EXL10 OCS Datasheet for

HE-EXV1E0, HE-EXV1E2, HE- EXV1E3, HE- EXV1E4, HE- EXV1E5, HE-EXV1E6
HEXT505C100, HEXT505C112, HEXT505C113, HEXT505C114, HEXT505C115, HEXT505C116

1. Specifications

General Specifications		Control & Logic Specifications		
Required Power (Steady state)	650mA @ 24VDC	Control Language Support	Advanced Ladder Logic Full IEC 1131-3 Languages	
Required Power (Inrush)	25A for <1 ms @ 24 VDC DC Switched	Logic Program Size & Logic Scan Rate	1MB, maximum 0.013mS/K	
Primary Power Range	10–30VDC	Online Programming Changes	Supported in Advanced Ladder	
Relative Humidity	5 to 95% Non-condensing	I/O Support	Digital Inputs	2048
Clock Accuracy	+/- 20 ppm maximum at 25° C (+/- 1 Minutes per Month)		Digital Outputs	2048
			Analog Inputs	512
Surrounding Air Temp	-10°C to +60°C		Analog Outputs	512
Storage Temp	-40°C to +60°C	General Purpose Registers	50,000 (words) Retentive 16,384 (bits) Retentive 16,384 (bits) Non-retentive	
Weight	4.375 lbs (*without I/O*)			
UL / CE	USA: http://www.heapg.com/content/21-certifications			
	Europe: http://www.horner-apg.com/en/support/certification.aspx			

Display Specifications		Connectivity	
Display Type	10.4" VGA TFT (550 nit typical)	Serial Ports	1 RS-232 & 1 RS-485 on first Modular Jack (MJ1/2) 1 RS-232 or 1 RS-485 on second Modular Jack (MJ3)
Resolution	640x480	USB mini-B	USB 2.0 (480MHz) Programming & Data Access
Color	16-bit (65,536)	USB A	USB 2.0 (480MHz) for USB FLASH Drives (2TB)
Screen Memory	27 MB	CAN	Remote I/O, Peer-to-Peer Comms, Cscape
User-Programmable Screens	1023	2 x Ethernet	10/100 Mb (Auto-MDX), Modbus TCP C/S, HTTP, FTP, SMTP, Cscape, Ethernet IP
Backlight	LED – 50,000 hour life	Remote I/O	SmartRail, SmartStix, SmartBlock, SmartMod
Screen Update Rate	User Configurable within the scan time. (perceived as instantaneous in many cases)	Removable Memory	MicroSD, support for 32GB max. Application Updates, Datalogging, more
		Internal Sensors	Optional built-in Temperature and Humidity sensors
		Audio	Mic In, Line In, Line Out

Input / Output Specifications

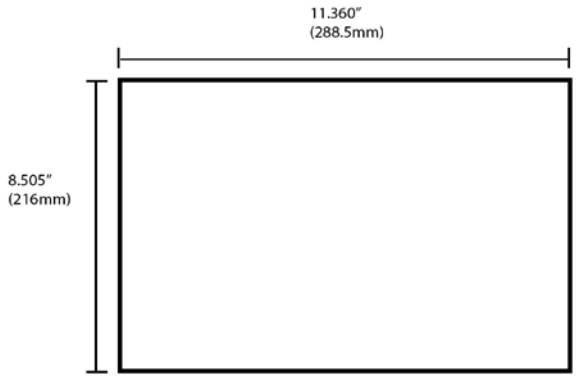
Model	DC In	DC Out	Relays	HS In	HS Out	mA/V In	mA/V RTD/Tc	mA/V Out
Model 2	12		6	4		4		
Model 3	12	12		4	2	2		
Model 4	24	16		4	2	2		
Model 5	12	12		4	2		2	2
Model 6	12	12		4	2		6*	4*

There are 4 high-speed inputs of the total DC Inputs. There are 2 high-speed outputs of the total DC outputs. Model 2, 3 & 4 feature 12-bit Analog I/O. Model 5 features 14/16-bit Analog I/O. High-speed Outputs can be used for PWM and Pulse Train Outputs, currently limited to <65kHz.. Model 6 Features a 14/17 bit Analog I/O

*Up To six mA/V In, mA/V RTD/Tc, and mA/V Out

High-Speed Counters	
Number of Counters	2
Maximum Frequency	500 kHz each
Accumulator Size	32-bits each
Modes Supported	
Totalizer	Quadrature
Pulse Measurement	Frequency Measurement
2 Position Controlled Outputs 1 ON/OFF Setpoint per Output	

2. Dimensions & Panel Cutout



Cutout tolerance to meet NEMA standards is ±0.005" (0.1mm). Max. Panel Thickness is 5mm.

3. Installation Procedures

1. Carefully locate an appropriate place to mount the EXL10e. Be sure to leave enough room at the top of the unit for insertion and removal of the microSD card. Also leave enough room at the bottom for the insertion and removal of USB FLASH drives and wiring

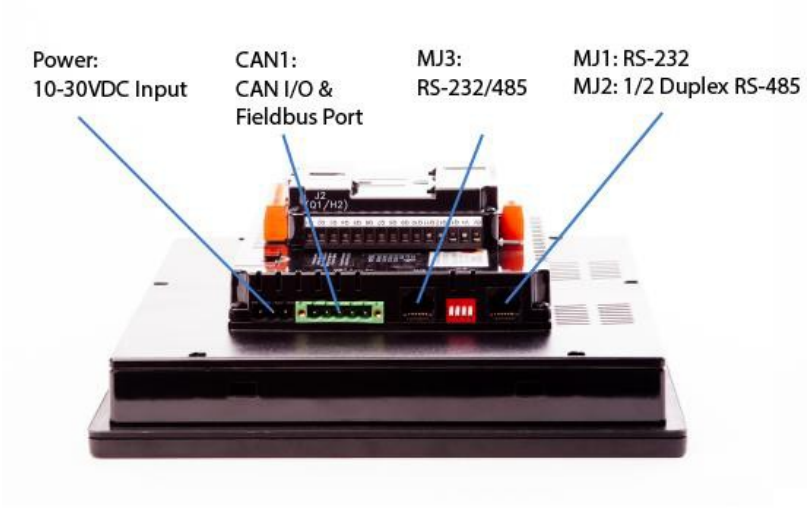
2. Carefully cut the host panel per the diagram above, creating a 288.5mm x 216 ± 0.1mm opening into which the XL7 may be installed. If the opening is too large, water may leak into the enclosure, potentially damaging the OCS. If the opening is too small, the OCS may not fit through the hole without damage.

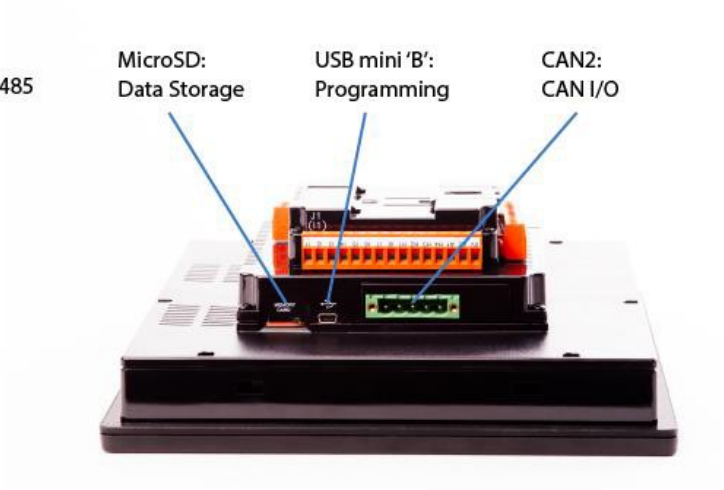
3. Remove all Removable Terminals from the OCS. Insert the OCS through the panel cutout (from the front). The gasket needs to be between the host panel and the OCS.

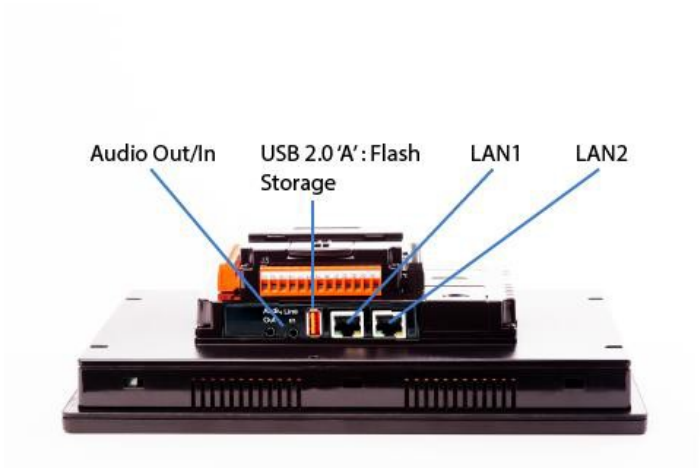
4. Install and tighten the mounting clips (provided in the box) until the gasket forms a tight seal (max torque 7-10 lb-in. [0.8 – 1.13 Nm])

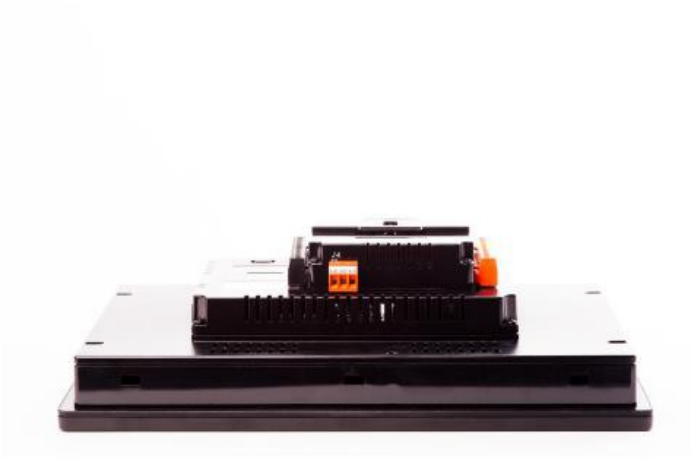
5. Reinstall the I/O Removable Terminal Blocks. Connect communications cables to the serial port, USB ports, Ethernet port, and CAN port as required.

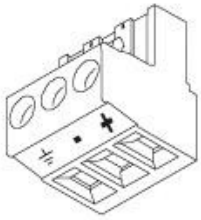
4. Ports & Connectors











DC Input / Frame

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

DC- is internally connected to I/O V–, but is isolated from CAN V–

A Class 2 power supply must be used.

Primary Power Port Pins		
PIN	SIGNAL	DESCRIPTION
1	Ground	Frame Ground
2	DC-	Input Power Supply Ground
3	DC+	Input Power Supply Voltage

CAN

Locking Spring-Clamp,
Two-terminators Per Conductor

Torque rating: 4.5 Lb-In
(0.50 N-m)

SHLD and V+ pins are not internally connected to XL7

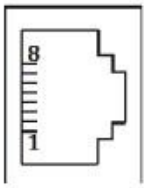
CAN1 / CAN2 Port Pin			
PIN	SIGNAL	DESCRIPTION	DIRECTION
1	V-	CAN Ground - Black	—
2	CN L	CAN Data Low - Blue	IN / OUT
3	SHLD	Shield Ground - None	—
4	CN H	CAN Data High - White	IN / OUT
5	V+ (NC)	No Connect - Red	—

MJ1/2 Independent Serial Ports

MJ1: RS-232 w/Full Handshaking

MJ2: RS-485 Half-Duplex

PIN	MJ1 PINS		MJ2 PINS	
	SIGNAL	DIRECTION	SIGNAL	DIRECTION
8	TXD	OUT	—	—
7	RXD	IN	—	—
6	0 V	Ground	0 V	Ground
5	+5V@60mA	OUT	+5V@60mA	OUT
4	RTS	OUT	—	—
3	CTS	IN	—	—
2	—	—	RX- / TX-	IN / OUT
1	—	—	RX+ / TX+	IN / OUT

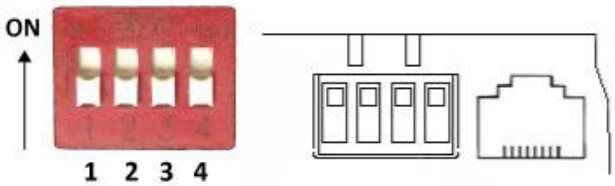


MJ3 Serial Port

Two multiplexed Serial Ports on One Modular Jack (8posn)

PIN	MJ3 PINS	
	SIGNAL	DIRECTION
8	TXD RS232	OUT
7	RXD RS232	IN
6	0 V	Ground
5	+5V@60mA	OUT
4	TX- RS485	OUT
3	TX+ RS485	OUT
2	RX- RS485	IN
1	RX+ RS485	IN

DIP Switches



SWITCH	NAME	FUNCTION	DEFAULT
1	MJ3 RS485 Termination	ON = Terminated	OFF
2	MJ3 Duplex	ON = Half OFF = Full	OFF
3			
4	MJ2 RS485 Termination	ON = Terminated	OFF

5. Built-in I/O (Model 2, 3, 4, 5 & 6)

All EXL10 models (except the HE-EXV1E0) feature built-in I/O. The I/O is mapped into OCS Register space, in three separate areas – Digital/Analog I/O, High-Speed Counter I/O, and High-speed Output I/O. Digital/Analog I/O location is fixed starting at 1, but the High- speed Counter and High-speed Output references may be mapped to any open register location. For more details on using the High-Speed Counter and High-Speed Outputs, see the XL7 OCS User's Manual (MAN0974-01).

Fixed Address	Digital/Analog I/O Function	EXL10e Model				
		2	3	4	5	6
%I1	Digital Inputs	1-12	1-12	1-24	1-12	1-12
	Reserved	13-32	13-31	25-31	13-31	
	ESCP Alarm	n/a	32	32	32	
%Q1	Digital Outputs	1-6	1-12	1-16	1-12	
	Reserved	7-24	13-24	17-24	13-24	
%AI1	Analog Inputs	1-4	1-2	1-2	1-2	
	Reserved	5-12	3-12	3-12	3-12	
%AQ1	Reserved	n/a	1-8	1-8	1-8	
	Analog Outputs	n/a	n/a	n/a	9-10	
Reserved areas maintain backward compatibility with other XL Series OCS models						

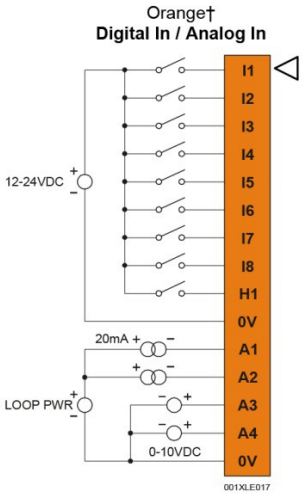
Default Address*	High-Speed Counter Function	EXL10e Models 2-6
%I1601	Status Bits	1-8
%Q1601	Command Bits	1-32
%AI0401	Accumulator 1 & 2	1-8
%AQ0401	Preload & Match Values	1-12
*Starting Address locations for %I, %Q, %AI & %AQ may be re-mapped by user		

Default Address*	High-Speed Output Function	EXL10e Models 2-6
%I1617	Status Bits	1-8
%Q1**	Command Bits	1-2
n/a	n/a	n/a
%AQ421	PWM or Pulse-Train Parameters	1-20
*Starting Address locations for %I & %AQ may be remapped by user		
**Q1-Q2 are part of the Fixed I/O Map. In High-Speed Output mode they can be used to initiate a Stepper/PTO Move		

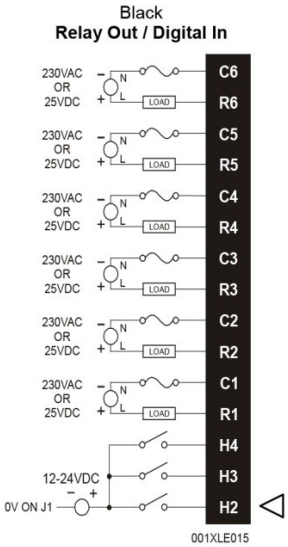
5.1 Model 2 – I/O

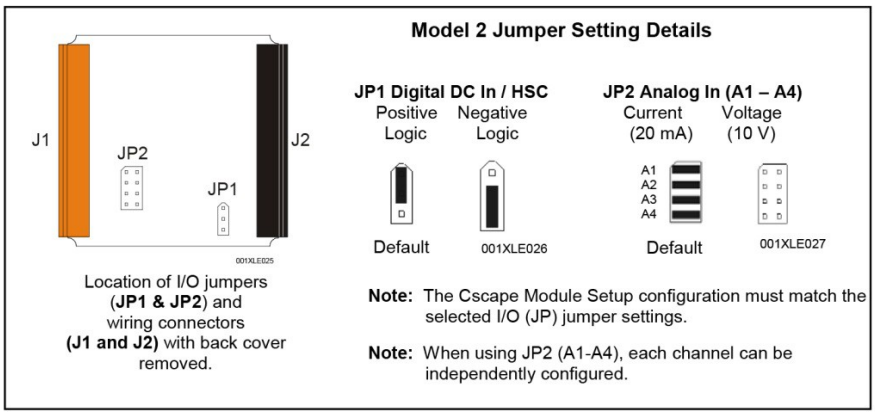
The EXL10 model 2 (HE-EXV1E2) features 12 DC Inputs, 6 Relay outputs, and 4 Analog Inputs. The DC Inputs are 12/24Vdc compatible, and can be jumpered for Positive Logic (sinking), or Negative Logic (sourcing). Two of the inputs (H1-H2) can be used for high-speed functions up to 500kHz. The 12-bit Analog Inputs can be jumpered for voltage (0-10V) or current (4-20mA) on a channel by channel basis. The Relay outputs are isolated, supporting AC and DC voltages, with output currents of up to 3A/relay, 5A total.

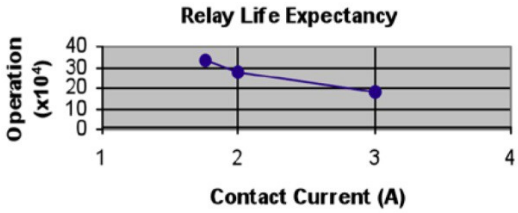
J1 (Orange)	Name
I1	IN1
I2	IN2
I3	IN3
I4	IN4
I5	IN5
I6	IN6
I7	IN7
I8	IN8
H1	HSC1 / N9
0V	Common
A1	Analog IN1
A2	Analog IN2
A3	Analog IN3
A4	Analog IN4
0V	Common



J2 (Black)	Name
C6	Relay 6 COM
R6	Relay 6 NO
C5	Relay 5 COM
R5	Relay 5 NO
C4	Relay 4 COM
R4	Relay 4 NO
C3	Relay 3 COM
R3	Relay 3 NO
C2	Relay 2 COM
R2	Relay 2 NO
C1	Relay 1 COM
R1	Relay 1 NO
H4	HSC4 / IN12
H3	HSC3 / IN11
H2	HSC2 / IN10







"**WARNING**: EXPOSURE TO SOME CHEMICALS MAY DEGRADE THE SEALING PROPERTIES OF MATERIALS USED IN THE Tyco relay PCJ

Cover / case & base: Mitsubishi engineering Plastics Corp. 5010GN6-30 or 5010GN6-30 M8 (PBT)
Sealing Material: Kishimoto 4616-50K (I part epoxy resin)

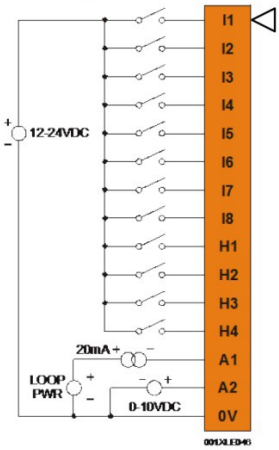
It is recommended to periodically inspect the relay for any degradation of properties and replace if degradation is found

5.2 Model 3 & 4 – I/O

The EXL10 model 3 (HE-EXV1E3) features 12 DC Inputs, 12 DC outputs, and 2 Analog Inputs. The XL7 model 4 (HE-XW1E4) increases the I/O count up to 24 DC Inputs, and 16 DC Outputs and 2 Analog Inputs. The DC Inputs are 12/24Vdc compatible, and can be jumpered for Positive Logic (sinking), or Negative Logic (sourcing). Two of the inputs (H1-H2) can be used for high-speed functions up to 500kHz. The12-bit Analog Inputs can be jumpered for voltage (0-10V) or current (4-20mA) on a channel by channel basis. The 12/24VDC Outputs feature Electronic Short Circuit protection, and support currents up to 0.5A per point, and 4A total. Two of the DC Outputs can be used for high speed functions (PWM or PTO). The output frequency is limited by the switching capability of the output drivers (about 10kHz), although an optional accessory (HE-XHSQ) can be added to provide parallel output drivers supporting frequencies up to 200kHz.

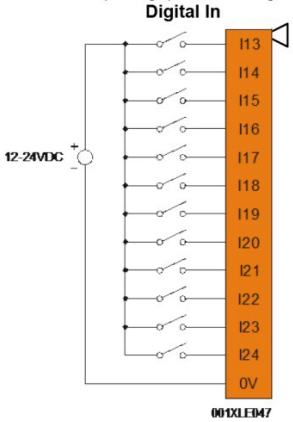
J1 (Orange)	Model 3 & 4 Signal Name
I1	IN1
I2	IN2
I3	IN3
I4	IN4
I5	IN5
I6	IN6
I7	IN7
I8	IN8
H1	HSC1 / IN9
H2	HSC2 / IN10
H3	HSC3 / IN11
H4	HSC4 / IN12
A1	Analog IN1
A2	Analog IN2
0V	Common

J1 (Orange) Positive Logic†
Digital & Analog In



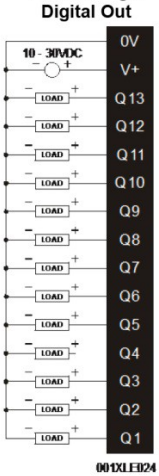
J3 (Orange)	Model 4 only Signal Name
I13	IN13
I14	IN14
I15	IN15
I16	IN16
I17	IN17
I18	IN18
I19	IN19
I20	IN20
I21	IN21
I22	IN22
I23	IN23
I24	IN24
0V	Common

J3 (Orange) Positive Logic
Digital In

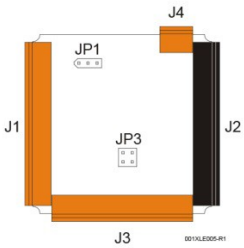


J2 (Black)	Model 3 Name	Model 4 Name
0V	Common	
V+	V+ *	
NC	No Connect	OUT13
Q12	OUT12	
Q11	OUT11	
Q10	OUT10	
Q9	OUT9	
Q8	OUT8	
Q7	OUT7	
Q6	OUT6	
Q5	OUT5	
Q4	OUT4	
Q3	OUT3	
Q2	OUT2 / PWM2	
Q1	OUT1 / PWM1	
*V+ Supply for Sourcing Outputs		

J2 Black
Positive Logic
Digital Out

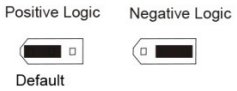


Jumper Setting Details



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

JP1 Digital DC Inputs



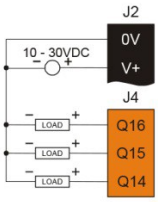
JP3 Analog Inputs

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.

J4 (Orange)	Model 4 Name
Q16	OUT16
Q15	OUT15
Q14	OUT14

J4 Orange
Positive Logic
Digital Out



Note:
Model 3 uses J1 & and J2 only.

Model 4 uses J1, J2, J3 & J4.

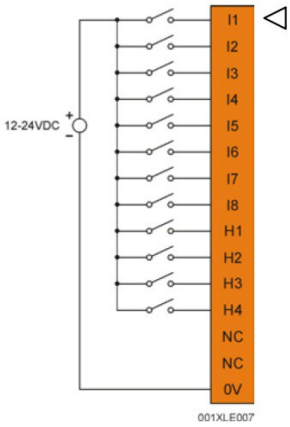
5.3 Model 5 – I/O

The EXL10 model 5 (HE-EXV1E5) features 12 DC Inputs, 12 DC outputs, with high performance, highly configurable Analog Inputs (2) and Analog Outputs (2). , The DC Inputs are 12/24Vdc compatible, and can be jumpered for Positive Logic (sinking), or Negative Logic (sourcing). Two of the inputs (H1-H2) can be used for high-speed functions up to 500kHz. The 12/24VDC Outputs feature Electronic Short Circuit protection, and support currents up to 0.5A per point, and 4A total. Two of the DC Outputs can be used for high speed functions (PWM or PTO). The output frequency is limited by the switching capability of the output drivers (about 10kHz), although an optional accessory (HE-XHSQ) can be added to provide parallel output drivers supporting frequencies up to 200kHz.

The two high resolution Analog Inputs can be configured for 4-20mA, 0-10V, or 0-100mV at 14-bit resolution. They also can be configured for 16-bit temperature measurement – supporting Thermocouples or RTDs with 0.05°C resolution. The Analog Outputs are sourcing, and can be configured for 4-20mA or 0-10V at 14-bit resolution. Each Analog Input or Output channel can be configured independently for maximum flexibility.

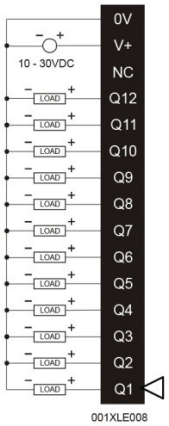
J1 (Orange)	Name
I1	IN1
I2	IN2
I3	IN3
I4	IN4
I5	IN5
I6	IN6
I7	IN7
I8	IN8
H1	HSC1 / IN9
H2	HSC2 / IN10
H3	HSC3 / IN11
H4	HSC4 / IN12
NC	No Connect
NC	No Connect
0V	Common

J1 (Orange) Positive Logic
Digital Inputs

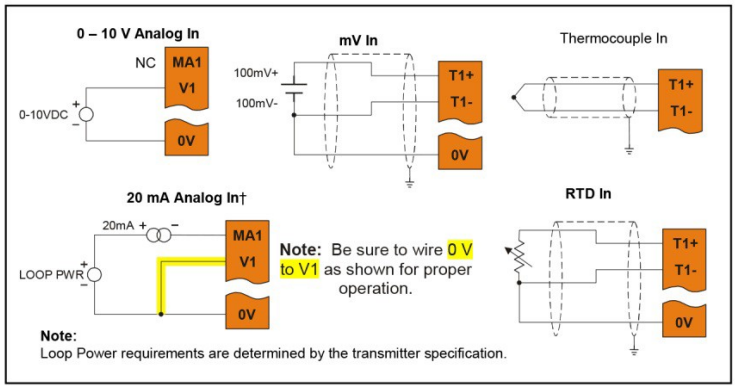


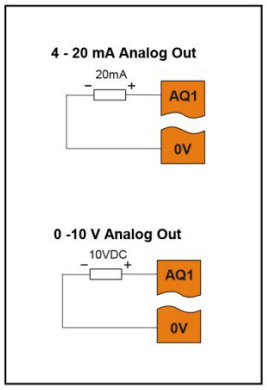
J2 (Black)	Name
0V	Common
V+*	Output Power
NC	No Connect
Q12	OUT12
Q11	OUT11
Q10	OUT10
Q9	OUT9
Q8	OUT8
Q7	OUT7
Q6	OUT6
Q5	OUT5
Q4	OUT4
Q3	OUT3
Q2	OUT2 / PWM2
Q1	OUT1 / PWM1

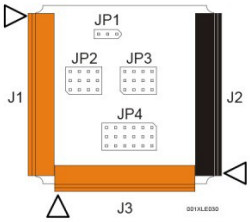
J2 (Black) Positive Logic
Digital Outputs



J3 (Orange)	Name
T1+	Tc (1 +) or RTD (1+) or 100mV (1+)
T1-	Tc (1-) or RTD (1-) or 100mV (1-)
T2+	Tc (2+) or RTD (2+) or 100mV (2+)
T2-	Tc (2-) or RTD (2-) or 100mV (2-)
AQ1	10V or 20mA Out (1)
AQ2	10V or 20mA Out (2)
0V	Common
MA1	0-20mA In (1)
V1	0-10V In (1)
0V	Common
MA2	0-20mA In (2)
V2	0-10V In (2)
0V	Common

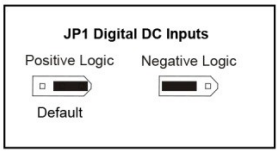


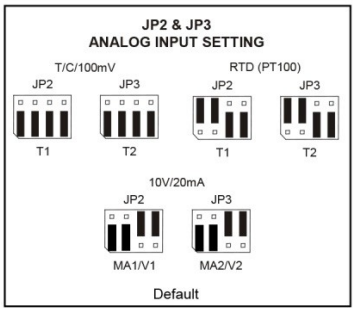


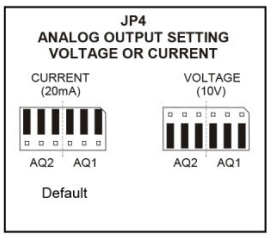


Location of I/O jumpers (**JP1-JP4**) and wiring connectors **(J1-J4)** with back cover removed.

Jumper Setting Details







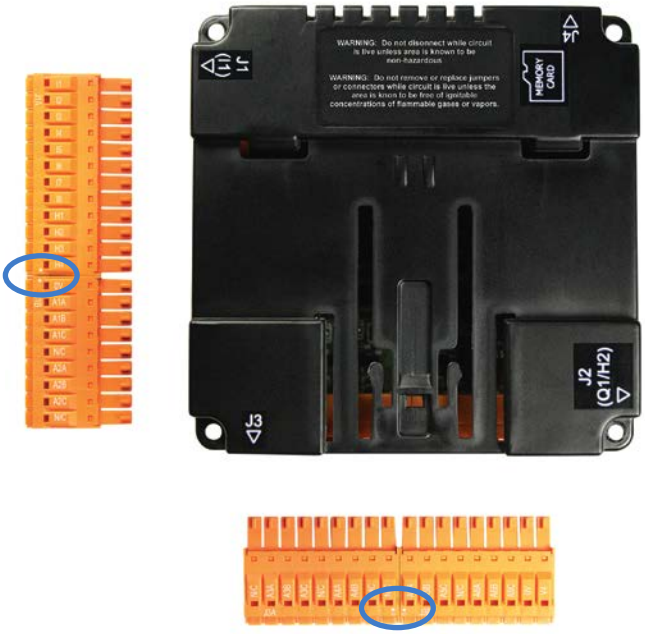
5.4 Model 6 – I/O

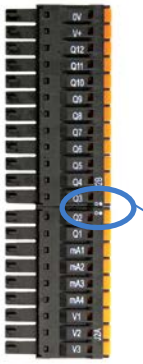
5.4.1 Hardware Specification

Digital DC Inputs			Digital DC Outputs	
Inputs per Module	12		Outputs per Module	12
Commons per Module	1		Commons per Module	1
Input Voltage Range	0 VDC - 24 VDC		Output Type	Sourcing / 10 K Pull-Down
Absolute Max. Voltage	35 VDC Max.		Absolute Max. Voltage	30 VDC Max.
Input Impedance	10 kΩ		Output Protection	Short Circuit & Overvoltage
Input Current Minimum 'On' current Maximum 'Off' current.	Positive Logic 0.8 mA 0.3 mA	Negative Logic -1.6 mA -2.1 mA	Max. Output Current per point	0.5 A
			Max. Total Current per driver (Q1-4, Q5-8, Q9-12).	2A Continuous
Min 'On' Input	8 VDC		Max. Output Supply Voltage	30 VDC
Max 'Off' Input	3 VDC		Minimum Output Supply Voltage	10 VDC
OFF to ON Response	1 ms		Max. Voltage Drop at Rated Current	0.25 VDC
ON to OFF Response	1 ms		Min. Load	None
Galvanic Isolation	None.		I/O Indication	None
Logic Polarity	Positive and Negative based on Common pin level.		Galvanic Isolation	None
I/O Indication	None.		OFF to ON Response	150nS
High Speed Counter Inputs*	4 - DIN 8-12		ON to OFF Response	150nS
High Speed Counter Max Freq*	XLE/T/6/10 / XL4/7 10KHz / 500KHz		PWM Out*	XLE/T/6/10 / XL4/7 65KHz / 500KHz
Connector Type	3.5mm Pluggable cage clamp connector		Output Characteristics	Current Sourcing (Pos logic)
Analog Inputs				
Number of Channels	6		Absolute max Input Voltage	-0.5 -12V dc. (+/-30Vdc)
Input Range	0–20mA, 4-20 mA dc. 0-60mV, 0-10V dc. T/C - J, K, N, T, E, R, S, B RTD - PT100, PT1000		Input Impedance (Clamped @ -0.5 to 10.23VDC).	T/C / RTD / mV > 2 MΩ mA: 15 Ω + 1.5 V V: 1.1 MΩ
Nominal Resolution	14 - 17 Bits (variable depending on input type)		Galvanic Isolation	None
Sensor Range and Accuracy	Input Type	Range		Accuracy
	TC J	-120 to 1000°C / -184 to 1832°F		± 0.2% FS ± 1°C
	TC K	-130 to 1372°C / -202 to 2501.6°F		± 0.2% FS ± 1°C
	TC T	-130 to 400°C / -202 to 752°F		± 0.2% FS ± 1°C
	TC E	-130 to 780°C / -202 to 1436°F		± 0.2% FS ± 1°C
	TC N	-130 to 1300°C / -202 to 2372°F		± 0.2% FS ± 1°C
	TC R, S	20 to 1768°C / 68 to 3214.4°F		± 0.2% FS ± 3°C
	TC B	100 to 1820°C / 212 to 3308°F		± 0.2% FS ± 3°C
	PT100/1000	-200 to 850°C / -328 to 1562°F		± 0.15% FS
	0-20mA	0-20mA		± 0.15% FS
	0-60mV	0-60mV		± 0.15% FS
	0-10V	0-10V		± 0.15% FS
Conversion Speed	Minimum all channels converted in approx. 150mS.			
Analog Outputs				
Number of Channels	4		Minimum Current load	500Ω
Output Ranges	0 – 10Vdc. 0 – 20mA, 4-20mA dc		Galvanic Isolation	None
Nominal Resolution	12 Bits		Conversion Speed	Min all channels once per scan.
Response Time	One update per ladder scan.			
Max. Error at 25°C (excluding zero)	0-20 mA 0.1% of full scale. 0-10 V 0.1% of full scale		Additional Error for temperatures other than 25°C	20mA 0.0126%/°C.

***see I/O information below for detail regarding HSC and PWM**

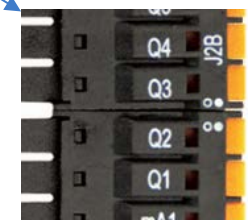
5.4.2 Connection Details



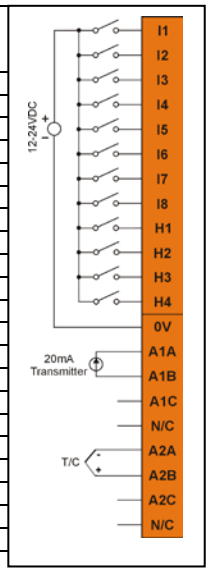


For ease of operability, the high density terminals are divided into more manageable pairs of connectors (J1A + J1B, J2A + J2B, J3A + J3B)

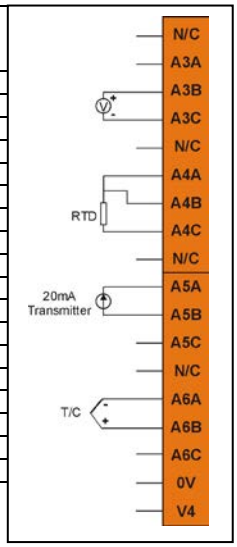
To ensure proper installation, connector symbols must match as seen below:

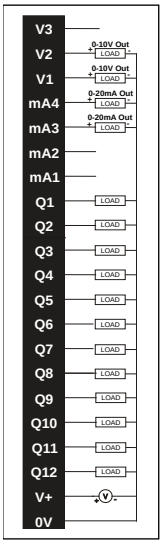


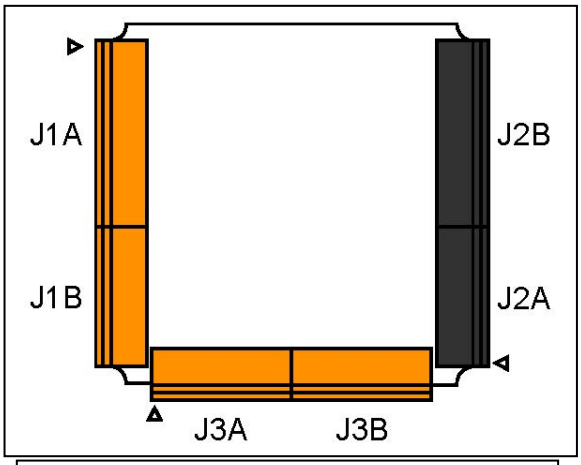
J1 (Orange/ Green)		Signal Name
J1A	I1	V IN1
	I2	V IN2
	I3	V IN3
	I4	V IN4
	I5	V IN5
	I6	V IN6
	I7	V IN7
	I8	V IN8
	H1	HSC1 / V IN9
	H2	HSC2 / V IN10
	H3	HSC3 / V IN11
	H4	HSC4 / V IN12
J1B	0V	Common
	A1A	Univ. AI 1 pin 1
	A1B	Univ. AI 1 pin 2
	A1C	Univ. AI 1 pin 3
	N/C	No Connection
	A2A	Univ. AI 2 pin 1
	A2B	Univ. AI 2 pin 2
	A2C	Univ. AI 2 pin 3
	N/C	No Connection



J3 (Orange/ Green)		Signal Name
Univ. AI	N/C	No Connection
	A3A	Univ. AI 3 pin 1
	A3B	Univ. AI 3 pin 2
	A3C	Univ. AI 3 pin 3
	N/C	No Connection
	A4A	Univ. AI 4 pin 1
	A4B	Univ. AI 4 pin 2
	A4C	Univ. AI 4 pin 3
	N/C	No Connection
Univ. AI	A5A	Univ. AI 5 pin 1
	A5B	Univ. AI 5 pin 2
	A5C	Univ. AI 5 pin 3
	N/C	No Connection
	A6A	Univ. AI 6 pin 1
	A6B	Univ. AI 6 pin 2
	A6C	Univ. AI 6 pin 3
	0V	Common
	V4	V OUT4*

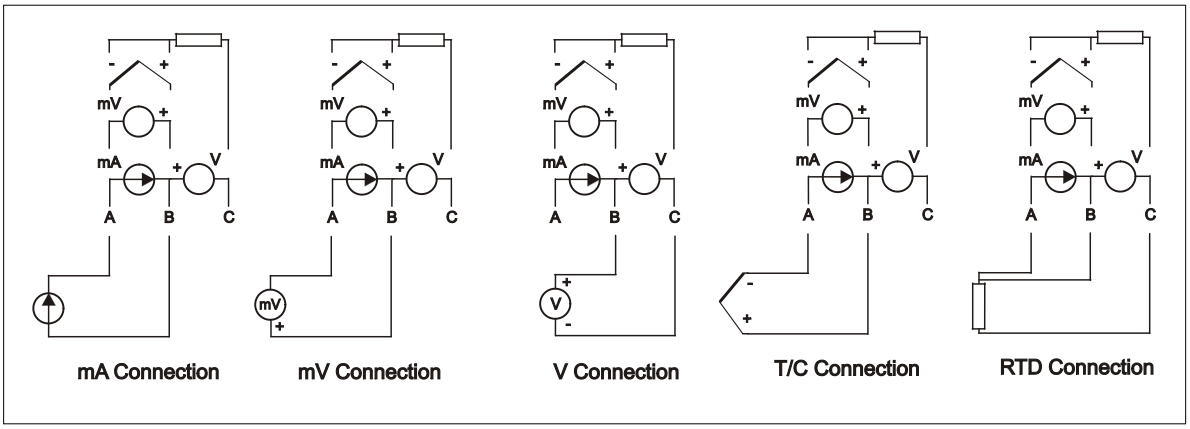






Note * Both mA & V outputs are active for each output channel, however, only the configured output type is calibrated (maximum 4 channels simultaneously).

5.4.3 Example Universal Input Wiring Schematic



Configuration

The data registers are as follows:

Digital Inputs	Digital Outputs	Analogue Inputs	Analogue Outputs
%I1-12	%Q1-12	%AI1-4, %AI33-38	%AQ9-12

Note that the first four analogue inputs are mapped to both %AI1-4 and %AI33-36, analogue input channels 5 & 6 are mapped to %AI37 and %AI38 respectively only.

5.4.4 Data values:

The analogue inputs return data types as follows:

Input Mode	Data format	Comment
0-2mA, 4-20mA	0-32000	
0-10V, 0-60mV	0-32000	
T/C, RTD	Temperature in °C or °F to 1 decimal place xxx.y	°C or °F may be selected in the I/O config section. The value is an integer, the user should divide by 10.

5.4.5 Status Register

Register	Description							
%R1	Bit-wise status register enable – R1.1 – R1.9 enable for registers R2 to R9							
%R2	Firmware version							
%R3	Watchdog count – cleared on power-up.							
%R4	Status bits -	16…4	3	2	1			
		Reserved	Normal	Config	Calibration			
%R5	Scan rate of the 106 board (average) in units of 100µS.							
%R6	Scan rate of the 106 board (max) in units of 100µS.							
%R7	Channel Status Channel 2				Channel 1			
	8	7	6	5	4	3	2	1
	Open RTD	Out of Limits	Shorted RTD	Open T/C	Open RTD	Out of Limits	Shorted RTD	Open T/C
%R8	Channel Status Channel 4				Channel 3			
	8	7	6	5	4	3	2	1
	Open RTD	Out of Limits	Shorted RTD	Open T/C	Open RTD	Out of Limits	Shorted RTD	Open T/C
%R9	Channel Status Channel 6				Channel 5			
	8	7	6	5	4	3	2	1
	Open RTD	Out of Limits	Shorted RTD	Open T/C	Open RTD	Out of Limits	Shorted RTD	Open T/C
%R10-14	Reserved							

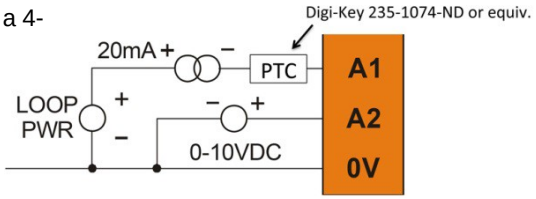
Note: For the purposes of the example, the block is shown starting at %R1, but it can be set to anywhere in the %R memory map.

6. Safety

WARNING: Battery may explode if mistreated. Do not recharge, disassemble or dispose of in fire. **WARNING:** EXPLOSION HAZARD – BATTERIES MUST ONLY BE CHANGED IN AN AREA KNOWN TO BE NON-HAZARDOUS Power input and output (I/O) wiring must be in accordance with Class I, Division 2 wiring methods of the National Electric Code, NFPA 70 for installations in the U.S., or as specified in Section 18-1J2 of the Canadian Electrical Code for installations within Canada and in accordance with the authority having jurisdiction. 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. **WARNING:** EXPLOSION HAZARD – Substitution of components may impair suitability for Class 1, Division 2. Digital outputs shall be supplied from the same source as the Operator Control Station.	**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. **WARNING:** To avoid the risk of electric shock or burns, always connect the 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 all Power Sources connected to the OCS. 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. Jumpers on connector JP1 and others shall not be removed or replaced while the circuit is live unless the area is known to be free of ignitable concentrations of flammable gasses or vapors.

7. Common Cause of Analog Input Tranzorb Failure

A common cause of Analog Input Tranzorb Failure on Analog Inputs Model 2, 3, 4 & 5: If a 4-20mA circuit is initially wired with loop power, but without a load, the Analog input could see 24Vdc. This is higher than the rating of the tranzorb. This can be solved by NOT connecting loop power prior to load connection, or by installing a low-cost PTC in series between the load and Analog input.



NOTE†: Refers to Model 2 – orange *(pg.5,)* Models 3 & 4 – J1 *(pg.6)* and Model 5 – 20mA Analog In *(pg.7.)*

8. Technical Support

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

North America
(317) 916-4274
Toll Free: 877-665-5666
http://www.heapg.com
e-mail: techsppt@heapg.com

Europe
(+) 353-21-4321-266
http://www.horner-apg.com
e-mail: tech.support@horner-apg.com