

UL924 LISTED
EMERGENCY LIGHTING
EQUIPMENT
73PK

Model CSC Installation Instructions & User Manual 500W-2000W Emergency Lighting Inverter

IMPORTANT SAFEGUARDS:

READ AND FOLLOW ALL SAFETY INSTRUCTIONS

When using electrical equipment, basic safety precautions should always be followed, including the following:

1. Do not install outdoors.
2. Do not install near gas or electric heaters.
3. Mount CSC securely and in locations and at heights where it will not be readily subjected to tampering by unauthorized personnel.
4. Do not use this equipment for other than its intended use.
5. All installation and servicing of this equipment must be performed by qualified personnel.
6. The use of accessory equipment not specified or recommended by Mule Lighting, Inc. may cause unsafe conditions and may void the warranty.
7. Use caution when servicing batteries. Battery acid can cause burns to skin and eyes. If acid is spilled on skin or in the eyes, flush with fresh water and seek medical attention immediately.
8. Make sure all connections are in accordance with NEC and local regulations.
9. Check AC Voltage rating on equipment label. Do not connect to any other voltage.
10. An unswitched AC power source is required (120 VAC or 277 VAC).
11. Do not use this product for other than intended use.
12. To reduce risk of electric shock, disconnect dedicated input breaker and all fuses before servicing.
13. Do not attempt to service sealed components with the exception of standard battery replacements.

SAVE THESE INSTRUCTIONS



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TEMPORARY STORAGE INSTRUCTIONS:

- For temporary storage of CSC system and batteries prior to installation select a clean, cool, dry location with normal ventilation suitable for human habitation and level floors. DO NOT store system or batteries in a sealed room or container. Ensure that floor is capable of bearing load.
- Do not store batteries for more than 60 days without charging. Doing so will cause irreversible damage to battery cells and void battery warranty. Ensure batteries are stored at temperatures within the following range: 40°F to 100°F.

◆ 3 Year Warranty ◆ ◆ 6 Year Pro-Rata Battery Warranty ◆

Mule Lighting warrants to the original purchaser/user for the published warranty period from the date of shipment that should Mule Lighting instruments or equipment prove defective by reason of improper workmanship or material, Mule will repair or replace the same equipment without charge. This warranty does not cover defects or malfunctions arising from improper installation, operation or repair, or neglect, accident or abuse. Mule Lighting will honor its warranty provided the equipment has not been physically damaged or improperly installed or connected. To obtain warranty/repair, the defective product should be shipped freight prepaid within the warranty period to the address below. To the extent permitted by applicable law, all warranties extending beyond repair or replacement as described above are disclaimed, including the implied warranties of merchantability and fitness for a particular purpose. Where applicable law prohibits disclaimers or the implied warranties of merchantability and fitness; those warranties are limited to 12 months from date of shipment. Mule Lighting does provide a 90 day money back guarantee if equipment does not perform in accordance with Mule published specifications. The liability of Mule Lighting and its agents under all warranties is limited to repair and replacement as described herein, and under no circumstances shall there be liability for any other kind of loss, damage, or labor, either consequential or for injury to person or property or otherwise.

Batteries are supplied on a pro-rata basis for six years, provided that the product has been properly installed in the correct surroundings.

Panel Location

1. Panel should be installed in a ventilated indoor location and not subjected to temperatures above 100 °F (37.8 °C) nor below 40 °F (4.5 °C) and at an altitude of less than 10,000 feet for optimum performance.
2. When the panel is installed on the wall, the wall must have sufficient strength to support the weight of the panel. A minimum of 4 screws (#10) should be securely fastened in wood or concrete with plastic inserts to secure the panel.
 - 500W: 160 lbs (4+ screws recommended)
 - 1000W: 240 lbs (4+ screws recommended)
 - 1500W: 350 lbs (6+ screws recommended)
 - 2000W: 440 lbs (8+ screws recommended)
3. Remove 2 or 3 knockouts from the top of the panel.
4. Install utility input conduit and wire from a dedicated circuit breaker, 120VAC 60 Hz or 277VAC 60 Hz, such as provided for a fire alarm or security system.
Note: 20A breaker recommended, except for 2000W, 120V system: 25A recommended.
5. Install emergency output conduit and wire to load.
6. When you receive the panel, there may be cardboard or foam protection on front panel to protect test switch. This should be removed after the panel has been securely mounted.

AC Input/Output Wiring Instructions

The CSC must be installed by a qualified electrician in accordance with local, state, and NEC codes. AC & DC Voltages are hazardous and care should be taken to follow all instructions. Prior to wiring AC connections, disconnect AC Input feed at relevant branch circuit breaker(s) and verify using proper voltage meter. Always wear appropriate clothing when handling batteries and equipment, and use insulated tools.

- 1) Check that all input breakers are disconnected. Trip all output breakers using a flat screwdriver.
 - 2) Check that knockouts on top of panel have been removed and conduits have been installed.
 - 3) Bring AC Input conductors and AC Output Conductors through the appropriate conduits. Per NEC, emergency output circuit should be installed in a dedicated conduit.
 - 4) Connect AC Input conductors to wires labelled “120VAC Input” or “277VAC Input”
 - 5) Connect AC Output conductors to wires labelled “120VAC Output” or “277VAC Output”
(277V MODELS 1000W & Larger ONLY): Take ACME XFR out of box and mount per instructions. Confirm that it has been properly configured: X1 should be connected with X3. X2 should be connected with X4. Connect one of XFR A wires in panel to X1&X3 in transformer (also labeled XFR A). Connect other XFR A wire in panel to X2&X4 in transformer (also labeled XFR A). Connect one XFR B wire in panel to H1 wire in transformer (also labeled XFR B). Connect other XFR B wire in panel to H5 wire in transformer (also labeled XFR B).
- NOTE: For 277V systems 1000W & Larger ONLY, the XFR B wire in the transformer which is connected to the White with Blue Stripe (#4) XFR B wire in panel should be grounded, because it is the neutral output of an isolation transformer. See transformer grounding instruction sheet provided.*
- 6) Connect grounds for AC Input & AC Output to grounding wires provided. **For systems larger than 1000W, NEC requires a grounding electrode conductor be installed from panel to grounding electrode.**
 - 7) Refer to battery wiring instructions.
 - 8) Ensure that cabinet is securely fastened to wall and that no wires are loose or disconnected.
 - 9) Ensure all connections & grounding have been made in workman-like & code compliant manner.

NOTE: The CSC can be field-wired in 3 distinct modes of operation. See “WIRING MODES” insert sheet for further details.

#1) (FACTORY DEFAULT) NORMALLY-ON: The emergency lights connected to the CSC will be ON at all times, during both normal condition and power interruptions. This mode is set by connecting the #1 wire on the red transfer switch to the utility input hot.

#2) NORMALLY-OFF: The emergency lights connected to the CSC will be OFF until a power interruption, at which time they will turn ON. This mode is set by capping off the #1 wire on the red transfer switch.

#3) NORMALLY-SWITCHED: The emergency lights connected to the CSC can be switched ON/OFF normally, until a power interruption, at which time they will turn ON regardless of switch position. This mode is set by connecting the load side of a switch, time clock, or relay panel to the #1 wire on the red transfer switch. Please note: Only one switch can be used per inverter. If multiple switches are needed, wire inverter as NORMALLY-ON, and use Mule Lighting EPC relays. With EPC relays an unlimited number of switch legs may be used. Contact tech support for further details (800) 556-7690.

Battery Installation

1. Remove batteries from shipping boxes and check for enclosure and terminal damage.
2. Batteries should have labels and jumper wires installed.
3. Home run wiring harness is provided with connectors to mate to battery jumpers. NOTE: Make all AC connections prior to battery connections.
4. Check all batteries for proper color connectors:

[IMPORTANT]

**TYPE "A" Batteries have BLACK jumper on LEFT terminal
YELLOW jumper on RIGHT terminal**

**TYPE "B" Batteries have YELLOW jumper on LEFT terminal
RED jumper on RIGHT terminal**

5. Follow "BATTERY INSTALLATION" label on inside of panel door for instructions on wiring batteries.
**NOTE: All connections should be made between the same colors.
(Black to Black, Red to Red, Yellow to Yellow).**

6. Complete the following battery voltage tests after all batteries are installed.
Measure DC voltage between the following terminals (- is left/black terminal, + is right/red terminal):

[ALL MODELS] Battery A (-) to Battery B(+) should measure ± 22 V-28V

7. Ensure that all connections have been made in a workman-like manner, and that panel door can close. It is suggested to keep the removable battery ropes/handles either inside or near the panel, for future use.

Start-Up Instructions

- #1) While input breaker is de-energized, close the output breaker(s) mounted on front or side of panel.
 - #2) Turn rocker switch on blue inverter (located near receptacle) to REMOTE position (REMOTE is the downward position of the 3 position rocker switch).
 - #3) Check that red LED on red transfer switch box is illuminated. Green LED should be OFF.
 - #4) Check that emergency lighting loads are illuminated.
 - #5) Wait 1 minute and ensure emergency lighting loads are still illuminated.
 - #6) Energize input breaker and verify that green LED on red transfer switch box is illuminated. Red LED should turn off after ~1-2 seconds.
 - #7) Press and hold test button on red transfer switch box. Green LED should turn off and Red LED and emergency lights should turn on after ~1-2 seconds.
 - #8) Release test button, green LED should turn on, red LED should turn off.
- Allow 96 hours for batteries to fully charge before performing full discharge (90 minutes) test.

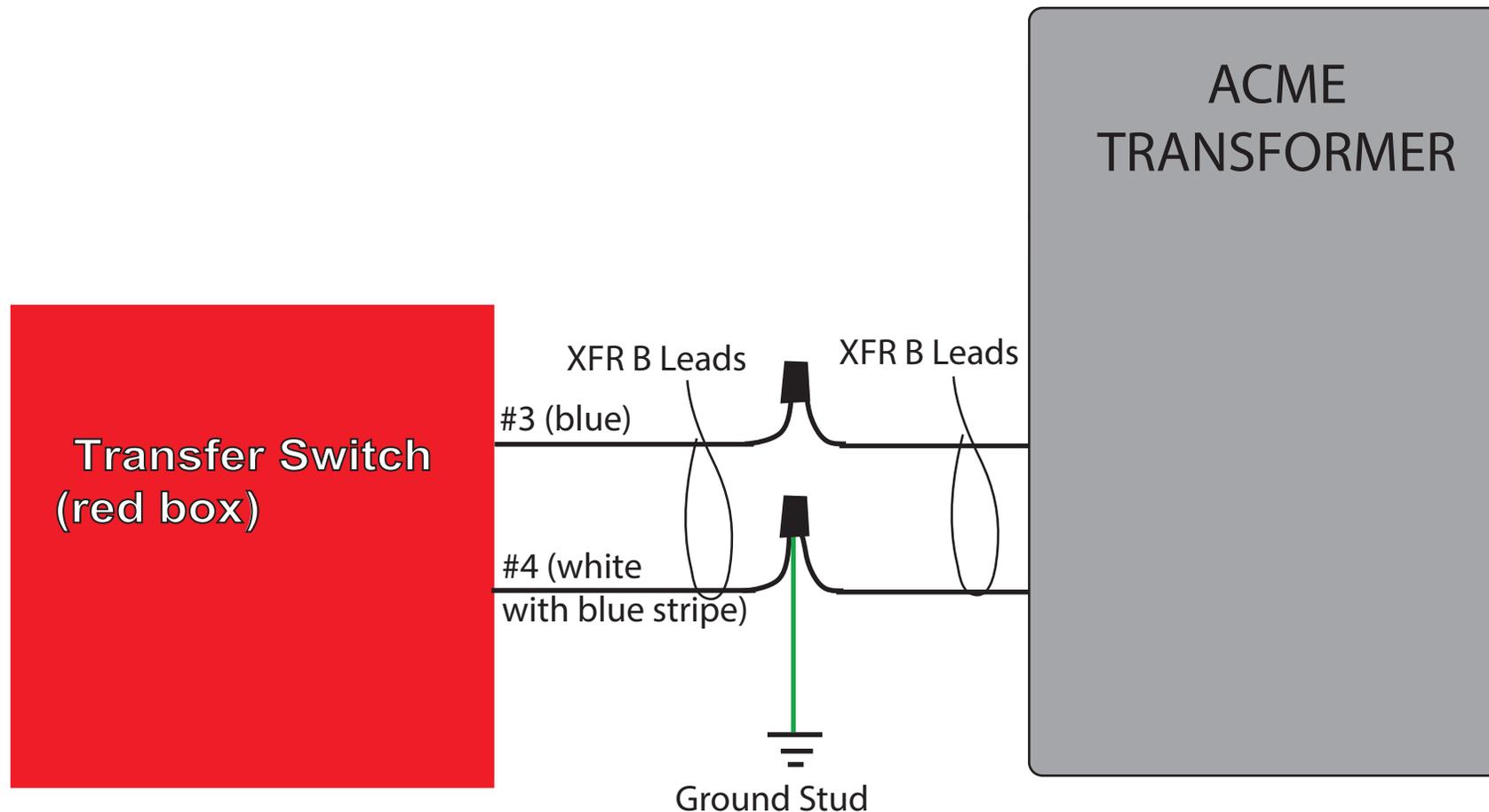
**Note: Blue LED function depends on WIRING mode from page 3.
For the purpose of startup test, ignore it.**

★ **If output does not match specifications or test is not successful, consult troubleshooting guide or call (800) 556-7690 for technical support.** ★

CSC 277V Output Transformer Grounding

NOTE:

Because the provided output transformer is isolation type, it is recommended to ground the #4 Wire (277V Neutral) (white wire with blue stripe) on the transfer switch.



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CSC WIRING MODES DIAGRAM

The wiring of the #1 wire on the transfer switch (red plastic box) will affect how the lights connected to the inverter output operate during normal condition.

#1) (DEFAULT) NORMALLY-ON:

CONNECT #1 TO INPUT HOT

The emergency lights connected to the CSC will be ON at all times, during normal condition (24/7) and power interruptions.

#2) NORMALLY-OFF:

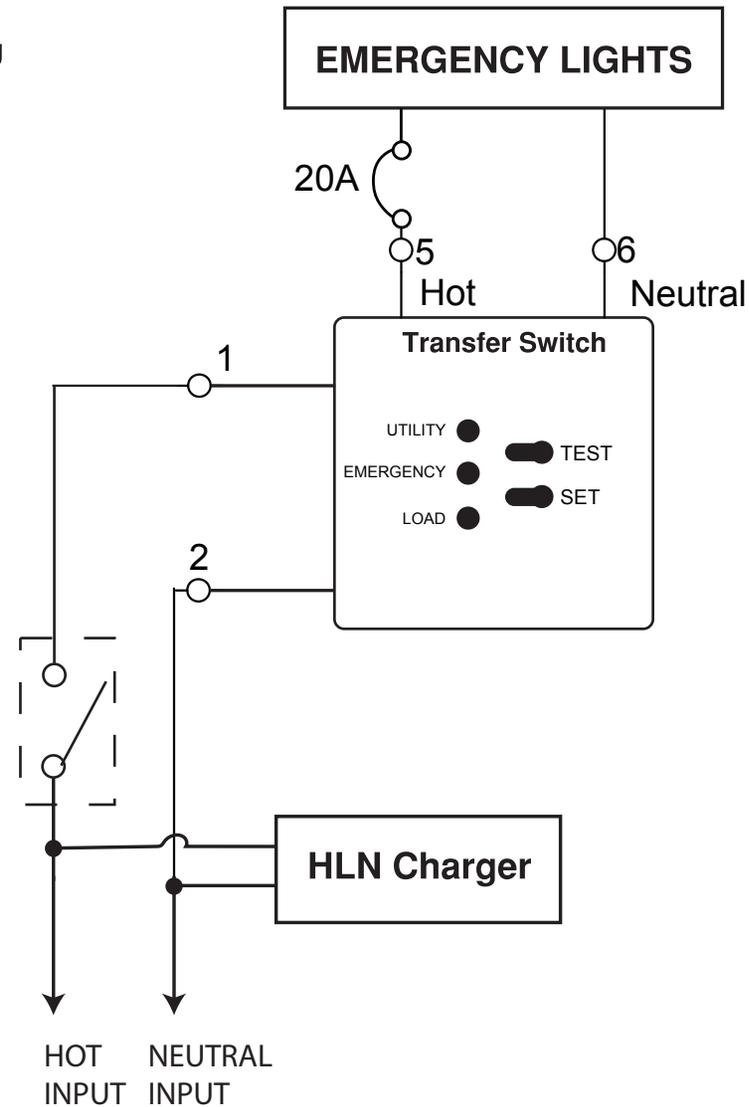
CAP OFF #1

The emergency lights connected to the CSC will be OFF until a power interruption, at which time they will turn ON.

#3) NORMALLY-SWITCHED:

CONNECT #1 to the load side of your wall switch, time clock or occupancy sensor. DO NOT connect the light itself to the switch or sensor or you will damage the inverter. The lights should be connected to "120V OUTPUT" or "277V OUTPUT" Leads.

The emergency lights connected to the CSC can then be switched ON/OFF normally, until a power interruption, at which time they will turn ON regardless of switch position. Please note: Only one switch leg can be used per inverter. If multiple switches are needed, wire the legs inverter as NORMALLY-ON, and use Mule Lighting EPC relays.



CSC GFCI Troubleshooting

If the GFCI on the blue inverter is tripping, there are two things that can cause this: a crossed neutral (dangerous) or inrush current (not dangerous). This simple test will help you to determine which it is.

#1) Get an amp/current meter

#2) Measure the red OUTPUT wire coming out of the inverter. Write down how many amps_____

Measure the white/red stripe OUTPUT wire coming out of the inverter. Write down how many amps_____

#3) The two amp readings should be equal (within 0.1A preferred). If it is equal and GFCI still strips, proceed to step #4. If it is not equal, there is a problem with your output neutral wiring. It needs to be a dedicated neutral wire going out to your lights and cannot touch the building neutral anywhere. Usually one of the emergency fixtures in the field has been incorrectly connected to a normal building neutral wire. As a result, some of your neutral current is returning to your building neutral instead of your inverter neutral. This is a code issue and if the imbalance is large enough it can also damage the inverter.

#4) If the currents are balanced please call tech support at (800) 556-7690 and reference this troubleshooting guide, they will assist with next steps.

Note: The reset switch for the blue inverter is on the back right side of the inverter. It is a 3 position rocker switch. You can reach it by reaching around the black cord through the opening in the metal side bracket and pressing the switch to the middle(OFF) position, wait 5 seconds, then turn it back down (ON).

You only need to use the reset when the three LED's shown in the left side of the picture are flashing or red. Normally they should all be green.

If first light and last light are RED, indicates low battery. Measure DC voltage on battery, it should be between 12.5-13.8VDC.

