



# QX Series Models:

- HE-QX451/HE-QX451-16/HEQX451C000/HEQX451C103/HEQX451C105 - 8" display models
  - HE-QX551/HE-QX551-16/HEQX551C000/HEQX551C103/HEQX551C105 - 10" display models
  - HE-QX651/HE-QX651-16/HEQX651C000/HEQX651C103/HEQX651C105 - 12" display models
- HE-BP41/HE-BP43 – Back Pack Modules**

## 1 INTRODUCTION

QX OCS 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 3 Serial Ports	FOX CsCAN	FOX CsCAN
HE-QX551		10.4" TFT SVGA with 32,768 colors	Ethernet	Up to 2 Plastic SmartStack Modules (for additional I/O)	Up to 4 Plastic SmartStack Modules (for additional I/O)
HE-QX651		12.1" TFT SVGA with 32,768 colors			High Speed I/O
<b>Other Products Commonly Used with Color QX (Back Pack Options Required)</b>					
<b>Plastic SmartStack Modules</b>			Provide a wide variety of I/O options for the QX. Require little space and are easy to install.		
<b>Fiber Optic Extension System (FOX104 / 404)</b>			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.		
<b>SmartStix Modules</b>			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)
<b>Primary Power</b>	<b>Voltage:</b> 24 VDC (+/-10%) <b>Steady State Current:</b> 0.625 A @ 24 VDC <b>Inrush Current:</b> (25 A @ 24 VDC) for 0.7 ms	<b>Voltage:</b> 24 VDC (+/-10%) <b>Steady State Current:</b> 1.25 A @ 24 VDC <b>Inrush Current:</b> (30 A @ 24 VDC) for 1 ms	<b>Voltage:</b> 24 VDC (+/-10%) <b>Steady State Current:</b> 1.25 A @ 24 VDC <b>Inrush Current:</b> (30 A @ 24 VDC) for 1 ms
<b>QX Dimensions (without Back Pack option or SmartStack I/O attached). See Panel Cut-outs and Dimensions for complete details (Section 3.2)</b>			
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 <a href="http://www.heapg.com/Pages/TechSupport/ProductCert.html">http://www.heapg.com/Pages/TechSupport/ProductCert.html</a>		
CE			

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

**Table 3 – Back Pack Specifications**

	BP41	BP43
I/O Interfaces	Plastic SmartStack I/O – 2 modules maximum Fiber Optic Expansion (FOX) I/O – 5 bases maximum CsCAN Network Port – 252 SmartStix I/O maximum	Plastic SmartStack I/O – 4 modules maximum Fiber Optic Expansion (FOX) I/O – 5 bases maximum 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 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 <a href="http://www.heapg.com/Pages/TechSupport/ProductCert.html">http://www.heapg.com/Pages/TechSupport/ProductCert.html</a>	
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 (Backpack sold separately in North America Only):** QX units are shipped with firmware that requires a Backpack for proper boot up to complete. If a Backpack is not to be used, a QX firmware update from Cscape must be performed for proper operation.

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 (Backpack sold separately in North America Only)**

**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. If installing BP Rev G and beyond use spacer CAB000023 as shown in the Figure 1 for the screw closest to the BP connector

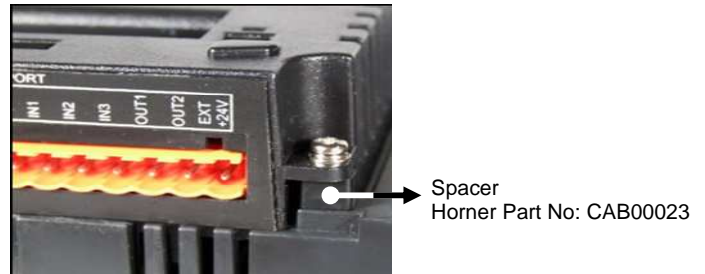


Figure 1 – BP Rev G Spacer Installation

**3.2 Panel Cut-Out and Dimensions**

**3.2.1 QX451 (8-inch)**

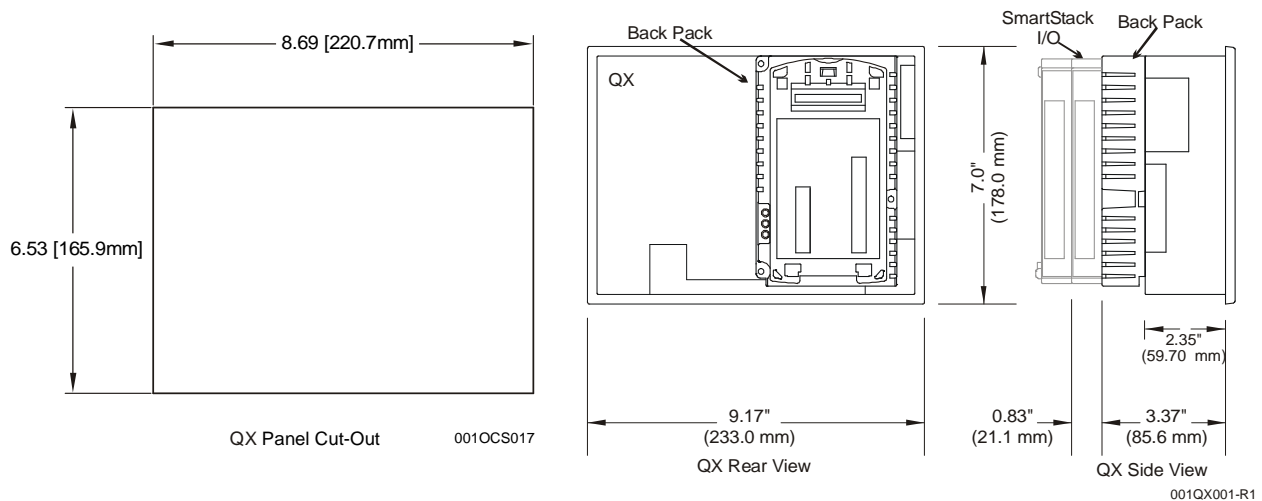


Figure 2 – Panel Cut-out and Dimensions 8-inch

3.2.2 QX551 (10-inch)

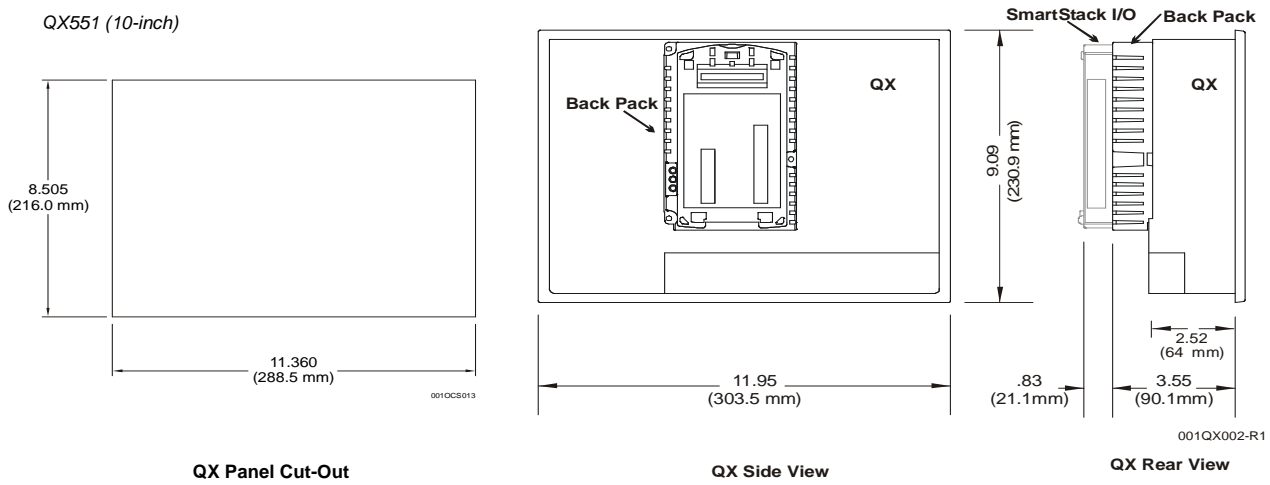


Figure 3 – Panel Cut-out and Dimensions 10-inch

3.2.2 QX651 (12-inch)

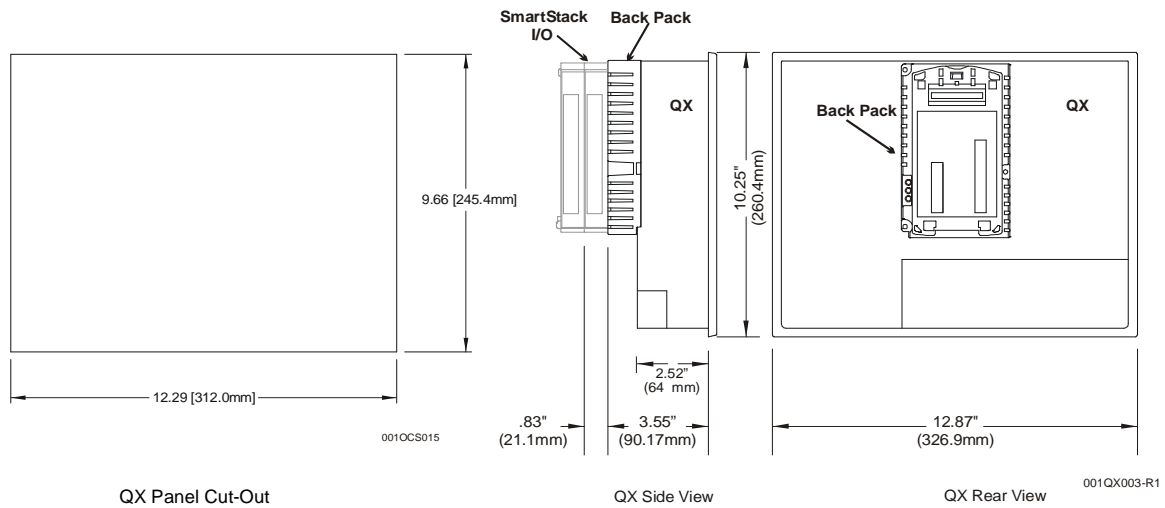


Figure 4 – Panel Cut-out and Dimensions 12-inch

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.

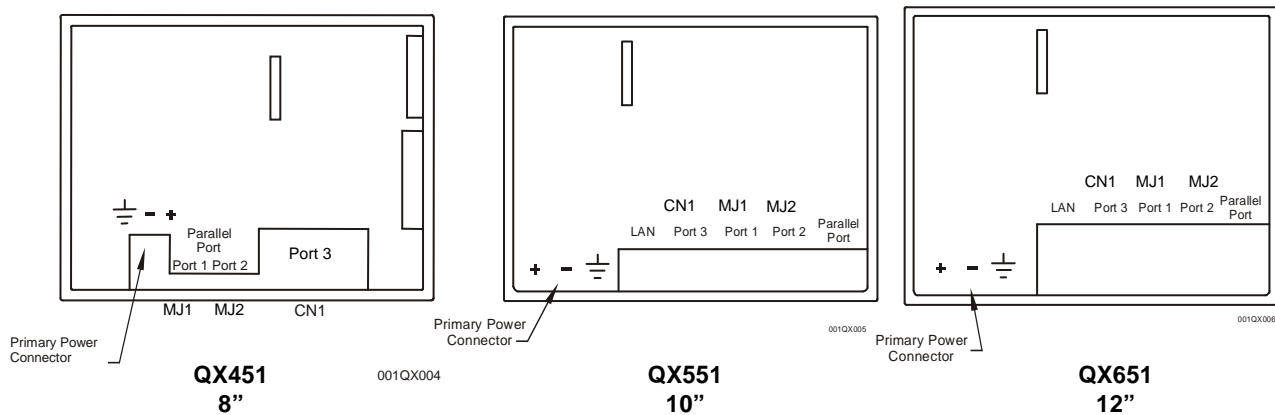



Figure 5 – QX Base Ports and Connectors

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	✓	✓	✓
RS-485	✓	✓	✓
Hardware Handshaking			✓
Programming	✓		
Ladder Function Controlled	✓	✓	✓
Modem	✓*	✓*	✓

\* Not supported by Cescape Modem Function Blocks

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

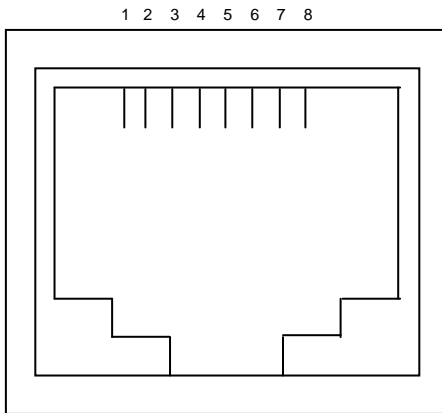


Table 6 – Port 1 (MJ1) / Port 2 (MJ2) Pins	
Pin	Signal
1	+SD/RD
2	-SD/RD
3	+5V
4	+5V
5	0V
6	0V
7	RXD
8	TXD

Output power supply: Max. 150mA

Figure 6 – Close-up of Port 1 (MJ1) / Port 2 (MJ2) (RS-232 and RS-485)

b. Port 3 (CN1) Connector

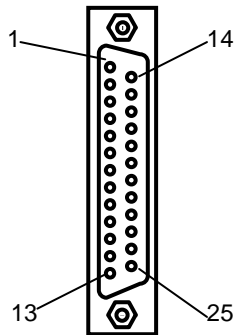


Table 7– Port 3 (CN1) Pins			
Pin #	Signal	Pin #	Signal
1	FG	14	QX451, 551, 651: +RTS
2	TXD	15	Not Used
3	RXD	16	Not Used
4	RTS	17	QX451, 551, 651: -RTS
5	CTS	18	-CTS
6	Not Used	19	+CTS
7	SG	20	Not Used
8	Not Used	21	Not Used
9	+5V	22	Not Used
10	0V	23	Not Used
11	Not Used	24	+RD
12	+SD	25	-RD
13	-SD		

Figure 7 – Port 3 (CN1) RS-232 / RS-485 Connector

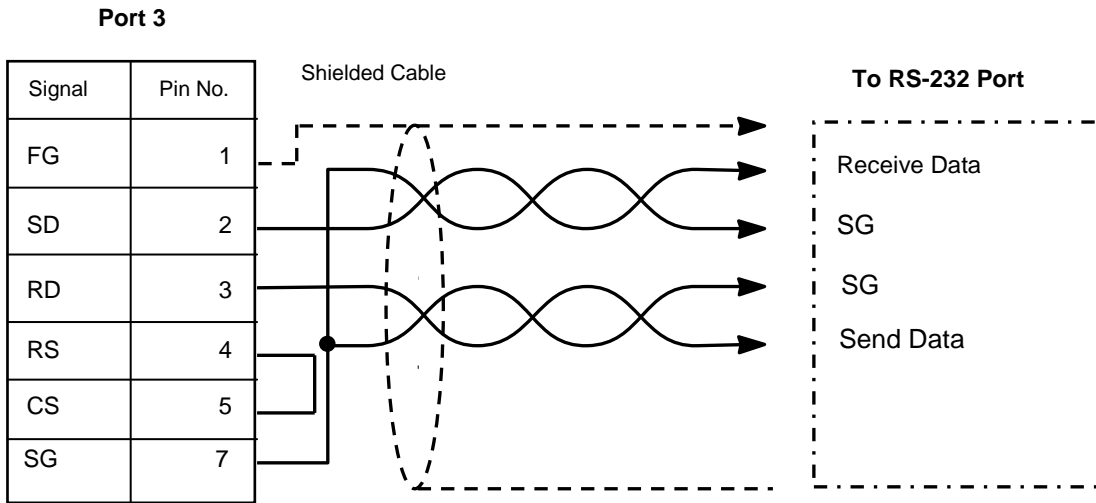


Figure 8 - Port 3 (CN1) RS-232 Port

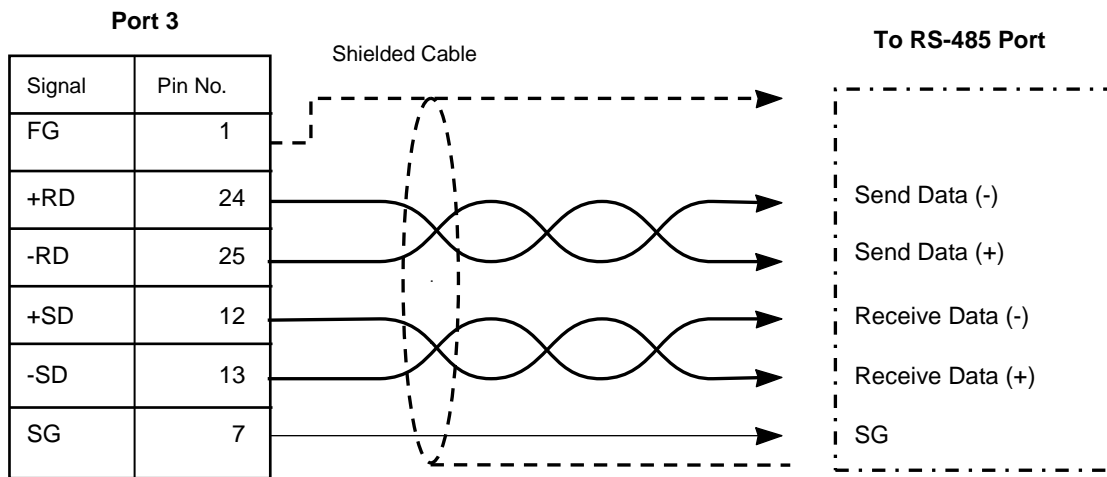
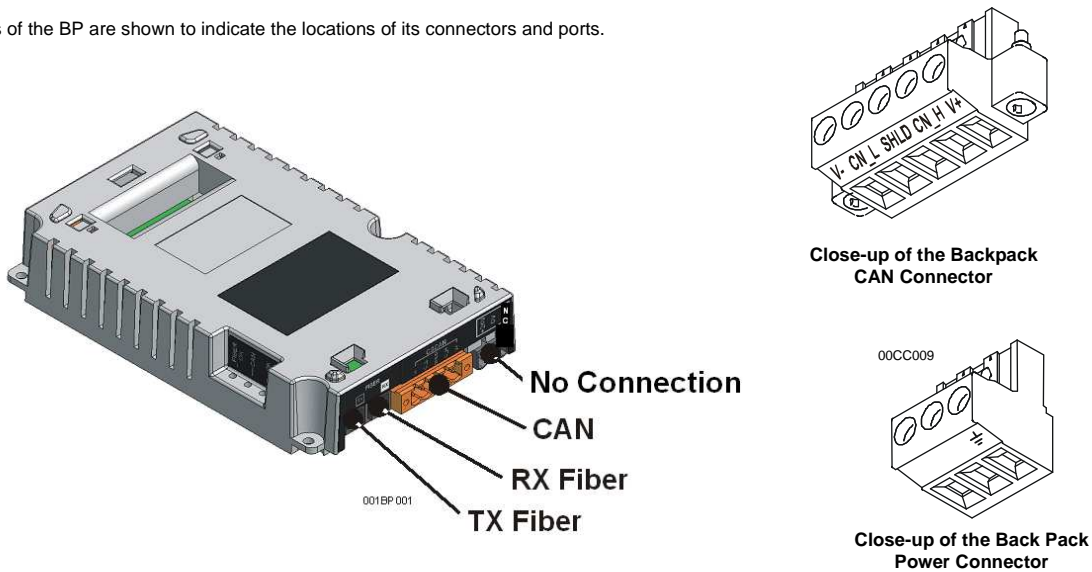
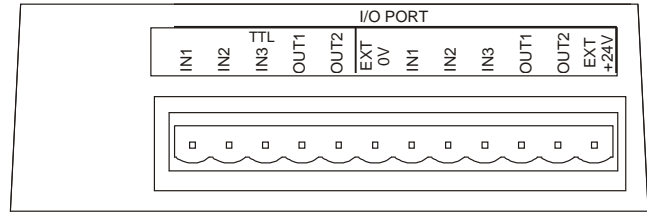
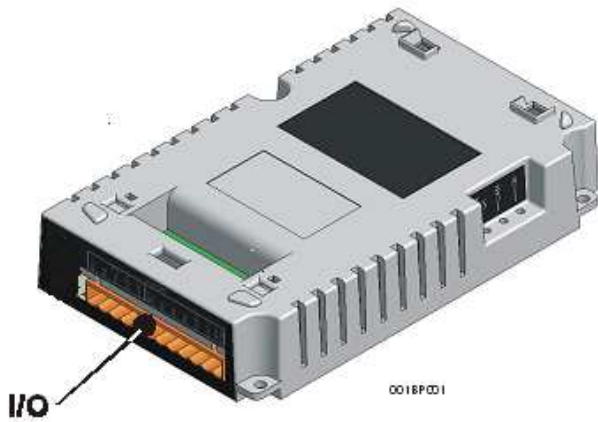


Figure 9 - Port 3 (CN1) RS-485 Port

**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 I/O Connector

001BP003

Figure 10 – QX Back Pack Connectors and Ports (Side Views)

Table 1 – 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 (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
<p>Note* - Depending on the output of the application, use 5 V (e.g., TTL In1) or 24 V (e.g., In1) per channel.</p>		

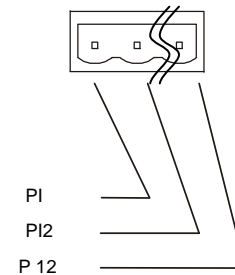


Figure 11 – QX Back Pack I/O Port

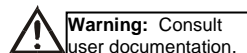
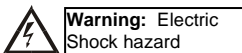
3.5 CAN Network Port and Wiring (QX Base and QX Back Pack)

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:



This equipment is suitable for use in Class I, Division 2, Groups A, B, C and D or Non-hazardous locations only

**WARNING – EXPLOSION HAZARD** – Do not disconnect equipment unless power has been switched off or the area is known to be non-hazardous.  
**AVERTISSEMENT - RISQUE D'EXPLOSION** - AVANT DE DECONNECTER L'EQUIPMENT, COUPER LE COURANT OU S'ASSURER QUE L'EMPLACEMENT EST DESIGNÉ NON DANGEREUX.

**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 voltage measurement inputs. 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 – EXPLOSION HAZARD** – Substitution of components may impair suitability for Class I, Division 2  
**AVERTISSEMENT - RISQUE D'EXPLOSION** - LA SUBSTITUTION DE COMPOSANTS PEUT RENDRE CE MATERIAL INACCEPTABLE POUR LES EMPLACEMENTS DE CLASSE 1, DIVISION 2.

**WARNING** - The USB parts are for operational maintenance only. Do not leave permanently connected unless area is known to be non-hazardous.

**WARNING – EXPLOSION HAZARD** - BATTERIES MUST ONLY BE CHANGED IN AN AREA KNOWN TO BE NON-HAZARDOUS  
**AVERTISSEMENT - RISQUE D'EXPLOSION** - AFIN D'EVITER TOUT RISQUE D'EXPLOSION, S'ASSURER QUE L'EMPLACEMENT EST DESIGNE NON DANGEREUX AVANT DE CHANGER LA BATTERIE

**WARNING** - Battery May Explode If Mistreated. Do Not Recharge, Disassemble or Dispose Of In Fire

**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 the hardware manual of the QX Series (MAN0798). (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 floor, hands and shoes 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**

**6 Technical Support**

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/XLt Manual Series (e.g., HE-XExxx)	MAN0878-03
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)	
XL6e	MAN0883
QX351	MAN0892
MiniOCS (e.g., HE500OCSxxx, HE500RCSxxx)	MAN0305
Other Useful References	
CAN Networks	MAN0799
Cscape Programming and Reference	MAN0313
Wiring Accessories and Spare Parts Manual	MAN0347

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

<b>North America:</b> Tel: 317-916-4274 Fax: 317-639-4279 Web: <a href="http://www.heapg.com">http://www.heapg.com</a> Email: <a href="mailto:techsppt@heapg.com">techsppt@heapg.com</a>	<b>Europe:</b> Tel: +353-21-4321-266 Fax: +353-21-4321-826 Web: <a href="http://www.horner-apg.com">http://www.horner-apg.com</a> Email: <a href="mailto:techsupport@hornerirl.ie">techsupport@hornerirl.ie</a>
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