

# XLE/XLEe & XLT/XLTe - Model 2

12 DC In, 6 Relay Out, 4 – 12-bit Analog In

MAN1113\_23\_EN\_XLET\_Mod2



## XLE/XLT User Manual - MAN0878

Find the user manual via the [Documentation Search](#) page on the Horner website.

## Table of Contents

|  |           |
|--|-----------|
| <b>TECHNICAL SPECIFICATIONS</b> .....              | <b>2</b>  |
| General Specifications .....                       | 2         |
| Control and Logic .....                            | 2         |
| User Interface .....                               | 3         |
| Connectivity .....                                 | 3         |
| <b>CONTROLLER OVERVIEW</b> .....                   | <b>4</b>  |
| Overview of XLE and XLT .....                      | 4         |
| Power Wiring .....                                 | 5         |
| <b>Model 2 Specifications</b> .....                | <b>6</b>  |
| Digital DC Input .....                             | 6         |
| Digital Relay Outputs .....                        | 6         |
| Analog Inputs, Medium Resolution .....             | 7         |
| <b>Chapter 1: WIRING: INPUTS AND OUTPUTS</b> ..... | <b>8</b>  |
| Analog Inputs Information .....                    | 8         |
| Digital Inputs .....                               | 8         |
| Relay Life .....                                   | 9         |
| Jumper Settings for Model 2 .....                  | 9         |
| Back Panel Torque Ratings .....                    | 10        |
| J1 Wiring - Digital In / Analog In .....           | 10        |
| J2 Wiring - Relay Out / Analog or Digital In ..... | 11        |
| Wiring Details .....                               | 11        |
| BUILT-IN I/O .....                                 | 12        |
| Analog Input Tranzorb Failure .....                | 12        |
| <b>COMMUNICATIONS</b> .....                        | <b>13</b> |
| Serial Communication .....                         | 13        |
| Ethernet .....                                     | 14        |
| CAN Communications .....                           | 14        |
| DIP Switches .....                                 | 15        |
| <b>DIMENSIONS &amp; INSTALLATION</b> .....         | <b>16</b> |
| Dimensions & Panel Cutout .....                    | 16        |
| Installation Information .....                     | 16        |
| Installation Procedure .....                       | 17        |
| Battery Maintenance .....                          | 17        |
| <b>SAFETY &amp; MAINTENANCE</b> .....              | <b>18</b> |
| Warnings .....                                     | 18        |
| FCC Compliance .....                               | 18        |
| Precautions .....                                  | 18        |

Find the manuals via the [Documentation Search](#) page on the Horner website.

## Part Numbers

| Global Part Numbers          |             |
|------------------------------|-------------|
| XLE - Model 2                | HE-XE102    |
| XLEe - Model 2 with Ethernet | HE-XE1E2    |
| XLT - Model 2                | HE-XT102    |
| XLTe - Model 2 with Ethernet | HE-XT1E2    |
| European Part Numbers        |             |
| XLE - Model 2                | HEXE220C112 |
| XLEe - Model 2 with Ethernet | HEXE221C112 |
| XLT - Model 2                | HEXT240C112 |
| XLTe - Model 2 with Ethernet | HEXT241C112 |

## Accessories and Add-Ons

| Part #      | Description   |
|-------------|---|
| HE-BAT009   | CR2450 Lithium Coin Battery   |
| HE-XCK      | Programming Cables  |
| HE-PRGMINI  | USB A to Mini-B Stand-alone Programming Cable                             |
| HE-XDAC     | 2 channel Analog Output I/O option kit, selectable 0-10V, +/-10V, 4-20mA. |
| HE-XDAC107  | 4 channel Analog Output I/O option kit, selectable 0-10V, +/-10V, 4-20mA. |
| HE-XKIT     | Blank I/O Board   |
| HE200MJ2TRM | Adapter, RJ45 (8P8C) male to 8-position terminal strip.                   |
| HE-FBD001   | Ferrite core for filtering out electrical noise.                          |



# TECHNICAL SPECIFICATIONS

## General Specifications

|                               |   |
|-------------------------------|---|
| Primary Power Range           | 10-30VDC  |
| Maximum Current               | 500mA, Class 2<br>750mA, Class 2 with heater*           |
| Required Power (Steady State) | 130mA @ 24VDC   |
| Inrush Current                | 30A for < 1ms   |
| Typical power backlight 100%  | 136mA @ 10V (1.36 W)<br>64mA @ 24V (1.53 W)             |
| Power Backlight Off           | 15mA @ 24V (0.36 W)                                     |
| Power Ethernet Models         | 35mA @ 10V (0.35 W)<br>20mA @ 24V (0.48 W)              |
| Heater Option*                | 250mA @ 24VDC with heater*                              |
| Real Time Clock               | Battery backed; lithium coin cell CR2450                |
| Clock Accuracy                | +/- 90 Secs/Month                                       |
| Relative Humidity             | 5 to 95% Non-condensing                                 |
| Operating Temperature         | -10°C to +60°C  |
| Storage Temperature           | -20°C to +70°C  |
| Weight                        | 0.75 lbs/ 340 g (without I/O)                           |
| Altitude                      | Up to 2000m   |
| Rated Pollution Degree        | Evaluated for Pollution Degree 2 Rating                 |
| Certifications (UL/CE)        | <a href="#">North America</a> or <a href="#">Europe</a> |
| Enclosure Type                | 1, 3R, 4, 4X, 12, 12K & 13                              |

\*Heater Option (Model # plus "-22")

## Control and Logic

|                           |   |
|---------------------------|---|
| Control Language Support  | Register-Based Advanced Ladder;<br>Variable-Based Advanced Ladder;<br>IEC 61131-3 Languages |
| Logic Program Size        | 256kB   |
| Scan Rate                 | 0.7ms/kB logic (XLE)<br>0.8ms/kB logic (XLT)  |
| Digital Inputs            | 2048  |
| Digital Outputs           | 2048  |
| Analog Inputs             | 512   |
| Analog Outputs            | 512   |
| General Purpose Registers | 9,999 (words) Retentive<br>2,048 (bits) Retentive<br>2,048 (bits) Non-retentive             |

## User Interface

|                       |  |
|-----------------------|--|
| Display Type          | Transflective LCD Sun- light Readable  |
| Resolution            | 128 x 64 pixels (XLEe)<br>160 x 128 pixels (XLTe)                                |
| Color                 | Monochrome   |
| Built-In Storage      | 16 MB  |
| User-Program. Screens | 1023 Maximum pages;<br>50 objects per page                                       |
| Backlight             | LED  |
| Backlight Lifetime    | 30,000+ hrs  |
| Brightness Control    | 0-100% (XLT) via System Register %SR57<br>On/Off (XLE) via System Register %SR57 |
| Number of Keys        | 20 (XLE)<br>5 (XLT)  |
| Touchscreen (XLTe)    | Resistive 1,000,000+ touch life  |

## Connectivity

|                    |  |
|--------------------|--|
| Serial Ports       | RS-232 full handshaking or RS-485 half duplex on first Modular Jack (MJ1)<br>RS-232 or RS-485 on second Modular Jack (MJ2) |
| Serial Protocols   | Modbus RTU, GE SNP, GPS (See Cscape for additional protocols)  |
| USB Mini-B         | Programming only   |
| CAN                | 1 x CAN Port, Isolated 1 kV  |
| CAN Protocols      | CsCAN, CANopen, DeviceNet Controller, J1939  |
| Ethernet           | Ethernet versions only<br>(XLEe & XLTe)  |
| Ethernet Protocols | TCP/IP, Modbus TCP, FTP, SRTP, EGD, ICMP, ASCII  |
| Remote I/O         | SmartRail, SmartStix,<br>SmartBlock, SmartMod  |
| Removable Memory   | MicroSD, SDHC, SDXC, IN FAT32 format, support for 32 GB Maximum Application Updates,<br>Datalogging                        |
| Audio (XLTe only)  | Beeper, System or<br>Software Controlled   |

## CONTROLLER OVERVIEW

### Overview of XLE and XLT



1. Function Keys
2. Touchscreen
3. Navigation Keys
4. USB Mini-B Port
5. High Capacity microSD Slot
6. RS-232/RS-485 Serial Ports (2)
7. Wide-Range DC Power
8. CAN Port
9. Ethernet LAN Port (XLEe and XLTe only)
10. Optional Built-In I/O (Models 2-6 only)
11. Configuration Switches
12. Mounting Clip Locations
13. DIN Rail Clip
14. Softkeys

**NOTE:** See Precaution #12 on about USB and grounding.

## Power Wiring

**NOTE:** The Primary Power Range is 10VDC to 30VDC.



HG-007

| Primary Power Port Pins |        |                            |
|-------------------------|--------|----------------------------|
| PIN                     | Signal | Description                |
| 1                       | Ground | Frame Ground               |
| 2                       | DC-    | Input Power Supply Ground  |
| 3                       | DC+    | Input Power Supply Voltage |

### DC Input / Frame

- Solid/Stranded Wire: 12-24 awg (2.5-0.2mm)
- Strip length: 0.28" (7mm)
- Torque, Terminal Hold-Down Screws: 4.5 – 7 in-lbs (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.

### Power Up

1. **OPTION:** Attach ferrite core with a minimum of two turns of the DC+ and DC- signals from the DC supply that is powering the controllers.



HG-006

2. Connect to earth ground.
3. Apply recommended power.

## Model 2 Specifications

### Digital DC Input

|                                      |  |                  |
|--------------------------------------|--|------------------|
| Inputs per Module                    | 12 including 4 configurable HSC inputs |                  |
| Commons per Module                   | 1                                      |                  |
| Input Voltage Range                  | 12VDC / 24VDC                          |                  |
| Absolute Maximum Voltage             | 30VDC Max.                             |                  |
| Input Impedance                      | 10kΩ                                   |                  |
| Input Current                        | Positive Logic                         | Negative Logic   |
| Upper Threshold Lower Threshold      | 0.8mA<br>0.3mA                         | -1.6mA<br>-2.1mA |
| Maximum Upper Threshold              | 8VDC                                   |                  |
| Minimum Lower Threshold              | 3VDC                                   |                  |
| OFF to ON Response                   | 1ms                                    |                  |
| ON to OFF Response                   | 1ms                                    |                  |
| High Speed Counter Maximum Frequency | 500kHz                                 |                  |

### Digital Relay Outputs

|  |   |
|--|---|
| Outputs per Module                                   | 6 Relay   |
| Commons per Module                                   | 6   |
| Maximum Output Current per Relay                     | 3A @ 250VAC, resistive                                  |
| Maximum Total Output Current                         | 5A continuous   |
| Maximum Output Voltage                               | 275VAC, 30 VDC  |
| Maximum Switched Power                               | 1000VAC, 150 W  |
| Contact Isolation to Ground                          | 1000VAC   |
| Maximum Voltage Drop at Related Current              | 0.5V  |
| Expected Life (see below derating chart for details) | <b>No Load:</b> 5,000,000<br><b>Rated Load:</b> 100,000 |
| Maximum Switching Rate                               | 300 CPM at no load<br>20 CPM at rated load              |
| Type   | Mechanical Contact                                      |
| Response Time  | One update per<br>ladder scan plus 10ms                 |

## Analog Inputs, Medium Resolution

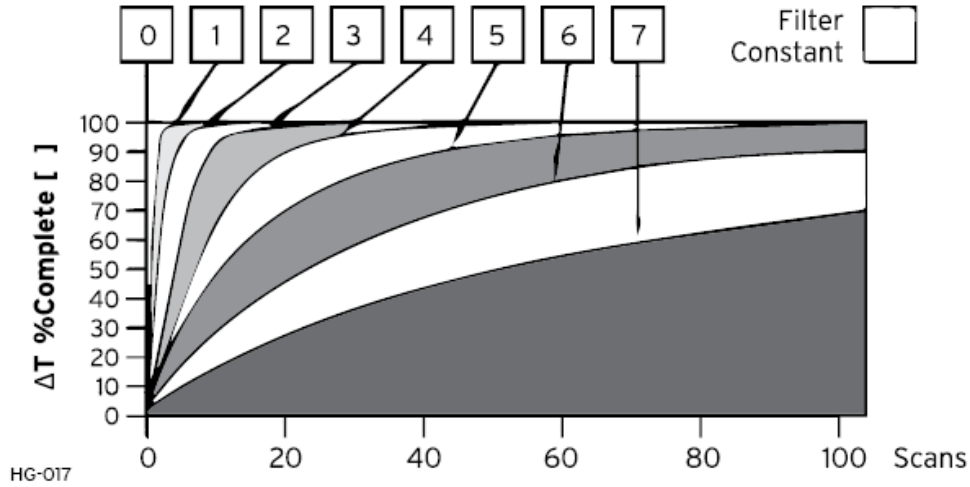
|   |  |
|---|--|
| Number of Channels  | 4  |
| Input Ranges  | 0-10VDC, 0-20mA, 4-20mA  |
| Safe Input Voltage Range  | -0.5V to 12V   |
| Input Impedance<br>(clamped @ -0.5VDC to 12VDC)                           | <b>Current Mode:</b> 100Ω<br><b>Voltage Mode:</b> 500kΩ              |
| Nominal Resolution  | 12 Bits  |
| %AI Full Scale  | <b>0V, 20mA, 100mV:</b><br>32,000 counts full scale                  |
| Maximum Over Current  | 35mA   |
| Conversion Speed  | Once per Ladder Scan   |
| Maximum Error at 25°C<br>(excluding Zero) Adjusting Filtering may Tighten | 4-20mA 1.00%<br>0-20mA 1.00%<br>0-10VDC 1.50%                        |
| Filtering   | 160Hz Hash (noise) Filter, 1-128 Scan Digital Running Average Filter |

# Chapter 1: WIRING: INPUTS AND OUTPUTS

## Analog Inputs Information

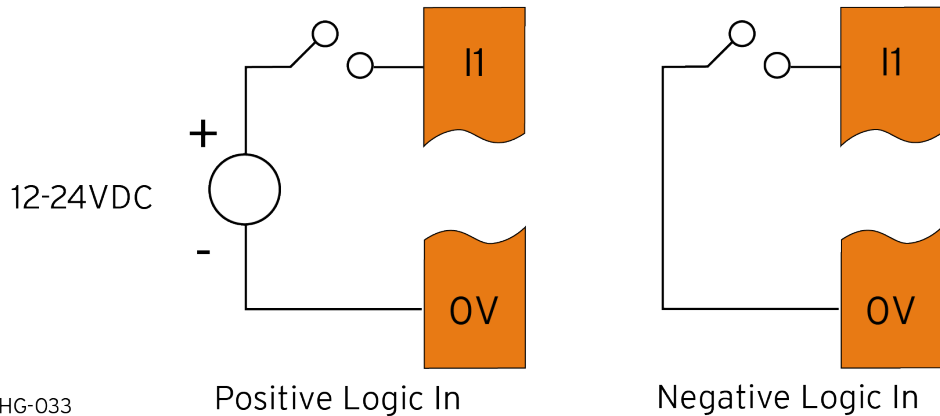
Raw input values for channels 1-4 are found in the registers as Integer-type data with a range from 0 – 32000.

Analog inputs may be filtered digitally with the Filter Constant found in the Cscape Hardware Configuration for Analog Inputs. Valid filter values are 0-7 and act according to the following chart:



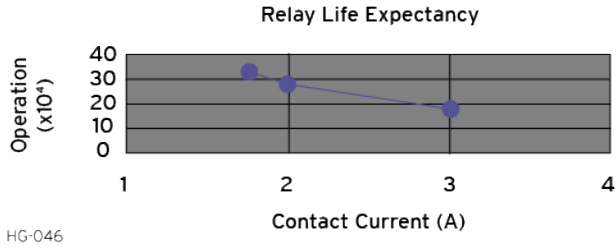
| Data Values    |                          |
|----------------|--------------------------|
| Input Mode:    | Data Format, 12-bit INT: |
| 0-20mA, 4-20mA | 0-32000                  |
| 0-10V          | 0-32000                  |

## Digital Inputs



Digital inputs may be wired in either a Positive Logic or Negative Logic fashion as shown. The setting in the Cscape Hardware Configuration for the Digital Inputs must match the wiring used in order for the correct input states to be registered. No jumper settings are required for XLEe/XLTc. When used as a normal input and not for high speed functions, the state of the input is reflected in registers %I1 – %I12.

# Relay Life

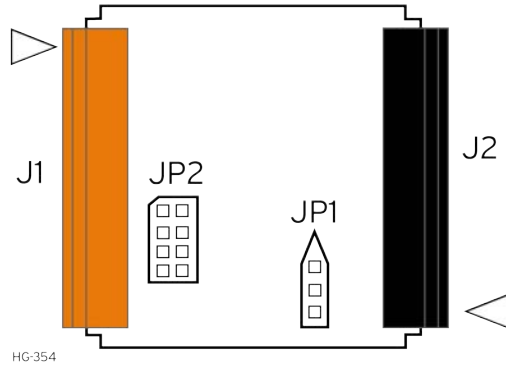


**WARNING:** Exposure to some chemicals may degrade the sealing proper- ties of materials used in the Tyco relay PCJ.

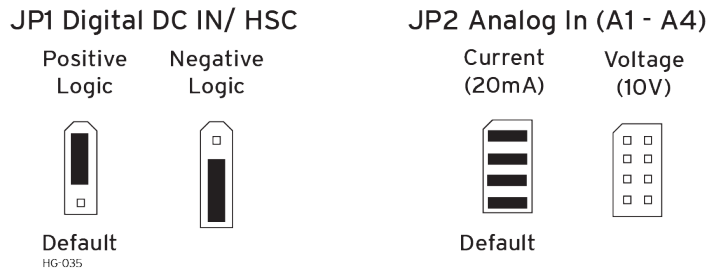
**Cover/Case & Base:** Mistubishi engineering Plastics Corp. 5010GN6-30 or 5010GN6-30 M8 (PBT)

**Sealing Material:** Kishimoto 4616-50K (I part epoxy resin)

# Jumper Settings for Model 2



Location of I/O jumpers (JP1 & JP2) and wiring connectors (J1 & J2) with back cover removed.



**NOTE:** The Cscape Module Configuration must match the selected I/O (JP) jumper settings.

**NOTE:** When using JP2 (A1-A4), each channel can be independently configured.

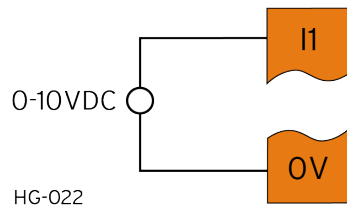
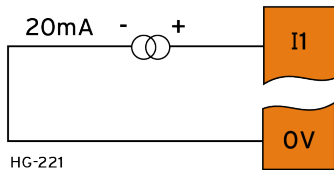
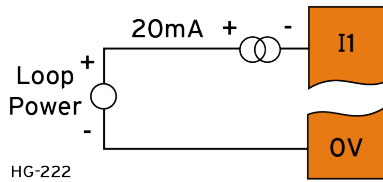
## Back Panel Torque Ratings

- XLE/XLT:** 3.0 - 4.0 in-lbs (0.34 - 0.45 N-m)
- XL4/XL4 Prime:** 3.0 - 4.0 in-lbs (0.34 - 0.45 N-m)
- EXL6/XL6 Prime:** 3.0 - 4.0 in-lbs (0.34 - 0.45 N-m)
- EXLW/ XLW Prime:** 3.0 - 3.5 in-lbs (0.34 - 0.40 N-m)
- XL7/XL7 Prime:** 3.0 - 3.5 in-lbs (0.34 - 0.40 N-m)
- EXL10/XL10 Prime:** 3.0 - 3.5 in-lbs (0.34 - 0.40 N-m)

## J1 Wiring - Digital In / Analog In

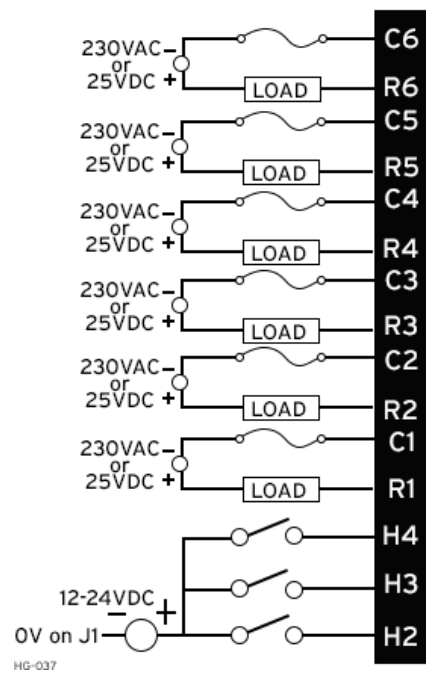
| J1 (Orange) | Name               |  |
|-------------|--------------------|--|
| I1 (%I1)    | Digital In 1       |  |
| I2 (%I2)    | Digital In 2       |  |
| I3 (%I3)    | Digital In 3       |  |
| I4 (%I4)    | Digital In 4       |  |
| I5 (%I5)    | Digital In 5       |  |
| I6 (%I6)    | Digital In 6       |  |
| I7 (%I7)    | Digital In 7       |  |
| I8 (%I8)    | Digital In 8       |  |
| H1          | HSC1/Digital In. 9 |  |
| 0V          | Common             |  |
| A1 (%A11)   | Analog In 1        |  |
| A2 (%A12)   | Analog In 2        |  |
| A3 (%A13)   | Analog In 3        |  |
| A4 (%A14)   | Analog In 4        |  |
| OV          | Common             |  |

**NOTE:** The 0V terminals are internally connected.



## J2 Wiring - Relay Out / Analog or Digital In

| J2 (Black) | Name                 |
|------------|----------------------|
| C6 (%Q6)   | Relay 6 COM          |
| R6 (%Q6)   | Relay 6 NO           |
| C5 (%Q5)   | Relay 5 COM          |
| R5 (%Q5)   | Relay 5 NO           |
| C4 (%Q4)   | Relay 4 COM          |
| R4 (%Q4)   | Relay 4 NO           |
| C3 (%Q3)   | Relay 3 COM          |
| R3 (%Q3)   | Relay 3 NO           |
| C2 (%Q2)   | Relay 2 COM          |
| R2 (%Q2)   | Relay 2 NO           |
| C1 (%Q1)   | Relay 1 COM          |
| R1 (%Q1)   | Relay 1 NO           |
| H4 (%I12)  | HSC4 / Digital In 12 |
| H3 (%I11)  | HSC3 / Digital In 11 |
| H2 (%I10)  | HSC2 / Digital In 10 |



### Wiring Details

**Solid/Stranded Wire:** 12-24 awg (2.5-0.2mm<sup>2</sup>).

**Strip Length:** 0.28" (7mm).

**Torque, Terminal Hold-Down Screws:** 4.5 – 7 in-lbs (0.50 – 0.78 N-m).

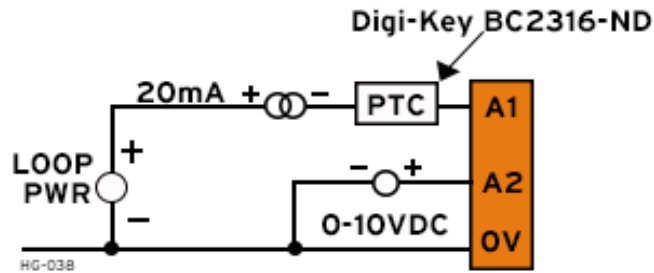
## BUILT-IN I/O

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.

| Digital and Analog I/O Functions |         |
|----------------------------------|---------|
| Digital Inputs                   | %I1-12  |
| Reserved                         | %I13-32 |
| ESCP Alarm                       | n/a     |
| Digital Outputs                  | %Q1-6   |
| Reserved                         | %Q7-24  |
| Analog Inputs                    | %AI1-4  |
| Reserved                         | %AI5-12 |
| Analog Outputs                   | n/a     |
| Reserved                         | n/a     |

## Analog Input Transorb Failure

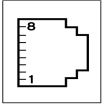
A common cause of Analog Input Transorb Failure on Analog Inputs Model 2, 3, 4 & 5: If a 4- 20mA circuit is initially wired with loop power, but without a load, the analog input could see 24VDC. This is higher than the rating of the transorb. This can be solved by NOT connecting loop power prior to load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



# COMMUNICATIONS

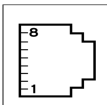
## Serial Communication

### MJ1 Wiring

|   |  |
|---|--|
|  | <b>RS-232</b> with full handshaking or <b>RS-485</b> half-duplex<br><b>RS-485</b> termination via switches; biasing via software |
|---|--|

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

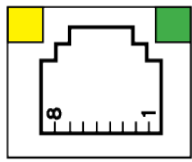
### MJ2 Wiring

|   |   |
|---|---|
|  | <b>RS-232</b> or <b>RS-485</b> half or full-duplex, software selectable<br><b>RS-485</b> termination via switches; biasing via software |
|---|---|

| MJ2 Pins |                   |              |
|----------|-------------------|--------------|
| PIN      | SIGNAL            | DIRECTION    |
| 8        | 232 TXD           | OUT          |
| 7        | 232 RXD           | IN           |
| 6        | 0V                | GROUND       |
| 5        | +5V @ 60mA        | OUT          |
| 4        | 485 TX-           | OUT          |
| 3        | 485 TX+           | IN           |
| 2        | 485 RX- or RX/TX- | IN or IN/OUT |
| 1        | 485 RX+ or RX/TX+ | IN or IN/OUT |

**NOTE:** Attach optional [ferrite core](#) with a minimum of two turns of serial cable.

## Ethernet

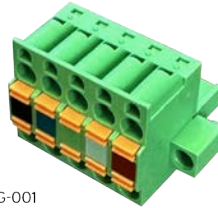


**Green LED indicates link** - when illuminated, data communication is available.

**Yellow LED indicates activity** - when flashing, data is in transmission.

HG-041

## CAN Communications

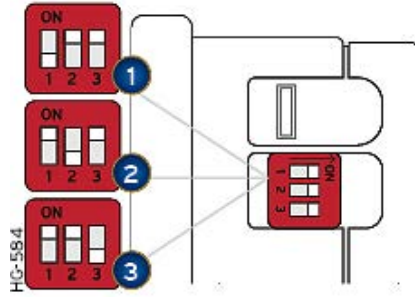


HG-001

| CAN Pin Assignments |         |                       |
|---------------------|---------|-----------------------|
| PIN                 | SIGNAL  | DESCRIPTION           |
| 1                   | V-      | CAN Ground – Black    |
| 2                   | CN_L    | CAN Data Low – Blue   |
| 3                   | SHLD    | Shield Ground – None  |
| 4                   | CN_H    | CAN Data High – White |
| 5                   | V+ (NC) | No Connect – Red      |

- **Solid/Stranded Wire:** 12-24 awg (2.5-0.2mm).
- **Strip Length:** 0.28" (7mm).
- Locking spring-clamp, two-terminators per conductor.
- **Torque, Terminal Hold-Down Screws:** 4.5 – 7 in-lbs (0.50 – 0.78 N-m).
- V+ pin is not internally connected, the SHLD pin is connected to Earth ground via a 1MΩ resistor and 10 nF capacitor.

# DIP Switches

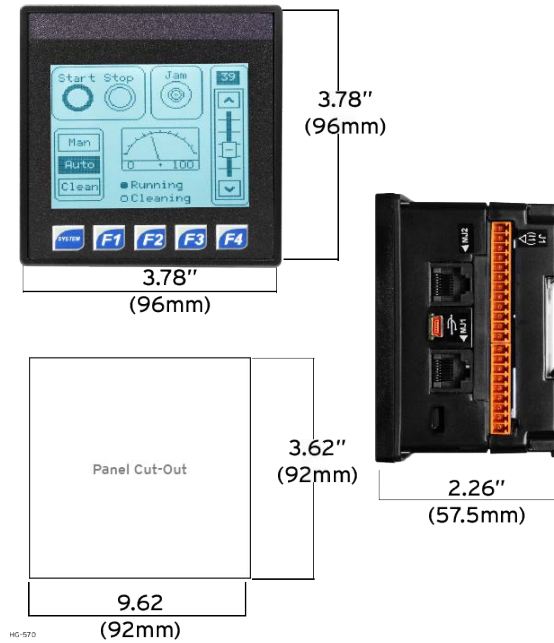


| DIP Switches |                        |                 |         |
|--------------|------------------------|-----------------|---------|
| PIN          | NAME                   | FUNCTION        | DEFAULT |
| 1            | MJ1 RS-485 Termination | ON = Terminated | OFF     |
| 2            | MJ2 RS-485 Termination | ON = Terminated | OFF     |
| 3            | Bootload               | Always Off      | OFF     |

The DIP switches are used to provide a built-in termination to both the MJ1 port and MJ2 port if needed. The termination for these ports should only be used if this device is located at either end of the multidrop/daisy- chained RS-485 network.

## DIMENSIONS & INSTALLATION

### Dimensions & Panel Cutout



\*+/- 0.1mm cutout tolerance

### Installation Information

- The XLE/XLT utilizes a clip installation method to ensure a robust and watertight seal to the enclosure. Please follow the steps below for the proper installation and operation of the unit.
- This equipment is suitable for Class I, Division 2, Groups A, B, C and D or non-hazardous locations only.
- Digital outputs shall be supplied from the same source as the operator control station.
- Jumpers on connector JP1 shall not be removed or replaced while the circuit is live unless the area is known to be free of ignitable concentrations of flammable gases or vapors.
- **WARNING-** The USB ports are for operational maintenance only. Do not leave permanently connected unless area is known to be non-hazardous.

## Installation Procedure

1. Carefully locate an appropriate place to mount the XLE/XLT. Be sure to leave enough room at the top of the unit for insertion and removal of the microSD™ card.
2. Carefully cut the host panel per the diagram, creating a 92mm x 92mm +/-0.1 mm opening into which the XLE/XLT may be installed. If the opening is too large, water may leak into the enclosure, potentially damaging the unit. If the opening is too small, the OCS may not fit through the hole without damage.
3. Remove any burrs and or sharp edges and ensure the panel is not warped in the cutting process.
4. Remove all Removable Terminals from the XLE/XLT. Insert the XLE/XLT through the panel cutout (from the front). The gasket must be between the host panel and the XLE/XLT.
5. Install and tighten the four mounting clips (provided in the box) until the gasket forms a tight seal (NOTE: Max torque 0.8 to 3 Nm, or 7-10 in-lbs).
6. Reinstall the XLE/XLT I/O Removable Terminal Blocks. Connect communications cables to the serial port, USB ports, Ethernet port, and CAN port as required.

## Battery Maintenance

The XLE/XLT uses a replaceable non-rechargeable 3V Lithium coin cell battery (CR2450) to run the Real-Time Clock and to keep the retained register values. This battery is designed to maintain the clock and memory for 7 to 10 years. Please reference MAN0878 providing instructions on how to replace the battery.

## SAFETY & MAINTENANCE

### Warnings

1. To avoid the risk of electric shock or burns, always connect the safety (or earth) ground before making any other connections.
2. 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.
3. Replace fuse with the same type and rating to provide protection against risk of fire and shock hazards.
4. In the event of repeated failure, do **NOT** replace the fuse again as repeated failure indicates a defective condition that will **NOT** clear by replacing the fuse.
5. 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.
6. 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.
7. **WARNING: Battery may explode if mistreated. Do not recharge, disassemble, or dispose of in fire.**
8. **WARNING: EXPLOSION HAZARD - Batteries must only be changed in an area known to be non-hazardous.**
9. **WARNING: Do not disconnect while circuit is live unless area is known to be non-hazardous.**

### FCC Compliance

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.

### Precautions

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:

1. Connect the safety (earth) ground on the power connector first before making any other connections.
2. When connecting to the electric circuits or pulse-initiating equipment, open their related breakers.
3. Do NOT make connection to live power lines.
4. Make connections to the module first; then connect to the circuit to be monitored.
5. Route power wires in a safe manner in accordance with good practice and local codes.
6. Wear proper personal protective equipment including safety glasses and insulated gloves when making connections to power circuits.
7. Ensure hands, shoes, and floor are dry before making any connection to a power line.
8. Make sure the unit is turned OFF before making connections to terminals.
9. Make sure all circuits are de-energized before making connections.
10. Before each use, inspect all cables for breaks or cracks in the insulation. Replace immediately if defective.
11. Use copper conductors in field wiring only, 60/75°C.
12. Use caution when connecting controllers to PCs via serial or USB. PCs, especially laptops, may use “floating power supplies” that are ungrounded. This could cause a damaging voltage potential between the laptop and controller. Ensure the controller and laptop are grounded for maximum protection. Consider using a USB isolator due to voltage potential differences as a preventative measure.



# Technical Support

| North America  | Europe   |
|--|--|
| 1 (317) 916-4274<br>1 (877) 665-5666<br><a href="http://www.hornerautomation.com">www.hornerautomation.com</a><br><a href="mailto:APGUSATechSupport@heapg.com">APGUSATechSupport@heapg.com</a> | +353 (21) 4321-266<br><a href="http://www.hornerautomation.eu">www.hornerautomation.eu</a><br><a href="mailto:technical.support@horner-apg.com">technical.support@horner-apg.com</a> |