Approvals

Marshalled 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 Safety: 8) EN 61131-2:2007 FM Approved: FM3600, FM3611, FM3810 Class I, Division 2, Groups A,B,C,D; Temperature code T4A at Ta = 60°C Class I, Zone 2, Group IIC; Temperature code T4 at Ta = 60°C 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 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 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 4) Accessory - used with F Analog Input 5) Accessory - used with F Analog Input MTA 6) UL60079-15 instead of UL1604 7) Class I, Division 2, Groups A,B,C,D; Temperature code T4 9) Not for use on MTAs with covers 10) See manual for special temperature restrictions
	6ES7650-1AA51-2XX0	
	6ES7650-1AA52-2XX0	
Analog Output 8-Channel 12 bit	6ES7650-1AB50-2XX0	
	6ES7650-1AB51-2XX0	
RTD Input 8-Channel	6ES7650-1AG50-2XX0	
	6ES7650-1AG51-2XX0	
TC Input 8-Channel	6ES7650-1AF50-2XX0	
	6ES7650-1AF51-2XX0	
Discrete Input 16-Channel 24 VDC	6ES7650-1AC10-3XX0	
	6ES7650-1AC11-3XX0	
F Relay Output 2) 10-Channel 24-150 VDC 120-230 VAC	6ES7650-1AM30-6XX0 6) 7) 10)	
	6ES7650-1AM31-6XX0 6) 7)10)	
Relay Output 16-Channel 24-150 VDC 120-230 VAC	6ES7650-1AM30-3XX0 6) 7) 10)	
F Analog Input 2) 6-Channel Failsafe	6ES7650-1AH50-5XX0	
	6ES7650-1AH51-5XX0	
F Analog Input HART 2) 6-Channel Failsafe	6ES7650-1AH61-5XX0	
	6ES7650-1AH62-5XX0 11)	
F Discrete Input 2) 12/24-Channel Failsafe 24 VDC	6ES7650-1AK10-7XX0	
	6ES7650-1AK11-7XX0	
F Discrete Output 2) 10-Channel Failsafe 24 VDC	6ES7650-1AL10-6XX0	
	6ES7650-1AL11-6XX0	
Power Monitor Board 3)	6ES7650-1BA02-0XX0 7)	
5.6V Diode Board 5)	6ES7650-1BB50-0XX0 9)	
	6ES7650-1BB51-0XX0 9)	
6.2V Diode Board 5)	6ES7650-1BC50-0XX0	
	6ES7650-1BC51-0XX0	
FET Switch Adapter 4) 5)	6ES7650-1BD50-0XX0	
	6ES7650-1BD51-0XX0	
Discrete Output 16-Channel 24 VDC	6ES7650-1AD10-2XX0	
	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

4 8-Channel Analog Input MTA

Part No. 6ES7650-1AA51-2XX0 or 6ES7650-1AA50-2XX0

4.1 Description

This section contains installation information and requirements for Siemens Marshalled Termination Assembly (MTA) (6ES7650-1AA51-2XX0 or 6ES7650-1AA50-2XX0), which connects to the Siemens ET 200M 8-Channel Analog Input Module (6ES7 331-7NF00-0AB0, E-Stand 5 or higher).

Note: The only major difference between the two part numbers is the housing. The Anthracite Gray housing is the latest design. Functionality of both part numbers is the same.

4.2 Features

This MTA has the following features:

- Redundant power connections
- LED indication of redundant power supply condition
- Power monitor plug-in available (optional)
- LED indication of power supply to the field device on an individual channel basis
- Per channel fusing of field power
- Dual connectors for redundant I/O Module operation
- Shield connections available for channel cabling
- Ground stud for connecting shield to earth ground
- Power input and field terminations are pluggable for easy maintenance
- Connectivity for HART Handheld Terminal (HHT) per channel

4.3 Operation

Power is supplied via the two removable power connectors which are retained by screws and marked **L+A**, **MA**, and **L+B**, **MB**. Each has circuitry to detect the presence of voltage over 15 VDC and turn on the LED indicator. The LEDs are marked **A POWER** and **B POWER.** There is also a connector (**J3**) for a Power Monitor board used to indicate the presence of both A and B power. See Section 19, *Power Monitor Board* (6ES7650-1BA02-0XX0).

Incoming power from **A** and **B** is diode OR'd, in **CR106**, to provide the MTA power from either input source. The output from **CR106** is sent to the channel fuses. This module does not require any power from the I/O power supply and therefore no module power circuitry is required.

Each channel has an LED to indicate the presence of power and the fuse status. If there is no power or the fuse is open, then the LED remains dark. If there is power and the fuse is good then the LED is illuminated.

The MTA has two types of jumpers for customer use:

- **I – V** jumpers are a header and shunt type that determines the connection to the input signal.
- Isolation jumpers are wires that can be cut to isolate the input channel from power return. See Section 4.10, *Hardware Configuration.*

Field Terminals, Channel + (**Ix+)**, Channel – (**Ix-***)*, Sensor power (**PWRx**) and Shield (**SHx**), connect to the field devices. **PWRx** is the +24 VDC power feed and is fused (.5A) on a channel-by-channel basis. The field termination connector is removable for ease of wiring maintenance and is retained by friction.

The channel inputs from the MTA connect to the I/O modules inputs via **J1** and **J2**. Redundant operation uses two modules with one each connected to **J1** and **J2**, while non-redundant systems have one module connected to either **J1** or **J2**.

4.4 Installation Requirements

See Section 2, *Installation*, before performing any installation and observe all warnings

A common interconnecting cable (6ES7922-3BD00-0AS0 or 6ES7922-3BJ00-0AS0), supporting eight analog input channels, connects the analog input termination assembly to the 8-channel analog input module (6ES7 331-7NF00-0AB0, E-Stand 5 or higher). See Figure 4–1.

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

- For channels measuring voltage, move the **I – V** jumper for that channel to the **V** side.
- For channels measuring current, move the **I – V** jumper for that channel to the **I** side
- To separate channel input low from power supply common, cut and remove the jumper associated with that channel, W8 for CH0 through W15 for CH7.

Note

To disconnect the interconnecting cable shield from ground at the MTA only, cut and remove the shield disconnect jumpers, **W100** and **W101**, for the associated cable.

4.5 Maintenance

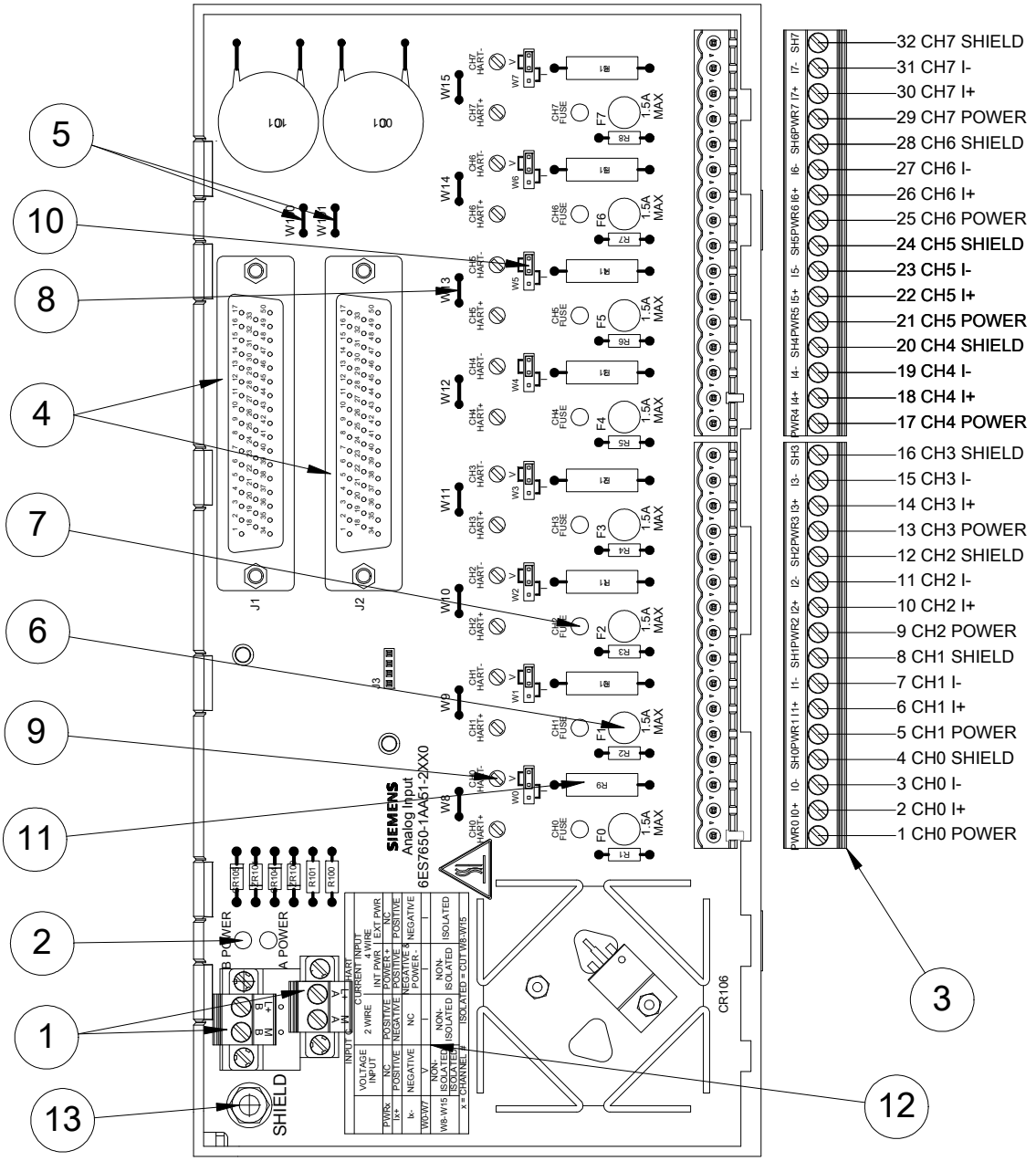
Under normal operation, the **A/B Power LED** and all the **Channel Fuse LEDs** are on. If all are off, check the power supply to MTA. If the **A/B Power LED** is off, check the power supply to the MTA. If the **Channel Fuse LED** is off, check the channel fuse and replace if necessary.

See Section 3, *Maintenance*, before performing any maintenance and observe all warnings.

4.6 8-Channel Analog Input Marshalled Termination Assembly

The figure below shows the basic parts of the 8-Channel Analog Input MTA.

Figure 4–1 8-Channel Analog Input Marshalled Termination Assembly (6ES7650-1AA51-2XX0 or 6ES7650-1AA50-2XX0)



Key to numbered items in Figure 4–1:	
Item	**Description**
1	Input power connections
2	Input Power Indicators
3	Field Connections
4	I/O Module Connections (J1 & J2)
5	Shield disconnect jumper (W100 & W101)
6	Field power fuses
7	Field power indication (1 of 8)
8	Input Isolation Jumpers (W8 – W15)
9	HART connectivity
10	Input Mode Jumper (I – V)
11	250 Ω resistors (R9-R16)
12	Input Connection Chart
13	Shield Ground Stud for connecting to earth ground

4.7 Technical Specifications

Technical Specifications for 8-Channel Analog Input MTA (6ES7650-1AA51-2XX0 or 6ES7650-1AA50-2XX0)	
Dimensions - See Section 1, Figure 1.3, Long 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 connected)	
Inrush	8.238 A maximum (Includes 8.16 A for transmitter inrush)
Normal	0.265 A maximum
Terminal Block Wire Sizes	TB100 & TB101
Wire Size – US	24 – 14 gauge AWG
Wire Size – Metric	0,205 – 2,08 mm sq.
Power Supply Specifications	See Module Specs
Fuse Ratings	
Individual channel – Normal	0.5 A Fast blow (Littelfuse P/N: 273.500) (Siemens Spare P/N: A5E01568880)
Individual channel – Optional	1.5 A Fast blow (Littelfuse P/N: 273 01.5) (Siemens Spare P/N: A5E01568886) Max total channel current: 8.16 Amps
Module	NA
Indicators	
Input Power	Green LED on when input power available
Module Power	NA
Channel Power	Green LED on when sensor power available
Field Terminal Block Wire Sizes TB1 – TB2	
Wire Size – US	24 – 14 gauge AWG
Wire Size – Metric	0,205 – 2,08 mm sq.
Environmental	
Ambient Temperature	-25C to +60C
Humidity	5% to 95% Non-condensing
Approvals	
MTA Agency Approvals	See Preface section, Approvals Table

Note

Fuses are available as spare parts from Siemens.

Fuse information can be found at:

http://www.littelfuse.com

http://www.bussmann.com

4.8 Module Restrictions

Restrictions for 8-Channel Analog Input MTA (6ES7650-1AA51-2XX0 or 6ES7650-1AA50-2XX0)	
I/O Module Restrictions	
MTA	None
SAI Module	None
Voltage	+/-5 V, 1 - 5 V, & +/-10 V
Current	0 – 20 mA, +/- 20 mA, & 4 – 20 mA
Module Accuracy	
Voltage Input (MTA I/V set to V)	See Module Specs
Current Input (MTA I/V set to I)	See Module Specs

4.9 Typical Transmitter Connection to Field Terminals

Figure 4–2 Analog Input Current Input Connection Examples (MTA I/V Jumper set to I)

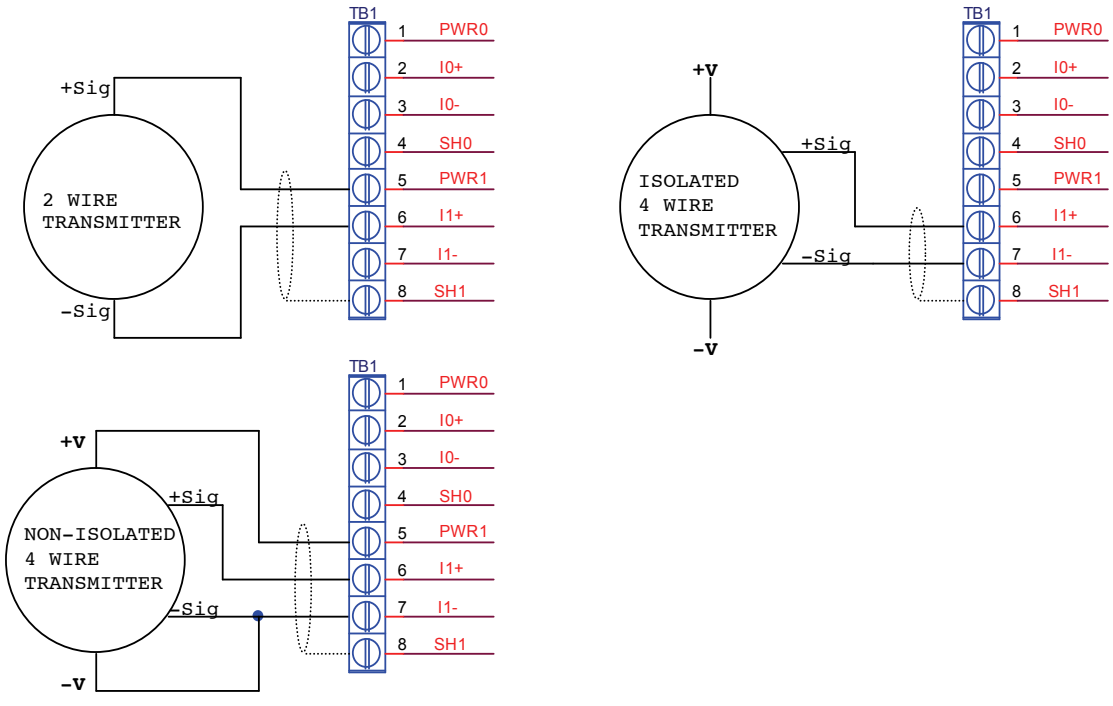
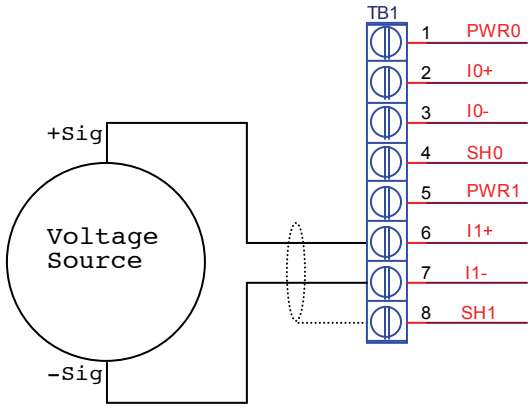


Figure 4–3 Analog Input Voltage Input Connection Example (MTA I/V Jumper set to V)



4.10 Hardware Configuration

Use the **I – V** jumpers to select voltage or current input signals.

Configure the AI8 module to match the input signal type.

See Figure 4–1, Item 8, for the location of the isolation jumper and Item 10, for the location of the **I - V** Jumper.

4.10.1 Addresses

Non-redundant Operation

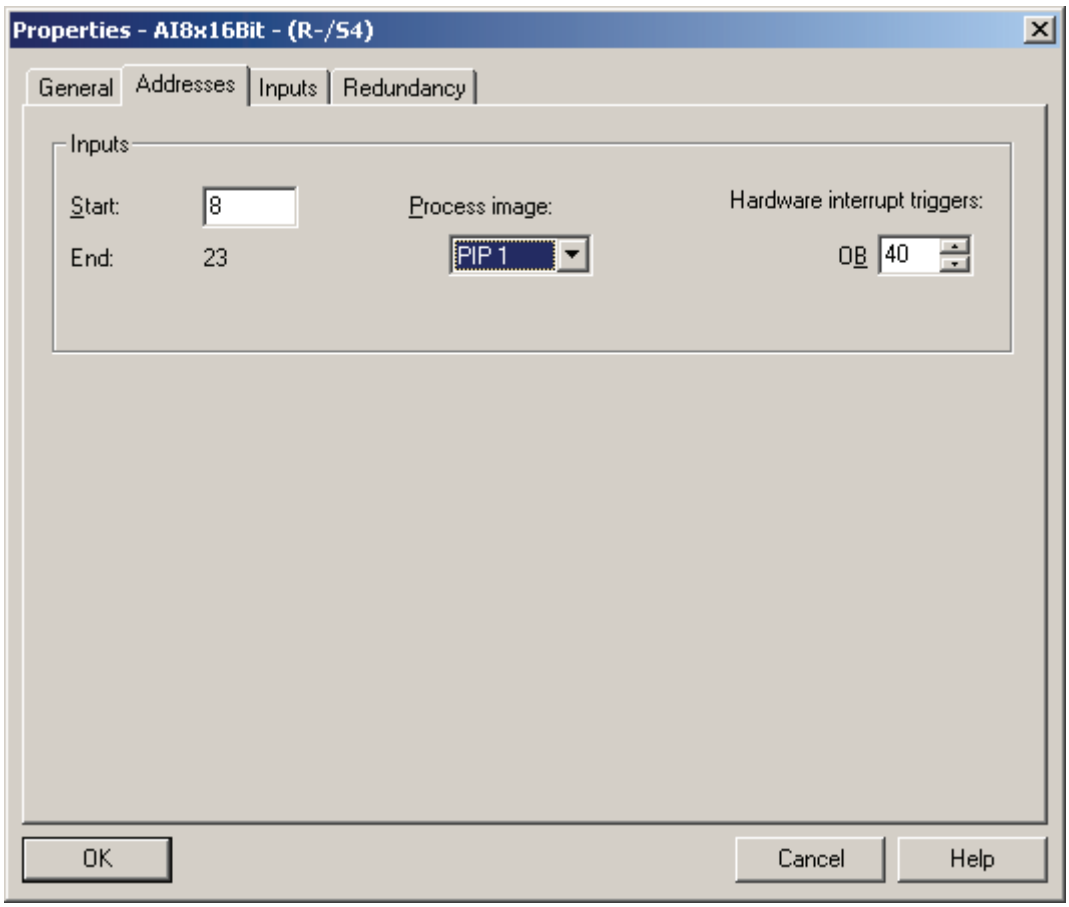
The choice of the Input Address and Process Image are left to the user.

Redundant Operation

Process Image should be set to something other than the default. The choice of the Input Address is left to the user.

Figure 4–4 shows addresses and process image for a redundant configuration.

Figure 4–4 8-Channel Analog Input Hardware Configuration: Address Setup for Redundant Operation



4.10.2 Inputs

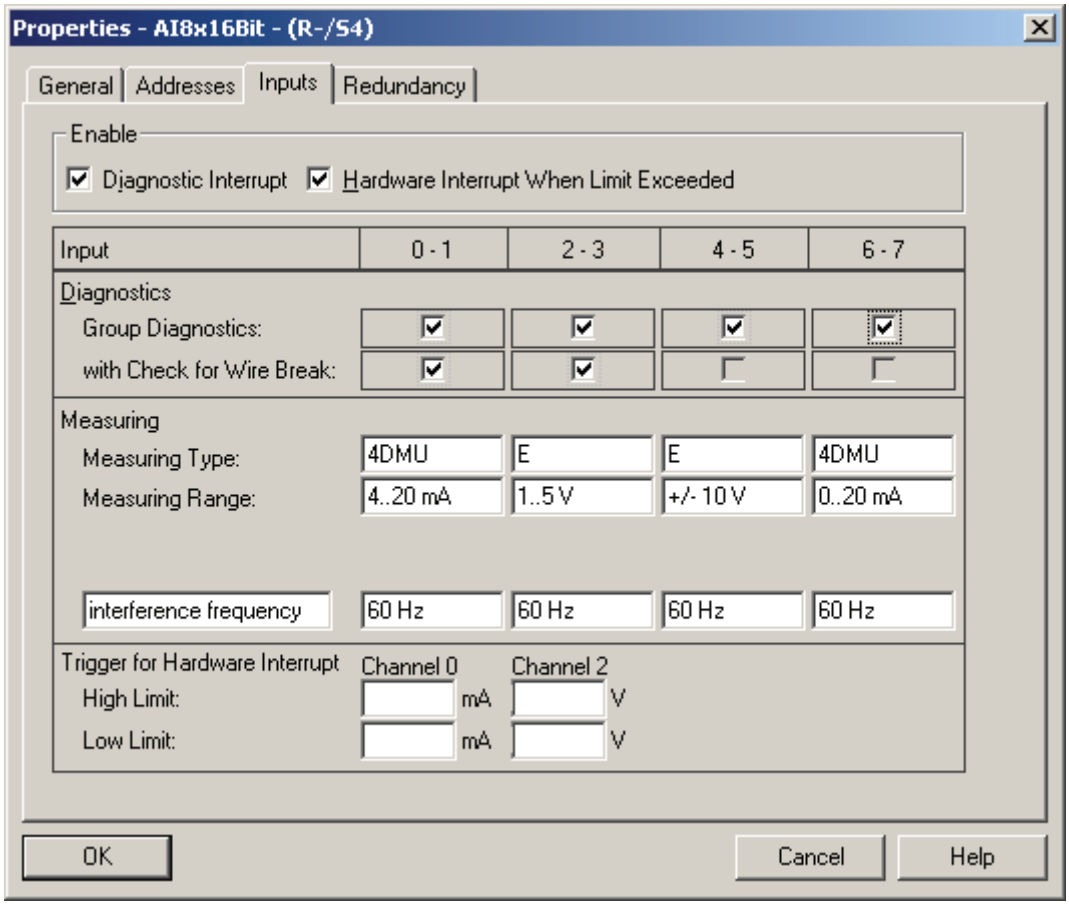
Select appropriate module hardware configuration settings.

Select **Measuring Type** and **Measuring Range** settings to match the input signal connected to the channel inputs.

Measurement of signals less than 0 volts or 0 mA requires that the channel isolation jumper be cut.

Figure 4–5 shows the all the diagnostic boxes checked.

Figure 4–5 8-Channel Analog Input Hardware Configuration: Inputs Setup



Note

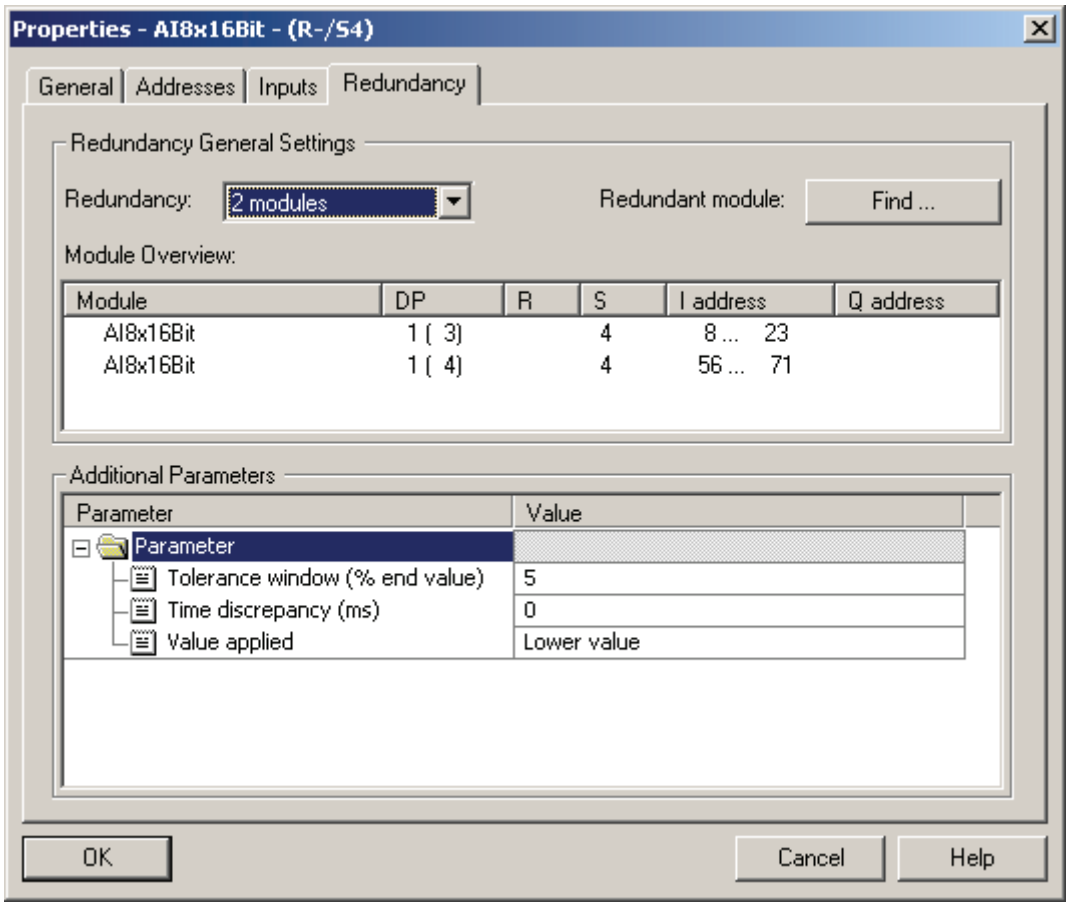
- Use the AI8 MTA **I – V** jumpers to select voltage or current input signals.
- Configure the AI8 module to match the input signal type.
- See Figure 4–1, Item 10, for the location of the **I - V** Jumper.

4.10.3 Redundancy

Figure 4–6 shows the redundant configuration. For non-redundant operation, in the **Redundancy** box, select **None**.

All other parameters should be set to user preferences.

Figure 4–6 8-Channel Analog Input Hardware Configuration: Redundancy Selection



4.11 Technical Specifications for 8-Channel Analog Input Module (6ES7 331-7NF00-0AB0)

Note

For a complete functional description and the most current technical specifications for this module, refer to the manual *S7-300 Programmable Controller Module Specifications* (document number A5E00105505).