Progressive Industries, Inc.

EMS

Electrical Management System

Complete Installation Guide

and

Operating Instructions for:
Model EMS-LCHW50
Rated at 240V/50A

Manufactured by:
Progressive Industries, Inc.
414B Airport Boulevard
Morrisville, NC 27560
(919) 462-8280

www.progressiveindustries.net

Proudly manufactured in the U.S.A.

Features

High/Low Voltage Protection

Whenever AC power falls below 104 volts, or rises above 132 volts, the EMS automatically shuts down power to the RV. The EMS will monitor the power and once the AC power rises above 104 volts, or drops below the 132 volt level, the time delay indicator flashes for the preset time and then automatically restores power to the RV.

Time Delay for A/C Compressor

If AC power is interrupted, or the EMS detects a fault condition, the built in time delay is activated. There are two settings on the EMS: one is 136 seconds (02:16), and the other is 15 seconds. Consult your air conditioner manual to see if it has a time delay built in. If so, use the 15 second delay, if not; use the 136-second delay. The factory setting is 15 seconds.

5 Mode Surge Protection

This feature provides full surge protection L-N, L-N, L-G, L-L and N-G. Total Joule rating is 3,580 and 88,000A surge current. Response time of <1 nano second.

Surge Indicator

In the event of a power surge and the surge protector circuit is damaged within the EMS, L-N or L-G, the digital display error code will read E-10. This indicates that the EMS needs to be serviced.

Reverse Polarity Protection

If AC power is a reverse polarity condition, the EMS will not allow power to the RV and the error code will read E1.

Open Neutral Protection

If AC power has an open neutral condition, the display will not light, and the EMS will not allow power to the RV.

Open Ground Protection

If AC power has an open ground condition, the EMS will read an error code of E2, and power will not be allowed to the RV.

AC Frequency Protection

If AC power frequency deviates plus/minus 9 hertz from 60 cycles per second, the EMS will shut down AC power. An Error Code of E7 will be displayed when the frequency is high; and an Error Code of E8 will be displayed when frequency is low.

Accidental 240V Protection

If 240 volts is detected when plugging into AC power, the EMS will **NOT** allow power to the RV. If this condition occurs while power is applied to the RV, the EMS shuts off power instantly. The display will read the voltage and E-3 for the error. ***(NEVER BYPASS THE EMS WHEN THIS OCCURS.)***

Display

Continuously scrolls the AC power information, including voltage, current, frequency, error codes and previous errors. Each reading is displayed for two (2) seconds.

Previous Error Code

This feature tells the user what the previous error was and why power was interrupted to the RV. To read a Previous Error Code, put a "P" in front of the "E" code. This is only displayed if an actual error occurs. The error is deleted when the power is disconnected from the EMS. .

Bypass

Enclosed blue jumper wire allows the user to bypass the computer circuit in the EMS in the event of computer failure, thus allowing AC power into the RV. This **does not** disable the surge protector portion of the EMS; however, all other features are disabled.

Modular Design

Replacement parts are designed for simple plug and play, making repairs extremely user friendly.

Microprocessor Controlled

The computer and built-in display are driven by state of the art microprocessors that are programmed with software to drive the entire EMS unit.

Warnings

- Do not exceed the rating on the EMS for any reason, however, these devices are designed to be reduced down to 120V/15A, and still maintain full protection.

- Do not modify the EMS in any way. This will void the warranty, compromise protection and could result in possible shock and/or fire hazard.

- It is important to always check the pedestal power outlet for charring; this condition means that the AC receptacle is providing a weak connection. **DO NOT USE**! It could result in possible melting of the RV power plug.

- Progressive Industries recommends you have a certified electrician or an authorized dealer perform the installation of the EMS.

- When running extension cords from the RV to AC power, always use a 6 gauge cable for your 240 Volt, 50 Amp system. Make sure that the cable is rated for outdoor use to reduce the risk of electrical shock. Small gauge cable will have a higher resistance and will result in voltage loss, plus it may result in an electrical fire.

- Whenever servicing or installing the EMS, or any other AC powered device, make sure AC power is disconnected.

- RV wiring is different than the wiring found in homes; the neutral and ground conductors are isolated in the RV, unlike in a home where they are tied together at the service panel. The reason is: homes have a bonded ground system, whereas RV's do not. Therefore, never bond the neutral and ground together for any reason. This will create a ground fault condition, and may result in electric shock and/or fire hazard.

- Never solder the ends of the wires that you attach during installation. This includes the Red, Black and White wires.

- **Never** plug the EMS into an inverter.

Installation Instructions *Before* Transfer Box Model EMS-LCHW50

For installation, in addition to the EMS Kit, you will need:

- 6 mounting screws
- In some cases you will need a jumper cable, length to be determined based on the placement of the EMS
- **Always** use #6 wire.

1. Unplug RV from AC power and be sure generator is off.
2. Determine a location for the EMS control box.
3. Cut the RV power cord about three (3) inches greater than the distance from the junction box to the desired location of the EMS control box. Then strip back the outer insulation three (3) inches on input, and three (3) inches on output cable. ***(See Picture A)***
4. Strip back each conductor 3/8 inch on both stripped ends, ***(See Picture A)*** and attach ring terminals to green ground wires. If this wire is solid wire, do not use ring terminals. Loop the wire around the ground screw.
5. Remove the lid from the EMS. Next, remove the digital display and pack of screws and then back off the six set screws from top of contactor. (L1, L2, etc.)
6. Take your long cable with the plug end and connect it to the input side by sliding through the wire restraint on the end of the EMS control box. Then connect the wires to the contactor by attaching black to L1, white to L2, red to L3, and green to ground screw on side of box. ***(See Picture B)*** Torque down set screws and ground nut to secure connections.
7. Take the short cable coming from the junction box by sliding it through the wire restraint output side of the EMS control box. Next slide the black wire through the current sensor containing the green tape and connect to T1, then connect the white wire to T2. Now slide the red wire through the other current sensor and attach to T3. The arrow that is on the sensor needs to face T1 and T3 and the green ground wire to the ground screw on side of box. ***(See Picture B)*** Make sure that the wire colors match up across from each other. Torque down set screws and ground nut to secure connections.
8. Double check all connections and make sure they are secure.
9. Remove the two screws on contactor where marked L1, L2, etc. Next remove the top plastic plate with markings. Examine inside, ensuring there are no loose plastic pieces inside the contactor. If so, remove and re-install cover with two screws.

(See Picture B) ***<u>Caution: If you break off a tab and do not remove it, this may stop the contactor from working and allow 240 volts into the RV.</u>***

10. Secure cable ends by tightening down strain reliefs over the input and output wires. Do not over tighten as this could bite through the insulation and cause a short.
11. Set time delay jumper on the circuit board. The factory setting is for 15 seconds. Remove jumper to set for 136 seconds (02:16). See Features Section on time delay to determine which to use. ***(See Picture B)***
12. Plug in display. ***(See Picture C)***
13. Attach EMS lid with the six black machine screws provided.
14. Mount the EMS control box.
15. Installation is complete. Next, plug in and follow operating instructions.

Installation *After* Transfer Box for Protection from both Generator and AC Power.

For installation, in addition to the EMS Kit, you will need:

- 6 mounting screws
- In some cases you will need a jumper cable, length to be determined based on the placement of the EMS
- **Always** use #6 wire.

1. Unplug RV from the AC power and be sure generator is off.
2. Locate transfer switch box; determine where the EMS control box will be mounted.
3. Measure the distance between the transfer switch and the control box and add one (1) foot. This is the length of cable that will be required for the installation. Make sure 6-gauge, 4-conductor cables are used.
4. Remove lid from transfer box, disconnect and remove the output cable.
5. Take jumper cable and strip back one end three (3) inches, and the other end the same as the end removed from the transfer box. The cable removed from the transfer box must have at least three (3) inches of the outer insulation removed. ***(See Picture A)***

6. Strip back all conductors 3/8 inches and attach ring terminals to green ground wires. ***(See Picture A)*** If this wire is solid wire, do not use ring terminals. Loop the wire around the ground screw.
7. Remove the lid from the EMS. Remove the digital display and pack of screws and then back off the six set screws from top of contactor. (L1, L2, etc.)
8. Take the jumper cable and connect it to the input side by sliding through the wire restraint on the end of the EMS control box and then connect black to L1; white to L2; red to L3; green to ground screw. ***(See Picture B)*** Torque down set screws and ground nut to secure connections.
9. The cable that came from the transfer box connects to the output side of the EMS control box in the same manner. Next slide the black wire through the current sensor containing the green tape and connect to T1, then connect the white wire to T2. Now slide the red wire through the other current sensor and attach to T3. The arrow that is on the sensor needs to face T1 and T3. Next, attach the green ground wire to the ground screw on side of box. ***(See Picture B)*** Make sure that the conductor's colors match up across from each other. Torque down the set screws and ground nut to secure connections.
10. Connect the loose end of the jumper cable to the transfer switch. See wiring diagram on transfer switch if needed.
11. Double check all connections to ensure they are secure.
12. Secure cable ends by tightening down strain reliefs over the input and output wires. Do not over tighten as this could bite through insulation and cause a short.
13. Set time delay jumper on the circuit board. Factory setting is for 15 seconds. Remove jumper to change setting to 136 seconds (02:16). See Features Section on time delay to determine which to use. ***(See Picture B)***
14. Plug in display. ***(See Picture C)***
15. Attach lid with the six black machine screws provided and attach transfer switch lid.
16. Mount the EMS control box.
17. Installation is complete. Next, plug in and follow operating instructions.

Operating Instructions

1. Plug into A/C power.
2. Digital display will read 888 for one second and then begin scrolling the voltage, amps, line frequency and error code, if any. In addition, the time delay light will flash while the EMS is going through its countdown and will stop when the unit engages. (Bottom right hand corner.)
3. You may notice when first plugging in that the display may read E-9. Don't worry about this, it only means that the display has not received data from the computer yet. By the next time through it should read E-0 if the A/C power is normal.
4. The digital display will read L-1, and then give you a three digit number which is your Line 1 voltage, then 0A which is Line 1 current (amps). Then L-2 and a three digit number which is Line 2 voltage, then OA which is Line 2 current (amps). Current will read zero until the time delay is complete. (136 seconds or 15 seconds, depending on your settings). Next, you will notice a number between 0 and 35. This number indicates how many amps the RV is drawing on each line. Next you will notice 60H and this is your line frequency. That number should remain fairly consistent, however, it may read plus/minus one or two. Lastly, you will notice the E code. E-0 is normal and only if E-0 or E-10 is present will the delay light flash and allow power to the RV. Refer to your Error Code chart that was provided or see Error Code chart for further details.
5. Verify that Error Code E0 is displayed and set up is now complete.

IMPORTANT: The display will only read voltages between approximately 78 volts and 255 volts.

NOTE: If the wiring reads anything different than correct, the EMS will not turn on and we recommend you move to a different source of AC power or use your generator power. Also, if power is below 104 volts or above 132 volts the EMS will not turn on, and we recommend using your generator power.

Error Code Chart

E-0 Normal Conditions
E-1 Reverse Polarity Condition (hot and neutral wires reversed)
E-2 Open Ground
E-3 Line 1 Voltage High (Line voltage above 132 volts)
E-4 Line 1 Voltage Low (Line voltage below 104 volts)
E-5 Line 2 Voltage High (Line voltage above 132 volts)
E-6 Line 2 Voltage Low (Line voltage below 104 volts)
E-7 Line Frequency High (Line frequency above 69 cycles per second)
E-8 Line Frequency Low (Line frequency below 51 cycles per second)
E-9 Data Link Down
E-10 Replace Surge Protector Module

NOTE: If the EMS cuts the power to the RV it will show a PE code following the E code. This denotes the previous error or why the EMS shut down. Example: The EMS cuts power for low voltage on Line 1, and then the power is restored. The Error Code reads E0, but the PE code reads PE4 which tells the user low voltage was the reason for the EMS previously cutting power. This PE error code will be deleted when power is disconnected from the EMS.

Accidental 240 Volt Protection:
Should this condition occur, the display will read 240 volts instead of displaying the voltage and the error code message will read E-3. AC power will shut down instantly. **DO NOT UNDER ANY CIRCUMSTANCES BYPASS THE EMS; OTHERWISE, THIS WILL RESULT IN SEVERE DAMAGE TO THE RV**.

Troubleshooting Guide

Common installation mistakes:

1. Check connections. Input is the plug side of the RV and black should be attached to L1, white to L2 and red to L3. Output (going to the RV) should match up. T1 is black, T2 white and T3 is red. The green ground gets attached to the input and output on the side of the box.
2. Make sure that input wires are, in fact, the input wires. Connecting the output to the input of the EMS will cause the device to malfunction.
3. If the EMS is still not functioning at this point, follow instructions below prior to calling Technical Support.

In order for the on-call Technician to troubleshoot the problem(s) you are experiencing and render the best possible solution, it is necessary that you be at your RV when you place your call.

1. If the display is illuminated and scrolling information, note the Error Code. If there is an Error Code of 1-9, the device will interrupt the power. See Error Chart for definition of AC power problem. The device being off when an Error Code is present indicates the product is working properly and protecting your coach.
2. If the display is illuminated and reading Error Code E-0, and yet no power is present in the coach, please contact Technical Support. You must wait for the time delay light to stop flashing.
3. If the display is not illuminated and power is in the coach there is a connection issue between the display and the main control box. Contact Technical Support.

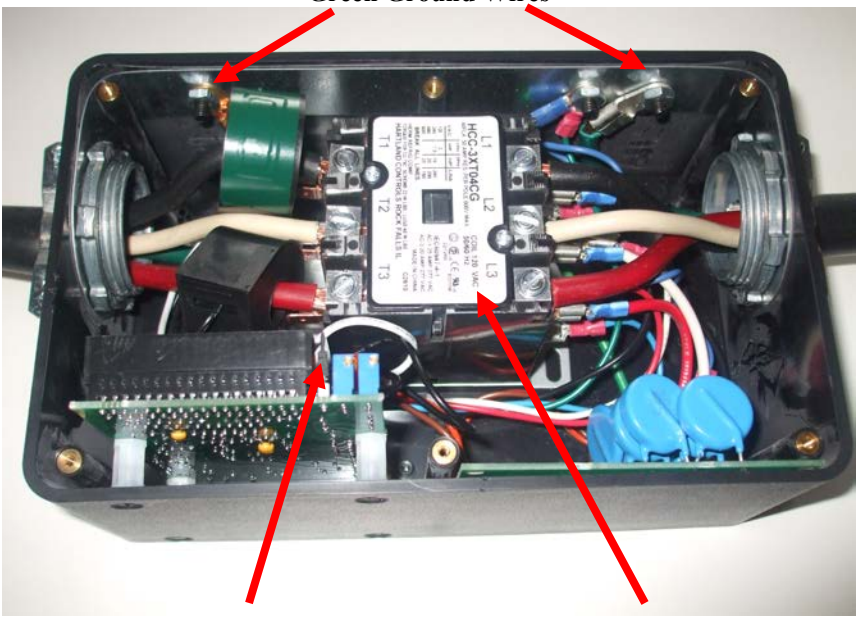
Technical Support can only help if the above information is provided, therefore, please do not call until this information is obtained. Again, it is necessary for you to be at the RV when you place your call. To recap…

1. **Are the connections correct?**
2. **What is the Error Code message being displayed?**
3. **Is the delay indicator flashing?**

Pictures Referenced in Instructions

Picture A

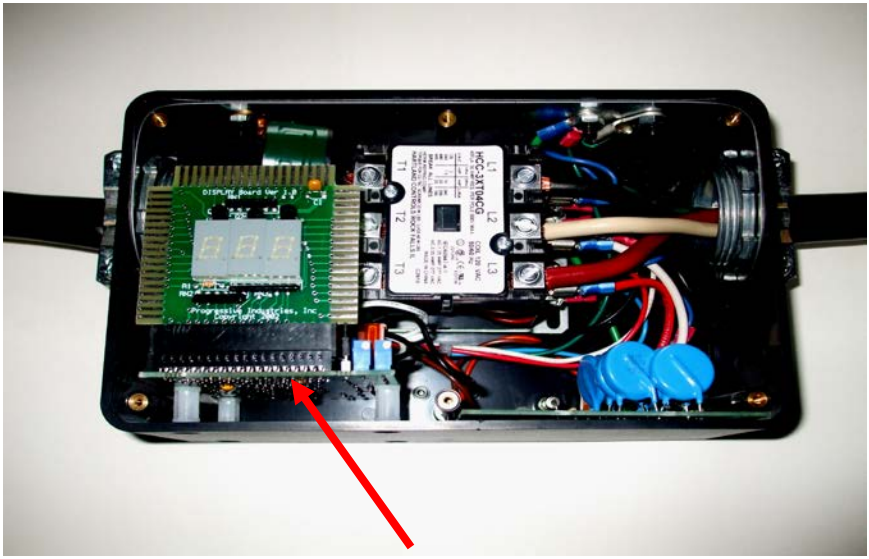
Green Ground Wires



Time Delay Jumper **Plastic Plate**

Picture B

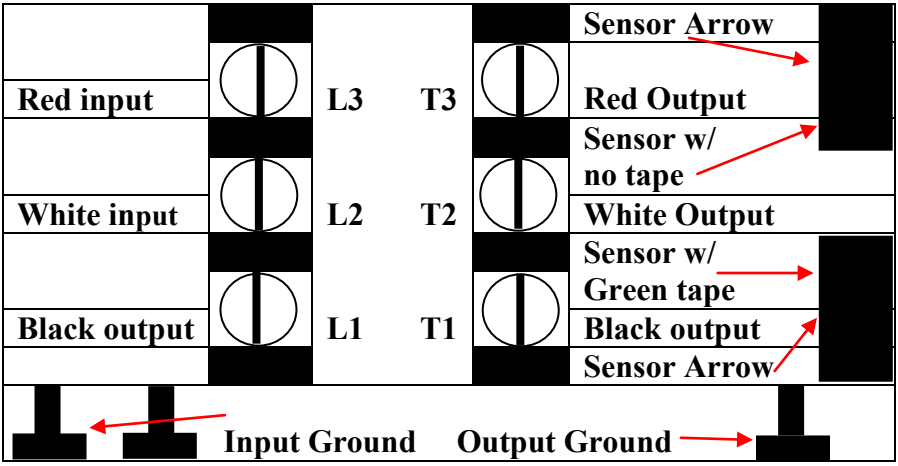
Pictures Referenced in Instructions (continued)



Display Socket with Display Plugged In

Picture C

Wiring Diagram



Progressive Industries Warranty

Progressive Industries warrants its products are free from defects in materials and workmanship for the life of the unit. This is in lieu of all other warranties, obligations, or liabilities expressed by the company. In the event that a properly installed EMS proves defective under normal use, Progressive Industries will repair or replace the device at its discretion.

The hardwired EMS product was specifically designed to be modular; therefore, any part of the EMS can be replaced without removing the entire unit. For Technical Support, please call (919) 462-8280. In order for the on-call Technician to troubleshoot the problem(s) you are experiencing and render the best possible solution, it is necessary that you be at your RV when you place your call.

Once Technical Support has properly diagnosed the problem, if any, a replacement part will be sent to you. Do not remove the damaged part unless instructed to do so. This will aid you with the installation of the replacement part(s).

When you receive your replacement part(s), inside the box will be a return address label. Simply use the same box and the return label to return the damaged part(s).

The address below is strictly a mailing address. Please do not attempt to visit our facility during business hours as the company is not staffed, nor equipped to handle on-site repair work. All returns must be routed through Technical Support.

Progressive Industries, Inc.
414B Airport Boulevard
Morrisville, North Carolina 27560

The unit being returned must be properly packaged with the postage paid and include the following information:

1) Date of purchase.
2) A detailed explanation of the problem/defect.
3) Your Name
4) Return Address and Phone Number

Progressive Industries cannot assume responsibility for acts of God, alterations, shipping/handling, or any other factors not under the control of Progressive Industries.

Progressive Industries has no responsibility for installation, personal injury, property damage, incidental, contingent, or consequential damages of any kind resulting from defects or failure of the unit to function.

The remedy for breach of this warranty is limited to the repair or replacement of the defective product at Progressive Industries' option. In no case shall the liability prescribed by law exceed the purchase price. Some states do not allow exclusion or limitation of incidental or consequential damages or allow disclaimers, modifications or limitations on how long a warranty lasts; therefore, the above warranties may not apply to you. This warranty gives you certain legal rights, and you may have other rights, which may vary from state to state.

(Revision E)