MATRIX

HARDWARE INSTALLATION GUIDE

AMERICAN AUTO-MATRIX®
SMART BUILDING SOLUTIONS®

Matrix Area Controller - Hardware Installation Guide

Part Number 1E-01-00-0057

MATRIX AREA CONTROLLER
HARDWARE INSTALLATION GUIDE

The following document provides general information relative to the hardware installation of the Matrix Area Controller hardware. Please read through this document carefully before proceeding with the hardware installation process.

1.1 INTRODUCTION

Unpack your Matrix Area Controller and inspect the contents for damaged or missing items. Included in this package, you should find the following items:

▼ Matrix Area Controller with lock and key
▼ Matrix Hardware Installation Guide
▼ Matrix Quick Start Guide

1.1.1 TOOLS REQUIRED

The following tools and supply may be required for installation:

▼ Small flat-bladed screwdriver - for field-bus and power connectors
▼ Drill - for mounting the product onto a wall
▼ Wire-strippers - for terminating EIA-485 connections

1.1.2 SAFETY PRECAUTIONS

NOTE
All equipment must be installed in accordance with NEC and local codes. For more information on local codes, please check state/local regulations in your area.

CAUTION
To prevent damage to any of the electrical components of this product and to ensure that it continually operates, do not attempt to attept to alter any componentry.

WARNING
Prior to serving the Matrix Area Controller, always disconnect power first.

1.1.3 STATIC DISCHARGE PRECAUTIONS

> **WARNING**
>
> *Follow the precautions provided specific to static discharge.*

Static discharge can produce voltages high enough to damage electronic circuits and components. The microprocessor and associated circuitry are sensitive to static discharge. Follow these precautions while working with the product during service and installation:

▼ Work in a static free environments
▼ Discharge any static electricity you may have accumulated by touching a known, securely grounded object.
▼ Do not handle the printed circuit board (PCB) without proper protection against static discharge. Users should handle PCB components while wearing a ground bracelet or strap (connected to Earth ground).

1.1.4 MISCELLANEOUS PRECAUTIONS

> **NOTE**
>
> Do not apply this product to aerospace systems, mailine communication systems, nuclear power control systems or medical equipment involved in life support that require high reliabilitiy and safety, as it is not intended for such use or application.

> **NOTE**
>
> This device complies with Part 15 of the FCC rules. Operation of this equipment is subject to the following conditions:
>
> 1.This device may not cause harmful interference.
> 2.This device must accept any interference received, including interference that may cause undesired operation.

1.2 PRODUCT MOUNTING

The Matrix Area Controller ships with an approved enclosure consistent with most electrical standards and regulations. It is intended for indoor applications only and should be installed in a location that is dry, away from direct sunlight and free from excessive dust, vibration, and electrical interference. Mount the Matrix Area Controller in a location that allows clearance for ease of wiring and service. Use the two keyhole-style screw holes located on the back of the enclosure for assistance with mounting.
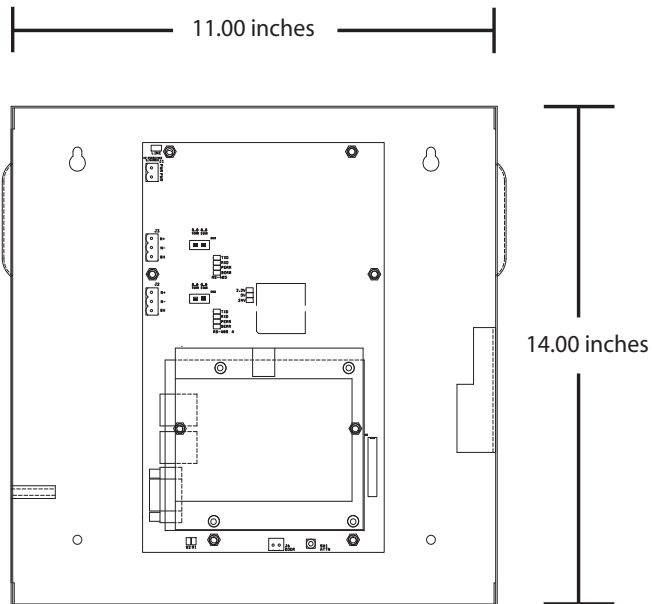

Figure 1-1 Product Enclosure without Hinged Door

1.2.1 ENCLOSURE DOOR

The enclosure cover of the Matrix Area Controller uses a hinged-door design complete with lock and key. The design intent of the enclosure door is meant to provide flexibility for confined spaces where one may not have enough space to open the cover fully and still access the interior area of the enclosure.

CAUTION
Use caution when removing and replacing the enclosure door.

1.3 HARDWARE LAYOUT

Below is an illustration of the hardware layout of the Matrix Area Controller. The device includes connection ports for Main Power, EIA-485 network connectivity and Ethernet connectivity. Depending on the model of Matrix Area Controller you have purchased, your application may involve using one of the or both EIA-485 network ports.
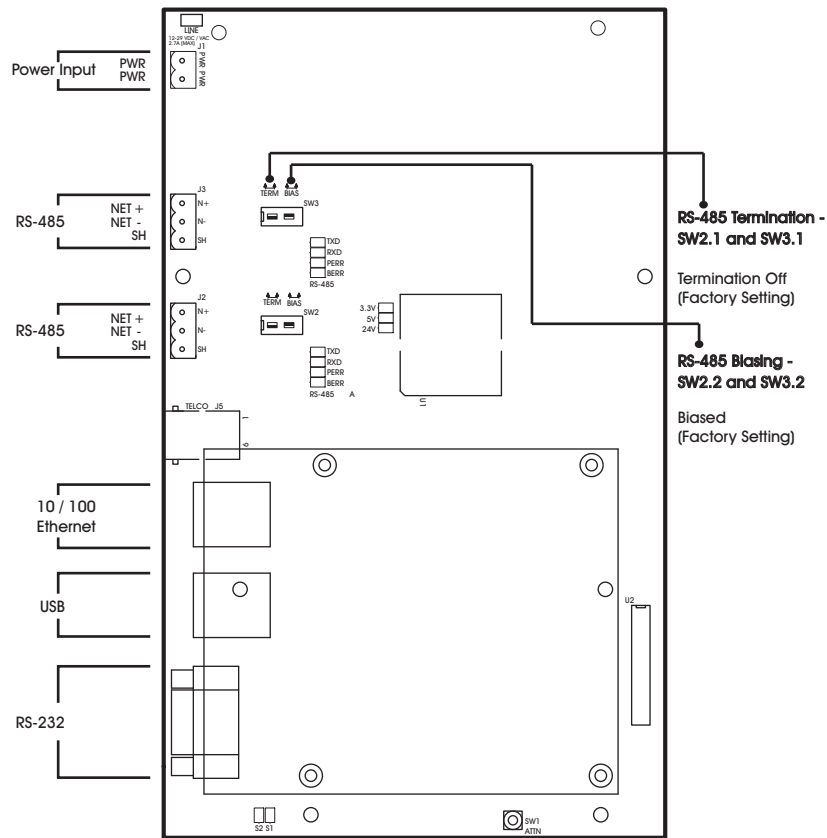

Figure 1-2 - Matrix Area Controller Board Layout

1.3.1 UNUSED PORTS

The Matrix Area Controller contains an RS-232 port, as well as dual USB ports. These ports currently contain no functionality relative to the Matrix Area Controller itself, but are reserved for future use and applications.

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1.3.2   POWER REQUIREMENTS

This product requires a transformer capable of providing 24VAC power to the Matrix Area Controller. Use a UL listed 24VAC transformer.

To connect power, use the supplied two-position terminal plug. The output leads from the transformer should be connected to the terminal plug. The terminal plug is then connected into the socket marked *J1* on the PCB. American Auto-Matrix recommends using 18AWG cable for power wiring.
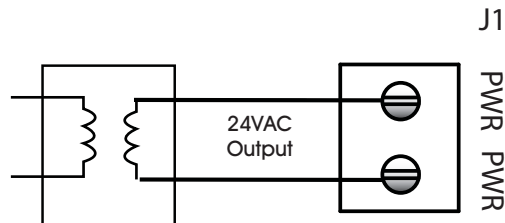

Figure 1-3 Connecting Power to Matrix Area Controller

WARNING

Do not share the power source for Matrix Area Controller with other devices. Damage to the product as a result of improper power and wiring will void product warranty.

1.3.2.1 LED INDICATION

The PCB of the product includes diagnostic LEDs, providing user feedback when power has been connected to the device. When power is connected, all three of the LEDs should be illuminated. The power diagnostic LEDs is located near the unused modem socket on the PCB.
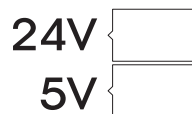

Figure 1-4 Power LEDs on Matrix Area Controller PCB

1.4 COMMUNICATION CONNECTIONS

Communication connections should be made with care. To avoid conflicts with existing networks, it is recommended all communication configuration of the Matrix Area Controller be performed prior to connecting physical media from the building automation system. Refer to the Matrix Area Controller Quick Start Guide or the AspectStudio On-Line Help System for additional information.

> **CAUTION**
>
> *It is recommended that all software configuration be performed prior to physically connecting this product to any associated communication networks.*

1.4.1 ETHERNET NETWORK

Ethernet is a high-speed network layer widely used in commercial buildings. This product includes an on-board Ethernet adapter, allowing users communicate with the device for product setup, as well as for building automation routines and applications. The Ethernet network interface is located on the single board computer card.

The on-board Ethernet network interface supports 10Base-T (10Mbps) and 100Base-T (100Mbps) Ethernet connections. The product will automatically switch to 100Base-T operations if other devices and cabling connected to the same subnetwork support this

1.4.1.1 CABLE TYPE AND LENGTH

Use an approved Category 5 (CAT5) Ethernet patch cable with RJ-45 plugs to connect the product to an Ethernet switch or hub. Use professionally manufactured cables to assure reliable transmission rates and connectivity between devices. Category 5 wiring is typically limited to about 100 meters (320 feet).
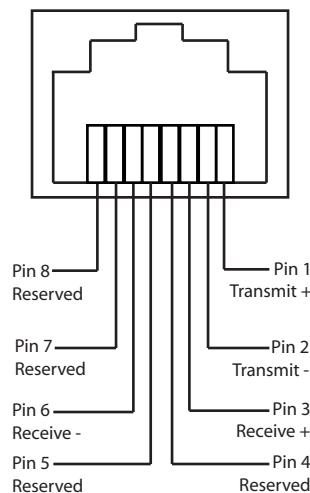

Pin 8 — Reserved
Pin 7 — Reserved
Pin 6 — Receive -
Pin 5 — Reserved
Pin 1 — Transmit +
Pin 2 — Transmit -
Pin 3 — Receive +
Pin 4 — Reserved

Figure 1-5 Standard Ethernet Connection Pinout of Matrix Area Controller

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1.4.2 EIA-485 NETWORK

The EIA-485 network ports are used to accommodate serial network protocols that utilize two-wire, shielded-twisted pair cabling - such as BACnet MS/TP, American Auto-Matrix PUP, and Modbus RTU. Terminals for EIA-485 network connections are located on the left side of the controller board and are labeled *J2* and *J3*. Each terminal has a connection for Network Positive (*N+*), Network Negative (*N-*), and Source High Reference Wire (*SH*, commonly used for serial networks that utilize a reference wire for electrical stability).

The Matrix Area Controller should be installed at an electrical end of the EIA-485 network. Avoid network topologies where the network is "t-tapped" or "starred".

1.4.2.1 CONNECTING EIA-485 NETWORKS

Connect the serial network to the determined EIA-485 port. Be sure to maintain network polarity at all times. Failure to do so can result in loss of network communications. For protection against ground loops or noise, connect the drain wire of the 485 network wire to one of the supplied enclosure studs located within the enclosure panel.
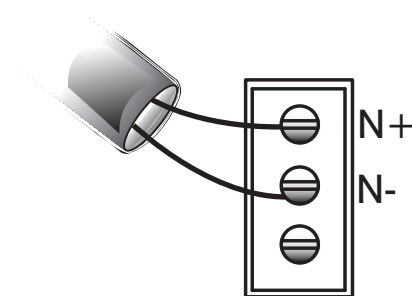

Figure 1-6 MS/TP Network Connection

1.4.2.2 NETWORK TERMINATION AND BIASING

Adjacent to each EIA-485 port is a two-position switch block, which applies termination and biasing to your 485 network.   To enable either termination (*TERM*) or biasing (*BIAS*), configure the respective switch towards the ON (Up) position.

When applying termination, be certain that it is applied at both ends of your EIA-485 network at the two end devices. In termination applications, biasing should also be enabled to ensure proper idle state voltage.
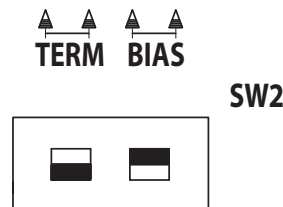

Figure 1-7 Termination and Biasing Switches and LED Indicators

1.4.2.3 LED INDICATION

Located below the network termination and biasing switches is a set of diagnostic LEDs that can be useful for troubleshooting network communication problems.

```
┌──────┐ TXD
├──────┤ RXD
├──────┤ PERR
└──────┘ BERR
```

Figure 1-8 Network Diagnostic LEDs

Table 1-1: EIA-485 LED Diagnostics

LED Position	Notes
TXD	This LED will flash anytime data is transmitted by the Matrix Area Controller to the field bus network. On an active network, this light should flash anytime the device passes a network token to another device or routes a request made by another device.
RXD	This LED will flash anytime data is received by the Matrix Area Controller from the field bus network. On an active network, this light should flash anytime there is activity on the network.
PERR	THis LED will flash upon the event a parity error occurs on the network. A parity error is caused by a mismatch between the calculated checksum and value received with the packet. The most common reason for a packet error is if more than one unit is attempting to communicate on the network at once, indicating the presence of a duplicate token or duplicate address.
BERR	This LED will flash upon the event a byte error occurs on the field bus network. A byte error is caused when information is lost during network communications, and is detected in the start, stop, or data bit timings. The most common reason for a byte error is due to devices attempting to communicate on the network at different baud rates.

NOTE

This product utilizes native EIA-485 communication drivers. Therefore, all network communications to field-devices should occur over specified network media as outlined in American Auto-Matrix product documentation. The use of media converters (such as Serial-to-Ethernet modems) not certified or sold by AAM is discouraged.

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1.5 PRODUCT SPECIFICATIONS

1.5.1 EIA-485 CONNECTIONS
- **Connection Type:** 3 position
- **Termination Count:** model dependent, up to 2 connections
- **Serial:** EIA-485
- **Baud Rates Supported:** 9.6kbps, 19.2kbps, 38.4kbps, 57.6kbps, 76.8kbps, 115.2kbps
- **Data isolation:** GMR Data Isolated
- **Termination:** 249 Ohm, switch selectable
- **Biasing:** 3.32k, switch selectable
- **LED:** indication for TXD, RXD, Byte-Error, Parity-Error
- **Protocol:** license enforced, driver selectable
- **Network Load:** license enforced, up to 64 devices per port

1.5.2 ETHERNET CONNECTION
- **Termination Count:** 1 connection
- **Connection Type:** RJ-45, female
- **Speed:** 10/100Mb auto-sensing

1.5.3 PRODUCT SETUP AND CONFIGURATION
- **Software**: AspectStudio with USB Copy Protection Key and License File
- **Browser:** Windows Internet Explorer v7.0 or later, Mozilla Firefox v3.0 or later, Apple Safari v3.2 or later, Google Chrome v1.0 or later

1.5.4 CPU
- **Processor:** ARM9 with embedded Linux OS
- **Memory:** 128MB SDRAM, 128MB Flash

1.5.5 POWER REQUIREMENTS
- **Connection:** 2 position
- **Power Source:** 11-29 VAC/VDC, 50/60Hz, 2.7A max

1.5.6 OPERATING CONDITIONS
- **Temperature:** 32-122º F (0- 50º C) ambient
- **Humidity:** 0-80%, non-condensing
- **Altitude:** -2000 to + 10,000 ft. (-650 to + 3500m)

1.5.7 AGENCY APPROVALS
- CE Approved
- FCC, Class A Computing Device; Part 15
- UL listed 916, Management Equipment, Energy (PAZX)
- UL Listed 873, Component Temperature-Indicating and Regulating Equipment (XAPX2)
- UL Listed, Component Temperature-Indicating and Regulation Equipment for Canada (XAPX8)