MODELS DSPSX AND DSPGT — Data Station Plus

c(UL)US LISTED
IND. CONT. EQ.
34AD

- PROTOCOL CONVERSION FEATURE CONVERTS NUMEROUS PROTOCOLS SIMULTANEOUSLY
- COMPACTFLASH® SLOT ALLOWS PROCESS DATA TO BE LOGGED DIRECTLY TO CSV FILES
- VIRTUAL HMI OFFERS BUILT-IN PC-BASED SCADA FUNCTIONALITY
- WEBSERVER PROVIDES WORLDWIDE ACCESS TO DATA LOGS AND VIRTUAL HMI
- EXTENSIVE BUILT-IN DRIVER LIST ALLOWS EASY DATA MAPPING TO PLCs, PCs, AND SCADA SYSTEMS
- ALARM NOTIFICATIONS CAN BE SENT VIA EMAIL OR TEXT MESSAGES
- 10 BASE-T/100 BASE-TX ETHERNET CONNECTION CAN CONNECT TO AN UNLIMITED NUMBER OF DEVICES VIA FOUR PROTOCOLS SIMULTANEOUSLY

c(UL)US LISTED
3PWL
PROGRAMMABLE
CONTROLLERS

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

CE

GENERAL DESCRIPTION

The Data Station Plus was designed to act as a nexus for industrial data collection and management. The unit offers multiple protocol conversion, data logging and remote machine access. With three built in serial ports and a 10 Base-T/100 Base-TX Ethernet port, the unit performs protocol conversion, allowing disparate devices to communicate seamlessly with one another. The Ethernet port supports up to ten protocols simultaneously using Crimson 3.0, so even Ethernet to Ethernet protocols can be converted.

The CompactFlash card allows data to be collected and stored for later review. The files are stored in simple CSV file format allowing common applications, such as Microsoft Excel and Access, to view and manage the data. The free Websync utility provides a means to synchronize the files with a PC's hard drive for permanent storage. The CompactFlash card may also be used to load new configuration files into the Data Station.

The built-in web server allows log files to be retrieved manually, and also provides access to the unique "virtual HMI". The virtual HMI is programmed just like Red Lion's G3 series of HMI. Any standard web browser such as Internet Explorer or Netscape may be used to monitor or control the HMI from a PC anywhere in the world.

The USB port may be used for blazing fast file downloads, or to mount the Data Station's CompactFlash card as an external drive to your PC.

The Data Station's DIN rail mounting saves time and panel space and snaps easily onto standard top hat (T) profile DIN rail.

SOFTWARE

The Data Station is programmed only 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.

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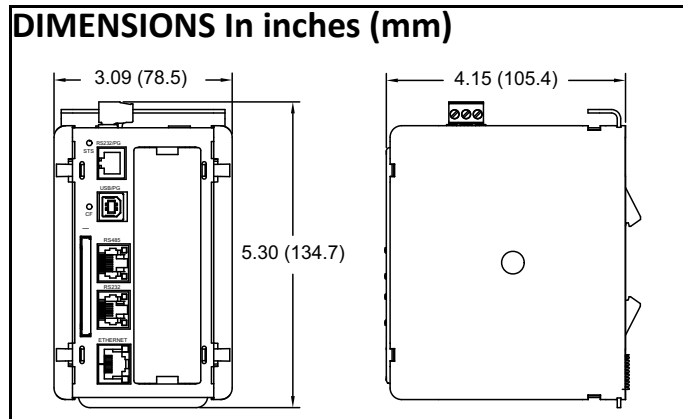
CAUTION: Risk of Danger.
Read complete instructions prior to installation and operation of the unit.

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, GROUGPS A, B, C, D, OR NON-HAZARDOUS LOCATIONS ONLY

DIMENSIONS In inches (mm)

3.09 (78.5)   4.15 (105.4)

5.30 (134.7)

CompactFlash is a registered trademark of CompactFlash Association.

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SPECIFICATIONS

1. **POWER**: 24 VDC ± 10%
   200 mA min. without expansion card
   1 Amp maximum with expansion card fitted
   Must use NEC Class 2 or Limited Power Source (LPS) rated power supply.
2. **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.
   Ethernet Port: 10 BASE-T / 100 BASE-TX
   RJ45 jack is wired as a NIC (Network Interface Card).
3. **LEDs**:
   STS – Status LED indicates condition of Data Station.
   TX/RX – Transmit/Receive LEDs show serial activity.
   Ethernet – Link and activity LEDs.
   CF – CompactFlash LED indicates card status and read/write activity
4. **MEMORY**:
   On-board User Memory: 4 Mbytes of non-volatile Flash memory.
   On-board SDRAM:
   DSPSX: 2 Mbytes
   DSPGT: 8 Mbytes
   Memory Card: CompactFlash Type II slot for Type I and Type II cards.
5. **REAL-TIME CLOCK**: Typical accuracy is less than one minute per month drift. Crimson 3.0's SNTP facility allows synchronization with external servers.
   Battery: Lithium Coin Cell. Typical lifetime of 10 years at 25 ºC.
   A "Battery Low" system variable is available so that the programmer can choose specific action(s) to occur when the battery voltage drops below its nominal voltage.
   This unit is NOT field serviceable. All work must be done by a qualified technician.

6. **ENVIRONMENTAL CONDITIONS**:
   Operating Temperature Range:
   DSPSX000 AND DSPGT000: 0 to 50 °C
   DSPSX001 AND DSPGT001: -20 to 70 °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 5 to 150 Hz, 2 g.
   Shock to IEC 68-2-27: Operational 30 g.
   Altitude: Up to 2000 meters
7. **CONSTRUCTION**: Case body is burgundy high impact plastic and stainless steel. For indoor use only. Installation Category II, Pollution Degree 2.
8. **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)
9. **MOUNTING**: Snaps onto standard DIN style top hat (T) profile mounting rails according to EN50022 -35 x 7.5 and -35 x 15.
10. **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 61010-2-201: Particular Requirements for Control Equipment
    RoHS Compliant
    UL Listed: File #E302106
    UL Hazardous: File #E317425
    ABS Certificate #09-HS426719-B-4-PDA
    Refer to EMC Installation Guidelines section of the bulletin for additional information.
11. **WEIGHT**: 15.1 oz (428 g)

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

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.

Figure 1 - Attach Data Station To DIN Rail
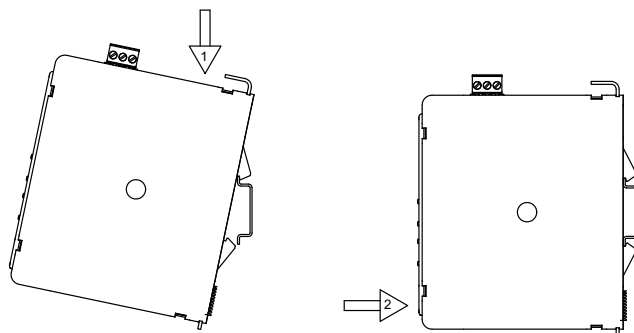
The unit shall be installed inside a UL Listed Industrial Control Panel or similar type of enclosure. A minimum 3.2 mm distance shall be maintained between the hazardous live parts of the equipment and accessible parts of the fire/electrical enclosure.

TOP
1.00" min. clearance
1.00" min. clearance
BOTTOM

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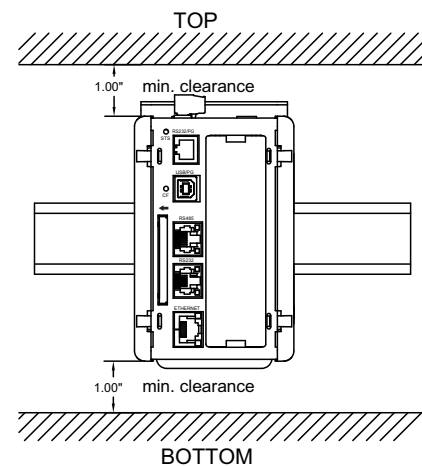
COMPACTFLASH® CARD

CompactFlash socket is a Type II socket that can accept either Type I or II cards. Use cards with a minimum of 4 Mbytes and formatted to a maximum of 2 Gbytes (see Note box) with the Data Station's CompactFlash socket. Cards are available at most computer and office supply retailers. CompactFlash cards can be used for configuration transfers, data logging, and trending.

CompactFlash-
Insert Top Side
Towards Left
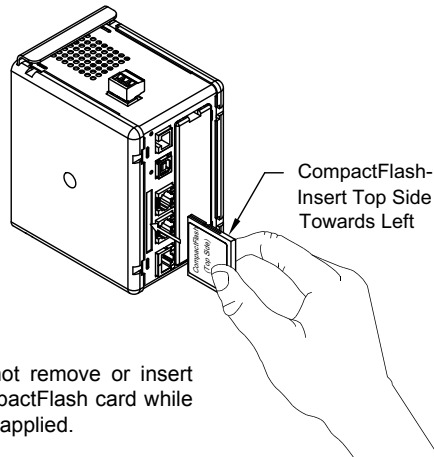
Note: Do not remove or insert the CompactFlash card while power is applied.

Information stored on a CompactFlash card can be read by a card reader attached to a PC. This information is stored in IBM (Windows®) PC compatible FAT16 file format.

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 Data Station. Ideally, the shortest length possible should be used.
– The wire used to connect the Data Station'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.

NOTE

For reliable operation of this and other Red Lion products, one of the following brands of CompactFlash card must be used...

SimpleTech	SMART® Modular	swissbit®
SanDisk®	Silicon Systems	

Not all of the above manufacturers offer CompactFlash cards recognized to UL standards, which may be required for your application.

Although Red Lion Controls products limit use of CompactFlash card memory to 2 GB, cards with a larger capacity can be used. They MUST be formatted to 2 GB and use the FAT 16 file system. It is recommended to format the CF card using the format utility from within Crimson.

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.

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WIRING

POWER CONNECTION
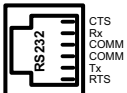

COMMON
+24 VDC

COMM
+24
N/C
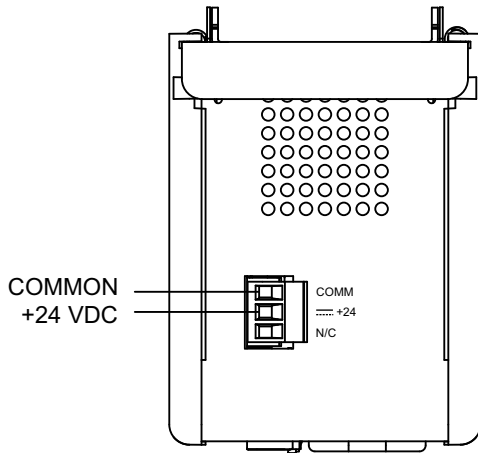
⚠ **WARNING - EXPLOSION HAZARD - DO NOT DISCONNECT WHILE CIRCUIT IS ALIVE UNLESS AREA IS KNOWN TO BE NON-HAZARDOUS.**

⚠ **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.**
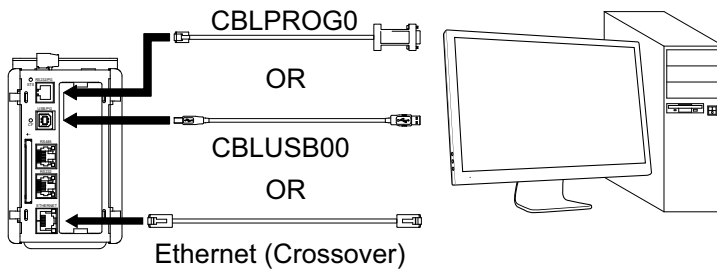
PROGRAMMING PORTS

RS232/PG

CTS
Rx
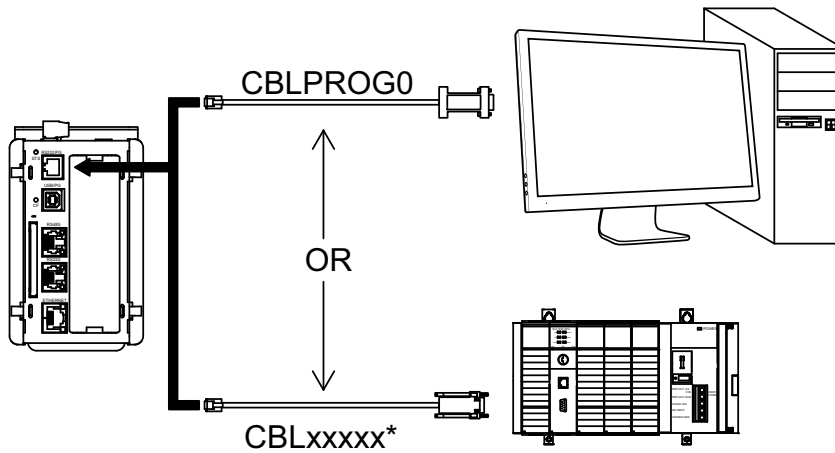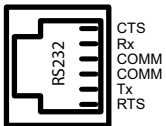COMM
COMM
Tx
RTS

USB/PG

ETHERNET

CBLPROG0

OR

CBLUSB00

OR

Ethernet (Crossover)

COMMUNICATION PORTS

RS232/PG

CTS
Rx
COMM
COMM
Tx
RTS

CBLPROG0

OR

CBLxxxxx*

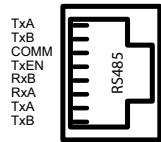**red lion®**

RS232

RTS
Tx
COMM
COMM
Rx
CTS

RS232

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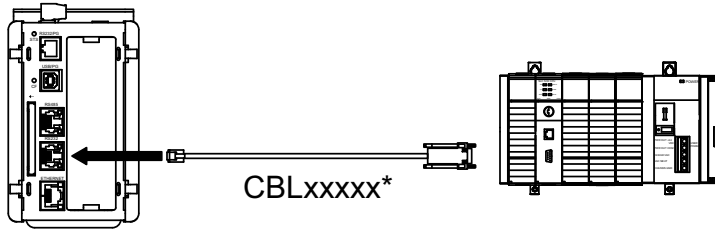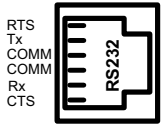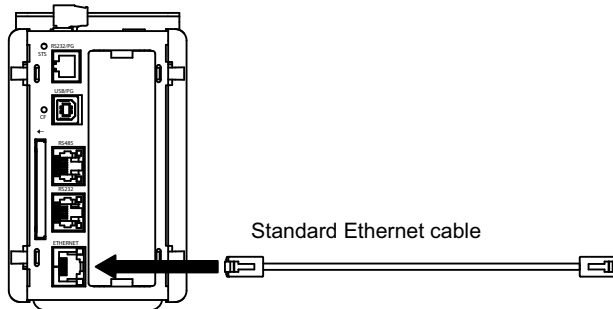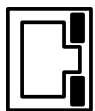
* Use appropriate communications cable. See Ordering Information for descriptions of the available cables.

RS485

TxA
TxB
COMM
TxEN
RxB
RxA
TxA
TxB

RS485

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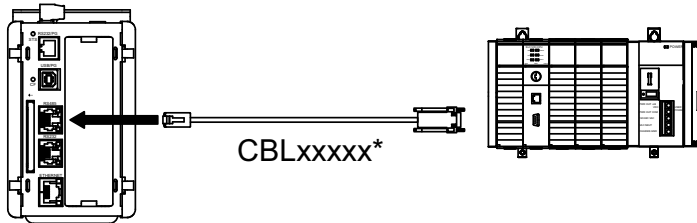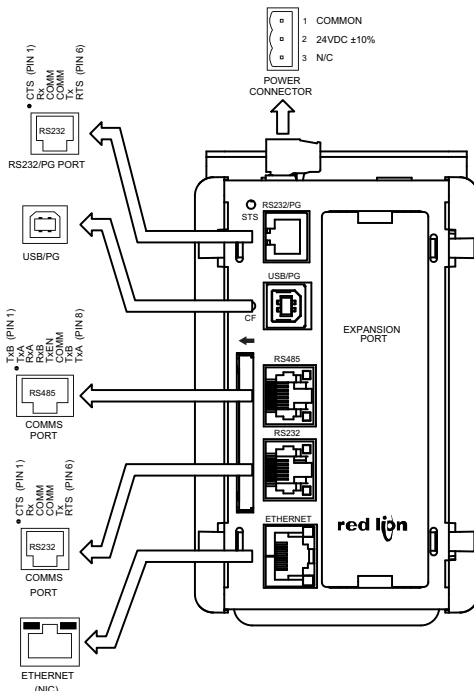
WARNING: Do **NOT** use a standard DH-485 cable to connect this port to Allen Bradley equipment.

PORT 3 - ETHERNET CONNECTION

Standard Ethernet cable

DATA STATION PORT PIN OUTS

1 COMMON
2 24VDC ±10%
3 N/C

POWER CONNECTOR

CTS (PIN 1)
Rx
COMM
COMM
Tx
RTS (PIN 6)

RS232

RS232/PG PORT

USB/PG

TxB (PIN 1)
TxA
RxA
RxB
TxEN
COMM
TxB
TxA (PIN 8)

RS485

COMMS PORT

CTS (PIN 1)
Rx
COMM
COMM
Tx
RTS (PIN 6)

RS232

COMMS PORT

ETHERNET (NIC)

RS232/PG
STS

USB/PG
CF

EXPANSION PORT

RS485

RS232

ETHERNET

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TROUBLESHOOTING

If for any reason you have trouble operating, connecting, or simply have questions concerning your new Data Station, 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

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COMMUNICATING WITH THE DATA STATION

CONFIGURING A DATA STATION

The Data Station 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 Data Station 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 Data Station through the RS232/PG port, USB/PG port, Ethernet or CompactFlash. The USB/PG port is connected using a standard USB cable with a Type B connector.

The driver needed to use the USB port will be 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 "Data Station Port Pin Outs" for wiring information.

The CompactFlash can be used to program a Data Station by placing a configuration file and firmware on the CompactFlash card. The card is then inserted into the target Data Station and powered. Refer to the Crimson 3.0 literature for more information on the proper names and locations of the files.

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 "Data Station Port Pin Outs" for wiring information.

USB, DATA TRANSFERS FROM THE COMPACTFLASH CARD

⚠️ **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.**

In order to transfer data from the CompactFlash card via the USB port, a driver must be installed on your computer. This driver is installed with Crimson 3.0 software and is located in the folder C:\Program Files(x86)\Red Lion Controls\Crimson 3.0\Device\ after Crimson 3.0 is installed. This may have already been accomplished if your Data Station was configured using the USB port.

Once the driver is installed, connect the Data Station to your PC with a USB cable, and follow "Mounting the CompactFlash" instructions in the Crimson 3.0 user manual.

Note that using the USB port for frequent data transfers is not recommended. For frequent data transfers it is recommended that the Ethernet connection be used. Through the Ethernet connection a web page can be set up to view logged data. Refer to the Crimson 3.0 manual for details.

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 Data Station'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 3.0 manual and Red Lion's website for additional information on Ethernet communications.

RS232 PORTS

The Data Station 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 Data Station has one RS422/485 port. This port can be configured to act as either RS422 or RS485.
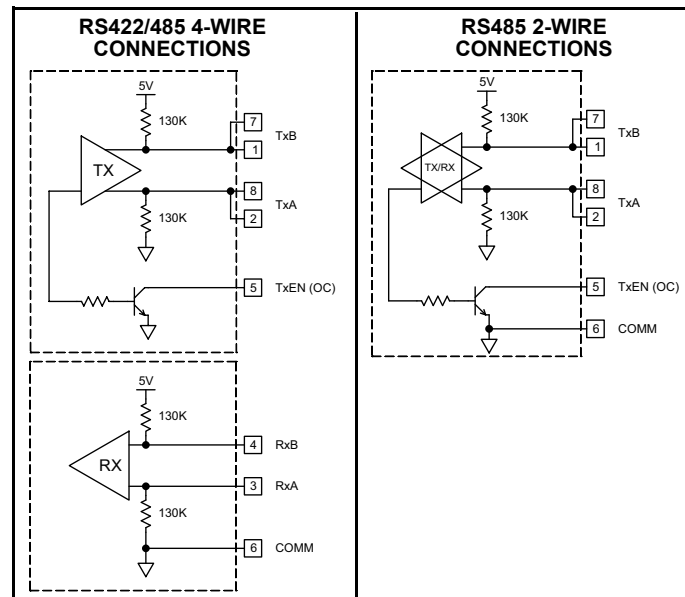
Note: All Red Lion devices connect A to A and B to B. Refer to www.redlion.net for additional information.

DH485 COMMUNICATIONS

The Data Station'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 Data Station. 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	Data Station is currently running the boot loader and/or being flash upgraded by Crimson software.
Steady	Data Station is operating properly.

CF - COMPACTFLASH LED

LED	INDICATION
Off	No CompactFlash Card is present.
Steady	Valid CompactFlash card is present.
Flashing Rapidly	CompactFlash card is being checked.
Flickering	Unit is writing to the CompactFlash, either because it is storing data, or because the PC connected via the USB port has locked the drive. [1]
Flashing Slowly	Incorrectly formatted CompactFlash card present.

1. Do not turn off power to the unit while this light is flickering. The unit writes data in two minute intervals.

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

ORDERING INFORMATION

TYPE	MODEL NO.	DESCRIPTION	PART NUMBER
Data Station Plus	DSP	Data Station with multiple protocol converter, data logger, web server with Virtual HMI up to QVGA (320 x 240) and expansion slot.	DSPSX000
		Data Station with multiple protocol converter, data logger, web server with Virtual HMI up to QVGA (320 x 240), expansion slot, and extended operating temperature	DSPSX001
		Data Station with multiple protocol converter, data logger, web server with Virtual HMI up to VGA (640 x 480) size and expansion slot with increased SDRAM	DSPGT000
		Data Station with multiple protocol converter, data logger, web server with Virtual HMI up to VGA (640 x 480), expansion slot with increased SDRAM, and extended operating temperature	DSPGT001
Communications Cables (10 feet)	CBL	RS232 Programming Cable	CBLPROG0
		USB Cable	CBLUSB00
		Communications Cables [1]	CBLxxxxx
Power Supply	PSDR	DIN Rail Mounted Power Supply	PSDRxxxx
Accessories	XCCN	CANopen option card for Modular Controller or Data Station Plus	XCCN0000
	XCDN	DeviceNet option card for Modular Controller or Data Station Plus	XCDN0000
	XCHSPA	GSM/HSPA+ Modem Option Card [2] for Modular Controller or Data Station Plus	XCHSPA00
	XCPB	PROFIBUS option card for Modular Controller or Data Station Plus	XCPBDP00
	XCRS	RS232/485 option card for Modular Controller or Data Station Plus	XCRS0000
	G3CF	CompactFlash Card [3]	G3CFxxxx
	ANT	2G/3G 3" hinged antenna	ANT-TG090113
		2G/3G/4G LTE low profile direct permanent mount antenna, IP67 rated	ANT-G30B108111
		2G/3G 4.5" whip magnetic mount antenna, IP65 rated	ANT-GA107201111
		2G/3G low profile direct permanent mount antenna, IP65 rated	ANT-G21B301111
	DR	DIN Rail Mountable Adapter Products [4]	DRxxxxxx

[1] Visit www.redlion.net for a complete list of communications drivers and cables.

[2] Antenna is NOT included with the card. Must be purchased separately if needed.

[3] Industrial grade two million write cycles. SMART Modular Technologies model SG9CF (UL Listed Directory Category NWGQ)

[4] Red Lion offers RJ modular jack adapters. Refer to the DR literature for complete details.

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TRADEMARK ACKNOWLEDGMENTS

CompactFlash is a registered trademark of CompactFlash Association.

Ethernet is a registered trademark of Xerox Corporation.

All other company and product names are trademarks of their respective owners.

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