



EXLW OCS DATASHEET

MODEL 5

12 DC In, 12 DC Out, 2 - 14/16-bit Analog In (mA/V/Tc/mV/RTD), 2 - 12-bit Analog Out

1 TECHNICAL SPECIFICATIONS

1.1 General Specifications

| | |
|-------------------------------|---|
| Required Power (Steady State) | 420mA @ 12VDC 230mA @ 24VDC |
| Required Power (Inrush) | 25A for < 1ms @ 24VDC, DC switched |
| Primary Power Range | 10 - 30VDC |
| Relative Humidity | 5 to 95% non-condensing |
| Typical Power Backlight 100% | 6.816W @ 24VDC |
| Power Backlight 50% | 6.169W @ 24VDC |
| Power Backlight OFF | 5.472W @ 24VDC |
| Clock Accuracy | + / - 20 ppm maximum at 25°C (+/- 1 min/month) |
| Real Time Clock | Battery Backed, Rechargeable Lithium |
| Operating Air Temp | -10°C to +60°C |
| Storage Temp | -20°C to +60°C |
| Weight | 1.59 lbs (721.2g) |
| Altitude | Up to 2000m |
| Rated Pollution Degree | Evaluated for Pollution Degree 2 Rating |
| Certifications (UL/CE) | North America: https://hornerautomation.com/certifications/ Europe: https://www.hornerautomation.eu/support/certifications-2 |

1.2 Control & Logic

| | |
|--------------------------|--|
| Control Language Support | Advanced Ladder Logic Full IEC 61131-3 Languages Tag-Based Editor |
| Logic Program Size | 1 MB, maximum |
| Logic Scan Rate | 0.013ms/kB |
| Digital Inputs | 2048 |
| Digital Outputs | 2048 |
| Analog Inputs | 512 |
| Analog Outputs | 512 |
| Gen. Purpose Registers | 50,000 (words) Retentive 16,384 (bits) Retentive 16,384 (bits) Non-retentive |

1.3 Connectivity

| | |
|------------------------|---|
| Serial Ports | 1 RS-232 and 1 RS-485 on first Modular Jack (MJ1/2) 1 RS-232 or 1 RS-485 on second Modular Jack |
| USB mini-B | USB 2.0 (480MHz) Programming & Data Access |
| USB A | USB 2.0 (480MHz) for USB flash drives (2TB) |
| CAN Port Isolated 1 kV | 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, Cscape, Ethernet IP |
| Remote I/O | SmartRail, SmartStix, SmartBlock, SmartMod |
| Removable Memory | microSD, SDHC, SDXC IN FAT32 format, support for 32GB max. Application Updates, Datalogging, and more |

1.4 User Interface

| | |
|-----------------------|---------------------------------------|
| Display Type | 7" TFT Color |
| Resolution | 800 x 480 |
| Color | 16-bit (65,536) |
| Screen Memory | 17MB |
| User-Program. Screens | 1023 max pages; 1023 objects per page |
| Backlight | LED - 50,000 hour life |

1.5 High-Speed Inputs

| | |
|--------------------|---|
| Number of Counters | 4 |
| Maximum Frequency | 1MHz Max |
| Accumulator Size | 32-bits each |
| Modes Supported | Totalizer, quadrature, pulse measurement, frequency measurement, set-point controlled outputs |

1.6 High-Speed Outputs

| | |
|------------------|--------------|
| Modes Supported | Stepper, PWM |
| Output Frequency | 500kHz |

EXLW User Manual [MAN1256]

The User Manual includes extensive information on: Built-in I/O, Common %S & %SR Registers, HSC/PWM/Totalizer/Quadrature & Accumulator Registers.

technical specifications continued on next page...

technical specifications continued...

1.7 Digital DC Inputs

| | | |
|------------------------------|--|-----------------------|
| Inputs per Module | 12 Including 4 Configurable HSC Inputs | |
| Commons per Module | 1 | |
| Input Voltage Range | 12VDC / 24VDC | |
| Absolute Max. Voltage | 35VDC Max. | |
| Input Impedance | 10kΩ | |
| Input Current | Positive Logic | Negative Logic |
| Upper Threshold | 0.8mA | -1.6mA |
| Lower Threshold | 0.3mA | -2.1mA |
| Max. Upper Threshold | 8VDC | |
| Min. Lower Threshold | 3VDC | |
| OFF to ON Response | 1ms | |
| ON to OFF Response | 1ms | |
| High Speed Counter Max Freq* | 1MHz | |

*See I/O info below for detail regarding HSC and PWM

1.8 Digital DC Outputs

| | |
|------------------------------------|---|
| Outputs per Module | 16 Including 2 Configurable PWM Outputs |
| Commons per Module | 1 |
| Output Type | Sourcing / 10kΩ Pull-Down |
| Output Frequency | 500kHz |
| Absolute Max. Voltage | 28VDC Max. |
| Output Protection | Short Circuit |
| Max. Output Current/Point | 0.5A |
| Max. Total Current | 4A Continuous |
| Max. Output Supply Voltage | 30VDC |
| Min. Output Supply Voltage | 10VDC |
| Max. Voltage Drop at Rated Current | 0.25VDC |
| Max. Inrush Current | 650mA per Channel |
| Min. Load | None |
| OFF to ON Response | 1ms |
| ON to OFF Response | 1ms |
| Output Characteristics | Current Sourcing (Pos. Logic) |
| PWM Out | ≈ 5kHz |
| Rise Time | 50 - 115μs |
| Fall Time | 8-20μs |

1.9 Analog Inputs, High Resolution

| | | | |
|---|---|---|--|
| Number of Channels | 2 | Thermocouple: B / R / S E T J K / N | Temperature Range: 32°F to 2,912°F (0°C to 1,600°C) -328°F to 1,652°F (-200°C to 900°C) -400°F to 752°F (-240°C to 400°C) -346°F to 1,382°F (-210°C to 750°C) -400°F to 2,498°F (-240°C to 1,370°C) |
| Input Ranges (Selectable) | 0-10VDC; 0-20mA; 4-20mA; 100mV PT100; and J, K, N, T, E, R, S, B Thermocouples | | |
| Safe Input Voltage Range | 10VDC: -0.5V to +15V 20mA: -0.5V to +6V RTD / T/C: +/- 24VDC | Thermocouple Common Mode Range | +/- 10V |
| Nominal Resolution | 10V, 20mA, 100mV: 14 Bits RTD, Thermocouple: 16 Bits | Converter Type | Delta Sigma |
| Input Impedance (Clamped @ -0.5 Vdc to 12 Vdc) | Current Mode: 100Ω, 35mA Max. Continuous Voltage Mode: 500kΩ, 25mA Max. Continuous | Max. Error at 25°C (*excluding zero) | *4-20mA +/- 0.10% of full scale *0-20mA +/- 0.10% of full scale *0-10VDC +/- 0.10% of full scale RTD (PT100) +/- 1.0 C° of full scale 0-100mV +/- 0.05% of full scale (*excluding zero) |
| %AI Full Scale | 10V, 20mA, 100mV: 32,000 counts full scale RTD / T/C: 20 Counts / °C | Max. Thermocouple Error (After Warm up Time of One Hour) | +/-0.2% (+/-0.3% below -100°C) of full scale |
| Max. Over-Current | 35mA | Conversion Speed, Both Channels Converted | 10V, 20mA, 100mV: 30 Times/Second RTD Thermocouple: 7.5 Times/Second |
| Open Thermocouple Detec Current | 50nA | Conversion Time per Channel | 10V, 20mA, 100mV: 16.7 ms RTD, Thermocouple: 66.7 ms |
| | | RTD Excitation Current | 250μA |

1.10 Analog Outputs

| | | | |
|--|---|---|---|
| Number of Channels | 2 | Minimum 10V Load | 1kΩ |
| Output Ranges | 0-10VDC , 0-20mA | Minimum Resistance Load | 500Ω |
| Nominal Resolution | 12 Bits | Analog Outputs; Output Points Required | 2 |
| Update Rate | Once per PLC scan | | |
| Max. Error at 25°C (Excluding Zero) | 20mA 0.1% of full scale 0 - 10V 0.1% of full scale | Add'l Error for Temp. Other Than 25°C | 20mA 0.000143%/ °C 0 - 10V 0.000151%/ °C |

2 CONTROLLER OVERVIEW

2.1 - Overview of EXLW



1. Touchscreen
2. USB 2.0 "A": Flash Drive
3. LAN Port
4. PWR: 10-30VDC In
5. CAN Port
6. MJ3: RS-232/485
7. Dip Switches
8. MJ1/MJ2: RJ45 Serial Port
9. microSD: Data Storage
10. USB mini "B": Programming

NOTE: See Precaution #12 on page 6 about USB and grounding.

2.2 - Power Wiring

| 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

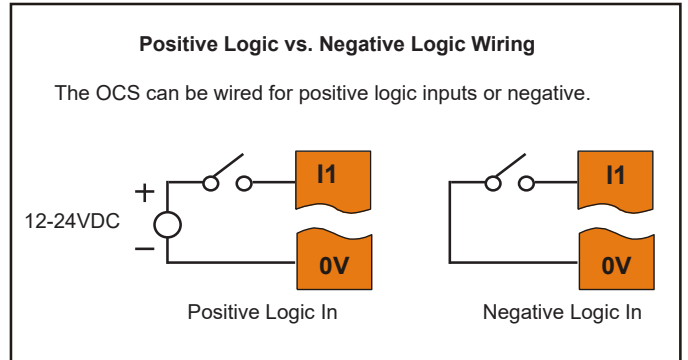
Solid/Stranded Wire: 12-24 awg (2.5-0.2mm).
Strip Length: 0.28" (7mm).
Torque Rating: 4.5 - 7 in-lbs (0.50 - 0.78 N-m).
 DC- is internally connected to I/O V-, but is isolated from CAN V-.
 A Class 2 power supply must be used.

POWER UP

1. Attach included ferrite core with a minimum of two turns of the DC+ and DC- signals from the DC supply that is powering the controller.
2. Connect to Earth Ground
3. Apply recommended power.

3 WIRING: INPUTS AND OUTPUTS

3.1 - Digital Input & Output Information



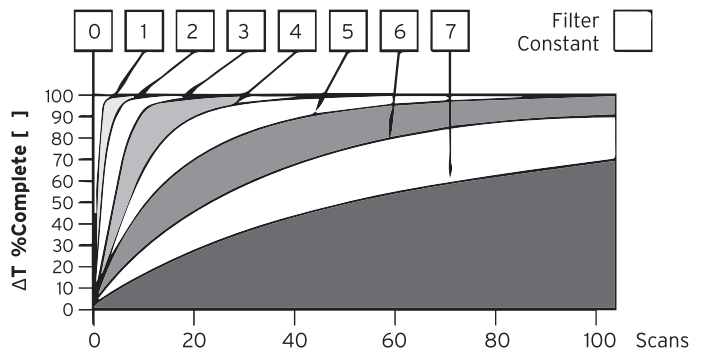
Digital inputs may be wired in either a Positive Logic or Negative Logic fashion as shown. The setting in the Cscape Hardware Configuration for the Digital Inputs must match the wiring used in order for the correct input states to be registered. When used as a normal input and not for high speed functions, the state of the input is reflected in registers %I1 - %I12.

Digital inputs may alternately be specified for use with High Speed Counter functions, also found in the Hardware Configuration for Digital Inputs. Refer to the EXLW User Manual [MAN1256] for full details.

3.2 - Analog Input Information

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

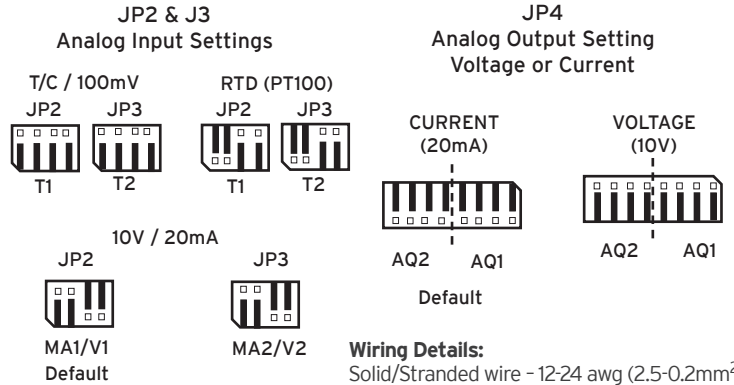
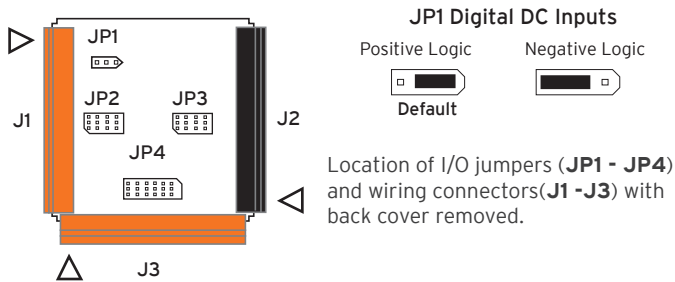
Analog inputs may be filtered digitally with the Filter Constant found in the Cscape Hardware Configuration for Analog Inputs. Valid filter values are 0 - 7 and act according to the following chart.



| Data Values | |
|----------------|--|
| INPUT MODE: | DATA FORMAT, 12-bit INT: |
| 0-20mA, 4-20mA | 0-32000 |
| 0-10V | 0-32000 |
| T/C & RTD | Temperature in °C or °F to 1 decimal place (xxx.y) NOTE: °C or °F may be selected in the Hardware Configuration section in Cscape. The value is an integer, so the user should divide by 20. |

wiring: I-O continued...

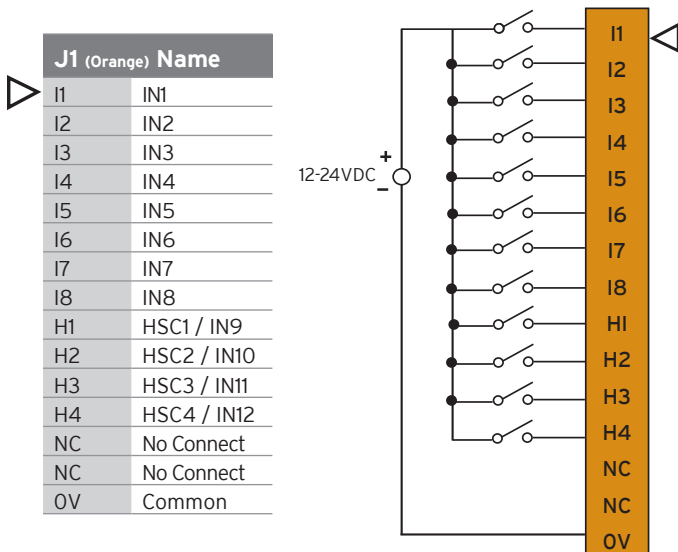
3.3- Jumper Setting Details



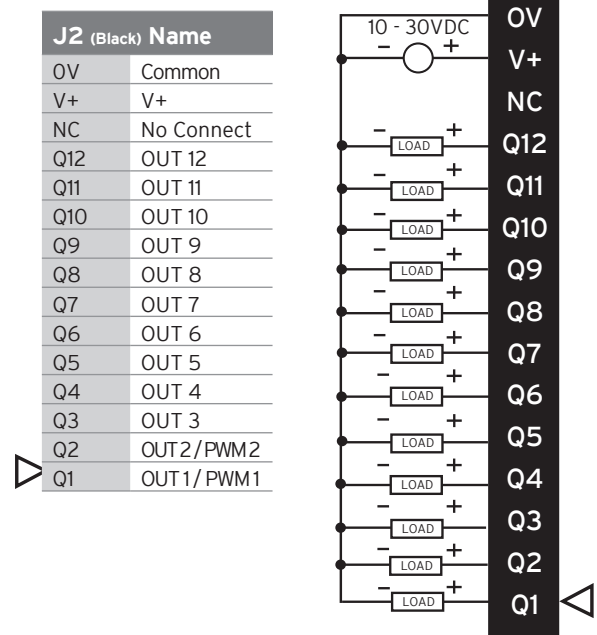
Wiring Details:
 Solid/Stranded wire - 12-24 awg (2.5-0.2mm²).
 Strip length - 0.28" (7mm).
 Torque rating: 4.5 - 7 in-lbs (0.50 - 0.78 N-m).

3.4 - Digital In & Out Wiring

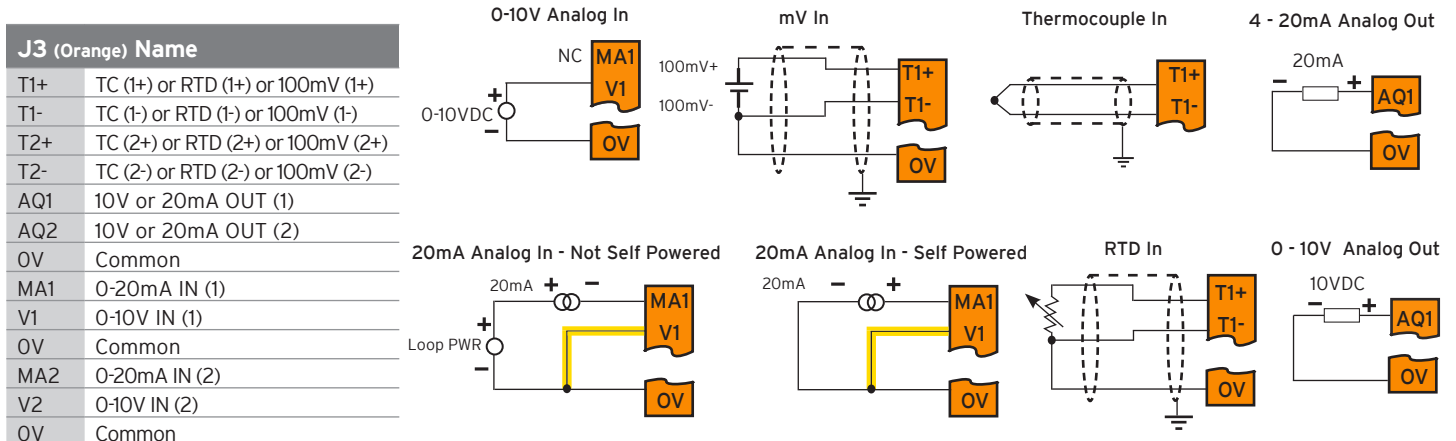
Positive Logic - Digital Inputs - J1 Wiring



Positive Logic - Digital Outputs - J2 Wiring

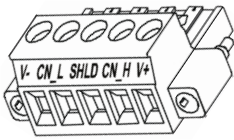


Model 5 - J3 Wiring



4 COMMUNICATIONS

4.1 - 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).

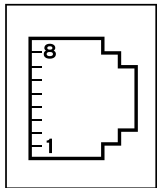
Strip Length: 0.28" (7mm).

Locking spring-clamp, two-terminators per conductor.

Torque Rating: 4.5 in-lbs (0.50 N-m).

V+ pin is not internally connected, the SHLD pin is connected to Earth ground via a 1 MΩ resistor and 10nF capacitor.

4.2 - Serial Communications



MJ1/2 SERIAL PORTS

Two Serial Ports on One Module Jack (8posn)

MJ1: RS-232 w/Full Handshaking

MJ2: RS-232 Half-Duplex

| MJ1 PINS | | | MJ2 PINS | |
|----------|------------|-----------|------------|-----------|
| PIN | SIGNAL | DIRECTION | SIGNAL | DIRECTION |
| 8 | TXD | OUT | -- | -- |
| 7 | RXD | IN | -- | -- |
| 6 | OV | GROUND | OV | 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

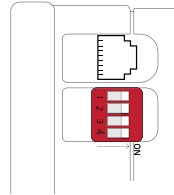
2 Multiplexed Serial Ports on One Modular Jack (8posn)

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

4.3 - Dip Switches

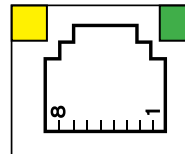
DIP SWITCHES

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



The DIP switches are used to provide a built-in termination to both the MJ1, MJ2 & MJ3 ports 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.

4.4 - Ethernet Communications



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

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

5 BUILT-IN I/O

5.1 Built-in I/O (EXLW, Model 5)

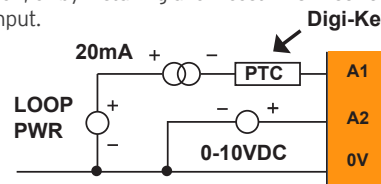
All EXLW models (except the Model 0) feature built-in I/O. The I/O is mapped into OCS Register space, in three separate areas - digital/analog I/O, high-speed counter I/O, and high-speed output I/O. Digital/analog I/O location is fixed starting at 1, but the high-speed counter and high-speed output references may be mapped to any open register location. For more details, see the EXLW OCS User's Manual [MAN1256].

5.2 Digital and Analog I/O Functions

| | |
|-----------------|---------|
| Digital Inputs | %I1-12 |
| Reserved | %I13-31 |
| ESCP Alarm | %I32 |
| Digital Outputs | %Q1-12 |
| Reserved | %Q13-24 |
| Analog Inputs | %A11-2 |
| Reserved | %A13-12 |
| Analog Outputs | %AQ9-10 |
| Reserved | %AQ1-8 |

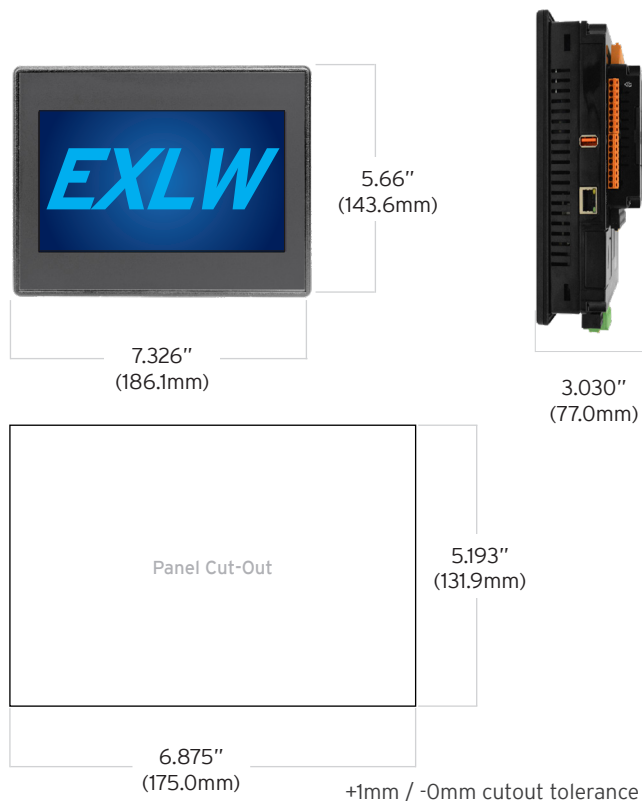
6 ANALOG IN TRANZORB FAILURE

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.



7 DIMENSIONS & INSTALLATION

7.1 - Dimensions



7.2 - Installation Procedure

- The EXLW 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.
- Carefully locate an appropriate place to mount the EXLW. Be sure to leave enough room at the top of the unit for insertion and removal of the microSD™ card.
 - Carefully cut the host panel per the diagram, creating a 131.9mm x 175.0mm, with a +1mm / -0mm panel cutout tolerance, opening into which the EXLW 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.
 - Remove any burrs and or sharp edges and ensure the panel is not warped in the cutting process.
 - Remove all Removable Terminals from the EXLW. Insert the EXLW through the panel cutout (from the front). The gasket must be between the host panel and the EXLW.
 - 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, or 7 to 10 in-lbs.
 - Reinstall the EXLW I/O Removable Terminal Blocks. Connect communications cables to the serial port, USB ports, Ethernet port, and CAN port as required.

8 SAFETY & WARNINGS

8.1 - WARNINGS

- To avoid the risk of electric shock or burns, always connect the safety (or earth) ground before making any other connections.
- 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.
- Replace fuse with the same type and rating to provide protection against risk of fire and shock hazards.
- 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.
- 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 - 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.**

8.2 - FCC COMPLIANCE

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

- This device may not cause harmful interference
- This device must accept any interference received, including interference that may cause undesired operation

8.3 - 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:

- Connect the safety (earth) ground on the power connector first before making any other connections.
- When connecting to the electric circuits or pulse-initiating equipment, open their related breakers.
- Do NOT make connection 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.
- 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.

9 BATTERY MAINTENANCE

The EXLW has an advanced battery system that uses a rechargeable lithium battery. The battery powers the real time clock when power is removed, and it is needed for register data retention. Please reference the EXLW User Manual [MAN1256] which provides instructions on how to replace the battery.

NOTE: For detailed rechargeable battery information, refer to the Battery Manual [MAN1142].

10 PART NUMBER

| | North America | Europe |
|---------|---------------|-------------|
| Model 5 | HE-EXLWE5 | HEXT381C115 |

11 TECHNICAL SUPPORT

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

North America
(317) 916-4274
www.hornerautomation.com
techsppt@heapg.com

Europe
(+) 353-21-4321-266
www.hornerautomation.eu
technical.support@horner-apg.com