TRYSTAR

# UltraLITE Series Model ELC

## *OWNERS MANUAL*

# 600W - 2KW COMPACT EMERGENCY LIGHTING INVERTER

IMPORTANT - SAVE THESE INSTRUCTIONS - PLEASE READ THIS MANUAL BEFORE USING EQUIPMENT

## ⚠ CAUTION

The following symbol indicates that caution should be taken when performing the process required in this manual. Damage to the unit or personal harm could happen if proper precautions are not taken.

## ⚠ SHOCK HAZARD

The following symbol indicates that there is a risk of electrical shock if proper precautions are not followed. Only qualified personnel should perform the actions required in this manual.

### ABOUT THIS MANUAL

When viewing electronically, click on the subject to jump to that page. Clicking the header on the front page will launch the Trystar web site. Clicking anywhere else on the front page will also jump to the Table of Contents. Clicking any blue text will take you to that section of our website.

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# INTRODUCTION

Trystar engineers and manufactures the industry's highest quality centralized emergency lighting inverters, capitalizing on 40 years of expertise. We have an enviable reputation for quality, which is reflected in the design, workmanship, and performance of our products.

The inverter technology in our UltraLITE, Model ELC effectively maintains critical equipment with extended brownout protection, tight voltage regulation, and power conditioning. Tight voltage regulation assures that facility egress lumens are maintained 100% at emergency lighting fixtures, in all modes of operation, and also extends ballast and lamp life.

## FEATURES & BENEFITS

- Uninterrupted, regulated, continuous sinewave output for use with "normally on" lighting fixtures and exit lamps, LED and HID compatible.
- Standby output for use with "normally off" emergency lighting fixtures.
- Timed Normally Off Bus "PLUS" option includes an adjustable soft start to accommodate the high inrush current of "normally off" emergency lights, regardless of type or manufacturer.
- True, on-line double-conversion topology provides conditioned, regulated power and 100% reliability to emergency lighting loads.
- High-speed automatic static bypass. Manual bypass switch.
- Advanced DSP control used for enhanced performance, accuracy, and system reliability.
- Compact, front access design, featuring one of the smallest cabinet footprints in the industry.
- Standard NEMA 2 drip-proof enclosure.
- 4-stage, temperature compensating smart charge.
- Generator-compatible.
- Operating Temperature: UL 924 Emergency Lighting Equipment (20° to 35° C); UL 924 Auxiliary Lighting and Power Equipment (0° to 40° C); C-UL Listed to CSA C22.2 No. 141-02 (10° to 40° C). Optimum battery performance and life at 25° C.
- Inverter electronics designed for use at 0°C to 40°C.

## PRODUCT SPECIFICATIONS (FULL PRODUCT SPECIFICATION AVAILABLE UPON REQUEST)

- Input Operating Voltage Range: +12%, -30% typical, load-dependent, without battery usage; +12%, -15% at full load.
- Input Frequency: 60 Hz, ± 2.5%
- Input Current Harmonic Distortion: < 5% THD

- Input Power Factor Correction: > .97 pF at full load
- Overload Rating: Up to 125% for 30 cycles, 150% for 4 cycles when fed from the AC power source, or on battery (without use of static bypass).
- LED Inrush Rating: Peak overload capability of 1200% to accommodate inrush current from LED fixtures/drivers (without use of static bypass).
- Operating Temperature: UL 924 Emergency Lighting Equipment (20° to 35° C); UL 924 Auxiliary Lighting and Power Equipment (0° to 40° C); C-UL Listed to CSA C22.2 No. 141-02 (10° to 40° C).
- Battery Time: UL 924 Listed 90 minutes at full-rated kW output, or with optional run times from 15 minutes to 4 hours, C-UL 924 Listed with 30 minutes run time.
- On Battery Overload Rating:  Normally On Bus Output: Up to 150% surge rating for 4 cycles, 125% for 30 cycles, and 102% continuous. Normally Off Bus Output with User-Programmable Soft-Start: Adjustable settings are provided to limit the high inrush current, associated with energizing normally off emergency lights, to within inverter on battery overload ratings.

**Safety**

- UL 924 listed Emergency Lighting Equipment
- UL 924 Auxiliary Power Supplies
- C-UL Listed to CSA Standard C22.2 No. 141-02 Equipment for Emergency Lighting
- NFPA 101, NFPA 111, NEC, and local codes

**STANDARDS**

- ANSI / IEEE C62.41 Category B3
- NFPA 101
- NFPA 111 Stored Electrical Energy Emergency and Standby Power Systems. Meets SEPSS / ECE / Level 1 and Level 2 criteria for types O, U, A, B, and 10; and Classes up to and including Class 1.5
- NFPA 70 National Electric Code
- FCC Article 15, Subpart J, Class A
- IEC 555
- UL 924 Listed as “Emergency Lighting Equipment” with 90 minutes at full output kW rating. This 90 minute Emergency Lighting Inverter system meets NFPA 101 and 111 standards, and is NFPA compliant as “Life Safety Equipment in accordance with ANSI/NFPA 70 (NEC), Article 700.

## BATTERIES

- Integral 90 minute, maintenance-free batteries.
- Rapid recharge, per UL 924 requirements.
- UL 924 Listed as “Emergency Lighting Equipment” with 90 minutes at full output kW rating. This 90 minute Emergency Lighting Inverter system meets NFPA 101 and 111 standards, and is NFPA compliant as “Life Safety Equipment in accordance with ANSI/NFPA 70 (NEC), Article 700.

## DISPLAY MONITOR & DIAGNOSTICS

Features:

- Self-Test Diagnostics
- Automatic Battery Test
- Audible Alarms
- Protected ON / OFF Switch
- Push-To-Test

Status Indicators:

- Percent Load
- High / Low / Normal Input Voltage
- On Battery
- Percent Of Battery
- Check Battery
- Static Bypass
- Alarm Status

## NFPA-COMPLIANT AUTOMATIC BATTERY TESTING / LOGGING

The Model ELC automatically performs a user-defined (date and time) 30 second or 5 minute system test every 7, 30 or 90 days. It also performs user-defined (date and time) cUL 30 minute or UL 90 minute annual battery test where applicable battery run times apply. For all of these tests, the ELC logs the test results with date and time, as well as a “pass” or “fail” indication. User defined parameters are easily programmed via the RS232 connection (DB9 or USB port).

## COMMUNICATIONS

The ELC provides user access to system status, alarm conditions, electrical measurements, system logs, and battery test pass/fail results, via RS232 from a DB9 connector or a USB port. Optionally, this information is available via an Ethernet TCP/IP, MODBUS TCP or MODBUS RS485 network connection. (See *“Optional Remote Communications”*.) Remote communication of inverter on battery, low battery, and a general alarm are available via normally open contacts rated at 120 VAC and .5 amps.

### Optional Remote Communications

The NetMinder CS121L series of adapters integrate the Model ELC into an Ethernet TCP/IP, MODBUS TCP,or MODBUS RS485 network with a

specific IP address. The NetMinder CS121L provides remote monitoring of the inverter status, battery test pass/fail results, alarm conditions, and electrical measurements via a web browser,without the need for any external software. Remote notification of alarms and status are available via SNMP,e-mail, and network broadcast messaging. Temperature and humidity sensing interface are also available.

## INVERTER OPTIONS

Timed Normally Off Bus "PLUS" Provides standby power to "normally off" emergency lights. When utility power is lost or inadequate, emergency power is applied to "normally off" lights, providing a safe means of egress. This option includes:

**User-Programmable Settings:**

- Transfer On Delay (0 – 10 seconds)
- Return Off Delay (0 – 15 minutes)
- Soft Start Control (0 – 192 cycles)

**Remote Input Command**

Allows a remote contact signal to energize the "Normally Off" bus, thus illuminating the "normally off" emergency lights.

**ZoneSaver-2™**

Offers design flexibility not provided with competing lighting inverters. ZoneSaver-2 can be configured for use in (2) distinct applications.

**Local Control Device Override**

Allows for user control of emergency egress lighting via occupancy sensors, wall switches, and dimmer switches. Local control devices are automatically bypassed in the event of a power outage. This ZoneSaver-2 option saves money by reducing costly "always on" circuits.

**Zone Sensing**

Allows for independent activation of "normally off" fixtures in multi-floor or multi-use facilities. The ELC uses ZoneSaver-2 to monitor normal lighting circuit panels for each floor / zone.

**Output Distribution Circuit Breakers**

A total of (12) circuit breakers or (6) monitored circuit breakers are available (120V or 277V), and can be factory-wired to the "Normally On" bus and / or optional "Normally Off" bus, in any combination specified.

# RECEIVING THE INVERTER

**Note:** Open the front door of the enclosure and inspect inside the unit for shipping damage.

## RECEIVING YOUR INVERTER

**INSPECTION, PLACEMENT, INSTALLATION, SETUP AND START-UP SHOULD BE PERFORMED BY QUALIFIED PERSONNEL ONLY**

## INSPECTION

Upon receipt of your lighting inverter, visually inspect the unit(s) for shipping damage. If shipping damage has occurred, the purchaser should promptly notify the carrier and file a claim with the carrier. The factory should be notified if the damages may impair the operation of the unit. Reference front cover or accompanying paper work for factory contact information.

Note: Open the front door of the enclosure and inspect inside the unit for shipping damage.

**IMPORTANT NOTICE**

This shipment has been carefully inspected, checked and properly packaged at our company.

When it was delivered to the carrier it was in good condition and technically it became your property at that time. Thus, any damage, whether obvious or hidden, must be reported to the transportation company within FIVE days of receipt of the shipment at your premises to avoid forfeiting claims for damages.

**FOR ALL SHIPMENTS DAMAGED IN TRANSIT**

Leave the items, packing material and carton “AS IS”. Notify your carrier’s local office and ask for immediate inspection of the carton and contents.

After inspection has been made by the carrier, and you have received acknowledgment in writing as to the damage, notify our Customer Service Department to make any required repair arrangements. It is your responsibility to follow the above instructions or the carrier will not honor any claims for damage. Also, if there are any shortages or questions regarding this shipment, please notify us within FIVE days.

Please note that we cannot be responsible for any service work or backcharges unless authorized by us in writing, before the work is performed.

## STORAGE

WHILE IN STORAGE BATTERIES MUST BE CHARGED FOR 24 HOURS EVERY 6 MONTHS. WHILE IN STORAGE TURN OFF THE DC BREAKER.

If it is necessary to store the unit, be sure to place it in a clean dry area. **For extended storage, the batteries must be charged for 24 hours every 6 months. Failure to do so will result in weak or bad batteries which**

**WILL NOT be covered under the warranty.** Charging is accomplished by installing the batteries, turning the inverter on and allowing it to run. See *"Battery Installation and Wiring"* for details on installing batteries and the *"Start-up Procedure"* for turning the inverter on. **WHILE STORING TURN OFF THE DC BREAKER**. Make sure proper ventilation is available any time the inverter is on.

**REMOVING THE LIGHTING INVERTER FROM THE PALLET**

**⚠ CAUTION ⚠**

CABINETS AND BATTERIES ARE EXTREMELY HEAVY USE PROPER EQUIPMENT WHEN REMOVING THE CABINETS FROM THE SKID

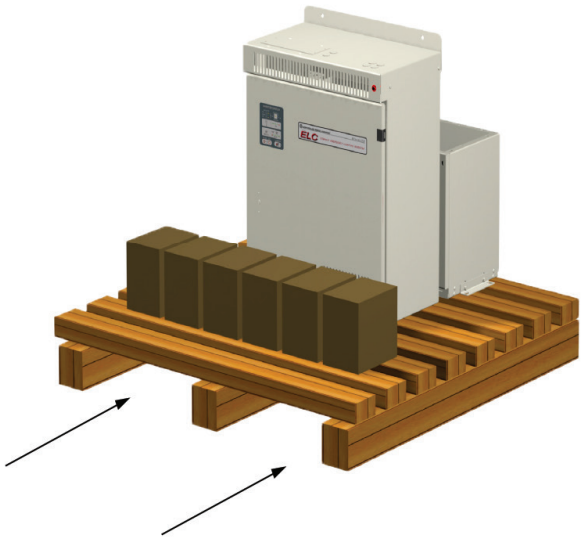
**⚠ SHOCK HAZARD ⚡**

DO NOT SHORT BATTERY TERMINALS

**TOOLS REQUIRED:**

Forklift, dolly.

1. Remove the plastic wrapping and banding and discard.
2. Remove batteries from pallet with the use of a dolly or other lifting device be sure to place them in a safe location.
3. Using a forklift, place the forks securely under the lighting inverter from the front or back side.
4. Carefully lift the lighting inverter and battery cabinet from the skid.
5. Set the cabinets down until ready for installation.




LIFT HERE TO MOVE ENTIRE PALLET

# SAFETY PRECAUTIONS

**NOT INTENDED FOR LIFE SUPPORT APPLICATIONS**

This unit is intended for installation in a temperature controlled, indoor area free of conductive contaminants.

**IMPORTANT SAFEGUARDS, READ AND FOLLOW ALL SAFETY INSTRUCTIONS. SAVE THESE INSTRUCTIONS.**

## ⚠ CAUTION ⚠

A BATTERY CAN PRESENT A RISK OF ELECTRICAL SHOCK AND HIGH SHORT CIRCUIT CURRENT. THE FOLLOWING PRECAUTIONS SHOULD BE OBSERVED WHEN WORKING ON BATTERIES:

- REMOVE WATCHES, RINGS, OR OTHER METAL OBJECTS.
- USE TOOLS WITH INSULATED HANDLES.
- DO NOT LAY TOOLS OR METAL PARTS ON TOP OF BATTERIES.
- DISCONNECT CHARGING SOURCE PRIOR TO CONNECTING OR DISCONNECTING BATTERY TERMINALS.

## ⚠ CAUTION ⚠

USE CAUTION WHEN HANDLING OR 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 CONTACT A PHYSICIAN IMMEDIATELY.

BATTERIES ARE VERY HEAVY. USE CAUTION WHEN LIFTING AND MOVING THEM. INSTALLATION SHOULD ONLY BE PERFORMED BY AUTHORIZED PERSONNEL.

DIAGRAMS FOR WIRING BATTERIES ARE LOCATED ON THE BATTERY CABINET DOOR. BE SURE TO WIRE BATTERIES PROPERLY. IMPROPER WIRING CAN CAUSE DAMAGE TO THE BATTERIES. WIRING SHOULD ONLY BE PERFORMED BY AUTHORIZED PERSONNEL.

- FOLLOW ALL STANDARD AND LOCAL ELECTRICAL CODES.
- BE SURE INPUT POWER TO UPS IS PROPERLY GROUNDED.
- DO NOT ALLOW WATER OR FOREIGN OBJECTS TO GET INSIDE UPS.
- DO NOT PLACE OBJECTS OR LIQUIDS ON TOP OF THE UPS.
- DO NOT LOCATE UPS NEAR RUNNING WATER OR WHERE THERE IS EXCESSIVE HUMIDITY.

- DO NOT USE OUTDOORS.
- DO NOT MOUNT NEAR GAS OR ELECTRIC HEATERS.
- EQUIPMENT SHOULD BE MOUNTED IN LOCATIONS AND AT HEIGHTS WHERE IT WILL NOT READILY BE SUBJECTED TO TAMPERING BY UNAUTHORIZED PERSONNEL.
- THE USE OF ACCESSORY EQUIPMENT NOT RECOMMENDED BY THE MANUFACTURER MAY CAUSE AN UNSAFE CONDITION.
- DO NOT USE THIS EQUIPMENT FOR OTHER THAN INTENDED USE.
- SERVICING OF BATTERIES SHOULD BE PERFORMED OR SUPERVISED BY PERSONNEL KNOWLEDGEABLE OF BATTERIES AND THE REQUIRED PRECAUTIONS.
- KEEP UNAUTHORIZED PERSONNEL AWAY FROM BATTERIES.
- DO NOT SHORT BATTERY TERMINALS.
- DO NOT DISPOSE OF BATTERY OR BATTERIES IN A FIRE. THE BATTERY MAY EXPLODE.
- ONLY REPLACE BATTERIES WITH IDENTICAL SPECIFICATION OF ORIGINAL BATTERIES SUPPLIED WITH THE SYSTEM.
- DO NOT OPEN OR MUTILATE THE BATTERY OR BATTERIES. RELEASED ELECTROLYTE IS HARMFUL TO THE SKIN AND EYES. IT MAY BE TOXIC.
- READ AND FOLLOW ALL SAFETY INSTRUCTIONS. SAVE THESE INSTRUCTIONS.

## PRELIMINARY INSTALLATION

### TOOLS REQUIRED AND INSTALLATION CHECKLIST

_ Phillips Head Screw Driver, 3/16” Allen wrench (for input/output terminal blocks).

_ For field wiring size, based on amperage and breaker sizes in table below. Units are rated for operation up to 40 deg. C. Amb. Refer only to the matrix below for the service panel AC breaker size. The unit comes standard with terminals for hard wire installation.

_ Lighting Inverters require a ground wire. The grounded supply conductor (Neutral) wire should be the same size as the input feed wires. The ground wire should be installed in accordance to NEC code. The ground that feeds the Lighting Inverter should be of good integrity and dedicated to the Lighting Inverter. The run should be as short as possible. Conduit cannot be used for the grounding of the circuit.

_ When wiring batteries be sure to use insulated tools for safety.

**Reference: NEC ARTICLE 250**

| OUTPUT RATING | 600VA / W | | 1KVA / KW | | 1.5KVA / KW | | 2KVA / KW | |
|---|---|---|---|---|---|---|---|---|
| NOMINAL VAC | 120 | 277 | 120 | 277 | 120 | 277 | 120 | 277 |
| INPUT CB RATING (AMPS) | 15 | 10 | 20 | 10 | 25 | 15 | 30 | 15 |
| STANDARD (QTY 1) OUTPUT CB RATING (AMPS) | 15 | 15 | 15 | 15 | 15 | 15 | 20 | 15 |
| RATED OUTPUT (AMPS) | 5 | 2.1 | 8.3 | 3.6 | 12.5 | 5.4 | 16.6 | 7.2 |
| 90M BATTERY AH (QTY 6) | 24 | 24 | 40 | 40 | 52 | 52 | 90 | 90 |
| Note: Input circuit breaker (CB) sized for full rated load, low line input voltage, and maximum recharge current simultaneously. | | | | | | | | |

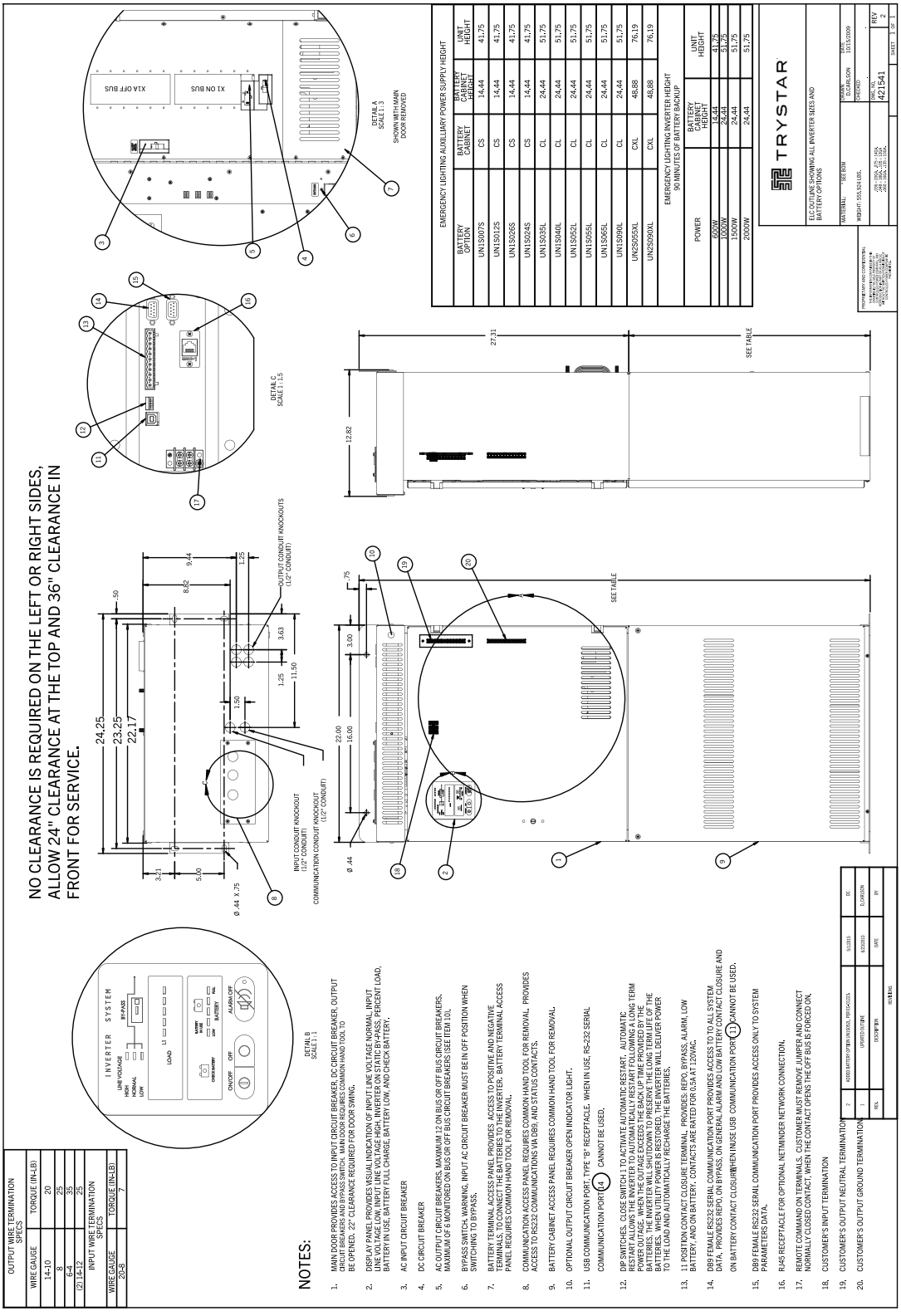
| | | 600VA / W | | 1KVA / KW | | 1.5KVA / KW | | 2KVA / KW | |
|---|---|---|---|---|---|---|---|---|---|
| INPUT VAC | OUTPUT VAC | WEIGHT (LBS) | BTU'S / HR | WEIGHT (LBS) | BTU'S / HR | WEIGHT (LBS) | BTU'S / HR | WEIGHT (LBS) | BTU'S / HR |
| 120 | 120 | 269 | 546 | 352 | 648 | 372 | 750 | 534 | 955 |
| 120 | 277 | 286 | 734 | 369 | 836 | 402 | 938 | 564 | 1143 |
| 277 | 120 | 286 | 734 | 369 | 836 | 402 | 938 | 564 | 1143 |
| 277 | 277 | 303 | 921 | 386 | 1024 | 432 | 1126 | 594 | 1331 |
| Note: Input circuit breaker (CB) sized for full rated load, low line input voltage, and maximum recharge current simultaneously. | | | | | | | | | |

**The ILS AC inverter systems must be located and installed conforming to CAN/CSA-C282-05 Emergency Electrical Power Supply for Buildings and CSA standard C22.1.**

**MINIMUM CHARGE TIME FOR FULL BATTERY CAPACITY = 24 HOURS**

## ALL INVERTER SIZES WITH ALL BATTERY OPTIONS

## CABINET DIMENSIONS, ACCESSES, CLEARANCES AND WIRE TERMINATION SPECS



# CABINET ASSEMBLY AND MOUNTING

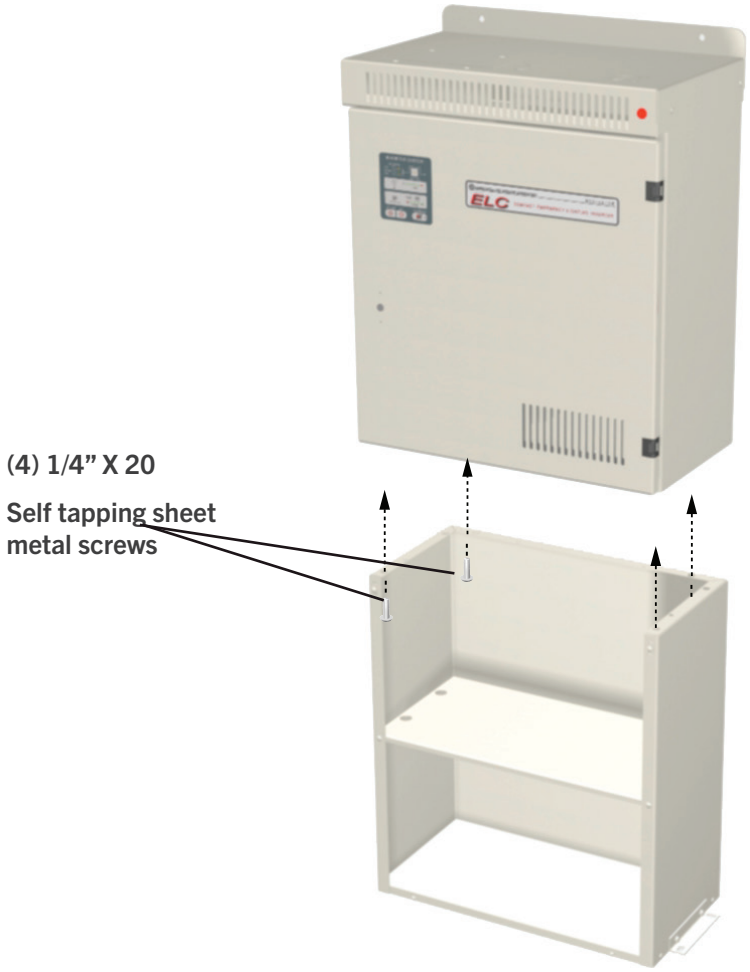
## BATTERY AND INVERTER CABINET ASSEMBLY

Connecting the inverter cabinet and the battery cabinet(s) MUST be done prior to battery installation.

Connect the inverter cabinet and battery cabinet(s) together using the supplied (4) 1/4” X 20 self tapping sheet metal screws, one on the left and right sides and two in the back as shown below. The screw must start from inside the battery cabinet up through the upper lip of the battery cabinet and into the inverter cabinet as shown. This configuration is also typical for multiple battery cabinets.

This may be accomplished easier by lying both pieces down on the back side then connecting the two, then tilting the connected cabinets up together until they are upright.

Move the ELC into place and secure the ELC to the wall or floor prior to battery installation.



## SECURING THE UNIT TO THE FLOOR / WALL

Secure the cabinet(s) to the floor and/or wall prior to battery installation. Secure the unit to the floor and/or wall using the mounting holes as shown below. Refer to local codes for proper hardware size. Secure the ELC to the wall or floor prior to battery installation.

# BATTERY INSTALLATION AND WIRING

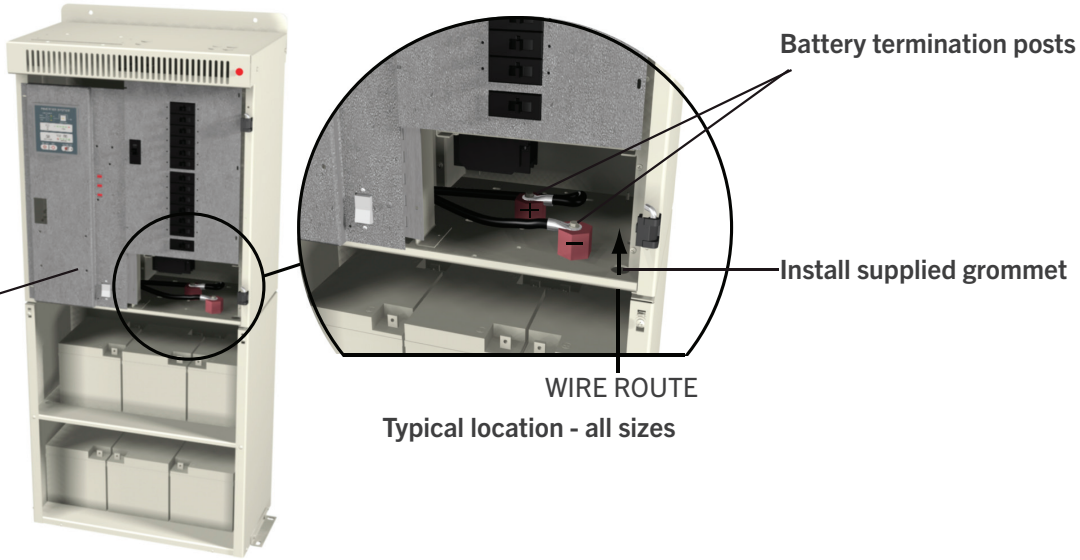
### BATTERY WIRING OVERVIEW

REFER TO THE BATTERY WIRING DIAGRAM ON THE INNER DOOR OF THE INVERTER OR BATTERY CABINET

NOTE - DO NOT PROCEED WITH FINAL BATTERY WIRING UNTIL READY FOR START UP. SECURE CABINET TO WALL OR FLOOR PRIOR TO BATTERY INSTALLATION.

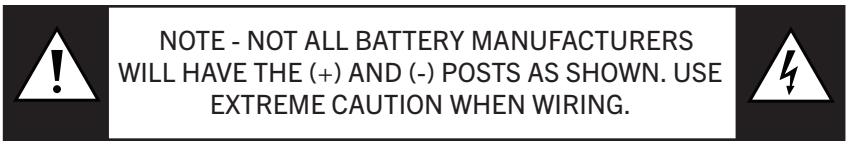
The DC voltage for a six (6) battery system is 72V. Batteries are wired in series as shown on the diagram inside the inverter door. Included with the lighting inverter is a kit for the wiring. Follow the steps and the diagram inside the inverter door noting the different lengths and labels of wire.

1. Place batteries in the battery cabinet as shown on the battery wiring diagram located inside the inverter door. Battery orientation is important. Place batteries exactly as shown.
2. Locate the proper sections of wire that correspond to the diagram.
3. Wire the batteries as shown in the diagram, taking note of the polarity. Note: install the supplied grommet in the battery cable feed through hole.
4. Once the batteries are wired, use a volt meter to measure the most positive and most negative leads, verify the polarity. The voltmeter should read approximately +72VDC. The minimum DC bus voltage to turn the unit on is 62VDC. If it is different recheck the wiring and test again. Terminate the most positive (+) and most negative (-) ends at the corresponding (+) positive and (-) negative battery termination posts provided as shown below.



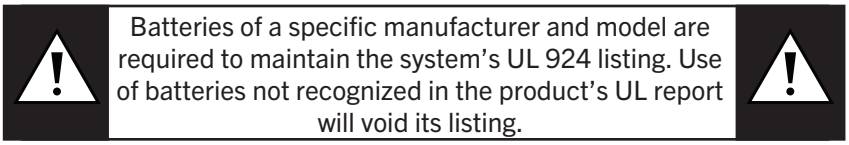

**NOTE: Battery connector located behind this panel - leave this connector DISCONNECTED until ready for start up.**

**Typical location - all sizes**




**SEE "INSTALLATION AND SAFETY PRECAUTIONS"**

**BATTERY REQUIREMENTS**




| BATTERIES FOR ELC'S RATED FOR 90 MINUTES | | |
|---|---|---|
| **MANUFACTURER** | **BATTERY MODEL NUMBER** | **FOR USE WITH MODELS RATED (QTY)** |
| Enersys Yuasa | NP24-12 | 600W (6) |
| CSB | GP12400 | 1kW (6) |
| Power Battery<br>CSB | PRC/TC-1265<br>GPL12520 | 1.5kW (6) |
| Power Battery<br>DEKA<br>DEKA<br>GNB | PRC/TC-1290<br>24HR3000<br>HR3000<br>S12V285/F | 1.5kW (6); 2.0kW (6) |

| BATTERIES FOR ELC'S RATED FOR 30 MINUTES | | |
|---|---|---|
| **MANUFACTURER** | **BATTERY MODEL NUMBER** | **FOR USE WITH MODELS RATED (QTY)** |
| CSB | GP12120 | 600W (6) |
| Enersys Yuasa | NP24-12 | 1.0kW (6) |
| CSB | GP12400 | 1.5kW (6); 2.0kW (6) |

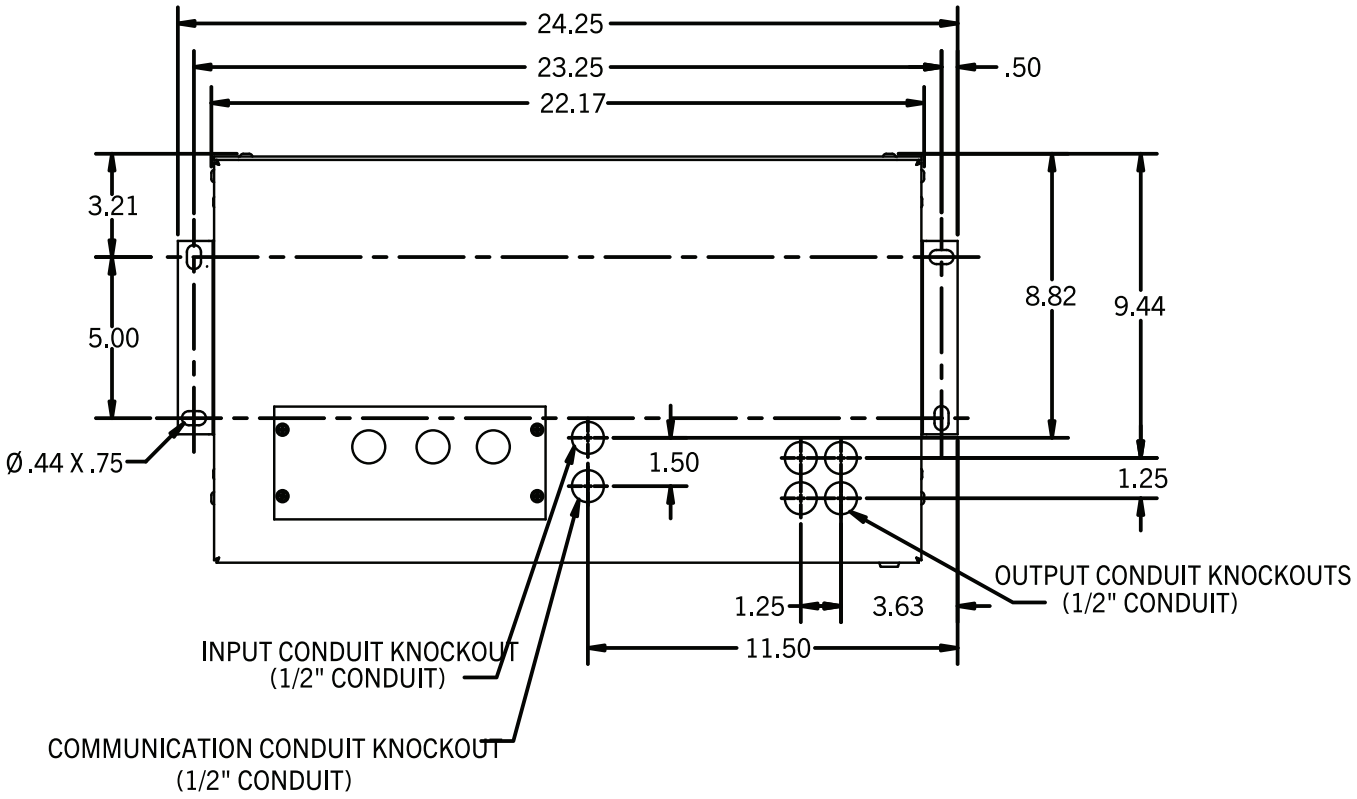
**MINIMUM CHARGE TIME FOR FULL BATTERY CAPACITY = 24 HOURS**

# INPUT AND OUTPUT WIRING

### INPUT AND OUTPUT CONDUIT ENTRY POINTS

**WARNING**

RISK OF ELECTRICAL SHOCK THE LIGHTING INVERTER RECEIVES POWER FROM MORE THAN ONE SOURCE. BE SURE ALL UTILITY CIRCUIT BREAKERS ARE IN THE OFF POSITION AND THE DC CIRCUIT BREAKER IS OFF BEFORE SERVICING.



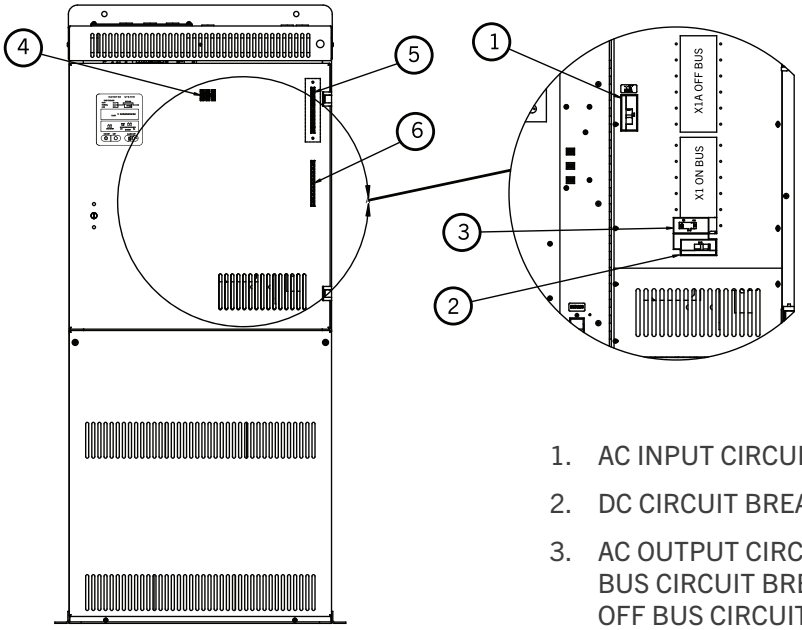
## INPUT AND OUTPUT WIRING

**WARNING**

RISK OF ELECTRICAL SHOCK THE LIGHTING INVERTER RECEIVES POWER FROM MORE THAN ONE SOURCE. BE SURE ALL UTILITY CIRCUIT BREAKERS ARE IN THE OFF POSITION AND THE DC CIRCUIT BREAKER IS OFF BEFORE SERVICING.

### Lighting Inverter Wiring With Distribution

Input wiring is performed at the input terminal strip. Output wiring is performed at the output distribution breakers inside the front door panel. It is recommended that all wiring is performed according to NEC standards and local codes.




| OUTPUT WIRE TERMINATION SPECS | |
|---|---|
| WIRE GAUGE | TORQUE (IN-LB) |
| 14-10 | 20 |
| 8 | 25 |
| 6-4 | 35 |
| (2) 14-12 | 25 |
| INPUT WIRE TERMINATION SPECS | |
| WIRE GAUGE | TORQUE (IN-LB) |
| 20-8 | 7 |

1. AC INPUT CIRCUIT BREAKER.
2. DC CIRCUIT BREAKER.
3. AC OUTPUT CIRCUIT BREAKERS. MAXIMUM 12 ON BUS OR OFF BUS CIRCUIT BREAKERS. MAXIMUM OF 6 MONITORED ON BUS OR OFF BUS CIRCUIT BREAKERS.
4. CUSTOMER'S INPUT TERMINALS.
5. CUSTOMER'S OUTPUT NEUTRAL TERMINATION.
6. CUSTOMER'S OUTPUT GROUND TERMINATION.

### Output Distribution Circuit Breakers

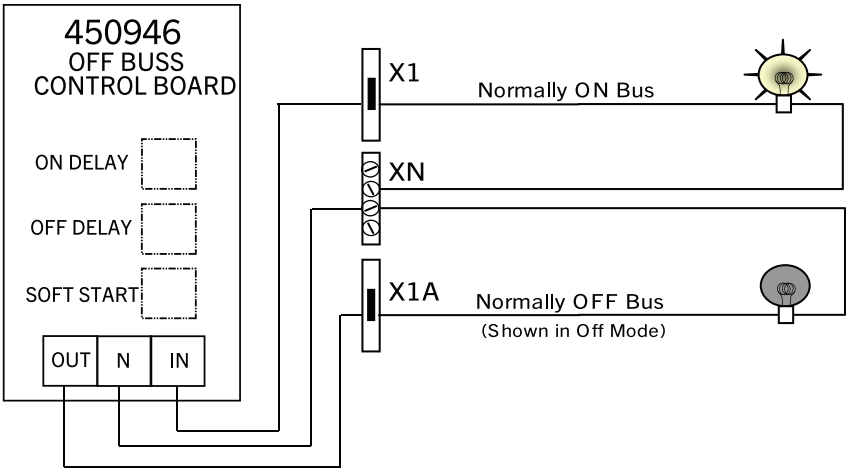
A total of (12) circuit breakers or (6) monitored circuit breakers are available (120V or 277V), and can be factory-wired to the "Normally On" bus and / or optional "Normally Off" bus, in any combination specified.

# OPTIONAL TIMED OFF BUS SET UP

## DESCRIPTION

In many lighting system applications, there are designated lights that remain off until a power outage occurs. Available on the model ELC is a Timed Normally Off Bus option. This option incorporates a programmable timer which controls an internal solid state switch located between the output of the inverter's "Normally On" uninterrupted output and the Normally Off emergency lighting. When utility power is lost, voltage is inadequate or a remote input "command on" signal is received, emergency power is applied to these lights after a user programmable time period has expired. This is especially useful in applications where there may be only a short duration of power loss (a few seconds), in which it may not be desirable for the Normally Off lighting to illuminate. With an additional timer, a "delay return" or "timed off" feature is provided. In this case, the timer can be configured so that there is a delay in the shut off of the emergency lighting when utility power is restored. This option is critical in applications where there is HID Sodium lighting used for normal lighting. Once utility power is restored to HID Sodium lighting, they required 10 or 15 minutes to reach full illumination. The Timed Normally Off bus compensates for that delay by keeping the Normally Off emergency lighting turned on until the HID lighting is fully illuminated.

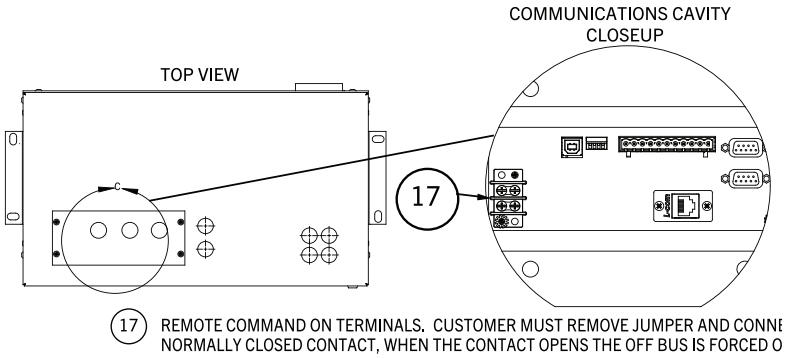
The Normally Off bus is rated at 100% of full load capacity. The diagram below represents how the Normally Off Bus works:




Under all conditions, uninterrupted power is being fed to the Normally On lighting. When utility power is present (as depicted above), the solid state switch between the output of the inverter and the Normally Off lighting is open; thus the Normally Off lighting is not illuminated. When utility power is lost, the solid state switch is closed and emergency power is applied to the Normally Off lighting. If an additional timer is implemented, when utility power returns, the timer senses it and delays the de-energizing of the solid state switch, according to the user programmed time period ("Return Off Delay" or "Transfer On Delay"). Once the solid state switch is de-energized, the Normally Off lighting is turned off.

## REMOTE INPUT COMMAND

Allows a remote contact signal to energize the “Normally Off” bus, thus illuminating the “normally off” emergency lights. Customer must remove jumper and connect normally closed contact. When the contact opens the off bus is forced on.




## TIMED NORMALLY OFF BUS “PLUS”

Provides standby power to “normally off” emergency lights. When utility power is lost or inadequate, emergency power is applied to “normally off” lights, providing a safe means of egress.

User-Programmable Settings:

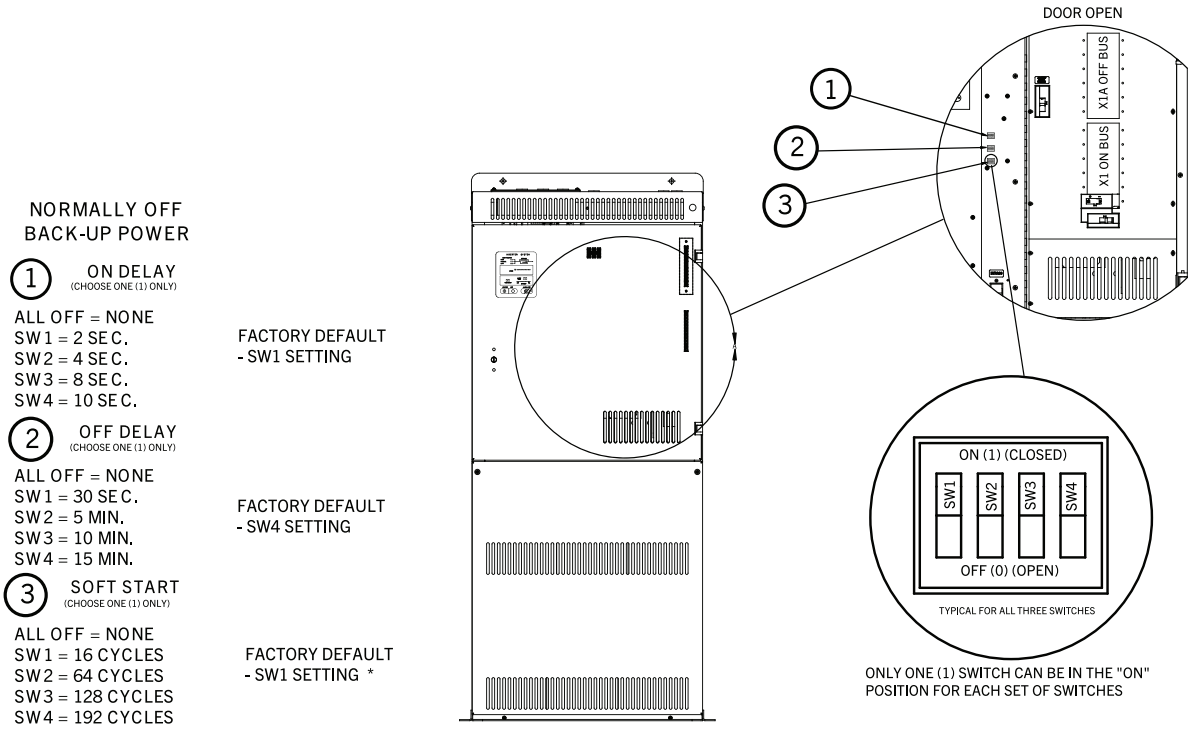
**Transfer On Delay (0 – 10 seconds)** - determines the amount of time the ELC will wait until it switches the off bus on after a power outage or line disturbance.

**Return Off Delay (0 – 15 minutes)** - determines the amount of time the ELC will wait to return the off bus output to normal status after a power outage or line disturbance has ended.

**Soft Start Control (0 – 192 cycles)** - A user programmable Control board allows the system to supply emergency loads during a power outage, even if those loads would normally draw extremely high inrush currents of 1000% or more, such as Incandescent or Halogen Lighting.

This is achieved through four different levels of soft-start control, in addition to an Instant On option. The soft start control is selectable from 16 cycles to 192 cycles (3 seconds) depending on the application.

In addition, the system features programmable ON delay and Off delay settings. These are used to control the transfer of emergency power to the load during a power outage and the transition back to the Normally Off model during resumption of utility power.




**Note: Inrush current of specific lighting fixtures may vary by manufacturer. The above settings are recommendations only. Final settings may need to be adjusted based on specific lighting fixtures used in normally off emergency circuits.**

*** Note: Inrush current of specific lighting fixtures may vary by manufacturer. The above settings are recommendations only. Final settings may need to be adjusted based on specific lighting fixtures used in normally off emergency circuits.**

**ALL OFF or SW1 setting recommended for electronic ballast (fluorescent lighting). SW3 or SW4 setting recommended for incandescent, halogen, or quartz lighting.**

## OPTIONAL ZONE SAVER 2

**Specifications**

Voltages ..... 277VAC 50/60Hz

**Max Load Requirements**

LED Lighting.....18A @277VAC

Ballast..... 20A @277VAC

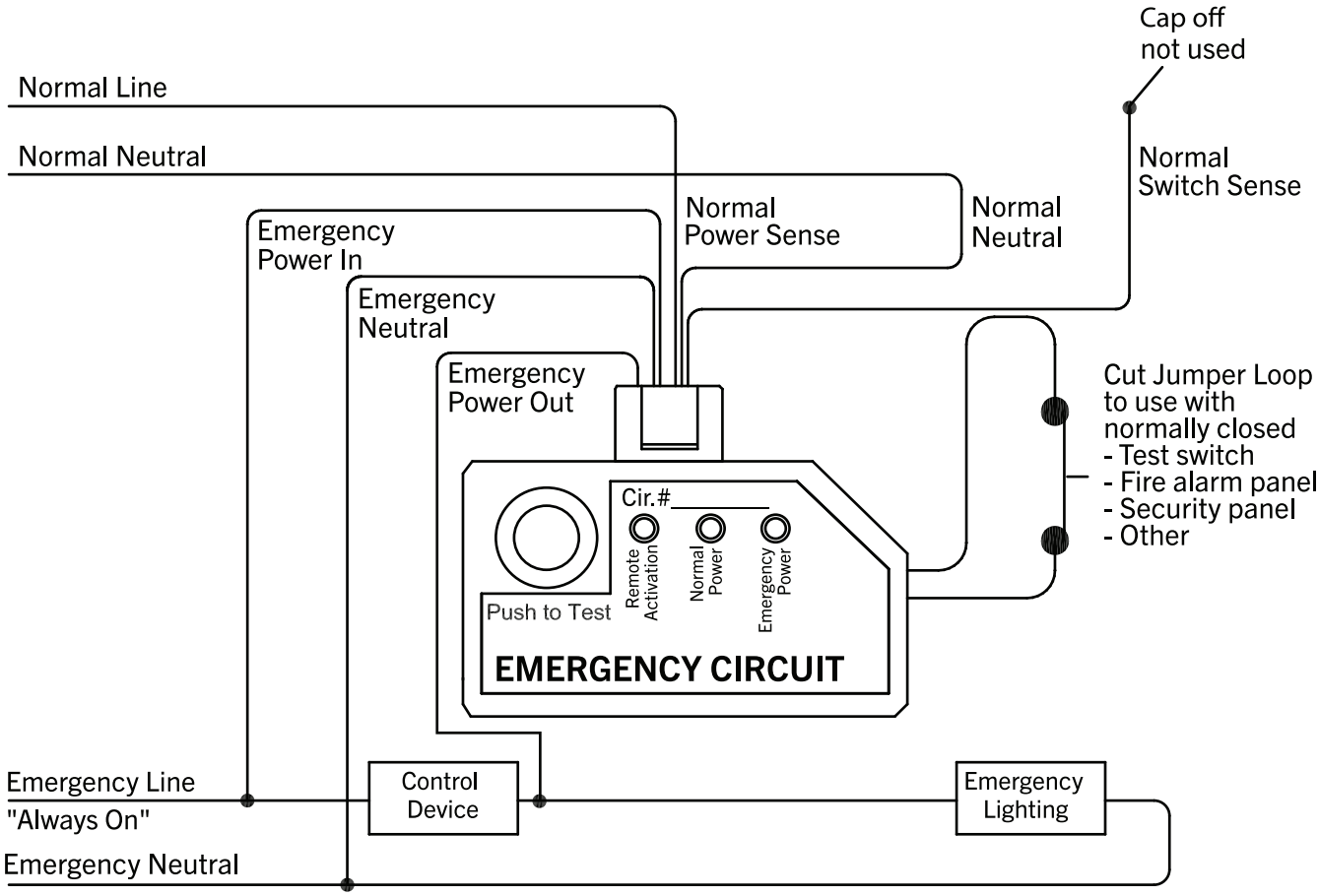
Incandescent.....10A @120VAC

**ZONESAVER-2, "LOCAL CONTROL OVERRIDE" INSTALLATION**

**CONTROL DEVICE OVERRIDE**

The ZoneSaver-2 emergency lighting control unit is a UL 924 listed load control relay wired to shunt around a local control device (e.g. dimmer control, wall switch, occupancy sensor) powered from the inverter's normally on output, in order to provide emergency power to designated emergency lights upon the failure or loss of commercial AC power.

The ZoneSaver-2 is a single circuit, single pole 120 VAC or 277 VAC, control unit that allows independent control of lighting fixtures during normal power conditions. However in the event of a power failure, or if remotely activated by a signal from a fire alarm panel, security panel, or test switch, the ZoneSaver-2 will automatically override the local control of selected fixtures and ensure their full illumination for safe egress.




When utility voltage is available at the Normal Power Sense input, the “Normal Power” light is illuminated indicating a normal condition. Local control is allowed. Note that when emergency power is available at the Emergency Power input, the “Emergency Power” light is illuminated.

When utility voltage is lost, the normal power light turns off. The control device is then bypassed, and emergency power is diverted to the selected emergency fixtures. Once power returns to the Normal Power Sense input, the local control device is inserted back into the circuit and the ZoneSaver-2 indicates a normal operating condition.

The “Remote Activation” light is illuminated under a normal condition, and turns off when the ZoneSaver-2 is activated by a signal from a fire alarm panel, a security panel, or the emergency power supply when performing an automatic “periodic” system test per NFPA 101. When activated, the local control device is then bypassed, and emergency power is diverted to the selected emergency fixtures. An integral push-to-test button is also provided to manually test the emergency circuits per NFPA 101.

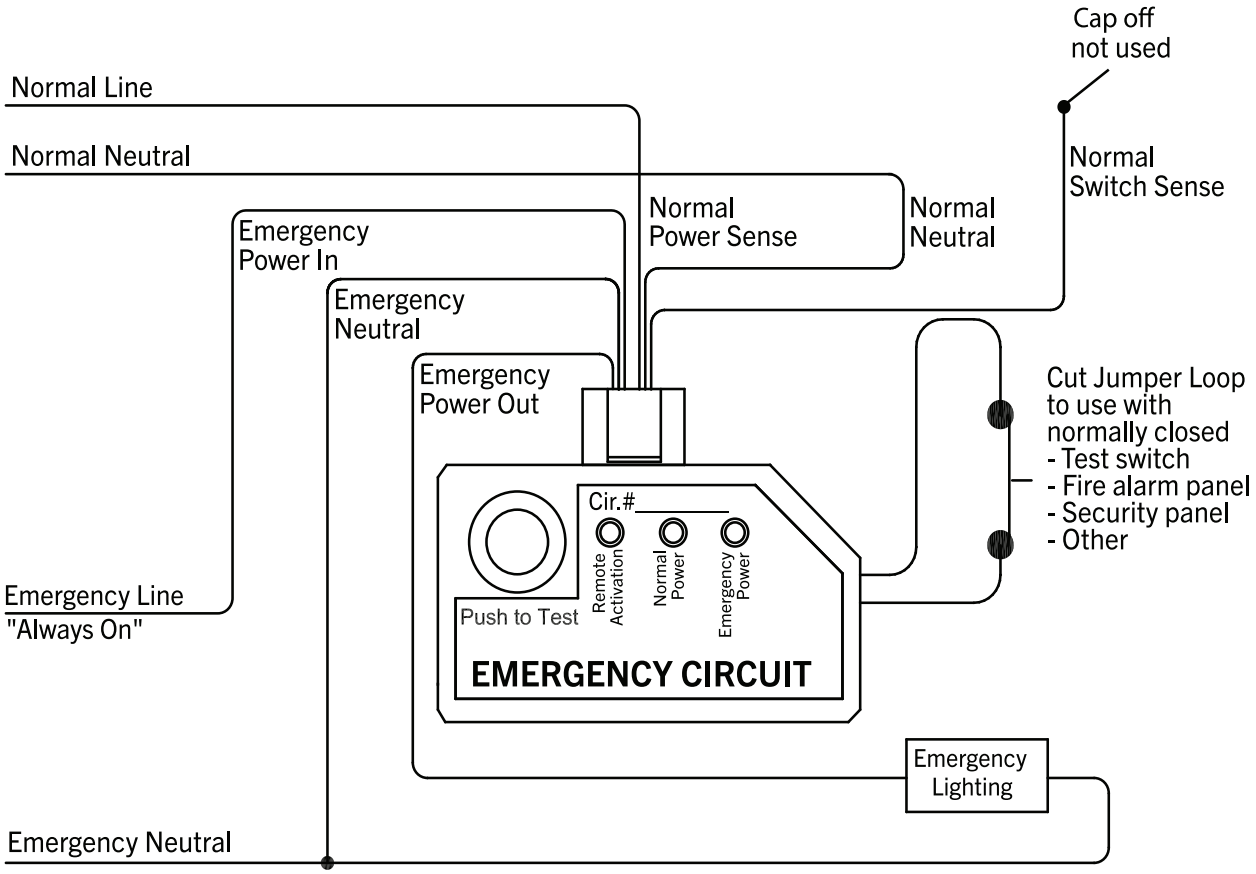
Refer to the manual that accompanied this device for function, use and installation instructions.

## ZONESAVER-2, “ZONE SENSING” INSTALLATION

### ZONE SENSING AND CONTROL OF NORMALLY OFF EMERGENCY LIGHTING

The ZoneSaver-2 emergency lighting control unit is a UL 924 listed load control relay, wired for zone sensing and independent control of normally off (standby) emergency lighting fixtures. The ZoneSaver-2 senses the voltage at an individual zone lighting panel. When a loss of normal power is detected, emergency power is made available to illuminate emergency fixtures within that specific zone.

The ZoneSaver-2 is a single circuit, single pole 120 VAC or 277 VAC, control unit that energizes normally off emergency lighting fixtures if a loss of power is detected at the normal lighting panel in that zone, or if remotely activated by a signal from a fire alarm panel, security panel, or test switch.




When utility voltage is available at the Normal Power Sense input, the “Normal Power” light is illuminated indicating a normal condition, and the normally off (standby) emergency lights remain off. Note that when emergency power is available at the Emergency Power input, the “Emergency Power” light is illuminated.

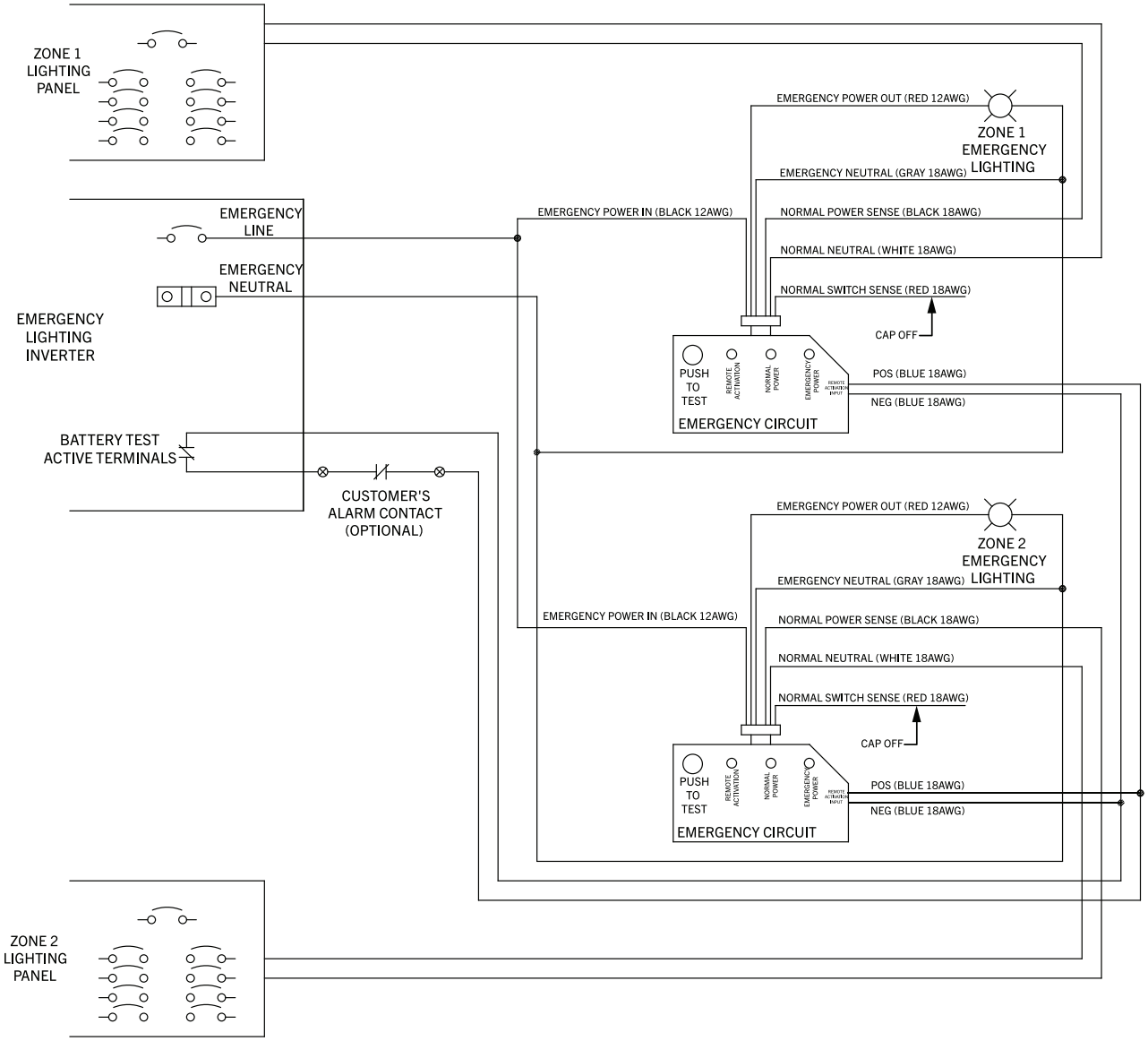
When utility voltage is lost, the normal power light turns off and the normally off (standby) emergency lights are energized. Once power returns to

the Normal Power Sense input, the emergency lights are shut off and the ZoneSaver-2 indicates a normal operating condition.

The “Remote Activation” light is illuminated under a normal condition, and turns off when the ZoneSaver-2 is activated by a signal from a fire alarm panel, a security panel, or the emergency power supply when performing an automatic “periodic” system test per NFPA 101. When activated, emergency power energizes the normally off (standby) emergency lights. An integral push-to-test button is also provided to manually test the emergency circuits per NFPA 101.

Refer to the manual that accompanied this device for function, use and installation instructions.

## MULTIPLE ZONESAVER-2 UNITS CONNECTED TO ONE EMERGENCY LIGHTING INVERTER - WIRING DIAGRAM




NOTES:

1. UP TO 5 ZONESAVER - 2 REMOTE ACTIVATION INPUTS MAYBE BE WIRED IN PARALLEL TO THE SAME ALARM CONTACT(S). MAXIMUM WIRE RUN 500’ WITH #18 AWG
2. ONLY ONE SET OF WIRES CAN BE LANDED ON THE EMERGENCY LIGHTING INVERTER’S, CUSTOMER CONTACTS TERMINAL STRIP - NORMALLY CLOSED TEST ACTIVE CONTACTS. SEE “COMMUNICATIONS DESCRIPTION”

Refer to the manual that accompanied this device for function, use and installation instructions.

# OPTIONAL REMOTE ANNUNCIATOR

## REMOTE ANNUNCIATOR INSTALLATION

Please read this entire instruction set before installing!

Turn off all power before installing or servicing!

## REMOTE ANNUNCIATOR

Trystar's Remote Annunciator is capable of displaying status conditions of an Emergency Lighting Inverter and alarming under critical conditions. The following installation instructions include operation, wiring, and mounting your Remote Annunciator.

## OPERATION

During normal operation of the Inverter, the Remote Annunciator will illuminate the green Inverter On LED. During an alarm condition (unit over temperature, utility fail, etc.) the red General Alarm LED will illuminate along with other applicable LED's indicating the nature of the alarm and the audible alarm will sound. The audible alarm can be silenced by pressing the Alarm Silence button on the front of the unit. If another alarm condition occurs (i.e. low battery), the alarm will resound. The Battery Test Active LED will illuminate when the Inverter is running a Manual or Automatic, Monthly or Annual battery test, but no alarm will sound for this condition. The audible alarm can be altogether defeated by changing jumper J1 on the circuit board. See the back side of the Remote Annunciator for J1 jumper setting.


**Figure 1: Remote Annunciator**

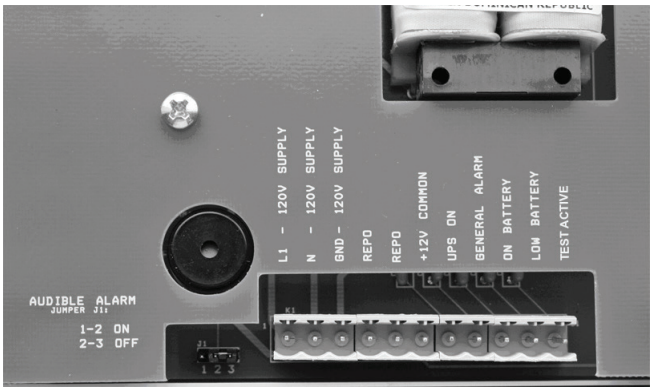



**Figure 2: Rear of Remote Annunciator showing J1 and terminal header**

## WIRING

The wiring of the Remote Annunciator consists of two feeds. One being the communication cable supplied with the unit, and the other is 120Vac 50/60Hz from the output of the Inverter it is monitoring. The power supply can be taken directly from an output breaker on the unit, a receptacle or panel that is fed by the Inverter or a nearby emergency lighting circuit fed by the Inverter. From the Inverter, run the communication cable to the location of the Remote Annunciator. The cable may be run through conduit, walls or cable tray/raceway, but care must be taken not to pinch, cut or kink the cable. After the cable is run, trim excess cable or coil in a safe location. Both feeds, after entering the box, must be wired to the supplied connector as shown in Fig 3. Use standard 1/2” box connector clamps to anchor the wire to the box (not supplied).

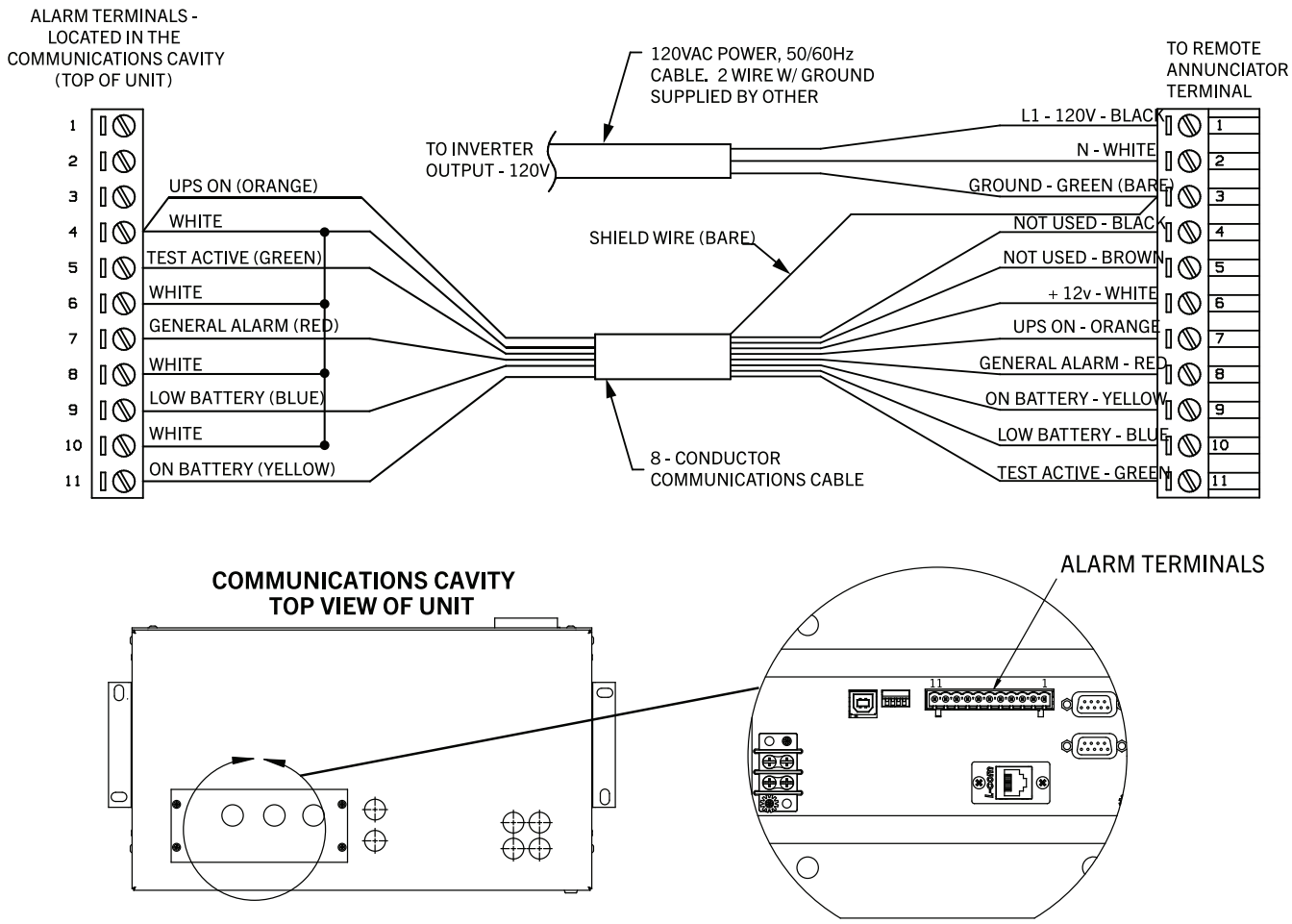



**Figure 3: CONNECTOR WIRING AND LOCATION**

**NOTES:**

1. All wires to connector must be stranded, maximum 12 AWG.
2. If using solid conductor for AC power, splice in length (minimum 4”) of stranded wire to connector.
3. Strip outer sheathing and foil back minimum 2”.
4. Strip all wires 0.25”.
5. 120V supply must come from UPS/Inverter output. Power must be present in event of utility failure.
6. Connector on other end of communication cable to be factory wired.

After all cable routing and connector wiring is complete, plug Remote Annunciator connector into the terminal header. Plug prewired connector into the Alarm Terminal Strip in the Inverter. See *“Communications Description”.*

**MOUNTING**

The Remote Annunciator is designed to be wall mounted with wiring inputs through the rear or top/bottom (using conduit). Flipping out the side doors, remove the four screws fastening the cover to the box. The cover is attached to the box with two plastic retaining straps. Using the four holes in the back of the box and proper anchors (not supplied), mount the unit to drywall, masonry, paneling or any other type of wall. Holes are provided for rear cable entry. If top or bottom entry is desired, holes must be drilled in recommended location for (maximum 1/2”) conduit (Fig. 4).

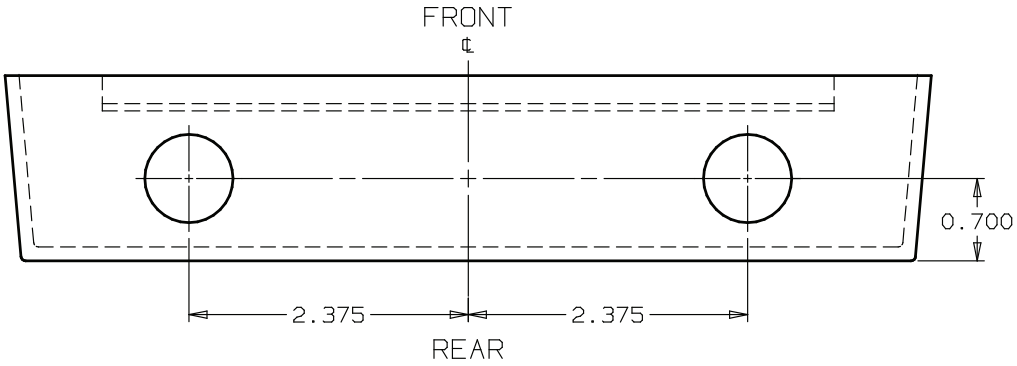



**Figure 4: Drilling locations for top/bottom conduit entrance.**

# OTHER OPTIONAL DEVICES

## OPTIONAL AUTOMATIC MESSAGE DIALER

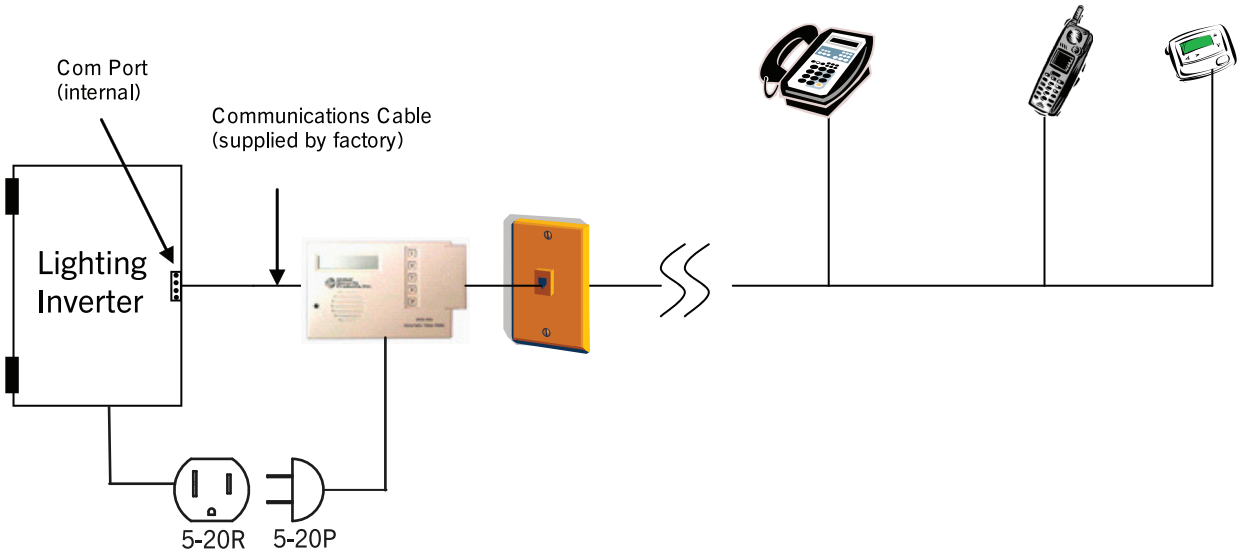
An Automatic Message Dialer is available on the Trystar line of Emergency Lighting Inverters. The Automatic Message Dialer is a device that notifies certain personnel if there is a problem with the lighting inverter via an analog phone line. The Automatic Message Dialer is a small box that plugs into the communications port of the inverter. All that is required for the device is an analog phone line and it is ready to go!

Here's how it works: If in the event that there is an alarm condition, the Automatic Message Dialer will dial up to 4 numbers; these can be landline phones or cell phones. When a call is answered or sent to voice mail, the Automatic Message Dialer will play a customer-recorded, voice message.

Here are some features of the Automatic Message Dialer:

- Dials up to 4 numbers
- Custom voice message
- Programmable delay prevents nuisance dialing
- Internal or external battery backup for memory retention
- Power supply included

Here is how it is connected:




Note: The power supply for these options MUST be taken from the output of the Inverter. A 120V receptacle (5-20R) whose supply is taken from the output of the inverter must be installed near the location of the Automatic Message Dialer. A standard phone receptacle and phone cord is also required to complete the circuit.

**NOTE: The power supply for these options MUST be taken from the output of the Inverter. A 120V receptacle (5-20R) whose supply is taken from the output of the inverter must be installed near the location of the Automatic Message Dialer. A standard phone receptacle and phone cord is also required to complete the circuit.**

Refer to the manual that accompanied these devices for features, function, use and installation Instructions.

## OPTIONAL MULTIFUNCTION COMMUNICATIONS MODEM

Meeting NFPA standards for system testing is critical in today's business infrastructure. To assist in meeting these standards, Trystar is offering the Multifunction Communications Modem (MCM). The MCM can send a fax, an e-mail, dial a phone number and play a prerecorded message, or report system test results to a web page.

On lighting inverters with system test pass/fail contacts, the MCM records system test results and automatically sends a written test report which satisfies NFPA guidelines for stored energy emergency lighting system testing. The MCM is provided standard with 2 dry contact inputs for battery test pass/fail results, plus 6 additional input channels to optionally monitor environmental conditions or safety-related alarms. Consult factory for interface options.

The MCM is available for Trystar Lighting Inverter models provided with the Intellistat or Intellistat TS (touchscreen) monitor.

The MCM product dimensions are 14"W x 1.75"H x 7"D, and weighs 3.5 lbs. The enclosure is designed for the following mounting configurations:

Features:

- 1U rack-mount
- Table-mount
- Wall-mount (using optional flanges)

Power Source 9VDC plug in a wall adapter (120VAC)

Battery Backup: In the event of a power failure, an internal battery keeps the MCM operating for approximately 3.5 hours when fully charged and undedr normal operating conditions.

MULTIFUNTION COMMUNICATIONS MODEM (MCM)

**NOTE: The power supply for these options MUST be taken from the output of the Inverter. A 120V receptacle (5-20R) whose supply is taken from the output of the inverter must be installed near the location of the MCM device. A standard phone receptacle and phone cord is also required to complete the circuit.**

Refer to the manual that accompanied these devices for features, function, use and installation Instructions.

# OPTIONAL REMOTE COMMUNICATIONS

**Netminder Remote Communications (CS141)**

The NetMinder CS141 series of adapters integrate a Controlled Power UPS or lighting inverter into an Ethernet TCP/IP, MODBUS TCP, or MODBUS RS485 network with a specific IP address. The NetMinder CS141 adapters provide remote monitoring of UPS / Inverter status, alarm conditions and electrical measurements via a web browser, without the need for any external software. Remote notification of alarms and status are available via SNMP, e-mail, and network broadcast messaging. The CS141 series of adapters also perform an unattended graceful shutdown of critical servers when used in conjunction with the NetMinder RCCMD client. When used in a lighting inverter application, the NetMinder CS141B will report inverter battery test pass/fail results for NFPA life safety system requirements. The NetMinder CS141L advanced version provides a temperature and humidity sensing interface. NOTE the CS121 has been discontinued and replaced by the CS141. The CS121 is still supported.

BACnet Communications

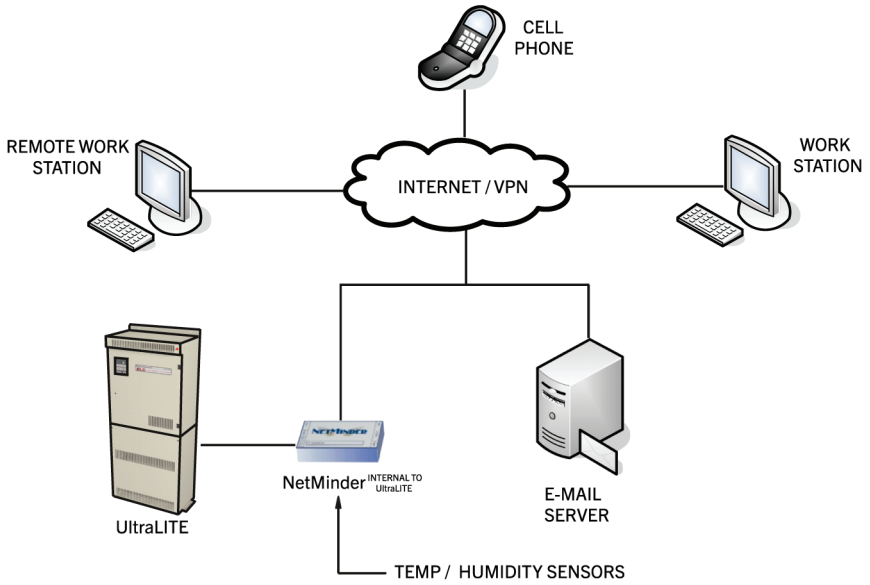
The NetMinder CS141 series of adapters are now able to communicate over a BACnet/IP or MS/TP network with the addition of customized hardware provided by Trystar. All objects including: parameters, alarms, status, and test results can be monitored and stored by building management systems, improving connectivity and simplifying maintenance.

The NetMinder CS141 series of adapters are available in three different versions:

NetMinder CS141B – Basic Ethernet / SNMP / TCP/IP / MODBUS TCP communications used in UPS and lighting inverter applications. The CS141B also provides battery test pass/fail reporting via TCP/IP, e-mail and MODBUS TCP for lighting inverters to satisfy NFPA requirements for life safety.

NetMinder CS141L – Advanced version, includes all functionality of the basic version, plus the addition of temperature and humidity sensing capability, and 4 auxiliary contact closure inputs.

NetMinder CS141L-485 – Adds MODBUS 485 communications to the advanced version of the NetMinder CS141L. However, temperature and humidity sensing are not available in this version.




**SEE THE ACCOMPANYING COMMUNICATIONS MANUAL FOR SETUP INSTRUCTIONS. SEE *"COMMUNICATIONS DESCRIPTION"* FOR PORT LOCATIONS.**

## START UP PROCEDURE

DO NOT ATTEMPT TO OPERATE THE UNIT UNTIL ALL SET UP PROCEDURES HAVE BEEN COMPLETED

### NORMAL MODE START UP

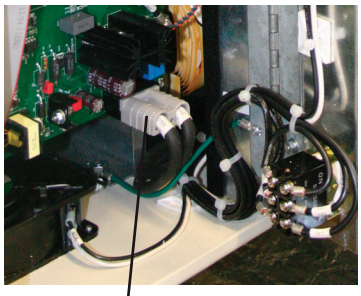
THIS PRODUCT IS SHIPPED WITH THE PERIODIC AUTOMATIC BATTERY TEST ENABLED FOR EVERY 30 DAYS STARTING WITH THE 15th DAY OF THE FOLLOWING MONTH FROM THE ACTUAL SHIP DATE AT 10 P.M.NOTE THAT THE UNIT WILL GO INTO THE AUTOMATIC BATTERY TEST UPON INITIAL START UP IF THE START UP DATE IS AFTER THE 15TH OF THE MONTH, ONE MONTH AFTER THE ORIGINAL SHIP DATE. SEE "BATTERY TEST DURATIONS" AT THE END OF THE MAINTENANCE SECTION. THE NEXT AUTOMATIC BATTERY TEST WILL BE EXACTLY 30 DAYS (DATE AND TIME) AFTER THE FIRST PERIODIC AUTOMATIC BATTERY TEST. REFER TO THE FOLLOWING SECTIONS IN THIS MANUAL FOR FURTHER INFORMATION: *"OPERATION", "MAINTENANCE PROCEDURES - BATTERY TESTING" AND "COMMUNICATIONS".*

**CAUTION - DO NOT PLACE UNIT IN BYPASS WHILE BATTERY TESTING IS IN PROGRESS.**

THIS PRODUCT IS SHIPPED WITH THE ANNUAL AUTOMATIC BATTERY TEST DISABLED. HOWEVER, THE TEST IS PRESET TO RUN TWELVE (12) MONTHS FROM THE DATE OF SHIPMENT, STARTING WITH THE 15th DAY OF THE MONTH, ONE YEAR FROM THE ACTUAL SHIP DATE AT 10 P.M. IF ENABLED, THE TEST WILL LAST FOR MAXIMUM OF 90 MINUTES DEPENDING ON THE BATTERY OPTION PURCHASED AND THEN AUTOMATICALLY TERMINATE. THE NEXT ANNUAL AUTOMATIC BATTERY TEST WILL BE ONE YEAR (DATE AND TIME) AFTER THE FIRST AUTOMATIC BATTERY TEST IF ENABLED. REFER TO THE FOLLOWING SECTIONS IN THIS MANUAL FOR FURTHER INFORMATION: *"OPERATION", "MAINTENANCE PROCEDURES - BATTERY TESTING" AND "COMMUNICATIONS".*

**CAUTION - DO NOT PLACE UNIT IN BYPASS WHILE BATTERY TESTING IS IN PROGRESS.**

1. Turn off all AC input breakers, the DC Circuit breaker and output circuit breakers. Verify that there are not any shorts on the input and output cables.
2. Verify the bypass switch is in the "Normal" position.
3. Turn the DC breaker on. Check the battery connector (inside left inner panel) for proper voltage and polarity. The minimum DC bus voltage to turn the unit on is 62VDC. Turn the DC breaker off.
4. Verify for correct voltage at the input terminals (L1, N, G). This should match the information on the specification tag on the unit.
5. Plug the battery connector into the lower right corner of the board as shown.
6. Turn on the DC Circuit breaker then the AC input breaker.
7. Press and hold the "On" button located on the front display for two seconds. The "Normal Line Voltage" and "Battery" lights will illuminate followed by the "Bypass" light. After a few seconds, the "Bypass" light will turn off and the unit will power up. See *"Operation".*
8. Check for correct output voltage at the output terminal (X1, X1A, XN).



**Battery Connector**

**Note 1**: Output voltage information is located on the specification tag.

**Note 2**: If the "OFF BUS" option is included, a power outage must be simulated first for voltage to be present at the "OFF BUS" terminal. Set OFF DELAY switches SW1 – SW4 to the open position all off; see *"Optional Timed Off Bus Set Up"*. Toggle the AC input breaker off and check for voltage at the "OFF BUS" terminals.

9. Turn **"OFF"** the input breaker and verify the system on battery power.
10. Turn **"ON"** the input breaker and verify the system returns to normal power.

**BEFORE TURNING LOADS ON.**

11. Turn the unit off by pushing the "**ON**" and "**OFF**" buttons simultaneously. Turn the DC breaker "**OFF**" then the AC Input breaker "**OFF**". Verify all loads are disconnected from the output breakers or all output breakers are "**OFF**". Next, turn the manual bypass switch to Bypass Mode, then the AC input breaker "**ON**" again. The unit is now running in bypass mode. See *"Bypass Switch".*

**⚠ WARNING ⚠**

**The AC Input breaker and the DC circuit breakers MUST be in the "OFF" position prior to switching to Bypass Mode. Failure to follow proper bypass procedures can cause serious damage to the inverter.**

12. Verify all output voltages, if correct then turn each load breaker **"ON"** one at a time verifying output current and voltage.

**Note:** If unit has an OFF BUS only, then this step cannot be performed.

**Note:** **DO NOT** turn OFF BUS breakers "**ON**" if voltage is present at the OFF BUS terminal or if the inverter is on battery.

**NOTE**: If unit has an OFF BUS only, then this step cannot be performed.

**NOTE**: **DO NOT** turn OFF BUS breakers "**ON**" if voltage is present at the OFF BUS terminal or if the inverter is on battery.

13. Turn the AC input breaker **"OFF"** and switch the bypass switch back to normal mode.
14. Set OFF DELAY switches to desired setting (see "*Optional Timed Off Bus Set Up"*). Turn the DC breaker then the AC breaker back "**ON**" and push and hold the "**ON**" button on the display panel for two seconds. The unit should turn on in normal mode.
15. Verify there is no voltage on "OFF BUS" terminal. If no voltage is present then begin to turn **"ON"** all OFF BUS breakers. You are now ready for operation.

## MINIMUM CHARGE TIME FOR FULL BATTERY CAPACITY = 24 HOURS

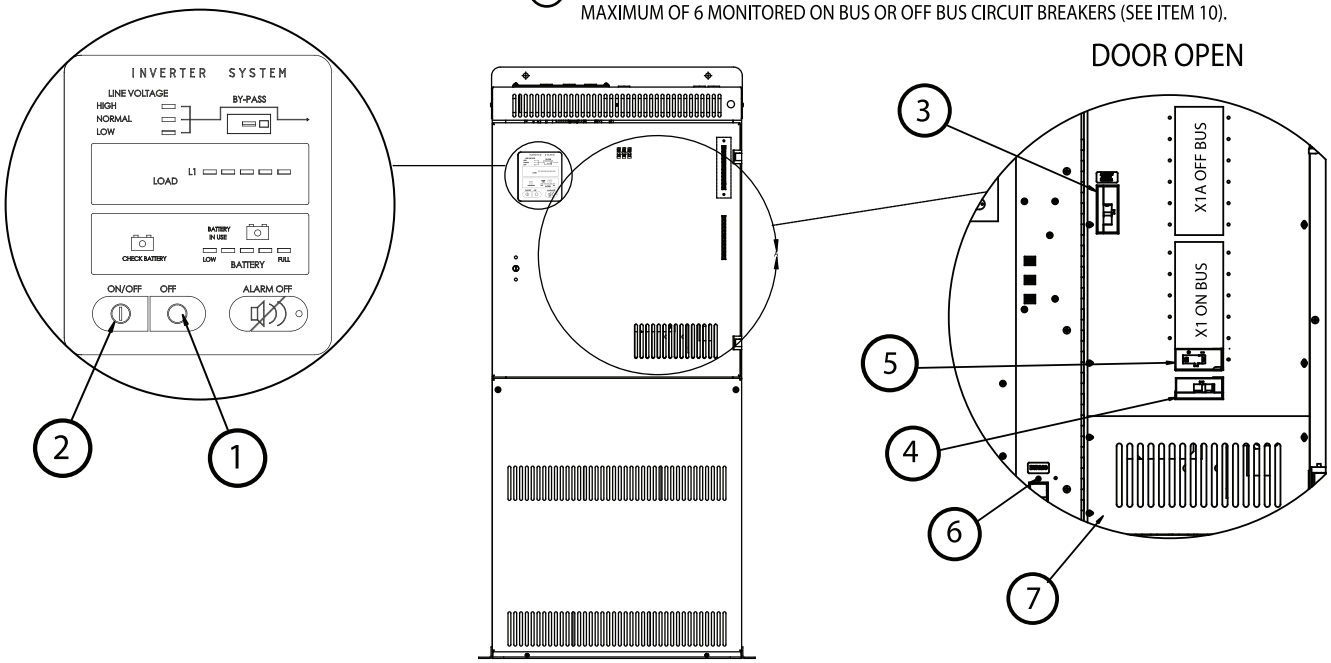
(1) OFF BUTTON. PUSH OFF (1) AND ON (2) BUTTONS SIMULTANEOUSLY TO TURN UNIT OFF.

(2) ON BUTTON

(3) AC INPUT CIRCUIT BREAKER

(4) DC CIRCUIT BREAKER

(5) AC OUTPUT CIRCUIT BREAKERS. MAXIMUM 12 ON BUS OR OFF BUS CIRCUIT BREAKERS. MAXIMUM OF 6 MONITORED ON BUS OR OFF BUS CIRCUIT BREAKERS (SEE ITEM 10).

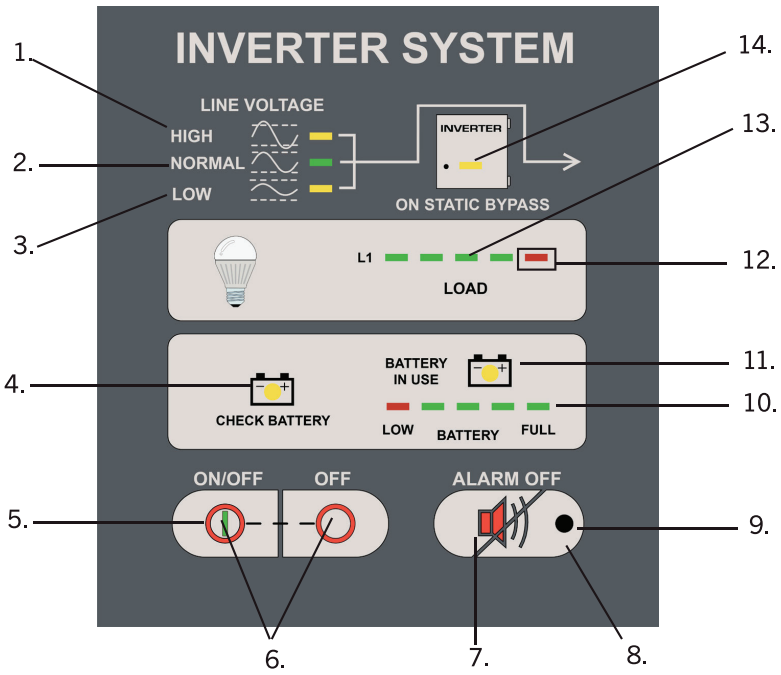



(6) BYPASS SWITCH. WARNING, INPUT AC CIRCUIT BREAKER MUST BE IN OFF POSITION WHEN SWITCHING TO BYPASS.

(7) BATTERY TERMINAL ACCESS PANEL PROVIDES ACCESS TO POSITIVE AND NEGATIVE TERMINALS, TO CONNECT THE BATTERIES TO THE INVERTER. BATTERY TERMINAL ACCESS. PANEL REQUIRES COMMON HAND TOOL FOR REMOVAL.

# OPERATION

## MONITOR OPERATION




1. LED indicates that high input voltage is present (+10%).
2. LED indicates that the input line voltage is nominal.
3. LED indicates that low input line voltage is present (-10%).
4. LED indicates the detection of weak batteries, Check Battery Condition.
5. Pushing and holding this button for two seconds will turn the system “ON”.
6. Pushing and holding both buttons will turn the system “OFF”.
7. Push to silence the alarm.
8. Pushing and holding this button for 3 seconds will generate a system battery test - See *“Maintenance Procedures - Manual Battery Test”* for test durations.
9. LED indicates that the system alarm is “ON”.
10. This scale indicates the charge / discharge level of the batteries.
11. Yellow LED indicates that the Inverter is on battery power.
12. These LED’s indicate an overload condition for L1 (100%).
13. This scale indicates % load levels.
14. Yellow LED indicates that the Inverter is in Static Bypass Mode.

**Note:** Optional Circuit Breaker Tripped Indicator - Will illuminate when an output circuit breaker has opened.

NOT SHOWN - Optional Circuit Breaker Tripped Indicator - Will illuminate when an output circuit breaker has opened.

*NOTE: When performing a power outage test or the inverter has been on battery for a few minutes and returns to normal power, the battery indicator lights may only display one indicator light, this is normal. Wait approximately 15 minutes and the battery indicator lights should return to full.

**AUDIBLE ALARM CONDITIONS**

The following are conditions that will cause an audible alarm. Some audible alarms have a corresponding LED Indication on the display.

| Condition | Possible Cause | Action |
|---|---|---|
| System on Battery | Input voltage or frequency is out of the required specifications. | Test the AC input power source to the Lighting Inverter, repair if required. |
| | Automatic battery testing is taking place | Verify that the “Check Battery” indicator in not illuminated during or after the test. If it is, verify battery condition and replace battery if required. |
| Low Battery | Weak batteries | Check batteries. |
| | | Check charging circuit - contact factory. |
| | Lighting Inverter has been in Inverter Mode for an extended period of time. | Consider controlled shutdown of system - see “Check Battery” indication on display - also see battery charge/discharge level indication on display. |
| Check Battery | Weak or bad batteries | Check batteries - replace as required - see “Check Battery” indication on display. |
| Over Temperature | Defective thermal sensor. | Thermal is not accessible - Contact factory. |
| | Defective fan motor. | Check fan motor - replace as required. |
| | Blocked air intake. | Remove debris from air intake. |
| Inverter Overload | System is overloaded. | Reduce the load from the output to within the output ratings of the unit. |
| Inverter On Static Bypass | System is overloaded. | Reduce the load from the output to within the output ratings of the unit. |
| | Defective Power Board | Contact the Factory |
| | Defective Control Board | Contact the Factory |
| | Overtemp | See “Over Temperature” Condition. |

# BYPASS SWITCH

The purpose of the bypass switch is to connect the loads to utility power in case of inverter failure.

**CAUTION**

Do not switch if the Inverter is on battery or the "Static Bypass" light on the display is NOT illuminated.

**CAUTION**

NOT A MAINTENANCE BYPASS. INTERNAL HIGH VOLTAGES PRESENT WHEN IN BYPASS.

**CAUTION - DO NOT PLACE UNIT IN BYPASS WHILE BATTERY TESTING IS IN PROGRESS.**

**Switching the Inverter to manual bypass mode.**

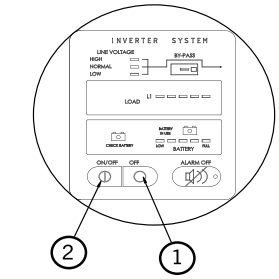
1. Turn the unit off by pushing the "**ON**" and "**OFF**" buttons simultaneously.
2. Turn the DC breaker "**OFF**".
3. Turn the AC Input breaker "**OFF**".
4. Turn the manual bypass switch to Bypass Mode.
5. Turn the AC input breaker "**ON**" again.
6. The unit is now running in Bypass Mode.

**Switching the Inverter to manual bypass mode.**

1. Turn the AC input breaker "**OFF**".
2. Turn the manual bypass switch to **"Normal"**.
3. Turn the DC breaker then the AC breaker back "**ON**".
4. Push the "**ON**" button on the display panel. The unit will turn on in normal mode.

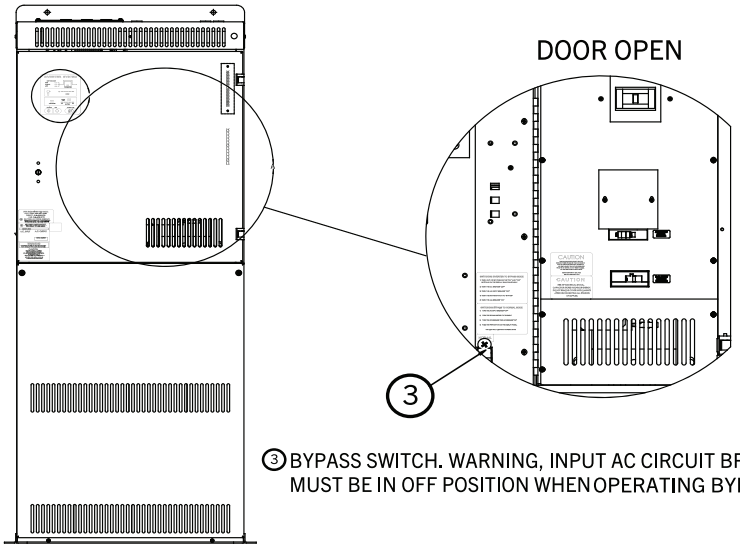
After switching to bypass mode, it is recommended that the DC circuit breaker be turned off. This will prevent battery discharge and possible battery damage if left in bypass mode for extended periods of time.

Be sure to turn the DC circuit breaker back ON before returning to normal mode operation.




1 OFF BUTTON. PUSH ON 2 AND OFF BUTTONS 1 SIMULTANEOUSLY TO TURN UNIT OFF.

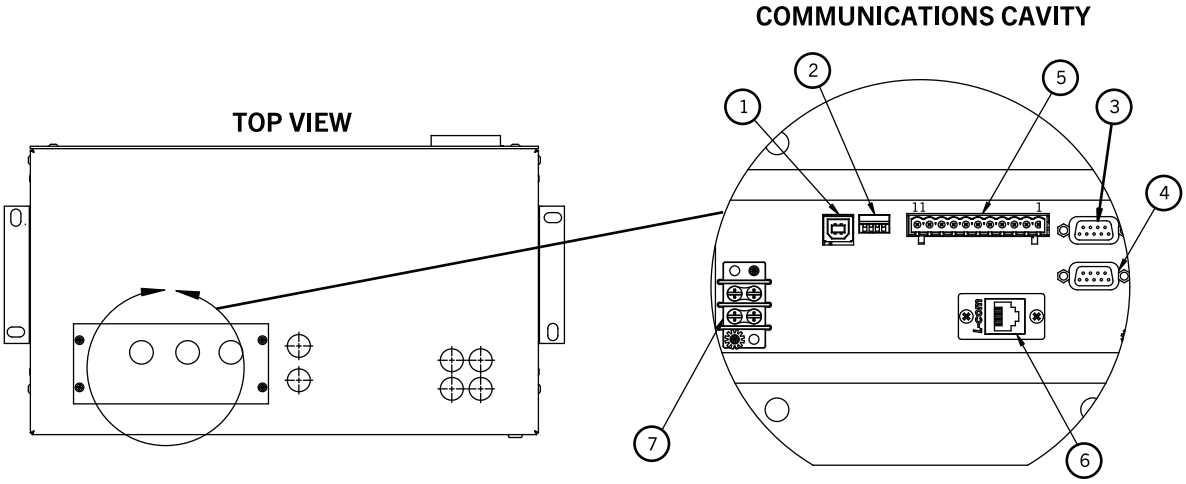
2 ON BUTTON




3 BYPASS SWITCH. WARNING, INPUT AC CIRCUIT BREAKER MUST BE IN OFF POSITION WHEN OPERATING BYPASS.

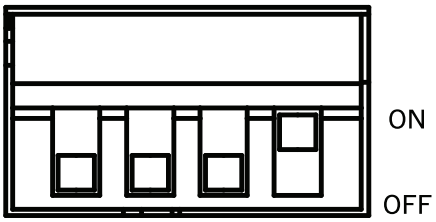
## COMMUNICATIONS DESCRIPTION

The ELC provides user access to system status, alarm conditions, electrical measurements, system logs, and battery test pass/fail results, via RS232 from a DB9 connector or a USB port. Optionally, this information is available via an Ethernet TCP/IP, MODBUS TCP or MODBUS RS485 network connection. (See *"Optional Remote Communications"*) Remote communication of inverter on battery, low battery, and a general alarm are available via normally open contacts rated at 120 VAC and .5 amps.




1. USB communication port, type "B" receptacle. When in use, RS-232 serial communication port 3 cannot be used. Port provides access to all system data. See *"Communications"* for instructions on accessing data. For communication purposes only - no contact closures are provided with this port. USB drivers must be installed on the user computer prior to using the USB port (Windows XP, Vista, Windows 7 and 8). See the accompanying CD and USB installation documentation for instructions on driver installation.

2. Dip switches, close switch one (1) to activate automatic restart. Automatic restart allows the inverter to automatically restart following a long term power outage. When the outage exceeds the back up time provided by the batteries, the inverter will shut down to preserve the long term life of the batteries. When utility power is restored, the inverter will deliver power to the load and automatically recharge the batteries. The remaining three dip switches are inactive.

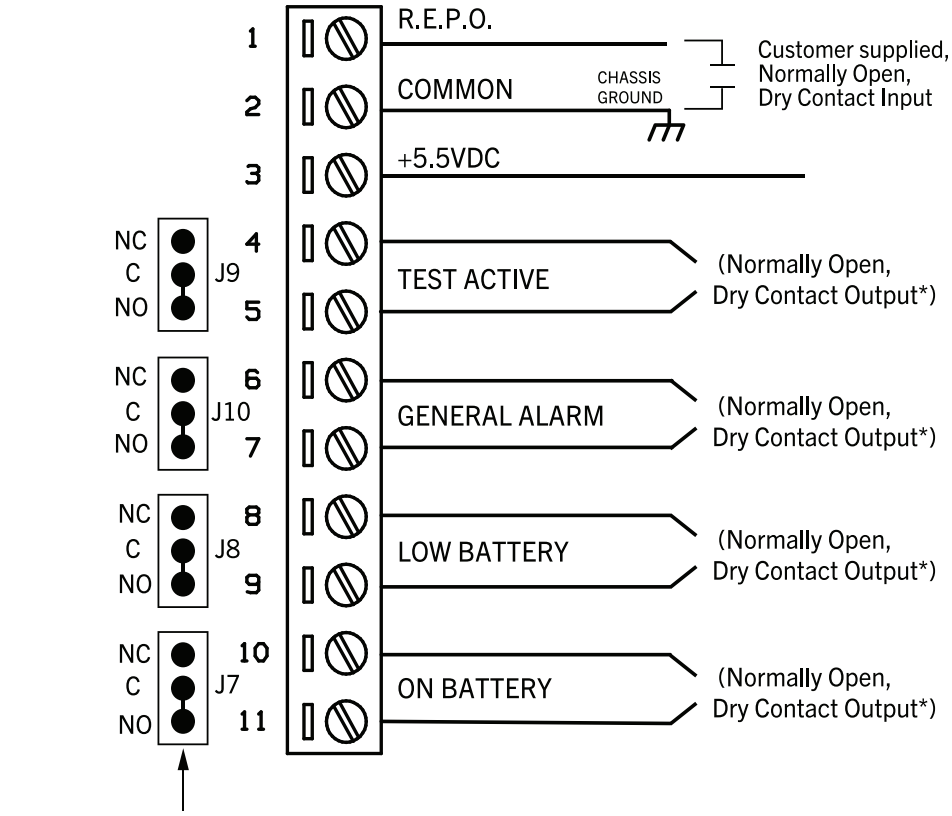



SWITCH 1 - AUTO RESTART
(SWITCHES 2,3 AND 4 INACTIVE)

3. DB9 female RS232 serial communication port provides access to all system data. Provides REPO connection, bypass contacts, general alarm contacts, low battery contact closure and on battery contact closure. When in use USB communication port (1) cannot be used. See *"Communications"* for instructions on accessing data.

4. DB9 female RS232 serial communication port provides access only to system parameters data. See *"Communications"* for instructions on accessing data.

5. Eleven (11) position contact closure terminal. Provides R.E.P.O., Test Active, General Alarm, Low Battery and On Battery. Contacts are rated for 0.5 at 125VAC.




*CONTACTS ARE USER SELECTABLE NORMALLY OPEN OR NORMALLY CLOSED BY MEANS OF JUMPERS ON CONTROL BOARD LOCATED JUST BELOW THE TERMINALS AS SHOWN ABOVE. THESE JUMPERS CAN BE ACCESSED BEHIND INNER DOOR, ON THE CONTROL BOARD.

**⚠ CAUTION ⚠**

BE SURE THAT NO POWER IS APPLIED TO THE INVERTER WHILE WIRING INTERNAL CONFIGURATION.

6. RJ45 receptacle (only present with NetMinder option), connection to output of NetMinder adapter. See *"Optional Remote Communications"* for software installation and operating instructions.

7. Allows a remote contact signal to energize the "Normally Off" bus, thus illuminating the "normally off" emergency lights. Customer must remove jumper and connect normally closed contact. When the contact opens the off bus is forced on. See *"Optional Timed Off Bus Set Up - Remote Input Command".*

# COMMUNICATIONS

**MINIMUM SYSTEM REQUIREMENTS:**

1. Computer/Laptop with Windows 3.1 or later.
2. "Hyperterminal" (Windows 3.1, Windows XP) or "PuTTY" for Windows Vista and Windows 7 or later. (download at http://www.putty.org/).
3. USB Port and Type B USB Cable, Setup USB 0.4 Drivers (Windows XP, Vista, Windows 7 and 8) and "Hyperterminal" or "PuTTY" emulation programs.

OR

4. DB9, RS232 Serial Port and Null Modem Cable - for use with all Windows operating systems and "Hyperterminal" or "PuTTY" emulation programs. See *"Communications Description"* for port locations.

**COMMUNICATIONS SETUP**

The UPS provides a beneficial means to communicate with a terminal or any TTY emulation program. Communication can be established with most communications programs with the following parameters:

Baud Rate = 9600

Data Bits = 8

Parity = None

Stop Bits = 1

Flow Control = Xon / Xof

Echo = On

**COMMUNICATIONS COMMANDS**

Once communication has been established with the UPS, system data can be obtained by sending a series of characters to the UPS. Below is a list of the character commands. **Note: Command entry is case sensitive. All characters must be entered as shown. NOTE: Cable MUST be null modem.**

**ss** = System Parameters

**pp** = System Set Points

**ll** = Log Functions

**e** = End Memory Modification

**tt** = UPS Time and Date

**cc** = Set UPS Time and Date

**e** = End Battery Test Setup

**ww** = Last 5 Shut Downs

**rr** = Battery Test Parameters

**bb** = Battery Test Setup

**BB** = Battery Test Logs

**mm** = System Memory Modification – Consult Factory

**SYSTEM PARAMETERS (ss)**

To access system parameters, send a lower case "ss" to the UPS from the terminal.

| Sample Display | Description | Explanation |
|---|---|---|
| Input Voltage(L1-N) = 120 | AC Volts input measured from L1 to N | The input voltage the Inverter is receiving |
| Output Voltage(X1-XN) = 120 | AC Volts output measured from X1 to XN | The output voltage the Inverter is sending to the loads |
| Output Current(X1-XN) = 5 | AC Amps output measured from X1 to XN | The output current the Inverter is supplying to the loads |
| Output Watts(X1-XN) = 600 | AC Watts output measured from X1 to XN | The amount of true power the load is consuming |
| Output VA(X1-XN) = 650 | AC Volt-Amps output measured from X1 to XN | The amount of apparent power that the load is consuming |
| Output Load(X1-XN) = 46 | Percentage load measured from X1 to XN | Percentage of the maximum rated load |
| Output Frequency = 60 | Frequency of the output waveform | Frequency in Hertz (Hz) of the output of the Inverter |
| Positive DC Voltage = 198.88 | Positive Voltage on DC Link | Positve DC voltage generated by power board |
| Negative DC Voltage = 197.33 | Negative Voltage on DC Link | Negative DC voltage generated by power board |
| Battery Voltage = 72 | Battery Voltage | Battery voltage measured in Volts |
| Percentage Battery = 100 | % of Battery Charging / Discharging | Battery Charge / Discharge in Volts |
| DC Charging Current = .30 | Output current of the charger | Current measured in Amps that the charger is delivering to the batteries |
| System Synchronized | Inverter has attained inverter to line synchronization | The Inverter has successfully synchronized itself with the incoming waveform |

**Note: Not necessarily in order shown.**

### SYSTEM SETPOINTS (pp)

To access system set points, send a lower case "pp" to the Inverter from the terminal. **NOTE: Not necessarily in order shown.**

| Sample Display | Description | Explanation |
|---|---|---|
| Output VA = 2,000 | AC volt-amps output of the unit | Setting which informs the Control Module of the output apparent power |
| Input nominal (L1-L2) = 120 | Input voltage setting from Line 1 to Line2 | Setting which informs the Control Module of the input voltage |
| Input nominal (L1-N) = 120 | Input voltage setting from Line 1 to Neutral | Setting which informs the Control Module of the input voltage |
| Output nominal (L1-L2) = 120 | Output voltage setting from Line 1 to Line 2 | Setting which informs the Control Module of the output voltage |
| Output nominal (L1-N) = 120 | Output voltage setting from Line 1 to Neutral | Setting which informs the Control Module of the output voltage |
| Low battery(%) = 40 | Low battery percentage | Percentage of battery at which the UPS displays "Low Battery" |
| Sag switch point(%) = 00 | Setting at which the UPS will switch to battery (1) | Setting which tells the UPS the type of ranging it uses to determine when to switch to battery when the voltage sags below normal |
| Surge switch point(%) = 112 | Setting at which the UPS will switch to battery | Setting which tells the UPS the type of ranging it uses to determine when to switch to battery when the voltage surges above normal |
| Battery Amperes Hours | Amp – hour of the batteries being used (3) | Setting which tells the UPS the amp-hour of the batteries being used |
| Input Voltage - 0 = 120, 3 = 277, 5 = 480 | Input Voltage Setting | Setting which informs the UPS of the iInput voltage |
| Output Voltage - 0 = 120, 3 = 277 | Output Voltage Setting | Setting which informs the UPS of the output voltage |
| Monitor (Y/N) (0/1) | With or Without Monitor | "0 = No Monitor 1 = With Monitor" |

1. The options for sag switch are: 00 = "Fuzzy" ranging and the actual sag input voltage percentage of the nominal input.
2. The value for this set point depends on the type of batteries, and the number of battery modules.

### TIME and DATE (tt) (cc)

To view the system time and date, send a lower case “tt” to the Inverter from the terminal.

To change the system time and date, send a lower case “cc” to the Inverter from the terminal.

<table>
<tr><th colspan="3">Time Format = HH:MM, XM, D<br>Example - 08:39, A, W (8:39AM, Wed)</th></tr>
<tr><th>HH:MM</th><th>XM</th><th>D</th></tr>
<tr><td>Hours:Minutes</td><td rowspan="2">A or P</td><td>U = Sunday</td></tr>
<tr><td>Example - 08:39</td><td>M = Monday</td></tr>
<tr><td rowspan="5">Date Format: MM/DD/YY<br>Month/Date/Year<br>Example - 04/23/09</td><td>T = Tuesday</td></tr>
<tr><td>W = Wednesday</td></tr>
<tr><td>H = Thursday</td></tr>
<tr><td>F = Friday</td></tr>
<tr><td>S = Saturday</td></tr>
</table>

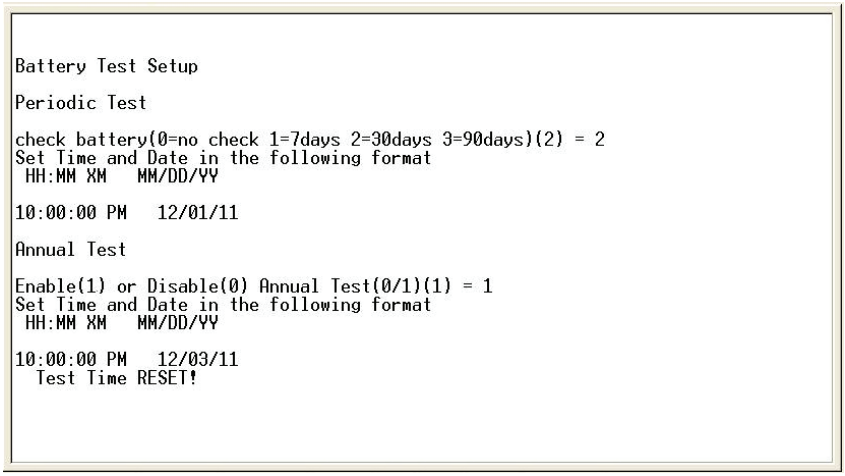
### LOG FUNCTIONS (ll)

To access a log of the outages and overloads, send a lower case “ll” to the Inverter from the terminal.

| Sample Display | Description |
|---|---|
| Number of outages = 4 | Indicates number of power outages |
| Power outage was at: 11:12:51 Date 03/16/02 | Date and time of power outage |
| Number of overloads = 1 | Indicates number of overloads |
| Overload was at: 11:12:51 Date 03/16/02 | Date and time of overload |
| Do you want to clear log (y/n)? | If “yes” is entered, all information in the log will be deleted |

### BATTERY TEST SETUP (bb)

Upon typing “bb”, you will be asked to make selections and enter information about the battery tests.




**PERIODIC BATTERY TEST:**

**CHECK BATTERY** – Enter in a “0” to disable the check, a “1” to do a test every 7 days, a “2” to do a test every 30 days, or a “3” to do a test every 90 days. Factory default = 2 (30 Days).

**SET AUTO BATTERY TEST TIME AND DATE** – First enter the hours of the test time. The “:” will be inserted after entering the second hours’ digit. Next enter the minutes of the test time. The “:00 “ will be inserted after entering the second minutes’ digit. Third, enter either “A” for AM or “P” for PM. Next enter the Month of the test. After entering in the second digit of the month, the “/” will be inserted. Now enter the day of the test. After the second digit of the day the “/” will be inserted. Enter in the year and the setting of the test time and date will be complete. At anytime except for after the last digit of the year is entered, you may hit backspace to clear the last entry and reenter a different number or character.Factory default = 15th of the following month from actually ship date, 10 P.M.

**DURATION** – Enter a “0” for a 30 second test duration or a “1” for a 5 minute test duration. Factory default= 1 (5 Minutes) for units with 30 minutes or more of battery time. 30 seconds for units with less than 30 minutes of battery time. See *“Battery Test Durations”* at the end of the maintenance section.

**ANNUAL:**

**ENABLE/DISABLE** – Enter a “1” to enable the annual test or a “0” to disable the annual test. Factory default = 0 (Disabled).

**SET ANNUAL BATTERY TEST TIME AND DATE** – First enter the hours of the test time. The “:” will be inserted after entering the second hours’ digit. Next enter the minutes of the test time. The “:00 “ will be inserted after entering the second minutes’ digit. Third, enter either “A” for AM or “P” for PM. Next enter the Month of the test. After entering in the second digit of the month, the “/” will be inserted. Now enter the day of the test. After the second digit of the day the “/” will be inserted. Enter in the year and the setting of the test time and date will be complete. At anytime

except for after the last digit of the year is entered, you may hit backspace to clear the last entry and reenter a different number or character. Factory default = 15th of the month, one year from actually ship date, 10 P.M. Duration (not user programmable) = 90 minutes for units with 90 minutes of battery time. For units that have other then 90 minutes of battery time, the test duration is anywhere from five (5) minutes to four (4) hours depending on battery option purchased and is pre-programmed at the factory not to exceed that battery time.

### BATTERY TEST PARAMETERS (rr)

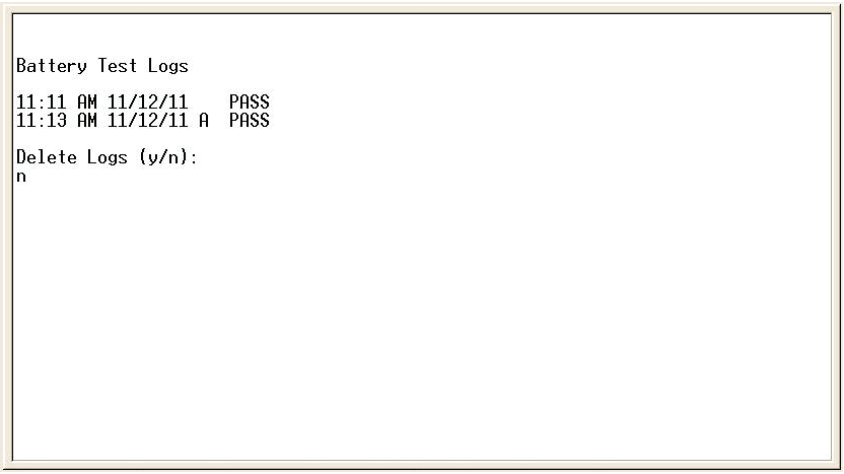
Upon typing an 'rr' the currently set battery test parameters will be shown. They include the auto test time and date, auto test period, auto test duration, and the annual test time and date. If either test is off, its information will not be shown and will say "test off".


### LAST FIVE (5) SHUT DOWNS (ww)

To list the last five (5) system shut down data, send a lower case "ww" to the terminal.

### BATTERY TEST LOGS (BB)

Upon typing a 'BB' the battery test logs will appear. The log will include up to 13 tests. Included in each log is the time, date, whether it passed or failed, and if it was an annual test or not. If the log was an annual test it will have an 'A' between its date and the pass fail indications. At the end of the log you are given the ability to delete the whole log or not. Entering a 'y' will delete the log, while entering an 'n' will leave the log intact.




**SYSTEM MEMORY MODIFICATION (mm)**

If system memory modification (mm) becomes necessary, please consult the factory.

**END MEMORY MODIFICATION (e)**

**END BATTERY TEST SETUP (e)**

To save and exit from the communications emulation program, send a lower case “e” to the terminal.

# MAINTENANCE PROCEDURES


## GENERAL MAINTENANCE

The best preventive maintenance is to operate the lighting inverter in a clean environment with proper ventilation and no restrictions on air intakes and cooling fan outputs.

Battery connections should be tightened annually by qualified electrical personnel. Batteries should be replaced as indicated by battery testing.

The lighting inverter should be checked monthly for battery operation. Take precautions to have the lighting load in a mode that could tolerate a shut down. See *"Maintenance - Battery Testing"* for instructions.

## COMPLETE MAINTENANCE CHECK

**PREPARATION** - A shutdown period must be scheduled to perform maintenance. The lighting loads should be available to test the lighting inverter with a loss of power simulation.

**EQUIPMENT** - Wire brush or other cleaning device (for battery connections), insulated tools (for battery connections) and safety glasses.

## SYSTEM OPERATION

1. With power on, check display functions of unit for proper operation.
2. Turn the AC input breaker off, the unit will go into inverter mode.
3. Turn the AC input breaker back on, and the unit will return to normal mode.

## VISUAL INSPECTION

1. Open Door.
2. Turn the unit off by means of the monitor, turn both AC and DC breakers **"OFF"**. Turn off the main feed breaker as a precaution. **WARNING: HIGH VOLTAGE STILL PRESENT AT BATTERIES.**
3. Check for burnt, frayed, broken or loose connections. Look closely in the following areas: Input, output connections, circuit breakers and battery terminals.
4. Correct any loose connections, replace any physically burned or broken components. Use extreme care when replacing components to assure correct installation.

### GENERATOR TEST

1. If a generator is backing up the inverter, check to be sure the inverter operates properly with the generator. Check the generator operation with no load. The unit should switch to inverter when the generator turns on. After a minute or so the lighting inverter should switch back to normal mode and run off the generator then check the generator with the loads.

### BATTERY MAINTENANCE

**Batteries of a specific manufacturer and model are required to maintain the system's UL 924 listing. Use of batteries not recognized in the product's UL report will void its listing.**

**WARNING**

Servicing of batteries should be performed or supervised by personnel knowledgeable of batteries and the required precautions. Keep unauthorized personnel away from batteries.SEE *"INSTALLATION PRECAUTIONS"*

Accidental shorts will cause severe arcing, burning or battery explosion - wear eye protection and use insulated tools when servicing batteries. Remove all jewelry.

NOTE: Never mix batteries with a different brand or size. Never mix old and new batteries. Dispose of batteries properly. Do not open, mutilate or dispose in a fire.

1. Visually inspect all battery connections. If there is any sign of corrosion - disconnect that battery and clean with a wire brush. Tighten all other battery connections. Make sure the batteries are not swollen or cracked. If they are, contact the factory. The minimum DC bus voltage to turn the unit on is 62VDC.
2. If batteries must be replaced, contact the factory or see *"Battery Installation and Wiring".*

**CAUTION - DO NOT PLACE UNIT IN BYPASS WHILE BATTERY TESTING IS IN PROGRESS.**

### BATTERY TESTING

**PREPARATION** - Proper precautions must be taken when performing battery testing. The lighting load(s) should be available to test on inverter, in a loss of power simulation. Be sure also to take precautions to have the lighting load in a mode that could tolerate a shut down. If the battery test fails the system may shutdown and all of the lighting loads connected to it will lose power.

It is recommended that batteries are periodically inspected for corroded and loose connections. Battery connections should be tightened annually by qualified electrical personnel. Batteries should be checked as

**Note:** The minimum DC bus voltage to turn the unit on is 62VDC.

indicated by monthly battery testing. Note: The minimum DC bus voltage to turn the unit on is 62VDC.

### MANUAL BATTERY TEST

1. On the front display, press and hold the "Alarm Silence" button for three (3) seconds. This will force the inverter into battery mode.
2. The unit will stay in battery mode for the programmed duration, then return to normal mode. See *"Battery Test Durations"* at the end of this section.
3. After the time has elapsed, if the check battery light is illuminated, there may be weak batteries. If this condition exists, contact the factory.
4. If the low battery condition is reached for longer than 10 seconds, then the battery test will stop and the "Check Battery" light will illuminate.

### AUTOMATIC PERIODIC BATTERY TEST

**GENERAL** - The inverter is preset at the factory for automatic monthly testing enabled and takes place on the programmed calendar date. See *"Battery Test Durations"* at the end of this section. During this time, the battery discharge rate is evaluated to determine the health of the battery string. Since the inverter is operating from battery power during the test, a general alarm condition will exist.

If the health of the battery string is suspect, the "Check Battery" indicator light located on the local monitor will illuminate and the general alarm will continue to exist after the battery test is complete. A contact closure signal is also provided as a result of the general alarm status. This general alarm signal may be used for external / remote communications. See *"Communications"* for details.

### AUTOMATIC ANNUAL BATTERY TEST

**GENERAL** - The inverter is preset at the factory for automatic annual testing disabled and takes place on the programmed calendar date. The duration time is preset at the factory in accordance with the battery option purchased and is not user programmable. During this time, the battery discharge rate is evaluated to determine the health of the battery string. Since the inverter is operating from battery power during the test, a general alarm condition will exist. See *"Communications"* for instructions on modifying battery test parameters.

If the health of the battery string is suspect, the "Check Battery" indicator light located on the local monitor will illuminate and the general alarm will continue to exist after the battery test is complete. A contact closure signal is also provided as a result of the general alarm status. This general alarm signal may be used for external / remote communications. See *"Communications"* for details.

**CHANGING BATTERY TEST PARAMETERS** - See *"Communications"* for details on changing battery test parameters.

**CAUTION - DO NOT PLACE UNIT IN BYPASS WHILE BATTERY TESTING IS IN PROGRESS.**

| BATTERY TEST DURATIONS | | | |
|---|---|---|---|
| **Battery Time** | **Periodic Test Duration** | **Annual Test Duration** | **Manual Test Duration** |
| => 90 Minutes | 5 Minutes | <= Total Battery Time* | 5 Minutes |
| 60-89 Minutes | 5 Minutes | <= Total Battery Time | 1 Minute |
| 30-59 Minutes | 5 Minutes | <= Total Battery Time | 1 Minute |
| =< 29 Minutes | 30 Seconds | <= Total Battery Time | 30 Seconds |
| * 4 Hours Maximum | | | |

# WARRANTY

**This Warranty applies only to the original purchaser who must properly register the product within thirty (30) days of receipt.**

**https://www.trystar.com/services/warranty-information/**

Trystar warrants that our products and their components will remain free from defects in material and workmanship for the duration of the respective warranty period* from the date of shipment and agrees to replace, F.O.B. its factory, any parts which fault through defect in material or workmanship during such period. Non payment for the product to either the reseller, rep, distributor or the factory direct will result in revocation of warranty, technical support and service contracts.**Warranty begins from date of shipment unless a factory Start-Up Plus is purchased, then the warranty begins from date of Start Up or 90 days from ship date; whichever comes first.**

If a Start-Up Plus is purchased with the unit(s) or within 30 days from original ship date, the 1st year warranty is upgraded to include onsite labor and expenses during normal business hours (Monday - Friday, 8AM - 4PM). Start-Up Plus includes all travel and living expenses. Start-Up Plus description: Testing all emergency circuitry - Calibration - Inspection - Exercising all circuit breakers - Cooling fan check - Input and output parameter check - Air intake / exhaust check - Complete battery inspection and testing (where applicable) - Re-torque all high current terminals - Battery certification report (where applicable) - Input/Output verification - Written report. User training to be done at time of start up (no return visits). Product installation is required to be complete before start up can be scheduled.

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Products:

- Emergency Lighting Inverters (ELU) / 2 Years parts only*, Batteries 1 Year full, 14 year pro-rated.

  * From original shipment date / Excludes on site labor and expenses unless otherwise noted.

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1. This Warranty shall be effective only if and so long as the system is installed and operated in the manner specified in the manual which accompanied the product, and is operated within the ratings on the nameplate of the system.
2. This Warranty shall be effective provided the purchaser pays the cost of transporting the faulty component(s) to and from Trystar's factory at the purchaser's own expense, unless the item covered under service contract with Trystar. There is no cost for installation of the replacement component(s) when done at the factory. Otherwise installation of the replacement component(s) are the responsibility of the purchaser, unless the item is covered under service contract with

Trystar. If after inspection the faulty component has been caused by misuse or abnormal conditions in the judgment of Trystar, the purchaser will be charged for repairs based on parts and labor required. This Warranty does not cover fuses, light bulbs, and other normally expendable items. Trystar service personnel are not included in this warranty unless covered by a Trystar service contract.

3. This Warranty shall be void if any alteration is made to the system, or any of its components are altered by anyone other than an authorized Trystar service person, without the written permission of Trystar.
4. This Warranty is in lieu of all other warranties, expressed or implied. Trystar neither assumes, nor authorizes any person to assume for it, any liability other than that specifically set forth in this Warranty. Except for its obligations, Trystar assumes no liability or responsibility for personal injury, loss of life, consequential or other damages resulting from defects in, or failure of, the system or any of its components.

https://www.trystar.com/services/warranty-information/

## CUSTOMER SUPPORT

Trystar NATIONWIDE CUSTOMER SUPPORT

Trystar offers total customer support that assures your critical equipment is maintained properly for trouble free operation.

**WHAT A CUSTOMER SUPPORT PLAN OFFERS:**

**HOT LINE:** 24 hour toll free 1-800-521-4792.

**REMEDIAL MAINTENANCE:** Covers all on-site repairs, parts, freight, labor and travel expenses.

**RESPONSE:** Immediate 24 hour phone support. If problem is not solved Controlled Power will make every effort to have your system running within 48 hours.

**BATTERIES:** Batteries are covered under a 15 year pro-rate schedule, beginning from the shipment date. The battery pro-rate does not cover labor, freight, battery disposal, travel or living expenses.

**PREVENTIVE MAINTENANCE:** Optional preventive maintenance includes the following:

**Annual battery run down certification for 90 minutes per NFPA 101 Life Safety Code, Section 5- 9.3 and NFPA 70 (N.E.C. 70) National Electric Code.**

- Testing all emergency circuitry
- Inspection
- Exercising all circuit breakers
- Input and output parameter check
- Complete battery inspection and testing
- Re-torque all high current terminals
- Calibration
- Clean internal and external
- Cooling fan check
- Air intake / exhaust check
- Written report
- **Battery certification report**

**START UP:** Includes installation inspection (wired properly, location, environment), Unit inspection (internal and external), Unit power up, Operation verification including options. One visit, includes all travel expenses.

| PLAN | ON SITE COVERAGE | PARTS COVERED | FIELD REPAIR LABOR COVERED | FACTORY REPAIR LABOR COVERED | FREIGHT COVERED | TRAVEL EXPENSES COVERED |
|---|---|---|---|---|---|---|
| SILVER | NONE | YES | NO | YES | NO | NO |
| GOLD | M-F 8AM-4PM | YES | YES | YES | YES | YES |
| PLATINUM | 24-7 | YES | YES | YES | YES | YES |

**TRAINING AND PARTS**

For Customers who maintain their own equipment, Controlled Power offers hands on training at our training facility and part kits. For more information, contact Controlled Power Customer Support Department at 1-800-521-4792.

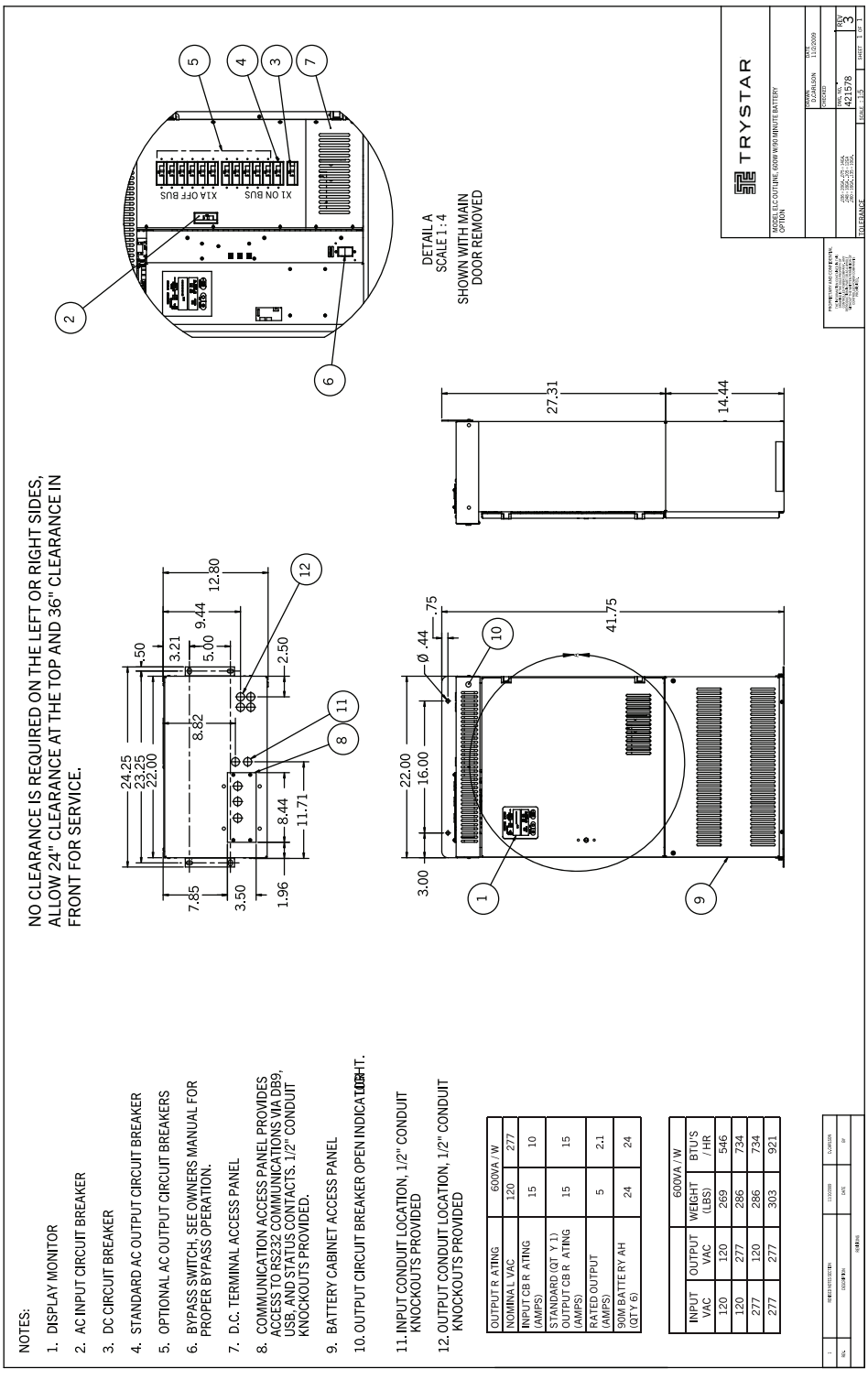
Individual components are available upon request, please contact the factory for specific part numbers and prices. When contacting the Parts Department, please have the unit's full model number and serial or system number. Call 1-800-521-4792.

# APPENDIX A

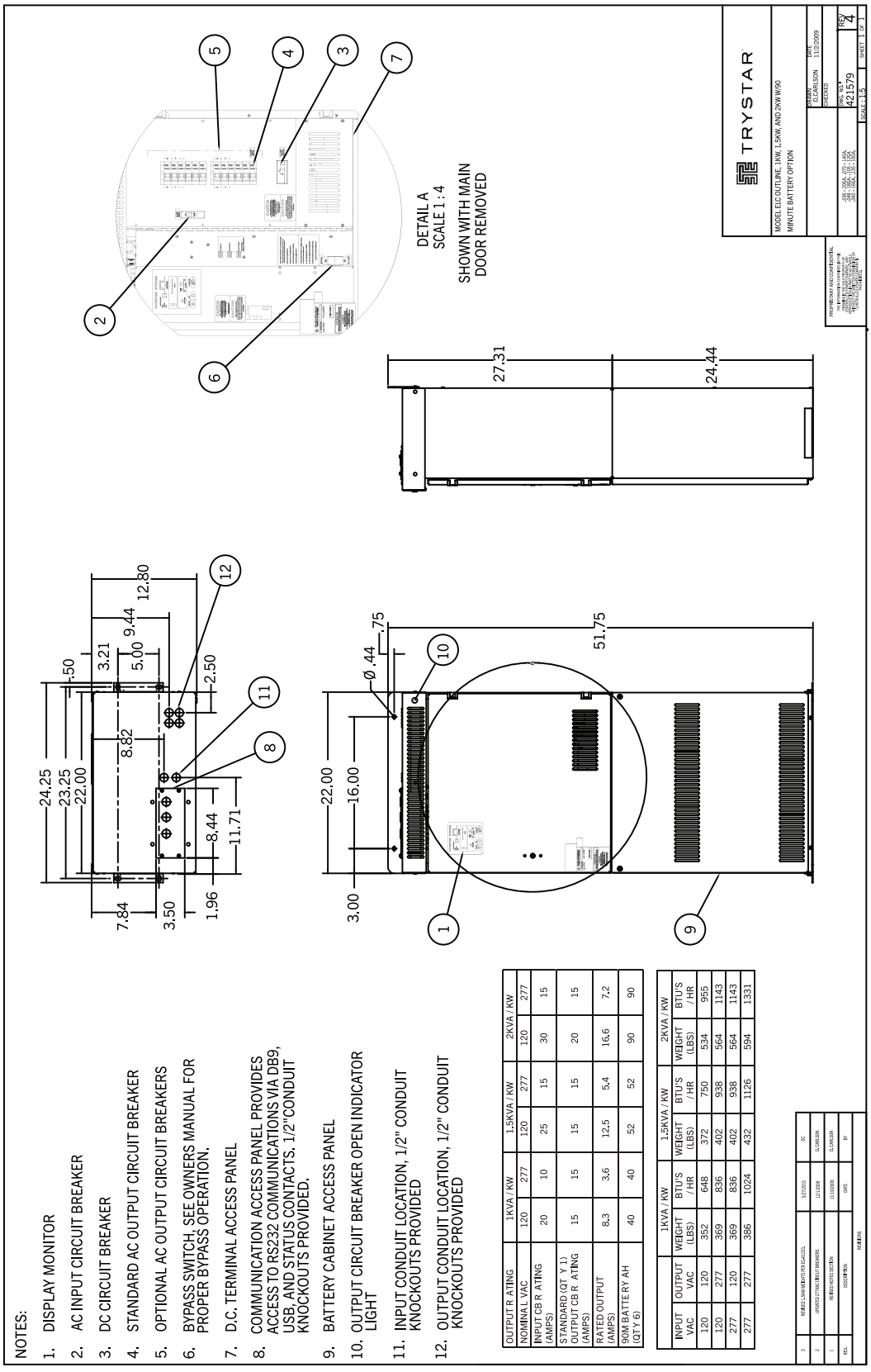
## APPENDIX A
## RELATIVE DRAWINGS
## &
## SCHEMATICS

# CABINET OUTLINE

## 600W



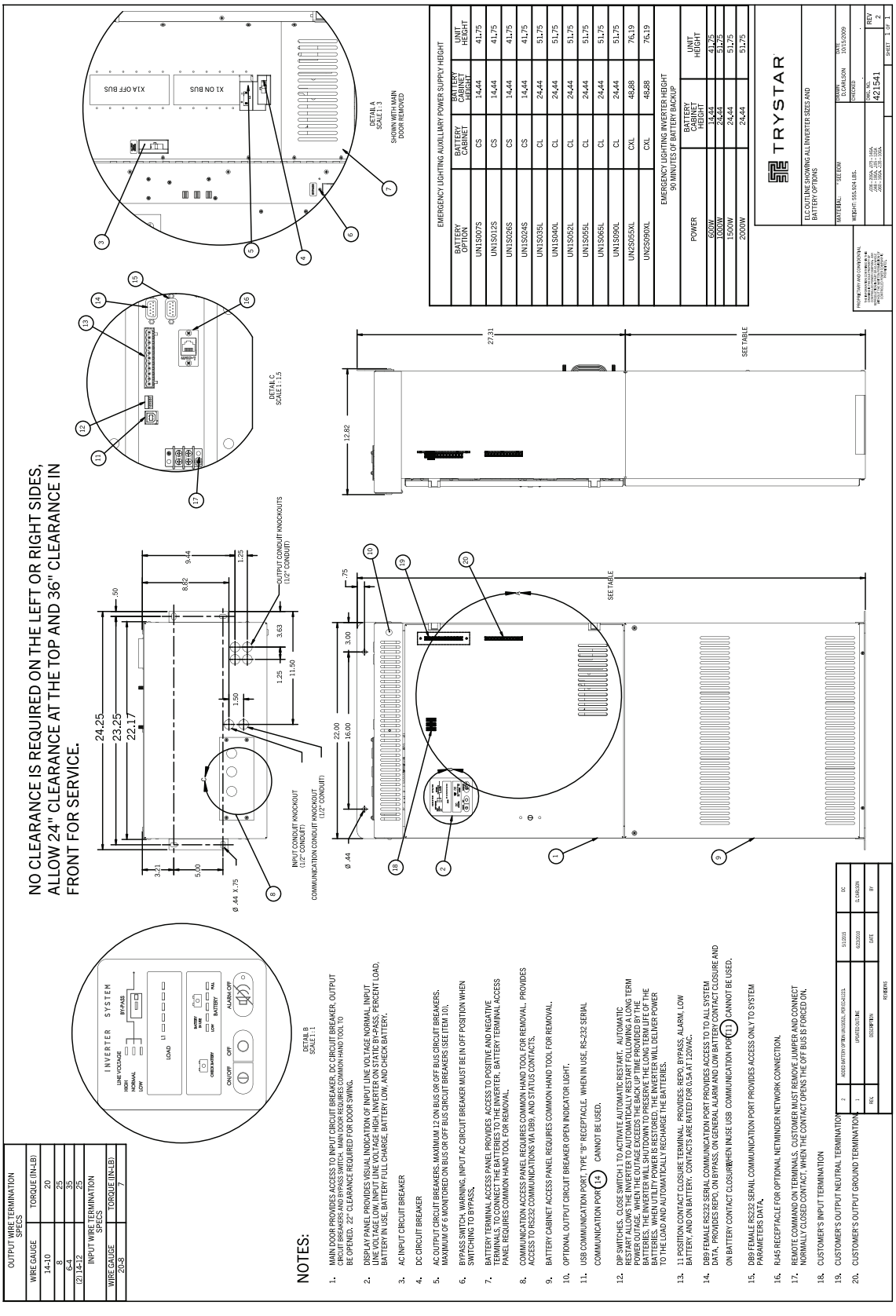
## 1KW - 2KW




| OUTPUT RATING | 1KVA / KW | | 1.5KVA / KW | | 2KVA / KW | |
|---|---|---|---|---|---|---|
| NOMINAL VAC | 120 | 277 | 120 | 277 | 120 | 277 |
| INPUT CB RATING (AMPS) | 20 | 10 | 25 | 15 | 30 | 15 |
| STANDARD (QTY 1) OUTPUT CB RATING (AMPS) | 15 | 15 | 15 | 15 | 20 | 15 |
| RATED OUTPUT (AMPS) | 8.3 | 3.6 | 12.5 | 5.4 | 16.6 | 7.2 |
| 90M BATTERY AH (QTY 6) | 40 | 40 | 52 | 52 | 90 | 90 |

| INPUT VAC | OUTPUT VAC | 1KVA / KW | | 1.5KVA / KW | | 2KVA / KW | |
|---|---|---|---|---|---|---|---|
| | | WEIGHT (LBS) | BTU'S / HR | WEIGHT (LBS) | BTU'S / HR | WEIGHT (LBS) | BTU'S / HR |
| 120 | 120 | 352 | 648 | 372 | 750 | 534 | 955 |
| 120 | 277 | 369 | 836 | 402 | 938 | 564 | 1143 |
| 277 | 120 | 369 | 836 | 402 | 938 | 564 | 1143 |
| 277 | 277 | 386 | 1024 | 432 | 1126 | 594 | 1331 |

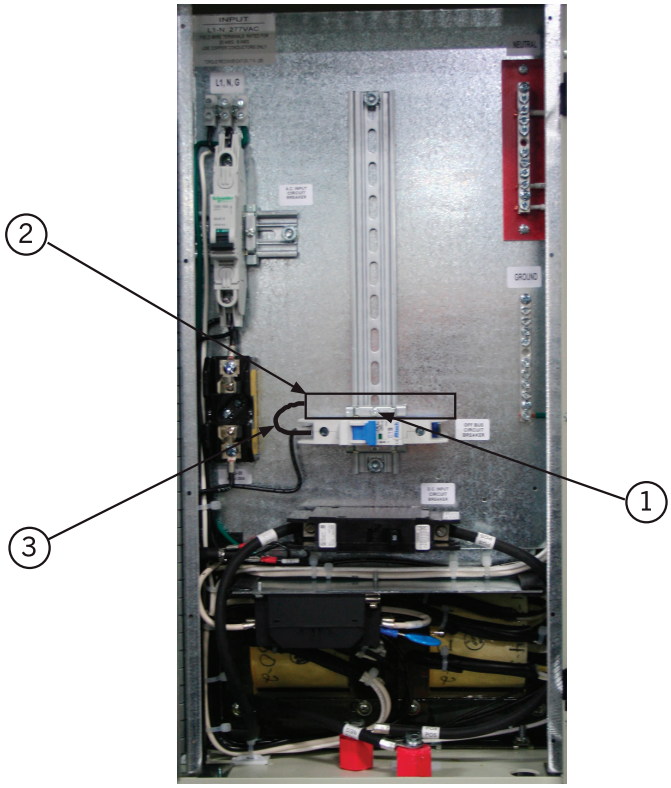
## ALL SIZES - ALL BATTERY CABINET OPTIONS



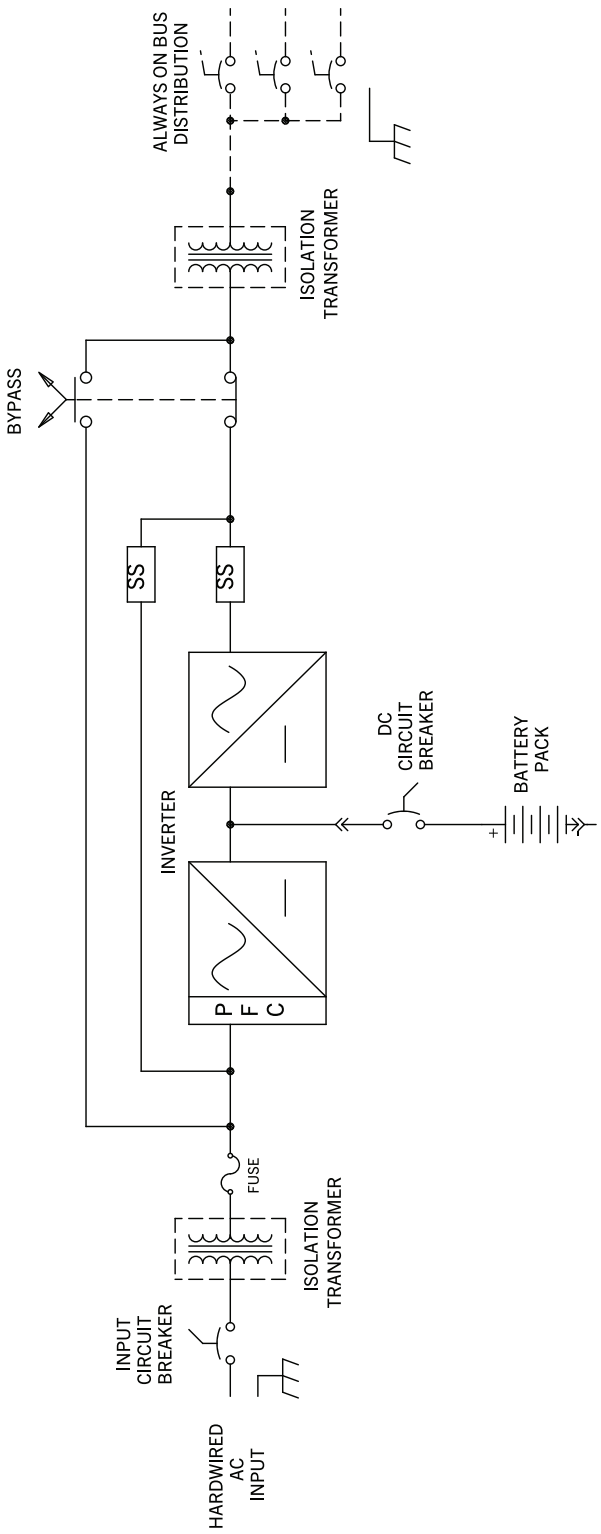
# ADDING OUTPUT BREAKERS

1. Loosen the breaker hold down bracket and slide the bracket up to make room for the new breaker.
2. Install the new breaker by snapping it in place on the din rail. Slide the breaker hold down bracket back down so it is tight against the new breaker and tighten into place.
3. Install a jumper wire from the line side of the breaker below the new breaker to the line side of the new breaker. For 277V outputs use #12 AWG type TEW wire. For 120V outputs use #10 AWG type TEW wire. Refer to the table below for proper torque specifications.

| OUTPUT WIRE TERMINATION SPECS | |
|---|---|
| WIRE GAUGE | TORQUE (IN-LB) |
| 14-10 | 20 |
| 8 | 25 |
| 6-4 | 35 |
| (2) 14-12 | 25 |
| INPUT WIRE TERMINATION SPECS | |
| WIRE GAUGE | TORQUE (IN-LB) |
| 20-8 | 7 |



# ONE LINE DIAGRAM



# CUSTOMER NOTES AND SETTINGS

TRYSTAR®

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