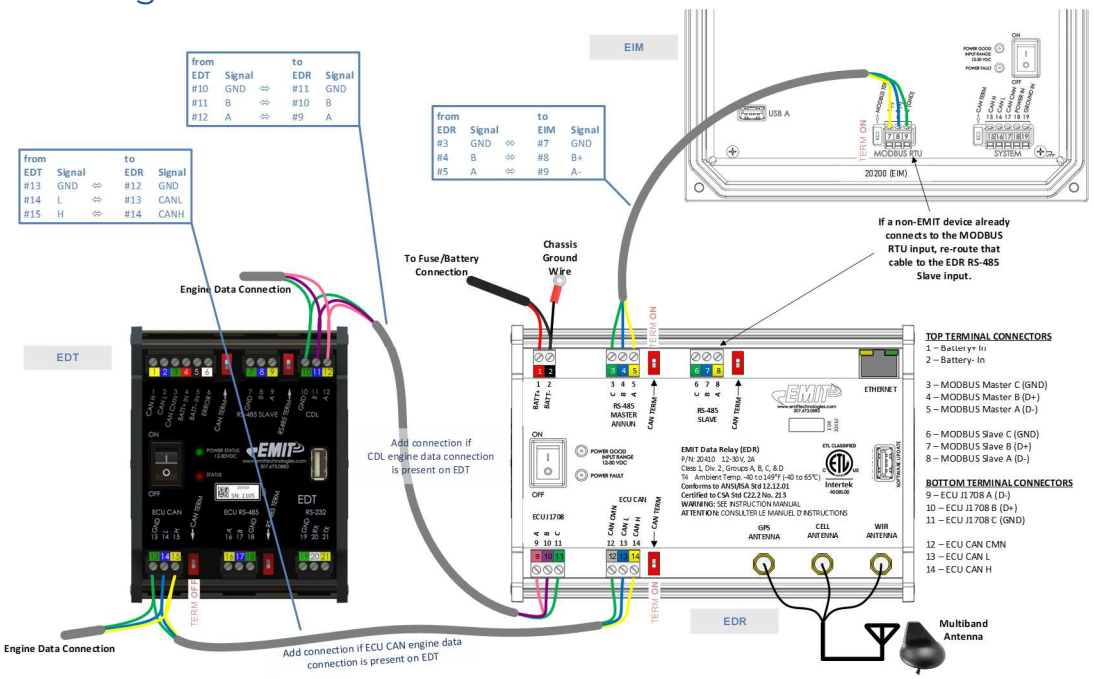
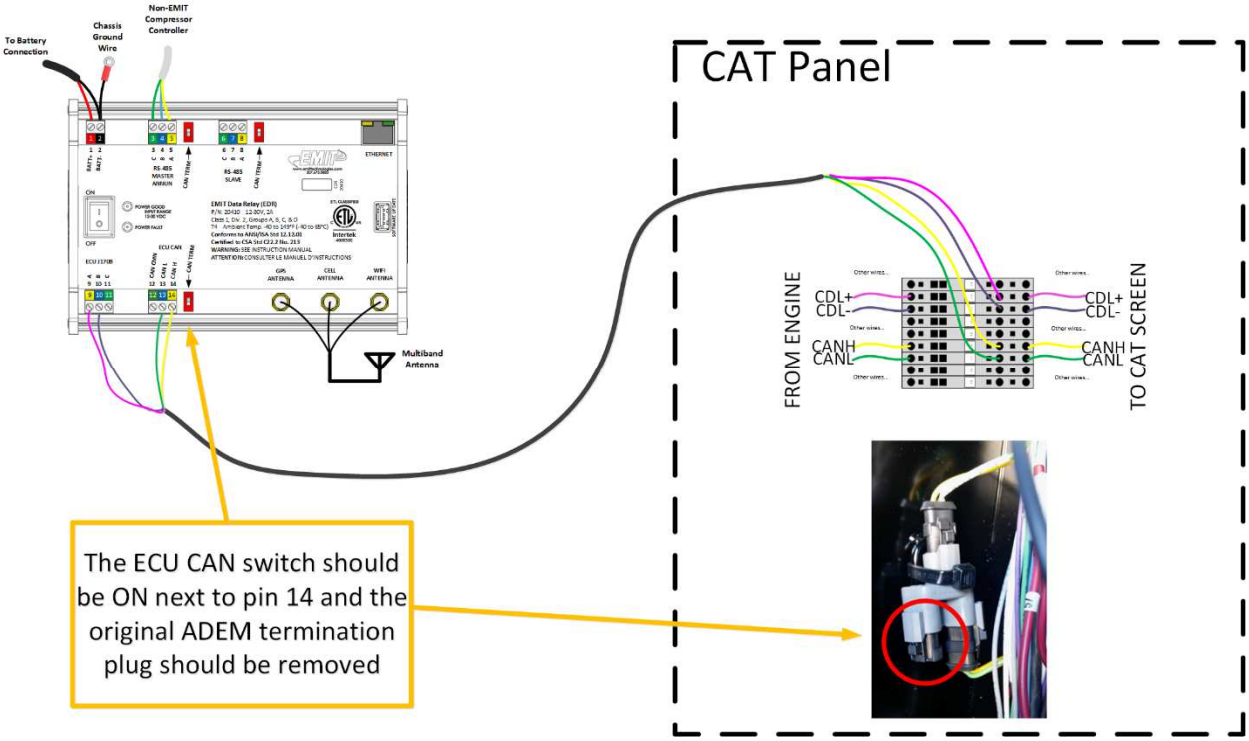
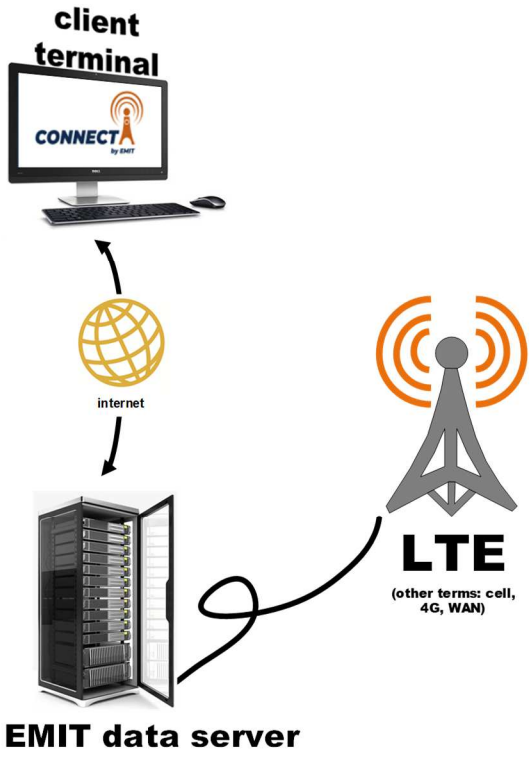
# Quick Guide

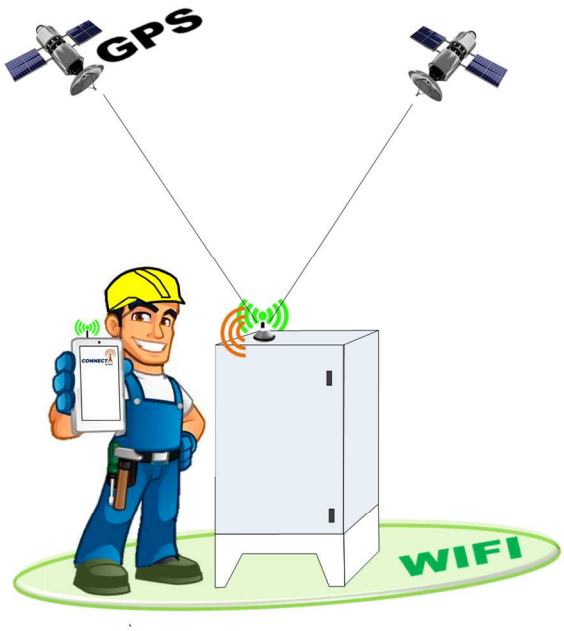
## Installing an EDR in an EMIT EIM Panel




## Installing an EDR in a non-EMIT Panel





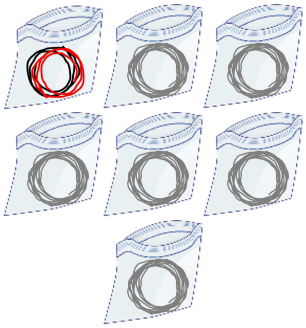

**Telematics – Universal Installation Guide**

Installation, Operation, and Troubleshooting Manual

# Table of Contents

# Content of 20017-0024 Universal EDR kit:

The 20017-0024 includes the following items:

| | EMIT Part Number | Description |
|---|---|---|
|  | 20410 | EMIT Data Relay |
|  | 20374-0001 | Multi-channel antenna: cell, WIFI, GPS |
|  | 20413-0002 | Antenna Mounting Bracket |
|  | 20129-0090 and 20132 | DIN Rail and DIN Rail Stop |
|  | 20017-0025<br>20017-0026<br>20017-0027<br>20017-0028<br>20017-0029<br>20017-0040<br>20017-0041 | Power and Ground wire set<br>ADEM wires<br>EIM wires<br>DE-3000 wires<br>CENTURION® wires<br>TTD wires<br>DD40/NTV wires |

# System Introduction

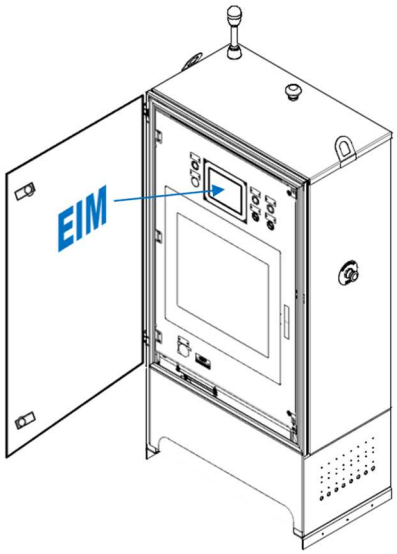
EMIT's Telematics solution provides remote access to gas compressor engine platforms to long-term monitor system performance and issue callouts for pre-configured events such as a system shutdown. Each field unit connects through a multi-carrier cell modem to a nearby mobile tower, to offload data, callouts, and receive configuration updates. The unit data are being collected every 15 minutes at an EMIT data server, which can be accessed via any internet terminal by users on a permission base. The system can be configured to send out SMS and email messages for callouts.

## C1D2 Notice

To preserve the C1D2 module rating, the EDR module must be installed in a C1D2-suitable enclosure such as the 14270-series panels to protect the module from moisture, dust, and from being accessed in normal operation without using a tool. The enclosure should suitably protect the equipment from deterioration that would affect its suitability for Class I, Division 2 locations.

# EDR Installation on an EIM

The field unit telematics hardware is not integrated into the EMIT Interface Module (20200 – **EIM**), and therefore needs the addition of an EMIT Data Relay (20410 – **EDR**) into the system.




## EDR Based Telematics

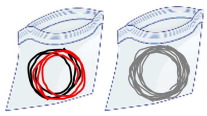
All 14270-series EMIT control panels are outfitted with an EIM for touchscreen control and require the addition of an EDR module and a multi-channel LTE/GPS/WIFI antenna in order to bring the EMIT telematics feature to the panel. The EDR module snaps into a DIN-rail inside the panel and connects through MODBUS to the existing control system. Field personal can access and configure the EDR through a WIFI connection via their mobile phone or similar device.

## EDR Spec

This document serves as an installation guide only. To download the full EDR full technical specification log into the EMIT Forum.

## Wires Needed

To install an EDR on an EIM based panel, only two of the seven bags with wires are used:

| | | |
|---|---|---|
|  | 20017-0025<br>~~20017-0026~~<br>20017-0027<br>~~20017-0028~~<br>~~20017-0029~~<br>~~20017-0040~~<br>~~20017-0041~~ | **Power and Ground wire set**<br>~~ADEM wires~~<br>**EIM wires**<br>~~DE 3000 wires~~<br>~~CENTURION® wires~~<br>~~TTD wires~~<br>~~DD40/NTV wires~~ |

## Installation Steps

To upgrade the EIM based system with an EDR:

(1) The EDR needs 3 antenna connection. Install the multi-channel antenna either

a. *preferred solution!* on top of the panel by drilling a 18mm hole through the panel and installing the antenna through the hole [see Figure 1 Option B], or

b. *alternative solution:* on a nearby mounting pole using the mounting bracket [see Figure 1 Option A]. ***Important note***: the three coax cables of the antenna are not UV resistant and must be protected from permanent sunlight exposure to avoid material breakdown. For example, wire loom tubing can be added around the cables.

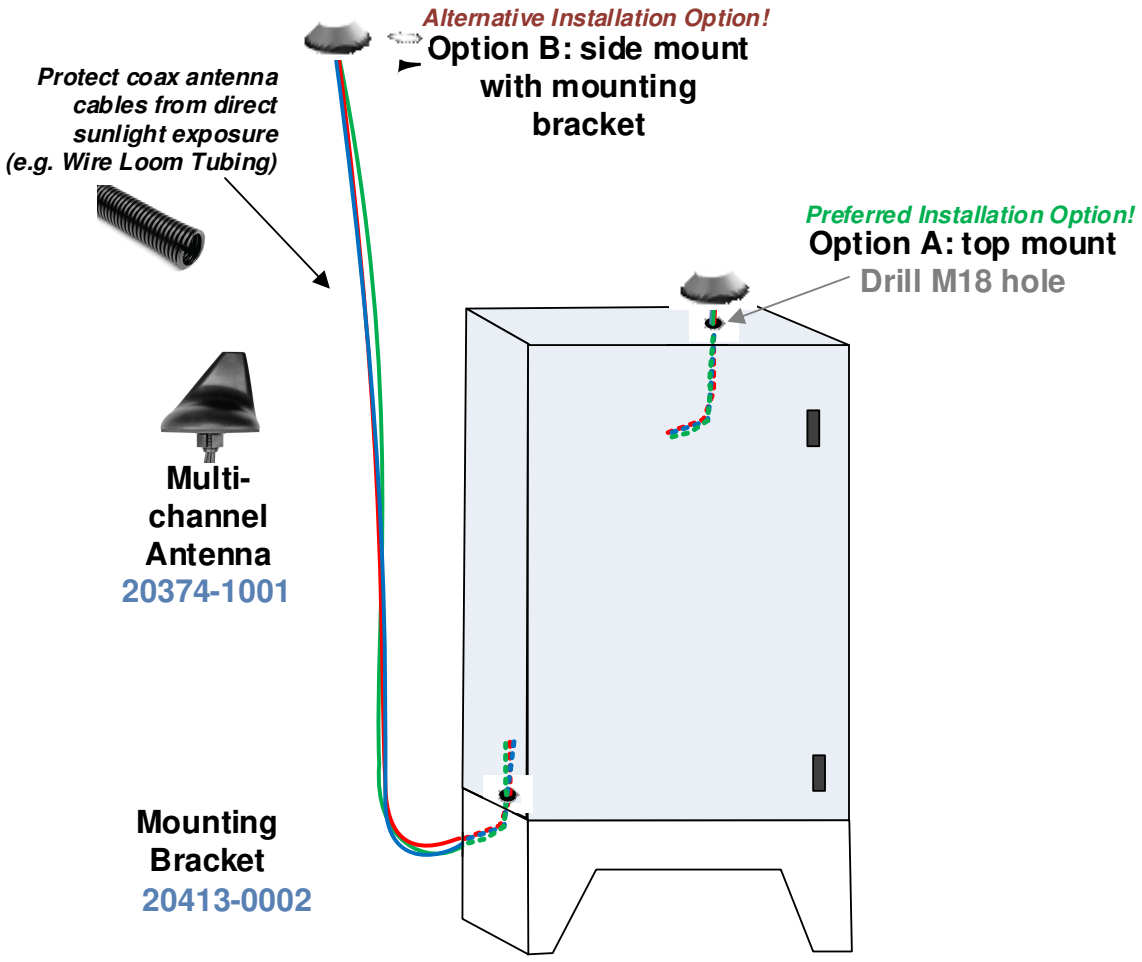



*Figure 1: Multi-Channel Antenna mounted to panel*

(2) Clip the EDR into an empty space on the DIN rail inside the control panel

(3) Make the following signal connections [Figure 2].

a. The EDR RS-485 Master ANNUNCIATOR port connects to the EIM MODBUS RTU port and turn the TERM switches on both ports on. If the MODBUS RTU terminals already have wires connected to some SCATA system, remove the wires and re-route them to the EDR RS-485 Slave port. Turn the EDR CAN TERM on.
b. If the EDT ECU CAN port has wires connected to it, add a connection to the EDR CAN port. Disable the CAN TERM on the EDT and turn the EDR's CAN TERM switch on
c. If the EDT CSL port has wires connected to it, add a connection to the EDR ECU J1708 port.
d. Connect antenna wires to the GPS, CELL (LTE), and WIFI ports accordingly.
e. Provide batter power (2A fuse), ground return (any free contact on terminal blocks TBD12-21), and a chassis ground connection to the EDR BATT port.

The following 11 pre-labeled wires are used to connect the EDR with the system:

**RS-485 connection from EDR Master ANNUN terminal to EIM**
16-WHT-EDR1,3/EIM1,9 (from EDR pin #3 (Common) to EIM pin 9 (SHLD))
16-WHT-EDR1,4/EIM1,8 (from EDR pin #4 (RS485 B) to EIM pin 8 (B+))
16-WHT-EDR1,5/EIM1,7 (from EDR pin #5 (RS485 A) to EIM pin 7 (A-))

**ADEM 4 or ADEM 3 CAN connection through EDT:** [1]
16-WHT-EDR1,12/EDT1,13 (from EDR pin #12 to EDT pin 13 (ECU CAN GND))
16-WHT-EDR1,13/EDT1,14 (from EDR pin #13 to EDT pin 14 (ECU CAN L))
16-WHT-EDR1,14/EDT1,15 (from EDR pin #14 to EDT pin 15 (ECU CAN H))

**Replacing the lost MODBUS RTU port in the panel at TBT200:**
16-WHT-EDR1,6/TBT200,E (from EDR pin #6 to triple-terminal block TBT200,E)
16-WHT-EDR1,7/TBT200,C (from EDR pin #7 to triple-terminal block TBT200,C)
16-WHT-EDR1,8/TBT200,A (from EDR pin #8 to triple-terminal block TBT200,A)

**Power Supply**
16-RED-EDR1,1/+24V (from EDR pin #1 to 24V fused battery terminal)
16-BLK-EDR1,2/GND (from EDR pin #2 to system ground (typically TBD12-21))

For a couple of specific examples of an EIM installation, see Appendix: Panel Example 14267-0025 (CG137 A4) and Appendix: Panel Example 14267-0020 (CG137)

[1] The EDT already collects all engine data – so the EDR simply pulls information from the EDR

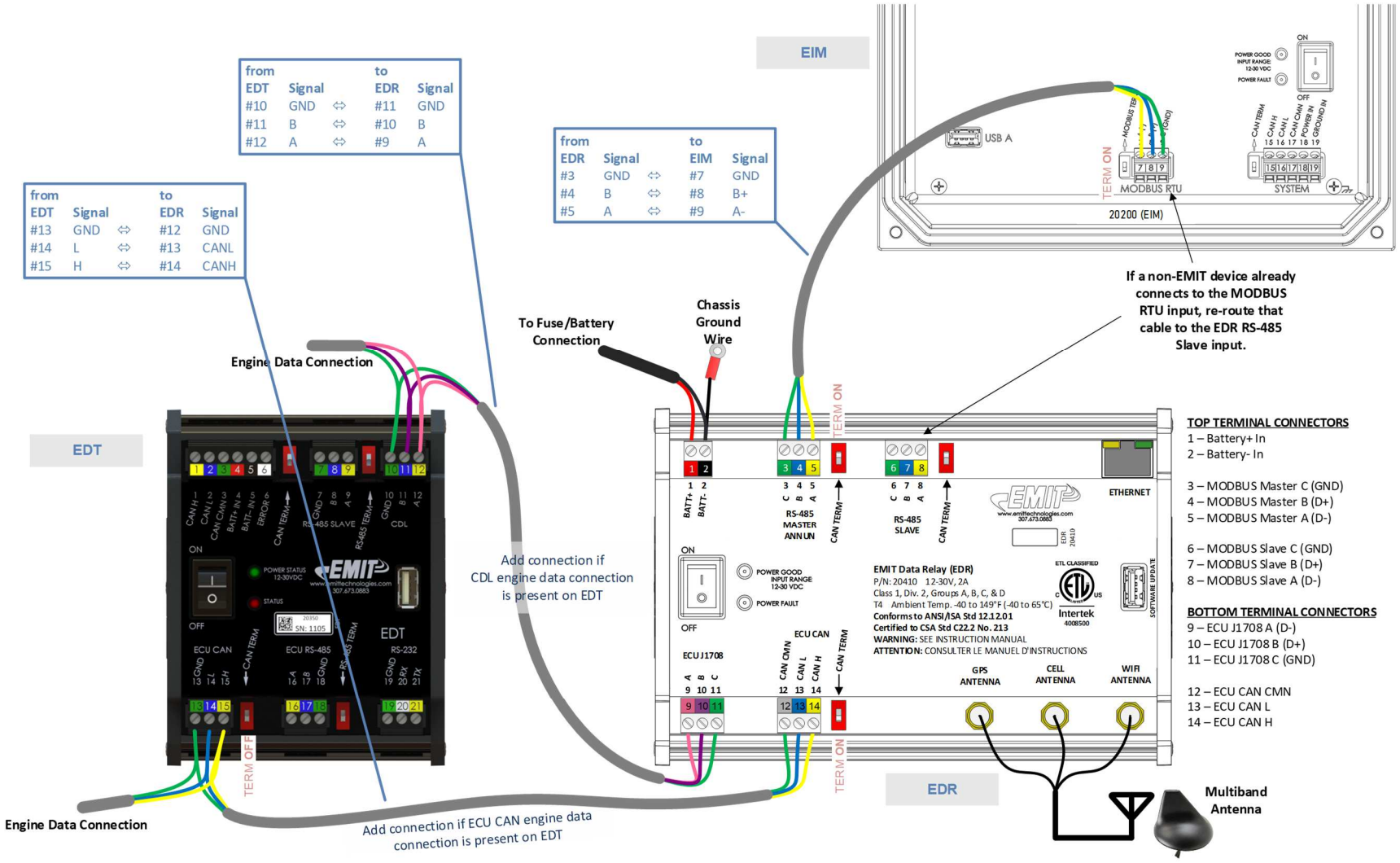


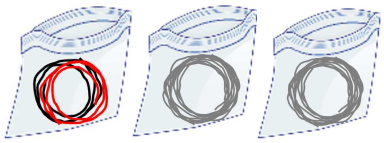

*Figure 2: EDR connections in an **EIM** based system*

# EDR Installation on a DE-3000

The EDR pulls compressor and engine data from the DE-3000 Annunciator and the ADEM controller if available.

## Wires Needed

To install an EDR on a DE-3000 unit, the following three bags of wires are used:

| | | |
|---|---|---|
|  | 20017-0025<br>20017-0026<br>~~20017-0027~~<br>20017-0028<br>~~20017-0029~~<br>~~20017-0040~~<br>~~20017-0041~~ | **Power and Ground wire set**<br>**ADEM wires**<br>~~EIM wires~~<br>**DE-3000 wires**<br>~~CENTURION® wires~~<br>~~TTD wires~~<br>~~DD40/NTV wires~~ |

## Installation Steps

Mount the EMIT Data Relay (20410 – **EDR**) inside the DE3000 enclosure utilizing the spare DIN rail if needed.

Attach the multi-channel antenna to the outside of the enclosure and connect the 3 antenna cables to the EDR input for cell, wifi, and GPS accordingly.

Connect the EDR RS-485 master port to RS-485 PORT 3 (pins B3, A3) on terminal module 1 (see Figure 3). Connect ECU CAN and ECU J1708 to the ADEM panel insert.[2] Provide 24V DC power and GND from the DE3000 panel terminals 102/103 to the EDR battery input. Verify the DE3000 MODBUS communication settings are correct.[3]

[2] The ADEM connection is option. The EDR pulls most system information from the DE-3000 annunciator. However, the following information are only available from the ADEM connection: Battery Voltage, Engine Jacket Water Temp, Engine timing, Engine Pct load;
[3] Most frequently the DE-3000 is already configured for the 9600bps baud rate and the EDR will connect to the DE-3000 without any adjustment. If however the data fields remain empty when the EDR is connected to the DE-3000, check if the baud rates for both devices are identical. The EDR is set to 9600 baud by default. On the DE-3000 verify that the communication settings are correct by navigating to menu EDIT SAFETY SHUTDOWN - MORE MENUS - COMMUNICATIONS. The setting for Node should be 1 and port 3 should show MODBUS 9600.

The following 11 pre-labeled wires are provided for each unit to make connection between the EDR and the DE3000 electronics:

**RS-485 connection from EDR Master ANNUN terminal to DE3000 Port 3 RS-485**
EDR1,3/DE3000,S3 (from EDR pin #3 (Common) to DE3000 pin S3 (SHLD))
EDR1,4/DE3000,A3 (from EDR pin #4 (RS485 B) to DE3000 pin A3)
EDR1,5/DE3000,B3 (from EDR pin #5 (RS485 A) to DE3000 pin B3)

**ADEM 4 or ADEM 3 CAN connection:** [4]
16-WHT-EDR1,12/ADEM,COMMON (from EDR pin #12 to ADEM 4 or ADEM 4 GND)
16-WHT-EDR1,13/ADEM,CAN- (from EDR pin #13 to A4 or A3 pin CAN-)
16-WHT-EDR1,14/ADEM,CAN+ (from EDR pin #14 to A4 or A3 pin CAN+)

**ADEM 3 CDL connection:** [5]
16-WHT-EDR1,9/A3,CDL+ (from EDR pin #9 to ADEM3 pin CDL+)
16-WHT-EDR1,10/A3,CDL- (from EDR pin #10 to ADEM3 pin CDL-)
16-WHT-EDR1,11/A3,COMMON (from EDR pin #11 to ADEM3 pin GND)

**Power Supply**
16-RED-EDR1,1/+24V (from EDR pin #1 to DE3000 24V battery terminal **102**)
16-BLK-EDR1,2/GND (from EDR pin #2 to DE3000 GND terminal **103**)

[4] For an ADEM 4, run a cable from the "ECU CAN" port to the "CAN H/L/SHLD" of the ADEM control panel. Typically, the CANH is Yellow and the CANL is Green in the CAT panel. The terminal block number of the ADEM CAN wires vary by engine- see the engine schematic if unsure. Typically, an EMIT wire bundle for the panel will include wires that go from the appropriate terminal block that connects to ECU CAN to the ADEM CAN terminal block.
[5] For an ADEM 3, there will be two connections required. Run the first connection from the "ECU CAN" port to the "CAN H/L/SHLD" of the ADEM control panel. Typically, the CANH is Yellow and the CANL is Green in the CAT panel. Run the second cable from the "ECU J1708" port to the "CDL+/-" connections in the ADEM panel. (Note: "A" connection on the EDR is CDL+ on the ADEM, and the "B" connection is CDL –). Typically, CDL+ is pink and CDL- is purple in the CAT panel. The terminal block numbers in the CAT panel for the CAN and CDL wires vary by engine- see the engine schematic if unsure.

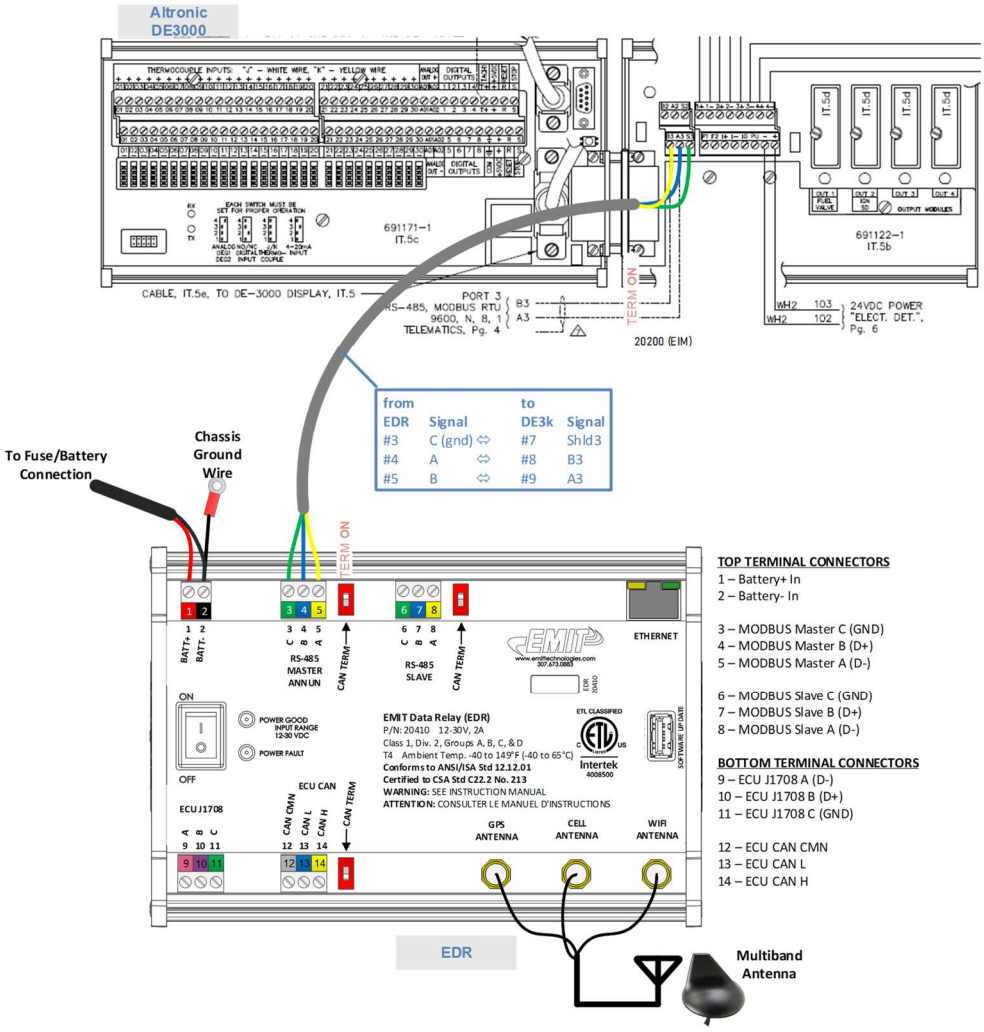


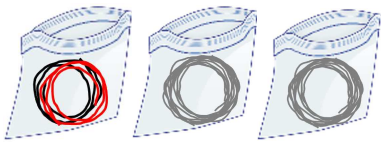

*Figure 3: Power and RS-485 connection*

# EDR Installation on a CENTURION™ 4

The EDR gathers compressor and engine data from the Centurion™ Annunciator and the ADEM controller if available.

## Wires Needed

To install an EDR on a DE-3000 unit, the following three bags of wires are used:

| | | |
|---|---|---|
|  | 20017-0025<br>20017-0026<br>~~20017-0027~~<br>~~20017-0028~~<br>20017-0029<br>~~20017-0040~~<br>~~20017-0041~~ | **Power and Ground wire set**<br>**ADEM wires**<br>~~EIM wires~~<br>~~DE-3000 wires~~<br>**CENTURION® wires**<br>~~TTD wires~~<br>~~DD40/NTV wires~~ |

## Installation Steps

Mount the EMIT Data Relay (20410 – **EDR**) inside the Centurion™ enclosure utilizing the spare DIN rail if needed.

Mount the multi-channel antenna (see Figure 4) and connect the 3 antenna cables to the EDR input for cell, wifi, and GPS accordingly.[6]

Connect the EDR RS-485 master port to Centurion Annunciator Port 2 RS-485 slave port (see Figure 5). Provide 24V DC power and GND to the EDR battery input. Configure Centurion™ control port 2 as RS-485, select 9,600 baud, and set the Port 2 Reply Delay to 10ms.[7]

The following 5 pre-labeled wires are used to make connection between the EDR and the Centurion™ electronics:

**RS-485 connection from EDR Master ANNUN terminal Centurion™ RS-485**
EDR1,3/C4,102 (from EDR pin #3 (C) to Centurion™ Annunciator pin 102 [RS-485 SHLD])
EDR1,4/C4,101 (from EDR pin #4 (B) to Centurion™ Annunciator pin 101 [RS-485 B])
EDR1,5/C4,100 (from EDR pin #5 (A) to Centurion™ Annunciator pin 100[RS-485 A])

**Power Supply**
EDR1,1/+24V (from EDR pin #1 to 24V supply terminal, use 1A or 2A fuse)
EDR1,2/GND (from EDR pin #2 to GND terminal)

[6] The antenna can also be mounted externally to the enclosure if the antenna does not fit on top of the enclosure or if the enclosure is indoors while the antenna needs uninterrupted exposure to the sky for GPS to function properly. Use the separately provided antenna bracket for mounting. ***Important:*** In this case ensure the 3 coax cables are protected from direct sunlight exposure (e.g. wrap cables with wire loom tubing).
[7] To update the Centurion configuration, enter the passcode, navigate to the “Miscellaneous Setup” and the “CTRL Port 2 Mode” sub-menu, and configure mode=RS485, delay=10, and baud rate=9600.

Optional connections (to get additional engine data):

**ADEM 4 or ADEM 3 CAN connection:** [8]
16-WHT-EDR1,12/ADEM,COMMON (from EDR pin #12 to ADEM 4 or ADEM 4 GND)
16-WHT-EDR1,13/ADEM,CAN- (from EDR pin #13 to A4 or A3 pin CAN-)
16-WHT-EDR1,14/ADEM,CAN+ (from EDR pin #14 to A4 or A3 pin CAN+)

**ADEM 3 CDL connection:** [9]
16-WHT-EDR1,9/A3,CDL+ (from EDR pin #9 to ADEM3 pin CDL+)
16-WHT-EDR1,10/A3,CDL- (from EDR pin #10 to ADEM3 pin CDL-)
16-WHT-EDR1,11/A3,COMMON (from EDR pin #11 to ADEM3 pin GND)

[8] For an ADEM 4, run a cable from the "ECU CAN" port to the "CAN H/L/SHLD" of the ADEM control panel. Typically, the CANH is Yellow and the CANL is Green in the CAT panel. The terminal block number of the ADEM CAN wires vary by engine- see the engine schematic if unsure. Typically, an EMIT wire bundle for the panel will include wires that go from the appropriate terminal block that connects to ECU CAN to the ADEM CAN terminal block.
[9] For an ADEM 3, there will be two connections required. Run the first connection from the "ECU CAN" port to the "CAN H/L/SHLD" of the ADEM control panel. Typically, the CANH is Yellow and the CANL is Green in the CAT panel. Run the second cable from the "ECU J1708" port to the "CDL+/-" connections in the ADEM panel. (Note: "A" connection on the EDR is CDL+ on the ADEM, and the "B" connection is CDL –). Typically, CDL+ is pink and CDL- is purple in the CAT panel. The terminal block numbers in the CAT panel for the CAN and CDL wires vary by engine- see the engine schematic if unsure.

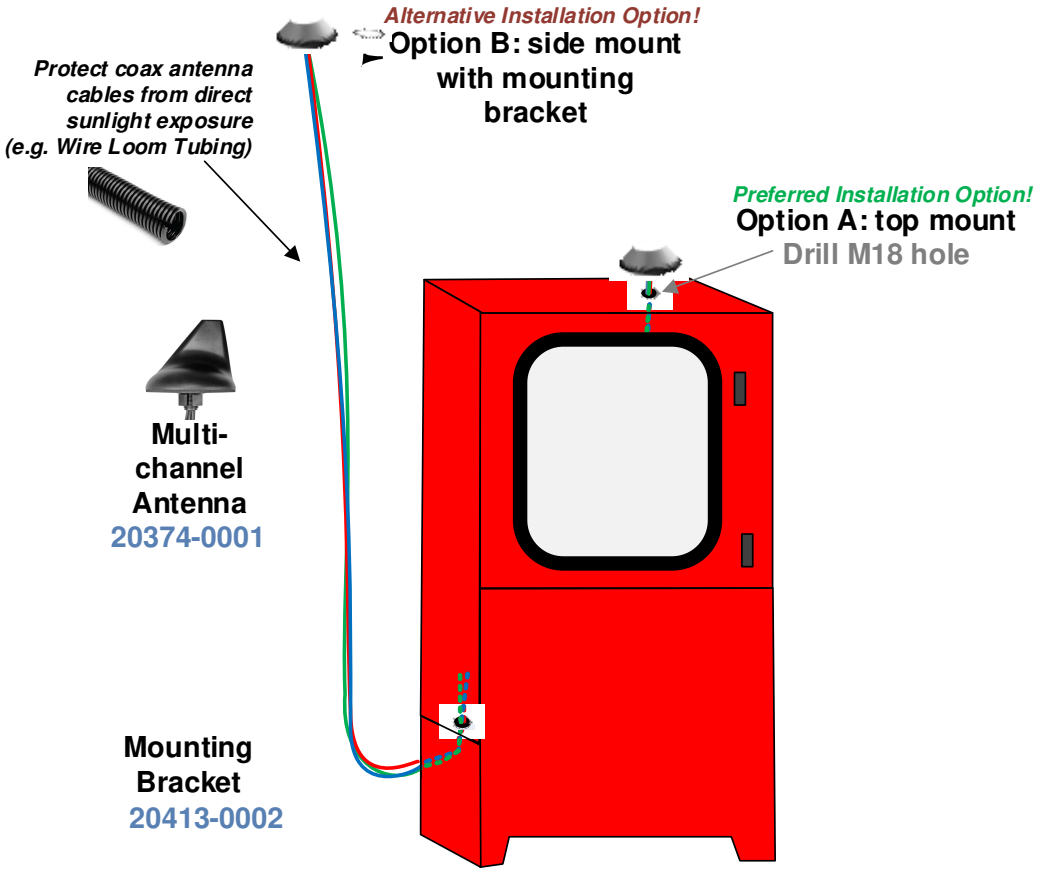



*Figure 4: Antenna Installation*

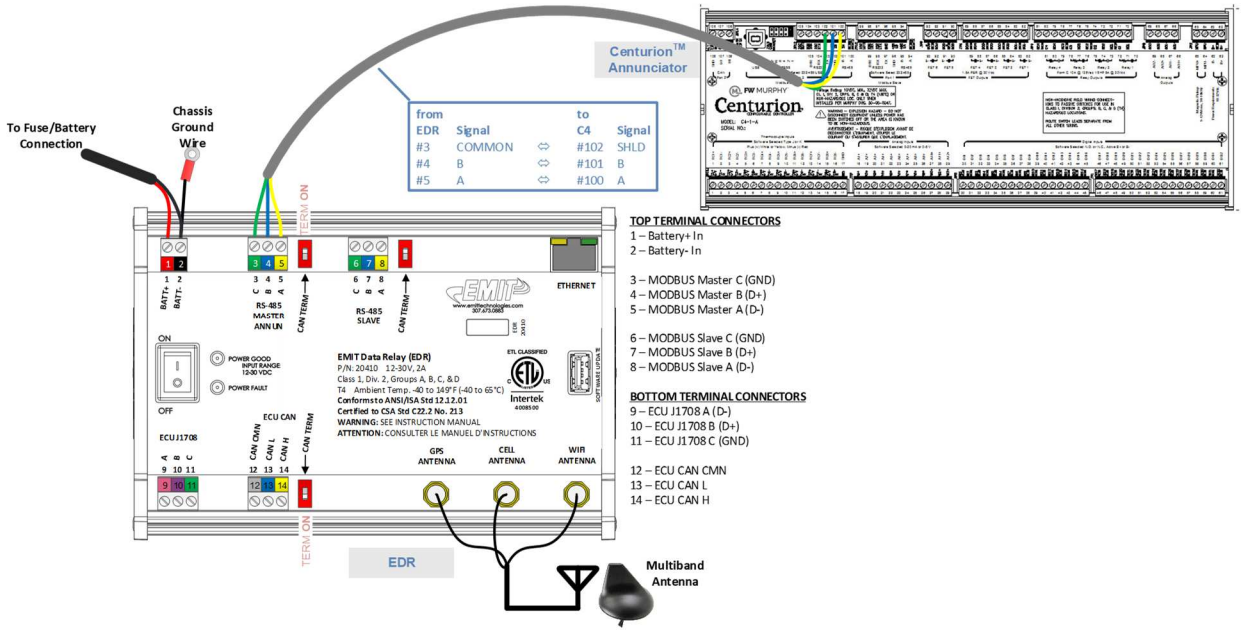


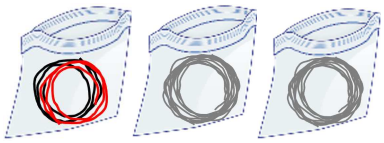

*Figure 5: EDR connections*

# EDR Installation on a TTD™

The EDR gathers compressor and engine data from the Centurion™ Annunciator and the ADEM controller if available.

## Wires Needed

To install an EDR on a DE-3000 unit, the following three bags of wires are used:

| | | |
|---|---|---|
|  | 20017-0025<br>20017-0026<br>~~20017-0027~~<br>~~20017-0028~~<br>~~20017-0029~~<br>20017-0040<br>~~20017-0041~~ | **Power and Ground wire set**<br>**ADEM wires**<br>~~EIM wires~~<br>~~DE-3000 wires~~<br>~~CENTURION® wires~~<br>**TTD wires**<br>~~DD40/NTV wires~~ |

## Installation Steps

Mount the EMIT Data Relay (20410 – **EDR**) inside the TTD™ enclosure utilizing the spare DIN rail if needed.

Mount the multi-channel antenna (see Figure 6) and connect the 3 antenna cables to the EDR input for cell, wifi, and GPS accordingly.[10]

Connect the EDR RS-485 master port to TTD Annunciator Communication Port 1 RS-485 slave port (screw terminal connector labeled **A** and **B** and the 1 screw terminal labeled **GND**) (see Figure 7). Provide 24V DC power and GND to the EDR battery input. Configure TTD™ communications port 1 (setup configuration is in SETUP 9) as RS-485, select 9,600 baud, and "N,8,1".

The following 5 pre-labeled wires are provided for each unit to make connection between the EDR and the TTD™ electronics:

**RS-485 connection from EDR Master ANNUN terminal to DE3000 Port 3 RS-485**
EDR1,3/TTD,GND (from EDR pin #3 (C) to TTD™ pin GND)
EDR1,4/TTD,B (from EDR pin #4 (B) to TTD™ pin B)
EDR1,5/TTD,A (from EDR pin #5 (A) to TTD™ pin A)

**Power Supply**
EDR1,1/+24V (from EDR pin #1 to 24V supply terminal, use 1A or 2A fuse)
EDR1,2/GND (from EDR pin #2 to GND terminal)

[10] The antenna can also be mounted externally to the enclosure if the antenna does not fit on top of the enclosure or if the enclosure is indoors while the antenna needs uninterrupted exposure to the sky for GPS to function properly. Use the separately provided antenna bracket for mounting. ***Important:*** In this case ensure the 3 coax cables are protected from direct sunlight exposure (e.g. wrap cables with wire loom tubing).

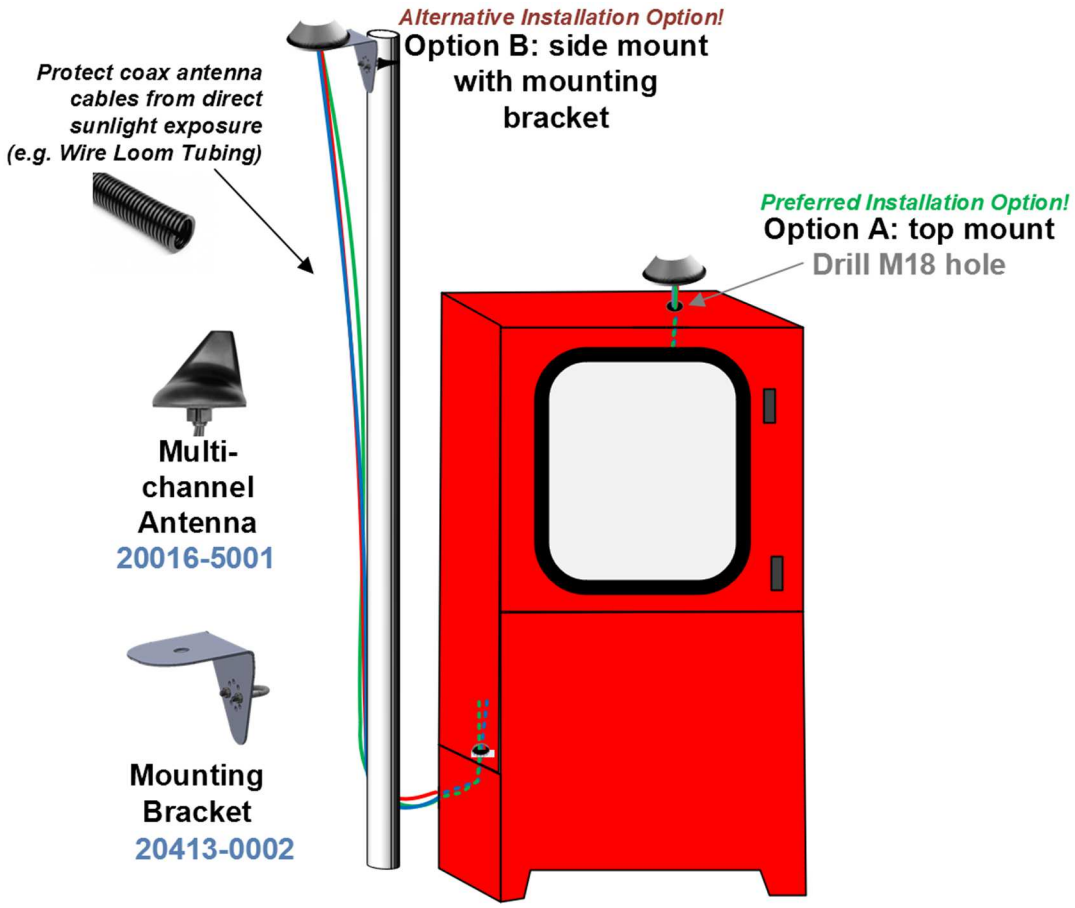



*Figure 6: Antenna Installation*

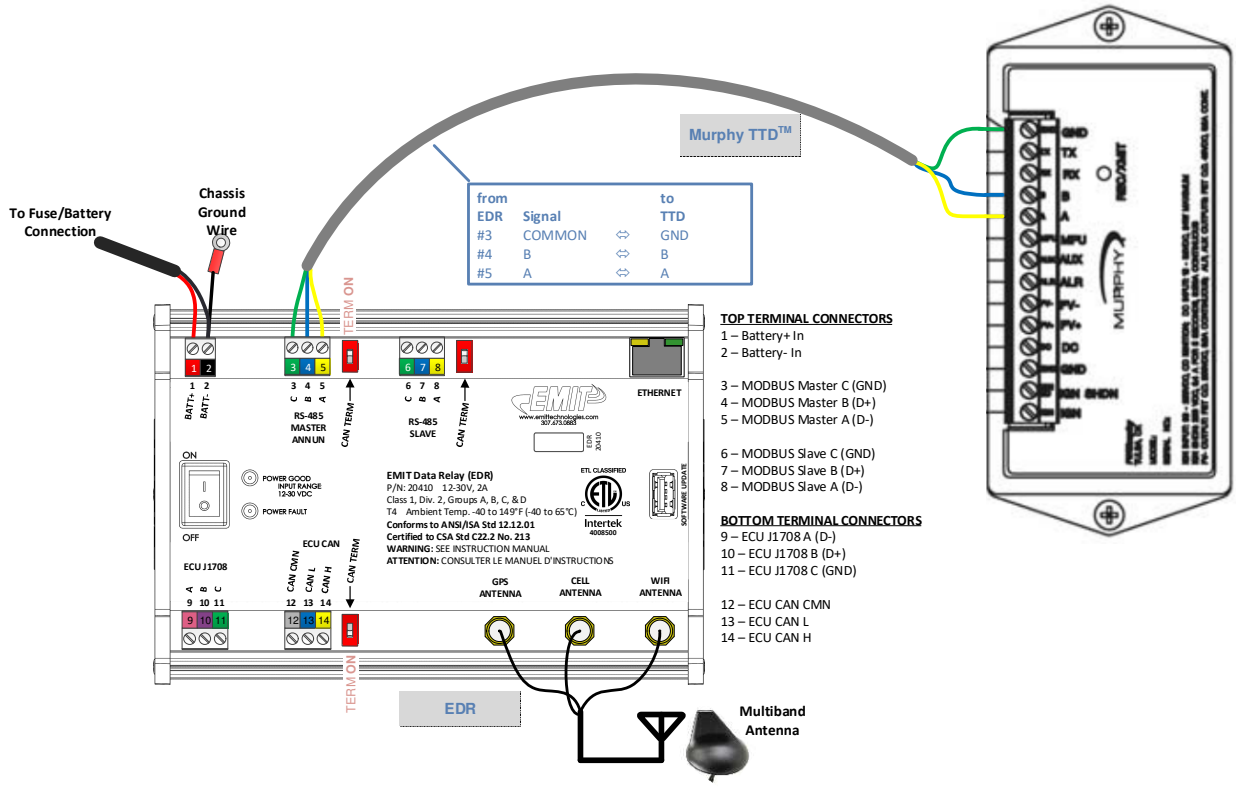



*Figure 7: EDR connections*

## TDXM Module

If a TDXM module is present to read TCs: Identify the ID and update the Modbus table accordingly. Register space:

TC1: 40001,
TC2: 40002, …
TC24: 40024,

## RX5 Interchange Comm Control Module

If a RX5 module is present (to read pressure sensors): Identify the ID and update the Modbus table accordingly. Register space:

AIN1=40024,
AIN2=40025, …
AI10=40033,

Read values range from 0-1023; for a 0-5VDC data count the reading will range 0-1023. For a typical 4-20mA data count would be 181-904. To translate this reading into the correct pressure, the pressure sensor range needs to be know and the following math has to be applied to the Modbus table offset and scale:
PSR20mA – Pressure Sensor Rating for 20mA Output (e.g. this would be 100 for a 0-100psi sensor)

SCALE=PSR20mA/(904-181)
OFFSET = -181*SCALE

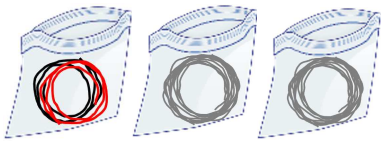
Examples:
0-100psi: Scale = 0.1383, Offset = -25.0346
0-300psi: Scale = 0.4149, Offset = -75.1037
0-500psi: Scale = 0.6916, Offset = -125.173
0-1000psi: Scale = 1.383, Offset = -250.346

# EDR Installation on a DD-40 (DD-40NTV)

The EDR gathers compressor and engine data from the DD-40 Annunciator and the ADEM controller if available.

## Wires Needed

To install an EDR on a DE-3000 unit, the following three bags of wires are used:

| | | |
|---|---|---|
|  | 20017-0025<br>20017-0026<br>~~20017-0027~~<br>~~20017-0028~~<br>~~20017-0029~~<br>~~20017-0040~~<br>20017-0041 | **Power and Ground wire set**<br>**ADEM wires**<br>~~EIM wires~~<br>~~DE-3000 wires~~<br>~~CENTURION® wires~~<br>~~TTD wires~~<br>**DD40/NTV wires** |

## Installation Steps

Mount the EMIT Data Relay (20410 – **EDR**) inside the DD-40NTV enclosure utilizing the spare DIN rail if needed.

Attach the multi-channel antenna to the outside of the enclosure and connect the 3 antenna cables to the EDR input for cell, wifi, and GPS accordingly.

Connect the EDR RS-485 master port to the RS-485 PORT (pins B, A) on the DD-40NTV (see Figure 3). Connect ECU CAN and ECU J1708 to the ADEM panel insert.[11] Provide 24V DC power and GND from the DD-40NTV panel to the EDR battery input. Verify the DD-40NTV MODBUS communication settings are correct.[12]

The following 10 pre-labeled wires are provided to connect the EDR to the DD-40NTV:

**RS-485 connection from EDR Master ANNUN terminal to DD-40NTV RS-485 port:**
EDR1,4/NTV,A (from EDR pin #4 (RS485 B) to DD40NTV pin A)
EDR1,5/NTV,B (from EDR pin #5 (RS485 A) to DD40NTV pin B)

[11] The ADEM connection is option. The EDR pulls RPM and shutdown codes from the DE-3000 annunciator. However, the following information are only available from the ADEM connection: Battery Voltage, Engine Jacket Water Temp, Engine timing, Engine Pct load;
[12] If the DD-40NTV is already configured for the 9600bps baud rate the EDR will connect to the DD-40NTV without any adjustment. If however the data fields remain empty when the EDR is connected to the DD-40NTV, check if the baud rates for both devices are identical. The EDR is set to 9600 baud by default. On the DD-40NTV verify that the communication settings are correct by navigating to menu SERIAL COMM..

**ADEM 4 or ADEM 3 CAN connection:** [13]
16-WHT-EDR1,12/ADEM,COMMON (from EDR pin #12 to ADEM 4 or ADEM 4 GND)
16-WHT-EDR1,13/ADEM,CAN- (from EDR pin #13 to A4 or A3 pin CAN-)
16-WHT-EDR1,14/ADEM,CAN+ (from EDR pin #14 to A4 or A3 pin CAN+)

**ADEM 3 CDL connection:** [14]
16-WHT-EDR1,9/A3,CDL+ (from EDR pin #9 to ADEM3 pin CDL+)
16-WHT-EDR1,10/A3,CDL- (from EDR pin #10 to ADEM3 pin CDL-)
16-WHT-EDR1,11/A3,COMMON (from EDR pin #11 to ADEM3 pin GND)

**Power Supply**
16-RED-EDR1,1/24V,+ (from EDR pin #1 to DD40NTV 24V battery terminal +)
16-BLK-EDR1,2/GND (from EDR pin #2 to DE3000 GND terminal GND)

[13] For an ADEM 4, run a cable from the "ECU CAN" port to the "CAN H/L/SHLD" of the ADEM control panel. Typically, the CANH is Yellow and the CANL is Green in the CAT panel. The terminal block number of the ADEM CAN wires vary by engine- see the engine schematic if unsure. Typically, an EMIT wire bundle for the panel will include wires that go from the appropriate terminal block that connects to ECU CAN to the ADEM CAN terminal block.
[14] For an ADEM 3, there will be two connections required. Run the first connection from the "ECU CAN" port to the "CAN H/L/SHLD" of the ADEM control panel. Typically, the CANH is Yellow and the CANL is Green in the CAT panel. Run the second cable from the "ECU J1708" port to the "CDL+/-" connections in the ADEM panel. (Note: "A" connection on the EDR is CDL+ on the ADEM, and the "B" connection is CDL –). Typically, CDL+ is pink and CDL- is purple in the CAT panel. The terminal block numbers in the CAT panel for the CAN and CDL wires vary by engine- see the engine schematic if unsure.

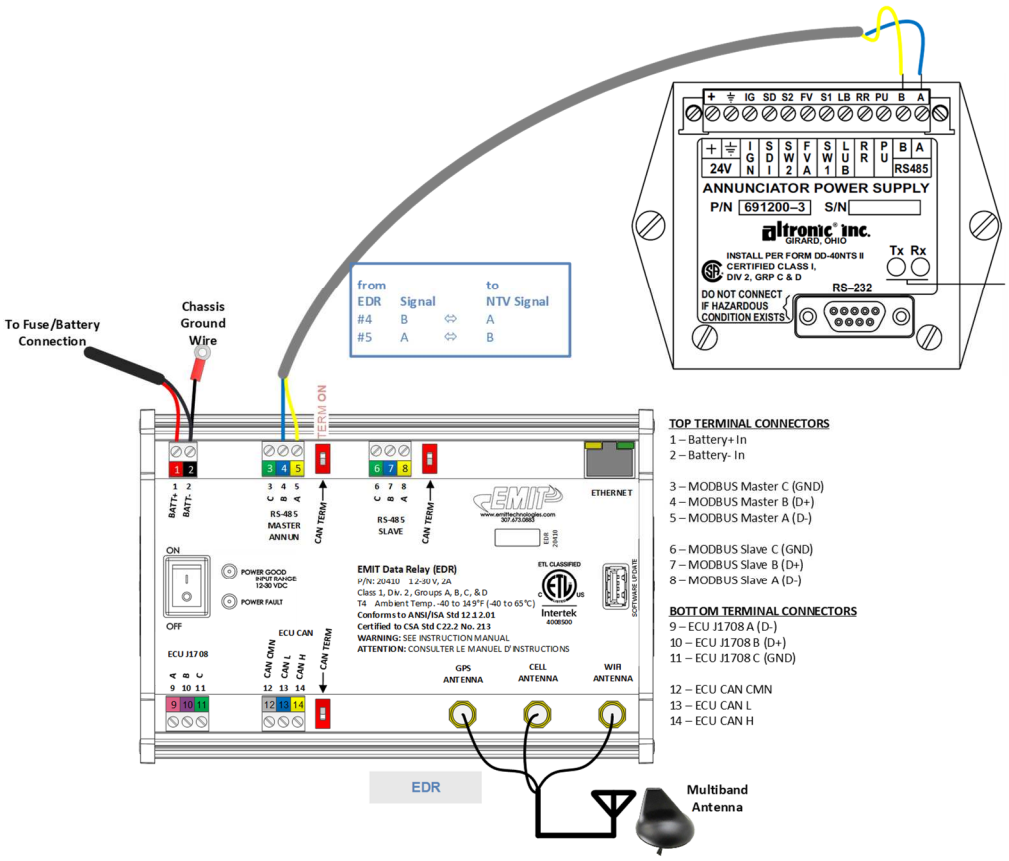



*Figure 8: Power and RS-485 connection*

## Additional Information

For steps on how to configure the EDR look up the EDR full technical specification by logging into the EMIT Forum.

If the LTE signal strength is marginal, install a directional antenna as described in the Direct Antenna Installation Guide.

If a Verizon connection instead of a ATE / T-Mobile connection is needed, install an EDR preconfigured for Verizon service.

For additional information or technical support, contact EMIT at 307-673-0883 or visit www.emittechnologies.com

# Appendix: Panel Example 14267-0025 (CG137 A4)

An example of an EIM based CG-137 panel is the 14271-1040 panel, which is based on a 14267-0025 panel wiring. This panel type includes an ADEM-4 engine controller, and EMIT's Brain, and EDT modules.

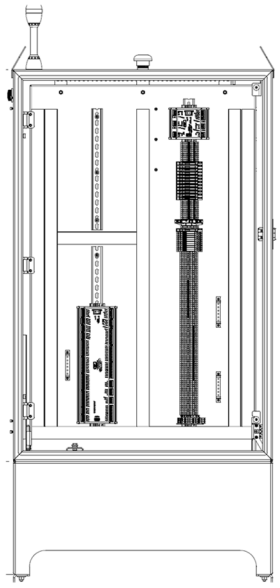


*Figure 9: 14267-0025 panel before Telematics Conversion*

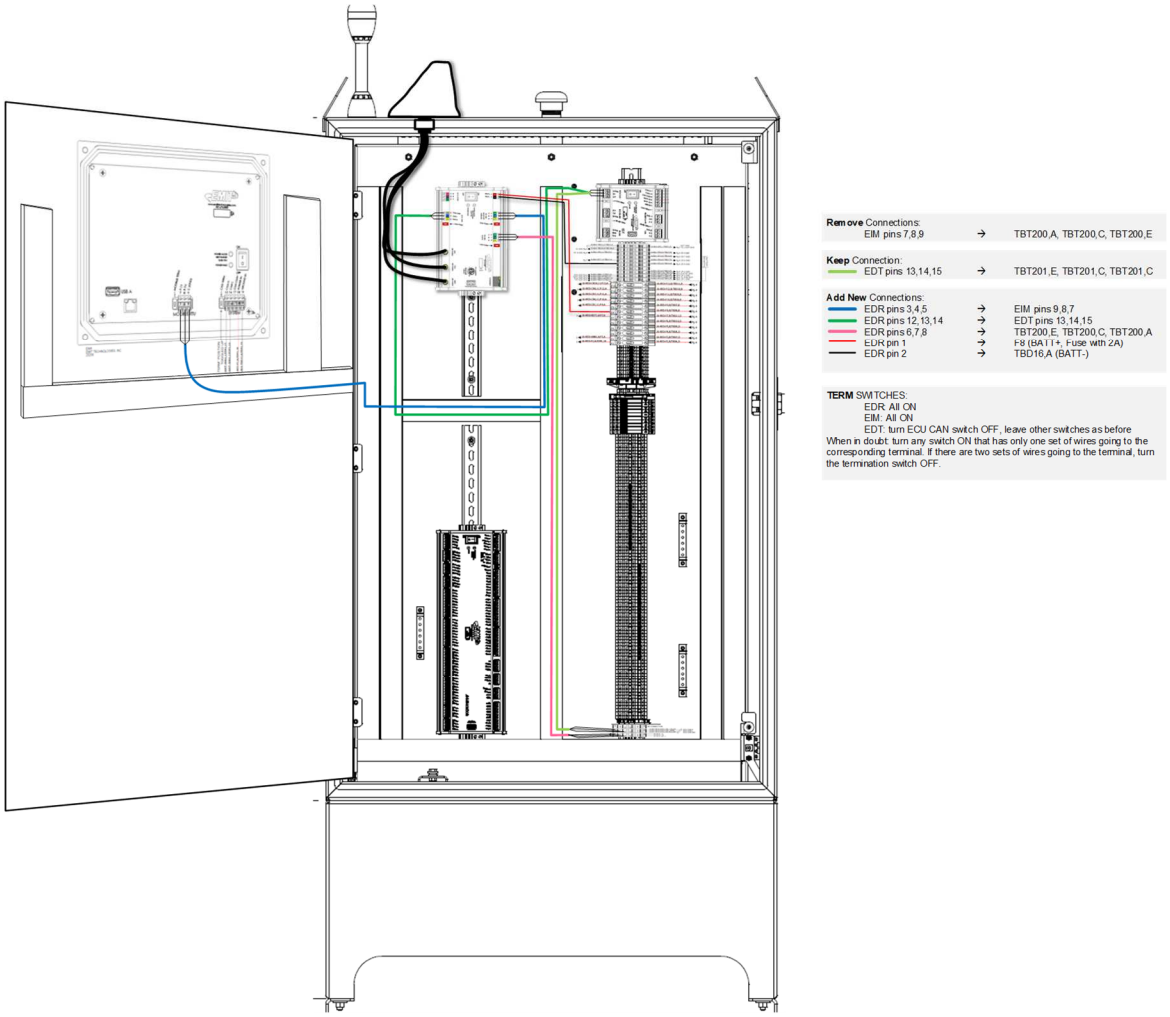



*Figure 10: 14267-0025 panel after Telematics Conversion*

# Appendix: Panel Example 14267-0020 (CG137)

The 14267-0020 panel is an example of an EIM based CG-137 panel, which includes an ADEM-4 engine controller, and EMIT's AFRC, Brain, Brain+, and EDT modules.

*Figure 11: 14267-0020 panel before Telematics Conversion*

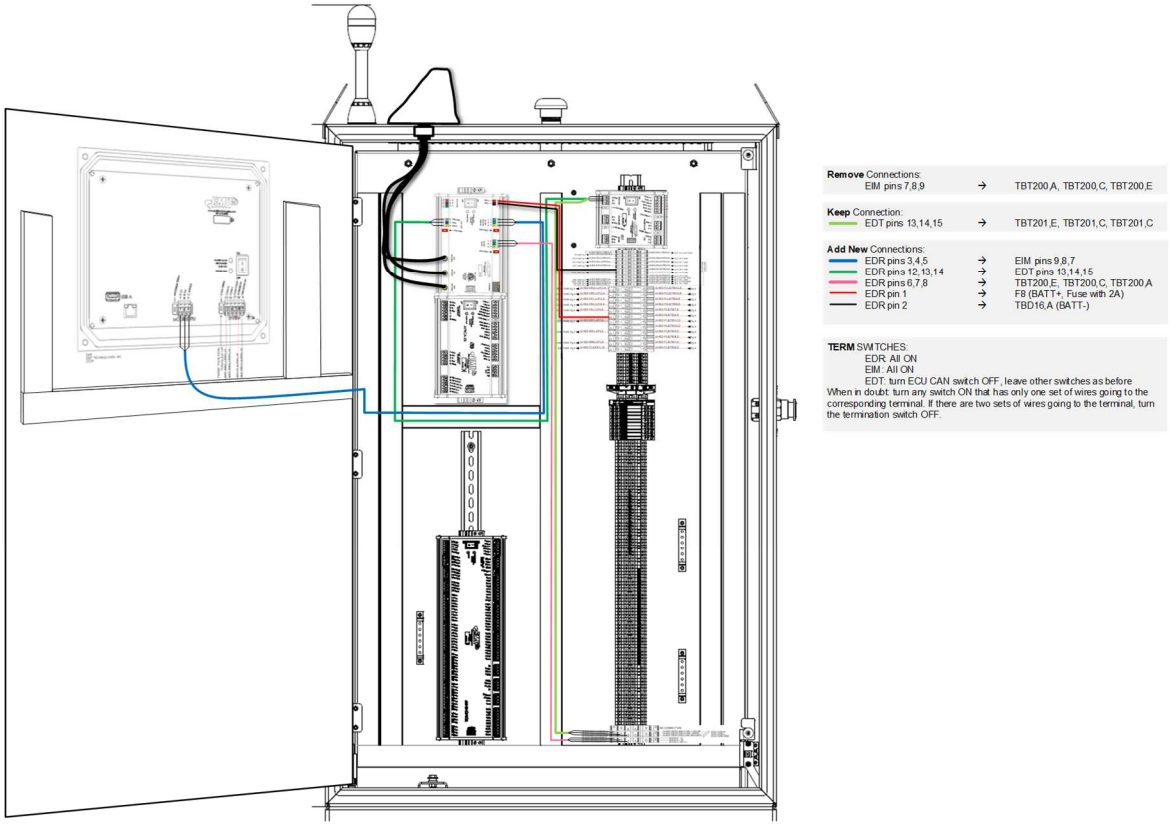



*Figure 12: 14267-0020 panel after Telematics Conversion*