

INSTRUCTION MANUAL



24 Vdc Power Supplies

Revision: 12/17



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General

- Prior to performing site or installation work, obtain required approvals and permits. Comply with all governing structure-height regulations, such as those of the FAA in the USA.
- Use only qualified personnel for installation, use, and maintenance of tripods and towers, and any attachments to tripods and towers. The use of licensed and qualified contractors is highly recommended.
- Read all applicable instructions carefully and understand procedures thoroughly before beginning work.
- Wear a **hardhat** and **eye protection**, and take **other appropriate safety precautions** while working on or around tripods and towers.
- **Do not climb** tripods or towers at any time, and prohibit climbing by other persons. Take reasonable precautions to secure tripod and tower sites from trespassers.
- Use only manufacturer recommended parts, materials, and tools.

Utility and Electrical

- **You can be killed** or sustain serious bodily injury if the tripod, tower, or attachments you are installing, constructing, using, or maintaining, or a tool, stake, or anchor, come in **contact with overhead or underground utility lines**.
- Maintain a distance of at least one-and-one-half times structure height, 20 feet, or the distance required by applicable law, **whichever is greater**, between overhead utility lines and the structure (tripod, tower, attachments, or tools).
- Prior to performing site or installation work, inform all utility companies and have all underground utilities marked.
- Comply with all electrical codes. Electrical equipment and related grounding devices should be installed by a licensed and qualified electrician.

Elevated Work and Weather

- Exercise extreme caution when performing elevated work.
- Use appropriate equipment and safety practices.
- During installation and maintenance, keep tower and tripod sites clear of un-trained or non-essential personnel. Take precautions to prevent elevated tools and objects from dropping.
- Do not perform any work in inclement weather, including wind, rain, snow, lightning, etc.

Maintenance

- Periodically (at least yearly) check for wear and damage, including corrosion, stress cracks, frayed cables, loose cable clamps, cable tightness, etc. and take necessary corrective actions.
- Periodically (at least yearly) check electrical ground connections.

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Table of Contents

PDF viewers: These page numbers refer to the printed version of this document. Use the PDF reader bookmarks tab for links to specific sections.

| | |
|---------------------------------------|-----------|
| 1. Introduction | 1 |
| 2. Cautionary Statements | 1 |
| 3. Initial Inspection..... | 2 |
| 4. Specifications..... | 4 |
| 5. Installation..... | 5 |
| 6. Troubleshooting..... | 14 |

Figures

| | |
|--|----|
| 1-1. 3.8 A (pn 28370), 10 A (pn 28371), and 20 A (pn 28372) power supplies | 1 |
| 3-1. 24 Vdc power supply kit contents | 2 |
| 5-1. DIN rail mounting procedure | 5 |
| 5-2. DIN rail components prior to wiring..... | 6 |
| 5-3. Connecting the L(+) terminal to the circuit breaker..... | 7 |
| 5-4. Connecting the circuit breaker to the L (Line) terminal block | 7 |
| 5-5. Connecting the N (Neutral) terminal block to the power supply | 8 |
| 5-6. Connecting the 3 x 6 terminal block to the datalogger..... | 9 |
| 5-7. Connecting the 3 x 6 terminal block to the enclosure ground lug | 10 |
| 5-8. Connecting the power supply to the charging regulator..... | 11 |
| 5-9. Connecting the charging regulator to the datalogger | 12 |
| 5-10. 10 A power supply wiring..... | 13 |
| 5-11. 20 A power supply wiring..... | 14 |
| 6-1. 24 Vdc power supply DC OK LED | 15 |

Tables

| | |
|-----------------------|---|
| 3-1. Parts List | 3 |
|-----------------------|---|

24 Vdc Power Supplies

1. Introduction

A Campbell Scientific 24 Vdc power supply kit allows a datalogger and sensors to be powered when AC power is available on-site. AC voltage is routed into the enclosure and through a circuit breaker to the power supply. The power supply sends 24 Vdc to the rest of the system through a charger such as the CH200. It is also possible to use a rechargeable power supply (for example, PS150) if a battery reserve is required in case of AC power failure.

Three power supplies are available with different output amperage ratings (FIGURE 1-1). Available ratings include 3.8 Amps (pn 28370), 10 Amps (pn 28371), and 20 Amps (pn 28372). Verify the power supply provides adequate amperage for all system components that will be connected to the power supply.



FIGURE 1-1. 3.8 A (pn 28370), 10 A (pn 28371), and 20 A (pn 28372) power supplies

2. Cautionary Statements

- READ AND UNDERSTAND the *Safety* section at the front of this manual.
- Prior to performing site or installation work, obtain required approvals and permits.
- Use only qualified personnel for installation, use, and maintenance.
- Read all applicable instructions carefully and understand procedures thoroughly before beginning work.
- The use of licensed and qualified contractors is highly recommended.
- Use only manufacturer recommended parts, materials, and tools.

- Comply with all electrical codes. Electrical equipment and related grounding devices should be installed by a licensed and qualified electrician.
- Use appropriate equipment and safety practices.
- Do not perform any work in inclement weather, including wind, rain, snow, lightning, etc.
- Periodically (at least yearly) check for wear and damage, including corrosion, stress cracks, frayed cables, loose cable clamps, cable tightness, etc. and take necessary corrective actions.
- Periodically (at least yearly) check electrical ground connections.

NOTE

The incoming AC voltage wires must be attached to the Ground (G), Neutral (N), and Line (L) terminal blocks. Do not connect the AC directly to the 24 Vdc power supply. Full wiring instructions are given in Section 5, *Installation* (p. 5).

3. Initial Inspection

The 24 Vdc power supply kit includes a 24 Vdc power supply, terminal blocks, circuit breaker, and the hardware required to mount them inside a Campbell Scientific enclosure (see FIGURE 3-1). Ensure all components are present (see TABLE 3-1).

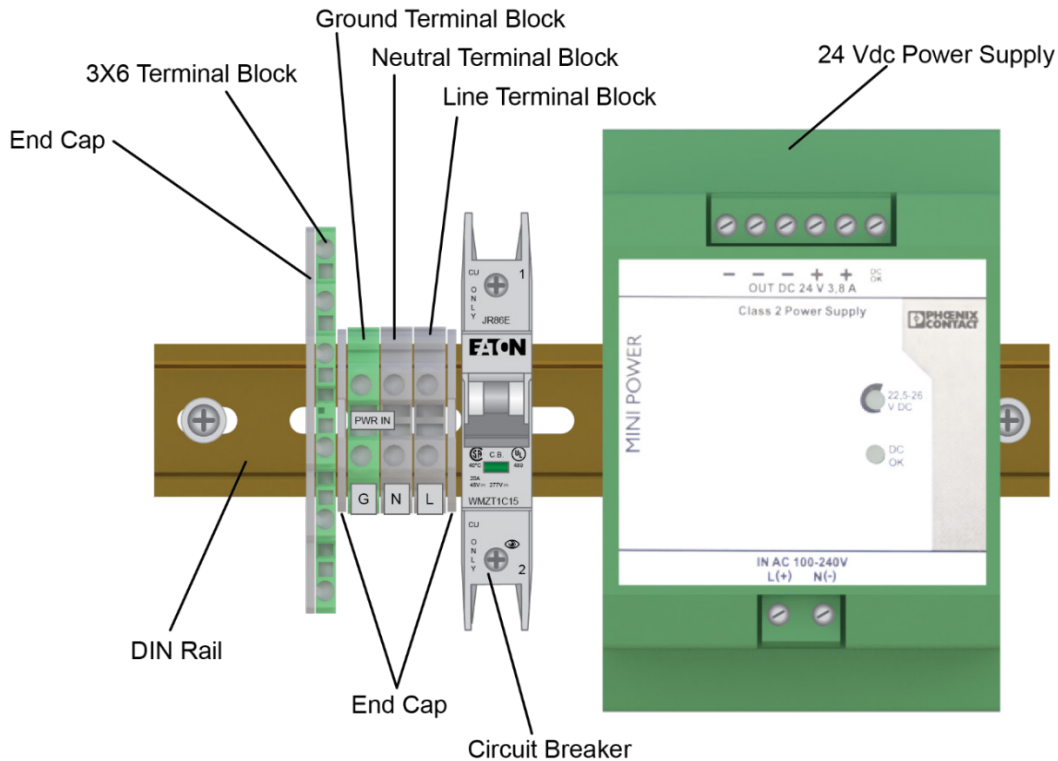


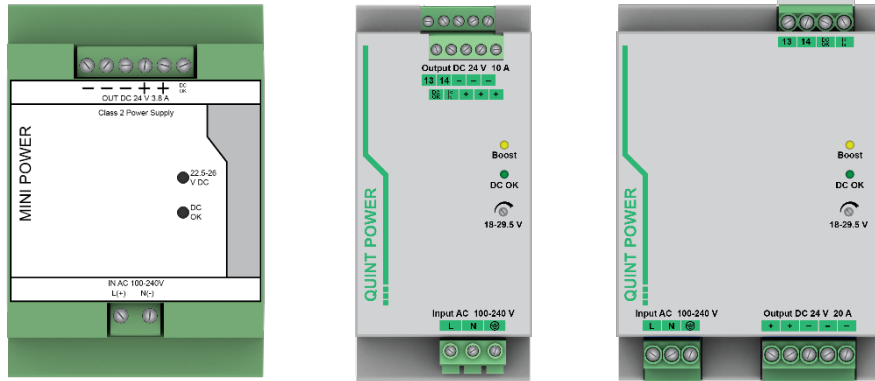
FIGURE 3-1. 24 Vdc power supply kit contents

| TABLE 3-1. Parts List | |
|------------------------------|--------------------|
| Item | Quantity |
| Power Supply | 1 |
| 15 A Circuit Breaker | 1 |
| End Cap (Gray) | 2 |
| End Cap (Green/Yellow) | 1 |
| Terminal Block (Gray) | 2 |
| 3 x 6 Terminal Block | 1 |
| 3 x 6 End Cap | 1 |
| AC Black Wire | 2 |
| AC White Wire | 1 |
| AC Green Wire | 3 (2 in 3.8 A kit) |
| DC Black Wire | 2 |
| DC Red Wire | 2 |
| 9-in DIN Rail | 1 |
| DIN Rail Stopper | 2 |
| #6-32 X .375 Screw | 3 |
| Grommet | 3 |
| Washer | 3 |
| DIN Rail End Cap | 2 |

NOTE

AC jumper wires in the 3.8 A and 10 A power supply kits are 14 AWG. DC jumper wires in the 3.8 A and 10 A power supply kits are 16 AWG. All jumper wires in the 20 A power supply kit are 12 AWG.

4. Specifications



| Specification | pn 28370 | pn 28371 | pn 28372 |
|-------------------------------------|---|--|--|
| Nominal input voltage | 100 to 240 Vac | 100 to 240 Vac | 100 to 240 Vac |
| AC input voltage range | 85 to 264 Vac | 85 to 264 Vac | 85 to 264 Vac |
| DC input voltage range | 90 to 350 Vdc | 90 to 350 Vdc | 90 to 350 Vdc |
| AC frequency range | 45 to 65 Hz | 45 to 65 Hz | 45 to 65 Hz |
| Inrush surge current | < 15 A (typical) | < 15 A (typical) | < 20 A (typical) |
| Power failure bypass | 120 Vac > 20 ms 230 Vac > 100 ms | 120 Vac > 36 ms 230 Vac > 36 ms | 120 Vac > 32 ms 230 Vac > 32 ms |
| Input fuse | 3.5 A (slow-blow, internal) | 10 A (slow-blow internal) | 12 A (slow-blow internal) |
| Nominal output voltage | 24 Vdc \pm 1% | 24 Vdc \pm 1% | 24 Vdc \pm 1% |
| Setting range of the output voltage | 22.5 to 26 Vdc (> 24 V constant capacity) | 18 to 29.5 Vdc (> 24 V constant capacity) | 18 to 29.5 Vdc (> 24 V constant capacity) |
| Output current | 3.8 A (-25 to 60 °C) | 10 A (-25 to 60 °C) | 20 A (-25 to 60 °C) |
| Derating | 60 to 70 °C (2.5%/K) | 60 to 70 °C (2.5%/K) | 60 to 70 °C (2.5%/K) |
| Residual ripple | < 40 mV _{pp} (20 MHz) | < 50 mV _{pp} (with nominal values) | < 30 mV _{pp} (with nominal values) |
| Maximum power dissipation, no load | 2.5 W | 9.1 W | 8 W |
| Maximum power loss of nominal load | 12 W | 22 W | 40 W |

5. Installation

The power supply kit components are mounted on a DIN rail inside a Campbell Scientific enclosure. Each component will snap onto the DIN rail as shown in FIGURE 5-1.

NOTE

All wire gauge descriptions in these instructions are for the 3.8 A and 10 A power supply kits. The 20 A power supply kit uses 12 AWG wire for all connections.

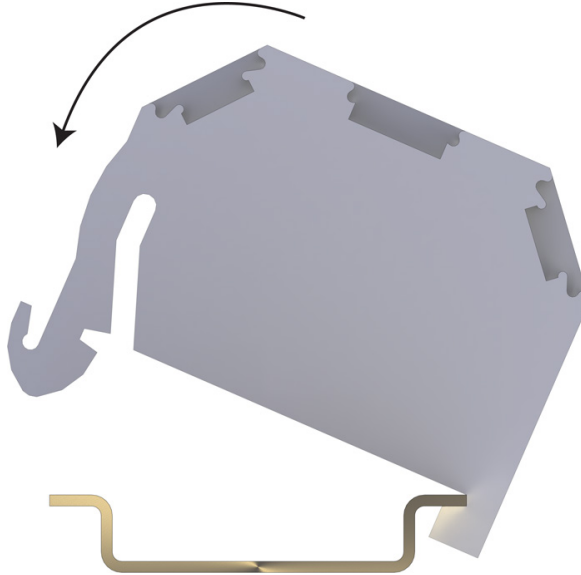


FIGURE 5-1. DIN rail mounting procedure

1. FIGURE 5-2 shows the components of the kit mounted on a DIN rail. From left to right, these include a 3 x 6 terminal block, a ground terminal block, a neutral terminal block, a line terminal block, the circuit breaker, and the 3.8 A power supply. Also shown are a CR1000 datalogger and CH200 charging regulator (not included in the kit).

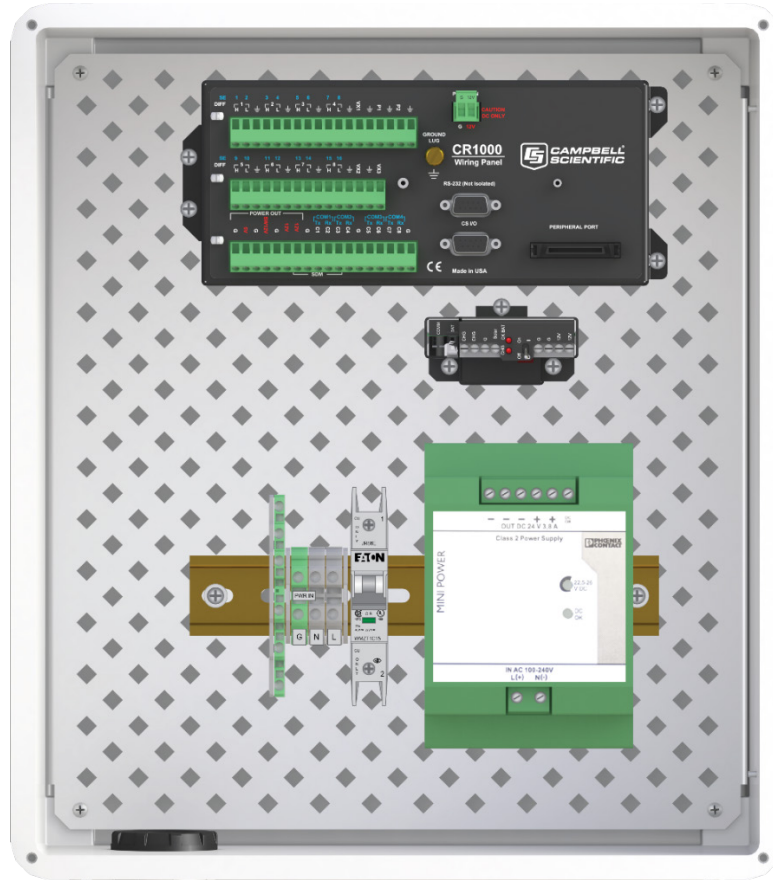


FIGURE 5-2. DIN rail components prior to wiring

2. Connect a black 14 AWG wire between the bottom of the breaker and the L(+) terminal on the power supply (FIGURE 5-3).

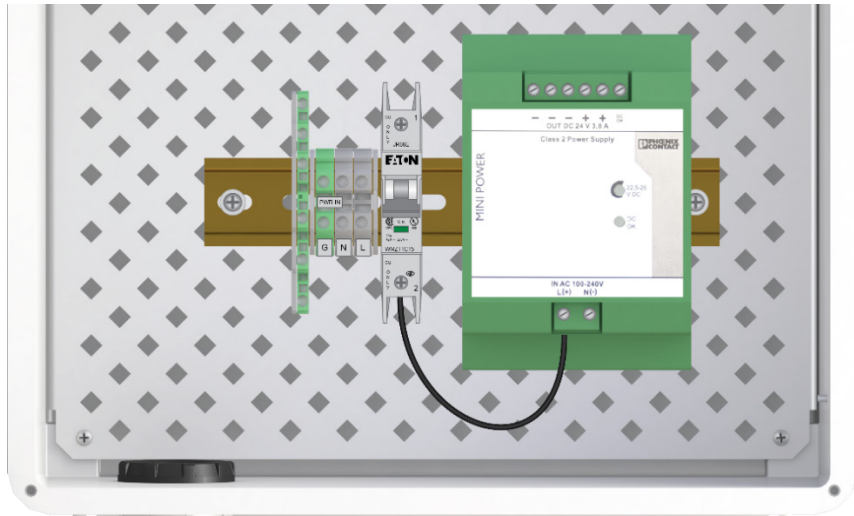


FIGURE 5-3. Connecting the L(+) terminal to the circuit breaker

3. Connect a black 14 AWG wire between the top of the breaker and the L (Line) terminal block (FIGURE 5-4).

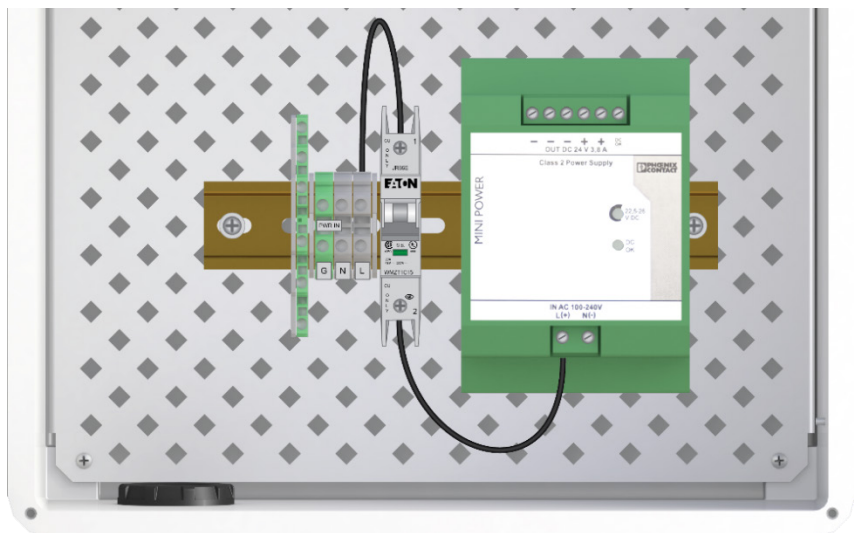


FIGURE 5-4. Connecting the circuit breaker to the L (Line) terminal block

- 4. Connect a white 14 AWG wire between the N (Neutral) terminal block and the N(-) terminal on the power supply (FIGURE 5-5).

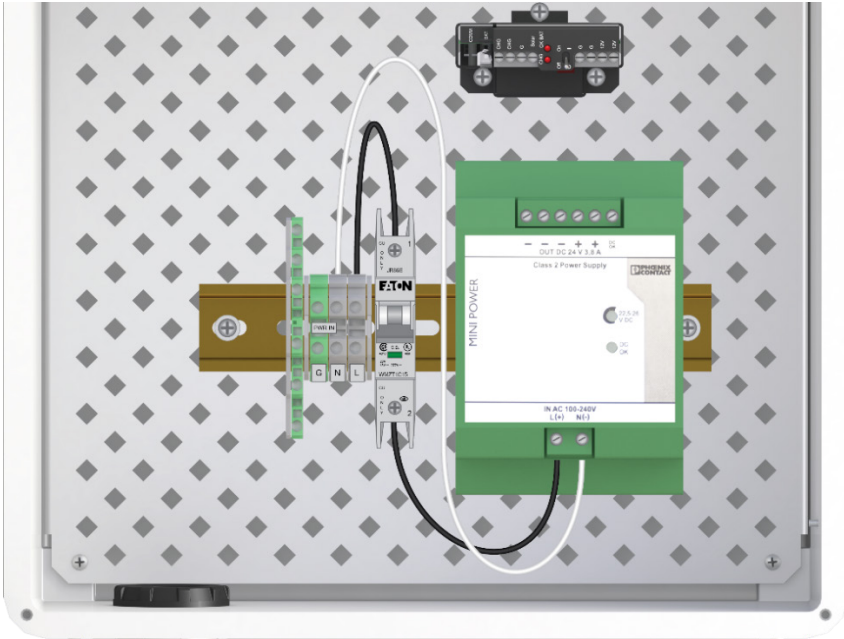


FIGURE 5-5. Connecting the N (Neutral) terminal block to the power supply

5. Connect the 3 x 6 terminal block to the datalogger (not included) ground point using a green/yellow 14 AWG ground wire (FIGURE 5-6). The remaining points on the terminal block are intended for additional accessories with ground lugs, such as the AVW200 or the SDM-CD8.

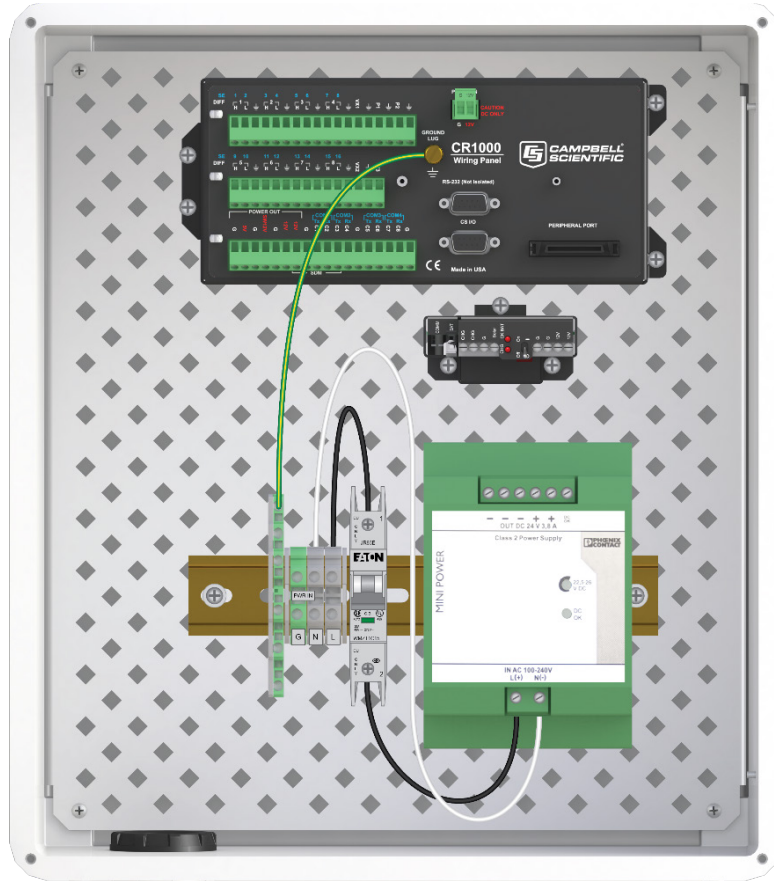


FIGURE 5-6. Connecting the 3 x 6 terminal block to the datalogger

6. Connect the bottom-side of the 3 x 6 terminal block to the enclosure ground lug (FIGURE 5-7).

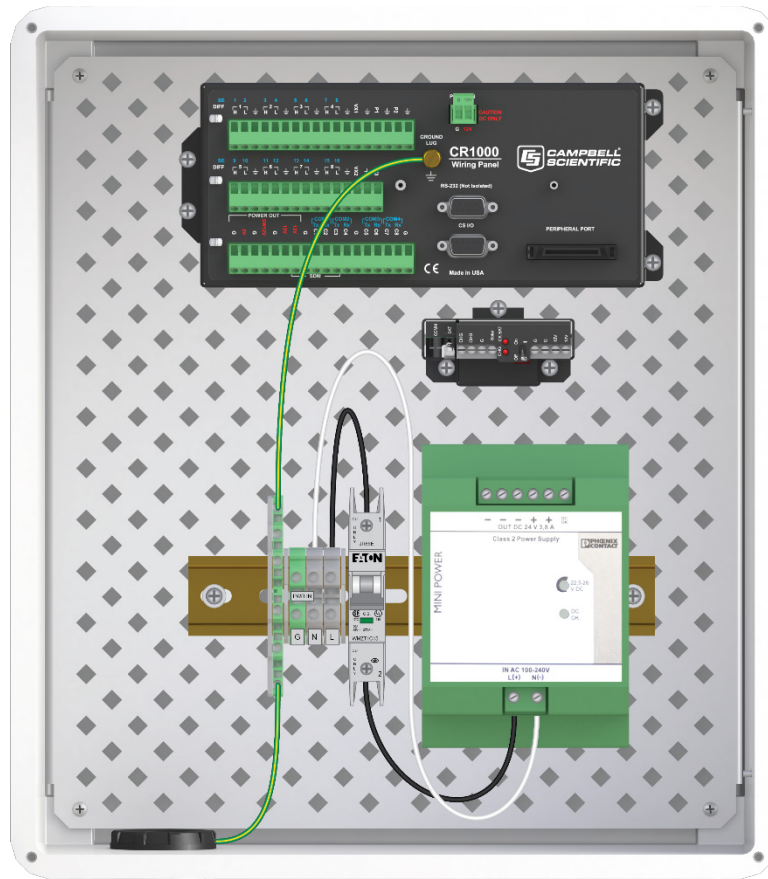


FIGURE 5-7. Connecting the 3 x 6 terminal block to the enclosure ground lug

7. Use the included 16 AWG red and black wires to connect the output (+) and (-) terminals of the power supply to the two (2) CHG inputs on the CH150, or CH200 (not included in the kit). See FIGURE 5-8. The **G** and **Solar** terminals on the charging regulator are used when power input is from a solar panel. Use the red wire for the + terminal and the black wire for the - terminal

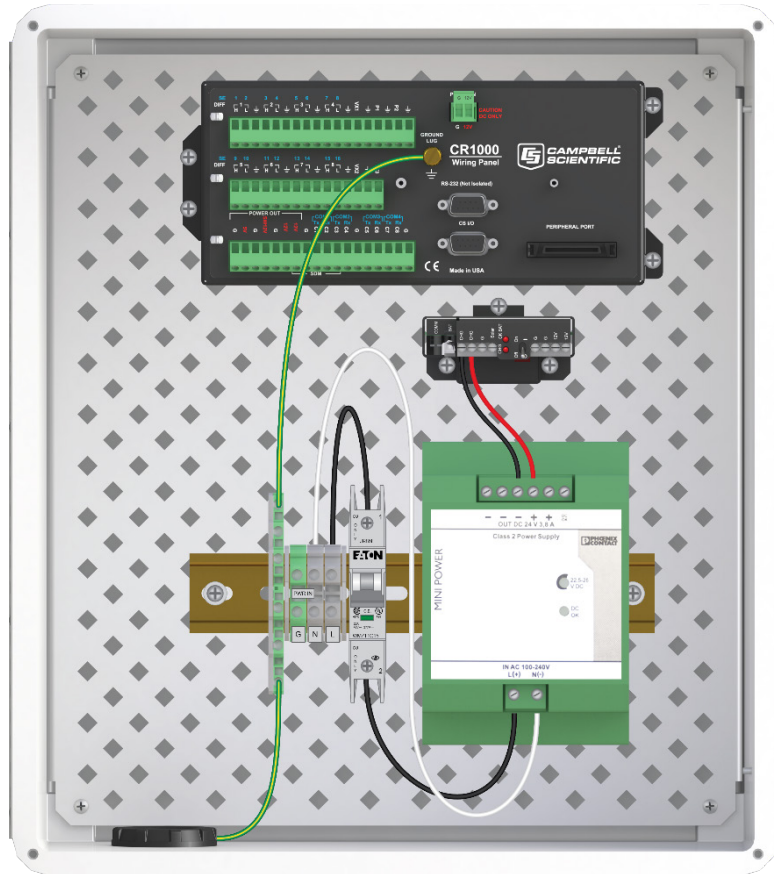


FIGURE 5-8. Connecting the power supply to the charging regulator

- Use 16 AWG red and black wires to connect the CH150 or CH200 +12 and G terminals to the G and 12V on the datalogger (FIGURE 5-9). Use the red wire for the 12V terminals and the black wire for the G terminals.

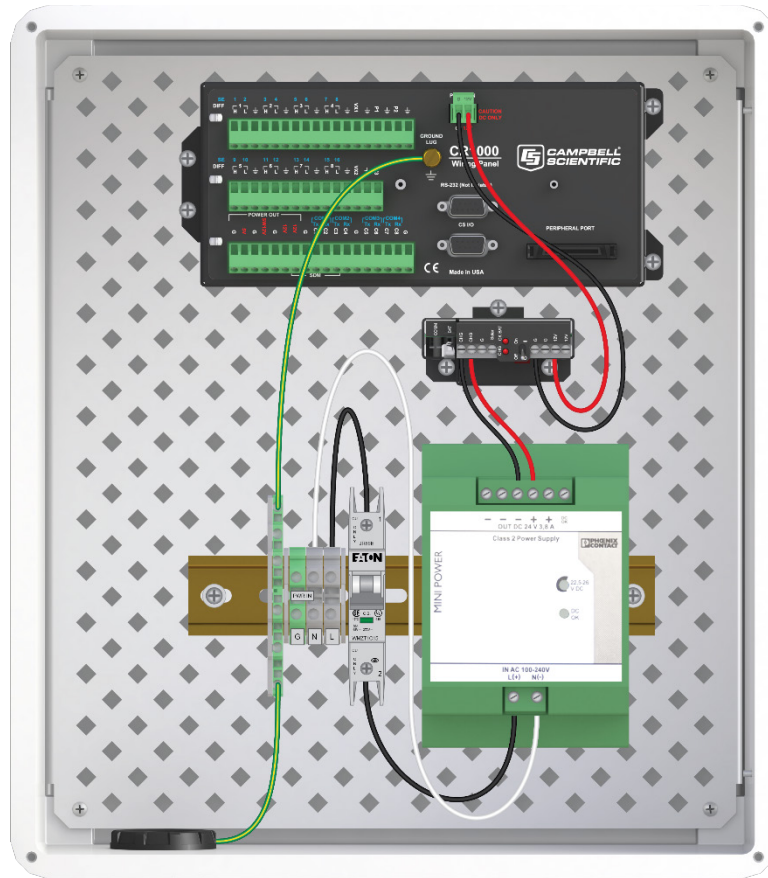


FIGURE 5-9. Connecting the charging regulator to the datalogger

9. FIGURE 5-10 shows an overview of the complete 10 amp kit Campbell Scientific pn 28371. The CR1000 and CH200 are not included in the kit. The 10 A power supply has a ground terminal, and requires a 14 AWG green wire to be connected between the ground terminal on the power supply and the G (Ground) terminal block as shown.

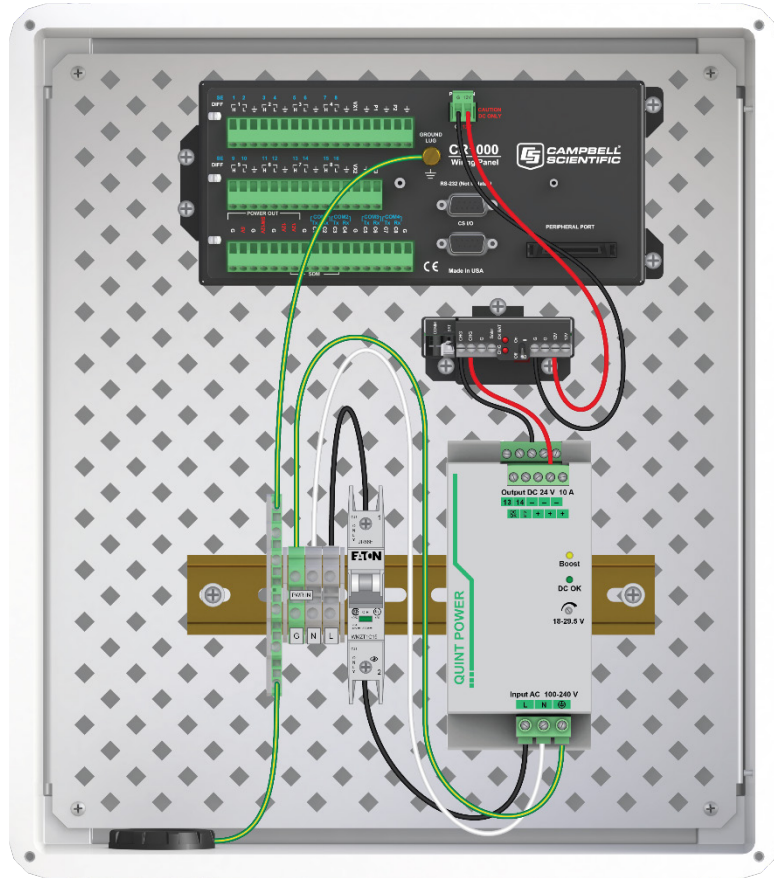


FIGURE 5-10. 10 A power supply wiring

10. FIGURE 5-11 shows an overview of the complete 20-amp kit Campbell Scientific pn 28372. The CR1000 and CH200 are not included in the kit. The 20 A power supply has a ground terminal, and requires a 12 AWG green wire to be connected between the ground terminal on the power supply and the G (Ground) terminal block as shown.

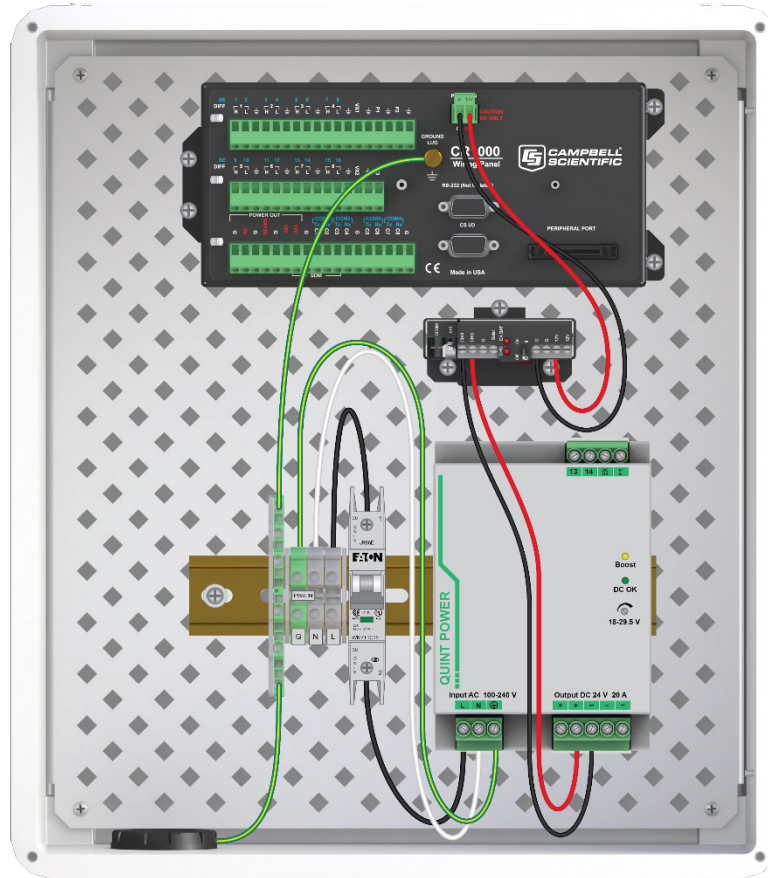


FIGURE 5-11. 20 A power supply wiring

11. Have a licensed and qualified electrical contractor complete the AC connections to the outside voltage source.

NOTE

The incoming AC voltage wires must be attached to the Ground (G), Neutral (N), and Line (L) terminal blocks. Do not connect the AC directly to the 24 Vdc power supply.

6. Troubleshooting

When troubleshooting the 24 Vdc power supply, begin by checking the ‘DC OK’ LED on the power supply (FIGURE 6-1). This LED remains lit whenever the power supply is receiving AC voltage and has a DC voltage output. If this LED is not lit, verify AC voltage is present from the outside power source. Also check the circuit breaker to ensure it has not been tripped. With the external power off, check the wire connections to ensure each terminal connection is secure.

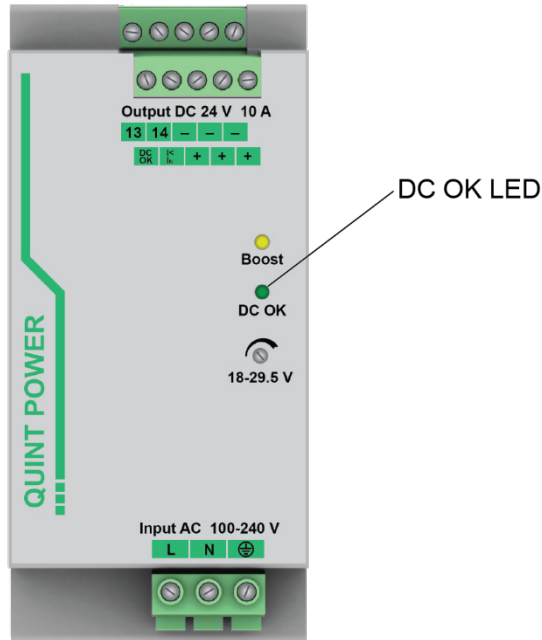


FIGURE 6-1. 24 Vdc power supply DC OK LED

If the 'DC OK' LED is lit, next look at the charging regulator. Campbell Scientific charging regulators include an LED that will light to indicate a valid charge source is found. The switch on the charging regulator must be in the 'On' position.

Current charging regulator LEDs will flash green to indicate the valid charge source. The PS150/CH150 will flash approximately once per second. The PS200/CH200 will flash approximately every 4 to 5 seconds. If this LED remains off with the switch in the 'On' position, the regulator is not receiving voltage from the 24 Vdc power supply. Check the wire connections between the two components.

NOTE

The PS100/CH100 has a red LED that lights constantly when a valid charge source is present.

Additional troubleshooting is possible by using a digital multimeter. With the power off, use the meter to check continuity of the wires between components. With the power on, check for the appropriate voltage at each connection. Take care to set the meter to the correct voltage type (AC or DC) for each measurement.

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