EC-BOS-6AX
MOUNTING AND WIRING INSTRUCTIONS

This document covers the mounting and wiring of the EC-BOS-6AX series controller. It assumes that you are an engineer, technician, or service person who is performing control system installation. Instructions in this document apply to the following products:

<table>
<thead>
<tr>
<th>Models</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>EC-BOS-6AX</td>
<td>EC-BOS-6AX base unit controller, powered by (either):</td>
</tr>
<tr>
<td>EC-NPB-PWR</td>
<td>DIN-mountable 24V power module</td>
</tr>
<tr>
<td>EC-NPB-PWR-UN</td>
<td>DIN-mountable 90-263VAC power module</td>
</tr>
<tr>
<td>EC-WPM-XX</td>
<td>Wall-mount universal AC power adapter, with different models available, where -XX is either: -US, -EU, or -UK (vary by AC wall plug).</td>
</tr>
</tbody>
</table>

**Note**

Not covered in this document is the NiagaraAX software installation and configuration required for a fully functioning unit. This includes setting host IP address and password, serial port configuration, and other parameters. Refer to the EC-BOSAX Install and Startup Guide for this information. In addition, the mounting and wiring of EC-BOS-6AX expansion options are covered in separate documents. See sections “About Expansion Options,” page 8, and “Related Documentation,” page 18.

These are the main topics included in this document:

- Preparation, page 2
- Precautions, page 4
- Mounting, page 5
- Board Layout, page 7
- About Expansion Options, page 8
- Wiring Details, page 11
- Power Up and Initial Checkout, page 16

Also included in this document are several appendixes, as follows:

- Using Status LEDs, page 19
- Maintaining the EC-BOS-6AX, page 20
- Replacement Parts, page 21
- Certifications, page 24
- Declaration of Conformity, page 25

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EC-BOS-6AX Mounting and Wiring Instructions
Part Number: 05DI-HIBS6AX-10

Revised: February 2008
Preparation

Unpack the EC-BOS-6\textsuperscript{AX} and power module (either EC-NPB-PWR, EC-NPB-PWR-UN or EC-WPM-XX) and inspect the contents of the packages for damaged or missing components. If damaged, notify the appropriate carrier at once and return any damaged components for immediate repair or replacement. See “Federal Communications Commission (FCC)” on page 24.

- Included in this Package
- Material and Tools Required

Included in this Package

Included in this package you should find the following items:

- a EC-BOS-6\textsuperscript{AX} base controller.
- These \textit{EC-BOS-6\textsuperscript{AX} Mounting and Wiring Instructions}, Part Number: 05DI-HIBS6AX-10
- a packing slip, which lists the factory settings for IP address, machine name, and host logon.
- a hardware bag containing the following items:
  - A grounding wire, with quick-disconnect 0.187” female connector.
- a power module (if ordered), which is required for operation.

The power module can be one of the following:

- EC-NPB-PWR: 24Vac in-line, DIN-mount capable, with grounding wire, \textit{or}
- EC-NPB-PWR-UN: 90-263Vac, DIN-mount capable, with grounding wire
- EC-WPM-XX: External wall-mount power adapter (input: 90–254Vac, 50–60 Hz, output: 15Vdc, 1A)
  where XX varies by the AC wall plug (for installation locale):
  - EC-WPM-US (U.S. or Japan installations)
  - EC-WPM-EU (European installations, type “C” plug)
  - EC-WPM-UK (United Kingdom installations, type “B” plug)

Material and Tools Required

The following supplies and tools may be required for installation:

- DIN rail, type NS35/7.5 (35mm x 7.5mm) and DIN rail end-clips (stop clips), recommended for any installation that includes a power module and/or optional I/O modules.

\begin{itemize}
  \item If using an EC-NPB-PWR power module, either one of the following:
    \begin{itemize}
      \item UL listed, Class 2, 24Vac transformer, rated at minimum of 8.5VA to 20VA. Note that a \textit{dedicated} transformer is required (cannot also power additional equipment).
      \item 24Vdc power supply, capable of supplying at least 1A (24W).
    \end{itemize}
  \item If using an EC-NPB-PWR-UN power module, the following:
    \begin{itemize}
      \item UL listed, Class 2, 90-263Vac transformer, rated at 40VA. Note that a \textit{dedicated} transformer is required (cannot also power additional equipment).
    \end{itemize}
\end{itemize}
Material and Tools Required

- Suitable screws and screwdriver for mounting DIN rail, or if DIN rail not used, for mounting bases of EC-BOS-6AX controller and power module (if used).
- #2 phillips screwdriver: used to install and remove optional communications modules.
- Small flat-blade screwdriver: used for mounting or removing the EC-BOS-6AX from DIN rail, also for making wiring connections to RS-485 connector, and optionally LON® connectors.
Precautions

This document uses the following warning and caution conventions:

**Caution**

Cautions remind the reader to be careful. They alert readers to situations where there is a chance that the reader might perform an action that cannot be undone, might receive unexpected results, or might lose data. Cautions contain an explanation of why the action is potentially problematic.

**Warning**

Warnings alert the reader to proceed with extreme care. They alert readers to situations where there is a chance that the reader might do something that can result in personal injury or equipment damage. Warnings contain an explanation of why the action is potentially dangerous.

Safety Precautions

The following items are warnings of a general nature relating to the installation and start-up of the EC-BOS-6\(^{AX}\) controller. Be sure to heed these warnings to prevent personal injury or equipment damage.

**Warning**

- Depending on power module used, the circuit powering the EC-BOS-6\(^{AX}\) is 24Vac at 50/60 Hz or 24Vdc (if using EC-NPB-PWR), 90 to 263Vac at 50/60Hz (if using EC-NPB-PWR-UN) or from 100–240Vac at 50/60 Hz (if using EC-WPM-XX). Disconnect power before installation or servicing to prevent electrical shock or equipment damage.
- Make all connections in accordance with national and local electrical codes. Use copper conductors only.
- To reduce the risk of fire or electrical shock, install in a controlled environment relatively free of contaminants.
- This device is only intended for use as a monitoring and control device. To prevent data loss or equipment damage, do not use it for any other purpose.

Static Discharge Precautions

Static charges produce voltages high enough to damage electronic components. The microprocessors and associated circuitry within a EC-BOS-6\(^{AX}\) controller are sensitive to static discharge. Follow these precautions when installing, servicing, or operating the system:

**Caution**

- Work in a static-free area.
- Discharge any static electricity you may have accumulated. Discharge static electricity by touching a known, securely grounded object.
- Do not handle the printed circuit board (PCB) without proper protection against static discharge. Use a wrist strap when handling PCBs. The wrist strap clamp must be secured to earth ground.
Mounting

Mount the EC-BOS-6AX controller in a location that allows clearance for wiring, servicing, and module removal. Additional mounting information applies, as follows:

- Environmental Requirements
- Physical Mounting

Environmental Requirements

Note the following requirements for the EC-BOS-6AX mounting location:

- This product is intended for indoor use only. Do not expose the unit to ambient conditions outside of the range of 0ºC (32º F) to 50ºC (122º F) and relative humidity outside the range 5% to 95% non-condensing (pollution degree 1).
- If mounting inside an enclosure, that enclosure should be designed to keep the unit within its required operating range considering a 20-watt dissipation by the controller. This is especially important if the controller is mounted inside an enclosure with other heat producing equipment.
- Do not mount the unit:
  - in an area where excessive moisture, corrosive fumes, or explosive vapors are present.
  - where vibration or shock is likely to occur.
  - in a location subject to electrical noise. This includes the proximity of large electrical contractors, electrical machinery, welding equipment, and spark igniters.

Physical Mounting

The following information applies about physically mounting the unit.

- You can mount the EC-BOS-6AX in any orientation. It is not necessary to remove the cover before mounting.
- Mounting on a 35mm wide DIN rail is recommended. The EC-BOS-6AX unit base has a molded DIN rail slot and locking clip, as does the power module and the I/O expansion modules. Mounting on a DIN rail ensures accurate alignment of connectors between all modules.
- If DIN rail mounting is impractical, you can use screws in mounting tabs on the EC-BOS-6AX, then in any end-connected accessory (EC-NPB-PWR, etc.). Tab dimensions are on page 26 of this document.

The following procedure provides step-by-step DIN rail mounting instructions for the EC-BOS-6AX.

Note

Mount the EC-BOS-6AX prior to mounting any accessory items (24V power module, etc.).

Procedure 1  To mount on DIN rail

Step 1  Securely install the DIN rail using at least two screws, near both ends of the rail.

Step 2  Position the EC-BOS-6AX on the rail, tilting to hook DIN rail tabs over one edge of the DIN rail (Figure 1 on page 6).

Step 3  Use a screwdriver to pry down the plastic locking clip, and push down and in on the EC-BOS-6AX, to force the locking clip to snap over the other edge of the DIN rail.

Step 4  Mount any accessory item onto the DIN rail in the same manner.
Mounting and Wiring Instructions

Step 5  Slide the accessory along the DIN rail to connect its 20-position plug into the EC-BOS-6AX

Step 6  Repeat this for all accessories, until all are mounted on the DIN rail and firmly connected to each other.

Step 7  To keep the final assembly together, secure at both ends with DIN rail end-clips provided by the DIN rail vendor. This also prevents the assembly from sliding on the DIN rail. See Figure 1 below.

Figure 1  EC-BOS-6AX and accessory mounting details.
Removing and Replacing the Cover

You must remove the EC-BOS-6\textsuperscript{AX} cover to connect the battery (new unit) or to replace the battery, and to install any option boards. The cover snaps onto the base with four plastic tabs (two on each end).

To remove the cover, press in the four tabs on both ends of the unit, and lift the cover off.

\begin{itemize}
  \item \textbf{Note} If accessory modules are plugged into the EC-BOS-6\textsuperscript{AX}, you may need to slide them away from the unit to get to the cover tabs.
\end{itemize}

To replace the cover, orient it so the cutout area for comm ports is correct, then push inwards to snap in place.

Board Layout

Figure 2 shows the location of LEDs, option slots, and other features of the EC-BOS-6\textsuperscript{AX} with cover removed. For a side view of communications ports and other features, see Figure 5 on page 15.

Figure 2 \hspace{1cm} EC-BOS-6\textsuperscript{AX} board layout details.
About Expansion Options

The EC-BOS-6AX provides for field-installable expansion with two kinds of options:

- **Option cards**—Install on connectors inside the EC-BOS-6AX base unit. See “About Option Cards” below.

- **Accessory modules**—To “chain” onto the EC-BOS-6AX’s 20-pin connector. See “About Accessory Modules” below.

About Option Cards

The EC-BOS-6AX has two (2) option slots for custom option cards designed for use with the EC-BOS-6AX. Each slot has a 30-pin connector on the EC-BOS-6AX base board. See Figure 2 on page 7.

**Warning**

Power to the EC-BOS-6AX must be OFF when installing or removing option cards, or damage will occur! Also, you must be very careful to plug an option card into its connector properly (pins aligned).

Option cards typically provide additional communications features, such as the following available models (with others still in development) listed below in Table 1.

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
<th>Notes</th>
</tr>
</thead>
</table>
| EC-NPB-LON  | FTT-10A LON (LONWORKS®) adapter with a 2-position removable screw-terminal connector plug. | Up to 2 LON option cards may be installed.  
• If one LON option, it operates as LON1, regardless of slot.  
• If two LON options, LON1 is Option slot 1, LON2 is Option slot 2. |
| EC-NPB-MDM  | 56Kbps Auto-dial/Auto-answer Modem with one RJ-11 connector for phone line.   | Maximum of one. Does not have own UART. Must be installed in Option Slot 1, where it operates as COM1. This disables the RS-232 base serial port (DB-9 connector) on the EC-BOS-6AX during normal operation.  
**Note:** If an EC-NPB-MDM is installed, and the “mode jumper” (see Figure 2) is put in “Serial Shell” position, the EC-BOS-6AX base RS-232 port becomes active immediately following a reboot. This allows an RS-232 connection to the “serial shell” for debugging purposes. To re-enable the modem, you must put the mode jumper back in the “Normal” position, and reboot again. |

Mounting Option Cards

For complete details, see the mounting & wiring instructions document that accompany the specific option card. The following procedure provides a basic set of steps.

**Procedure 2** Mounting option cards on a EC-BOS-6AX.

**Step 1** Remove power from the EC-BOS-6AX—see the previous Warning.

**Step 2** Remove the cover. See “Removing and Replacing the Cover,” page 7.

**Step 3** Remove the battery and bracket assembly by taking out the four screws holding it in place, setting the screws aside for later. Unplug the battery from the connector on the EC-BOS-6AX.

**Step 4** Remove the blanking end plate for the slot you are installing the option card into. (Retain the blanking plate in case the option card must be removed at a later date.)
Step 5  Carefully insert the pins of the option card into the socket of the appropriate option card slot. The mounting holes on the option board should line up with the standoffs on the base board. If they do not, the connector is not properly aligned. Press until the option card is completely seated.

Step 6  Place the custom end plate that came with the option card over the connector(s) of the option card.

Step 7  Plug the battery connector plug into the battery connector on the EC-BOS-6AX.

Step 8  Set the battery and bracket assembly back over the option card slots, with the mounting holes aligned with the standoffs.

Step 9  Place the four screws through the battery bracket, end plates, and into the standoffs on the EC-BOS-6AX base board. Hand tighten these screws.

Step 10  Replace the cover.

About Accessory Modules

The EC-BOS-6AX has a 20-pin, right-angle, Euro-DIN connector that accepts custom-built accessory modules. The connector provides power and signal lines to any connected modules, and is located on the end of the EC-BOS-6AX opposite to the option cards.

⚠️ Warning

- Power to the EC-BOS-6AX must be OFF when inserting or unplugging accessory modules. Wait for all LED activity to stop (all LEDs to be off).
- Also, do not connect live voltages to the inputs or outputs of an I/O module (EC-NetAX IO-16 or EC-NetAX IO-34) while it is in an “un-powered state” before plugging the module into an EC-BOS-6AX.
- Otherwise, damage to the I/O module and/or the EC-BOS-6AX controller may result!

Each accessory module has a DIN-mount base, and provides two (2) 20-pin connectors that allow you to “chain” multiple accessories (see Procedure 1 on page 5). Table 2 lists the currently available accessory modules.

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>EC-NPB-PWR</td>
<td>DIN-mountable, 24V isolated power module, used to power EC-BOS-6AX from a dedicated, external, Class-2, 24Vac transformer or a 24Vdc power supply.</td>
<td>• Wiring is covered in this document, see “EC-NPB-PWR,” page 12 or “EC-NPB-PWR-UN,” page 13.</td>
</tr>
<tr>
<td>EC-NPB-PWR-UN</td>
<td>DIN-mountable, 90-263V isolated power module, used to power EC-BOS-6AX from a dedicated, external, Class-2, 90 to 263Vac transformer.</td>
<td>• Only one EC-NPB-PWR/EC-NPB-PWR-UN per EC-BOS-6AX.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Do not install if using EC-WPM-XX.</td>
</tr>
</tbody>
</table>
### About Accessory Modules

**Table 2** **EC-BOS-6AX** accessory modules.

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
<th>Notes</th>
</tr>
</thead>
</table>
| EC-Net<sup>AX</sup> IO-16 | DIN-mountable, 16 points I/O module, used to provide I/O points as noted. Provides the following I/O points:  
- 8 - Universal Inputs (UIs).  
- 4 - Digital Outputs (DOs), SPST-relay type.  
- 4 - Analog Outputs, 0-10Vdc type.  
Up to four (maximum) IO-16 accessory modules are supported.  
Wiring is covered in a separate document, see the EC-Net<sup>AX</sup> IO-16 Installation and Configuration Instructions. |                                                                                                                                                                                                                           |
| EC-Net<sup>AX</sup> IO-34 | DIN-mountable, combined 34 points I/O with 24V isolated power module, used to provide I/O points as well as power EC-BOS-6AX from a dedicated, external, Class-2, 24Vac transformer or a 24Vdc power supply. Only one EC-Net<sup>AX</sup> IO-34 per EC-BOS-6AX. Provides the following I/O points:  
- 16- Universal Inputs (UIs).  
- 10- Digital Outputs (DOs), SPST-relay type.  
- 8- Analog Outputs, 0-10Vdc type.  
Up to two additional IO-16 accessory modules can be used. Do not power the IO-34 if using an EC-WPM-XX.  
Wiring is covered in a separate document, see the EC-Net<sup>AX</sup> IO-34 Installation and Configuration Instructions. |
Wiring Details

See Figure 2 on page 7 to locate connectors and other components on the EC-BOS-6AX controller.

Make connections to the EC-BOSAX in the following order.

1. Install any option boards (LON, RS-485, or modem) in option slots 1 and 2. See “Mounting Option Cards,” page 8 for a general procedure. For complete details, refer to the specific mounting and wiring guide that shipped with the option board.

2. Connect supplied earth grounding wires (with spade connector) from the earth ground lug on the EC-BOS-6AX and any accessory modules (if used) to a nearby earth grounding point. See “Grounding” below for details.

3. Prepare power wiring (leave the unit powered off). See “Power Wiring” for details.

4. Connect communications cables. See “Communications Wiring,” page 14 for ports available on the EC-BOS-6AX base unit. For ports on any installed option board (LON, RS-485, modem) see the specific mounting and wiring guide for any additional details.

5. If I/O accessory modules are installed, connect I/O wiring. Refer to the appropriate mounting and wiring guide for complete details.

6. Connect the backup battery to the EC-BOS-6AX battery connector, and apply power to the unit. See “Power Up and Initial Checkout,” page 16.

Grounding

An earth ground spade lug (0.187”) is provided on the base of the EC-BOS-6AX for connection to earth ground. For maximum protection from electrostatic discharge or other forms of EMI, connect the supplied earth grounding wire to this lug and a nearby earth ground (see Figure 3 on page 13). Keep this wire as short as possible.

Power is provided for EC-BOS-6AX plug-in accessory modules through the 20-pin accessory connectors. However, you should also connect the earth ground spade lug of each accessory module to ground in the same manner.

Power Wiring

The EC-BOS-6AX must be powered by an approved 15 Vdc power source. This can be either an external wall mount AC adapter (EC-WPM-XX) or the DIN-mount power module (EC-NPB-PWR/-UN). The EC-BOS-6AX controller does not include an on/off switch. To apply power, plug in the power connector to either the EC-BOS-6AX (if EC-WPM-XX) or the EC-NPB-PWR/-UN.

The EC-BOS-6AX controller does not include an on/off switch. To apply power, you either:

• if EC-WPM-XX, plug in the power connector to the EC-BOS-6AX.
• if EC-NPB-PWR, plug in its 2-position power connector.
• if EC-NPB-PWR-UN, energize the AC circuit (90-263Vac) wired to that module.

1. In some markets, a fourth power option is available: an EC-NetAX IO-34 accessory module, which is a combination of the EC-NPB-PWR module and two EC-NetAX IO-16 modules (plus two extra relays). Please refer to its mounting and wiring instructions document for more details. For general information on accessory modules, see “About Accessory Modules,” page 9.
Caution: Do not connect both the EC-WPM-XX and EC-NPB-PWR/-UN supplies at the same time, or equipment damage may result.

If desired, you can use the wall mount EC-WPM-XX in your office (to initially commission the EC-BOS-6AX), and then install the EC-BOS-6AX at the job using an EC-NPB-PWR/-UN module. The following sections provide more details:

- EC-WPM-XX (Wall Power Modules)
- EC-NPB-PWR (24Vac-powered in-line module)
- EC-NPB-PWR-UN (90-263Vac powered in-line module)

**EC-WPM-XX**

All models of wall power modules (US, EU, UK) are self-contained, isolated, switching power supplies designed to plug into a standard building power receptacle of appropriate voltage. To supply power to the EC-BOS-6AX, you then simply plug the barrel connector plug from the EC-WPM-XX into the barrel power connector on the EC-BOS-6AX base board (see Figure 5 on page 15).

Caution: Do not plug the barrel connector plug from the EC-WPM-XX into the EC-BOS-6AX until all other mounting and wiring is completed. See “Power Up and Initial Checkout,” page 16.

**EC-NPB-PWR**

Using the EC-NPB-PWR module lets you power the EC-BOS-6AX from a dedicated Class 2, 24Vac transformer, or from a 24Vdc power supply. If installing EC-NetAX IO-16 modules, the EC-NPB-PWR installs as the last (end) module in the chain. See

Note: If powering from the transformer, do not power any other equipment with it. Otherwise, conducted noise problems may result. Also, do not ground either side of the transformer’s secondary.

Located at the bottom of the power module is a 2-position power connector, and an earth ground spade lug, as shown in Figure 3.
Connect the supplied earth ground wire to a nearby earth ground point. Unplug the power connector plug from the module and make connections to it as shown in Figure 3.

**Caution**
Do not plug 24V power into the EC-NPB-PWR (reinsert connector plug) until all other mounting and wiring is completed. See “Power Up and Initial Checkout,” page 16.

Power consumption depends on installed accessories and option boards, and may vary from:

- EC-BOS-6\(^{AX}\) with EC-NPB-PWR alone: Approximately 8.5VA (AC) or 8.5W (DC)
- EC-BOS-6\(^{AX}\) with EC-NPB-PWR and four (4) EC-Net\(^{AX}\) IO-16 modules, plus option boards: up to 20VA (AC) or 20W (DC)

**EC-NPB-PWR-UN**
The EC-NPB-PWR-UN module lets you power the EC-BOS-6\(^{AX}\) (and if installed, EC-Net\(^{AX}\) IO-16 modules) from AC line power, with a universal input range from 90-263Vac. If installing EC-Net\(^{AX}\) IO-16 modules, the EC-NPB-PWR-UN installs as the last (end) module in the chain. See Figure 1 on page 6.

**Warning**
- A 120Vac or 240Vac circuit powers the EC-NPB-PWR-UN. **Disconnect power** to this circuit before installation to prevent electrical shock of equipment damage.
- Make all connections in accordance with national and local electrical codes. Use copper conductors only.
- Do not exceed the 30W capacity of EC-NPB-PWR-UN by powered devices.

Power input connections are made to the terminals on the circuit board (cover removal is required). An earth ground connection must be made to the grounding lug using the supplied earth wire. See Figure 4 on page 14.
Communications Wiring

**Procedure 3  Wiring EC-NPB-PWR-UN input power and earth ground**

**Step 1**  Remove power from the AC circuit being wired to the EC-NPB-PWR-UN - see previous warning.

**Step 2**  Remove the EC-NPB-PWR-UN cover.
To do this, press in the four tabs on both ends of the unit and lift the cover off.

**Step 3**  If the EC-BOS-6AX or EC-NetAX IO-16 accessory module is plugged into the unit, you may need to slide it away to get to the cover tabs.

**Step 4**  Connect the supplied earth grounding wire to a nearby grounding point. See Figure 4.

**Step 5**  Make AC circuit connections line (mains) and neutral to the terminals labeled “INPUT PWR”.

**Step 6**  Replace the cover on the EC-NPB-PWR-UN.
Make sure all modules in the mounted assembly are firmly connected together and secured.

---

**Caution**  Do not energize the AC circuit wired to the EC-NPB-PWR-UN until all other EC-BOS-6AX mounting and wiring is completed. See “Power Up and Initial Checkout,” page 16

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**Communications Wiring**

Connect communications wiring to the EC-BOS-6AX using ports on the bottom of the unit (Figure 5), which include:

- Ethernet
- Serial
Note Prior to connecting cables, provide strain relief for them to prevent damage to the controller.

Figure 5 EC-BOS-6Ax bottom side (cover removed).

Ethernet
Two, female 10/100-Mbit Ethernet connections are provided on the EC-BOS-6Ax. These are RJ-45 connectors labeled LAN2 and LAN1. Use a standard Ethernet patch cable for connecting to a hub or Ethernet switch. An activity LED for each Ethernet port is visible, and are labeled “LAN2” and “LAN1” on the cover.

The factory-default IP address for LAN1 on an EC-BOS-6Ax is 192.168.1.12n, where the last numeral n in the address matches the EC-BOS-6Ax’s serial number, and subnet mask is 255.255.255.0. By default, LAN2 on an EC-BOS-6Ax is disabled. Refer to the EC-BOSAx Install and Startup Guide for details on changing IP address.

Note Typically, you only use LAN1 (primary port), unless you have a specific application for isolating a driver’s network traffic to a separate LAN, using LAN2. Do not use LAN2 as the primary port.

Serial
There are two serial ports on the EC-BOS-6Ax base unit. Each has a UART capable of operation up to 115,200 baud. At the bottom of the board (see Figure 5), the left port is an RS-232 port using an DB-9 plug (male) connector. To the right of this is a two-wire with shield, isolated RS-485 port, using a screw-terminal connector plug.

Note A green “receive” LED and yellow “transmit” LED are provided for each serial port. These LEDs are located on the bottom board, on the opposite side of the serial connectors (see Figure 2 on page 7). These LEDs are labeled on the board (COM1, COM2) and are not visible with the cover on.

RS-232—An RS-232 serial port using a male DB-9 connector always operates as COM1. You can use standard DB-9 serial cables with this port. The EC-BOS-6Ax is a serial DTE device, such another DTE device (PC, for example) requires a “null modem” cable. If connecting the EC-BOS-6Ax to a DCE device (modem, for example), a straight-through cable is used. Table 3 provides standard serial DB-9 pinouts.
If a modem option card (EC-NPB-MDM) is installed, this port becomes disabled—except if rebooted with the mode jumper (see Figure 2 on page 7) in the “Serial Shell” position.

### Table 3  Serial port (RS-232 and RS-485) pinouts.

<table>
<thead>
<tr>
<th>Pinout References</th>
<th>Signal</th>
<th>DB-9 Plug Pin</th>
<th>Base RS-485 Port (COM2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>DB-9 Plug (male)</td>
<td></td>
<td></td>
<td>3-position connector (male)</td>
</tr>
<tr>
<td>1</td>
<td>DCD Data carrier detect</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>RXD Receive data</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>TXD Transmit data</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>DTR Data terminal ready</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>GND Ground</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>DSR Data set ready</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>RTS Request to send</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>CTS Clear to send</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>not used on the EC-BOS-6(^{\text{AX}})</td>
<td>9</td>
<td></td>
</tr>
</tbody>
</table>

**RS-485**—An RS-485, optically isolated port uses a 3-position, screw terminal connector and always operates as COM2. Wire to this connector with shielded 18-22AWG wiring (refer to the TIA/EIA-485 standard). As shown in Table 3, the screw terminals (from left-to-right) are shield, plus (+), and minus (–).

**USB**—A single USB port is on the top of the board.

---

**Power Up and Initial Checkout**

Ensure power wiring to the EC-BOS-6\(^{\text{AX}}\) is ready—see the “Power Wiring” section on page 11. Refer to Figure 2 on page 7 for the locations of the EC-BOS-6\(^{\text{AX}}\) battery connector, status LEDs and barrel power connector (for EC-WPM-XX only). Refer to Figure 3 on page 13 for location of the power connector on the EC-NPB-PWR/-UN power module.

Following all mounting and wiring, perform the following:

**Procedure 4  Initial power up and checkout**

**Step 1**  Connect the Backup Battery.

**Step 2**  Apply Power.

**Step 3**  Check the Status LEDs.
Connect the Backup Battery

With the cover removed from the EC-BOS-6AX (see “Removing and Replacing the Cover,” page 7), locate the red and black wires coming from the backup battery, with 2-position connector plug. Insert the plug into the battery connector on the bottom board (below option slot 2 area), as shown in Figure 6.

Figure 6  Backup battery connector on EC-BOS-6AX bottom board.

The connector is keyed—you cannot insert it incorrectly. The red (positive) connection should be the furthest from the two 30-pin option board connectors. For more battery details, see “About the Battery,” page 18.

Apply Power

Apply power to the EC-BOS-6AX by plugging in the power plug into either the EC-BOS-6AX (if wall mount AC adapter EC-WPM-XX) or the 24V-powered EC-NPB-PWR module. If powering using the line-voltage input EC-NPB-PWR-UN power supply module, energize the 90-263Vac circuit wired to the EC-NPB-PWR-UN module.

Caution  Do not connect both the EC-WPM-XX and EC-NPB-PWR/EC-NPB-PWR-UN supplies at the same time, or equipment damage may result, or a power outage may go unrecognized.

Check the Status LEDs

When power is applied, the green LED labeled “STATUS” will light. This indicates that the system is OK and that power is applied. Once the EC-BOS-6AX boots, the yellow “BEAT” (heartbeat) LED will begin blinking, with a typical rate of about 1 Hz. Blinking should begin within 30 seconds after power is applied.

If after applying power, the STATUS LED goes out, or if the BEAT LED comes on (steady) and stays lit longer than two minutes, contact Systems Engineering for technical assistance. See also the “Using Status LEDs” section on page 19.
About the Battery

The EC-BOS-6AX is provided with a custom 10-cell NiMH battery pack mounted to the unit (under the cover). This battery allows the EC-BOSAX to continue operation through very short power bumps (a few seconds in duration). If a longer power outage occurs, the battery provides enough run time for the EC-BOS-6AX to backup data and then shutdown. Typically, this is one minute. Shutdown occurs automatically, after data is backed up to on-board flash memory.

The EC-BOS-6AX charges the battery during normal operation, until fully charged. Typically, the charge operation completes within 18 hours. Following a power outage, the battery is charged again, as necessary. The power and battery circuitry is monitored by a station running on the EC-BOSAX (via the PowerMonitorService). Station alarms are generated whenever primary power is lost, or if the battery is uncharged or unable to hold a sufficient charge.

The battery should be replaced approximately every three years, or more often if the unit is in a high temperature environment.

Note

A NiMH battery characteristic is to lose charge if not left in charge mode (trickle charge). Leaving the battery unconnected, or in the unit powered off will cause the battery to fully discharge in a matter of weeks. Note that in the case of a new EC-BOS-6AX, it ships from the factory with a completely discharged battery. Therefore, allow at least 18 hours for the battery to charge if it has not been in a powered unit.

For more information on the use and replacement of the battery, refer to the “Required Battery Maintenance” section on page 20.

Related Documentation

For more information on configuring and using the EC-BOS-6AX controller, consult the following documents:

- **EC-BOSAX Install and Startup Guide**
- **EC-NetAX IO-16 Installation and Configuration Instructions**
- **EC-NetAX IO-34 Installation and Configuration Instructions**
- **EC-NPB-LON Option Installation Sheet**
- **EC-NPB-MDM Option Installation Sheet**
- **NiagaraAX Ndio Guide**
- **NiagaraAX User Guide**
Using Status LEDs

The EC-BOS-6AX controller includes several LEDs that can help determine the status of the unit. They are located in two places: the top of the controller (visible through the cover), and for serial ports, on the bottom board (only with cover removed). From left-to-right these LEDs include:

- Ethernet Ports
- Heartbeat
- Status
- Serial Ports

Refer to Figure 2 on page 7 for the exact locations of status LEDs on the EC-BOS-6AX controller.

Ethernet Ports

Each Ethernet port (“LAN2”, “LAN1”) has one green LED, visible on the top cover.

A “LANx” LED indicates activity on that port as follows:

- Off—No Ethernet link is made
- On—Ethernet link is present, but no activity on the LAN
- Blinking—Ethernet link is present with data activity on the LAN.

Heartbeat

The “BEAT” LED is located to the right of the Ethernet status LEDs, and is yellow. Under normal operation, this LED should blink about once per second. If the heartbeat LED stays on constantly, does not light, or blinks very fast (more than once per second), contact System Engineering for technical support.

Caution
During boot-up, the heartbeat LED blinks in a 90% on - 10% off pattern. Do not remove power during this time or data loss may result (I/O module’s firmware upgrade may be in progress).

Status

The “STATUS” LED is located to the right of the heartbeat (“BEAT”) LED, and is green. This LED provides a CPU machine status check, and should remain lit whenever the EC-BOS-6AX is powered. If the STATUS LED does not light while power is applied, contact System Engineering for technical support.

Serial Ports

LEDs for the two serial ports are located on the EC-BOS-6AX’s bottom board, on the opposite side of the RS-232 and RS-485 ports (see Figure 2 on page 7). Labels “COM1” and “COM2” correspond to the software configuration of the COM ports. LEDs show the transmit and receive activity for the serial ports and optional modem.

Note
You must remove the cover to the serial port LEDs. See “Removing and Replacing the Cover,” page 7.

- The yellow transmit LED indicates that the EC-BOS-6AX is sending data out the serial port over a communications line to a connected device.
• The green receive LED indicates that the EC-BOS-6AX is receiving data from a connected device. These LEDs provide a fixed on-time when data is detected on the port. If these LEDs are on constantly, this indicates a problem with the communications channel, such as a shorted wire or reversed wiring.

Maintaining the EC-BOS-6AX

This section provides information on the following topics:

• Cleaning
• Required Battery Maintenance
• Replacement Parts
• Replacing the base assembly

Federal Communications Commission (FCC)

Cleaning

If dust or metal filings are present inside the unit, clean with vacuum or compressed air. Otherwise, no cleaning inside the unit is required. Optionally, if the cover becomes dirty, you can wipe it with a damp cloth and mild detergent.

Required Battery Maintenance

Battery life expectancy is a function of its discharge cycles (the number of discharges and their depth) and the ambient temperature of the battery during normal operation. In most applications, the battery should see relatively few discharges. Therefore, ambient temperature has more to do with determining the life expectancy of the battery than does any other factor. If the EC-BOS-6AX is installed in a conditioned space, the battery should provide dependable service for approximately three years (average). In an environment where the operating temperature is higher (that is, 50ºC or 122ºF), you should only expect the battery to last approximately one year.

The NiMH battery in the EC-BOS-6AX controller is fully discharged when factory shipped. Additionally, NiMH batteries lose charge over time if not kept trickle-charged (for more details, see “About the Battery,” page 18). Therefore, even a new unit (or replacement battery) will require up to 18 hours of powered operation before it can provide reliable backup power (is at full charge).

The EC-BOS-6AX monitors the battery and periodically loads the battery to test its ability to maintain battery-backed functions. Investigate any battery trouble message, and check the battery connections to the unit. Replace the battery as required. To order a new battery, see the “Standard Replacement Parts” section on page 22.

Replacing the Battery

A replacement battery is a complete assembly, that is a battery pack pre-attached to a battery bracket. See Figure 6 on page 17.

Caution

Use only battery packs approved for use with the EC-BOS-6AX.

To replace the battery, proceed as follows:
Procedure 5  Replacing NiMH battery assembly on an EC-BOS-6AX.

**Step 1**  Backup the EC-BOS-6AX controller’s configuration to your PC using the appropriate NiagaraAX software tool (for example, EC-NetAx Pro).

**Step 2**  Remove power from the EC-BOS-6AX.  
Wait for LED activity to stop - after several seconds, all LEDs on the EC-BOS-6AX should be off.

**Step 3**  Remove the cover. See “Removing and Replacing the Cover,” page 7.

**Step 4**  Remove the old battery and bracket assembly by taking out the four screws holding it in place, setting the screws aside for later. Unplug the battery from the connector on the EC-BOS-6AX.

**Step 5**  Plug the battery connector plug of the replacement battery into the battery connector on the EC-BOS-6AX.

**Step 6**  Set the replacement battery/bracket assembly back over the option card slots, with the mounting holes aligned with the standoffs.

**Step 7**  Place the four screws through the battery bracket, option cards blanking plates, and into the standoffs on the EC-BOS-6AX base board. Hand tighten these screws.

**Step 8**  Replace the cover.

**Step 9**  Restore power to the EC-BOS-6AX and verify normal operation.

Replacement Parts

Servicing the EC-BOS-6AX may call for replacement parts. There are three categories of parts:

- **Non-replaceable Parts**
- **Standard Replacement Parts**
- **New Replacement Units**

Non-replaceable Parts

Other than the parts listed in the replacement parts sections, there are no serviceable components on the base assembly.

Memory

Any addition, modification, or replacement of memory components requires software configuration and is not a field upgrade. For additional information on modifying the memory capacity of the EC-BOS-6AX, consult Distech Controls office for technical support

Fuse

The EC-BOS-6AX contains a non-user replaceable fuse, soldered on the circuit board. This fuse provides protection from internal shorts or connection to incorrect power supplies. If the fuse circuitry is suspect, contact Distech Controls office for technical support. See the “Federal Communications Commission (FCC)” section on page 24.
Standard Replacement Parts

Standard replacement parts are listed in Table 4 and can be ordered from stock without restriction. Standard replacement parts cannot be returned for credit and should be disposed of in an appropriate manner.

Table 4 Standard replacement parts.

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>10499</td>
<td>NiMH Battery Pack (with battery bracket)—see “Replacing the Battery,” page 20</td>
</tr>
<tr>
<td>10027</td>
<td>RS-485 connector plug, 3-position</td>
</tr>
</tbody>
</table>

Screws used for the EC-BOS-6\(^{AX}\) are standard #6-32 x 3/8” types, which you can obtain locally if lost.

New Replacement Units

To replace a faulty unit, order and install a new EC-BOS-6\(^{AX}\)—please note that EC-BOS\(^{AX}\) series products do not have special “field replacement units,” or FRUs, with separate part numbers.

If the faulty EC-BOS-6\(^{AX}\) is still in warranty, you can receive credit by returning it to Distech Controls. Be sure to contact Distech Controls for a return authorization (RMA) number before shipping an item for return credit. See “Federal Communications Commission (FCC),” page 24, for more details.

Before ordering a new EC-BOS-6\(^{AX}\), it is strongly recommended that you contact your normal technical support resource to eliminate the possibility of a software issue or mis-configuration problem.

Replacing the base assembly

Caution

Before handling circuit boards, discharge any accumulated static by touching the metal surface of the EC-BOS-6\(^{AX}\). For details, see the “Static Discharge Precautions” section on page 4.

To replace the EC-BOS-6\(^{AX}\) base assembly in the field, proceed as follows:

Procedure 6 Replacing a EC-BOS-6\(^{AX}\) base assembly.

Step 1 Using the appropriate Niagara\(^{AX}\) software tool, back up the EC-BOS\(^{AX}\)’s configuration to your PC.

Step 2 Remove power to the EC-BOS-6\(^{AX}\). The unit should power down automatically.

Note If I/O accessory modules are installed and any I/O points have voltage, turn the devices off or disconnect power to them.

Step 3 Note positions of all communications and other wiring cables going to the EC-BOS-6\(^{AX}\), as well as all installed accessory modules (if they must be removed). If necessary, label connectors and accessory modules to avoid mis-connection later, after EC-BOS-6\(^{AX}\) is replaced.
Step 4 Unplug all Ethernet, serial, LON, and modem connectors from the EC-BOS-6AX, and unplug its earth ground wire.

Step 5 If I/O accessory modules are installed:

- If DIN rail mounting with DIN end-clips was used, you may be able to remove the DIN rail end clip that secures the EC-BOS-6AX end of the assembly and then slide the EC-BOS-6AX away from the rest of the assembly. Then you can remove the EC-BOS-6AX from the DIN rail (see Figure 1 on page 6), leaving the mounting and wiring of I/O modules untouched. In this case, after removing the EC-BOS-6AX from the DIN rail, skip ahead to Step 6.

- If tab (screw) mounting was used instead of DIN rail mounting, or if a combination of DIN rail mounting and tab screws (into the EC-BOS-6AX’s “accessory side” tab holes, see last page), you will need to remove the accessory modules first, before removing the EC-BOS-6AX. In this case:
  a. Making a careful note of all wiring terminations, unplug the I/O connector plugs and earth ground wires from the installed I/O modules.
  b. Remove the installed accessory modules, starting with the end module. Modules may be secured by screws in mounting tabs or clipped to a DIN rail, or fastened by some combinations. See Figure 1 on page 6 for details on removal from (and mounting onto) the DIN rail.
  c. Remove any screws fastening the EC-BOS-6AX and remove it (see Figure 1 on page 6).

Step 6 Remove the cover from the old EC-BOS-6AX (see “Removing and Replacing the Cover,” page 7). Note the position of installed option boards, if any. You must transfer them to the replacement EC-BOS-6AX.

Step 7 Remove the option boards from the old EC-BOS-6AX and install them into the replacement EC-BOS-6AX, if applicable. See “Mounting Option Cards,” page 8, for more details.

Step 8 Mount the replacement EC-BOS-6AX as it was previously, using the same DIN rail location and/or screws.

Step 9 Reconnect/remount any removed accessory modules, being careful to replace in the same order, using the same DIN rail location and/or screws. Secure all accessory modules as done previously.

Step 10 Reconnect the earth ground wires to the EC-BOS-6AX grounding lug and any installed accessory modules.

Step 11 Reconnect any Ethernet, serial, and modem connectors to the EC-BOS-6AX and any installed accessory modules.

Step 12 If using I/O modules, and any of your I/O points have voltage, turn the devices back on or reconnect power to them.

Step 13 Restore power to the EC-BOS-6AX. It should boot up as a new unit (see “Check the Status LEDs,” page 17).

Step 14 Using the NiagaraAX platform tools, re-commission the EC-BOS-6AX, and install the saved station database. For more details, see the EC-BOSAX Install and Startup Guide.
Certifications

Federal Communications Commission (FCC)

This equipment generates, uses, and can radiate radio frequency energy, and if not installed and used in accordance with the instruction manual, may cause interference with radio communications. It has been tested and found to comply with the limits for a Class A computing device pursuant to Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area may cause interference, in which case, users at their own expense will be required to take whatever measures may be required to correct the interference. Any unauthorized modification of this equipment may result in the revocation of the owner’s authority to continue its operation.

Canadian Department of Communications (DOC)

Note

This Class A digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

Note

Cet appareil numérique de la classe A respecte toutes les exigences du Règlement canadien sur le matériel pouvant causer des interférences.
### Declaration of Conformity

**EC-BOS-6AX**


**Manufacturer's Name:** Distech Controls, Inc.

**Manufacturer's Address:**
4005-B Matte Boulevard  
Brossard, Quebec J4Y 2P4  
Canada

**Product Model Number:** EC-BOS-6AX, with the following: EC-NPB-PWR, EC-NPM-PWR-UN, EC-NPB-LON, EC-NPB-MDM

**Type of Equipment:** Information Technology Equipment

**EMC Standards Applied:**

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<thead>
<tr>
<th>Standard</th>
<th>Description</th>
<th>Criteria Met</th>
</tr>
</thead>
<tbody>
<tr>
<td>EN 61000-6-4</td>
<td>Electro-Magnetic Compatibility Emissions - Generic</td>
<td>Complies</td>
</tr>
<tr>
<td>EN 61000-6-2 and</td>
<td>Electro-Magnetic Compatibility Immunity</td>
<td>Complies, as documented below</td>
</tr>
<tr>
<td>EN 61000-6-1, as defined below</td>
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<td></td>
</tr>
<tr>
<td>EN50081-2</td>
<td>Generic Emission Standard for residential, commercial, and light industrial environment</td>
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</tr>
<tr>
<td>CISPR 11</td>
<td>Limits of Radio Disturbance - Radiated Emissions</td>
<td>PASS Class A</td>
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<tr>
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<td>E.S.D</td>
<td>PASS Criteria A</td>
</tr>
<tr>
<td>IEC 61000-4-3</td>
<td>Radiated Field Immunity</td>
<td>PASS Criteria A</td>
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<td>Quasi-Stationary Harmonics Test, Voltage Fluctuation and Flicker</td>
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</table>
Tab Mounting Dimensions

Note: Electronic and printed versions of this guide may not show the dimensions to scale.

DIN mounting is recommended over tab mounting.

Tip: If mounting accessory modules, future removal/replacement of the EC-BOS^AX is simplified if you do not install screws in the “accessory module side” tabs of the EC-BOS^AX (see above).