SIMPLE SOLUTIONS. POWERFUL MONITORING.
Tel 281•350•8751 Fax 888•418•5955
www.monicoinc.com

# mCore® SECURE DATA ROUTER - ADVANCED PROTOCOL CONVERTER

Thank you for purchasing mCore® SDR (Secure Data Router). Your device comes preconfigured and ready to install.

Prior to use, thoroughly read the instructions in this manual to connect and use this product correctly. Please retain this manual for future reference and make sure that this manual is available to all users. To ensure the safety and proper operation of the device and any connected equipment, installation or relocation should be performed by qualified personnel only.

IND. CONT. EQ.
FOR HAZ. LOC.
CL I, DIV 2, GP A, B, C, D
Operating Temp. Code T5

Conforms to UL STD 61010-1 & ISA STD 12.12.01
Certified to CSA STD C22.2 #s 61010-1 & 213

mCore SDR
IND. CONT. EQ.
FOR HAZ. LOC.
CL I, DIV 2, GP A, B, C, D
Operating Temp. Code T5

MONICO MONITORING, INC.
MADE IN THE U.S.A.

INPUT VOLTAGE: 8-48 VDC ⎓ ( -40°C ≤ Tamb ≤ 65°C )
CURRENT: 200 mA normal to 1200 mA max
INPUT VOLTAGE: 8-28 VDC ⎓ ( -40°C ≤ Tamb ≤ 70°C )
CURRENT: 300 mA normal to 1200 mA max
IP66/IP67

⚠ See Instruction Manual
⚠ Voir Le Manuel D'instruction

Conforms to UL STD 61010-1 & ISA STD 12.12.01
Certified to CSA STD C22.2 #s 61010-1 & 213

Manufacturing Location: 1001 E. Arapaho Rd. Richardson, TX 75081

www.monicoinc.com

## SAFETY PRECAUTIONS

**Thoroughly read and follow the safety precautions and operating instructions listed in this manual before using the product. After reading, retain this manual for future reference.**

•Do not use or mount the product in any manner or location not intended.
•This manual should be available for anyone operating, repairing or relocating the product.
•The product should be installed, repaired or removed by qualified personnel only.
•Do not disassemble or modify the product. Improper installation or repair may cause injury, damage, electric shock or fire.
•To ensure proper operation and avoid damage to the product, use appropriate tools along with recommended connectors and recommended wire gauge.
•Do not open or break the seal between the housing and the connector header.
•Do not operate a unit that has been damaged.
•Extended environmental conditions: wet location, outdoor use, ambient temperature - 40°C and 70°C, and altitude up to 2000m.

## WARNINGS

**WARNING** – EXPLOSION HAZARD. DO NOT CONNECT OR DISCONNECT WHEN ENERGIZED.
**AVERTISSEMENT** – RISQUE D'EXPLOSION. NE PAS BRANCER OU DÉBRANCHER LORSQUE LE CIRCUIT EST SOUS TENSION.
**WARNING** – EXPLOSION HAZARD. DO NOT DISCONNECT WHILE THE CIRCUIT IS LIVE OR UNLESS THE AREA IS FREE OF INGNITIBLE CONCENTRATIONS.
**AVERTISSEMENT** – RISQUE D'EXPLOSION. NE PAS DÉBRANCHER SI LE CIRCUIT EST SOUS TENSION, À MOINS QUE LE MILIEU SOIT LIBRE DE SUBSTANCES INFLAMMABLES CONCENTRÉES.
**WARNING** – EXPLOSION HAZARD. DO NOT REMOVE OR REPLACE BATTERIES OR PLUG-IN MODULES (AS APPLICABLE) UNLESS POWER HAS BEEN DISCONNECTED OR THE AREA IS FREE OF IGNITIBLE CONCENTRATIONS.
**AVERTISSEMENT** – RISQUE D'EXPLOSION. NE PAS RETIRER OU REMPLACER DES BATTERIES OU DES MODULES DE PLUG-IN (COMME APPLICABLES) À MOINS QUE LA PUISSANCE A ETE DÉCONNECTEE OU LA ZONE EST LIBRE DE CONCENTRATIONS IGNITIVE.
**WARNING** – DO NOT REMOVE THE AMPSEAL CONNECTORS UNLESS THE EQUIPMENT NEEDS TO UNDERGO REPAIR OR MAINTENANCE. AFTER REPAIR OR MAINTENANCE HAS BEEN DONE, PLEASE CHECK THE BARE PINS ON THE EQUIPMENT TO ENSURE THERE IS NO DUST OR WATER PRESENT. IP RATING OF THE EQUIPMENT IS ONLY MAINTAINED WITH THE AMPSEAL CONNECTORS ATTACHED TO THE EQUIPMENT.
**AVERTISSEMENT** - NE RETIREZ PAS LES CONNECTEURS AMPSEAL À MOINS QUE L'ÉQUIPEMENT NE SOIT RÉPARÉ OU ENTRETENU. UNE FOIS LA RÉPARATION OU L'ENTRETIEN EFFECTUÉE, VÉRIFIEZ LES BROCHES NUES SUR L'ÉQUIPEMENT POUR VOUS ASSURER QU'IL N'Y A PAS DE POUSSIÈRE OU D'EAU PRÉSENTE. LA CLASSIFICATION IP DE L'ÉQUIPEMENT EST UNIQUEMENT ENTRETENUE AVEC LES CONNECTEURS AMPSEAL ATTACHÉS À L'ÉQUIPEMENT.
**WARNING** – TO MAINTAIN CLASS 1, DIVISION 2 RATING, THE UNIT MUST BE INSTALLED IN A TOOL-SECURED ENCLOSURE USING ONE OF THE NEC WIRING METHODS THAT IS OUTLINED IN THIS MANUAL.
**AVERTISSEMENT** - POUR MAINTENIR L'INDICE DE CLASSE 1, DIVISION 2, L'UNITÉ DOIT ÊTRE INSTALLÉE DANS UN BOÎTIER SÉCURISÉ EN UTILISANT L'UNE DES MÉTHODES DE CÂBLAGE NEC DÉCRITES DANS CE MANUEL.

**FOR CONFIGURATION AND OR INSTALLATION ASSISTANCE PLEASE CONTACT MONICO AT 281-350-8751 – OPTION 1**

## GETTING STARTED

mCore® SDR is designed for industrial applications requiring protocol translation between CDL (CAT® Data Link), S.A.E. J1939, Modbus RTU, and Modbus TCP. Each unit comes to you preconfigured and ready to install.

The mCore® SDR is easy to mount, with two mounting options, and environmentally sealed to protect against dust ingress and temporary immersion in up to 1 meter of water (IP66 & IP67). It was designed specifically for industrial mobile, mining, marine, and off-road applications. The device displays LED indicating lights configured to provide positive confirmation of power, connectivity, and data transmit/data receive.

**Figure 1**
Weight: 2.0 lbs. (.907 Kg)

## CONNECTING MCORE

The unit should be connected to the desired ports according to the pinout below using the recommended connectors shown in Table 1 on the last page of this manual.

The pin numbers are labeled on each AMPSEAL key connector to ensure proper connection.

| | | |
|---|---|---|
| Pin 1 **Blank** | Pin 2 **Blank** | Pin 3 **Blank** |
| Pin 4 **Reset (+)** | Pin 5 **Reset (-)** | |
| Pin 6 **Key Switch** | Pin 7 **Battery (-)** | Pin 8 **Battery (+)** |

**Pinout for Key Connector A**

** Please carefully review the Input Power Requirements on the next page. **

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Pin 1 **RS485 (-)** | Pin 2 **RS485 (+)** | Pin 3 **CDL (+)** | Pin 4 **J1939 #2 Term** | Pin 5 **J1939 #2 Term** | Pin 6 **J1939 #1 Term** | Pin 7 **J1939 #1 Term** | Pin 8 **J1939 #1 Comm** | Pin 9 **Ethernet 1 Rx (+)** | Pin 10 **Ethernet 1 Rx (-)** | Pin 11 **Ethernet 2 Rx (-)** | Pin 12 **Ethernet 2 Rx (+)** |
| Pin 13 **RS232 Comm** | Pin 14 **RS485 Comm** | Pin 15 **CDL (-)** | Pin 16 **J1939 #2 High** | Pin 17 **J1939 #2 Low** | Pin 18 **J1939 #1 High** | Pin 19 **J1939 #1 Low** | Pin 20 **Ethernet 1 Tx (+)** | Pin 21 **Ethernet 1 Tx (-)** | Pin 22 **Ethernet 2 Tx (-)** | Pin 23 **Ethernet 2 Tx (+)** | |
| Pin 24 **RS232 Tx** | Pin 25 **RS232 Rx** | Pin 26 **CDL Comm** | Pin 27 **J1939 #2 Comm** | Pin 28 **Blank** | Pin 29 **Blank** | Pin 30 **Blank** | Pin 31 **Blank** | Pin 32 **Blank** | Pin 33 **Blank** | Pin 34 **Blank** | Pin 35 **Blank** |

**Pinout for Key Connector B**

**Pinout is depicting the female header connectors and respective key orientations on your mCore® SDR that will mate to the male connectors shown in Table 1. Be sure to follow the AMPSEAL "How-to Instructions" located at:**

laddinc.com > resources > how-to-instructions > ampseal-connectors

laddinc.com > resources > how-to-instructions > ampseal-16-contact-crimping

**These instructions include steps for proper inserting, crimping, and removing of wires into the pin connectors. For proper hand crimping, an AMPSEAL 2119118-1 hand crimping tool (not included) must be used.**

**mCore® SDR is approved for Class I Div 2 Group A, B, C and D. In order to maintain this rating the unit must be installed in a separate tool secured enclosure and comply with the one of the following NEC wiring methods:**

1. Extra-hard usage cord – Section 501.140 of the NEC and Rule J18-160 of the CE Code Part I;

2. Instrumentation tray cable (Type ITC or CIC) – Section 501.10(B) and 501.105(B)(6) of the NEC and Rule J18-152 of the CE Code Part I;

3. Power-limited tray cable (Type PLTC) – Article 725 of the NEC; and

4. Tray cable (Type TC) installed per Article 336 of the NEC and Rule 12-2202 of the CE Code Part I.

**FOR CONFIGURATION AND OR INSTALLATION ASSISTANCE PLEASE CONTACT MONICO AT 281-350-8751 – OPTION 1**

## INPUT POWER REQUIREMENTS

mCore® SDR power is supplied through Pins 7 and 8 on Key Connector A (see Table 1). Pins 7 and 8 can be located on the Pinout Guide under "Connecting mCore". The input voltage requirements are 8–48 VDC for operating temperatures between -40°C and +65°C. The input voltage requirements are limited to 8–28 VDC for operating temperatures between -40°C and +70°C. mCore® SDR has internal reverse polarity protection, but will not operate under reverse polarity conditions.

In addition to the battery positive and battery negative leads, there is a key switch wire that must be wired into the positive terminal of the power source or wired to a switch connected to the positive terminal of the power source.
**mCore® SDR will not boot if key switch is not powered.**

## MOUNTING mCORE®

**Surface-Mount:** The unit should be mounted securely against a flat surface, using two ¼" fasteners (not provided), to a suitable location as close to the engine as possible. DO NOT mount directly to the engine block. The unit should be mounted, as shown in Figure 1 on page 2, either horizontally or vertically. Horizontal is the optimal mounting orientation considering LED visibility and heat dissipation. However, other mounting orientations are acceptable.

**DIN Rail Mount:** The mCore® SDR unit should be mounted vertically on a horizontal DIN rail. Tilt the unit to a 45-degree angle and insert the top lip of the DIN rail bracket onto the DIN rail. Then attach the bottom lip to the DIN rail to snap the unit into place (illustrated in Figure 2). A minimum of 1" of space should be maintained on all sides of the unit to ensure proper heat regulation.

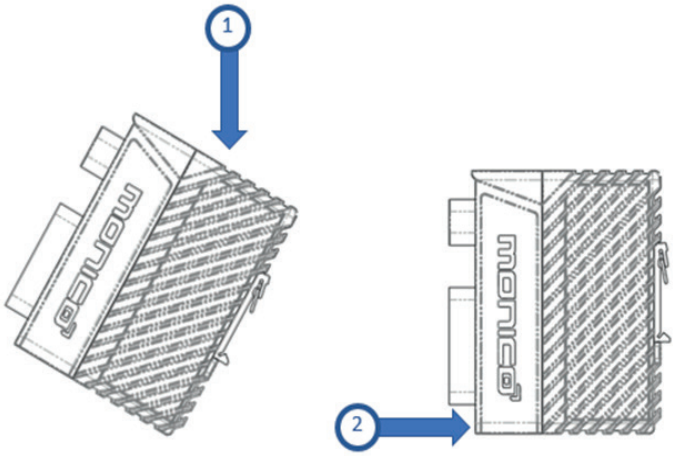



**Figure 2**

To remove the unit from the DIN rail, push down on the unit until the bottom lip is clear from the rail. Then pull out from the bottom. The unit should remove with ease.

## GROUNDING mCORE®

After mounting and connecting mCore® SDR, the unit must be grounded in compliance with local and national electrical codes. It must be externally grounded using a customer-supplied ground wire before any power is applied. Contact the appropriate electrical inspection authority if you are uncertain that suitable grounding is available.

**TOOLS REQUIRED:**

| | |
|---|---|
| QTY: 1 | Grounding Lug (included) |
| QTY: 1 | 6-Gauge Ground Wire (not included) |
| QTY: 1 | Nut Driver (not included) |
| QTY: 1 | Pliers or Crimping Tool (not included) |

**PROCEDURE:**

Step 1: Use the Pliers or Crimping Tool to crimp the 6-Gauge Ground Wire to the Grounding Lug.
Step 2: Connect the Grounding Wire to the mCore™ SDR Ground ing Lug connection point, shown below in Figure 3.
Step 3: Place the Grounding Wire over the Grounding Lug and tighten these components using a nut driver. Tighten to 9.6 in-lbs.
Step 4: Connect the other end of the wire to a reliable earth ground if possible. For most effective grounding, use the grounding standards listed below.

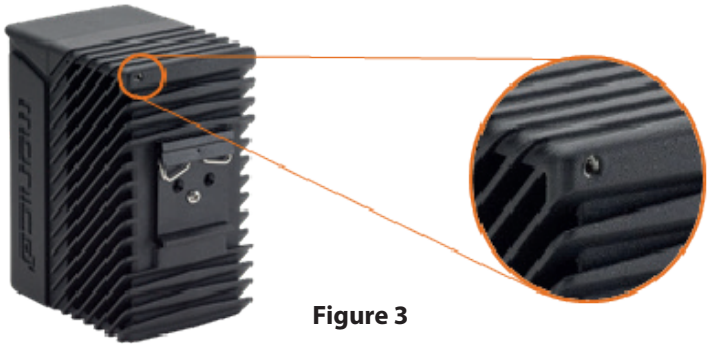


**Figure 3**

* Safety guidelines for proper grounding are outlined in OSHA Standard 1926.962.
* National standards for proper grounding are outlined in IEEE Standard 142.

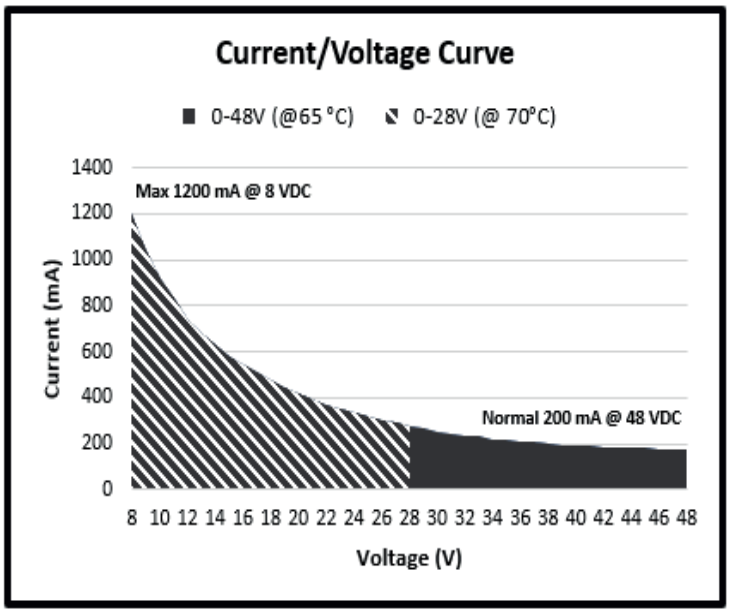
## POWER DISCONNECT

To disconnect power to mCore® SDR lift the locking ear on the side of Key Connector A using a flat blade screwdriver and pull gently. The locking ear is shown below in Figure 4.

Failure to protect mCore® SDR or use in any manner not specified may result in damage.

**Figure 4**

## CURRENT/VOLTAGE REQUIREMENTS




** User is required to install a 2 Amp fast blow fuse rated for at least 50VDC (or the maximum voltage of the supplied power) to protect against short circuit. **

**Table 1**

| mCore *Mating Connector Options (*AMPSEAL*)* | | |
|---|---|---|
| **Item** | **Description** | **AMPSEAL Part Number** |
| | **Plug, Key Connector A** | **776286-1** |
| | **Plug, Key Connector B** | **776164-1** |
|  | **Sealing Plug** | **770678-1** |
| | **Backshell** | **776463-1 and 776464-1** |
| | **Connector** | **770854-1** |

* Connectors are AMPSEAL available through LADD Industries

## mCORE® LED INDICATOR GUIDE

| | Solid Green | Blinking Green | Blinking Amber | Solid Red | Blinking Red | No LED |
|---|---|---|---|---|---|---|
| **Ethernet 1** | Connected | Passing Traffic, 100MB | Passing Traffic, 10MB | Not Connected | | Not Configured |
| **Ethernet 2** | Connected | Passing Traffic, 100MB | Passing Traffic, 10MB | Not Connected | | Not Configured |
| **CDL** | | Receiving Packets as Expected | 100% Passive Data | Bad Data/Reverse Polarity | No Traffic | |
| **CAN 1** | Good Connection | Valid Data | | Bad Connection or No Data | | Not Configured |
| **CAN 2** | Good Connection | Valid Data | | Bad Connection or No Data | | Not Configured |
| **RS485** | Good Connection | Valid Data | | Bad Connection or No Data | | |
| **RS232** | Good Connection | Valid Data | | Bad Connection or No Data | | |
| **Power** | Power Good; Setup Files Present | Power Good; No Setup Files | | | Controlled Shutdown State | |