XL Series Built-in I/O – Model 3 & Model 4 I/O
Model 3: 12 DC Inputs, 12 DC Outputs, 2 Analog Inputs
Model 4: 24 DC Inputs, 16 DC Outputs, 2 Analog Inputs
for XLe, XLt, XL6 (all models) and XL10e

1 Specifications

Specifications					
Digital DC Inputs	**Model 3**	**Model 4**	**Digital DC Outputs**	**Model 3**	**Model 4**
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	0.5 A per point, 4A total (continuous)	
Upper Threshold	0.8 mA	-1.6 mA	Min./Max. Output Supply Voltage	10 VDC (min), 30 VDC (max)	
Lower Threshold	0.3 mA	-2.1 mA	Max. Voltage Drop at Rated Current	0.25 VDC	
Max Upper Threshold	8 VDC		Max. Inrush Current	650 mA per channel	
Min Lower Threshold	3 VDC		Min. Load	None	
OFF to ON Response	1 ms		OFF to ON Response	1 ms	
ON to OFF Response	1 ms		ON to OFF Response	1 ms	
HSC Max. Switching Rate	10 kHz Totalizer/Pulse,Edges 5 kHz Frequency/Pulse,Width 2.5 kHz Quadrature		Output Characteristics	Current Sourcing (Pos logic)	

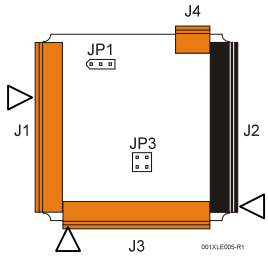
Analog Inputs, Medium Resolution	**Model 3 & 4**	**Analog Inputs, Medium Resolution**	**Model 3 & 4**
Number of Channels	2	Nominal Resolution	12-bits
Input Ranges	0-10VDC, 0-20mA, 4-20mA	%AI full-scale reading	32,000 counts
Safe Input Voltage Range	-0.5V to +12VDC	Conversion Speed	All channels converted every ladder scan
Max over-current	35mA	Max. Error at 25°C (excluding zero)	Current Mode: 1.00% Voltage Mode: 0.50%
Input Impedence (Clamped at -0.5 to +12Vdc)	Current Mode: 100 Ω Voltage Mode: 500 kΩ	Filtering	160Hz hash (noise) filter 1-128 scan digital running average filter

2 Wiring and Jumpers

Wiring Specifications

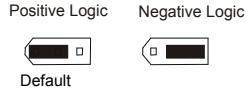
- For I/O wiring (discrete), use the following wire type or equivalent: Belden 9918, 18 AWG (0.8 mm^2) or larger.
- For shielded Analog I/O wiring, use the following wire type or equivalent: Belden 8441, 18 AWG (0.8 mm^2) or larger.
- For CAN wiring, use the following wire type or equivalent: Belden 3084, 24 AWG (0.2 mm^2) or larger. Use copper conductors in field wiring only, 60/75° C

Jumper Setting Details



Location of I/O jumpers (**JP1 & JP3**) and wiring connectors **(J1, J2, J3 & J4)** with back cover removed.

JP1 Digital DC Inputs



JP3 Analog Inputs

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

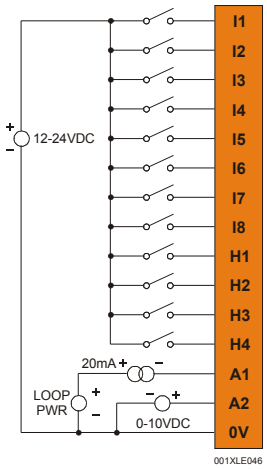
Note: When using JP3 (A1-A2), each channel can be independently configured.

3 Input Wiring Details

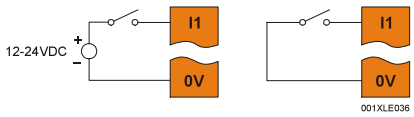
J1 Orange	Model 3 & 4 Signal Name
I1	IN1
I2	IN2
I3	IN3
I4	IN4
I5	IN5
I6	IN6
I7	IN7
I8	IN8
H1	HSC1 / IN9
H2	HSC2 / IN10
H3	HSC3 / IN11
H4	HSC4 / IN12
A1	Analog IN1
A2	Analog IN2
0V	Ground

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

J1 Orange
Positive Logic
Digital In

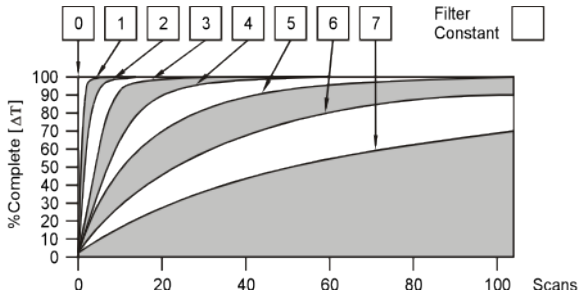


Positive Logic vs. Negative Logic Wiring
The XLe can be wired for Positive Logic inputs or Negative Logic inputs.



Positive Logic In Negative Logic In

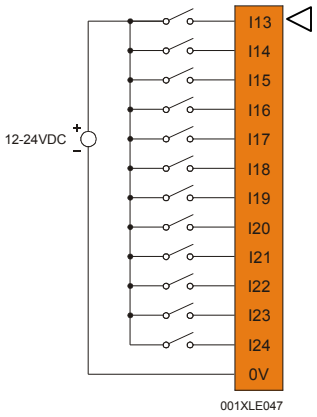
Analog Input Digital Filtering



Digital Filtering
The chart above demonstrates the effect of digital filtering on an analog input value. The Digital Filtering level is set in Cscape as part of the I/O Configuration.

J3 Orange	Model 4 only Signal Name
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

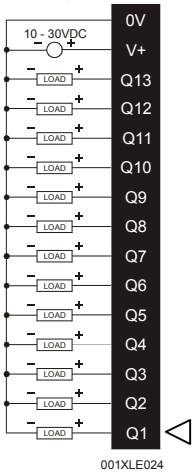


4 Output Wiring Details

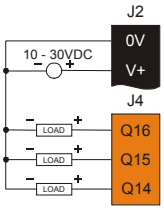
J2 Black	Model 3 Name	Model 4 Name
0V	Ground	
V+	V+ *	
NC	No Connect	OUT13
Q12	OUT12	
Q11	OUT11	
Q10	OUT10	
Q9	OUT9	
Q8	OUT8	
Q7	OUT7	
Q6	OUT6	
Q5	OUT5	
Q4	OUT4	
Q3	OUT3	
Q2	OUT2 / PWM2	
Q1	OUT1 / PWM1	
V+* Supply for Sourcing Outputs		

J4 Orange	Model 4 Name
Q16	OUT16
Q15	OUT15
Q14	OUT14

J2 Black
Positive Logic
Digital Out



J4 Orange
Positive Logic
Digital Out



5 I/O Register Map

Registers	Description	Registers	Description
%I1 to %I24	Digital Inputs	%AI1 to %AI4	Analog inputs
%I32	Output Fault	%AI5, %AI6	HSC1 Accumulator
%I25 to %I31	Reserved	%AI7, %AI8	HSC2 Accumulator
%Q1 to %Q16	Digital outputs	%AI9, %AI10	HSC3 Accumulator
%Q17	Clear HSC1 accumulator to 0	%AI11, %AI12	HSC4 Accumulator
%Q18	Totalizer: Clear HSC2 Quadrature 1-2: Accumulator 1 Reset to max – 1	%AQ1, %AQ2	PWM1 Duty Cycle
		%AQ3, %AQ4	PWM2 Duty Cycle
%Q19	Clear HSC3 Accumulator to 0	%AQ5, %AQ6	PWM Prescale
%Q20	Totalizer: Clear HSC4 Quadrature 3-4: Accumulator 3 Reset to max – 1	%AQ7, %AQ8	PWM Period
		%AQ9 to %AQ14	Analog outputs (not present on this model)
%Q21 to %Q32	Reserved		

6 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 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

7 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