

17 Failsafe 10-Channel, 24-150 VDC/120-230 VAC Relay Output MTA

Part No. 6ES7650-1AM31-6XX0 or 6ES7650-1AM30-6XX0

17.1 Description

This section contains information and requirements to facilitate installation of Siemens, 24-150 VDC/120-230 VAC Relay Output Marshallled Termination Assembly (MTA) (6ES7650-1AM31-6XX0 or 6ES7650-1AM30-6XX0), designed to interface with the Siemens ET 200M 10-Channel Failsafe Discrete Output Module (6ES7 326-2BF10-0AB0, E-Stand 3 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.

17.2 Features

The following features have been incorporated into this MTA:

- Form C Relay for each output
- Redundant power connections
- LED indication of redundant power supply condition
- Power monitor plug-in available (optional)
- Dual connectors for redundant I/O Module operation
- Per module power fusing
- Ground stud for connecting shield to earth ground
- Power input and field terminations are pluggable for easy maintenance

17.3 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 a LED to indicate the presence of voltage over 15 VDC. The LEDs are marked **A POWER** and **B POWER**. There is also a connector 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 to provide the MTA and the module power from either input source. The output is sent to the I/O modules via the module fuses and to the channels via the channel fuses. Module 1 Fuse supplies the I/O Module plugged into the **Module 1 connector** and Module 2 Fuse 2 supplies power to the I/O Module plugged into the **Module 2 connector**.

Field Terminals, Normally Closed (**NCx**), Common (**COMx**), and Normally Open (**NOx**) connect to the field devices. **NCx** and **COMx** are used to provide a normally closed connection when the relay is not energized. **NOx** and **COMx** are used to provide a normally open connection when the relay is not energized. The field termination connector is removable for ease of wiring maintenance and is retained by friction.

The relay coil x connects to the I/O modules input via the channel fuse to the **Module 1** and **Module 2 connectors**. Redundant operation uses two modules with one each connected to the **Module 1** and **Module 2 connectors**. Redundant operation is achieved by connecting the diode output from each channel on different modules together. Non-redundant systems have one module connected to either the **Module 1** or **Module 2 connectors**.

17.4 Installation Requirements

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

A common interconnecting cable (6ES7922-3BD00-0AS0 and 6ES7922-3BJ00-0AS0), supporting 10 DO channels, interconnects the discrete output termination assembly to the 10-channel, 24 VDC Failsafe discrete output module (6ES7 326-2BF10-0AB0, E-Stand 3 or higher).

Note

To disconnect the interconnecting cable shield from ground at the MTA only, cut and remove the shield disconnect jumper, **item 5**, for the associated cable. See Figure 17—.

17.5 Maintenance

See Section 3, *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 channel fuse and replace as necessary.

Remove field power before removing or installing any device.



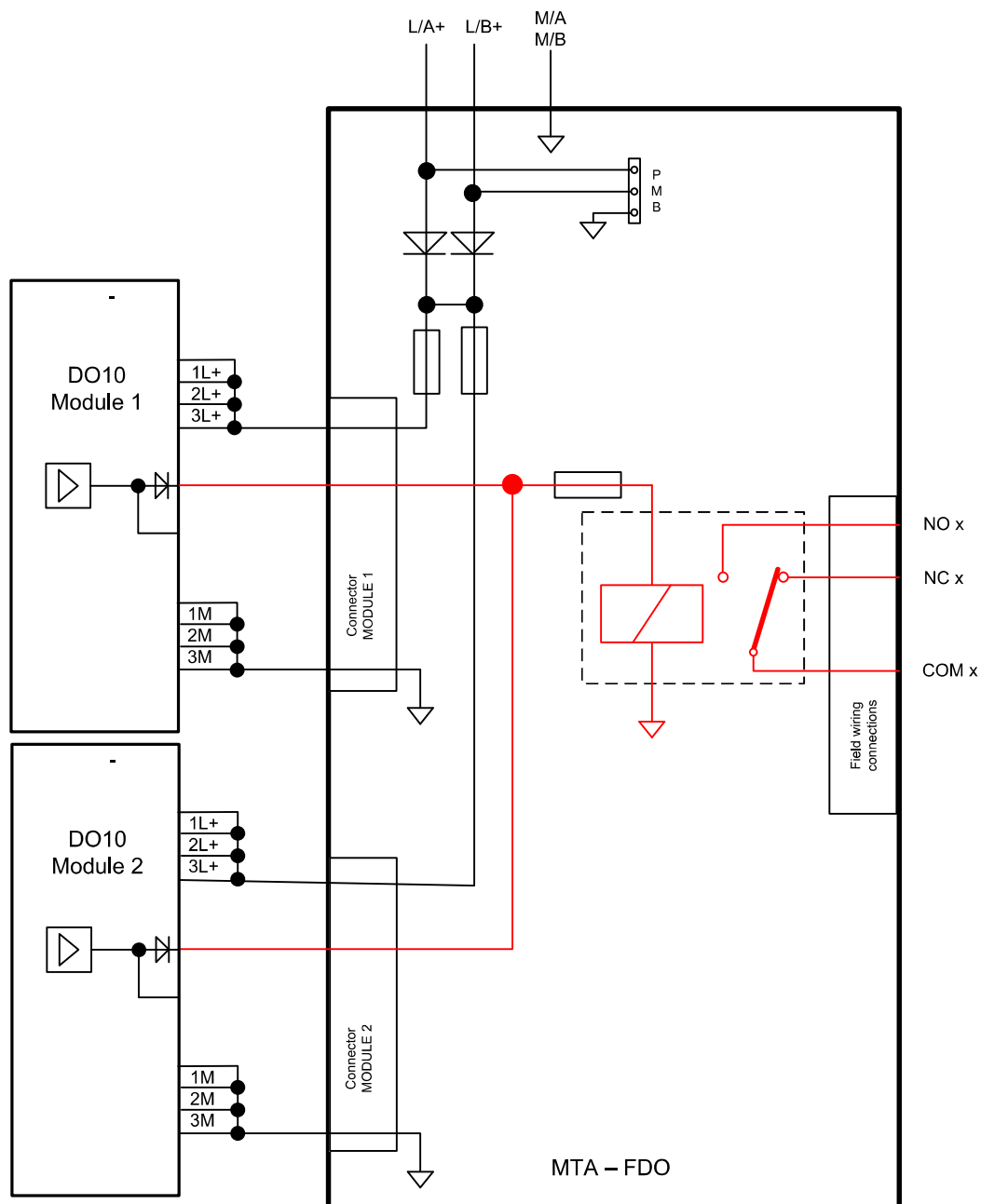
Warning

Electrical shock hazard

- An electrical shock hazard exists for Relay Output MTAs only when connected to loads with voltage > 30V rms and 42.4V peak or 60V dc
 - Remove power from all wires and terminals before working on equipment.
 - For AC voltages all channels must be the same phase. For voltages greater than 150 VDC, all channels must be of the same voltage.
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17.6 Simplified diagram

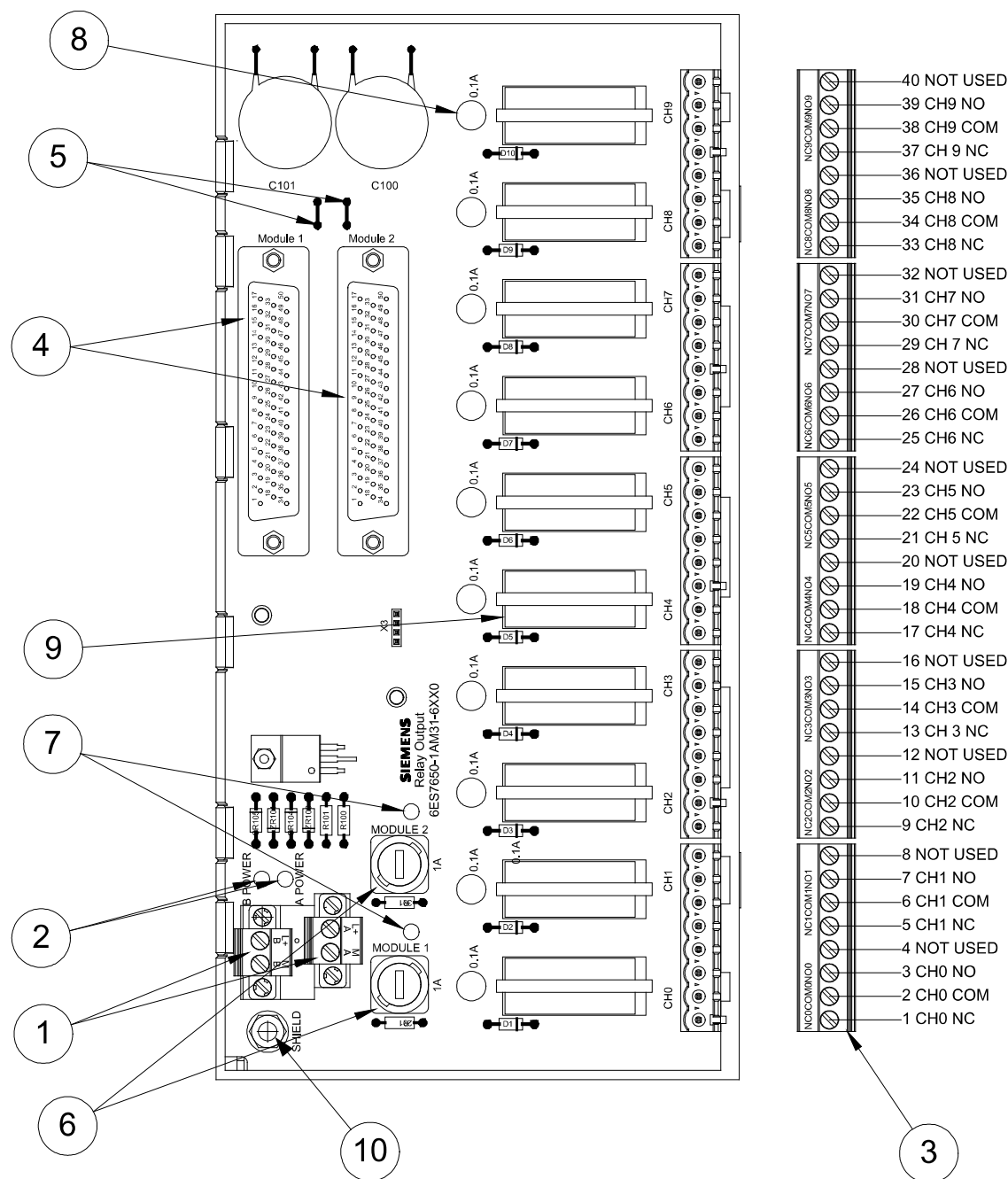
Figure 17–1 12/24-Channel, 24 VDC F Discrete Input Marshallled Termination Assembly (6ES7650-1AM31-6XX0 or 6ES7650-1AM30-6XX0)



17.7 Failsafe 10-Channel, 24-150 VDC/120-230 VAC Relay Output Marshallled Termination Assembly

Figure 17– shows the basic parts of the 10-Channel, 24-150 VDC/120-230 VAC Relay Output MTA.

Figure 17–2 10-Channel, 24-150 VDC/120-230 VAC Relay Output Marshallled Termination Assembly (6ES7650-1AM30-6XX0 or 6ES7650-1AM31-6XX0)



Key to numbered items in Figure 17–:	
Item	Description
1	Input power connections
2	Input power indicators
3	Field wiring connections
4	I/O module connectors
5	Shield disconnect jumpers
6	Module power fuses
7	Module power indicators
8	Module output fuse (1 of 10)
9	Relay (1 of 10)
10	Shield Ground Stud for connecting to earth ground

17.8 Technical Specifications

Note

Technical specifications differ slightly for the two MTA part numbers. Note the part number and refer to the appropriate sections below.

17.8.1 Technical Specifications for 6ES7650-1AM30-6XX0

Technical Specifications: 10-Channel, 24-150 VDC/120-230 VAC Relay Output MTA (6ES7650-1AM30-6XX0)	
Dimensions - See Section 1, Figure 1.3, Long Version	
L x W x D – inches	9.07 x 4.55 x 2.87
L x W x D – mm	230.4 x 130.9 x 73
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)	
All outputs ON	0.820 A maximum
All outputs OFF	0.575 A normal
Power Dissipation (typical)	7 W
Terminal Block Wire Sizes	TB100 & TB101
Wire Size – US/ Metric	24 – 14 gauge AWG / 0,205 – 2,08 mm sq.
Power Supply Specifications	See Module Specs
Fuse Ratings	
Module Power	1.0 A (Bussmann P/N: GMA-1.0A) (Siemens Spare P/N: A5E01568881)
Individual channel – Normal	0.10 A (Littelfuse P/N 273.100) (Siemens Spare P/N: A5E01568889)
Indicators	
Input Power	Green LED on when input power available
Module Power	Green LED on when module power available
Channel Power	NA
Field Terminal Block Wire Sizes TB1 – TB5	
Wire Size – US	24 – 14 gauge AWG
Wire Size – Metric	0,205 – 2,08 mm sq.
Relay Contacts	
Output Contacts	Normally Open – NO Common – C Normally Closed – NC

Overvoltage Installation Category	
Category III	150V maximum
Category II	250V maximum
Environmental	
Ambient Temperature	-25C to +60C
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 2

Fail-safe performance Characteristics		
(unprotected inductive loads should not be used for failsafe functions)	Resistive and protected inductive AC loads	Resistive and protected inductive DC loads
Low demand mode (average probability of failure on demand) per channel.	PFDavg $\leq$ 1.26E-03; Up to 5 yr proof time PFDavg $\leq$ 2.5E-03; Up to 10 yr proof time PFDavg $\leq$ 5.0E-03; Up to 20 yr proof time	PFDavg $\leq$ 6.30E-03; Up to 5 yr proof time PFDavg $\leq$ 1.26E-02; Up to 10 yr proof time PFDavg $\leq$ 2.5E-02; Up to 20 yr proof time
High Demand continuous mode (probability of dangerous failure per hour per channel)	PFH $\leq$ 5.8E-08	PFH $\leq$ 2.9E-07

17.8.2 Technical Specification for 6ES7650-1AM31-6XX0

Technical Specifications: 10-Channel, 24-150 VDC/120-230 VAC Relay Output MTA (6ES7650-1AM31-6XX0)	
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 @ 24 VDC	
10 Channels Active	0.56 A Typical
5 Channels Active	0.42 A Typical
Terminal Block Wire Sizes	
Wire Size – US	24 – 14 gauge AWG
Wire Size – Metric	0,205 – 2,08 mm sq.
Power Supply Specifications	See Module Specs

Fuse Ratings	
Module Power	1.0 A (Bussmann P/N: GMA-1.0A) (Siemens Spare P/N: A5E01568882)
Individual channel – Normal	0.10 A (Littelfuse P/N 273.100) (Siemens Spare P/N: A5E01568889)
Indicators	
Input Power	Green LED on when input power available
Module Power	Green LED on when module power available
Channel Power	NA
Field Terminal Block Wire Sizes	
Wire Size – US	24 – 14 gauge AWG
Wire Size – Metric	0,205 – 2,08 mm sq.
Relay Contacts	
Output Contacts	Normally Open – NO Common – C Normally Closed – NC (Siemens Spare P/N A5E02164558)
Environmental	
Ambient Temperature	-25C to +70C (Horizontal Mounting) -25C to +40C (Vertical Mounting) -25C to +60C (Vertical Mounting, CH5 to CH9 only)
Humidity	5% to 95% Non-condensing
Approvals	
Maximum achievable safety class in safety mode	
SIL according to IEC 61508, DIN EN 62061	SIL 2
Performance Level according to EN ISO 13849-1	DC: PLb AC: PLc
Category according to EN ISO 13849-1	DC: Cat. B AC: Cat. 1
Failsafe performance characteristics	
Resistive and protected inductive loads (unprotected inductive loads should not be used for failsafe functions)	
Low Demand (PFD) according to SIL 2 (per channel)	< 2,53 E-2 (up to 10 yr proof time) < 5,06 E-2 (up to 20 yr proof time)
High Demand (PFH) according to SIL 2 (per channel)	< 5,77 E-7 1/h
Note: SIL2 requires that there is a signal change at least once a year and that the process status is read back. If a fault is detected during this function test, replace the Relay MTA module.	
Overvoltage Installation Category	
Category III	150V maximum
Category II	250V maximum

Isolation	
between channels < – > shield + secondary	Yes (250 VAC)
between the channels	Yes. $U < 150\text{ V}$ reinforced insulation $U > 150\text{ V}$ to 250 V basic insulation
Insulation test	Test voltage (routine test at IEC 61131-2)
Rated voltage $150\text{ V} < U_e \leq 300\text{ V}$	1350 VAC/2sec (all channels to sec. + shield)
Rated voltage $100\text{ V} < U_e \leq 150\text{ V}$	820 VAC/2sec (between channels for 150 VDC)

Note

Fuses are available as spare parts from Siemens.

Fuse information can be found at:

<http://www.littelfuse.com>

<http://www.bussmann.com>

Relays are available as spare parts from Siemens.

Relay Information can be found at:

<http://www.azettler.com>

17.9 Module Restrictions

Note

Module restrictions differ slightly for the two MTA part numbers. Note the part number and refer to the appropriate sections below.

17.9.1 Module Restrictions for 6ES7650-1AM30-6XX0

Restrictions for 10-Channel, 24-150 VDC/120-230 VAC Relay Output MTA (6ES7650-1AM30-6XX0)	
I/O Module Restrictions	
Module Design - Diode Outputs used	See module specifications for limitations
Relay	
Maximum Relay Contact Ratings	Resistive Load: Max Switched Power: 150 W Or 1250 VA Max Switched Current: 5 Amps at 120 VAC – 230 VAC 5 Amps at 24 VDC 0.4 A at 120 VDC ¼ HP @ 120 VAC motor load
Coil Resistance	1200 Ohm (Nominal)
Minimum Output Rating (Wetting Rating)	0.1 A at 5 VDC
Relay Output Fuse	None - External Fusing required
Minimum operations	
Mechanical	30 million operations
Electrical	1 x 10 ⁵ at 10 A, 24 VDC or 120 VAC 2 x 10 ⁵ at 8 A, 230 VAC
Relay Contact Restrictions	
Relay Output Fusing	Fuses for the relay output connection must be provided externally to the MTA
Relay Voltage Restrictions	For voltages up to 150 VDC channels may be mixed mode. For voltages greater than 150 VDC, all channels must be of the same voltage. For AC voltages all channels must be the same phase.