XLE OCS Model:

HE-XE103 / HEXE220C113 / HEXE220C013

12 Digital DC Inputs / 12 Digital Outputs
2 Analog Inputs (Medium Resolution)

XLE OCS Model:

HE-XE104 / HEXE220C114 / HEXE220C014

24 Digital DC Inputs / 16 Digital Outputs
2 Analog Inputs (Medium Resolution)

1 Specifications

Specifications					
Digital DC Inputs	**XLE103**	**XLE104**	**Digital DC Outputs**	**XLE103**	**XLE104**
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 kΩ		Output Protection	Short Circuit	
Input Current	Positive Logic	Negative Logic	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	**XLE103**	**XLE104**	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 Current Mode: 100 Ω Voltage Mode: 500 k Ω		**General Specifications**		
Nominal Resolution %AI full scale Max. Over-Current	10 Bits 32,000 counts 35 mA		Required Power (Steady State)	130 mA @ 24 VDC	
Conversion Speed	All channels converted once per ladder scan		Required Power (Inrush)	30 A for 1 ms @ 24 VDC	
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	0°C to +50°C	
			Terminal Type	Screw Type,5 mm Removable	
			CE / UL	See Compliance Table at http://www.heapg.com/Pages/TechSupport/ProductCert.html	
			Weight	12.5 oz. (354.36 g)	
			Clock Accuracy	+/- Seven Minutes/Month at 20C	

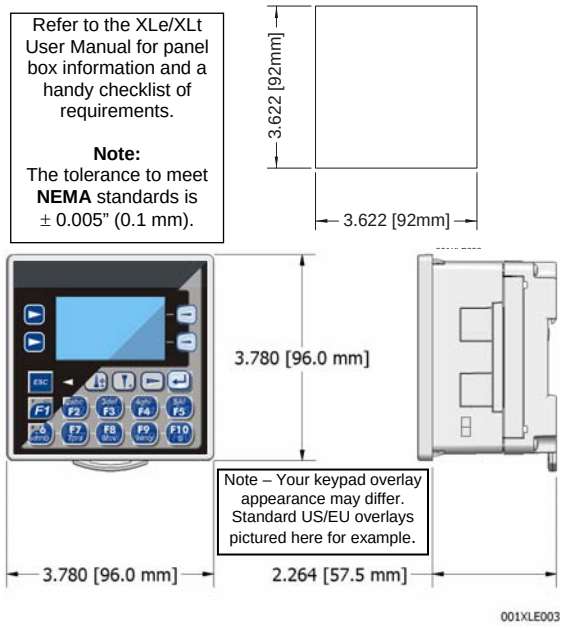
Note: Highest usable frequency for PWM output is 65 KHz

2 Panel Cut-Out and Dimensions

Note: Max. panel thickness: 5 mm.

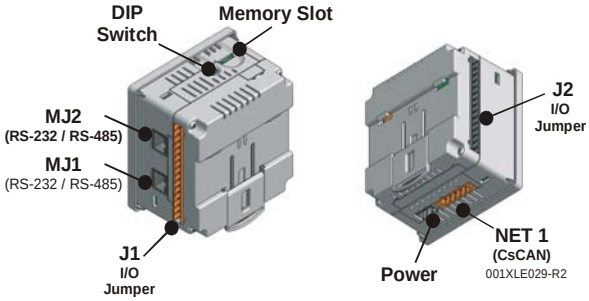
Refer to the XLe/XLt User Manual for panel box information and a handy checklist of requirements.

Note:
The tolerance to meet **NEMA** standards is ± 0.005" (0.1 mm).



3 Ports / Connectors / Cables

Note: The case of the XLe is black, but for clarity, it is shown in a lighter gray color.

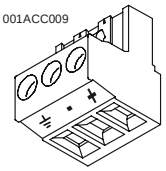


To Remove Back Cover:
Unscrew 4 screws located on the back of the unit and remove back cover.

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

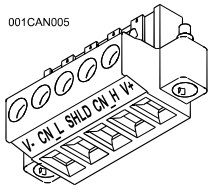
I/O Jumpers (Not Shown): I/O Jumpers (**JP**) are located internally. To access, remove back cover of unit.

Wiring Connectors (**J1 – J4**), **I/O Jumpers** (**JP1-3**), and **External Jumpers** (**RS-485**) are described in the ***Wiring and Jumpers*** section of this document.



Power Connector

Power Up:
Connect to Earth Ground.
Apply 10 – 30 VDC.
Screen lights up.
Torque rating 4.5 - 7 Lb-In
(0.50 – 0.78 N-m)



CAN Connector

Use the CAN Connector when using CsCAN network.

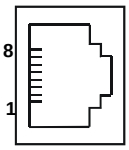
Torque rating 4.5 – 7 Lb-In
(0.50 – 0.78 N-m)

Section 3 continued

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

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.



Pin	MJ1 Pins		MJ2 Pins	
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

* +5Vdc 60mA Max on XLe Rev E and later

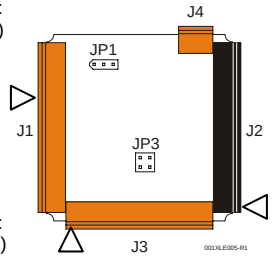
4 Wiring and Jumpers

- Wire according to the type of inputs / outputs used and select the appropriate jumper option. Use Copper Conductors in Field Wiring Only, 60/75° C

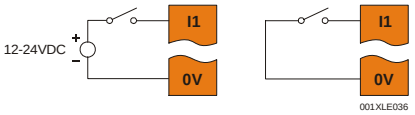
Wiring Specifications

- For I/O wiring (discrete), use the following wire type or equivalent: Belden 9918, 18 AWG (0.8 mm^2) or larger.
- For shielded Analog I/O wiring, use the following wire type or equivalent: Belden 8441, 18 AWG (0.8 mm^2) or larger.
- For CAN wiring, use the following wire type or equivalent: Belden 3084, 24 AWG (0.2 mm^2) or larger.

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



Positive Logic vs. Negative Logic Wiring
The XLE can be wired for Positive Logic inputs or Negative Logic inputs.

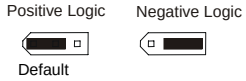


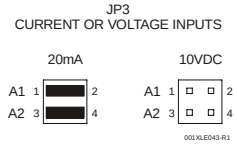
Positive Logic In Negative Logic In

4.1 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





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

4.2 External DIP Switch Settings (or Jumpers Settings)

Some XLes have jumpers to set RS-485 port termination, though most use DIP Switches.

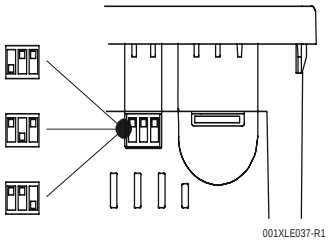
The External Jumpers or DIP Switches are used for termination of the RS-485 ports. The XLe is shipped un-terminated.

To terminate, select one of the jumpers shipped with the product and insert it based upon the option that is desired or, ***select the switch*** (as shown in the illustration) and configure based upon the option that is desired.

DIPSW3: FACTORY USE ONLY (tiny bootloader firmware downloading). NOT TO BE USED FOR NORMAL OCS OPERATION.

DIPSW2: MJ2 Termination (Default – none)

DIPSW1: MJ1 Termination (Default – none)

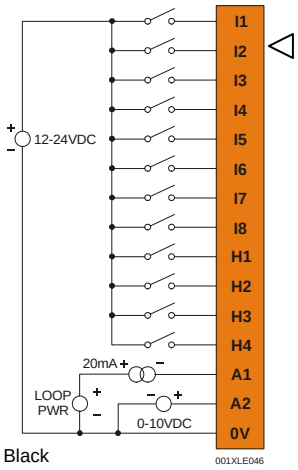


4.3 Wiring Examples

Note: The wiring examples show **Positive Logic** input wiring.

J1 Orange	XE103 / XE104 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

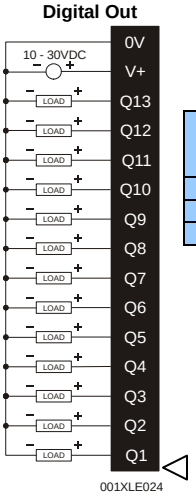
J1 Orange
Positive Logic
Digital In



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

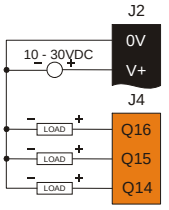
J2 Black	XE103	XE104
0V	Ground	
V+	V+ *	
NC	No Connect	OUT13
Q12	OUT12	
Q11	OUT11	
Q10	OUT10	
Q9	OUT9	
Q8	OUT8	
Q7	OUT7	
Q6	OUT6	
Q5	OUT5	
Q4	OUT4	
Q3	OUT3	
Q2	OUT2 / PWM2	
Q1	OUT1 / PWM1	
V+* Supply for Sourcing Outputs		

J2 Black
Positive Logic
Digital Out



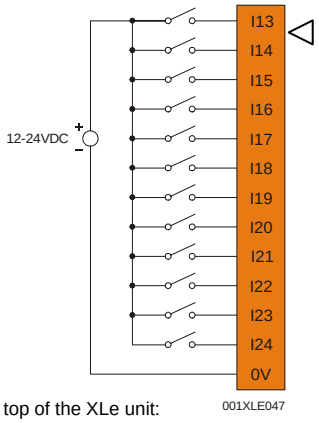
J4 Orange	XE104
Q16	OUT16
Q15	OUT15
Q14	OUT14

XE104 J4 Orange
Positive Logic
Digital Out



J3 Orange	XE104
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

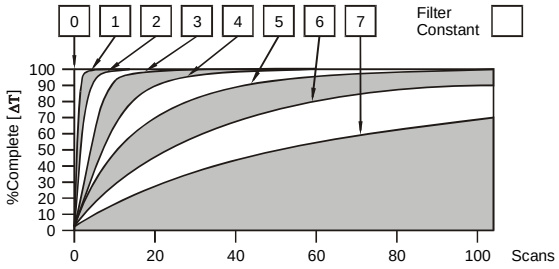
J3 Orange
Positive Logic
Digital In



As seen when looking at the top of the XLe unit:

5 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.

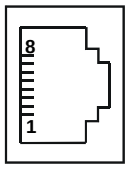
6 I/O Register Map

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
%AI1 to %AI4	Analog inputs
%AI5, %AI6	HSC1 Accumulator
%AI7, %AI8	HSC2 Accumulator
%AI9, %AI10	HSC3 Accumulator
%AI11, %AI12	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 XLe 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			
%AQ5	PWM Prescale (32 bit)		Run Count (32 bit)
%AQ6			
%AQ7	PWM Period (32 bit)		Decel Count (32 bit)
%AQ8			
%Q1			Run
%I30			Ready/Done
%I31			Error

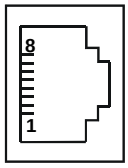
7 MJ2 Pinouts in Full and Half Duplex Modes



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

* +5 on XLe Rev E and later

Full 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	TX-/RX-	IN/OUT
1	TX+/RX+	IN/OUT

* +5 on XLe Rev E and later

Half Duplex Mode

8 Safety

When found on the product, the following symbols specify:


Warning: Electrical Shock Hazard.


Warning: Consult user documentation.

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 – 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 – 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 DECONNECTOR L'EQUIPMENT, COUPER LE COURANT OU S'ASSURER QUE L'EMPLACEMENT EST DESIGNE 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: 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.

- 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 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.
- Use Copper Conductors in Field Wiring Only, 60/75° C

9 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