

ELI-S-400 LFP ELI-S-400-2HR

SINEWAVE INVERTER

Installation and Operation Instructions

ELI SERIES EMERGENCY LIGHTING INVERTERS

bodine



! IMPORTANT SAFEGUARDS !

WHEN USING ELECTRICAL EQUIPMENT, BASIC SAFETY PRECAUTIONS SHOULD ALWAYS BE FOLLOWED, INCLUDING THE FOLLOWING:

READ AND FOLLOW ALL SAFETY INSTRUCTIONS

1. Do not use outdoors.
2. Do not let power supply cords touch hot surfaces.
3. This product is suitable for use in damp locations where the ambient temperature is 20°C minimum, 30°C maximum. Product is not suitable for heated air outlets and wet or hazardous locations. DO NOT INSTALL NEAR GAS OR ELECTRIC HEATERS.
4. Equipment should be mounted securely in locations and at heights where it will not be readily subjected to tampering by unauthorized personnel.
5. The use of accessory equipment and replacement parts not recommended by the manufacturer may cause an unsafe condition.
6. Do not use this equipment for other than its intended purpose.
7. The AC voltage rating of this equipment is 120 or 277 VAC. Do not connect equipment to any other voltage.
8. This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:
 1. This device may not cause harmful interference, and
 2. This device must accept any interference that may cause undesired operation.

Consumer Information:

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

SAVE THESE INSTRUCTIONS

! IMPORTANT ! - PLEASE TAKE NOTE BEFORE THE INSTALLATION:

You must determine how the connected emergency lighting fixtures are to operate; normally-on (unswitched and always energized), normally-off (only energized during a power failure), or switched on/off. Wire according to the appropriate wiring diagram given below. Consult factory for special wiring diagrams.



Ensure that ALL combined/connected Emergency lighting loads are less than 800W in normal mode and are capable of being dimmed down to 400VA from an industry standard 0-10V source in Emergency mode.

ELI-S-400 LFP and ELI-S-400 2HR WILL ONLY deliver 400VA maximum into the connected lighting load. This is accomplished by automatically dimming the connected emergency lighting loads down to the product output power rating.



Li - ion

**THIS PRODUCT INCLUDES RECHARGEABLE LITHIUM BATTERIES.
THE BATTERIES MUST BE RECYCLED OR DISPOSED OF PROPERLY.**

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MODEL SPECIFIC OUTPUT RATINGS

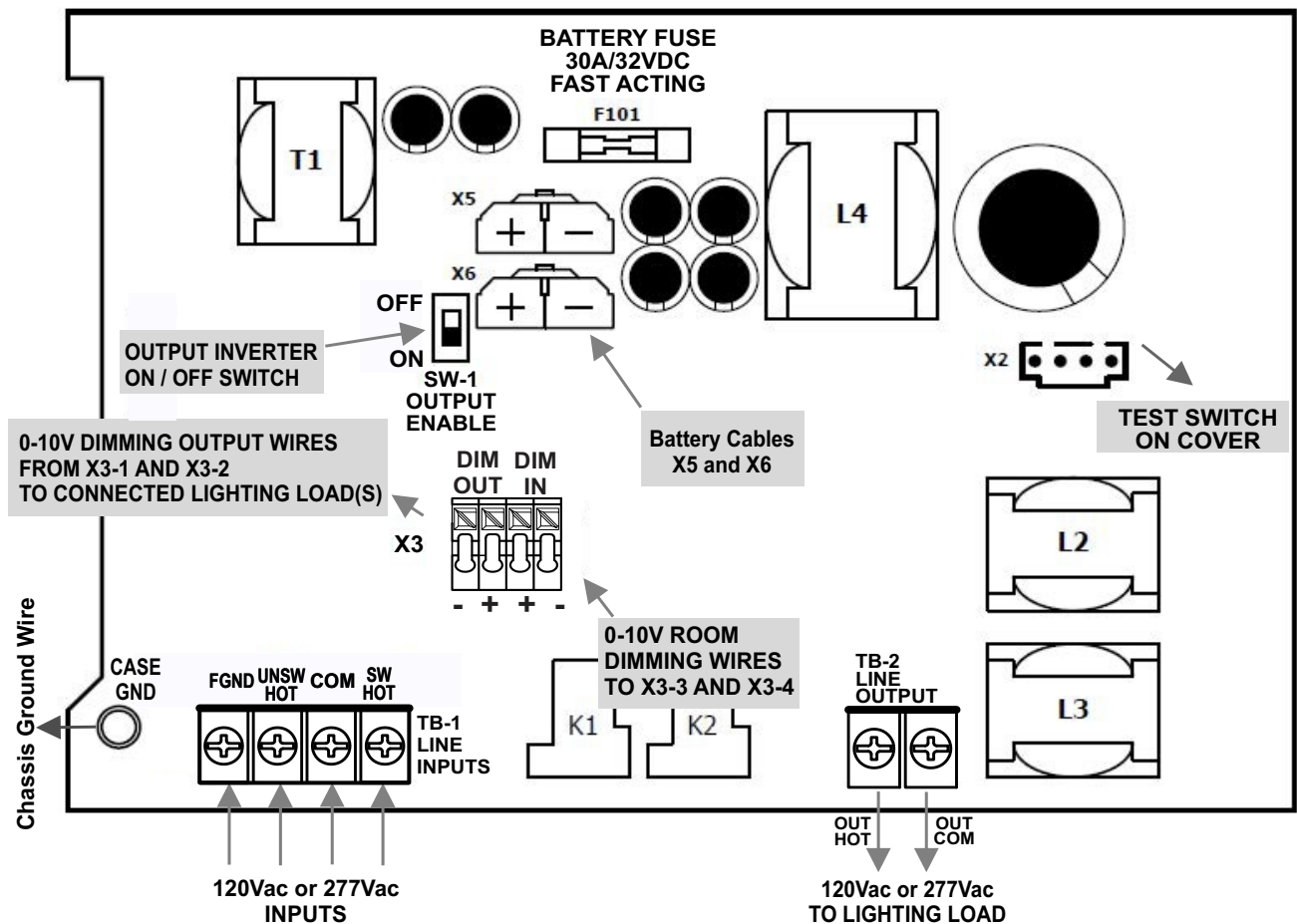
Model	Input Voltage	Output Voltage (Autoselect)	Emergency Output Power	Max Connected AC Load*	Emergency Run Time
ELI-S-400 LFP	120/277Vac	120/277Vac	400 VA	800 W	Minimum of 90 minutes
ELI-S-400-2HR	120/277Vac	120/277Vac	400 VA	800 W	Minimum of 120 minutes

* NOTE: AC Input Power to an LED or Fluorescent Driver/Ballast is always more than the output power. Furthermore, dimming drivers are less efficient at reduced power. These inefficiencies must be accounted for in the design as they will likely reduce the maximum connected load to something less than 800W. As a typical rule of thumb, provide at least 10% margin whenever the load specifics are not well known.

INSTALLATION

Illustration 1, below, shows the inverter's main circuit board. This circuit board contains the enable switch, fuse, and wiring terminals. Approximate locations of these items are given in Illustration 1 along with details of their use. Reference this diagram for the remainder of the installation instructions.

ILLUSTRATION 1
CIRCUIT BOARD INSTALLATION QUICK REFERENCE



STEP #1 INSTALLING THE EMERGENCY LIGHTING SYSTEM

- > Remove front cover, circuit board tray, and any packing material inside the unit housing that may have been used for shipping purposes.
- > Secure housing to the mounting surface through the keyhole knockouts using mounting hardware (not supplied). This hardware must be appropriate to hold the unit weight of approximately 50 lbs. with the batteries installed.
- > Remove the knockouts to install input and, output, and optional 0-10V dimming wiring conduit fittings.
- > Extend AC supply wiring and output load wiring into the equipment enclosure using appropriate wiring hardware and methods.
- > Illustration 1 details the locations of the various wiring terminals needed for the remainder of the installation. Reference Illustration 1 for steps through 2 through 6.

STEP #2 BATTERY INSTALLATION AND CABLE CONNECTION

This product is provided with four sealed Lithium ion batteries. Only the batteries supplied by the inverter manufacturer should be used. Install the batteries as shown, referring to Illustrations 2A and 2B.

With the unit secured to the mounting surface, begin installation by sliding the batteries into the enclosure. Connect the battery cables using the supplied hardware. The batteries must be connected using the provided battery connection wires. Insert the bolt into the lock-washer first, then through the retaining washer, the battery cable's ring terminal, and finally into the threaded hole in the battery terminal (observing proper polarity by matching the cable color to the battery terminal color). Tighten to no more than 4 Ft/Lbs torque. Cover the main harness terminals with the rubber terminal cover to protect against accidental short circuits. Open the ferrite core and pass the red and black battery connector wires through and close (Illustration 2B). Connect the battery jumper cable last.



CAUTION: DO NOT CONNECT the battery cables to Circuit Board connector X5 and X6 until the unit is ready for use. The batteries WILL BE discharged after long periods of unit inactivity while connected to the circuit board. If this occurs, the batteries will require at least 24 hours charging to recover before they can be used for emergency service. If left in this discharged state for extended periods, the batteries may be damaged.

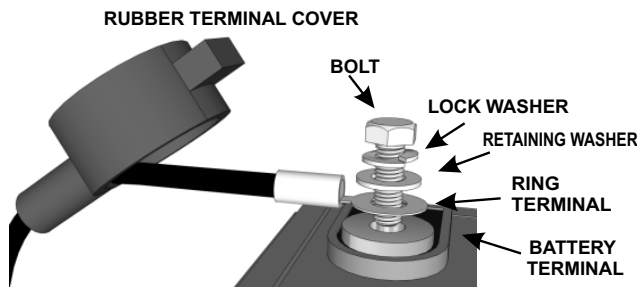


Illustration 2A

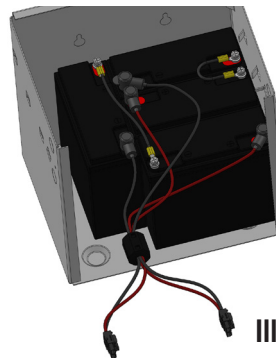


Illustration 2B

STEP #3 WIRING THE EMERGENCY LIGHTING INVERTER'S PRIMARY POWER CONNECTIONS



CAUTION

- Ensure input and output primary wiring connections are made to the proper terminals. Damage to product may occur if miswired.
- Ensure load voltage requirements match the output ratings of this product or damage to the load devices may occur.

NOTE: Make sure all connections are in accordance with the National Electrical Code, Canadian Electrical Code and any local regulations.

Reference Illustration 1, 3A, 3B, and 3C when making the following wiring connections.

- > Loop the load wires the once through the ferrite core (Illustration 3A)
- > Connect the Load Common lead to screw terminal TB-2 "OUT COM" (Illustration 1)
- > Connect the Load Hot lead to screw terminal TB-2 "OUT HOT" (Illustration 1)
- > Loop test switch wire once through another Ferrite core. (Illustration 3C)
- > Install the test switch in the enclosure lid and connect the test switch to X2 (Illustration 1)
- > Loop input wires from the TB-1 (FGND, UNSW HOT, and COM) once through another Ferrite core and connect UNSW HOT and COM to the output of Line filter. (Illustration 3B)
- > Connect the TB-1 FGND and the ground of the EMI filter to case ground screw terminal (Illustration 3B)
- > Connect the unswitched AC Power HOT and COM to the input of the line filter (Illustration 3B)
- > Connect the Wall switch hot wire to screw terminal TB-1 "SW HOT". This is the means of powering the load luminaires in Normal Mode when a wall switch is used to turn these luminaires on and off. If no wall switch is used, and the load luminaires are controlled by the same circuit breaker that is powering the un-switched hot. In this case TB-1 "SW HOT" must be jumpered to TB-1 "UNSW HOT". (Illustration 1)

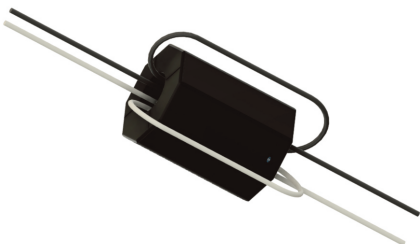


Illustration 3A
Output Load Wires

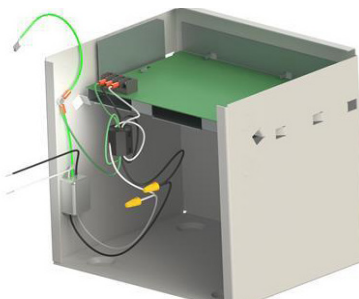


Illustration 3B
Input Connections

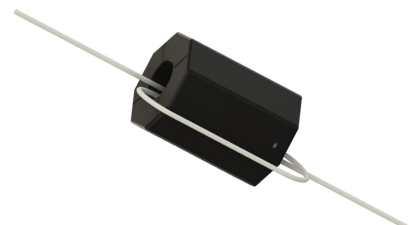


Illustration 3C
Test Switch Indicator

STEP #4 WIRING THE EMERGENCY LIGHTING INVERTER'S DIMMING CONNECTIONS (OPTIONAL)

This product features an industry-standard 0-10V dimming voltage output. Existing area dimming controls can be wired through the product's dimming relay to allow for normal dimming by occupants of the area during Normal mode operation. The X3 connector accepts wire size # 24 AWG to # 16 AWG. Refer to Illustration 1.

STEP #5 ENABLE THE INVERTER AND APPLY AC POWER

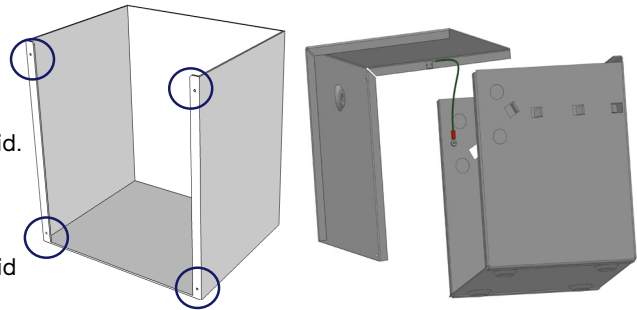
- > After installation is complete, **and after the building power commissioning has been completed**, apply AC mains power and then turn on SW-1 on the circuit board.

NOTE: The inverter features a "power commission lockout" that prevents the inverter from operating in the Emergency Mode unless charging power (UNSW HOT) has been applied AFTER the batteries are connected.

- > At this point, the Charging Indicator Light on the test switch should illuminate indicating the battery is charging.
- > A short-term discharge test may be conducted after the Emergency Lighting Inverter has been charging for 12 hours. Charge for 24 hours before conducting a long-term discharge test. Refer to OPERATION for details.

STEP #6 INSTALLATION OF ENCLOSURE LID

- > Remove clip-nuts (X4) from accessory kit.
- > Press on to chassis flanges, over lid mounting holes.
- > Install the test switch through the hole in the lid.
- > Reconnect the test switch to the PCBA.
- > Install ground wire to enclosure with hardware provided.
- > Install clip end of ground wire onto enclosure lid as shown
- > Place lid onto unit chassis.
- > Install 8-32 screws in lid, through clip nuts(x4).



Clip-Nut Locations (x4)

Ground Clip Locations

OPERATION

Normal Operation: AC power is supplied to the AC ballast/AC LED drivers within the connected luminaires through the SW HOT input. The batteries are charged from power supplied to the UNSW HOT input. Turning on SW-1 on the circuit board supplies power to the control/monitor circuit and enables the Emergency Lighting Inverter.

Emergency Mode Operation and Dimming: Immediately after an AC power failure the Emergency Lighting Inverter applies back-up power to the connected loads and outputs a minimum DC voltage on the 0 – 10V dimming supply. This causes the dimmable connected loads to start out at minimum light output and consequently, minimum power draw. The inverter rapidly increases the 0 – 10V dimming voltage until the output power provided by the inverter reaches the products maximum emergency mode power into the connected load(s). This is referred to as Auto-Dimming. When AC power is restored, the unit returns to normal charging mode. The ELI-S-400 LFP operates the emergency lighting load for a minimum of 90 minutes and ELI-S-400-2HR operates the emergency lighting load for a minimum of 120 minutes.

NOTE: Driver efficiency and power factor must be taken into account. This may reduce the maximum AC load connected. Contact the factory with any questions.

Self-Test: This product contains self-testing functionality. Self-test will automatically perform a 30-second test each month and a full duration test once per year (90 or 120 minutes, depending on the model). During this automatic test, the product will perform diagnostics on the battery, the battery charger, the load transfer circuitry, and the load. Any failures will be indicated by flashing of the charge indicator LED built into the illuminated test switch. This flashing will continue until either the condition has been corrected and the unit reset OR the next scheduled test has been run successfully.

Load Monitoring / Commissioning: This product complies with the latest UL standard for emergency lighting, UL 924, and includes the required load change detection circuit for use when performing the diagnostic self-test routine. When first energized, a 30-second commissioning test must be performed to detect the connected emergency lighting load level. The commissioning process is activated by pressing the test switch and wait for unit to transfer to emergency mode then release. Repeat two times for a total of three test switch presses and releases. The unit will go into emergency mode for 30 seconds. This load level is stored in the unit. During future tests or outages, the load level will be checked and compared against this value. If the load level deviates by more than 10%, the product will send an error code through flashing of the charge indicator LED. The inverter WILL continue to provide emergency power, regardless of error status.

MAINTENANCE & TROUBLESHOOTING



WARNING:

Always turn off SW-1(first), then turn off AC power to the equipment inside the case before servicing. **! REFER ANY SERVICING TO QUALIFIED PERSONNEL !**

Servicing should be performed only by qualified service technicians. Use only manufacturer supplied replacement parts. Although no routine maintenance is required to keep this emergency lighting inverter functional, it should be checked periodically to ensure that it is working.

TESTING

1. Automatic self-testing performs a 30-second test once every month and a 90 minute or 120-minute test (depending on model) once per year. A failure during this test will cause the charge indicator LED to flash with a code indicating the failure type.
2. Visually inspect the charging indicator light monthly. It should be steadily illuminated. If flashing, use the table below to determine the failure mode and follow the troubleshooting steps.

If manual testing is desired, the illuminated test switch on the product cover can be used to send the product into three different test modes. These modes are detailed in the table below.

TEST SWITCH MODES

Test Type	Procedure to Follow	Description
Manual Test	Press and Hold the Test Switch	Initiates the emergency mode for as long as the switch is depressed. During the manual test the emergency lighting load will turn off momentarily (if switched power is present). After a few seconds, the lights will turn back on in the emergency mode. Releasing the test switch will return the emergency lighting load to the normal AC mode.
Manual 30-Second Test	Press the test switch and wait for unit to transfer to emergency mode then release. Repeat one more time for a total of two test switch presses and releases.	Manually initiates a 30-second diagnostic test. The inverter will switch to the emergency mode for 30 seconds and test all relevant functions. Once complete, the inverter returns to normal AC mode and indicate any faults, if detected.
Commissioning	Press the test switch and wait for unit to transfer to emergency mode then release. Repeat two more times for a total of three test switch presses and releases.	Initiates a 30-second commissioning test. The inverter will switch to the emergency mode and store in its memory the current connected load level. If, during future self-tests, this load level deviates by more than 10%, an error will be triggered.

TROUBLESHOOTING

Trouble State or Indicator Light Status	Error	Corrective Action
Indicator Light On Steady	None	<ul style="list-style-type: none"> • No Action. The product is operating correctly.
Indicator Light Off	No Unswitched AC Mains Present	<ul style="list-style-type: none"> • Unit maybe operating in emergency mode only and there is no error • Check unswitched hot wiring connections. • Ensure unswitched hot circuit breaker is on. • Ensure switch SW-1 is on.
1x Flashes	Load Control (Transfer) Fault	<ul style="list-style-type: none"> • Check output voltage if it is within the spec • Check if output load is connected properly • Check output voltage is functioning • If all the above conditions check OK, replace unit.
2x Flashes	Battery Fault	<ul style="list-style-type: none"> • Charge battery. If after an hour failure is still indicated, see battery action below.
3x Flashes	Battery Disconnected or Charge Current Fault	<ul style="list-style-type: none"> • Ensure input wiring is correct and verify voltage is correct and stable. • Check battery voltage and ensure battery is connect fully.
4x Flashes	Load Level Change Greater Than 10%	<ul style="list-style-type: none"> • Ensure proper operation of all connected loads. If all functional, recommission the inverter's load level detection (see Commissioning Test).
Continuous Flashing	Commissioning Required	<ul style="list-style-type: none"> • Follow instructions above to initiate the commissioning test.

REPLACEMENT PARTS

Model	Accessories			Replacement Batteries	
	Installation Kit	Battery Harnesses	Fuse	Part No.	Quantity
ELI-S-400 LFP ELI-S-400-2HR	1x PRT00143	2x PRT00144	1x Littlefuse 0312030	PRT00400	1 Required

Battery Maintenance: The batteries supplied with this equipment require no maintenance. However, the inverter should be tested periodically, and batteries replaced whenever they will no longer operate the connected fixtures for the rated run-time. The batteries supplied have a life expectancy of four years when used in normal ambient temperature of 72 degrees F.

Battery Date Code: The battery date code is made up of six characters which represent the month, day and year of manufacture (MM/DD/YY). For example, 080221 means the battery was made August 2, 2021. There may be additional alpha-numeric characters at the end of the date code. The date code is located on the battery carton and additionally engraved into the battery.

Battery Replacement: When replacing batteries, use only batteries supplied by the inverter manufacturer. The old batteries should be disposed of properly or recycled in accordance with your local regulations. When replacing the batteries, follow the process outlined in Installation Step #2 and #5 and the cautions and warnings given in these instructions. During replacement, disable SW-1 on the inverter, then remove AC power from the product.

Fuse: The fuse contained within this product is field replaceable. For the battery fuse location see illustration 1. To replace the fuse, disable SW-1 on the inverter then, remove AC power from the product and disconnect the battery connector. Ensure that the battery fuse is replaced by Littelfuse 0312030 (312-030) or equivalent 3AG, 30 A, 32 VDC.

WIRING DIAGRAM

DIMMABLE EMERGENCY LIGHTING SYSTEM

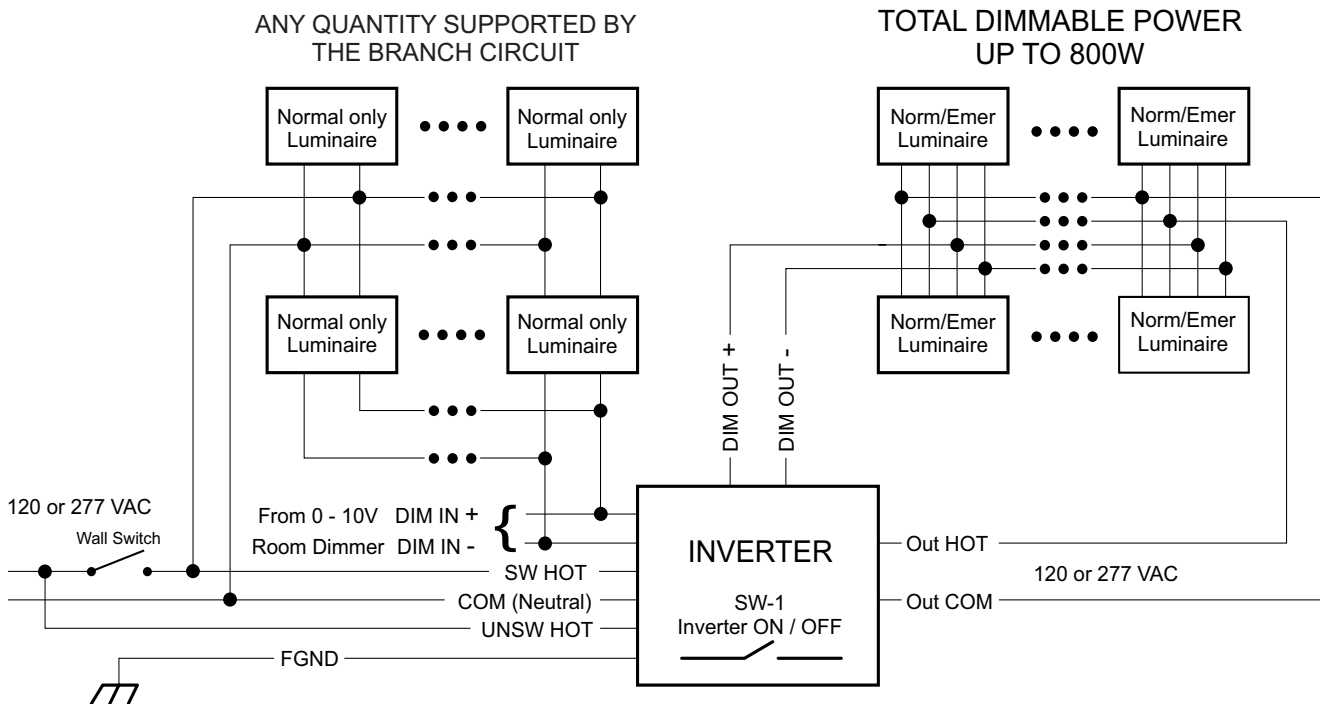


Figure W1 shows an example of a branch circuit powering a number of dimmable luminaires, 4 (or more) of which are powered through the Emergency Lighting Inverter. During normal AC power mode, the power from the switched hot lighting power and 0-10V room-dimmer voltage is passed through the Inverter to the “Normal/Emergency” fixtures. The unswitched hot charges the battery. During a power failure, the Inverter powers the “Normal/Emergency” fixtures for a minimum of the products rated runtime at a power level set by the Inverter’s dimming output circuit. In any example, the dimmable “Normal/Emergency” luminaires are automatically limited to only draw a total maximum of 400 VA from the inverter during an emergency event.

Non-DIMMABLE EMERGENCY LIGHTING SYSTEM

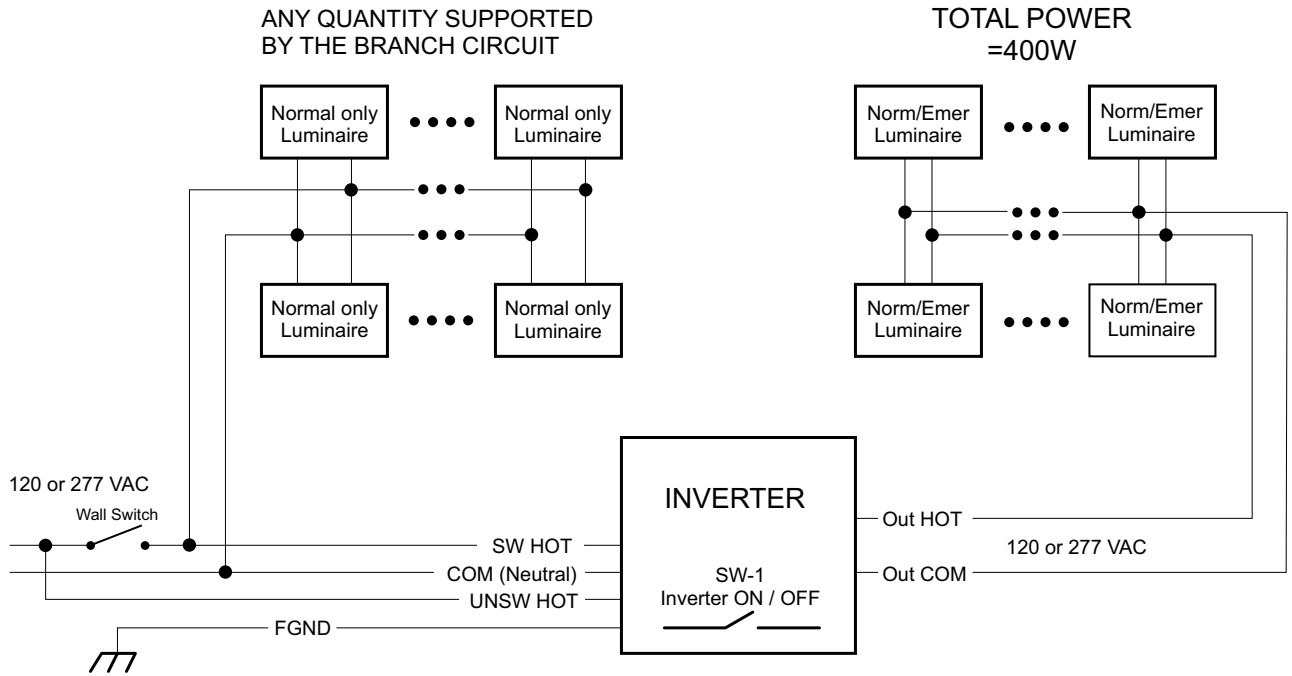


Figure W2, shows an example of an alternate emergency lighting system in which the emergency luminaires ARE NOT dimmable. In this case, the total connected Emergency lighting load MUST BE LESS THAN or EQUAL to the Inverter's maximum output power.