

MODEL CSMSTRV2 - Modular Controller Series Master



- PERFORMS HIERARCHICAL CONTROL OF OTHER MODULES IN THE MODULAR CONTROLLER SERIES
- PROVIDES POWER AND COMMUNICATIONS TO MODULES THROUGH BACKPLANE CONNECTOR
- STORES MODULE CONFIGURATION INFORMATION, AND AUTOMATICALLY REPROGRAMS REPLACED MODULES
- EXTENSIVE BUILT-IN DRIVER LIST ALLOWS EASY DATA MAPPING TO PLCs, PCs, AND SCADA SYSTEMS
- INDEPENDENT SERIAL PORTS PROVIDE VIRTUALLY UNLIMITED INTEGRATION METHODS
- 10 BASE-T/100 BASE-TX ETHERNET CONNECTION PROVIDES NETWORKING CAPABILITY
- SUPPORTS UP TO 16 MODULAR CONTROLLER SERIES MODULES



FOR USE IN HAZARDOUS LOCATIONS:
 Class I, Division 2, Groups A, B, C, and D



GENERAL DESCRIPTION

The Model CSMSTRV2 is a communications and control platform designed for use with Modular Controller Series slave modules. The CSMSTRV2V2 uses a proprietary high speed serial protocol to communicate, via backplane connection, with up to 16 slave modules. Through the same connection, the Master also provides power to the modules.

When powered up, the CSMSTRV2 automatically identifies and addresses connected slave modules. By storing the configuration information of all of the modules, the CSMSTRV2 is able to automatically configure modules if they are replaced.

The Master provides high-speed RS232/422/485 communication ports and an Ethernet port for connection to PCs, PLCs, and SCADA systems. An extensive list of master and slave protocol drivers are available to allow the CSMSTRV2 to share and exchange variable data with external devices. The 10 Base-T/100 Base-TX Ethernet port can also be used to connect and share data with other devices at high speeds.

The design of the Modular Controller Series high density packaging and DIN rail mounting saves time and panel space. The controller snaps easily onto standard top hat (T) profile DIN rail.

SOFTWARE

The CSMSTRV2 is programmed with Crimson® 3.0 Gold Build 699 or later software on Windows® 7 or later platforms. The software is an easy to use, graphical interface which provides a means of communication configuration, as well as commissioning and calibration of new systems.

CONTENTS OF PACKAGE

- CS Master
- Termination Plug
- Terminal block for connecting power

SAFETY SUMMARY

All safety related regulations, local codes and instructions that appear in the manual or on equipment must be observed to ensure personal safety and to prevent damage to either the instrument or equipment connected to it. If equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

Do not use the controller to directly command motors, valves, or other actuators not equipped with safeguards. To do so can be potentially harmful to persons or equipment in the event of a fault to the unit. An independent and redundant temperature limit indicator with alarm outputs is strongly recommended.



CAUTION: Risk of Danger.
 Read complete instructions prior to installation and operation of the unit.

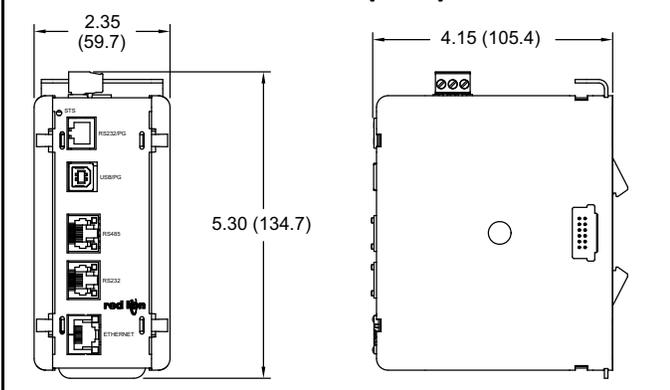


WARNING - EXPLOSION HAZARD - SUBSTITUTION OF COMPONENTS MAY IMPAIR SUITABILITY FOR CLASS I, DIVISION 2.



THIS EQUIPMENT IS SUITABLE FOR USE IN CLASS I, DIVISION 2, GROUPS A, B, C, D, OR NON-HAZARDOUS LOCATIONS ONLY

DIMENSIONS In inches (mm)



SPECIFICATIONS

- POWER:** 24 VDC \pm 10%
400 mA min. (1 module)
3.5 Amps max. (16 modules)
Must use NEC Class 2 or Limited Power Source (LPS) rated power supply.
- COMMUNICATIONS:**
USB/PG Port: Adheres to USB specification 1.1. Device only using Type B connection.



WARNING - DO NOT CONNECT OR DISCONNECT CABLES WHILE POWER IS APPLIED UNLESS AREA IS KNOWN TO BE NON-HAZARDOUS. USB PORT IS FOR SYSTEM SET-UP AND DIAGNOSTICS AND IS NOT INTENDED FOR PERMANENT CONNECTION.

Serial Ports: Format and Baud Rates for each port are individually software programmable up to 115,200 baud.

RS232/PG Port: RS232 port via RJ12

COMMS Ports: RS422/485 port via RJ45, and RS232 port via RJ12

DH485 TXEN: Transmit enable; open collector, $V_{OH} = 15$ VDC,

$V_{OL} = 0.5$ V @ 25 mA max.

Note: For additional information on the communications or signal common and connections to earth ground please see the "Connecting to Earth Ground" in the section "Installing and Powering the CSMSTRSX."

Ethernet Port: 10 BASE-T / 100 BASE-TX

RJ45 jack is wired as a NIC (Network Interface Card).

- LEDs:**
STS – Status LED indicates condition of master.
TX/RX – Transmit/Receive LEDs show serial activity.
Ethernet – Link and activity LEDs.
- MEMORY:**
On-board User Memory: 4 Mbytes of non-volatile Flash memory.
On-board SDRAM: 8 Mbytes
- ENVIRONMENTAL CONDITIONS:**
Operating Temperature Range: 0 to 50 °C
Storage Temperature Range: -30 to +70 °C
Operating and Storage Humidity: 80% max relative humidity, non-condensing, from 0 to 50 °C

- Vibration to IEC 68-2-6: Operational 10 to 150 Hz, 1 g.
Shock to IEC 68-2-27: Operational 25 g.
Altitude: Up to 2000 meters
- CONSTRUCTION:** Case body is burgundy high impact plastic and stainless steel. For indoor use only. Installation Category II, Pollution Degree 2.
 - POWER CONNECTION:** Removable wire clamp screw terminal block.
Wire Gage Capacity: 24 AWG to 12 AWG
Torque: 4.45 to 5.34 in/lb (0.5 to 0.6 N-m)
 - MOUNTING:** Snaps onto standard DIN style top hat (T) profile mounting rails according to EN50022 -35 x 7.5 and -35 x 15.
 - CERTIFICATIONS AND COMPLIANCES:**
CE Approved
EN 61326-1 Immunity to Industrial Locations
Emission CISPR 11 Class A
Safety requirements for electrical equipment for measurement, control, and laboratory use:
EN 61010-1: General Requirements
EN 61010-2-030: Particular Requirements for Testing and Measuring Circuits
EN 61010-2-201: Particular Requirements for Control Equipment
RoHS Compliant
UL Listed: File #E302106
UL Hazardous: File #E317425
ABS Type Approval for Shipboard Applications
 - WEIGHT:** 12.9 oz (365.7 g)



WARNING - EXPLOSION HAZARD - DO NOT DISCONNECT EQUIPMENT UNLESS POWER HAS BEEN SWITCHED OFF OR AREA IS KNOWN TO BE NON-HAZARDOUS.

ORDERING INFORMATION

| TYPE | MODEL NO. | DESCRIPTION | PART NUMBER |
|---------------------------------|---------------------|---|-------------|
| Master Module | CSMSTR ¹ | Modular Controller Master, Comms ports and Ethernet | CSMSTRV2 |
| | | Modular Controller Master with multiple protocol converter, Ethernet and expansion slot | CSMSTRLE |
| | | Modular Controller Master with multiple protocol converter, data logger, web server with Virtual HMI up to QVGA (320 x 240) size and expansion slot | CSMSTRSX |
| | | Modular Controller Master with multiple protocol converter, data logger, web server with Virtual HMI up to VGA (640 x 480) size and expansion slot with increased SDRAM | CSMSTRGT |
| Communications Cables (10 feet) | CBL | RS232 Programming Cable | CBLPROG0 |
| | | USB Cable | CBLUSB00 |
| | | Communications Cables ¹ | CBLxxxx |
| Power Supply | PSDR | DIN Rail Mounted Power Supply | PSDRxxxx |
| Accessories | G3CF | CompactFlash Card ² | G3CFxxxx |
| | | Replacement Base | CSBASE00 |
| | | Replacement Termination Plug | CSTERM00 |

¹ Visit www.redlion.net for a complete list of PID modules, data acquisition modules, communications drivers and cables.

² Industrial grade two million write cycles.

HARDWARE INSTALLATION

DIN rail should be mounted horizontally so that the unit's ventilation holes are vertical in relation to cabinet orientation. A minimum clearance of 1 inch (25.4 mm) should be maintained above and below the unit in order to ensure proper thermal regulation.

The unit shall be installed inside a UL Listed Industrial Control Panel or similar type of enclosure. A minimum 3.2 mm distance shall be maintained between the hazardous live parts of the equipment and accessible parts of the fire/electrical enclosure.

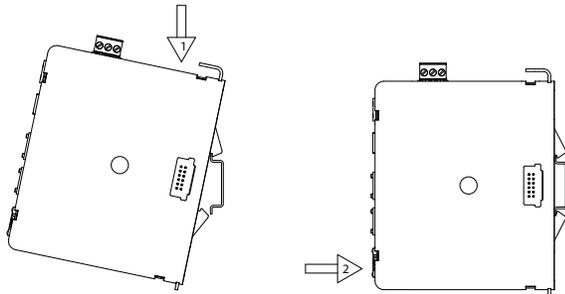


Figure 1 - Attach CSMSTR Master To DIN Rail

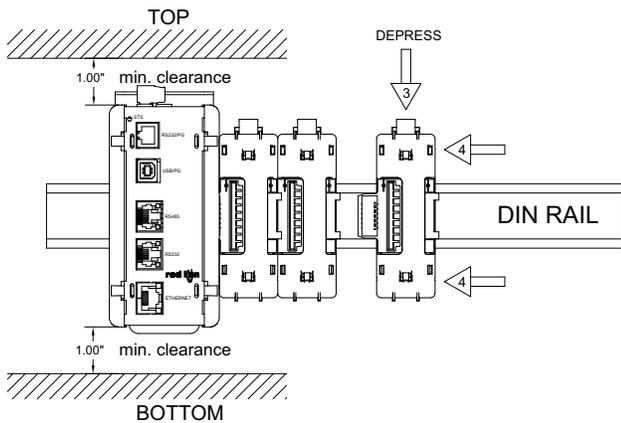


Figure 2 - Attach Slave Bases To DIN Rail

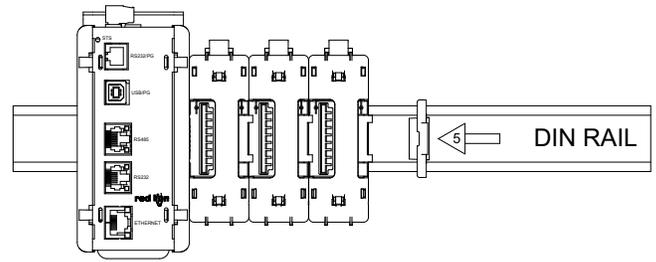


Figure 3 - Attach Termination Plug*
* Supplied with CSMSTRLE Master Module.

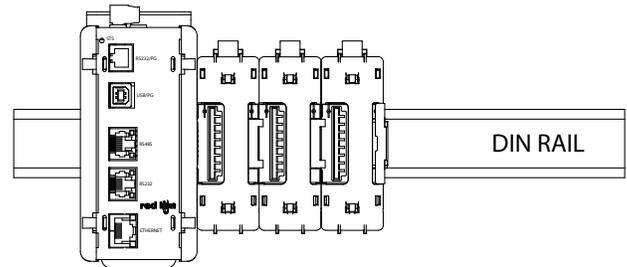


Figure 4 - Installation Complete

POWER SUPPLY REQUIREMENTS

It is very important that the power supply is mounted correctly if the unit is to operate reliably. Please take care to observe the following points:

- The power supply must be mounted close to the unit, with usually not more than 6 feet (1.8 m) of cable between the supply and the master. Ideally, the shortest length possible should be used.
- The wire used to connect the master's power supply should be at least 22-gage wire. If a longer cable run is used, a heavier gage wire should be used. The routing of the cable should be kept away from large contactors, inverters, and other devices which may generate significant electrical noise.
- A power supply with an NEC Class 2 or Limited Power Source (LPS) and SELV rating is to be used. This type of power supply provides isolation to accessible circuits from hazardous voltage levels generated by a mains power supply due to single faults. SELV is an acronym for "safety extra-low voltage." Safety extra-low voltage circuits shall exhibit voltages safe to touch both under normal operating conditions and after a single fault, such as a breakdown of a layer of basic insulation or after the failure of a single component has occurred.

Visit www.redlion.net for a complete list of our PSDR Series of NEC Class 2 power supplies.

EMC INSTALLATION GUIDELINES

Although Red Lion Controls products are designed with a high degree of immunity to Electromagnetic Interference (EMI), proper installation and wiring methods must be followed to ensure compatibility in each application. The type of the electrical noise, source or coupling method into a unit may be different for various installations. Cable length, routing, and shield termination are very important and can mean the difference between a successful or troublesome installation. Listed are some EMI guidelines for a successful installation in an industrial environment.

1. A unit should be mounted in a metal enclosure, which is properly connected to protective earth.
2. Use shielded cables for all Signal and Control inputs. The shield connection should be made as short as possible. The connection point for the shield depends somewhat upon the application. Listed below are the recommended methods of connecting the shield, in order of their effectiveness.
 - a. Connect the shield to earth ground (protective earth) at one end where the unit is mounted.
 - b. Connect the shield to earth ground at both ends of the cable, usually when the noise source frequency is over 1 MHz.
3. Never run Signal or Control cables in the same conduit or raceway with

AC power lines, conductors, feeding motors, solenoids, SCR controls, and heaters, etc. The cables should be run through metal conduit that is properly grounded. This is especially useful in applications where cable runs are long and portable two-way radios are used in close proximity or if the installation is near a commercial radio transmitter. Also, Signal or Control cables within an enclosure should be routed as far away as possible from contactors, control relays, transformers, and other noisy components.

- 4. Long cable runs are more susceptible to EMI pickup than short cable runs.
- 5. In extremely high EMI environments, the use of external EMI suppression devices such as Ferrite Suppression Cores for signal and control cables is effective. The following EMI suppression devices (or equivalent) are recommended:

Fair-Rite part number 0443167251 (Red Lion Controls #FCOR0000)

Line Filters for input power cables:

Schaffner # FN2010-1/07 (Red Lion Controls #LFIL0000)

- 6. To protect relay contacts that control inductive loads and to minimize radiated and conducted noise (EMI), some type of contact protection network is normally installed across the load, the contacts or both. The most effective location is across the load.

a. Using a snubber, which is a resistor-capacitor (RC) network or metal oxide varistor (MOV) across an AC inductive load is very effective at reducing EMI and increasing relay contact life.

b. If a DC inductive load (such as a DC relay coil) is controlled by a transistor switch, care must be taken not to exceed the breakdown voltage of the transistor when the load is switched. One of the most effective ways is to place a diode across the inductive load. Most Red Lion products with solid state outputs have internal zener diode protection. However external diode protection at the load is always a good design practice to limit EMI. Although the use of a snubber or varistor could be used.

Red Lion part numbers: Snubber: SNUB0000

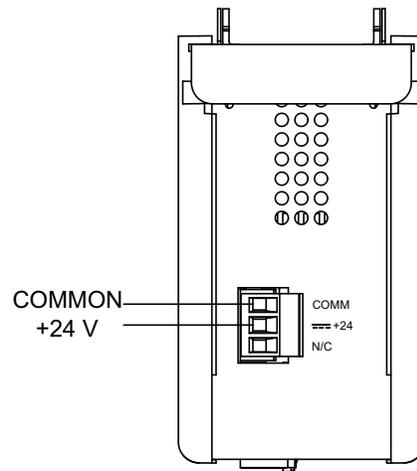
Varistor: ILS11500 or ILS23000

- 7. Care should be taken when connecting input and output devices to the instrument. When a separate input and output common is provided, they should not be mixed. Therefore a sensor common should NOT be connected to an output common. This would cause EMI on the sensitive input common, which could affect the instrument's operation.

Visit www.redlion.net/emi for more information on EMI guidelines, Safety and CE issues as they relate to Red Lion products.

WIRING

POWER CONNECTION

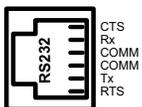


WARNING - EXPLOSION HAZARD - DO NOT DISCONNECT WHILE CIRCUIT IS ALIVE UNLESS AREA IS KNOWN TO BE NON-HAZARDOUS.

INPUT AND OUTPUT (I/O) WIRING MUST BE IN ACCORDANCE WITH CLASS I, DIV. 2 WIRING METHODS AND IN ACCORDANCE WITH THE AUTHORITY HAVING JURISDICTION.

PROGRAMMING PORTS

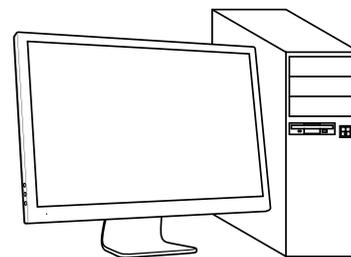
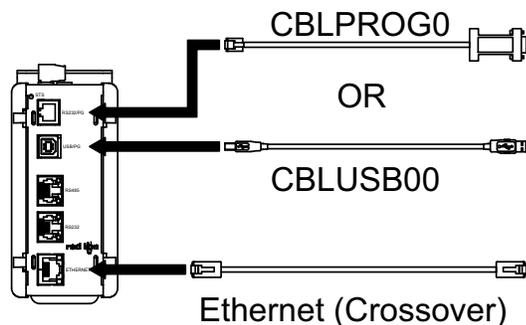
RS232/PG



USB/PG



ETHERNET

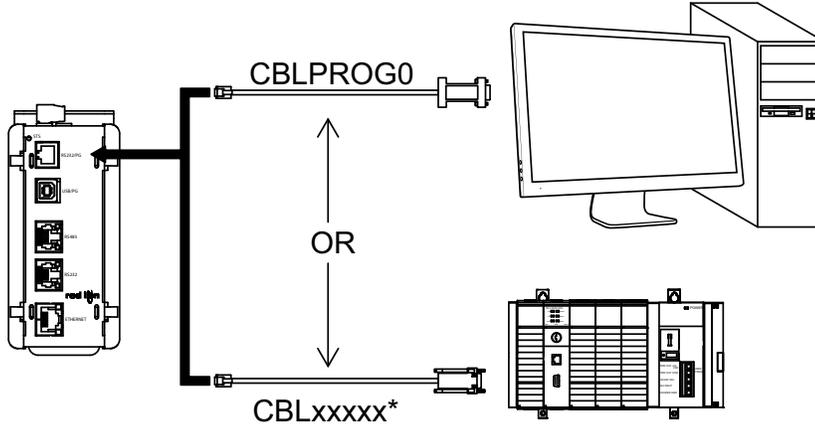


COMMUNICATION PORTS

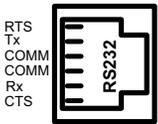
RS232/PG



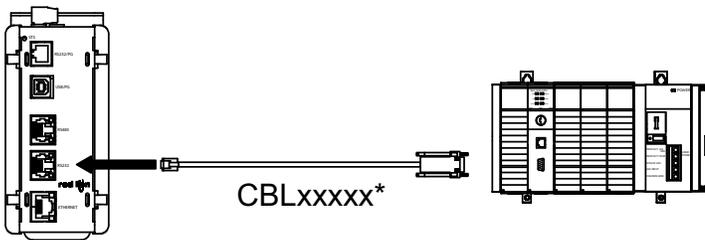
CTS
Rx
COMM
COMM
Tx
RTS



RS232

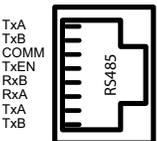


RTS
Tx
COMM
COMM
Rx
CTS

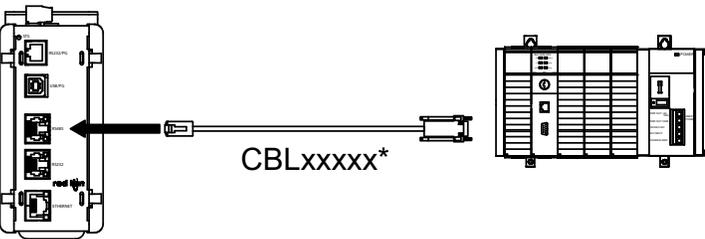


* Use appropriate communications cable. See Ordering Information for descriptions of the available cables.

RS485

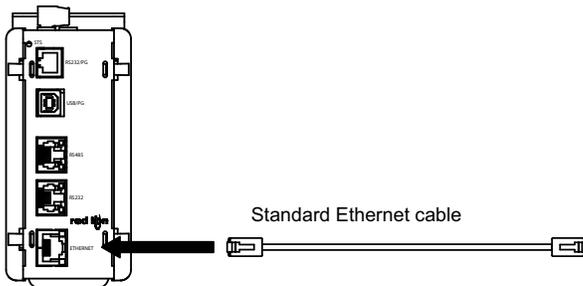


TxA
TxB
COMM
TxEN
RxB
RxA
TxA
TxB

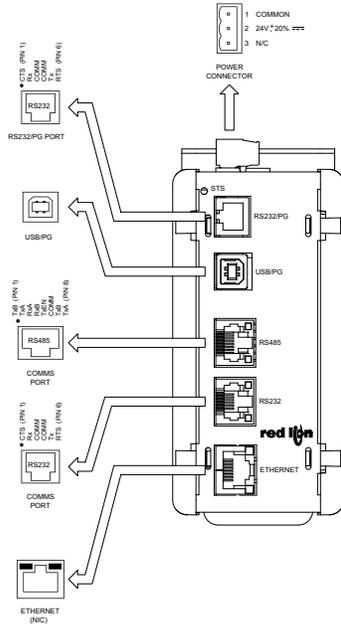


WARNING: Do **NOT** use a standard DH-485 cable to connect this port to Allen Bradley equipment.

PORT 3 - ETHERNET CONNECTION



MASTER PORT PIN OUTS



TROUBLESHOOTING

If for any reason you have trouble operating, connecting, or simply have questions concerning your new Master, contact Red Lion's technical support.

Email: support@redlion.net
Website: www.redlion.net
Inside US: +1 (877) 432-9908
Outside US: +1 (717) 767-6511

COMMUNICATING WITH THE MASTER

CONFIGURING A MASTER

The Master is configured using Crimson 3.0 software. Crimson software is available as a no charge download from Red Lion's website. Crimson updates for new features and drivers are posted on the website as they become available. By configuring the Master using the latest version of Crimson 3.0, you are assured that your unit has the most up to date feature set. Crimson 3.0 software can configure the Master through the RS232/PG port, USB/PG port, or Ethernet port. The USB/PG port is connected using a standard USB cable with a Type B connector.

The driver needed to use the USB port is installed as part of Crimson configuration. The RS232/PG port uses a programming cable made by Red Lion to connect to the DB9 COM port of your computer. If making your own cable, refer to the "Master Port Pin Outs" for wiring information.

CABLES AND DRIVERS

Red Lion has a wide range of cables and drivers for use with many different communication types. A list of these drivers and cables along with pin outs is available from Red Lion's website. New cables and drivers are added on a regular basis. If making your own cable, refer to the "Master Port Pin Outs" for wiring information.

Note: The USB port is for system set-up and diagnostics and is not intended for permanent connection.

ETHERNET COMMUNICATIONS

Ethernet communications can be established at either 10 BASE-T or 100 BASE-TX. The Master's RJ45 jack is wired as a NIC (Network Interface Card). For example, when wiring to a hub or switch use a straight-through cable, but when connecting to another NIC use a crossover cable.

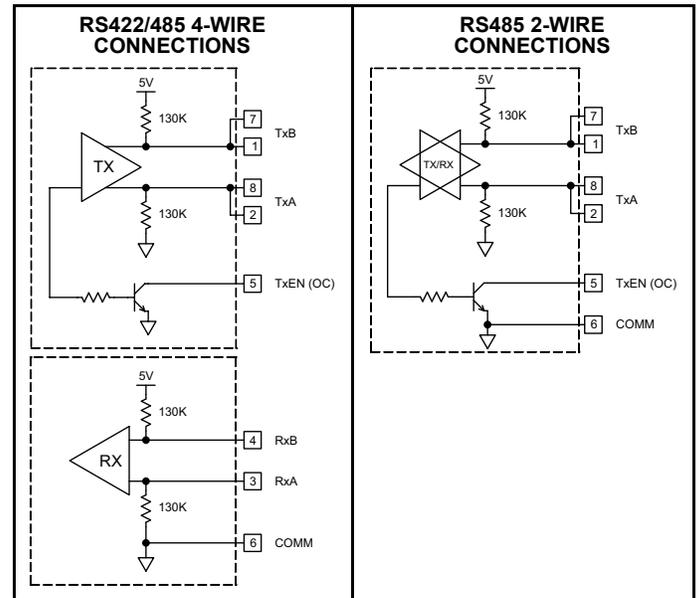
Refer to the Crimson manual and Red Lion's website for additional information on Ethernet communications.

RS232 PORTS

The Master has two RS232 ports. There is the RS232/PG port and the COMMS port. Although only one of these ports can be used for programming, both ports can be used for communications with a PLC. The RS232/PG port can be used for either master or slave protocols.

RS422/485 COMMS PORT

The Master has one RS422/485 port. This port can be configured to act as either RS422 or RS485.



Note: All Red Lion devices connect A to A and B to B. Refer to www.redlion.net for additional information.

DH485 COMMUNICATIONS

The Master's RS422/485 COMMS port can also be used for Allen Bradley DH485 communications.

WARNING: DO NOT use a standard DH485 cable to connect this port to Allen Bradley equipment. A cable and wiring diagram are available from Red Lion.



LEDs

STS – STATUS LED

The green Status LED provides information regarding the state of the Master, as well as the rest of the system. This includes indication of the various stages of the start-up routine (power-up), and any errors that may occur.

Startup Routine

| | INDICATION |
|------------------|--|
| Rapidly Flashing | Master is currently running the boot loader and/or being flash upgraded by Crimson software. |
| Steady | Master is operating properly. |

Error States

| LED | INDICATION |
|-------------------------|---|
| 1 blink, pause, repeat | One or more slave modules are missing from the system. Master and installed modules will perform normally in this state. |
| 2 blinks, pause, repeat | Missing configuration, or configuration being updated by Crimson program |
| 3 blinks, pause, repeat | Quantity of module bases does not match configuration file. Master will not communicate with the modules until the error is corrected. |
| 4 blinks, pause, repeat | Termination plug not installed, or one or more bases are malfunctioning. Master will not communicate with the modules until the plug is reinstalled, and power is cycled. |

USER COMMUNICATION PORTS - TX/RX LEDS

| LED | INDICATION |
|-------|--------------|
| GREEN | Transmitting |
| RED | Receiving |

Note: LEDs are not available on the Programming Port: RS232/PG.

ETHERNET LEDS

| LED | INDICATION |
|-------------------|----------------------------|
| YELLOW (Solid) | Link Established |
| YELLOW (Flashing) | Network Activity |
| GREEN (OFF) | 10 BASE-T Communications |
| GREEN (ON) | 100 BASE-TX Communications |

LIMITED WARRANTY

(a) Red Lion Controls Inc., (the "Company") warrants that all Products shall be free from defects in material and workmanship under normal use for the period of time provided in "Statement of Warranty Periods" (available at www.redlion.net) current at the time of shipment of the Products (the "Warranty Period"). **EXCEPT FOR THE ABOVE- STATED WARRANTY, COMPANY MAKES NO WARRANTY WHATSOEVER WITH RESPECT TO THE PRODUCTS, INCLUDING ANY (A) WARRANTY OF MERCHANTABILITY; (B) WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE; OR (C) WARRANTY AGAINST INFRINGEMENT OF INTELLECTUAL PROPERTY RIGHTS OF A THIRD PARTY; WHETHER EXPRESS OR IMPLIED BY LAW, COURSE OF DEALING, COURSE OF PERFORMANCE, USAGE OF TRADE OR OTHERWISE.** Customer shall be responsible for determining that a Product is suitable for Customer's use and that such use complies with any applicable local, state or federal law.

(b) The Company shall not be liable for a breach of the warranty set forth in paragraph (a) if (i) the defect is a result of Customer's failure to store, install, commission or maintain the Product according to specifications; (ii) Customer alters or repairs such Product without the prior written consent of Company.

(c) Subject to paragraph (b), with respect to any such Product during the Warranty Period, Company shall, in its sole discretion, either (i) repair or replace the Product; or (ii) credit or refund the price of Product provided that, if Company so requests, Customer shall, at Company's expense, return such Product to Company.

(d) **THE REMEDIES SET FORTH IN PARAGRAPH (c) SHALL BE THE CUSTOMER'S SOLE AND EXCLUSIVE REMEDY AND COMPANY'S ENTIRE LIABILITY FOR ANY BREACH OF THE LIMITED WARRANTY SET FORTH IN PARAGRAPH (a).**