

### Overview

The EXB family of ICSLan Device Control Boxes provides Ethernet-based remote port expansion for NetLinx Central Controllers which can provide remote ports for a master (eliminating the need to implement another Central Controller), or to provide large numbers of ports in a rack-mount environment.

#### EXB ETHERNET MODULES - PRODUCT FAMILY

| Name     | FG#       | Description                                      |
|----------|-----------|--|
| EXB-COM2 | FG2100-22 | ICSLan Serial Interface, 2 Ports                 |
| EXB-I/O8 | FG2100-21 | ICSLan Input/Output Interface, 8 Channels        |
| EXB-IRS4 | FG2100-23 | ICSLan IR/S Interface, 4 IR/S and 4 Inputs       |
| EXB-MP1  | FG2100-26 | ICSLan Multi-Port, 1 COM, 1 IR/S, 2 I/O, 1 IR RX |
| EXB-REL8 | FG2100-20 | ICSLan Relay Interface, 8 Channels               |

### Common Features

Many features are common to all products in the EXB family, as described in the following table. Module-specific connector descriptions are in the following section. For additional details on the individual modules, refer to the *EXB Ethernet Modules Operation/Reference Guide* (available online at [www.amx.com](http://www.amx.com)).

#### EXB MODULES - COMMON FEATURES

|                                |   |                           |
|--------------------------------|---|---------------------------|
| Dimensions (HWD):              | <ul style="list-style-type: none"> <li>EXB-COM2, -I/O8, -IRS4 and -REL8: 1.00" x 4.35" x 5.15" (25.48 x 110.36 x 130.81)</li> <li>EXB-MP1: 1.00" x 3.04" x 4.82" (25.48cm x 77.14cm x 122.43cm)</li> </ul>  |                           |
| Weight:                        | <ul style="list-style-type: none"> <li>EXB-COM2: 1 lb (454 g)</li> <li>EXB-I/O8: 1 lb (454 g)</li> <li>EXB-IRS4: 1 lb (454 g)</li> <li>EXB-MP1: 0.75 lb (280 g)</li> <li>EXB-REL8: 1 lb (454 g)</li> </ul>  |                           |
| Power Requirements:            | PoE (Power-over-Ethernet).  |                           |
|                                | Idle (minimum) Power Draw:  | Busy (maximum) Power Draw |
| EXB-COM2:                      | 40mA 1.92 watts   | 40mA 1.92 watts           |
| EXB-IO8:                       | 30mA 1.44 watts   | 40mA 1.92 watts           |
| EXB-IRS4:                      | 40mA 1.92 watts   | 50mA 2.4 watts            |
| EXB-MP1                        | 40mA 1.92 watts   | 40mA 1.92 watts           |
| EXB-REL8:                      | 40mA 1.92 watts   | 70mA 3.36 watts           |
| Enclosure:                     | Metal with black matte finish   |                           |
| <b>Front Panel Components</b>  |   |                           |
| ID Pushbutton:                 | <p>The ID Pushbutton serves four functions:</p> <ul style="list-style-type: none"> <li><b>ID Mode:</b> Used in conjunction with the ID Mode feature in NetLinx Studio, a momentary push assigns a device address to the Module. See the <i>Using ID Mode to Set the Device Address on the EXB Modules</i> section in the Instruction Manual for details.</li> <li><b>Static/DHCP:</b> If the button is pressed and held for 10 seconds or longer and then released, the unit toggles between static and dynamic IP addressing. See the <i>Toggling Between Static and DHCP IP Addressing</i> section in the Instruction Manual for details.</li> <li><b>Factory Reset:</b> If the ID button is held for 10 seconds or longer during the boot process, the unit will reset to factory defaults. See the <i>Performing a Factory Reset</i> section in the Instruction Manual for details.</li> <li><b>Factory Image:</b> If the ID pushbutton is held for 20 seconds and released while the Module is booting up, the Module will restore itself to a factory firmware image. See the <i>Resetting the Unit to the Factory Default Firmware Image</i> section in the Instruction Manual for details.</li> </ul> |                           |
| Status LED:                    | The green Status LED indicates unit status. See the <i>Detailed LED Behavior</i> section in the Instruction Manual for details.   |                           |
| L/A LED:                       | The green L/A (Link / Active) LED indicates communication status. See the <i>Detailed LED Behavior</i> section in the Instruction Manual for details.   |                           |
| <b>Rear Panel Components</b>   |   |                           |
| Ethernet / PoE Connector       | RJ-45 connector provides IP communication and PoE. This is an Auto MDI/MDI-X enabled port, therefore either straight-through or crossover Ethernet cables can be used. Note: The Ethernet connector is located on the front panel of the EXB-MP1.   |                           |
| Storage/Operating Environment: | <ul style="list-style-type: none"> <li>Operating Temperature: 0° C (32° F) to 40° C (104° F)</li> <li>Storage Temperature: -10° C (14° F) to 60° C (140° F)</li> <li>Operating Humidity: 5% to 85% RH (non-condensing)</li> <li>Heat Dissipation (Typical): 36.9 BTU/hr</li> <li>Designed for indoor use only.</li> </ul>   |                           |
| Certifications:                | FCC Part 15 Class B, CE, and IEC 60950  |                           |
| Included Accessories:          | Phoenix (captive-wire) connectors - varies as required by model. See the <i>Operation/Reference Guide</i> for details.  |                           |
| Other AMX Equipment            | <ul style="list-style-type: none"> <li>NXA-ENET8POE Gigabit Ethernet Switch (FG2178-62)</li> <li>PS-POE-AF PoE Injector (FG423-80)</li> <li>AVB-VSTYLE-SURFACE-MNT V-Style Module Surface Mount (FG1010-722)</li> <li>AVB-VSTYLE-RMK-1U V-Style Module Tray (FG1010-720)</li> <li>AVB-VSTYLE-RMK-FILL-1U V-Style Module Tray w/ fill plates (FG1010-721)</li> <li>AVB-VSTYLE-POLE-MNT V Style Module Pole Mount (FG1010-723)</li> </ul>   |                           |

### SAFETY INSTRUCTIONS

- For UL compliance, the EXB family of ICSLan Device Control Boxes should be powered directly via any listed external IEC/UL 60950-1 2nd edition certified LPS PoE switch or injector, such as the AMX NXA-ENET8POE or PS-POE-AF.
- The EXB family of ICSLan Device Control Boxes are intended for Network Environment 0 per IEC TR62101, and are to be connected only to PoE networks without routing to the outside plant.

### Connections and Wiring

#### LAN/PoE Port

The LAN/PoE (RJ45) port on all EXB Modules provides 10/100 BaseT network connectivity. Use standard Cat5/6/6E ethernet cable to connect the EXB Module to the LAN. The following table lists the pinouts, signals, and pairing for the Network port.

#### LAN/POE PORT PINOUTS AND SIGNALS

| Pin | Signals | Connections | Pairing   | Color        |
|-----|---------|-------------|-----------|--------------|
| 1   | TX +    | 1 ----- 1   | 1 ----- 2 | White-Orange |
| 2   | TX -    | 2 ----- 2   |           | Orange       |
| 3   | RX +    | 3 ----- 3   | 3 ----- 6 | White-Green  |
| 4   | DC +    | 4 ----- 4   |           | Blue         |
| 5   | DC +    | 5 ----- 5   |           | White-Blue   |
| 6   | RX -    | 6 ----- 6   |           | Green        |
| 7   | DC -    | 7 ----- 7   |           | White-Brown  |
| 8   | DC -    | 8 ----- 8   |           | Brown        |

The Ethernet Port LEDs show communication activity, connection status, speeds, and mode information:

- SPD (speed)** - Yellow LED lights On when the connection speed is 100 Mbps and turns Off when the speed is 10 Mbps.
- L/A (link/activity)** - Green LED lights On when the Ethernet cables are connected and terminated correctly, and blinks when receiving Ethernet data packets.

### Module-Specific Connectors

#### EXB-COM2

##### Port 1 (Multi-Protocol COM Port)

Port 1 (multi-protocol port) is a 10-pin 3.5mm captive-wire connector that supports RS-232/422/485 serial communication. The following table provides the pinout configuration:

#### EXB-COM2 COM 1 PORT PINOUTS

| Signal  | Function        | Wiring Configuration |          |        |                  |
|---------|-----------------|----------------------|----------|--------|------------------|
|         |                 | RS-232               | RS-422   | RS-485 |                  |
| GND     | Signal ground   | X                    | X        |        |                  |
| RXD     | Receive data    | X                    |          |        |                  |
| TXD     | Transmit data   | X                    |          |        |                  |
| CTS     | Clear to send   | X                    |          |        |                  |
| RTS     | Request to send | X                    |          |        |                  |
| TX+     | Transmit data   |                      | X        | X      | (strap to pin 8) |
| TX-     | Transmit data   |                      | X        | X      | (strap to pin 9) |
| RX+     | Receive data    |                      | X        | X      | (strap to pin 6) |
| RX-     | Receive data    |                      | X        | X      | (strap to pin 7) |
| +12 VDC | Power           | optional             | optional |        |                  |

##### Port 2 (RS-232 only)

Port 2 is a 5-pin 3.5mm captive-wire connector that supports RS-232 (only) serial communication. Pins 1-5 on COM2 provide the same RS-232 functions as pins 1-5 on the COM1 connector:

#### EXB-COM2 PORT 2 PIN ASSIGNMENTS

| Signal | Function      | Signal | Function        |
|--------|---------------|--------|-----------------|
| GND    | Signal ground | CTS    | Clear to send   |
| RXD    | Receive data  | RTS    | Request to send |
| TXD    | Transmit data |        |                 |

#### EXB-I/O8

##### Port 1 (I/O 1-8)

Port 1 is a 10-pin 3.5mm captive-wire connector that provides eight I/O contacts (1-8) as well as PWR and GND.

#### EXB-I/O8 I/O8 CONNECTOR PIN ASSIGNMENTS

| Signal | Function                    |
|--------|-----------------------------|
| +12V   | +12VDC (max current 200 mA) |
| 8-1    | Channels 8 - 1              |
| GND    | Ground                      |

- When used for voltage inputs, the I/O port detects a low signal (0 - 1.5 VDC) as a Push, and a high signal (3.3 - 5 VDC) as a Release.
- Although a high signal is defined as 3.3 - 5 VDC, this port can handle up to 12V without harm.
- When used for outputs, the I/O port acts as a switch to GND and is rated for 200mA @ 12 VDC.

Note: The I/Os on this Module are not dry closure; they are electronic switches that float at 3V when Off. Therefore, they should not be expected to work in situations that require true dry contact (or dry closure). The I/Os do work with AMX PC1, PC2, UPC20 and UPC20+.

## EXB-IRS4

### IR/Serial Port Bank (Ports 1-4)

The IR/Serial Port Bank is an 8-pin 3.5mm captive-wire connector that supports up to 4 (optional) CC-NIRC IR Emitters.

#### IR/SERIAL CONNECTOR PIN ASSIGNMENTS

| Signal | Function           | Signal | Function           |
|--------|--------------------|--------|--------------------|
| 4 +    | IR/Serial port 4 + | 2 +    | IR/Serial port 2 + |
| 4 -    | IR/Serial port 4 - | 2 -    | IR/Serial port 2 - |
| 3 +    | IR/Serial port 3 + | 1 +    | IR/Serial port 1 + |
| 3 -    | IR/Serial port 3 - | 1 -    | IR/Serial port 1 - |

### Input Port Bank

The Input Port Bank is a 6-pin 3.5mm captive-wire connector that supports up to 4 (optional) CC-NIRC IR Emitters. The Input channel detects a low signal (0 - 1.5 VDC) as a Push, and a high signal (3.3 - 5 VDC) as a Release.

#### I/O CONNECTOR PIN ASSIGNMENTS

| Signal | Function                    |
|--------|-----------------------------|
| +12VDC | +12VDC (max current 200 mA) |
| 1 - 4  | Channel 255                 |
| GND    | Ground                      |

Note: Although a high signal is defined as 3.3 - 5 VDC, this port can handle up to 12V without harm.

### Input Linking

Each of the 4 input pins can be linked with one IR-Tx port. Any of the 4 IR-Tx ports/pins on an EXB-IRS4 can be run in either "unlinked" or "linked" mode. Unlinked mode is the default mode at boot up. When an IR-Tx port is unlinked the input pin state has no effect on the IR-Tx port. See the *Instruction Manual* for details.

### EXB-MP1

#### Port 1 (RS-232 only)

Port 1 is a 5-pin 3.5mm captive-wire connector that supports RS-232 (only) serial

#### EXB-MP1 PORT 1 PIN ASSIGNMENTS

| Signal | Function        | Signal | Function      |
|--------|-----------------|--------|---------------|
| RTS    | Request to send | RXD    | Receive data  |
| CTS    | Clear to send   | GND    | Signal ground |
| TXD    | Transmit data   |        |               |

#### Port 2 (I/O)

Port 2 is a 4-pin 3.5mm captive-wire connector that provides 2 I/O contacts (1-2) as well as PWR and GND.

#### EXB-MP1 PORT 2 PIN ASSIGNMENTS

| Signal | Function                    |
|--------|-----------------------------|
| +12VDC | +12VDC (max current 200 mA) |
| 2 - 1  | Channels 2 - 1.             |
| GND    | Ground                      |

- Although a high signal is defined as 3.3 - 5 VDC, this port can handle up to 12V without harm.
- The input channel detects a low signal (0 - 1.5 VDC) as a Push, and a high signal (3.3 - 5 VDC) as a Release.

#### Port 3 (IR-TX/Serial)

Port 3 is an 2-pin 3.5mm captive-wire IR-TX connector that supports 1 (optional) CC-NIRC IR Emitter.

#### EXB-MP1 PORT 3 PIN ASSIGNMENTS

| Signal | Function           |
|--------|--------------------|
| +      | IR/Serial port 1 + |
| -      | IR/Serial port 1 - |

#### Port 4 (IR-RX)

Port 4 is a 1/8th inch (6.35 mm) IR-RX (TRS) connector for use with an (optional) IRO3 External IR Receiver Module.

### EXB-REL8

#### Port 1 (Relay Connector)

The Relay Connectors are two 8-pin 3.5mm captive-wire connectors that provide A / B connections for 8 SPST Relay channels (1-8). An 8-position metal Commoning Strip is provided with each EXB-REL8 to common multiple relays.

- Connectors are labeled A and B.
- These relays are independently controlled, isolated and normally open.
- The relay contacts are rated for a maximum of 1 A @ 0-24 VAC or 0-28 VDC (resistive).

#### EXB-REL8 RELAY CONNECTOR PINOUTS

| First Relay Connector Pinout |             | Second Relay Connector Pinout |             |
|------------------------------|-------------|-------------------------------|-------------|
| Pin                          | Description | Pin                           | Description |
| 1                            | Channel 1A  | 1                             | Channel 5A  |
| 2                            | Channel 1B  | 2                             | Channel 5B  |
| 3                            | Channel 2A  | 3                             | Channel 6A  |
| 4                            | Channel 2B  | 4                             | Channel 6B  |
| 5                            | Channel 3A  | 5                             | Channel 7A  |
| 6                            | Channel 3B  | 6                             | Channel 7B  |
| 7                            | Channel 4A  | 7                             | Channel 8A  |
| 8                            | Channel 4B  | 8                             | Channel 8B  |

## Network Configuration

EXB modules support two IP addressing modes: *Static IP*, and *DHCP (with link-local fallback)*. By default, EXB Modules are set to **DHCP** Mode.

The modules can be configured for either of these modes via three methods:

- The front-panel ID Pushbutton.
- Telnet command.
- The Network Device Addressing dialog in NetLinx Studio (v3.3 or higher).

#### DEFAULT PARAMETERS FOR STATIC IP MODE

|          |               |       |             |
|----------|---------------|-------|-------------|
| Address: | 192.168.1.2   | DNS1: | 192.168.1.1 |
| Netmask: | 255.255.255.0 | DNS2: | 192.168.1.1 |
| Gateway: | 192.168.1.1   | DNS3: | 192.168.1.1 |

### DHCP Mode

When in DHCP mode (the default setting), the module will attempt to get a DHCP lease (consisting of IP address, gateway, and other network parameters). Should it fail to obtain a lease from a DHCP server, it will then configure itself for a link-local address.

- EXB modules utilize a modified link-local addressing procedure: the first address to be tried is a known address in the link-local space: **169.254.2.2**. That address will be probed, and if unclaimed will be used by the EXB module.
- If 169.254.2.2 is already claimed, the EXB module will choose a random address within the 169.252.x.x link-local address space (again probing to ensure that it is unclaimed).

Once operating with a link-local address, the device will periodically re-try DHCP, and re-assign the IP to a valid DHCP grant if successful. At any time, if the device determines that its IP address has changed, it will disconnect from the Master (if necessary, depending on the connection state), and then reconnect to the Master.

### TCP/IP Address Configuration

EXB modules support IPV4 network addresses, gateway addresses, DNS server addresses, and network name. EXB modules support NetLinx Discovery Protocol (NDP) capabilities as well as IP discovery via NetLinx Studio.

### Using the ID Pushbutton

Use the ID Pushbutton (on the front panel of all EXB Modules) to perform various initial configuration settings, as described in the following sections. The ID Pushbutton provides several functions, depending on when and for how long the pushbutton is pressed and held:

#### Momentary press:

The ID Pushbutton is used in conjunction with the NetLinx Studio software program to allow you to assign new Device and System numbers for the Module.

Using NetLinx Studio, place the system in Identity (ID) Mode. ID Mode means the entire system is put on hold while it waits for an event from any NetLinx device in the named system (for example, pushing the ID button on a Module). The device generating the first event is the identified device.

Press the ID Mode button to generate an event from the Module and allow you to assign new Device and System numbers in NetLinx Studio.

Note that a momentary press is ignored if the device is not in Identity (ID) Mode.

- 10-Second Press and Hold (during runtime):** If the ID Pushbutton is held for 10 seconds or longer and then released during runtime (i.e., after boot completes), the unit will toggle between Static IP and DHCP Mode IP addressing. Note that after applying the new setting, the module will automatically reboot. By default, EXB Modules are set to *DHCP* Mode (with link-local fallback).

- 10-Second Press and Hold (during boot-up):** If the ID Pushbutton is held for 10 seconds or longer at boot, the module will reset to factory default parameters and reboot after release.

Press and hold the ID Pushbutton while plugging in the Ethernet / PoE connector. Begin counting only when the LEDs begin to flash (as opposed to the moment that the connector is inserted).

Note that once the module has started booting up, all LEDs flash in unison at the rate of once per second. After 10 flashes at this rate, the LEDs will flash in unison at a faster rate. At the point that the blink rate increases (approximately 10 seconds after boot-up), release the pushbutton.

- 20-Second Press and Hold (during boot-up):** If the ID Pushbutton is held for 20 seconds or longer at boot, the module will reset to the factory default firmware image and reboot after release.

Press and hold the ID Pushbutton while plugging in the Ethernet / PoE connector. Begin counting only when the LEDs begin to flash (as opposed to the moment that the connector is inserted).

Note that once the module has started booting up, all LEDs flash in unison at the rate of once per second. After 10 flashes at this rate, the LEDs will blink in unison at a faster rate. After 10 seconds of flashing at the increased rate, all LEDs go to solid on. At the point that the LEDs go to solid on (approximately 20 seconds after boot-up), release the pushbutton.

### Telnet IP Configuration Commands

The Terminal commands listed in the following table can be sent directly to the device via a Telnet terminal session. These commands can be used for initial network configuration of the EXB Modules:

| EXB MODULES - TELNET IP CONFIGURATION COMMANDS |   |
|--|---|
| SET IP   | Sets the IP configuration of the device. Enter a Host Name, Type ( <i>DHCP</i> or <i>Fixed</i> ), IP Address, Subnet Mask, and Gateway IP Address.<br>Note: The Device must be rebooted to enable new settings. |
| GET IP   | Displays the IP configuration of the EXB Module.  |
| GET CONNECTION                                 | Show the master connection information.   |
| SET CONNECTION                                 | Set the master connection settings interactively.<br>Note: These changes do not require a reboot to take effect.  |

Note: Refer to the *EXB Ethernet Modules Operation/Reference Guide* for a full listing of all supported Telnet commands.

### Additional Documentation

Refer to the *EXB Ethernet Modules Operation/Reference Guide* (available to view/download from [www.amx.com](http://www.amx.com)) for detailed programming and configuration instructions.



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