



XL6/XL6M/XL6e OCS Models

HE-XL103 / HE-XL1M3 / HEXT350C113 /

HEXT280C113

HE-XL1E3 / HEXT351C113

Digital DC Inputs / 12 Digital Outputs

2 Analog Inputs (Medium Resolution)

XL6/XL6M/XL6e OCS Models

HE-XL104 / HE-XL1M4 / HEXT350C114 /

HEXT280C114

HE-XL1E4 / HEXT351C114

24 Digital DC Inputs / 16 Digital Outputs

2 Analog Inputs (Medium Resolution)

1 Specifications

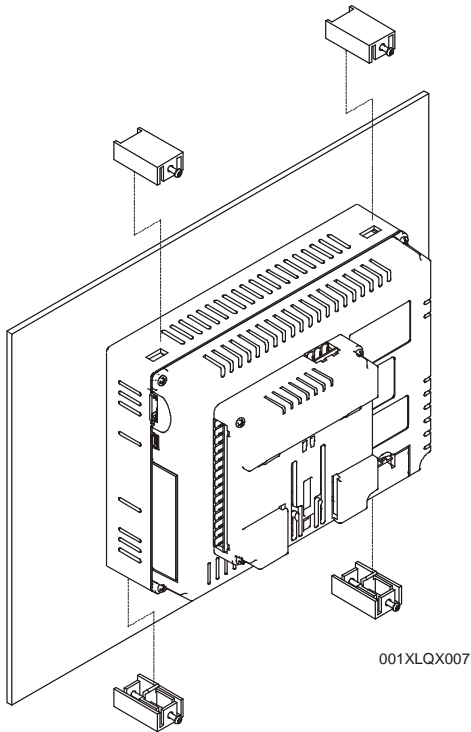
Specifications					
Digital DC Inputs	XL103	XL104	Digital DC Outputs	XL103	XL104
Inputs per Module	12 including 4 configurable HSC inputs	24 including 4 configurable HSC inputs	Outputs per Module	12 including 2 configurable PWM outputs	16 including 2 configurable PWM outputs
Commons per Module	1		Commons per Module	1	
Input Voltage Range	12 VDC / 24 VDC		Output Type	Sourcing / 10 K Pull-Down	
Absolute Max. Voltage	35 VDC Max.		Absolute Max. Voltage	28 VDC Max.	
Input Impedance	10 k Ω		Output Protection	Short Circuit	
Input Current	<u>Positive Logic</u>	<u>Negative Logic</u>	Max. Output Current per point	0.5 A	
Upper Threshold	0.8 mA	-1.6 mA	Max. Total Current	4 A Continuous	
Lower Threshold	0.3 mA	-2.1 mA	Max. Output Supply Voltage	30 VDC	
Max Upper Threshold	8 VDC		Minimum Output Supply Voltage	10 VDC	
Min Lower Threshold	3 VDC		Max. Voltage Drop at Rated Current	0.25 VDC	
OFF to ON Response	1 ms		Max. Inrush Current	650 mA per channel	
ON to OFF Response	1 ms		Min. Load	None	
HSC Max. Switching Rate	10 kHz Totalizer/Pulse, Edges 5 kHz Frequency/Pulse, Width 2.5 kHz Quadrature		OFF to ON Response	1 ms	
Analog Inputs, Medium Resolution	XL103	XL104	ON to OFF Response	1 ms	
Number of Channels	2	2	Output Characteristics	Current Sourcing (Pos logic)	
Input Ranges Safe input voltage range Input Impedance (Clamped @ -0.5 VDC to 12 VDC)	0 - 10 VDC 0 - 20 mA 4 - 20 mA -0.5 V to +12V <u>Current Mode:</u> 100 Ω <u>Voltage Mode:</u> 500 k Ω		General Specifications		
Nominal Resolution %AI full scale Max. Over-Current	10 Bits 32,000 counts 35 mA		Required Power (Steady State)	500 mA @ 24 VDC	
Conversion Speed	All channels converted once per ladder scan		Required Power (Inrush)	30 A for 1 ms @ 24 VDC - DC Switched 2.5 A for 4 ms @ 24 VDC - AC Switched	
Max. Error at 25°C (excluding zero)	4-20 mA 1.00% 0-20 mA 1.00% 0-10 VDC 0.50%		Primary Power Range	10 - 30 VDC	
Additional error for temperatures other than 25°C	TBD		Relative Humidity	5 to 95% Non-condensing	
Filtering	160 Hz hash (noise) filter 1-128 scan digital running average filter		Operating Temperature	-10°C to +60°C	
			Terminal Type	Screw Type, 5 mm Removable	
			CE	USA: http://www.heapg.com/Pages/TechSupport/ProductCert.html Europe: http://www.horner-apg.com/en/support/certification.aspx	
			UL		
			Weight	26.5 oz. (.751 kg)	
			Clock Accuracy	+/- 35 ppm maximum at 25° C (+/- 1.53 Minutes per Month)	
Display Properties					
Display Type	5.7" QVGA TFT	Display Life	Minimum 40000 hours (50% brightness, 25 deg C)		
Display Size 5.7"	5.7"	User Keys	5 user-defined Function keys and a System Key		
Display Screen Dimension	320 x 240	Screens supported	1023		
Display Memory	2.75 MB	Colors	32768/ 16 shade Grey scale (XL6M models only)		
Connectivity					
Serial Ports	2 Serial Ports - RS232 & RS485				
Ethernet	10/100-Mbps (XL6e models only)				
USB	USB Networking Port for communication with PCs and programming Port				
Removable Media	Removable Media for upto 2 GB of storage for programs, data logging or screen capture				
Smartstix	Remote IO modules communicating on CAN				
Note: Highest usable frequency for PWM output is 65 KHz					

2 Installation

1. Prior to mounting, observe requirements for the panel layout design and spacing/clearances in the OCS XL6 Series Manual (MAN0883).
2. Cut the host panel.
3. Insert the OCS through the panel cutout (from the front). The gasket material needs to be between the host panel and the OCS.

Caution: Do not force the OCS into the panel cutout. An incorrectly sized panel cutout can damage the touch screen.

4. Install and tighten the mounting clips (provided with the OCS) until the gasket material forms a tight seal.
5. Connect cables as needed such as communications, programming, power and CsCAN cables to the ports using the provided connectors.
6. Begin configuration procedures.

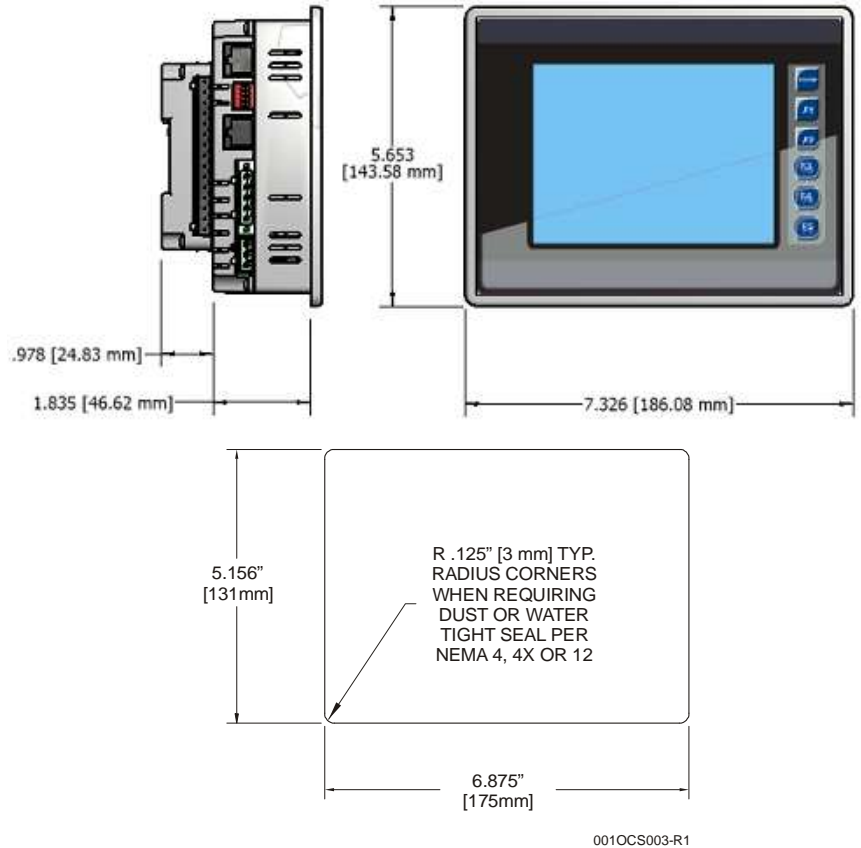


3 Panel Cut-Out and Dimensions

Note: Max. panel thickness: 5 mm.

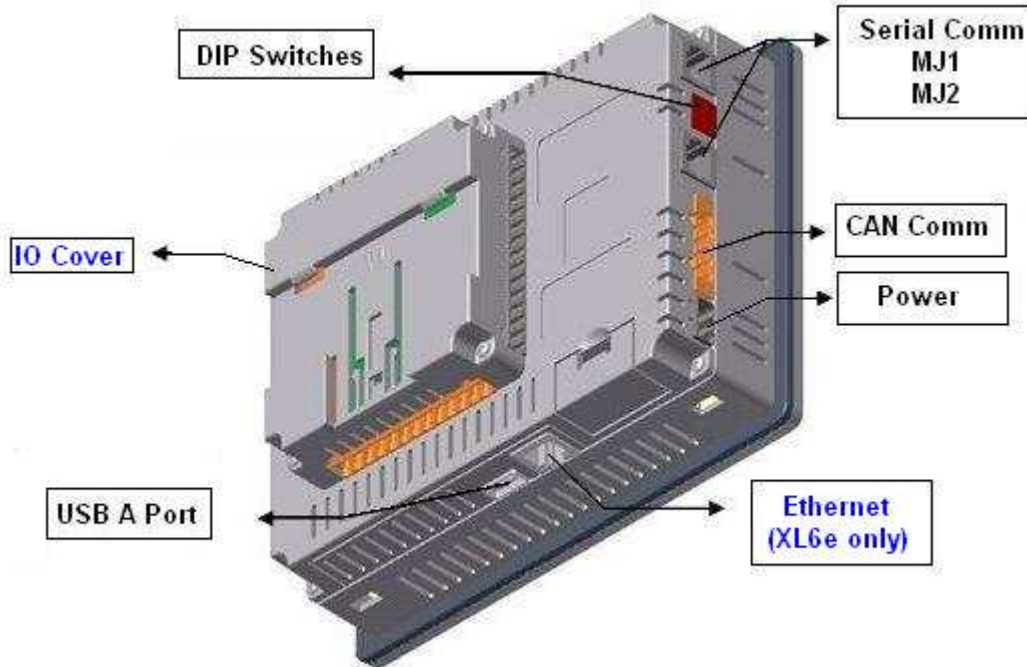
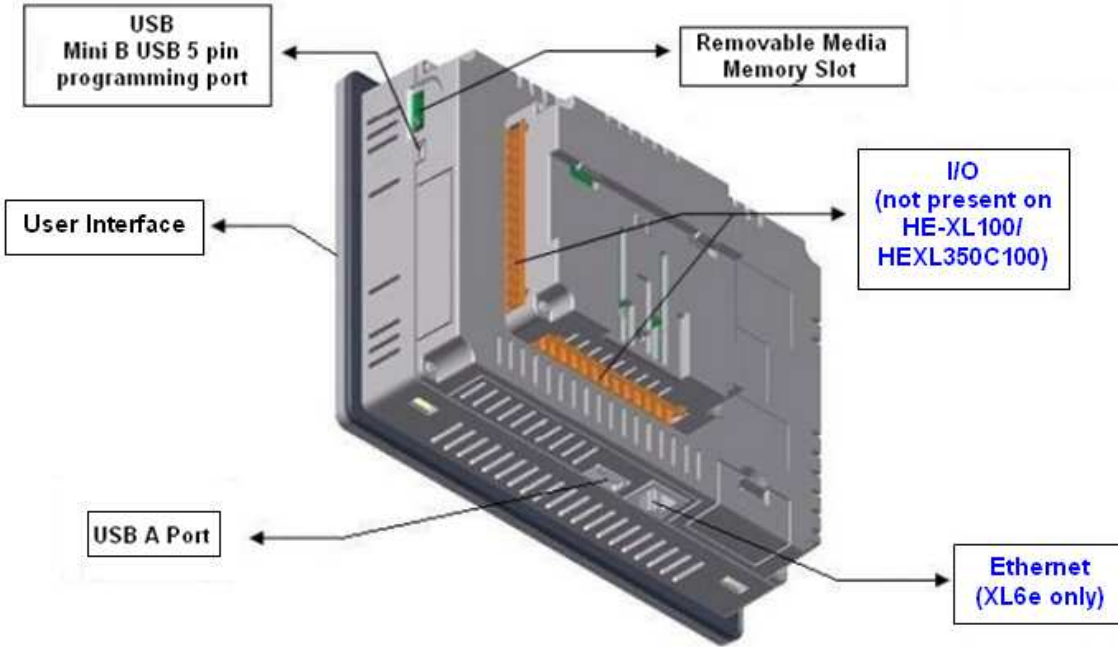
Refer to the XL6 User Manual (MAN0883) for panel box information and a handy checklist of requirements.

Note: The tolerance to meet NEMA standards is $\pm 0.005''$ (0.1 mm).



HE-XL1x3/ HE-XL1x4

4 Ports and Connectors



To Remove I/O Cover:
 Unscrew 4 screws located on the cover.
 Remove cover.

CAUTION: Do not over tighten screws when replacing the back cover.

I/O Jumpers:
 I/O Jumpers (JP) are located internally. To access, remove I/O cover of unit.

Wiring Connectors (J1 / J2 / J3 / J4) and I/O Jumpers (JP1 and JP3) are described in the *Wiring and Jumpers* section of this document.

USBA: For flash drive connectivity

USBB: For network communication and programming of OCS

Removable Memory: Uses **Removable Memory** for data logging, screen captures, program loading and recipes. **Horner Part No.: HE-MC1**

Serial Communications: MJ1/MJ2: (RS-232 / RS-485) Use for Cscape programming and Application-Defined Communications.

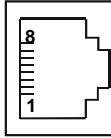
Ethernet: Used for Cscape programming and Application-Defined Communications.

4.1 Serial Communications:

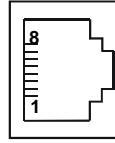
MJ1: (RS-232 / RS-485) Use for Cscape programming and Application-Defined Communications.

MJ2: (RS-232 / RS-485) Use for Application-Defined Communications.

MJ2 Pinouts in Half and Full Duplex Modes



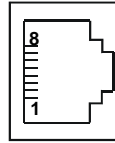
Pin	MJ1 Pins		MJ2 Pins	
	Signal	Direction	Signal	Direction
8	TXD	OUT	TXD	OUT
7	RXD	IN	RXD	IN
6	0 V	Ground	0 V	Ground
5*	+5 60mA	OUT	+5 60mA	OUT
4	RTS	OUT	TX-	OUT
3	CTS	IN	TX+	OUT
2	RX- / TX-	IN / OUT	RX-	IN
1	RX+ / TX+	IN / OUT	RX+	IN



Pin	MJ2 Pins	
	Signal	Direction
8	TXD	OUT
7	RXD	IN
6	0 V	Ground
5*	+5 60mA	OUT
4	TX-	OUT
3	TX+	OUT
2	TX-/RX-	IN/OUT
1	TX+/RX+	IN/OUT

* +5V 60mA Max

MJ2 Half Duplex Mode



Pin	MJ2 Pins	
	Signal	Direction
8	TXD	OUT
7	RXD	IN
6	0 V	Ground
5*	+5 60mA	OUT
4	TX-	OUT
3	TX+	OUT
2	RX-	IN
1	RX+	IN

* +5V 60mA Max

MJ2 Full Duplex Mode

Table - Ports and Functions

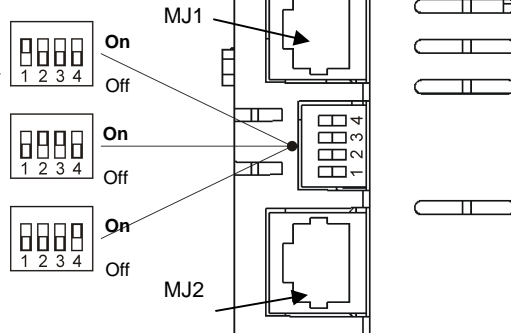
Functions	Port 1 (MJ1)	Port 2 (MJ2)
RS-232	✓	✓
Hardware Handshaking	✓	X
Programming	✓	X
Ladder function controlled	✓	✓
Serial Downloadable Protocols	✓	✓
RS 485 Full duplex	X	✓
RS485 Half duplex	✓	✓

4.2 External DIP Switch Settings

As seen when looking at the side of the XL6 unit :

The DIP Switches are used for termination of the RS-485 ports. The XL6 is shipped un-terminated.

To terminate, select one of the DIP Switches and configure it based upon the option that is desired.



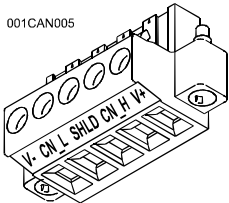
SW1 - ON enables **MJ2** RS485 port termination (121 Ohms). OFF disables **MJ2** RS485 port termination.

SW2 & SW3 - ON places **MJ2** RS485 port in half-duplex mode. OFF places **MJ2** RS485 port in full-duplex mode.

SW4 - ON enables **MJ1** RS485 port termination (121 Ohms). OFF disables **MJ1** RS485 port termination.

4.3 CAN Network Port and Wiring

001CAN005



CAN Connector

Use the CAN Connector when using Cscape network.

Torque rating 4.5 – 7 Lb-In (0.50 – 0.78 N-m)

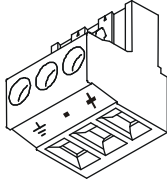
NET1 Port Pin Assignments

Pin	Signal	Signal Description	Direction
1	V-	CAN Ground	-
2	CN_L	CAN Data Low	In/Out
3	SHLD	Shield Ground	-
4	CN_H	CAN Data High	In/Out
5	NC	No Connect	-

4.4 Ethernet Port

Speeds	10 BaseT Ethernet (10-Mbps) 100 BaseTx Fast Ethernet (100-Mbps)
Modes	Half or Full Duplex
Auto-Negotiation	Both 10/100-Mbps and Half/Full Duplex
Connector Type	Shielded RJ-45
Cable Type (Recommended)	CAT5 (or better) UTP
Port	Auto MDI/MDI-X

4.5 Power Port and Wiring



Primary Power Port Pins		
Pin	Signal	Description
1	Ground	Frame Ground
2	V-	Input Power Supply Ground
3	V+	Input Power Supply Voltage

5 Wiring and Jumpers

- Wire according to the type of inputs / outputs used and select the appropriate jumper option.

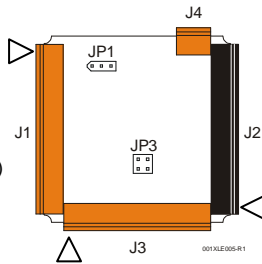
Wiring Specifications

For I/O wiring (discrete), use the following wire type or equivalent: Belden 9918, 18 AWG (0.8 mm²) or larger.

For shielded Analog I/O wiring, use the following wire type or equivalent: Belden 8441, 18 AWG (0.8 mm²) or larger.

For CAN wiring, use the following wire type or equivalent: Belden 3084, 24 AWG (0.2 mm²) or larger.

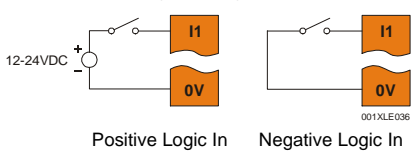
Location of I/O jumpers (JP) and wiring connectors (J1 – J4).



Use copper conductors in field wiring only, 60/75°C

Positive Logic vs. Negative Logic Wiring

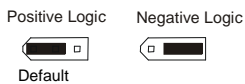
The XL6 can be wired for Positive Logic inputs or Negative Logic inputs.



5.1 I/O Jumpers Settings (JP1 – JP3)

Note: The Cscape Module Setup configuration must match the selected I/O (JP) jumper settings.

JP1 Digital DC Inputs



JP3 CURRENT OR VOLTAGE INPUTS

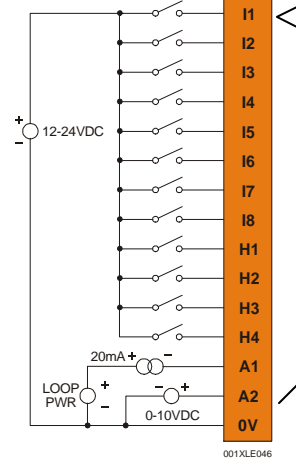


Note: When using JP3 (A1-A2), each channel can be independently configured.

5.2 Wiring Examples

J1 Orange	XL103 / XL104 Name
I1	IN1
I2	IN2
I3	IN3
I4	IN4
I5	IN5
I6	IN6
I7	IN7
I8	IN8
H1	HSC1 / IN9
H2	HSC2 / IN10
H3	HSC3 / IN11
H4	HSC4 / IN12
A1	Analog IN1
A2	Analog IN2
0V	Ground

XL103 / 104 J1 Orange Positive Logic Digital In

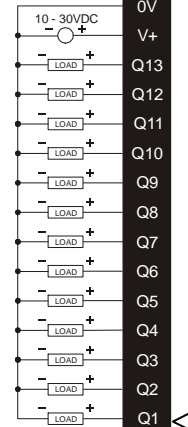


Note: Loop Power requirements are determined by the transmitter specification.

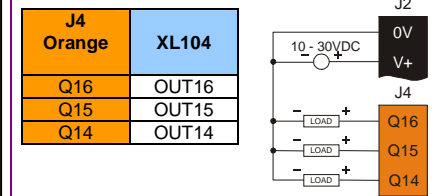
J2 Black	XL103	XL104
0V	Ground	Ground
V+	V+ *	V+ *
NC	No Connect	OUT13
Q12	OUT12	OUT12
Q11	OUT11	OUT11
Q10	OUT10	OUT10
Q9	OUT9	OUT9
Q8	OUT8	OUT8
Q7	OUT7	OUT7
Q6	OUT6	OUT6
Q5	OUT5	OUT5
Q4	OUT4	OUT4
Q3	OUT3	OUT3
Q2	OUT2 / PWM2	OUT2 / PWM2
Q1	OUT1 / PWM1	OUT1 / PWM1

V+* Supply for Sourcing Outputs

XL103 / 104 J2 Black Positive Logic Digital Out

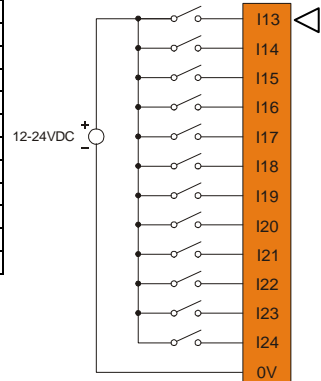


XL104 J4 Orange Positive Logic Digital Out



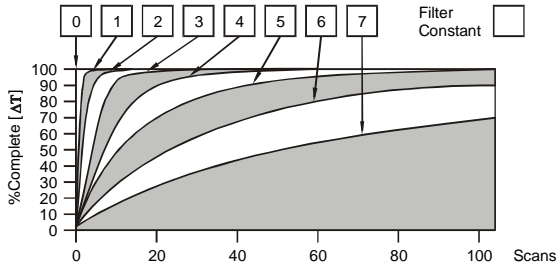
J3 Orange	XT104
I13	IN13
I14	IN14
I15	IN15
I16	IN16
I17	IN17
I18	IN18
I19	IN19
I20	IN20
I21	IN21
I22	IN22
I23	IN23
I24	IN24
0V	Ground

XL104 J3 Orange Positive Logic Digital In



6 Filter

Filter Constant sets the level of digital filtering according to the following chart.



Digital Filtering. The illustration above demonstrates the effect of digital filtering (set with Filter Constant) on module response to a temperature change.

7 I/O Register Map

Registers	Description
%I1 to %I24	Digital Inputs
%I32	Output Fault
%I25 to %I31	Reserved
%Q1 to %Q16	Digital outputs
%Q17	Clear HSC1 accumulator to 0
%Q18	Totalizer: Clear HSC2 Quadrature 1-2: Accumulator 1 Reset to max - 1
%Q19	Clear HSC3 Accumulator to 0
%Q20	Totalizer: Clear HSC4 Quadrature 3-4: Accumulator 3 Reset to max - 1
%Q21 to %Q32	Reserved
%A11 to %A14	Analog inputs
%A15, %A16	HSC1 Accumulator
%A17, %A18	HSC2 Accumulator
%A19, %A110	HSC3 Accumulator
%A111, %A112	HSC4 Accumulator
%AQ1, %AQ2	PWM1 Duty Cycle
%AQ3, %AQ4	PWM2 Duty Cycle
%AQ5, %AQ6	PWM Prescale
%AQ7, %AQ8	PWM Period
%AQ9 to %AQ14	Analog outputs

Note: Not all XL6 units contain the I/O listed in this table.

Registers	PWM	HSC	Stepper
%AQ1	PWM1 Duty Cycle (32 bit)	HSC1 Preset Value	Start Frequency
%AQ2			Run Frequency
%AQ3	PWM2 Duty Cycle (32 bit)	HSC2 Preset Value	Accel Count (32 bit)
%AQ4			Run Count (32 bit)
%AQ5	PWM Prescale (32 bit)		Decel Count (32 bit)
%AQ6			Run
%AQ7	PWM Period (32 bit)		Ready/Done
%AQ8			Error
%Q1			Run
%I30			Ready/Done
%I31			Error

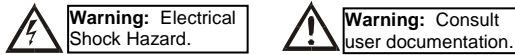
9 Technical Support

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

North America: Tel: 317 916-4274 Fax: 317 639-4279 Web: http://www.heapg.com Email: techsppt@heapg.com	Europe: Tel: +353-21-4321266 Fax: +353-21-4321826 Web: http://www.horner-apg.com Email: tech.support@horner-apg.com
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8 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 EMBLEMES 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 DESIGNÉ 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.

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference.
2. This device must accept any interference received, including interference that may cause undesired operation.

Radiated Emission Compliance: For compliance requirement, a ferrite (Horner P/N FBD006 supplied with the unit) needs to be placed on the AC/DC line with one loop.

- All applicable codes and standards need to be followed in the installation of this product.
- Adhere to the following safety precautions whenever any type of connection is made to the module:
 - Connect the safety (earth) ground on the power connector 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 floors 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.
- Use Copper Conductors in Field Wiring Only, 60/75° C

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