TSi POWER

Operating Manual for:

Outdoor XUPS-1200B-0780

MC00048
Issue 2, May, 2013

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LIMITED WARRANTY
TSi Power Corporation warrants this product to be free from defects in materials and workmanship for two (2) years from the date of purchase from TSi Power or its authorized representatives. TSi will repair (or at its option, replace) any defective component(s) during this warranty period.

To make a request or claim for service under this limited warranty, the original purchaser must return the product, in the original shipping container or equivalent, to TSi Power or its authorized agent, accompanied by a written receipt showing the date of purchase and both the model name and serial number of the product.

Warranty does not cover transportation costs. Damage by misuse, accident or unauthorized tampering of the product is not covered by the warranty. NO OTHER WARRANTIES ARE EXPRESSED OR IMPLIED. TSI IS NOT LIABLE FOR CONSEQUENTIAL DAMAGES. THIS WARRANTY GIVES YOU SPECIFIC LEGAL RIHTS, AND YOU MAY ALSO HAVE OTHER RIGHTS WHICH VARY FROM STATE TO STATE.

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REVISIONS

ISSUE	DATE	REASON FOR REVISION
2	May, 2013	Issue 2

1. GENERAL

1.1 PRODUCT APPLICATION

This outdoor UPS is ideal for the protection of sewage control systems / perimeter surveillance and security/gate control systems, LED traffic light/ roadway display systems and industrial remote terminal units (RTUs). It is equipped with wide-temperature, pure lead, gel batteries and is housed in a weather-protected enclosure. It offers line-interactive automatic voltage regulation, surge protection with heavy duty noise filtering, communications capability and optional extended battery backup.

Figure 1: The XUPS-1200B-0780 Cabinet

1.2 SAFETY ALERTS

SAFETY SIGNAL WORD DEFINITIONS

This document contains safety alert pictorial Symbols and Words that point out areas and procedures that require special attention with regards to safety. These Symbols and Words are defined in ANSI Z535.4-1998, Product Safety Signs and Labels.

DANGER:

DANGER ***indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.***

WARNING:

WARNING ***indicates a potentially hazardous situation which, if not avoided, will result in death or serious injury.***

CAUTION:

CAUTION ***indicates an imminently hazardous situation which, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices.***

The safety alert pictorial symbol appears in this document to make users aware of important operating and safety concerns.

1.3 GENERAL CABINET DESCRIPTION

- Built-in automatic voltage regulation enables a wide-input voltage window to deliver power while preventing unnecessary battery drain.
- LED status indicators show voltage, load and battery levels.
- The XUPS is compatible with high-quality generators.
- The cabinet can be pad, pole, or wall mounted for utmost mounting flexibility.
- Rain tested to UL 50E standards.
- Heavy-duty surge protection and noise filtering protects load and UPS.
- The XUPS uses wide-temperature, pure lead, gel batteries and internal cooling fan to extend battery life and protect electronic components.

- Operates in line mode with bad battery bank, which prevents unscheduled service calls.
- The XUPS is easier to repair because internal circuit board assemblies are connectorized.
- Precise output current limiting permits start of induction motors and other difficult loads.
- Includes a two-year limited warranty.

1.4 OVERALL DIMENSIONS – The XUPS-1200B-0780 cabinet is 24" (610 mm) H x 24" (610 mm) W x 16.5" (419 mm) D and weighs 295 lbs/133.8 kg (with 4 batteries), see Figure 2.

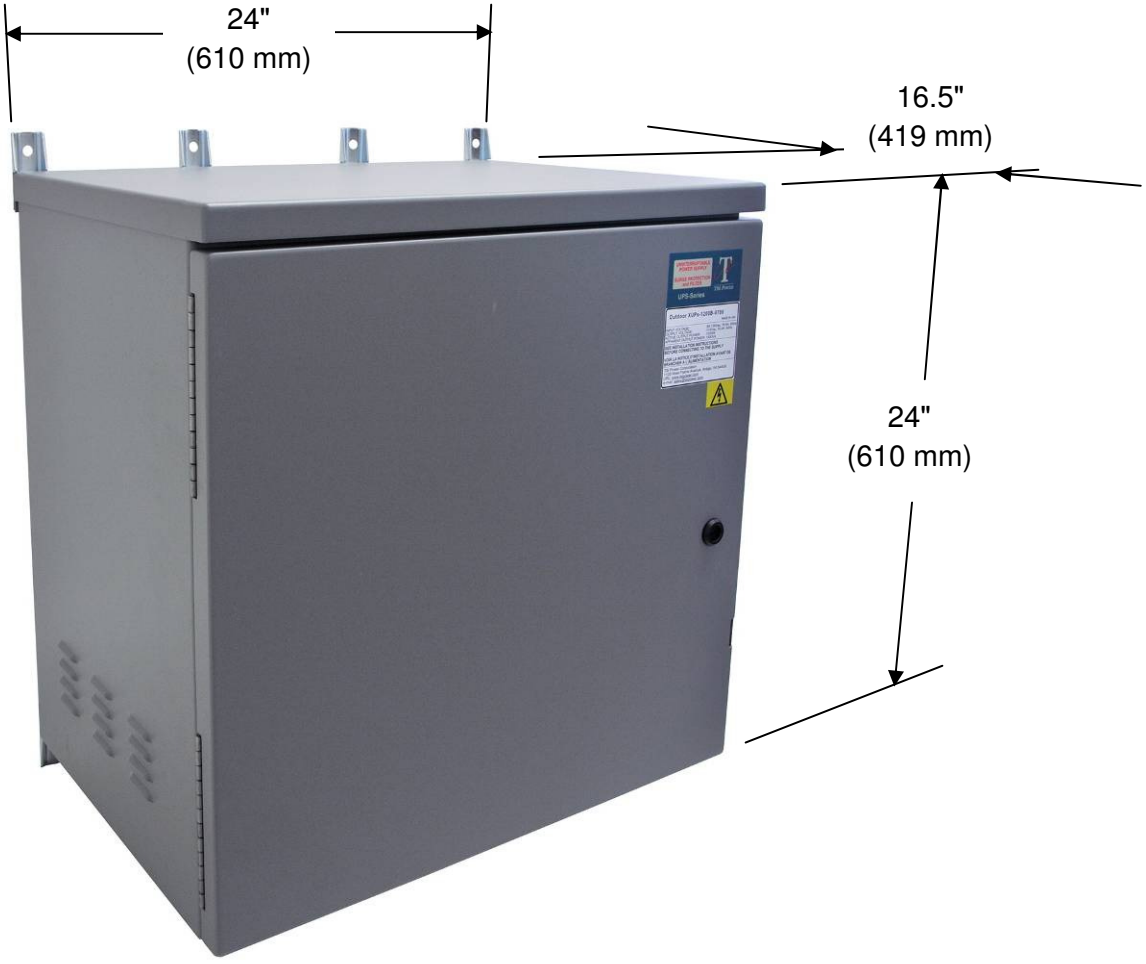

Figure 2: Outdoor XUPS-1200B-0780 Dimensions

1.5 CONSTRUCTION – The XUPS-1200B-0780 cabinet is constructed of 5052-H32 aluminum and finished with a gray polyester powder coat that is designed to protect against corrosion, water intrusion UV radiation and impact resistance. The XUPS-1200B-0780 outputs 1050 W at 115 V.

1.6 DOORS & LOCKS – The electronic/battery compartment is accessed by a front door which is retained by stainless steel hinges and secured by a quarter–turn lock. This lock provides for proper compression gasket sealing and prevents unauthorized entry.

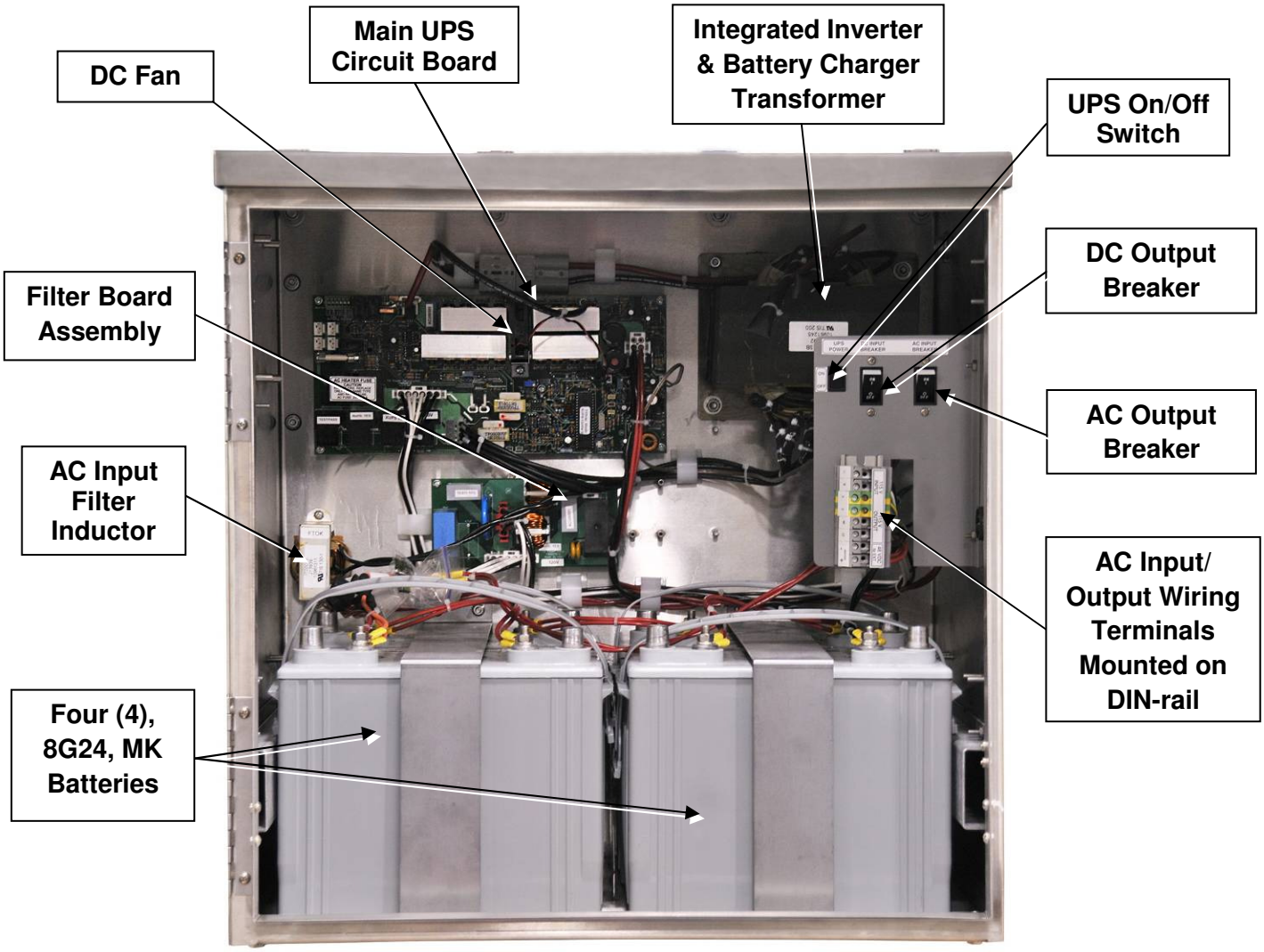

Figure 3: Electronic/Battery Compartment w/Door Open

1.7 FRONT ACCESS (Electronic/Battery Compartment) See Figure 3

With the front door open, both the electronics and batteries are readily accessible for ease of testing, servicing or component replacement.

2. MAJOR COMPONENT/CIRCUIT DESCRIPTIONS

2.1 XUPS WIRING DIAGRAM –

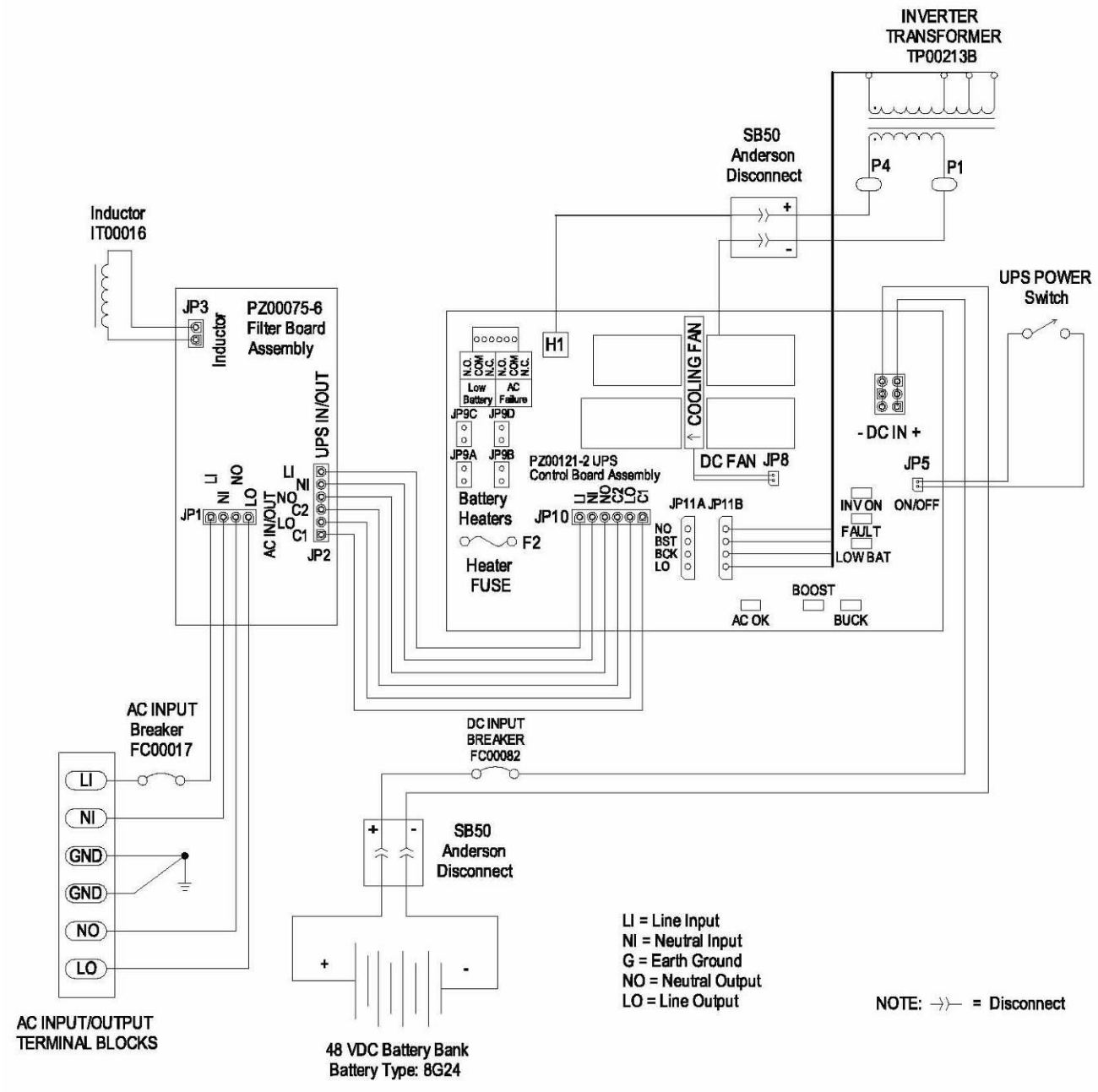

Figure 4: XUPS-1200B-0780 Wiring Diagram

2.2 INVERTER, CHARGER & VOLTAGE REGULATION TRANSFORMER

The main transformer of the XUPS is connected to the main circuit board and performs three functions: (see Figure 5):

1. Inverter transformer
2. It acts as an auto transformer adjusting the mains voltage as required
3. It charges the Battery Bank as required

Figure 5: Inverter & Voltage Regulation Transformer

2.3 INVERTER, CHARGING & VOLTAGE REGULATION MAIN CIRCUIT BOARD

The control board of the XUPS uses a rugged design with a microprocessor-controlled 20 kHz sine wave inverter (see Figure 6). The circuit boards are conformally coated for use in severe outdoor environments. The control board includes integral LED indicators for AC OK, BOOST and BUCK as well as INV ON, FAULT and LOW BAT to provide a real-time status of the XUPS' operation.

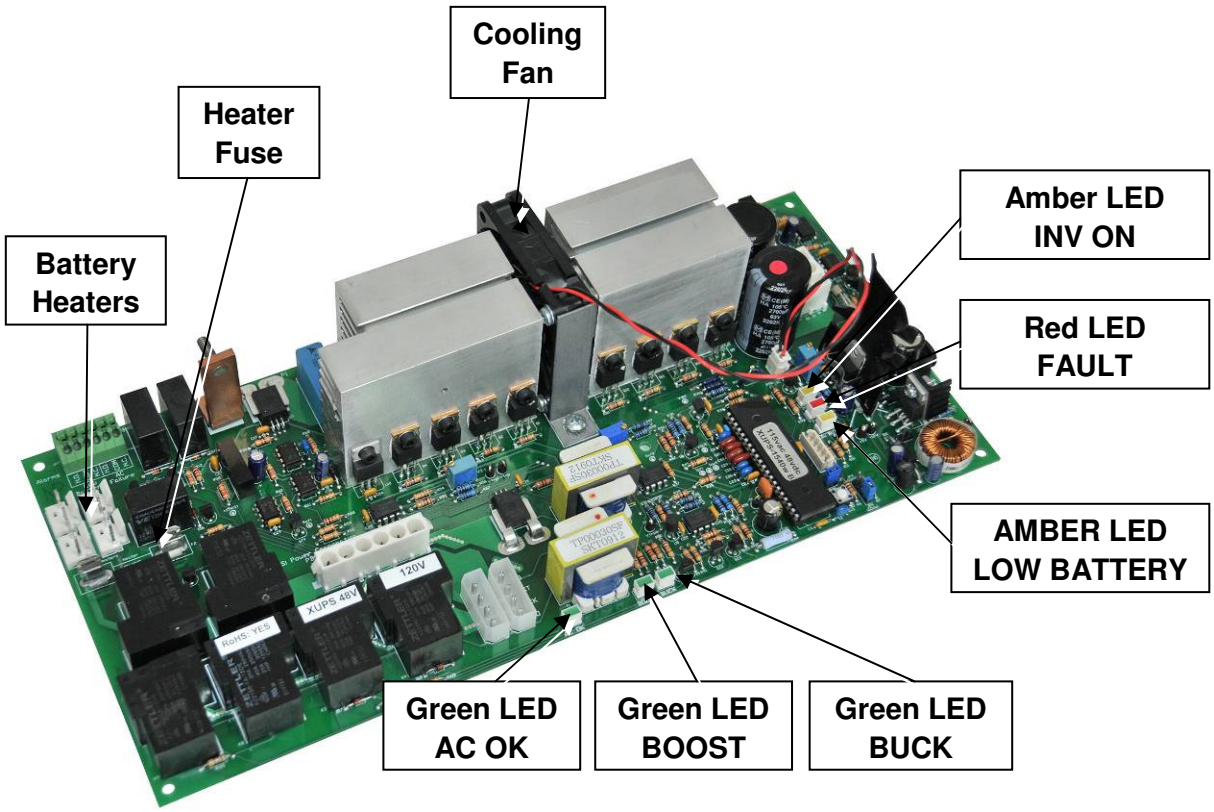

Figure 6: Main Inverter, Charging & Voltage Regulation Circuit Board

2.4 FILTER BOARD ASSEMBLY

The XUPS-1200B-0780 is protected against surge voltages by a proprietary circuit board. This board uses a 40mm MOV to provide protection and assure the continued function of the XUPS (see Figure 7).

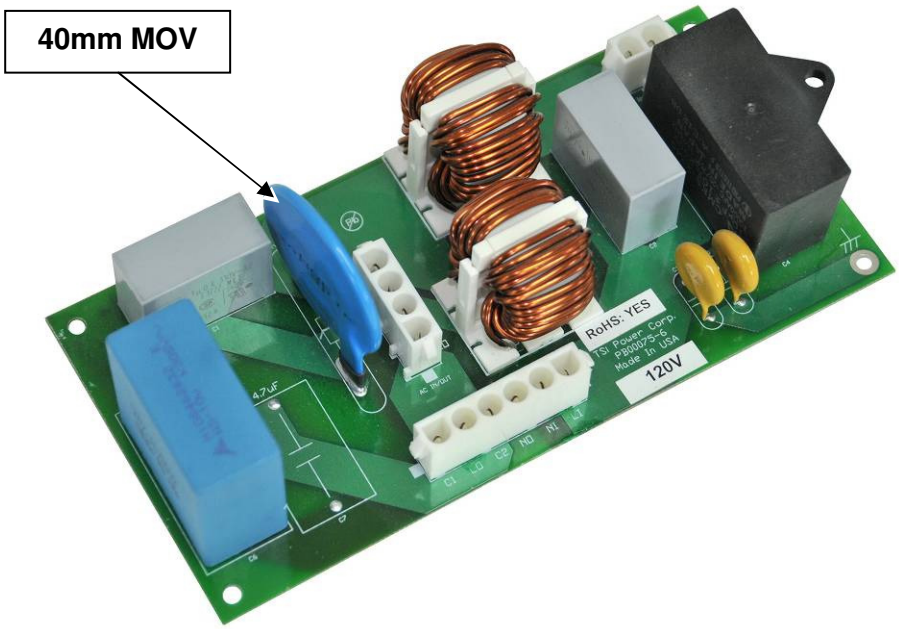

Figure 7: Filter Board Asssembly

2.5 INPUT FILTER INDUCTOR

This 1mh, iron core filter inductor is off board and is placed after the surge protection circuit. It filters out normal mode noise between the line and neutral branches of the incoming AC (see Figure 8).

Figure 8: AC Input Filter Inductor

2.6 ALARM CONNECTIONS

Alarm connection terminations which have been integrated into the main control board and are located in the upper left corner of the board. To connect the alarm wires, insert the stripped wire into the desired Wire Inlet and press the corresponding Compression Tab on the connector (see Figure 9).

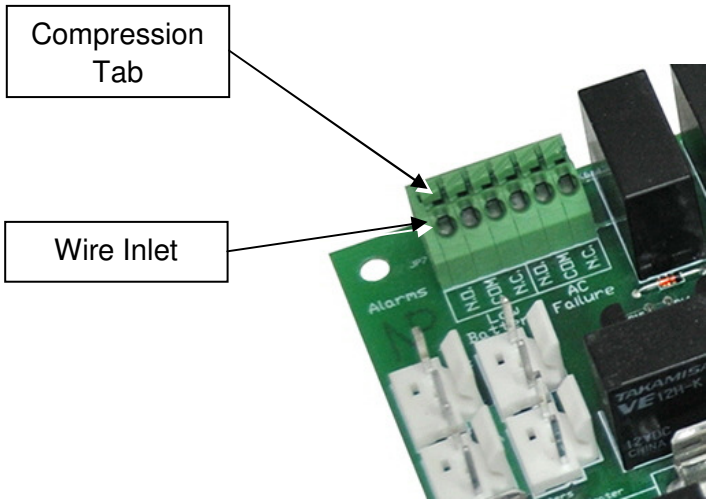

Figure 9: Alarm Connections

2.61 Low Battery Alarms

N.O. – COM: Open = Battery OK

N.C. – COM: Closed = Battery OK

2.62 AC Failure Alarms

N.O. – COM: Open = AC OK

N.C. – COM: Closed = AC OK

3. INSTALLATION

IMPORTANT: ONLY QUALIFIED PERSONNEL SHOULD PERFORM THE INSTALLATION OF THIS PRODUCT.

CAUTION: Make sure that appropriate lifting equipment is used and that company safety practices are followed.

3.1 TYPE – The XUPS Series can be installed in any one of three configurations:

3.11 Wall - Mount

- In this configuration, the unit can be mounted vertically to a solid wall by means of six (6) mounting feet that are provided and attached as standard items when the XUPS is ordered (see Figure 10).
- Before this unit is mounted, it is important to determine the load bearing capabilities of the mounting surface and to make sure that company practices regarding safety are followed.

Figure 10: Wall Mounting of XUPS

3.12 Pole - Mount

- When ordering the XUPS for this application, an optional pole-mount bracket must be included. This bracket will come installed on the rear of the unit (see Figure 11).

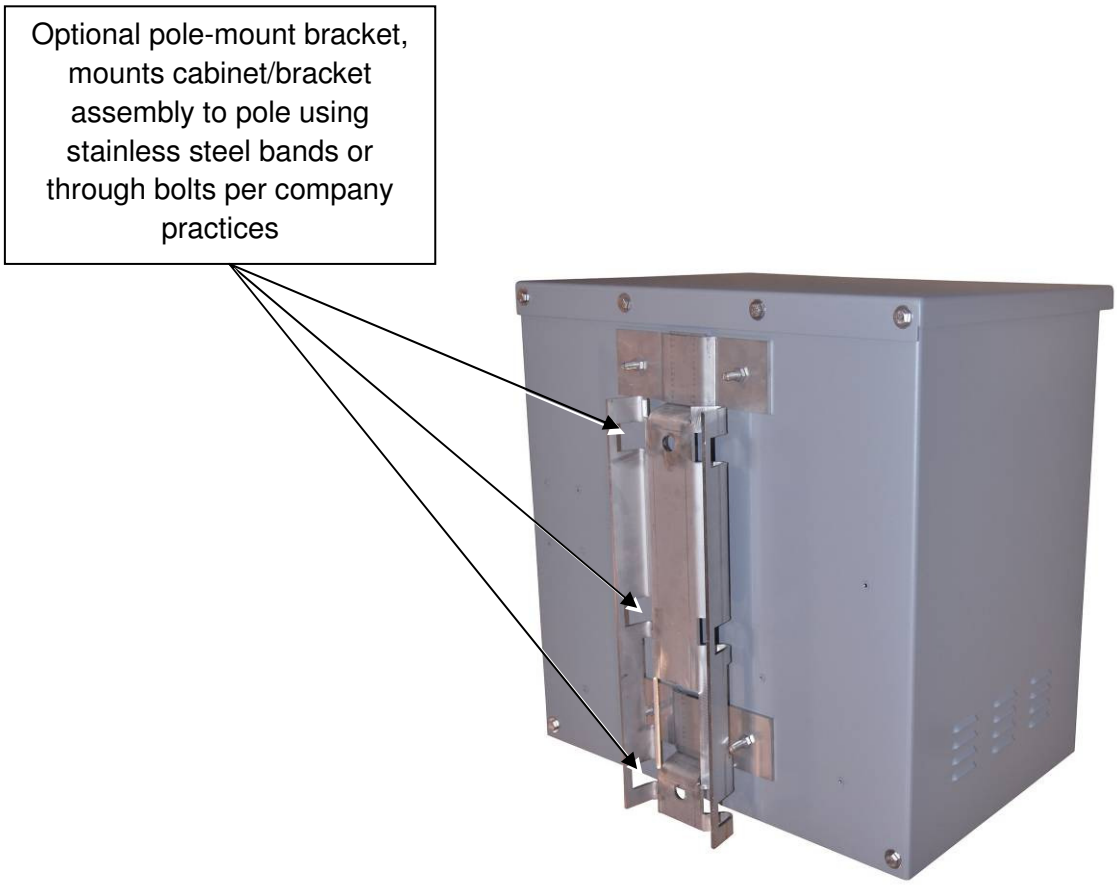

Figure 11: Mounting of XUPS to a Pole

- This product is intended for installation in RESTRICTED ACCESS LOCATIONS ONLY.
- It is recommended that this unit be installed as a Walk-Up unit making sure that the center of the door is at an eye-level height for optimum accessibility and ease of installation.
- The cabinet should be mounted on the power pole in such a manner so that the door doesn't open onto a road or a driveway.
- Position the cabinet on the pole so that the cabinet rests where the cable can easily enter the cabinet from the right side. If bringing in cable through a conduit up the pole, make sure that the trade size of the conduit is no larger than ½". Larger conduit will not fit through the cable fitting.

- Make sure that the door clearances around the unit provide for unobstructed access.
- The cabinet/bracket assembly should be fastened to the pole by means of stainless steel banding of size and type to be determined by local practices.
- Provide a 20 A, 120 V service with a disconnect switch in the near vicinity of the XUPS.

3.13 Pad-Mount

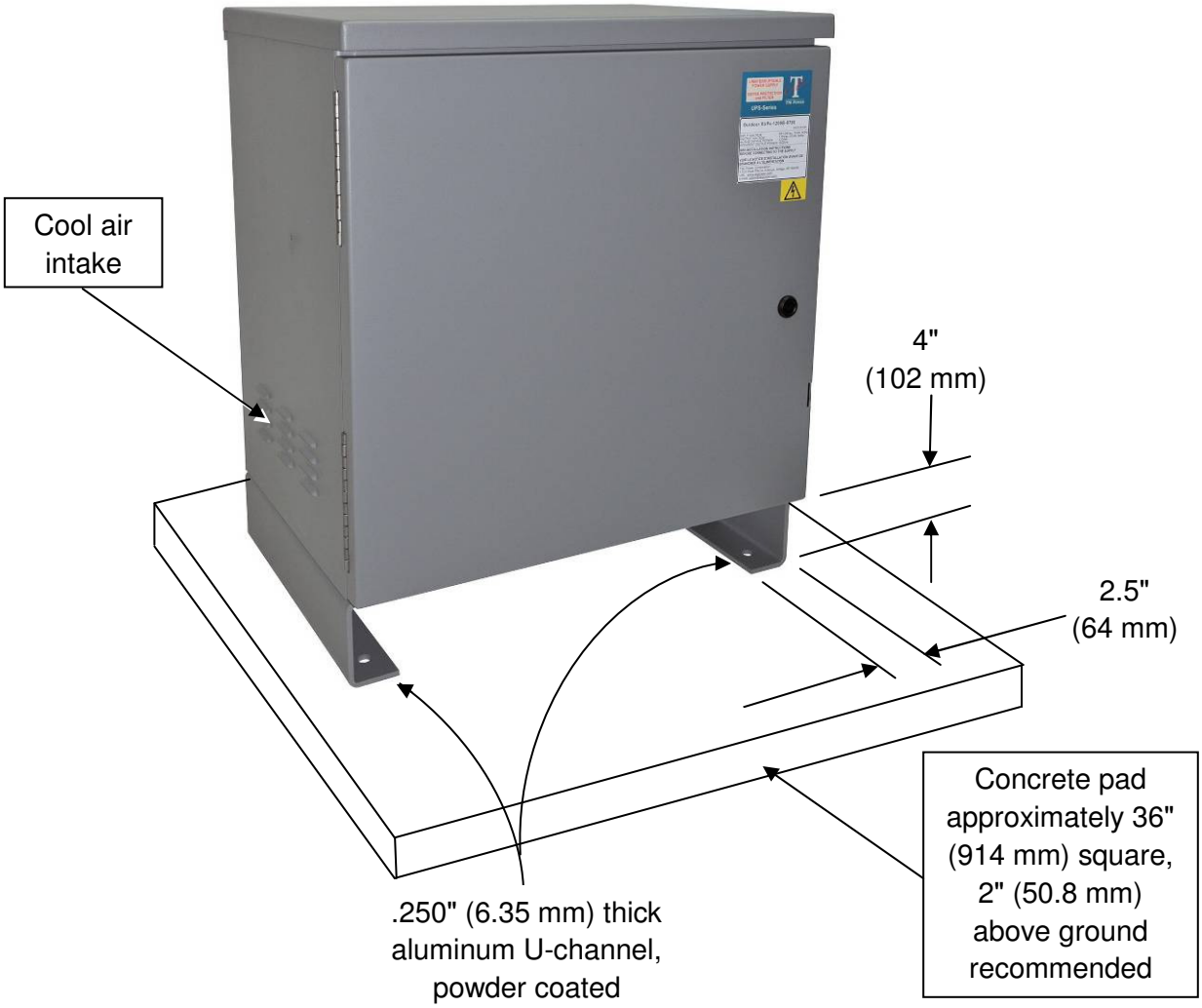

Figure 12: Pad-Mounting the XUPS

- When the XUPS is to be mounted on a pad, two optional painted U-channels must also be ordered. They will be attached to the cabinet when shipped.
- Prepare ground surface and pour concrete pad per local company practices and to approximate size as shown in Figure 12. If composite pad is used, follow manufacturer's instructions.
- Use the four (4) pre-punched holes in the U-channels to position and mount the cabinet assembly to the pad per local practices.

3.2 REQUIRED TOOLS

- A standard screwdriver to open the cabinet door
- A standard telco socket wrench set and standard mechanic telco tools
- Appropriate lifting equipment to lift and secure the unit to the approriate mounting location, pole, pad or wall. The weight with four batteries is 295 lbs. (133.8 kg).

3.3 UNPACKING & INSPECTION

3.31 The units are shipped in wooden crates, each containing one, two or three units. The units are placed on a pallet, back-to-back, with protective material between them.

3.32 Carefully open the crates, making sure not to damage the units, and remove the protective wrap and packing material.

3.33 Before the units are removed from the crates, inspect them for physical damage.

3.34 If no damage is found, remove the units from the crates, open the door and again inspect for damage. If damage is found in either steps 3.32 or 3.33, do not accept the shipment and file a claim with the carrier. Contact TSi Power for assistance if necessary.

CAUTION: The units may contain charged batteries capable of causing fire and injury if shorted across terminals. Be very careful not to short terminals accidentally when unpacking.

4. POWERING UP THE XUPS

Before powering up the unit, make sure that the air inlet and exhaust ports are free of obstruction to prevent overheating.

4.1 AC INPUT CONNECTIONS

4.11 Make sure that an AC, 20 A, 120 V service with a disconnect switch is provided near the XUPS and confirm that it is switched **OFF.**

4.12 If bringing in cable through a conduit up the pole, make sure that the trade size of the conduit is ½" and not larger. Larger conduit will not fit through the 1/2" holes for cable entry which are on the right side of the unit, see Figure 13. Cool air intake louvers are on the left side, see Figure 12.

Figure 13: Cable Entry and Exit Ports in Right Side of Cabinet

4.13 Use 12 AWG wire with a 105° C insulation system for all conductors.

4.14 Allow for sufficient wire length to reach the wiring terminals and leave enough slack to reduce the stress in the wires.

4.15 Strip approximately 3/8" (9.52 mm) insulation from the end of each of the six (6) incoming AC wires and terminate them in the wiring terminals located on the right side of the cabinet (see Figure 14).

4.16 Terminate the incoming wires on the terminals marked as shown in Figure 14 and as follows:

- **LI** is for phase conductor (black)
- **NI** is for neutral conductor (white)
- **G** is for safety ground

4.17 Terminate the outgoing wires on the terminals marked as shown in Figure 14 and as follows:

- **LO** is for phase conductor (black)
- **NO** is for neutral conductor (white)
- **G** is for safety ground

4.18 In terminating the wires as outlined in 4.16 & 4.17 above, use a slotted screwdriver to tighten the terminal screws until the wires are secure. Do not apply excessive torque to make sure that the terminal screws are not damaged. Once the screws have been tightened, gently tug on the wires to make sure that they are properly connected.

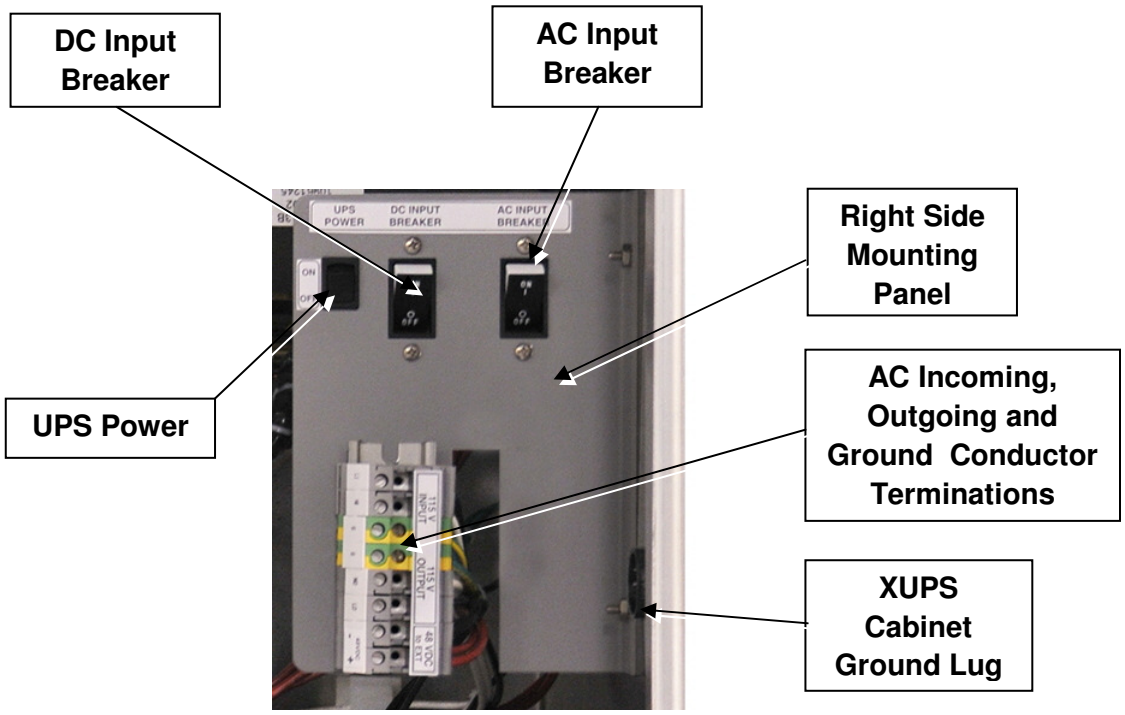

Figure 14: Incoming & Outgoing Wire Terminations

WARNING: TO PREVENT DAMAGE MAKE SURE TO CHECK THAT THE INPUT & OUTPUT WIRES ARE NOT REVERSED

4.2 ENERGIZING THE XUPS

The following steps outline the procedures for putting the XUPS into operation:

4.21 Turn on the AC, 20 A, 120 V service by putting the AC Breaker disconnect switch to the **ON** position (see Figure 14).

4.22 Turn on the **DC INPUT BREAKER**

4.23 Turn on the UPS POWER SWITCH.

4.24 Verify that all LEDs on the Control Board Assembly (see Figure 6) illuminate one by one. This may take approximately five (5) seconds.

4.25 Verify that the following LEDs are illuminated:

1. Verify that the **AC OK** is illuminated.

2. If LED **INV ON** remains on or fluctuates between **AC OK** and **INV ON**, check with power company for out of mains voltage tolerance.

3. Once the green LED **AC OK** stabilizes and remains ON: **THE SYSTEM IS NOW READY FOR OPERATION.**

5. MAINTAINING THE XUPS-1200B-0780

To make sure that the unit is functioning properly and safely, check the following periodically or at least once a year:

5.1 XUPS OPERATION

5.11 Switch-off AC Breaker disconnect.

5.12 Verify that the XUPS operates in **Inverter Mode** with **Amber LED ON**.

5.2 CABINET INTEGRITY

5.21 Check the air intake and exhaust for dust and debris. Remove as required.

5.22 Check for moisture and water accumulation and remove as necessary.

5.23 Check to make sure locks are functioning properly and have not been vandalized. Replace if necessary.

5.24 Check the gasketing to make sure that door seals are still tight and effective. Replace if necessary.

5.3 BATTERY MAINTENANCE

See Section 6 for battery replacement.

5.31 Check the batteries for electrolyte leakage. Clean up and replace if necessary.

5.32 Disconnect battery cable from battery to be checked. Measure the battery terminal voltage of all batteries. Each battery should have a terminal voltage of 13.5 VDC ±0.3V. Replace **All** batteries if the difference is larger than ±0.3V.

6. TROUBLESHOOTING & COMPONENT REPLACEMENT

6.1 TROUBLESHOOTING

The Outdoor XUPS-1200B-0780 is designed to facilitate quick replacement of circuit boards in the field. Therefore, troubleshooting procedures described in this manual are limited to visual inspection and board and battery replacement only. More detailed troubleshooting, repair and calibration can only be done at the TSi Power factory.

6.2 REPLACING BATTERIES

DANGER: The servicing or replacement of batteries should be restricted to qualified and experienced personnel.

- **Use extreme care when handling the batteries.**
- **When lifting the batteries wear heavy gloves and safety glasses at all times.**
- **Do not wear rings, metal wrist bands, or bracelets.**
- **Do not allow metal objects to come in contact with the terminal side of the batteries.**
- **Use tools with insulated handles.**
- **Disconnect charging source prior to connecting or disconnecting battery terminals.**
- **Determine if battery is inadvertently grounded. If inadvertently grounded, remove source from ground. Contact with any part of a grounded battery can result in electric shock. The likelihood of such shock can be reduced if such grounds are removed during installation and maintenance.**

CAUTION: Do not dispose of batteries in a fire. The batteries may explode.

CAUTION: Do not open or mutilate batteries. Released electrolyte is harmful to the skin and eyes. It may be toxic.

CAUTION: **A battery can present a risk of electric shock and high short-circuit current.**

AVERTISSEMENT: Ne jetez pas les batteries dans un feu. Elles pourraient exploser.

AVERTISSEMENT: N'ouvrez pas et n'altérez pas physiquement les batteries. La solution électrolyte qui serat libérée est dangereuse pour la peau et des yeux. Elle pourrait même être toxique.

ATTENTION: Une batterie peut présenter un risque de décharge électrique et un fort courant de court-circuit.

6.21 The battery compartment accomodates four (4) 73.6 Ah, 8G24FT, MK Batteries. See Figure 15.

6.22 Only 8G24FT (without handle) wide temperature, sealed, valve-regulated gel batteries made by MK Battery should be used. The TSi part number for the battery is VB00014.

6.23 The following battery replacement procedure should be followed:

- Turn off AC circuit breaker,
- Turn off external disconnect,
- Turn off DC circuit breaker,
- Loosen terminal bolts,
- Remove ring terminal connections one by one and save hardware,
- Set battery jumpers aside,
- Remove battery brackets.
- Pull out old batteries carefully, set them aside,
- If heating pads are used, set them aside,
- Install new batteries. If heating pads are used, follow the instructions shown in section 7.
- Reinstall battery brackets,
- Connect battery jumpers and cables using the hardware that came with the new batteries. Tighten bolts and nuts lightly.
- Torque bolts in accordance with battery manufacturer's specifications.

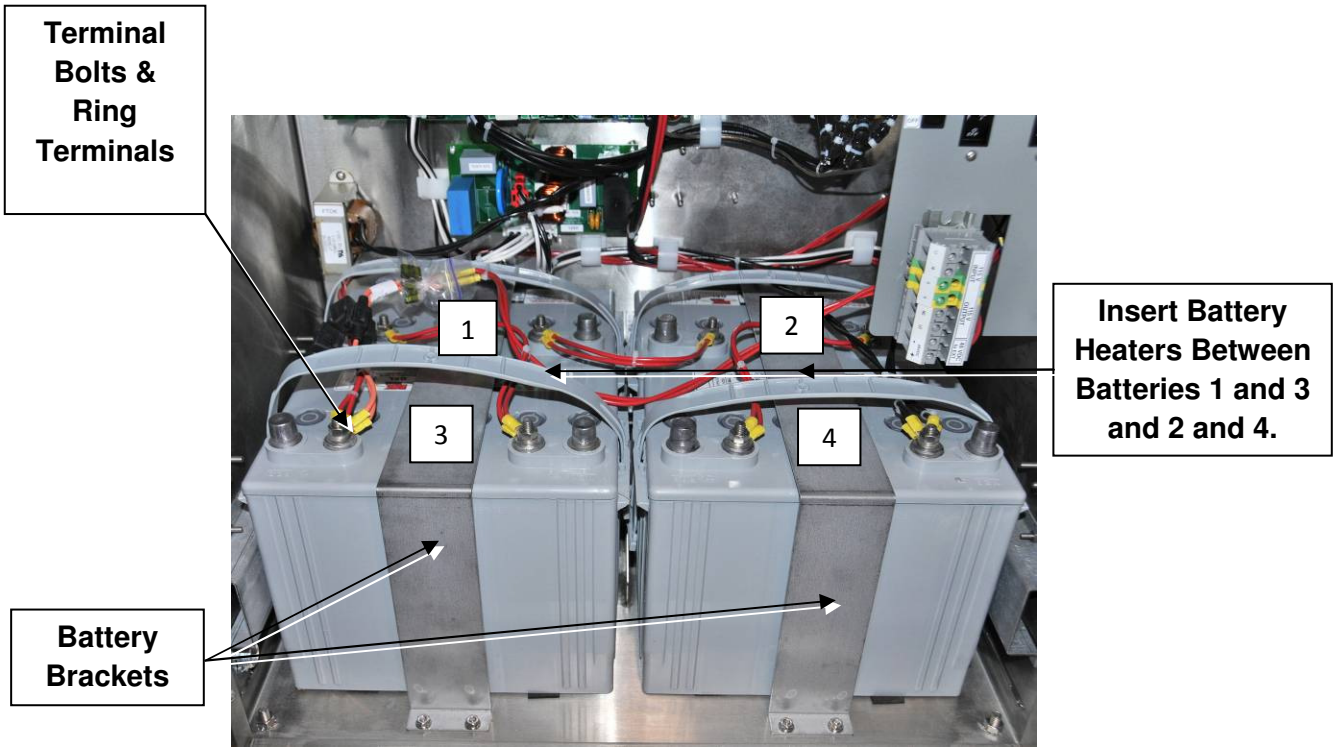

Figure 15: Four (4), 8G24F1 Battery Configuration Shown in Open Battery Compartment

- Check all connections,
- Re-energize system,
- Dispose of old batteries in accordance with battery manufacturer's instructions.

7. OPTIONAL EQUIPMENT

7.1 OPTIONAL BATTERY HEATER CIRCUIT BOARD

The optional battery heating pads are constructed from printed circuit boards with resistor networks that are encapsulated in epoxy (see Figure 16). The AC current flows through the resistors to generate heat. By being pressed against the walls of the batteries, the batteries are heated.

Installation of the heater pads is as follows:

- Turn the AC circuit breaker off,
- Turn the DC circuit breaker off,
- Remove connections between batteries (save hardware),
- Remove battery brackets,
- Remove batteries by pulling them out of compartment,
- Remove ”bumpons” from back wall of compartment,
- Push 2 batteries gently into compartment and against back wall,
- Place heating pads so that they press against the front face of batteries 1 and 2 and the rear face of batteries 3 and 4,
- Push batteries back in,
- The heating pad should now be secure between the batteries,
- Replace battery brackets,
- Run the wires back to the heater connections on the Control PCB and mate connector with header.
- Restart the XUPs.

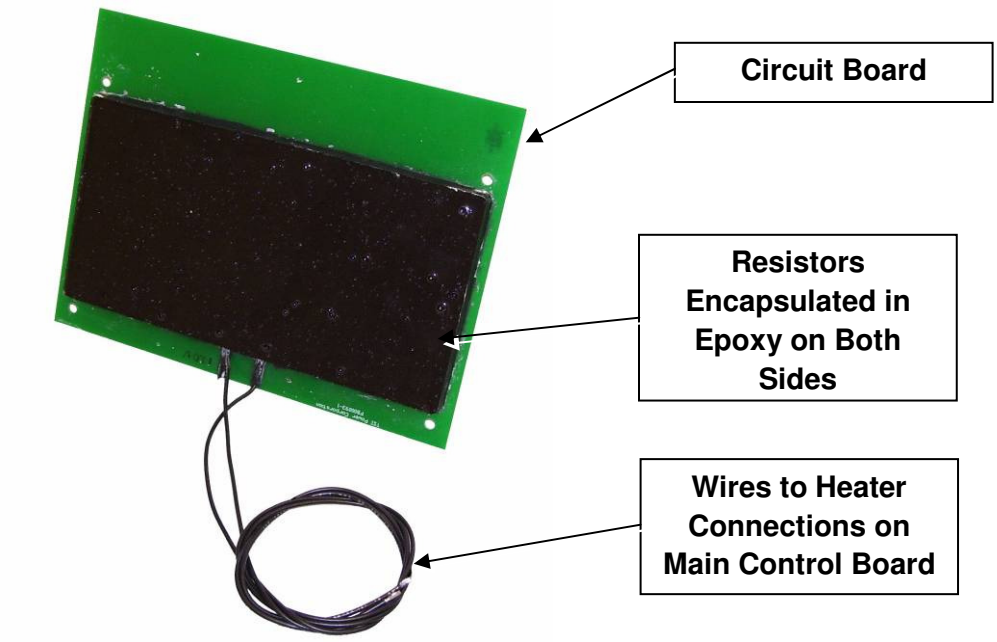

Figure 16: Optional Battery Heater Circuit Board

8. REPAIRS, SERVICE & SPARE PARTS

8.1 REPAIRS - The Outdoor XUPS-1200B-0780 should only be repaired by persons with knowledge of power electronics and electrical safety procedures. Others should contact TSi Power Corporation for a Return Material Authorization (RMA). The TSI service representative will determine if factory repair is necessary and issue an RMA.

A replacement unit will be shipped to certain customers with service agreements. TSI retains the repaired unit.

8.2 SPARE PARTS - The table below contains information on replaceable parts that can be ordered from TSI if necessary.

Description	TSi Part Number	Manufacturer	Mfg. Part No.
Main UPS PCB	PZ00121-2	TSi Power	N/A
Filter/Surge Protection PCB	PZ00075-6	TSi Power	N/A
Input inductor	IT00016	Johnson Electric Coil	J13939
Inverter transformer	TP00213B	Johnson Electric Coil	J14394 (RoH Compliant)
DC Battery breaker	FC00082	Carling Technologies	IELBX1-1-72-40.0-M3-V
AC Input Breaker	FC00017	Carling Technologies	IELBX1-1-72-20.0-M3-V
73.6 Ah battery	VB00014	MK Battery	8G24FT

9. REFERENCE

8.11 SPECIFICATIONS

Input	
Voltage range	96 to 136 VAC
Voltage regulation	115 VAC ± 8%
Frequency	47 - 63 Hz ± 5%
Current max charging	5.2 A

Surge voltage test condition	ANSI/IEEE: 6 kV, 1.2 x 50 µs/3 kA, 8 x 20 µs
Surge voltage let-through	L-N: 450 V L-G: 300 V N-G: 300 V
Circuit Breaker (FC00017)	20 A
Output	
Output Power	1050 W
Voltage	115 V ± 8%
Crest Factor	3 : 1
Waveform & Harmonic Distortion	Sine wave, <3% THD with linear load
Power Efficiency in AC Line Mode	Line: 97%
Power Efficiency in Inverter Mode	Inverter: 92% under full load conditions
Transfer Time AC Line to Inverter	0 to 8 ms
Battery	
Type	Four (4), wide temperature, sealed 12 VDC gel, valve-regulated, lead-acid, maintenance free MK Battery: 8G24FT (sold separately)
Temperature Range Fully Charged	-4° to +140° F (-20° C to +60° C), -40° to +140° F (-40° C to +60° C) with optional battery heater
Capacity Ah @ 20 hr rate and bus voltage	73.6 Ah, 48 VDC
Number of batteries	4
Circuit Breaker	40 A magnetic type
Weight per battery (lb/kg)	52 / 23.8
Dimensions (in/mm)	7.71L x 5.18W x 7.22H/196L x 132W x 183H
Battery backup time vs. load	1.8 hrs at 1050 W / 4.8 hrs at 525 W
Recharge Time	Temperature compensated charger, charge to 90% capacity after full discharge – 20 hrs

Battery Heater Pad	34 W, two required
LED Indicators	
INVERTER ON	Amber, Solid
FAULT ON	Red, Solid
LOW BATT ON	Amber, Solid
BUCK ON	Green, Solid
BOOST ON	Green, Solid
AC OK ON	Green, Solid
Mechanical	
Dimensions (in/mm)	24H x 24W x 16.5D / 762H x 762W x 419D
Weight, without batteries (lb/kg)	87 / 39.5
Environmental	
Operating Temperature* (with heater)	-40° F to +113° F (-40° C to +45° C)
Operating Temperature** (without heater)	14° to +113° F (-10° C to +45° C)
Storage Temperature	-76° F to 140° F(-60° C to 60° C)
Humidity	0 to 95 % non-condensing
* Duration of storage will determine the need for supplemental charge, especially at elevated temperatures. ** Extended exposure to temperatures >40° C may shorten battery life.	
Mounting Configuration	
Wall-Mount (comes equipped w/6 mounting feet – WM2; Pole-Mount (comes equipped w/optional Pole-Mount Bracket – PM2; Pad-Mount (comes equipped w/optional Pad-Mount U-Channels – PAD2)	
Agency Compliance	
Rain tested to UL 50E and designed to UL 60950-1 and UL 1778	

9.2 TSi POWER CONTACT INFORMATION

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