# OCS QX Series

***Want More Information?***
To download the QX User Manual (MAN0798), refer to *Technical Support* in this document.

## 1 INTRODUCTION

***QX Series* (QX) *provides…***

- ***Powerful Standard Features* in *one* unit including**
  - ✓ ***Controller***
  - ✓ ***Network***
  - ✓ ***I/O***
  - ✓ ***Operator Interface***
  - ✓ ***Highly Visual Display Screen***
- ***Optional Back Pack* adds *comprehensive I/O and communication capabilities.***

**Table 1 – Features of QX Base Models and Back Pack Options**

| ***Standard Features on QX Bases*** | | | | ***Features on Back Pack (BP) Options*** | |
|---|---|---|---|---|---|
| **QX Base Model** | **Network** | **Screen Type** | **Standard QX Features** | ***HE-BP41*** | ***HE-BP43*** |
| **HE-QX451** | On-Board Ethernet 100BaseT | 8.4" TFT SVGA with 32,768 colors | CompactFlash<br>3 Serial Ports<br>Ethernet | FOX<br>CsCAN<br>Up to 2 Plastic SmartStack Modules (for additional I/O) | FOX<br>CsCAN<br>Up to 4 Plastic SmartStack Modules (for additional I/O)<br>High Speed I/O |
| **HE-QX551** | | 10.4" TFT SVGA with 32,768 colors | | | |
| **HE-QX651** | | 12.1" TFT SVGA with 32,768 colors | | | |

| **Other Products Commonly Used with Color QX (*Back Pack Options Required*)** | |
|---|---|
| **Plastic SmartStack Modules** | Provide a wide variety of I/O options for the QX. Require little space and are easy to install. |
| **Fiber Optic Extension System (FOX104 / 404)** | Extends a high-speed QX backplane enabling SmartStack I/O Modules to be mounted several meters from the QX. The FOX, also, significantly increases the number of SmartStack I/O modules supported by one QX. |
| **SmartStix Modules** | Is a family of remote I/O products for the QX. |

# 2 SPECIFICATIONS / PRODUCT DESCRIPTIONS

| Table 2 - QX Base Specifications | | | |
|---|---|---|---|
| **Base Models** | **QX451 (8-inch) (SVGA)** | **QX551 10-inch) (SVGA)** | **QX651 (12-inch) (SVGA)** |
| **Display Type (LCD with backlight)** | 800 x 600 TFT | 800 x 600 TFT | 800 x 600 TFT |
| **Display Size** | 8.4” | 10.4” | 12.1” |
| **Display Screen Dimensions** | 6.7”W x 5”H (170 x 128 mm) | 8.3“W x 6.2“H (211 x 159 mm) | 9.7“W x 7.3“H (246 x 185 mm) |
| **Display Memory** | 8 MBytes | | |
| **User Keys** | 7 configurable keys + System Key | | |
| **Screens Supported** | 1,023 screens (300 objects per screen) | | |
| **Number of Colors** | 32,768 | | |
| **Base Models** | **QX451 (8-inch)** | **QX551 10-inch)** | **QX651 (12-inch)** |
| **Primary Power** | **Voltage:** 24 VDC (+/-10%) **Steady State Current:** 0.625 A @ 24 VDC **Inrush Current:** (25 A @ 24 VDC) for 0.7 ms | **Voltage:** 24 VDC (+/-10%) **Steady State Current:** 1.25 A @ 24 VDC **Inrush Current:** (30 A @ 24 VDC) for 1 ms | **Voltage:** 24 VDC (+/-10%) **Steady State Current:** 1.25 A @ 24 VDC **Inrush Current:** (30 A @ 24 VDC) for 1 ms |
| **QX Dimensions (without Back Pack option or SmartStack I/O attached).** See *Panel Cut-outs and Dimensions* for complete details (page 4). | | | |
| **Base Models** | **QX451 (8-inch)** | **QX551 10-inch)** | **QX651 (12-inch)** |
| **Height** | 7.0” (178 mm) | 9.09” (230.9 mm) | 10.25” (260.4 mm) |
| **Width** | 9.17” (233 mm) | 11.95” (303.5 mm) | 12.87” (326.9 mm) |
| **Mounting Depth** | 2.35” (59.70 mm) | 2.52” (64 mm) | 2.52” (64 mm) |
| **Keypad Material** | Faceplate made of Lexan® HP92 by GE Plastics. The material is resistant to most corrosive substances found in industrial environments. The material also holds up well in most industrial conditions. | | |
| **Serial Ports** | 3 RS-232 / RS-485 Ports. Software Selectable. | | |
| **Network Options** | On-board Ethernet 100BaseT | | |
| **Control Memory** | 256K Ladder Memory plus 32KB Register Space | | |
| **Control Scan Rate** | 0.2mS / K Ladder Logic (typical) | | |
| **Portable Memory** | Compact FLASH (CF) slot | | |
| **Temperature & Humidity** | 32 - 122°F (0 - 50°C), 5 to 95% Non-condensing | | |
| **UL** | Please refer to Compliance Table located at http://www.heapg.com/Support/compliance.htm | | |
| **CE** | | | |

If using a Back Pack Option (BP41 or BP43), refer to the following specifications.

| Table 3 – Back Pack Specifications | | |
|---|---|---|
| | **BP41** | **BP43** |
| **I/O Interfaces** | Plastic SmartStack I/O – 2 modules maximum<br>Fiber Optic Expansion (FOX) I/O – 5 bases maximum<br>CsCAN Network Port – 252 SmartStix I/O maximum | Plastic SmartStack I/O – 4 modules maximum<br>Fiber Optic Expansion (FOX) I/O – 5 bases maximum<br>CsCAN Network Port – 252 SmartStix I/O maximum |
| **Built-in High Speed Counter / PWM** | No | Yes - >1MHz max TTL or 24vdc level |
| **Built-in PWM Outputs** | No | Yes<br>TTL or 24vdc level |
| **LEDs** | 3 LEDs (CAN, FIBER OK and OK) | 3 LEDs (CAN, FIBER OK and OK) |
| **Temperature & Humidity** | 32 - 122°F (0 - 50°C), 5 to 95% Non-condensing | |
| **UL** | Please refer to Compliance Table located at<br>http://www.heapg.com/Support/compliance.htm | |
| **CE** | | |

# 3 INSTALLATION

**Note:** Prior to mounting, observe requirements for the panel layout design and adequate clearances in the **QX Hardware Manual** (MAN0798). A handy checklist is provided in the *Installation* chapter.

## 3.1 Installation Procedures

### a. QX Base Installation

1. Per specifications of the QX model you are using, carefully prepare the panel cutout. Make sure the corners of the cutout are square and free from burrs. (Locate the panel cut-outs and dimensions that pertain to your QX model as shown in this document.)
2. Cut the host panel
3. Insert the QX (base unit only) through the panel cutout from the front. The gasket material needs to lie between the host panel and the QX.

**Caution: Do not force the QX into the panel cutout. An incorrectly sized panel cutout damages the QX screen.**

4. Install and tighten the mounting clips (provided with the QX) until the gasket material forms a tight seal.

**Caution: Do not over-tighten. Over-tightening damages the case.**

5. If used, install the Back Pack (BP) option. (Refer to **Item b** in this section for details.)
   **Note:** QX Bases are not shipped with firmware that is compatible with the Back Pack option. A firmware update is performed as part of the BP installation procedure.

6. Connect cables as needed such as communications, programming, power and fiber optic cables to the QX ports using the provided connectors.
7. As a final step before using, carefully remove the protective, plastic sheet from the front of the unit. The protective, transparent sheet is used to protect the display window.
8. Begin configuration procedures for the QX.

### b. Back Pack (BP) Installation

**Note:** QX Bases are not shipped with firmware that is compatible with the Back Pack option. A firmware update is performed as part of the BP installation procedure in this section.

1. Remove the clear plastic label on the unit.
2. Push the BP into place on the QX Base.
3. Insert and tighten the 3 screws.

**Caution: Do not over-tighten. Over-tightening damages the case.**

4. Load BP firmware using the **Firmware Update Wizard** in Cscape Software.
   a. In Cscape's main menu, press **File**, and then, click on **Firmware Update Wizard**.
   b. A new screen appears; click on the **Product** pull-down menu. Scroll down until you find the desired BP model and click on it.
   c. A new screen appears; press **Start**.

## 3.2 Panel Cut-Out and Dimensions

### *3.2.1 QX451 (8-inch)*

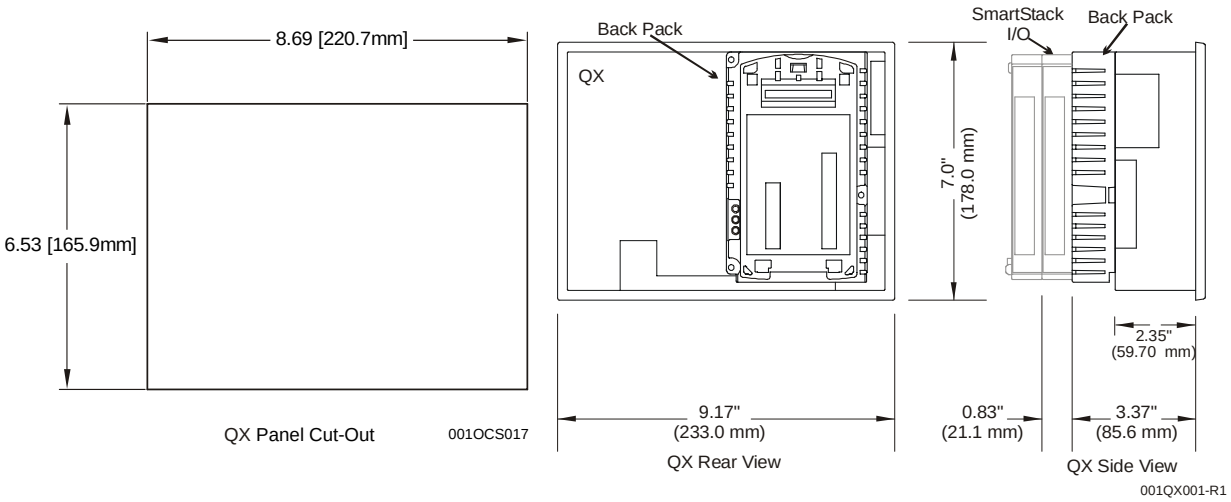



**Figure 1 – Panel Cut-out and Dimensions 8-inch**

### *3.2.2 QX551 (10-inch)*

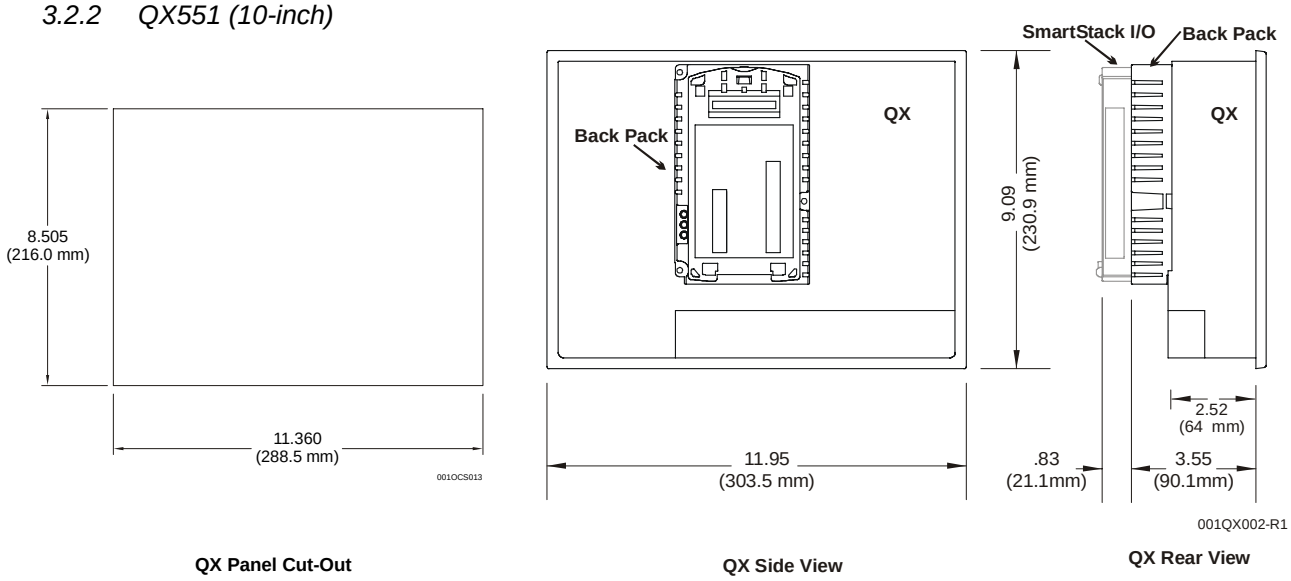



**Figure 2 – Panel Cut-out and Dimensions 10-inch**

### *3.2.2 QX651 (12-inch)*

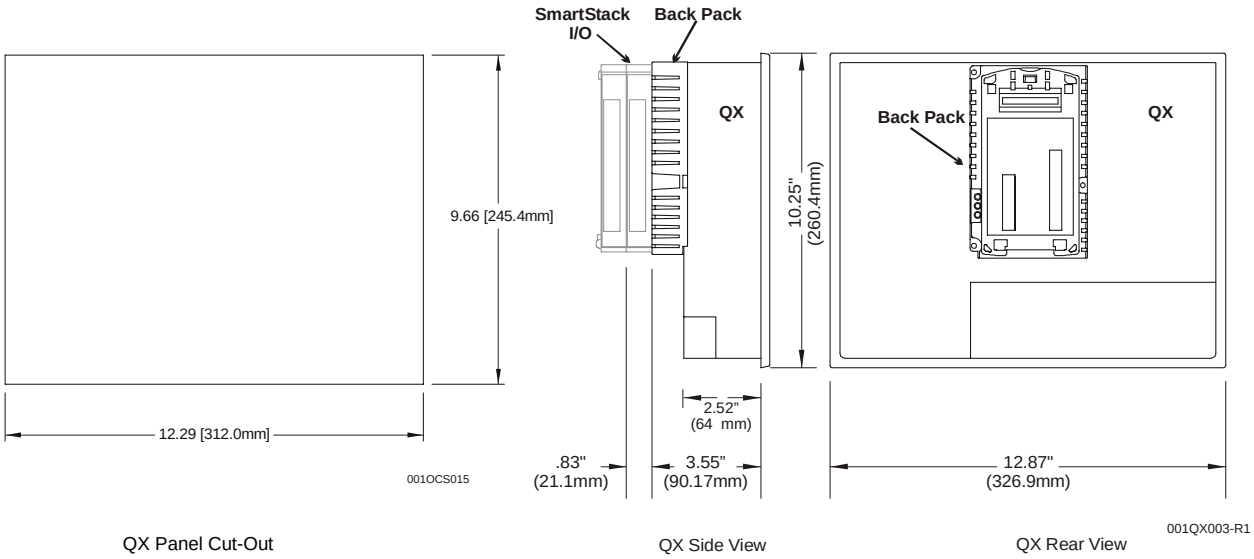



**Figure 3 – Panel Cut-out and Dimensions 12-inch**

### 3.3 QX Base Ports and Connectors

The QX base has power, network, programming and fiber optic ports. Three RS-232 and RS-485 ports are available.

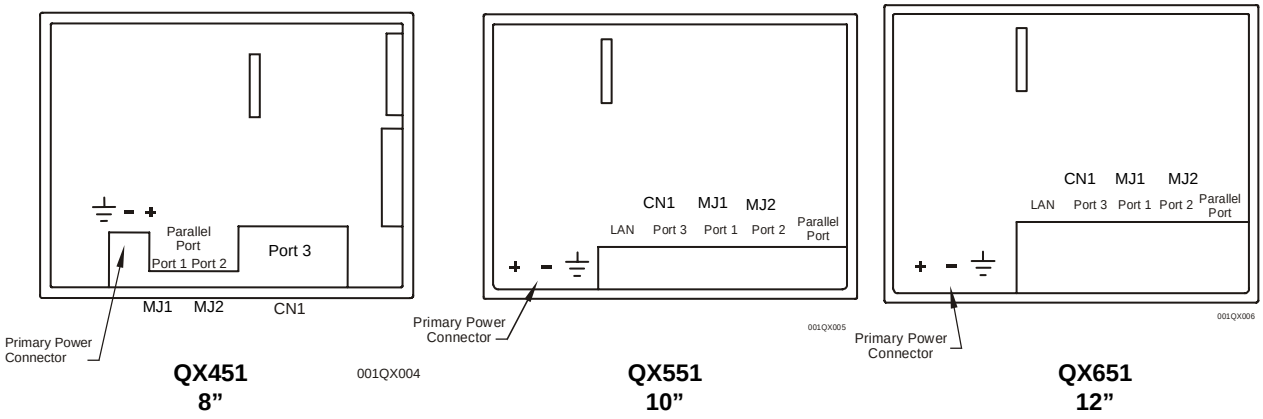



**Figure 4 – QX Base Ports and Connectors**

#### *3.3.1 Primary Power Port / Grounding*

| Table 4 – Primary Power Port Pins | |
|---|---|
| **Signal Pin** | **Description** |
| V+ | Input power supply voltage |
| V- | Input power supply ground |
| ⏚ | Frame Ground |

**Note: Power Supply Voltage Range is from 24VDC ±10%.**

#### *3.3.2 RS-232 Port / RS-485 Port*

There are a variety of ways to connect to the RS-232 and RS-485 ports; You can use two modular jacks (MJ1 and MJ2) or the 25-pin Dsub connector (CN1).

| Table 5 – Ports and Functions (Port 1, 2, and 3) | | | |
|---|---|---|---|
| **Functions** | **Port 1 (MJ1)** | **Port 2 (MJ2)** | **Port 3 (CN1)** |
| **RS-232** | **x** | **x** | **x** |
| **RS-485** | **x** | **x** | **x** |
| **Hardware Handshaking** | | | **x** |
| **Programming** | **x** | | |
| **Ladder Function Controlled** | **x** | **x** | **x** |
| **Modem** | **x*** | **x*** | **x** |
| * Not supported by Cscape Modem Function Blocks | | | |

### a. Port 1 (MJ1) / Port 2 (MJ2) Modular Jacks

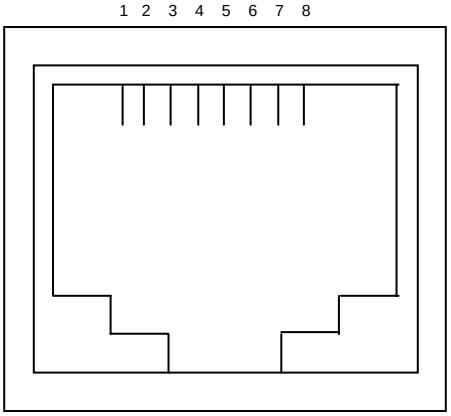



**Figure 5– Close-up of Port 1 (MJ1) / Port 2 (MJ2) (RS-232 and RS-485)**

| Table 6 – Port 1 (MJ1) / Port 2 (MJ2) Pins | |
|---|---|
| **Pin** | **Signal** |
| 1 | +SD/RD |
| 2 | -SD/RD |
| 3 | +5V |
| 4 | +5V |
| 5 | 0V |
| 6 | 0V |
| 7 | RXD |
| 8 | TXD |
| Output power supply: Max. 150mA | |

### b. Port 3 (CN1) Connector

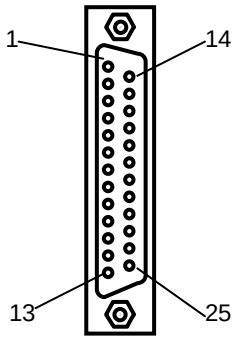



**Figure 6 – Port 3 (CN1) RS-232 / RS-485 Connector**

| Table 7– Port 3 (CN1) Pins | | | |
|---|---|---|---|
| **Pin #** | **Signal** | **Pin #** | **Signal** |
| **1** | FG | **14** | QX451, 551, 651: +RTS |
| **2** | TXD | **15** | Not Used |
| **3** | RXD | **16** | Not Used |
| **4** | RTS | **17** | QX451, 551, 651: -RTS |
| **5** | CTS | **18** | -CTS |
| **6** | Not Used | **19** | +CTS |
| **7** | SG | **20** | Not Used |
| **8** | Not Used | **21** | Not Used |
| **9** | +5V | **22** | Not Used |
| **10** | 0V | **23** | Not Used |
| **11** | Not Used | **24** | +RD |
| **12** | +SD | **25** | -RD |
| **13** | -SD | | |

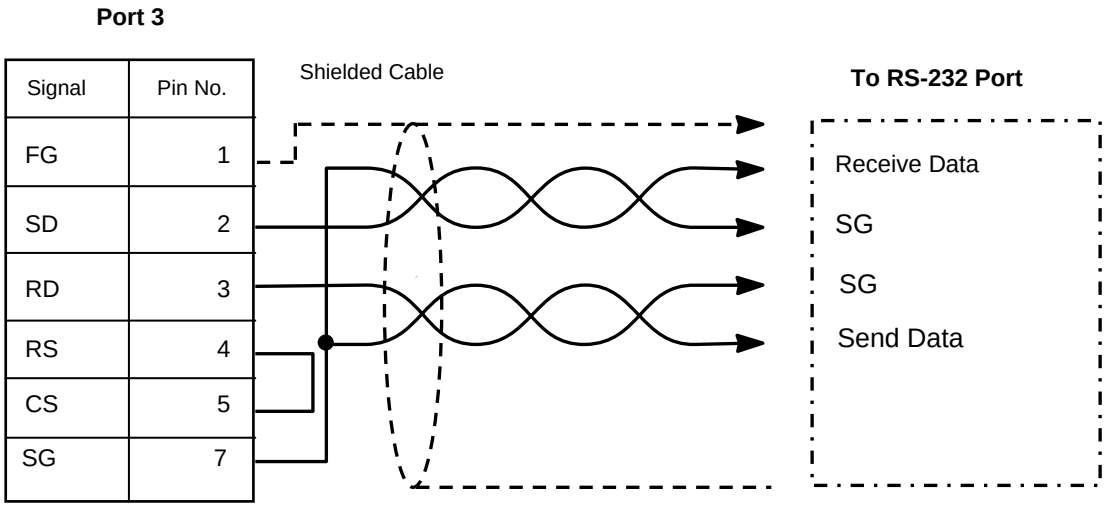



**Figure 7 - Port 3 (CN1) RS-232 Port**

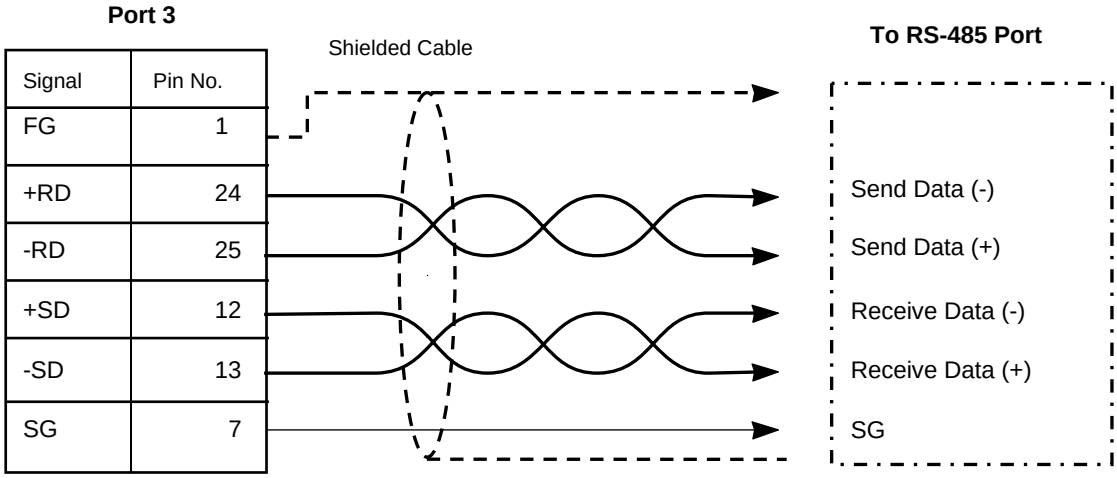
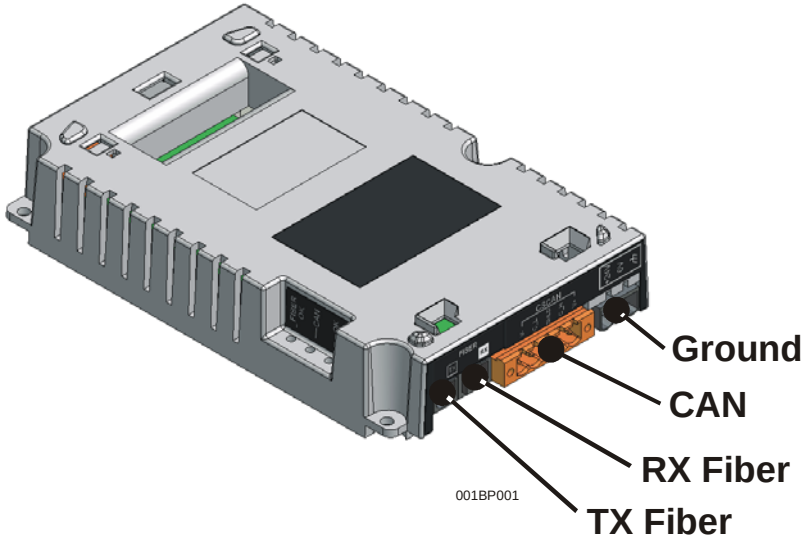
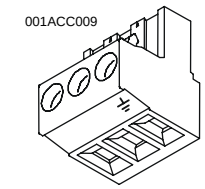



**Figure 8 –Port 3 (CN1) RS-485 Port**

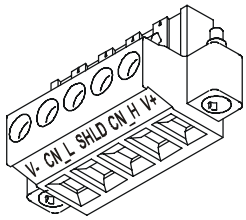
### 3.4 Back Pack (BP) Connectors and Ports

Side views of the BP are shown to indicate the locations of its connectors and ports.

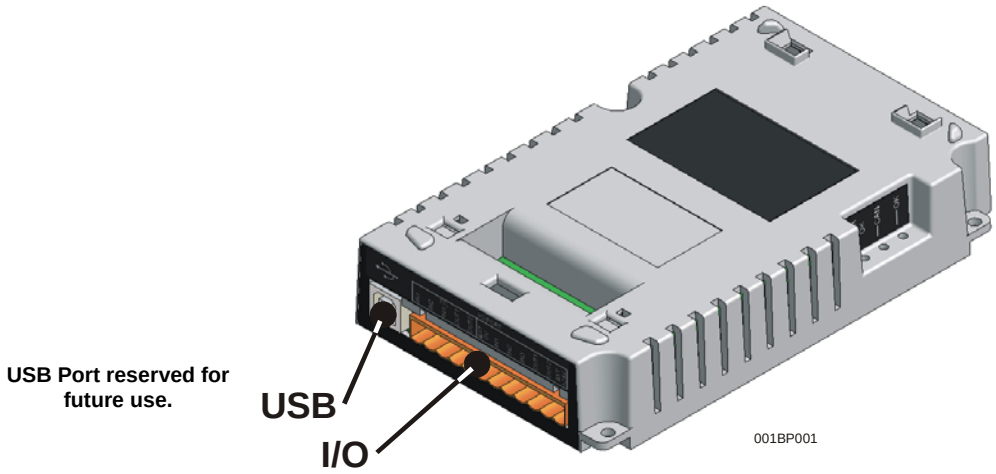


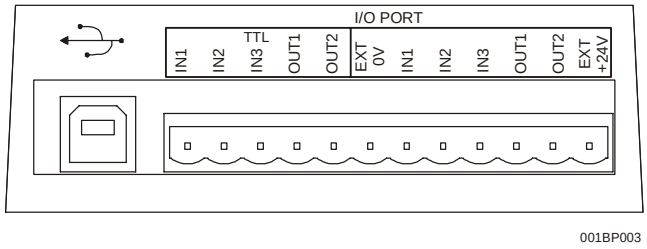




**Close-up of the Back Pack Power Connector**




**Close-up of the Back Pack CAN Connector**

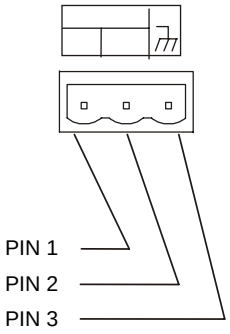



**Close-up of the Back Pack I/O Connector**

**Figure 9 – QX Back Pack Connectors and Ports (Side Views)**

| Table 8 –Power Port Pins | | |
|---|---|---|
| **Pin** | **Signal** | **Description** |
| 1 | NC | No Connect |
| 2 | NC | No Connect |
| 3 | ⏚ | Frame Ground |




**Note: For best results and immunity, please connect Frame Ground to Pin 3 of the Power Port.**

**Figure 10 – QX Back Pack Power Port**

| **Table 8 – I/O Port Pins (HSC)** (Orange Connector) | | |
|---|---|---|
| **Pin** | **Signal** | **Description** |
| 1 | TTL In1 | HSC 1 / 5 V Input 1 (See Note*) |
| 2 | TTL In2 | HSC 2 / 5 V Input 2 (See Note*) |
| 3 | TTL In3 | HSC 3 / 5 V Input 3 (See Note*) |
| 4 | TTL Out1 | HSC 1 / 5 V Output 1 (See Note*) |
| 5 | TTL Out2 | HSC 2 / 5 V Output 2 (See Note*) |
| 6 | 0 V | Ground<br>(For best performance, use separate supply and isolated ground.) |
| 7 | In1 | HSC 1 / 24 V Input 1 (See Note*) |
| 8 | In2 | HSC 2 / 24 V Input 2 (See Note*) |
| 9 | In3 | HSC 3 / 24 V Input 3 (See Note*) |
| 10 | Out1 | HSC 1/ 24V Output 1 / PWM 1 |
| 11 | Out2 | HSC 2/ 24V Output 2 / PWM 2 |
| 12 | +24 V | Power for Outputs |
| **Note* - Depending on the output of the application, use 5 V (e.g., TTL In1) *or* 24 V (e.g., In1) *per channel*.** | | |

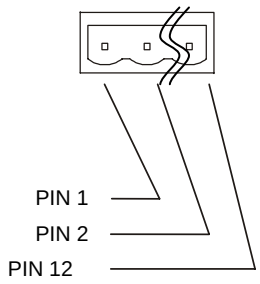



**Figure 11 – QX Back Pack I/O Port**

### 3.5 CAN Network Port and Wiring (QX Base and QX Back Pack)

See the latest edition of Horner's **CAN Networks Manual** (MAN0799) by referring to the website location listed in the **Technical Support** section in this document.

**Note:** To optimize CAN network reliability in electrically noisy environments, the V- CAN Ground needs to be isolated from the primary input power supply ground.

## 4 SAFETY

When found on the product, the following symbols specify:

**Warning:** Consult user documentation.

**Warning:** Electrical Shock Hazard.

**WARNING: To avoid the risk of electric shock or burns, always connect the safety (or earth) ground before making any other connections.**

**WARNING: To reduce the risk of fire, electrical shock, or physical injury it is strongly recommended to fuse the power. Be sure to locate fuses as close to the source as possible.**

**WARNING: Replace fuse with the same type and rating to provide protection against risk of fire and shock hazards.**

**WARNING: In the event of repeated failure, do not replace the fuse again as a repeated failure indicates a defective condition that will not clear by replacing the fuse.**

**WARNING: Only qualified electrical personnel familiar with the construction and operation of this equipment and the hazards involved should install, adjust, operate, or service this equipment. Read and understand this manual and other applicable manuals in their entirety before proceeding. Failure to observe this precaution could result in severe bodily injury or loss of life.**

For detailed installation and a handy checklist that covers panel box layout requirements and minimum clearances, refer to the hardware manual of the controller you are using. (See the **Additional References** section in this document.)

- All applicable codes and standards need to be followed in the installation of this product.
- For I/O wiring (discrete), use the following wire type or equivalent: Belden 9918, 18 AWG or larger.

Adhere to the following safety precautions whenever any type of connection is made to the module.

- Connect the green safety (earth) ground first before making any other connections.
- When connecting to electric circuits or pulse-initiating equipment, open their related breakers. Do not make connections to live power lines.
- Make connections to the module first; then connect to the circuit to be monitored.
- Route power wires in a safe manner in accordance with good practice and local codes.
- Wear proper personal protective equipment including safety glasses and insulated gloves when making connections to power circuits.
- Ensure hands, shoes, and floor are dry before making any connection to a power line.
- Make sure the unit is turned OFF before making connection to terminals. Make sure all circuits are de-energized before making connections.
- Before each use, inspect all cables for breaks or cracks in the insulation. Replace immediately if defective.

## 5 ADDITIONAL REFERENCES

The following information serves as a *general* listing of Horner controller products and other references of interest and their corresponding manuals numbers. Visit our website listed in the **Technical Support** section to obtain user documentation and updates.

**Note:** This list is not intended for users to determine which products are appropriate for their application; controller products differ in the features that they support. If assistance is required, see the **Technical Support** section in this document.

| Controller | Manual Number |
|---|---|
| XLE Series (e.g., HE-XExxx) | MAN0805 |
| QX Series (e.g., HE-QXxxx) | MAN0798 |
| NX Series (e.g., HE-NXxxx) | MAN0781 |
| LX Series (e.g., LX-xxx; also covers RCS116) | MAN0755 |
| Color Touch OCS (e.g., OCSxxx) | MAN0465 |
| OCS (Operator Control Station) (e.g., OCS1xx / 2xx; Graphic OCS250) | MAN0227 |
| Remote Control Station (e.g., RCS2x0) | |
| MiniOCS (e.g., HE500OCSxxx, HE500RCSxxx) | MAN0305 |
| **Other Useful References** | |
| CAN Networks | MAN0799 |
| Cscape Programming and Reference | MAN0313 |
| Wiring Accessories and Spare Parts Manual | MAN0347 |

## 6 TECHNICAL SUPPORT

For assistance and manual updates, contact Technical Support at the following locations:

**North America:**
(317) 916-4274
www.heapg.com
email: techsppt@heapg.com

**Europe:**
(+) 353-21-4321-266
www.horner-apg.com
email: techsupport@hornerirl.ie