C.E. Niehoff & Co.
CHARGING AND POWER MANAGEMENT SOLUTIONS®

C2002 Battery Equalizer

Installation Instructions

C2002(A,B,C,D) Battery Equalizer

The CEN C2002 is a 125A Battery Equalizer, designed to be installed in parallel with the vehicle's batteries to ensure that all batteries in a vehicle's 28V and 14V systems remain in balance during operation.

When configured with the appropriate sensors, C2002 is capable of monitoring charging and discharging current, voltage, and temperature of the vehicle's batteries. This data can be broadcast across the vehicle network via J1939 for use with telematics systems and advanced battery charging profiles. Compatible CEN Smart Regulators will use this data to optimize charging profiles for all battery types under all environmental conditions. A, B, C, and D suffixes indicate different source addresses, so multiple equalizers can be used to equalize up to four separate battery banks.

Equalizer harness must be configured for each application to use applicable features for each vehicle. Contact CEN and see C2002 model-specific data sheet for complete list of features and J1939 message table. Follow instructions below for proper installation.

1. Find a suitable, flat location on vehicle and mount equalizer by the slotted mounting points (sized for M6 or 1/4" screws). Use hardened flat washers between mounting surfaces and bolt heads or lock washers. See Figure 1.
2. Remove Input/output stud cover plate and connect battery cables in the following sequence, following the stacking order shown in Figure 2:
   a. First, connect battery ground cable to equalizer ground stud with flat washer, disc spring washer, and nut.
   b. Next, connect battery positive 14V cable to equalizer 14V stud with flat washer, disc spring washer, and nut.
   c. Finally, connect battery positive 28V cable to equalizer 14V stud with flat washer, disc spring washer, and nut.
   d. Torque all three nuts to 15 Nm/11 lb. ft.
   e. Replace terminal cover plate and torque all four cover plate screws to 1.1 Nm/10 lb. in.

NOTICE *Wire gauge must be capable of handling maximum equalizer output with minimum voltage drop. All cables must be supported within 305 mm (12 in.) to prevent twisting, loosening, and damage to terminals.*

3. Insert vehicle control harness into equalizer control harness receptacle until connector snaps in place.

NOTICE *Harness must be configured for each vehicle build according to the requirements of the application. See page 2 for equalizer control connector pin functions.*

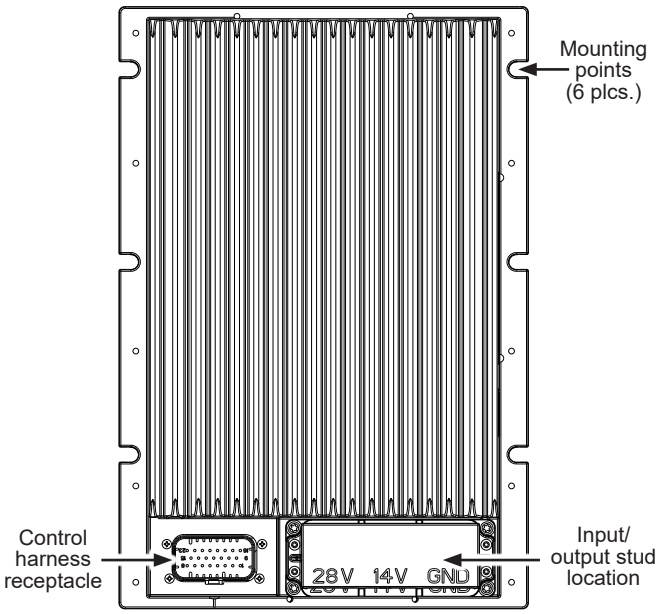

Figure 1: C2002 Equalizer Features

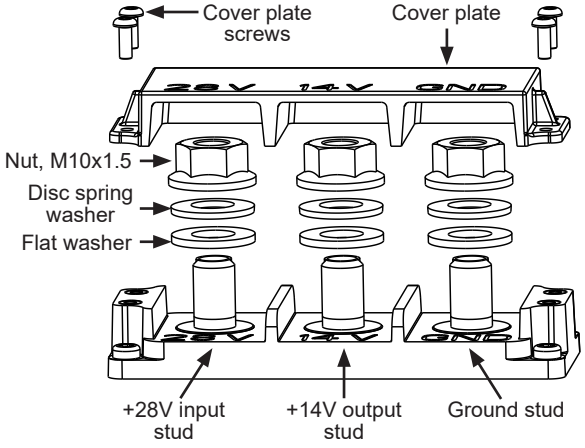

Figure 2: Input/Output Terminal Location and Stacking Order

C2002 Control Harness Configuration

Control harness for C2002 equalizer must be configured as follows in order to use the features listed below. Mating connector parts (to be supplied by user) are TE Connectivity connector shell P/N TE770680-5 and pin(s) P/N TE770854-1. Use P/N TE770678-1 cavity plugs to plug each unused pin cavity. See Figure 3 and Table 1 for connector layout and pin designations.

- IGN voltage (+28V) must be provided from vehicle DC ignition source or multiplex system to pin 15 in order to energize equalizer. This is required for all applications.
- For optional remote battery voltage sensing, pin 21 must be connected directly to battery +28V terminal, pin 14 must be connected to battery +14V terminal, and pin 22 must be connected to battery ground terminal.
- For optional battery pack temperature sensing, connect thermistor, (NTC 10kΩ @25˚C, with B25 constant of 3974K), between pins 23 and 9. Sensor should be located in battery compartment or directly on a battery terminal (preferably ground terminal) for more precise temperature measurment.
- For optional battery pack current sensing, use CEN high range (±600A) current sensor C2031 on 28V battery positive cable. For greater resolution, add C2033 low range (±100A) to 28V battery positive cable as well. C2032 (±200A) current sensor may be used on 14V battery positive cable to measure battery current on the 14V circuit if desired. See installation instructions packaged with each sensor and sensor model-specific data sheets for more information.
  - All CEN current sensors are powered by +14V power supplied by equalizer pin 3.
  - 28V high range current sensor signal output must be connected to pin 20. Signal ground can be jumped to sensor power ground for most applications.
  - 28V low range current sensor signal output must be connected to pin 7. Signal ground can be jumped to sensor power ground for most applications.
  - 14V current sensor signal output must be connected to pin 8. Signal ground can be jumped to sensor power ground for most applications.
- For optional J1939 communication, connect pin 5 (CAN H), pin 6 (CAN L), and pin 13 (CAN shield) to vehicle J1939 backbone. See equalizer data sheet for message table.
- Four 14V, 0.5A programmable outputs (pins 4, 11, 18, and 19) and four 28V, 0.5A programmable outputs (pins 2, 10, 16, and 17) are available and can be activated by vehicle control system via J1939. See equalizer data sheet for message table.

NOTICE *All cables must be supported within 305 mm (12 in.) to prevent twisting, loosening, and damage to terminals.*

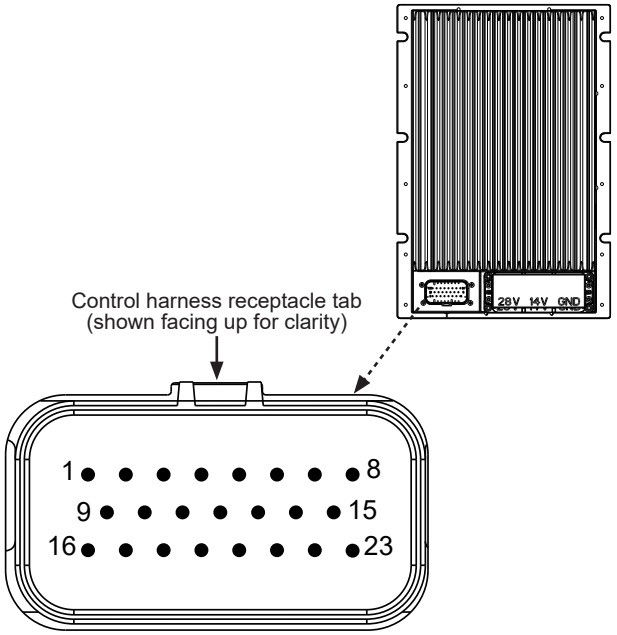

Figure 3: Control Receptacle Pin Layout

Table 1: Control Receptacle Pin Designations	
Pin	**Function**
1	Power for current sensor(s) (+28V)
2	Programmable output #2
3	Power for current sensor(s) (+14V)
4	Programmable output #3
5	CAN H
6	CAN L
7	Batt pack low range current sensor input
8	Bottom battery (14V) current sensor input
9	Battery temp/current sensor return
10	Programmable output #7
11	Programmable output #6
12	Reserved (do not connect)
13	CAN shield
14	+14V battery remote voltage sense
15	IGN
16	Programmable output #1
17	Programmable output #5
18	Programmable output #9
19	Programmable output #4
20	Batt pack high range current sensor input
21	+28V battery remote voltage sense
22	Battery negative (ground) remote sense*
23	Battery temp sensor (NTC 10kΩ @25˚C)

* Do not use for any other purpose than voltage sense ground reference.

If you have questions about your alternator or any of these instructions, or if you need to locate a Factory authorized Service Distributor, please contact us at:
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