



**XLT OCS Model:**  
**HE-XT103 / HEXT240C113 / HEXT240C013**  
 12 Digital DC Inputs / 12 Digital Outputs  
 2 Analog Inputs (Medium Resolution)

1 Specifications

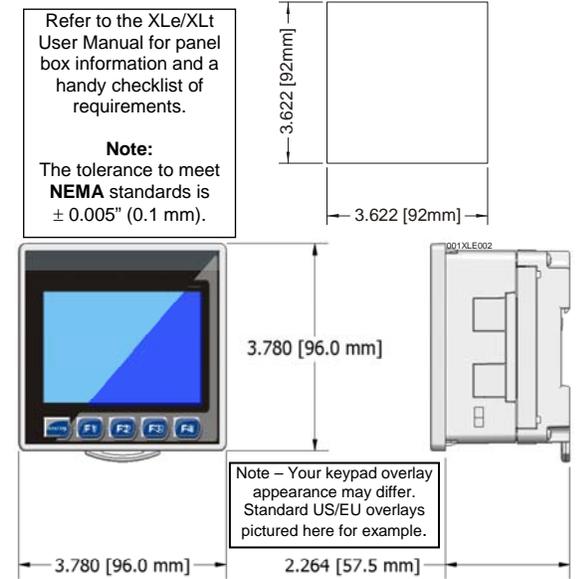
| Specifications                                    |   |  |                                    |   |   |
|---|---|--|------------------------------------|---|---|
| Digital DC Inputs                                 | XLT103  | XLT104                                 | Digital DC Outputs                 | XLT103  | XLT104                                  |
| 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<br>5 kHz Frequency/Pulse, Width<br>2.5 kHz Quadrature |  | OFF to ON Response                 | 1 ms  |   |
| Analog Inputs, Medium Resolution                  | XLT103  | XLT104                                 | ON to OFF Response                 | 1 ms  |   |
|   | 2   | 2                                      | Output Characteristics             | Current Sourcing (Pos logic)  |   |
| Input Ranges                                      | 0 - 10 VDC<br>0 - 20 mA<br>4 - 20 mA  |  | <b>General Specifications</b>      |   |   |
| Safe input voltage range                          | -0.5 V to +12V  |  |                                    |   |   |
| Input Impedance (Clamped @ -0.5 VDC to 12 VDC)    | Current Mode:<br>100 Ω<br>Voltage Mode:<br>500 k Ω                                  |  | Required Power (Steady State)      | 130 mA @ 24 VDC   |   |
| Nominal Resolution                                | 10 Bits   |  | Required Power (Inrush)            | 30 A for 1 ms @ 24 VDC  |   |
| %AI full scale                                    | 32,000 counts   |  | Primary Power Range                | 10 - 30 VDC   |   |
| Max. Over-Current                                 | 35 mA   |  | Relative Humidity                  | 5 to 95% Non-condensing   |   |
| Conversion Speed                                  | All channels converted once per ladder scan   |  | Operating Temperature              | -10°C to +60°C  |   |
| Max. Error at 25°C (excluding zero)               | 4-20 mA   | 1.00%                                  | Terminal Type                      | Screw Type, 5 mm Removable  |   |
|   | 0-20 mA   | 1.00%                                  | CE                                 | See Compliance Table at <a href="http://www.heapq.com/Pages/TechSupport/ProductCert.html">http://www.heapq.com/Pages/TechSupport/ProductCert.html</a> |   |
|   | 0-10 VDC  | 0.50%                                  | UL                                 |   |   |
| Additional error for temperatures other than 25°C | TBD   |  | Weight                             | 12.5 oz. (354.36 g)<br>+/- Seven Minutes/Month at 20C   |   |
| Filtering   | 160 Hz hash (noise) filter<br>1-128 scan digital running average filter             |  | Clock Accuracy                     |   |   |

Note: Highest usable frequency for PWM output is 65 KHz

**XLT OCS Model:**  
**HE-XT104 / HEXT240C114 / HEXT240C014**  
 24 Digital DC Inputs / 16 Digital Outputs  
 2 Analog Inputs (Medium Resolution)

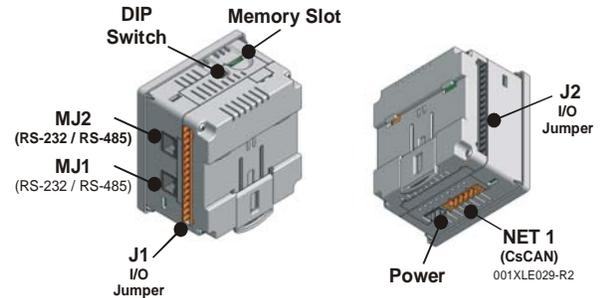
2 Panel Cut-Out and Dimensions

Note: Max. panel thickness: 5 mm.



3 Ports / Connectors / Cables

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

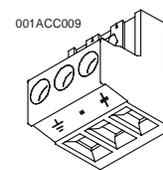


**To Remove Back Cover:**  
 Unscrew 4 screws located on the back of the unit and remove back cover.

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

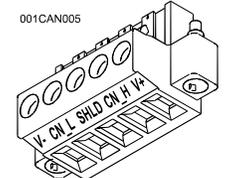
**I/O Jumpers (Not Shown):** I/O Jumpers (JP) are located internally. To access, remove back cover of unit.

**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:**

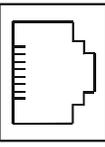
Uses **Removable Memory** for data logging, screen captures, program loading and recipes.

**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

**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

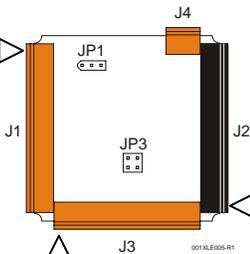
**Wiring Specifications**

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

- For I/O wiring (discrete), use the following wire type or equivalent: Belden 9918, 18 AWG (0.8 mm<sup>2</sup>) or larger.

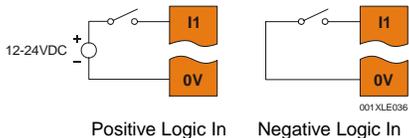
- For shielded Analog I/O wiring, use the following wire type or equivalent: Belden 8441, 18 AWG (0.8 mm<sup>2</sup>) or larger.

- For CAN wiring, use the following wire type or equivalent: Belden 3084, 24 AWG (0.2 mm<sup>2</sup>) or larger.



**Positive Logic vs. Negative Logic Wiring**

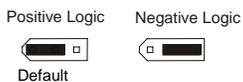
The XLt can be wired for Positive Logic inputs or Negative Logic inputs.



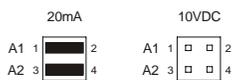
**4.1 I/O Jumpers Settings (JP1 – JP3)**

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

**JP1 Digital DC Inputs**



**JP3 CURRENT OR VOLTAGE INPUTS**



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

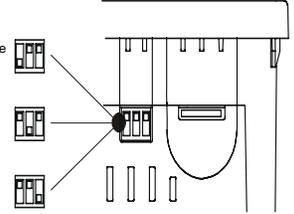
**4.2 External DIP Switch Settings (or Jumpers Settings)**

The External DIP Switches are used for termination of the RS-485 ports. The XLt 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.

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

- 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)

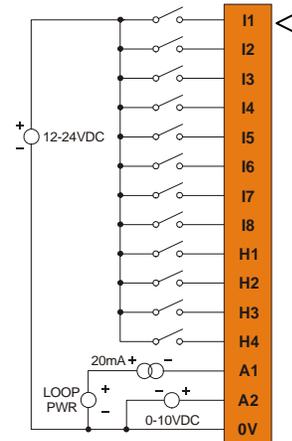


**4.3 Wiring Examples**

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

| J1 Orange | XT103 / XT104 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             |

**XT103 / 104 J1 Orange Positive Logic Digital In**

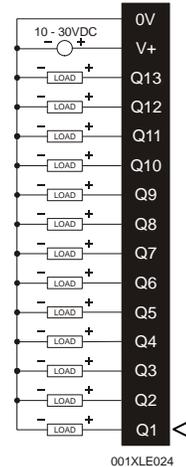


**Note:** Loop Power requirements are determined by the transmitter specification.

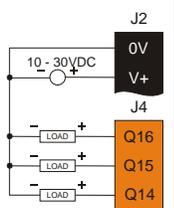
| J2 Black | XT103       | XT104 |
|----------|-------------|-------|
| 0V       | Ground      |       |
| V+       | V+ *        |       |
| NC       | No Connect  | OUT13 |
| Q12      | OUT12       |       |
| Q11      | OUT11       |       |
| Q10      | OUT10       |       |
| Q9       | OUT9        |       |
| Q8       | OUT8        |       |
| Q7       | OUT7        |       |
| Q6       | OUT6        |       |
| Q5       | OUT5        |       |
| Q4       | OUT4        |       |
| Q3       | OUT3        |       |
| Q2       | OUT2 / PWM2 |       |
| Q1       | OUT1 / PWM1 |       |

V+\* Supply for Sourcing Outputs

**XT103 / 104 J2 Black Positive Logic Digital Out**

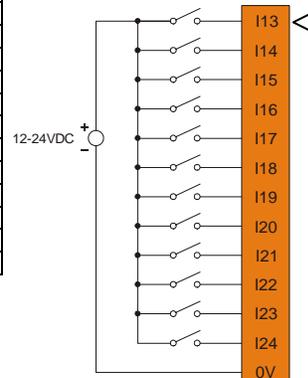


**XT104 J4 Orange Positive Logic Digital Out**



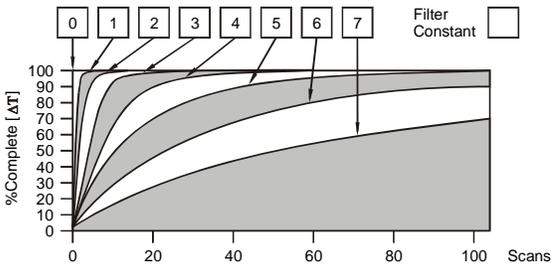
| J3 Orange | XT104  |
|-----------|--------|
| I13       | IN13   |
| I14       | IN14   |
| I15       | IN15   |
| I16       | IN16   |
| I17       | IN17   |
| I18       | IN18   |
| I19       | IN19   |
| I20       | IN20   |
| I21       | IN21   |
| I22       | IN22   |
| I23       | IN23   |
|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

**XT104 J3 Orange Positive Logic Digital In**



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.

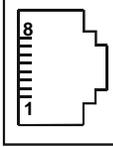
6 I/O Register Map

| 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<br>Totalizer: Clear HSC2 |
| %Q18          | Quadrature 1-2: Accumulator 1<br>Reset to max - 1    |
| %Q19          | Clear HSC3 Accumulator to 0<br>Totalizer: Clear HSC4 |
| %Q20          | Quadrature 3-4: Accumulator 3<br>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 XLt 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)    |                   | Run Count (32 bit)   |
| %AQ6      |                          |                   | Decel Count (32 bit) |
| %AQ7      | PWM Period (32 bit)      |                   | Run                  |
| %AQ8      |                          |                   | Ready/Done           |
| %Q1       |                          |                   | Error                |
| %I30      |                          |                   |                      |
| %I31      |                          |                   |                      |

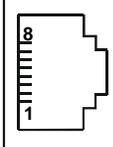
7 MJ2 Pinouts in Full and Half Duplex Modes



| 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        |

\* +5Vdc 60mA max

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    |

\* +5Vdc 60mA Max

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 DECONNECTER 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](http://www.heapg.com)

email: [techsppt@heapg.com](mailto:techsppt@heapg.com)

**Europe:**

(+) 353-21-4321-266

[www.horner-apg.com](http://www.horner-apg.com)

email: [techsupport@hornerirl.ie](mailto:techsupport@hornerirl.ie)

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