

RS-485 Digital communications accessory board installation and operation instructions



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Safety for life



Eaton's Cooper Power series Products meets or exceeds all applicable industry standards relating to product safety. We actively promote safe practices in the use and maintenance of our products through our service literature, instructional training programs, and the continuous efforts of all Eaton employees involved in product design, manufacture, marketing and service.

We strongly urge that you always follow all locally approved safety procedures and safety instructions when working around high-voltage lines and equipment and support our "Safety For Life" mission.

Safety information

The instructions in this manual are not intended as a substitute for proper training or adequate experience in the safe operation of the equipment described. Only competent technicians, who are familiar with this equipment should install, operate, and service it.

A competent technician has these qualifications:

- Is thoroughly familiar with these instructions.
- Is trained in industry-accepted high- and low-voltage safe operating practices and procedures.
- Is trained and authorized to energize, de-energize, clear, and ground power distribution equipment.
- Is trained in the care and use of protective equipment such as flash clothing, safety glasses, face shield, hard hat, rubber gloves, hotstick, etc.

Following is important safety information. For safe installation and operation of this equipment, be sure to read and understand all cautions and warnings.

Hazard Statement Definitions

This manual may contain four types of hazard statements:

DANGER

Indicates a hazardous situation which, if not avoided, will result in death or serious injury.

WARNING

Indicates a hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION

Indicates a hazardous situation which, if not avoided, may result in minor or moderate injury.

CAUTION

Indicates a hazardous situation which, if not avoided, may result in equipment damage only.

Safety instructions

Following are general caution and warning statements that apply to this equipment. Additional statements, related to specific tasks and procedures, are located throughout the manual.

DANGER

Hazardous voltage. Contact with high voltage will cause death or severe personal injury. Follow all locally approved safety procedures when working around high- and low-voltage lines and equipment.

WARNING

Before installing, operating, maintaining, or testing this equipment, carefully read and understand the contents of this manual. Improper operation, handling, or maintenance can result in death, severe personal injury, and equipment damage.

WARNING

This equipment is not intended to protect human life. Follow all locally approved procedures and safety practices when installing or operating this equipment. Failure to comply may result in death, severe personal injury, and equipment damage.

WARNING

Power distribution and transmission equipment must be properly selected for the intended application. It must be installed and serviced by competent personnel who have been trained and understand proper safety procedures. These instructions are written for such personnel and are not a substitute for adequate training and experience in safety procedures. Failure to properly select, install or maintain power distribution and transmission equipment can result in death, severe personal injury, and equipment damage.



Figure 1. CL-5 and CL-6 Series regulator control RS-485 communications module kit

Product information

Introduction

Service Information MN225072EN provides the installation and operation instructions for a CL-6 series and CL-5 series regulator control RS-485 communications module.

Read this manual first

Read and understand the contents of this manual and follow all locally approved procedures and safety practices before installing or operating this equipment. Read and understand the manuals detailing the installation and operation of the regulator and the regulator control used with the regulator. Refer to *MN225016EN CL-6 Series Control Installation, Operation, and Maintenance Instructions* for information on the CL-6 series voltage regulator control. Refer to *MN225008EN VR-32 Voltage Regulator with Quik-Drive Tap-Changer Installation, Operation, and Maintenance Instructions* for information on the Cooper Power series voltage regulator with Quik-Drive™ tap-changer. Refer to *S225-10-10 McGraw-Edison VR-32 Voltage Regulator and CL-5 Series Control Installation, Operation and Maintenance Instructions and Parts Replacement Information* for information on the Cooper Power Systems voltage regulator and CL-5 series control.

Additional information

These instructions cannot cover all details or variations in the equipment, procedures, or process described nor provide directions for meeting every possible contingency during installation, operation, or maintenance. For additional information, please contact your Eaton representative.

Acceptance and initial inspection

This kit is thoroughly inspected at the factory. It is in good condition when accepted by the carrier for shipment.

Upon receipt of the regulator kit, a thorough inspection should be made for damage, evidence of rough handling, or shortages. Should this initial inspection reveal evidence of rough handling, damage, or shortages, it should be noted on the bill of lading and a claim should immediately be made with the carrier. Also, notify your Eaton representative.

Handling and storage

Be careful during handling and storage of equipment to minimize the possibility of damage. If the regulator kit is not to be placed into immediate use, store the kit where the possibility of damage is minimized.

Quality standards

ISO 9001 Certified Quality Management System

Description

The RS-485 communications board allows digital SCADA communications from the CL-5/CL-6 series Cooper Power Systems voltage regulator control to external remote communication devices.

Mounting instructions

Table 1. Kit parts identification

| Item | Description | Qty |
|------|--|-----|
| 1 | Communication module circuit board | 1 |
| 2 | Interface cable: CL-6/CL-5 to communication module | 1 |
| 3 | Nylon cable clip | 1 |
| 4 | Machine screw, 6-32 x 1/2, round head | 2 |
| 5 | Flat washer, #8, stainless steel | 2 |
| 6 | Cable ties, 1/16-5/8 | 8 |
| 7 | Lock washer, #6, stainless steel | 2 |
| 8 | Stand-off stud, 1 1/4" | 4 |
| 9 | Stand-off stud 1/2" | 6 |
| 10 | Machine screw, 10-32 x 3/8", stainless steel | 10 |
| 11 | Lead assembly, #20, white/black | 1 |
| 12 | Lock washer, #10, stainless steel | 12 |
| 13 | Flat washer, #10, brass | 4 |
| 14 | Lead assembly, #20, white | 1 |
| 15 | Stainless steel mounting plates | 2 |
| 16 | Assembly Drawings | 3 |

CL-6B Control

Follow these instructions to install the RS-485 communications module onto a CL-6B control.

1. De-energize the control panel according to the regulator manufacturers instructions.



Electrical Shock Hazard. Failure to de-energize the control panel will expose the equipment installer to 120 VAC resulting in an electrical shock.

On Cooper control boxes, open the **V**¹ and **V**⁶ (if present) knife switches and close the **C** switch on the back panel. This will de-energize the control panel and also the back panel below the switches.

2. The communications board may be mounted at two possible locations on the rear of the CL-6B control panel. Each location is defined by four threaded mounting holes. Locate one set of four mounting holes on the rear of the CL-6B control panel. See Figure 2.

Note: These mounting holes are threaded to accept the stand-off studs.



Figure 2. Communications module mounting locations, rear of CL-6B control panel

3. Screw four of the 1/2" threaded stand-off studs (Item 9) into the rear of the CL-6B control panel. See Figure 3.



Figure 3. Stand-off studs on control panel

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Figure 4. Module mounted on rear of CL-6B control panel

- Using the screws (Item 10), brass washers (Item 13), and lock washers (Item 12), mount the communications module (Item 1) to the stand-off studs. The brass washer is placed directly on the communications module; the lock washer is placed between the brass washer and the screw. See Figure 4.

Note: The orange RS-485 connectors should point down.

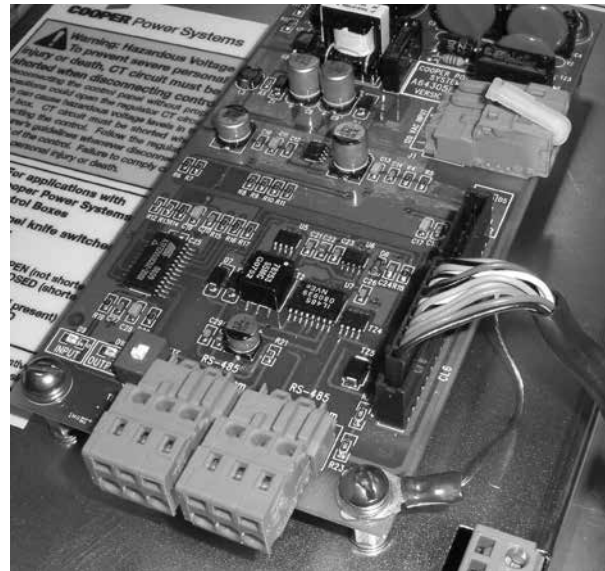


Figure 5. Connecting interface cable to module



Figure 6. Connecting interface cable to CL-6B control panel

- Connect the interface cable (Item 2) to the jack on the right side of the communications module marked "CL6". See Figure 5.

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6. Loosen the module mounting screw to the right of the RS-485 connectors (lower right corner). Place the fork terminal of the grounding lead from the interface cable between the brass washer and the communication board and retighten the screw. See Figure 5.
7. Push the interface cable terminal connector into an open accessory jack on the hinge side of the control panel. Use the lower jack (Com2); if Com2 is in use, use the upper jack (Com3). See Figure 6.
8. Use the supplied cable clip (Item 3) to route the control cable through the clip and mount the clip to the control using the threaded hole adjacent to the accessory jacks. See Figure 6. Use Items 4, 5, and 7 to accomplish this.
9. Mount the control cable fork terminal lead (grounding lead) to the second threaded hole adjacent to the accessory jacks. See Figure 6. Use items 4, 5, and 7 to mount the fork terminal.
10. Confirm that both cable terminals and both fork leads are connected.
11. Route the cable along the back of the control panel and add cable ties (Item 6) where appropriate.

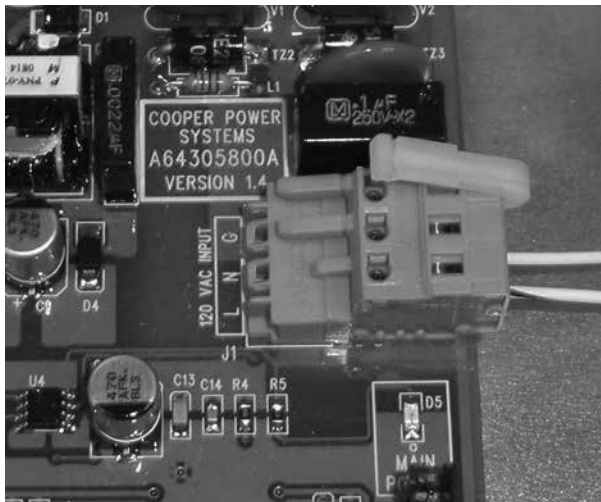


Figure 7. Connecting power to communications module

12. Connect the white/black lead (Item 11) to the "L" terminal; connect the white lead (Item 14) to the "N" terminal. See Figure 7.
13. Connect the communications board to a stable approximately 120 VAC power source.

- A. When installing the communications board in a Cooper control box the RCT terminal board should be used to supply power. See Figure 8.
 1. Connect the white/black lead (Item 11) to the 115 terminal.
 2. Connect the white wire (Item 14) to the COM terminal.
- B. For communications boards installed in other than Cooper control boxes, any stable 120 VAC source can be used to supply power to the board.

⚠ CAUTION

The communications module must not be subjected to a voltage above 137 VAC or damage may result. A voltage supply below 80 VAC will result in loss of function.

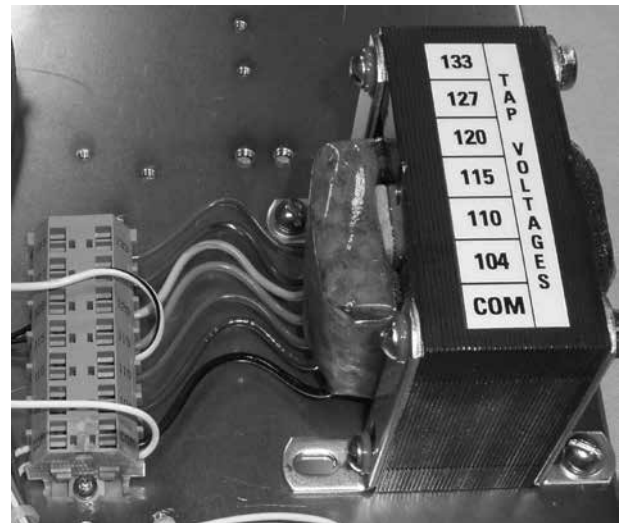


Figure 8. Connecting power leads to RCT terminal board

14. Set the termination resistor DIP switch located to the left of the orange RS-485 connectors at the bottom of the communication board. See Figure 9. Typically, the switch will be set to terminate for the communications cards located at the beginning and end of an RS-485 communications wire. The communications cards between the first and last of a system should have the switch set to non-terminating. Refer to the Operation section of this manual for more information.

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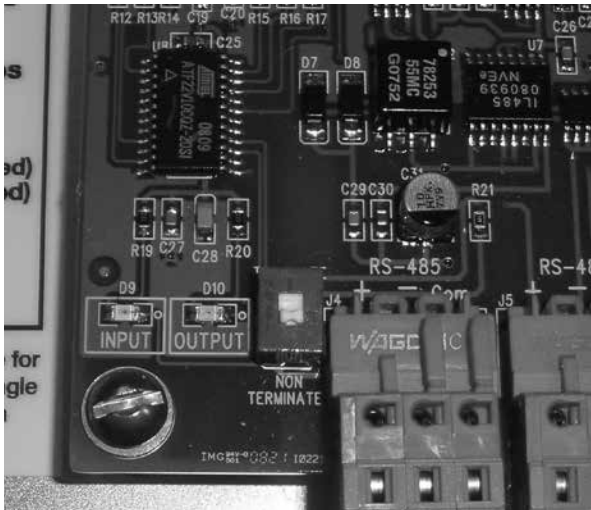


Figure 9. Setting the termination resistor DIP switch

CL-6A and CL-5 Series controls

Follow these instructions to install the RS-485 communications module onto a CL-6A control or a CL-5 series control from Cooper Power Systems. The preferred mounting location for these models is the control box back panel.

1. De-energize the control panel according to the regulator manufacturers instructions.

CAUTION

Electrical Shock Hazard. Failure to de-energize the control panel will expose the equipment installer to 120 VAC resulting in an electrical shock.

On Cooper control boxes, open the **V¹** and **V⁶** (if present) knife switches and close the **C** switch on the back panel. This will de-energize the control panel and also the back panel below the switches.

2. Locate the four mounting holes on the control back panel. See Figure 10.

Note: These mounting holes are threaded to accept the stand-off studs.

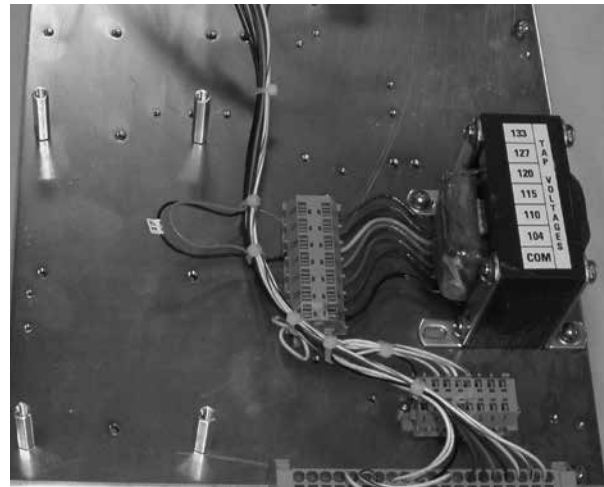


Figure 10. Module mounting location with stand-off studs mounted, control box back panel

3. Determine which length stand-off studs are required to allow clearance off the terminal block at the lower edge of the rear panel. The kit includes 1/2" studs (Item 9) and 1 1/4" studs (item 8).
4. Screw the appropriate threaded stand-off studs into the mounting holes on the control box back panel. See Figure 10.

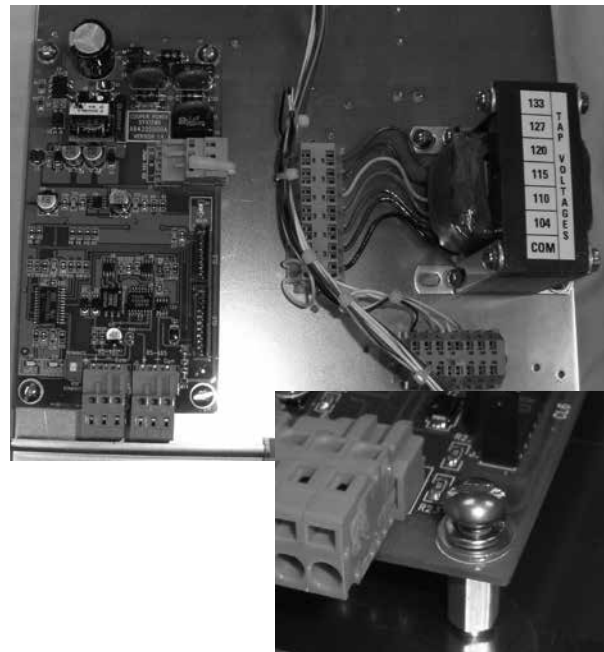


Figure 11. Module mounted on control box back panel

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- Using the screws (Item 10), brass washers (Item 13), and lock washers (Item 12), mount the communications module (Item 1) to the stand-off studs. The brass washer is placed directly on the communications module; the lock washer is placed between the brass washer and the screw. See Figure 11.
- Connect the provided interface cable (Item 2) to the jack on the right side of the communications module. See Figure 14. Use the jack marked "CL5" for CL-5 Series control panels and the one marked "CL6" for CL6 Series control panels. The interface cable for the CL6 has 10-pin terminals and for the CL-5 it has 8-pin terminals.

Note: The orange RS-485 connectors should point down.

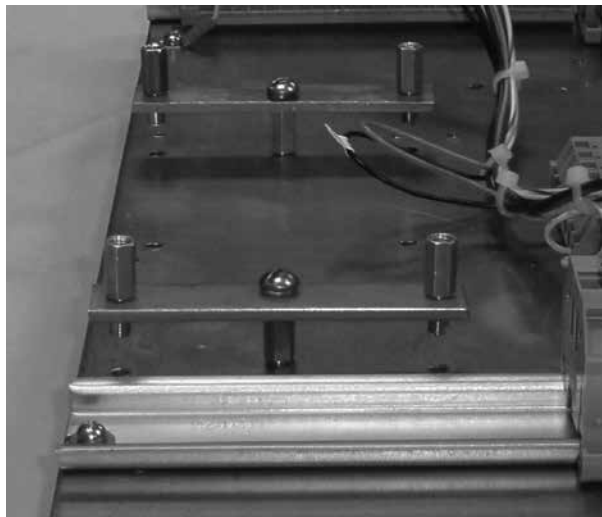


Figure 12. Alternate method of mounting communications module

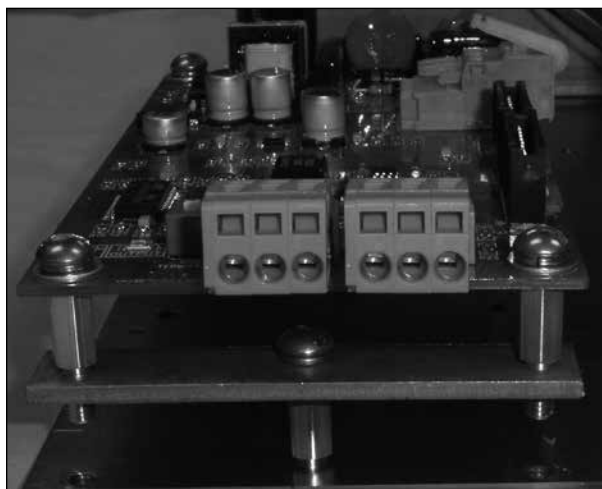


Figure 13. Communications module mounted using alternate method

- An alternate method of mounting the communications board onto the back panel is to use two (2) stainless steel mounting plates (Item 15), six (6) screws and lock washers (Items 10 and 12), four (4) brass washers (Item 13) and six (6) 1/2" stand-off studs, (Item 9). See Figures 12 and 13.

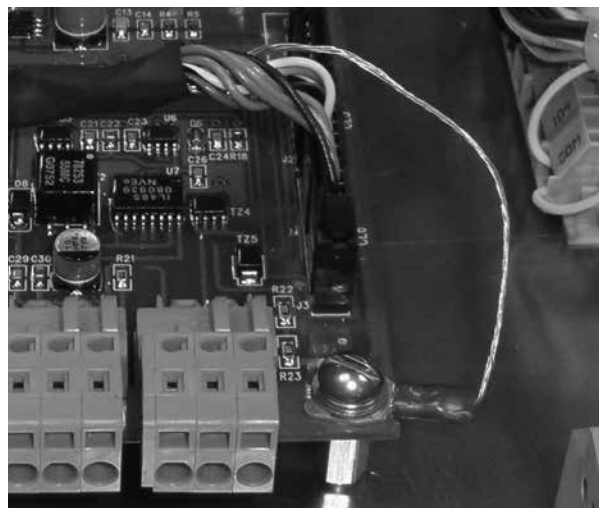


Figure 14. Connecting interface cable to module



Figure 15. Connecting to the interface cable to the CL-6A control panel

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8. Loosen the module mounting screw to the right of the RS-485 connectors (lower right corner). Place the fork terminal of the grounding lead from the interface cable between the brass washer and the communication board and retighten the screw. See Figure 14.
9. Connect the interface cable to the control panel:
 - A. For the CL-6A control panel: Push the interface cable terminal connector into an open accessory jack located on the hinged side of the control panel. Use the lower jack, (Com2); if Com 2 is in use, use the upper jack (Com 3). See Figure 15.
 - B. For the CL-5 control panel: Remove the metal shield from the back of the control by removing 4 nuts and wiring harness cable stay. Push the interface cable terminal connector into the accessory jack located at the top right of the printed circuit board. See Figure 16.

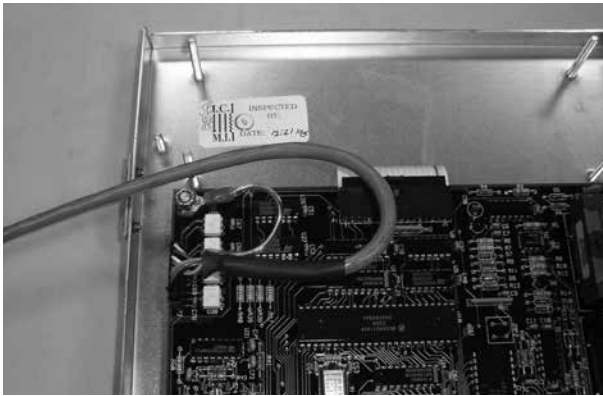


Figure 16. Connecting interface cable to CL-5 control panel

10. For the CL-6A, use the supplied cable clip (Item 3) to route the control cable through the clip and mount the clip to the control using the threaded hole adjacent to the accessory jacks. See Figure 15. Use items 4, 5, and 7 to accomplish this. Skip this step for the CL-5 control.
11. Connect the interface cable grounding lead to the control panel:
 - A. For the CL-6A, connect the lead to the threaded hole adjacent to the accessory jacks. See Figure 15. Use items 4, 5, and 7.
 - B. For the CL-5, connect the lead under the nut adjacent to the accessory jack. See Figure 16. Install the metal shield onto the back of the control panel, routing the interface cable through the slot in the side of the shield as it is installed. See Figure 17.



Figure 17. Routing interface cable on CL-5 control panel

12. Confirm that both cable terminals and both fork leads are connected.
13. Route the cable along the back of the control panel and add cable ties (Item 6) where appropriate.
14. Connect the white/black lead (Item 11) to the "L" terminal; connect the white lead (Item 14) to the "N" terminal. See Figure 17.
15. Connect the communications board to a stable approximately 120 VAC power source.
 - A. When installing the communications board in a Cooper control box the RCT terminal board should be used to supply power. See Figure 18.
 1. Connect the white/black lead (Item 11) to the 115 terminal.
 2. Connect the white wire (Item 14) to the COM terminal.
 - B. For communications boards installed in other than Cooper control boxes, any stable 120 VAC source can be used to supply power to the board.

CAUTION

The communications module must not be subjected to a voltage above 137 VAC or damage may result. A voltage supply below 80 VAC will result in loss of function.

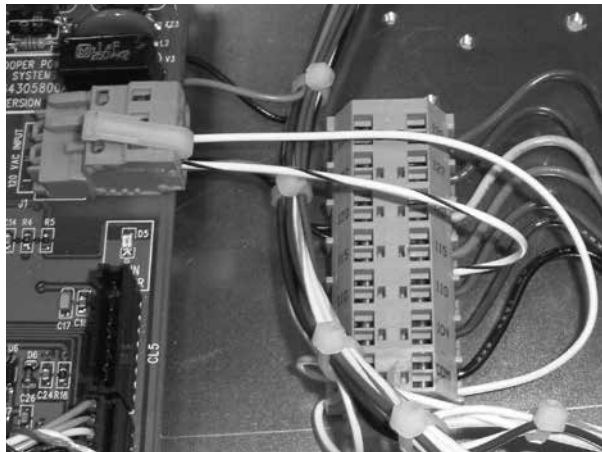


Figure 18. Connecting power to module

16. Set the termination resistor DIP switch located to the left of the orange RS-485 connectors at the bottom of the communication board. See Figure 19. Typically, the switch will be set to terminate for the communications cards located at the beginning and end of an RS-485 communications wire. The communications cards between the first and last of a system should have the switch set to non-terminating. Refer to the Operation section of this manual for more information.

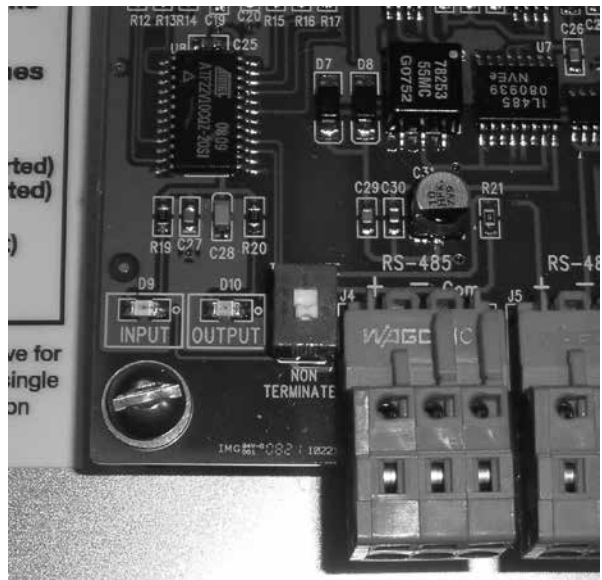


Figure 19. Setting DIP switch

Operation

The The RS-485 communications board allows digital SCADA communication from the CL-5/CL-6 series regulator control to external remote communication devices. Several Function Codes (FC) must be set properly when attempting to use the second communications port: for CL-5 series, FC 64—FC 68; for CL-6 series, FC 60—FC 67 for Com 1/Com 3 and FC 160—FC 167 for Com 2..

To properly set the FCs, refer to *MN225016EN CL-6 Series Control Installation, Operation, and Maintenance Instructions* for information on the CL-6 series voltage regulator control and refer to Service Information *S225-10-10* for information on the CL-5 series. Refer also to any manuals provided by the RTU/master station vendor.

For additional assistance contact your Eaton representative.

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Publication No. MN225074EN
March 2017

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