# XL4 Prime - Model 0
## No Built-In I/O

## Part Numbers

| Global Part Number | HE-XPC1E0 |
|---|---|
| European Part Number | HEXP251C100 |

## User Manual and Add-Ons

Find the documents via the Documentation Search.

| Part # | Description |
|---|---|
| MAN0964 | XL4 & XL4 Prime User Manual |
| HE-BAT013 | CR2032 Lithium Battery |
| HE-XCK | Programming Cables |
| 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. |

## Backup Battery

The XL4 Prime uses a Renata CR2032 lithium battery to run the Real Time Clock. The battery life is 7-10 years.

## Table of Contents

# TECHNICAL SPECIFICATIONS

## General Specifications

| | |
|---|---|
| Typical Power Back-light 100% | 407mA @ 10V (4.07W)<br>192mA @ 24V (4.61W) |
| Power Backlight @ 50% | 167mA @ 24V (4.01W) |
| Power Backlight OFF | 165mA @ 24V (3.96W) |
| Required Power (Inrush) | 2A for < 1ms @ 24VDC, DC switched |
| Heater Option* | 250mA with heater* (24VDC) |
| Primary Power Range | 10 - 30VDC<br>10-24VDC (with heater*) |
| Max. Current | 500mA, Class 2<br>750mA, Class 2 (with heater*) |
| Relative Humidity | 5 to 95%, Non-Condensing |
| Clock Accuracy | + / - 20 ppm maximum at 25°C (+/- 1 min/month) |
| Real Time Clock | Battery Backed, Rechargeable Lithium |
| Operating Temperature | -10°C to +60°C<br>-40°C to +60°C (with heater*) |
| Storage Temperature | -20°C to +60°C |
| Weight | 12 oz / 340g (without I/O) |
| Altitude | Up to 2000m |
| Pollution Degree | Degree 2 Rating |
| Certifications (UL/CE) | North America or Europe |
| Enclosure Type | 1, 3R, 4, 4X, 12, 12K & 13 |

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

## Control and Logic

| | |
|---|---|
| Control Lang. Support | Register-Based Advanced Ladder Logic;<br>Variable-Based Advanced Ladder;<br>IEC 61131-3 Languages |
| Logic Program Size | 2MB, maximum |
| Scan Rate | .02ms/kB |
| Digital Inputs | 2048 |
| Digital Outputs | 2048 |
| Analog Inputs | 512 |
| Analog Outputs | 512 |
| Gen. Purpose Registers | 50,000 (words) Retentive<br>16,384 (bits) Retentive<br>16,384 (bits) Non-retentive |

## User Interface

| | |
|---|---|
| Display Type | 3.5" TFT Color |
| Screen Brightness | 640cd/m2 (nits) |
| Resolution | QVGA (320 x 240) |
| Color | 16-bit (65,535) |
| User-Program. Screens | 1023 max pages; 1023 objects per page |
| Backlight | LED - 50,000 hour life |
| Brightness Control | 0-100% via System Register %SR57 |
| Number of Keys | 5 |

## Connectivity

| | |
|---|---|
| Serial Ports | 1 RS-232 and 1 RS-485 on singular Modular Jack |
| USB mini-B | USB 2.0 (480MHz) Programming & Data Access |
| USB A (500mA max) | USB 2.0 (480MHz) for USB flash drives (2TB) |
| CAN Port Isolated 1kV | Remote I/O, Peer-to-peer Comms, Cscape |
| CAN Protocols | CsCAN, CANopen, DeviceNet, J1939 |
| Ethernet | 10/100 Mb (Auto-MDX) |
| Ethernet Protocols | TCP/IP, Modbus TCP, FTP, SMTP, EGD, ICMP, ASCII |
| Remote I/O | SmartRail, SmartStix, SmartBlock, SmartMod |
| Removable Memory | microSD, SDHC, SDXC IN FAT32 format, support for 32GB max. Application Updates, Datalogging |

## USB Webcams

USB Webcams supported should support the UVC (USB Video class) protocol for the OCS to be able to display video. Most USB based video devices support this today. Special feature such as zoom and high definition are not supported by the OCS.
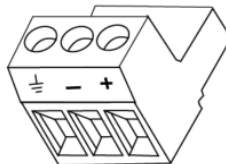
# CONTROLLER OVERVIEW

## Overview of OCS
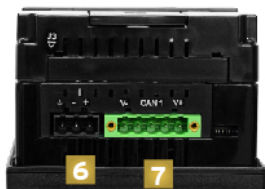


1. Touchscreen
2. High Capacity microSD Slot
3. RS232/RS485 Serial Port
4. CAN Port (via RJ485)
5. LAN Port
6. USB Mini-B Port
7. Analog I/O
8. DC Inputs
9. DC Outputs
10. DC Power

**NOTE**: See "Precautions" on page 6 about USB and grounding.

## Power Wiring

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



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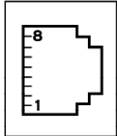


2. Connect to earth ground.
3. Apply recommended power.

# COMMUNICATIONS

## Serial Communication

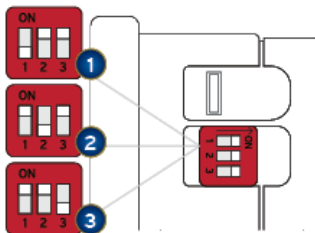### MJ1/2 Serial Ports



2 Serial Ports on 1 Module Jack (8posn)

**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 | 0V | GROUND | 0V | GROUND |
| 5 | +5V @ 60mA | OUT | +5V @ 60mA | OUT |
| 4 | RTS | OUT | -- | -- |
| 3 | CTS | IN | -- | -- |
| 2 | -- | -- | RX- / TX- | IN / OUT |
| 1 | -- | -- | RX+ / TX+ | IN / OUT |

**NOTE**: Attach optional Ferrite Core (HE-FBD001) with a minimum of two turns of serial cable.
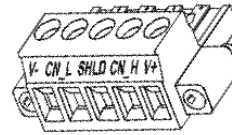
## CAN Communications



| 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 | RS-485 Termination | ON = Terminated | OFF |
| 2 | Spare | Always OFF | OFF |
| 3 | Factory Use | Always OFF | OFF |

The DIP switches are used to provide a built-in termination to the 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.
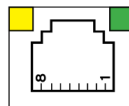
## Ethernet



**Green LED indicates link** - when illuminated, data communication is available.
**Yellow LED indicates activity** - when flashing, data is in transmission.

# DIMENSIONS & INSTALLATION

## XL4 & XL4 Prime Dimensions



3.78"
(96mm)

3.78"
(96mm)

2.264"
(57.5mm)

Panel Cut-Out

3.622"
(92mm)

3.622
(92mm)

\* +/- 0.1mm cutout tolerance

## Installation Information

- The XL4/XL4 Prime 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 OCS 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 +/-0.1mm opening into which theOCS 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 OCS. Insert the OCSthrough the panel cutout (from the front). The gasket must be between the host panel and the OCS.
5. Install and tighten the four mounting clips (provided in the box) until the gasket forms a tight seal. **NOTE**: Max torque is 0.8 to 1.13Nm, 7 to 10 in-lbs.
6. Reinstall the I/O Removable Terminal Blocks. Connect communications cables to the serial port, USB ports, Ethernet port, and CAN port as required.

# 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 are is know 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.

## Technical Support

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## 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
2. other connections.
3. When connecting to the electric circuits or pulse-initiating equipment, open their
4. related breakers.
5. Do NOT make connection to live power lines.
6. Make connections to the module first; then connect to the circuit to be monitored.
7. Route power wires in a safe manner in accordance with good practice and local codes.
8. Wear proper personal protective equipment including safety glasses and insulated gloves when making connections to power circuits.
9. Ensure hands, shoes, and floor are dry before making any connection to a power line.
10. Make sure the unit is turned OFF before making connection to terminals.
11. Make sure all circuits are de-energized before making connections.
12. Before each use, inspect all cables for breaks or cracks in the insulation. Replace
13. immediately if defective.
14. Use copper conductors in Field Wiring only, 60/75°C.
15. 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.