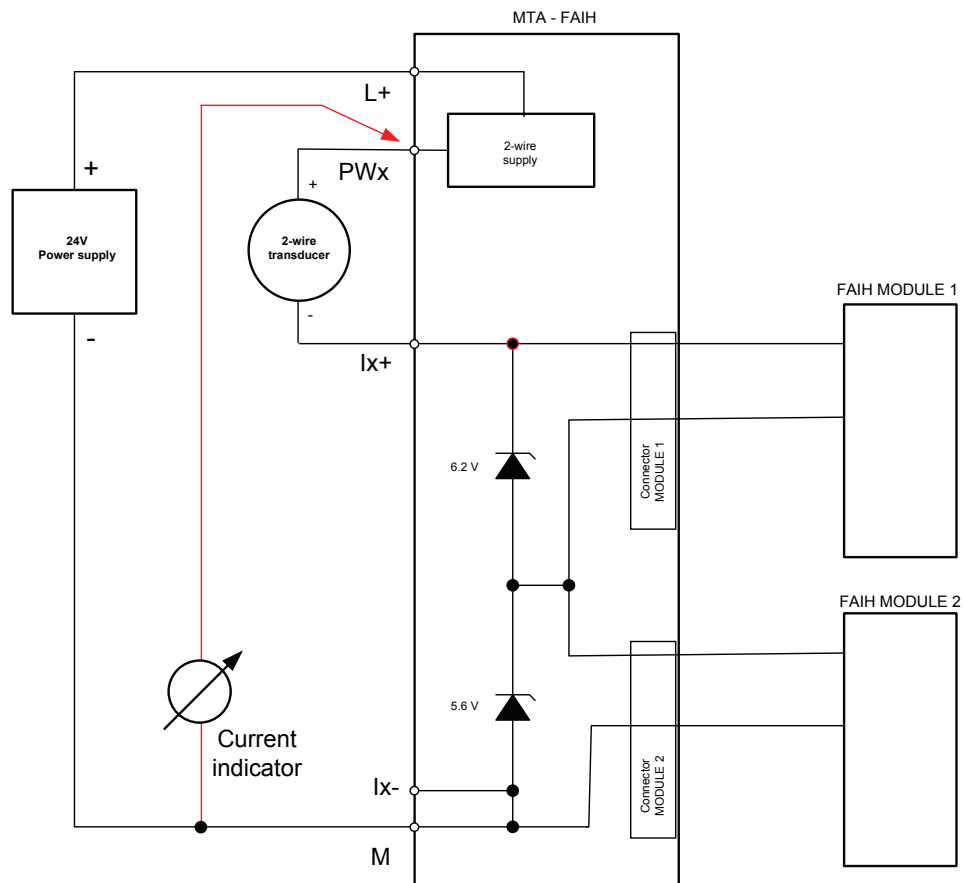
The power supply circuit works in redundant mode. By this reason also in case of a internal component error the normal current range (<24mA) will be supported.

Nevertheless a periodic check of the 2-wire power supply will be commended.

Please notice::

This check will disable the measurement on both conducted FAIH- modules.
During test both modules will provide a broken wire diagnostic.

Figure 11-3 2-wire transducer supply test setup



The correct function of the 2-wire transducer supply can be checked without modifying the wiring.

A DC current indicator connected with the minus connector to ground (M/A or M/B) contacts PW0 ... PW5.

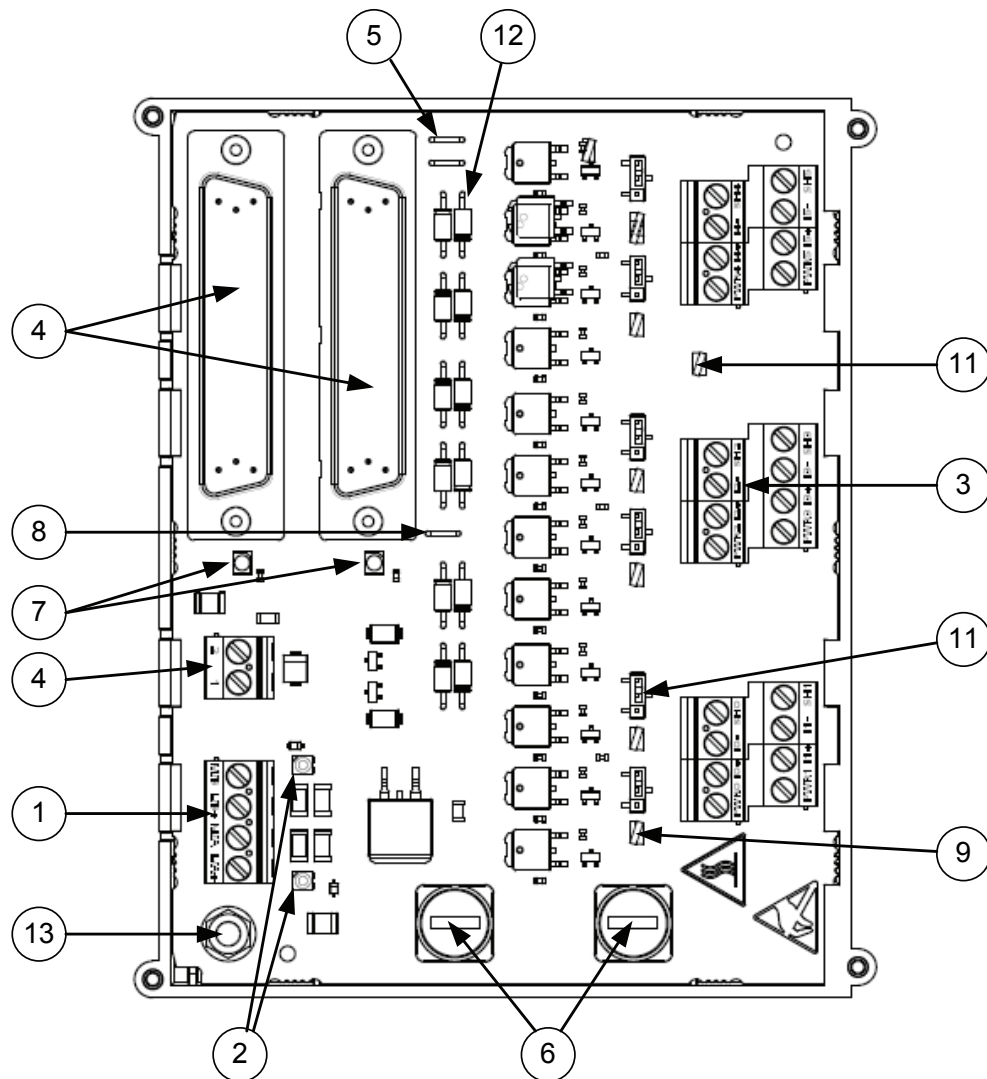
Measured current must be 35mA ... 40mA.

In case a smaller value will be measured the MTA has become defect.

11.6.2 6-Channel F Analog Input HART Marshalled Termination Assembly

Figure 10–3 shows the basic parts of the 6-Channel F Analog Input HART MTA.

Figure 11–4 6-Channel F Analog Input HART Marshalled Termination Assembly
(6ES7650-1AH62-5XX0)



Key to numbered items in Figure 10–3:	
Item	Description
1	Input power connections (L/A+, M/A, L/B+, M/B)
2	Input power indicators (A POWER, B POWER)
3	Field wiring connections
4	Output Power Monitor System (1, 2)
5	Shield disconnect jumper (X100, X101)
6	Module power fuses (MODULE 1, MODULE 2)
7	Module power fuse indicators
8	Input isolation Jumper (X300)
9	HART connectivity terminals (CHx HRT+)
10	HART connectivity ground (COM HRT-)
11	Channel Input Disconnect Jumper (CON/DIS)
12	Zener diodes
13	Shield Ground Stud for connecting to earth ground

11.7 Technical Specifications

Technical Specifications for 6-Channel F Analog Input HART MTA 6ES7650-1AH62-5XX0 in use with FAIH-module 6ES7336-4GE00-0AB0 and cables 6ES7392-3Bx00-0AU0	
Dimensions - See Section 1, Figure 1.3, Short Version	
Mounting	
DIN Rail	35mm (deep top hat style)
Power Input	
Voltage Input for Single or Redundant Feed	21.6 to 28.8 VDC
Current Consumption (nominal ratings; all channels 20 mA)	< 0.5 A
Power Dissipation (typical)	1 W
Fuse Ratings	
Module Power	0.5 A (Bussmann P/N: GMA-0.5A) (Siemens Spare P/N: A5E01568885)
Power output for 2-wire transducer supply	
Supply current for each channel	typ. 20 mA
Short circuit current	max. 40 mA
Load capability	> 750 Ω
Open loop voltage	max. L+
Short circuit protection	electronically; individual for each channel
Power Monitoring System - Optorelay Output Contact Ratings	
Threshold voltage	ca. 15 V
Maximum switched Voltage	30 V DC
Maximum switched Current	0.5 A resistive load; not short circuit proofed
Indicators	
Input Power	Green LED on when input power available red LED on if power supply is reversed
Field Terminals	
Wire Size – US	24 – 14 AWG
Wire Size – Metric	0,205 – 2,08 mm sq.
Environmental	
Ambient Temperature	-25°C to +60°C
Humidity	5% to 95% Non-condensing
Approvals	
MTA Agency Approvals	See Preface section, Approvals Table
Max achievable Safety Integrity Level in safety mode	
In Accordance with IEC 61508	SIL 3
Fail-safe performance characteristics	
Low demand mode (average probability of failure on demand) per channel	PFD _{avg} < 8,34E-5 @ 60°C
High Demand continuous mode (probability of dangerous failure per hour per channel)	PFH _G < 1,05E-9
Proof-test interval	20 years

11.11 Input Sharing

11.11.1 Description

This section contains information and requirements for input sharing between a Failsafe Analog Input module (6ES7 336-4GE00-0AB0) and a Standard Analog Input Module (6ES7 331-7NF00-0AB0, E-Stand 5 and higher or 6ES7 331-7NF10-0AB0, E-Stand 8 or higher), using the Siemens FAIH Marshallled Termination Assembly (MTA) (6ES7650-1AH62-5XX0 and the Siemens AI Marshallled Termination Assembly (MTA) (6ES7650-1AA52-2XX0).

11.11.2 Purpose

Input sharing allows the transmitter signal to be distributed to both the Fail-Safe Analog Input Module and the Standard Analog Input Module. Both systems will then receive the same input data.

Figure 11–6 FAIH SAI Input Sharing

