

DA50D Advanced Protocol Converter with Modular Communication

Installation Guide

- Provides enhanced features for data acquisition
- Webserver provides worldwide access to data logs and virtual HMI
- Virtual HMI offers built-in PC-based SCADA functionality
- Fully isolated design provides reliable operation
- Independent serial ports provide virtually unlimited integration methods
- 10 Base-T/100 base-TX Ethernet connection provides networking capability
- Configured using Crimson® software (version 3.1 or later)



II 3 G Ex ec IIC T4 Gc
 DEMKO 20 ATEX 2268X
 IECEx UL 20.0007X



FOR USE IN HAZARDOUS LOCATIONS:
 Class I, Division 2, Groups A, B, C, and T4

GENERAL DESCRIPTION

The DA50D provides networking and communication capabilities in a modular architecture to ensure easy deployment in any industrial application. This modular design makes ensuring compatibility with rapidly evolving communications standards as easy as replacing a field-installable sled. With an intuitive LED status ring, diagnosing issues is simple and straightforward. The DA50D delivers a compact adaptable solution that securely connects industrial applications.

CONVERTER PACKAGE CHECKLIST

This product package should contain the items listed below. This list does not include any sleds that may have been ordered. If any items are missing or damaged, contact Red Lion immediately.

- DIN Rail Mount DA50D Converter
- Pre-installed Sled Holder
- Installation Guide

SAFETY SUMMARY

All safety related regulations, local codes and instructions that appear in this document or on equipment must be observed to ensure personal safety and to prevent damage to either the device or equipment connected to it.

Do not use these products to replace proper safety interlocking. No software-based device (or any other solid-state device) should ever be designed to be responsible for the maintenance of personnel safety or consequential equipment not equipped with safeguards. Red Lion disclaims any responsibility for damages, either direct or consequential, that result from the use of this equipment in a manner not specified.

 **CAUTION: Risk of Danger**
 Read complete instructions prior to installation and operation of the unit.
ATTENTION : Risque de danger
 Lire les instructions complètes avant l'installation et l'utilisation de l'appareil.

 **WARNING - EXPLOSION HAZARD - SUBSTITUTION OF COMPONENTS MAY IMPAIR SUITABILITY FOR CLASS I, DIVISION 2**
AVERTISSEMENT - DANGER D'EXPLOSION - LE REMPLACEMENT DE COMPOSANTS PEUT NUIRE L'APTITUDE À LA CLASSE I, DIVISION 2

 This equipment is suitable for use in Class I, Division 2, Groups A, B, C, D, or non-hazardous locations only.
 Cet équipement est adapté à une utilisation dans des endroits de classe I, Division 2, Groupes A, B, C, D, ou dans des endroits non dangereux seulement.

 **WARNING - EXPLOSION HAZARD. NOT HOT SWAPPABLE. DO NOT REMOVE OR REPLACE WHILE CIRCUIT IS LIVE UNLESS THE AREA IS FREE OF IGNITIBLE CONCENTRATIONS.**
AVERTISSEMENT - RISQUE D'EXPLOSION. PAS ÉCHANGEABLE À CHAUD. NE PAS RETIRER OU REMPLACER TANT QUE LE CIRCUIT EST SOUS TENSION SAUF SI LA ZONE EST EXEMPTÉ DE TOUTE CONCENTRATION INFLAMMABLE.

SPECIFICATIONS

1. POWER REQUIREMENTS:

The DA50D Converter must use a Class 2 circuit according to National Electrical Code (NEC), NFPA-70 or Canadian Electrical Code (CEC), Part I, C22.1 or a Limited Power Supply (LPS) according to IEC 60950-1 or Limited-energy circuit according to IEC 61010-1.

Power connection via removable five position terminal block.

Supply Voltage: 12 to 24 VDC +/- 15%, Class 2 source

INPUT VOLTAGE	12 V	24 V
Typ. Power DA50D Converter only	2.5 W	2.6 W
Max Power DA50D Converter only	3.0 W	3.1 W
Max Power DA50D Converter, with Sleds	5.6 W	5.7 W

2. BATTERY: Lithium coin cell. Typical lifetime of 5 years, at nominal usage. To maintain UL rating, replacement battery must be: Red Lion CRA000 BT3V0 00000, Rayovac BR1225X-BA or Panasonic BR1225A/BN.

3. MEMORY:

On Board User Memory: 1 GB of non-volatile Flash memory.
Memory Card: microSD slot accepts Class 5 or better microSD cards up to 256 GB capacity. FAT32, industrial grade.

4. COMMUNICATION CAPABILITIES:

USB Device Port: Isolated USB 2.0 full speed, type B connection. USB DEVICE PORT IS FOR SYSTEM SET-UP AND DIAGNOSTICS AND IS NOT INTENDED FOR PERMANENT CONNECTION.

Ethernet Ports: Two 10 BASE-T / 100 BASE-TX RJ-45 Ports, auto MDI/MDI-X.

Isolation from Ethernet network to converter: 1500 Vrms
Serial Ports: Two serial ports with individual port isolation; 1 - RS-232 port (RJ12 connector) and 1 - RS-485/422 port (RJ45 connector)

5. ENVIRONMENTAL CONDITIONS:

Operating Temperature Range: -40 to 75 °C

Storage Temperature Range: -40 to 85 °C

Operating and Storage Humidity: 0 to 85% max. RH non-condensing

Vibration to IEC 60068-2-6: Operational 5-500 Hz, 2 g

Shock to IEC 60068-2-27: Operational 15 g

Altitude: Up to 2000 meters

Installation Category II, Pollution Degree 2 as defined in IEC/EN 60664-1.

6. CERTIFICATIONS AND COMPLIANCES:

CE Approved

EN 61326-1 Immunity to Industrial Locations

Emission CISPR 11 Class A

IEC/EN 61010-1

RoHS Compliant

ATEX Approved

II 3 G Ex ec IIC T4 Gc

DEMKO 20 ATEX 2268X

IECEX Approved

IECEX UL 20.0007X

UL Hazardous: File # E317425

Rugged IP30 enclosure

7. CONNECTIONS:

Power Connection: Five-pin top mounted connector

Wire Strip Length: 0.3" (7.5 mm)

Wire Gauge Capacity: 12 to 24 AWG (3.31 to 0.20 mm²) copper wire only

Torque: 4.4-5.3 inch-lbs (0.5-0.6 N-m)

8. CONSTRUCTION:

Polycarbonate enclosure with IP30 rating.

For use only in an approved enclosure.

9. MOUNTING REQUIREMENTS:

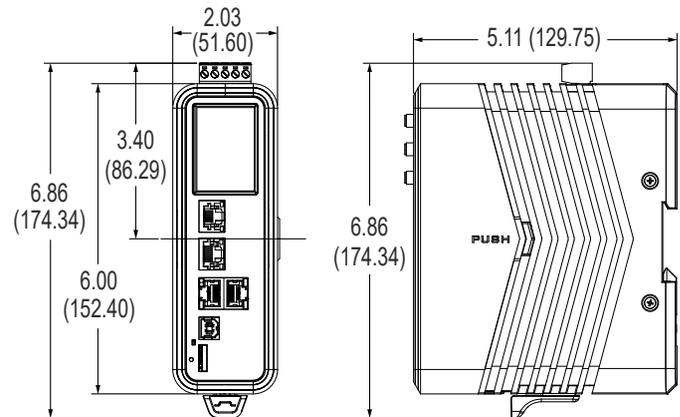
Mounts onto standard DIN style top hat (T) profile mounting rails according to EN50022

- 35 x 7.5 mm and 35 x 15 mm.

10. WEIGHT:

13 oz (404.3 g)

DIMENSIONS In Inches (mm)



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 #FCOR000)

Line Filters for input power cables:

Schaffner # FN2010-1/07 (Red Lion #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 <https://www.redlion.net/emi> for more information on EMI guidelines, Safety and CE issues as they relate to Red Lion products.

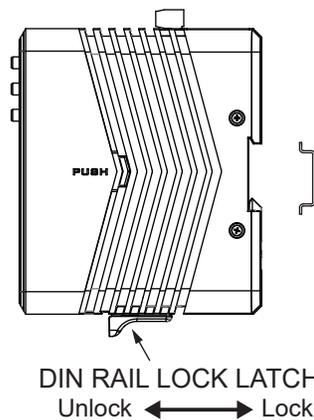
INSTALLATION

Converter DIN Rail Mounting

The DIN rail should be mounted horizontally so that the unit's ventilation holes are vertical in relation to installation 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. For environments with vibration or impacts, DIN rail clamps are recommended.

For hazardous location installation, the following shall be taken into consideration:

- The equipment shall only be used in an area of at least pollution degree 2, as defined in EN/IEC 60664-1.
- The equipment shall be installed in an enclosure that provides a minimum ingress protection of IP54 in accordance with EN/IEC 60079-0. The enclosure shall be accessible only with the use of a tool.
- Transient protection shall be provided that is set at a level not exceeding 140% of the peak rated voltage value at the supply terminals to the equipment.



Recommended DIN Rail Mounting Steps:

1. Ensure the DIN rail lock latch is in the outward most position (unlocked). Hook the top back of the DA50D DIN rail clip on the unit over the DIN rail.
2. Push the bottom of the unit towards the DIN rail until the unit is flush with the rail.

3. Push the DIN rail lock latch to the latched (in) position.

Recommended DIN Rail Removal Steps:

1. Move the DIN rail lock latch to the unlatched (out) position.
2. Unhook the top of the unit and remove it from the DIN rail.

SLED INSTALLATION



CAUTION: Follow standard ESD precautionary procedures.

ATTENTION: Suivez les procédures de précaution standard de décharge électrostatique.

1. Prior to installing the Sled for your DA50D Converter application, ensure that the Converter is not receiving power.
2. Disconnect and remove your DA50D from the DIN rail.
3. Remove the DA50D Converter's front cap by squeezing the sides and pulling.
4. Slide out the sled holder.
5. Install a sled into the sled holder and hand tighten the captive fasteners, or use a screwdriver.
6. Re-install the sled holder containing the sled into the Converter. Make sure it is fully seated.
7. Replace the front cap.



CAUTION: Failure to properly align the sled holder can result in damage to the connector pins.

ATTENTION: Si le tiroir n'est pas correctement aligné, les broches du connecteur du tiroir risquent d'être endommagées.

POWER SUPPLY REQUIREMENTS

The DA50D Converter requires a 12-24 VDC power supply. Your unit may draw considerably less than the maximum rated power depending upon the configuration and features being used. Your unit will draw increased power with a sled installed. Items that could cause increases in current are microSD card, communications sleds, and other features programmed through software.

To ensure you do not exceed the capacity of your DA50D Converter host power supply, calculate the total power consumption required for all planned accessories.

It is very important that the power supply meets the following requirements and 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 Converter. Ideally, the shortest length possible should be used.
- The wire used to connect the Converter power supply should be at least 22-gauge wire. If a longer cable run is used, a heavier gauge wire should be used. The routing of the cable should be kept away from large capacitors, inverters, and other devices which may generate significant electrical noise.
- Use a power supply with an NEC Class 2 or Limited Power Source (LPS) and SELV (safety extra-low voltage) rating. This type of power supply provides isolation to accessible circuits from hazardous voltage levels generated by a mains power supply due to single faults. 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.
- Peak efficiency (DA50D) occurs at the low side of the voltage range (approx. 12 V), recommended for high temperature applications.

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

WIRING

All power, input and output (I/O) wiring must be in accordance with Class I, Division 2 wiring methods and in accordance with the authority having jurisdiction.



CAUTION: Only UL listed wiring with temperature ratings greater than 90 °C permitted for Class I, Division 2, Zone 2 and ATEX/IECex installations.

ATTENTION: Seul le câblage homologué UL avec des températures nominales supérieures à 90°C est autorisé pour les installations de classe I, Division 2, zone 2 et ATEX/IECex.

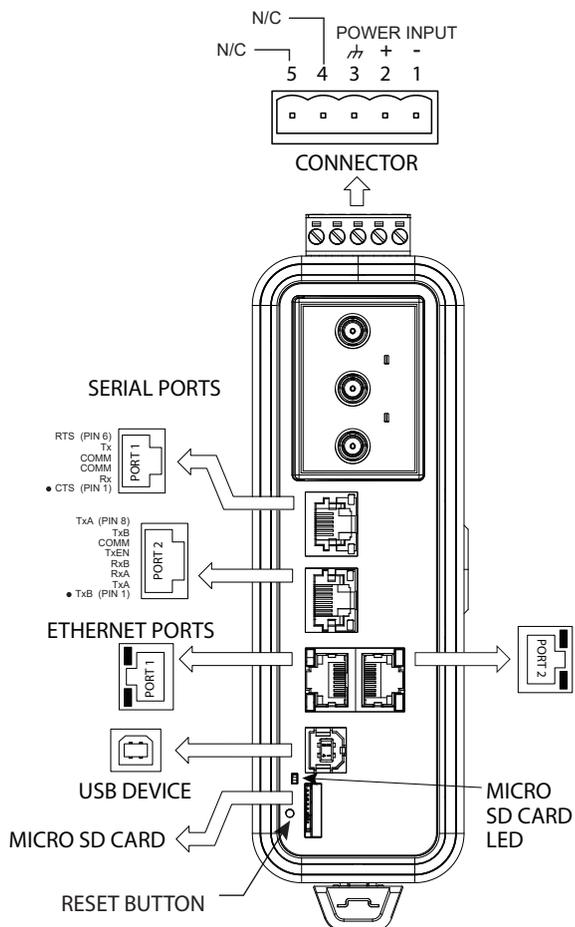
CONNECTING TO EARTH GROUND

Each DA50D has a chassis ground terminal on the top of the unit. Your unit should be connected to earth ground. Steps should be taken beyond connecting to earth ground to eliminate the buildup of electrostatic charges.

The chassis ground is not connected to signal common of the unit. Maintaining isolation between earth ground and signal common is not required to operate your unit. But, other equipment connected to this unit may require isolation between signal common and earth ground. To maintain isolation between signal common and earth ground care must be taken when connections are made to the unit. For example, a power supply with isolation between its signal common and earth ground must be used. Also, plugging in a USB cable may connect signal common and earth ground.¹

¹ USB's shield may be connected to earth ground at the host. USB's shield in turn may also be connected to signal common.

DA50D PORT PINOUTS



FACTORY RESET BUTTON

The factory reset button located in the lower left area of the front of the unit can be used to access the system console. Refer to software manual for access procedure and available options.

CONFIGURING A DA50D

The DA50D is configured using Crimson® 3.1 software. Crimson 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 DA50D using the latest Crimson version, you are assured that your unit has the most up to date feature set. Crimson software can configure the DA50D through the Serial programming port, USB device port, Ethernet ports or microSD card.

The microSD card can be used to program a DA50D by placing an image file on the SD card. The card is then inserted into the target DA50D and powered. Refer to the Crimson 3.1 User Manual for more information on the proper names and locations of this file.

DA50D Cellular Connectivity

Cellular connectivity is achieved using the DA 4G LTE - CAT4 Modem Sled. Refer to the documentation shipped with your DA 4G LTE - CAT4 Modem Sled for installation and setup information.



WARNING - Do not connect or disconnect cables while power is applied unless area is known to be non-hazardous. Not hot swappable.

Ethernet Communications

Ethernet communications can be established at either 10 BASE-T or 100 BASE-TX. The DA50D'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 3.1 User Manual and Red Lion's website for additional information on Ethernet communications.

LED COLOR(S)	MEANING
YELLOW solid	Link established.
YELLOW flashing	Data being transferred.
GREEN (OFF)	10 BASE-T Communications
GREEN (ON)	100 BASE-TX Communications

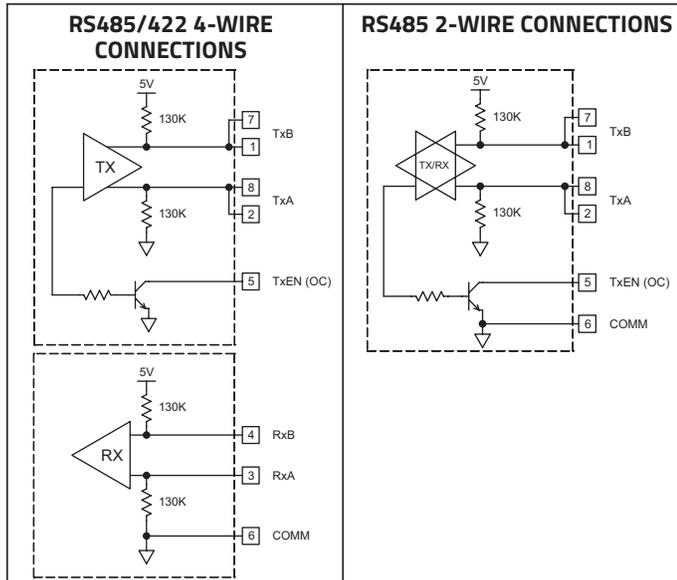
RS232 PORT

The DA50D0B has one RS232 serial port that can be used for either programming or for communications. The RS232 port can be used for either master or slave protocols. The serial port has a pair of LEDs to indicate transmit and receive activity. The pinout is shown to the right.

DA50D RS232 to a PC			
DA50D: RJ12		PC: DB9	
Pin #	Name	Pin #	Name
4	COMM	1	DCD
5	Tx	2	Rx
2	Rx	3	Tx
	N/C	4	DTR
3	COMM	5	GND
	N/C	6	DSR
1	CTS	7	RTS
6	RTS	8	CTS
	N/C	9	RI

RS485/422 COMMS PORT

The RS485 port of the DA50D can be used for RS485 or RS422 communication. The serial port has a pair of LEDs to indicate transmit and receive activity.



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

Examples of RS485 2-Wire Connections

DA50D : RJ45		RLC : RJ11	
Pin #	Name	Pin #	Name
5	TxEN	2	TxEN
6	COMM	3	COMM
1	TxB	5	B-
2	TxA	4	A+

DA50D to Modular Controller			
DA50D		Modular Controller	
Pin #	Name	Pin #	Name
1,4	TxB	1,4	TxB
4,1	RxB	4,1	RxB
2,3	TxA	2,3	TxA
3,2	RxA	3,2	RxA
5	TxEN	5	TxEN
6	COMM	6	COMM
7	TxB	7	TxB
8	TxA	8	TxA

DH485 COMMUNICATIONS

The DA50D's RS485/422 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 at www.redlion.net/cables-drivers.

STATUS RING LED

LED COLOR	LED STATE	MEANING
Green	Solid	Converter is configured and running
Blue	Rapid Flashing	Bootloader is Active
Blue	Slow Flashing	Invalid File System
Red	Solid	Active Auto Alarm
Red	Flashing	Active Manual Alarm

USB, DATA TRANSFERS FROM THE microSD CARD



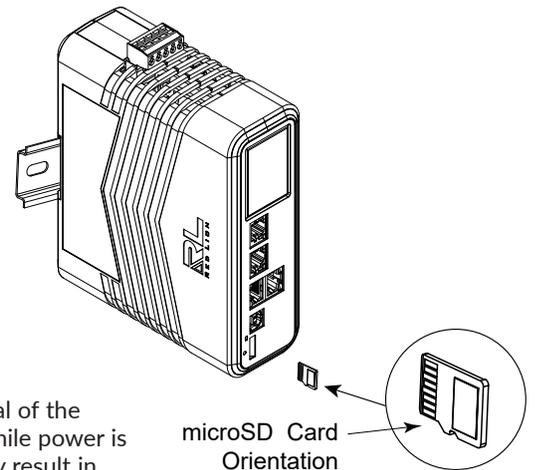
WARNING - Do not connect or disconnect cables while power is applied unless area is known to be non-hazardous. Not hot swappable. USB port is for system set-up and diagnostics and is not intended for permanent connection.

In order to transfer data from the SD card via the USB port, a driver must be installed on your computer. This driver is installed with Crimson and is located in the folder C:\Program Files\Red Lion Controls\Crimson 3.1\Device\ after Crimson is installed. This may have already been accomplished if your DA50D was configured using the USB port.

Once the driver is installed, connect the DA50D to your PC with a USB cable, and follow "Mounting the microSD" instructions in the Crimson 3.1 User Manual.

INSTALL THE microSD CARD

Insert the microSD card into the slot on the front of the Converter with the card oriented as shown. The card is inserted properly when the card clicks into place in the card holder. To remove the microSD card, push in slightly on the card.



Note: Removal of the microSD while power is applied may result in corruption or loss of data.

DA50D CONVERTER BATTERY & TIME KEEPING

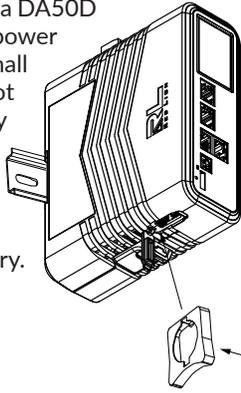


WARNING - Explosion Hazard - The area must be known to be non-hazardous before servicing/ replacing the unit and before installing or removing I/O wiring and battery. Not hot swappable.

A battery is used to keep time when the unit is without power. The battery of a DA50D Converter unit does not affect the unit's memory, all configurations and data is stored in non-volatile memory.

Changing the Battery

To change the battery of a DA50D Converter, first remove power to the unit. Insert a small screwdriver into the slot provided on the battery holder and pry the battery holder out of the unit. Remove the old battery from the holder and replace it with a new battery.



Note: Battery orientation MUST MATCH as shown.

To maintain UL rating, battery must be replaced with one listed in the Specifications.



CAUTION: Lithium battery. Danger of explosion if battery is incorrectly replaced. Replace only with the same or equivalent type recommended by the manufacturer.

ATTENTION: Pile au lithium. Danger d'explosion si la batterie est mal remplacée. Remplacez-la uniquement par une pile du même type ou d'un type équivalent recommandé par le fabricant.



Please note that the old battery must be disposed of in a manner that complies with your local waste regulations. The battery must not be disposed of in fire, or in a manner whereby it may be damaged and its contents could come into contact with human skin.

Veuillez noter que la vieille pile doit être éliminée conformément à la réglementation locale en matière de déchets. La pile ne doit pas être jetée au feu, ni d'une manière qui pourrait l'endommager et son contenu pourrait entrer en contact avec la peau humaine.

RED LION CONTROLS TECHNICAL SUPPORT

If for any reason you have trouble operating, connecting, or simply have questions concerning your new DA70D Controller, contact Red Lion's technical support.

Support: support.redlion.net

Website: www.redlion.net

Inside US: +1 (877) 432-9908

Outside US: +1 (717) 767-6511

Red Lion Controls, Inc.

20 Willow Springs Circle York, PA 17406

ORDERING INFORMATION

DESCRIPTION	PART NUMBER
DA50D Single Sled Advanced Protocol Converter	DA50D 0BNN 000 0000
4G LTE (CAT4) Cellular Sled for AMER (AT&T, Generic)	DA S00 CL9C4S AM000
4G LTE (CAT4) Cellular Sled for AMER (Verizon)	DA S00 CL9C4S VZ000
4G LTE (CAT4) Cellular Sled for EMEA, SAARC, APAC	DA S00 CL9C4S EU000
802.11n Wi-Fi Sled	DA S00 WF10N0 AM000
1 Port USB 2.0 Host Sled	DA S00 PN40U4 00000
Dual RS232 Ports Sled (Isolated)	DA S00 PN2221 IS000
Dual RS485 Ports Sled (Isolated)	DA S00 PN2442 IS000
Mixed RS232/RS485 Ports Sled (Isolated)	DA S00 PN2245 IS000

Spaces in listed part numbers are shown to improve readability, do not include when searching for or ordering these parts.