TSi Power Corporation

Outdoor UPs-8229

Description, Installation & Maintenance Manual

MC68229
Issue 2, September, 2009

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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 or its authorized representatives. TSi will repair (or at its option, replace) any defective component(s) during this warranty period. *Excluding batteries. Battery manufacturer's warranty applies to batteries.

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 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	September, 2009	Corrections

1. GENERAL

1.1 PRODUCT APPLICATION

The Outdoor UPs-8229 is designed specifically for powering O-eMTA cable equipment. The product is intended for installation on an exterior wall by means of a provided mounting bracket that is fastened to the wall. The receptacle bracket on the back of the unit mates with the wall bracket. The enclosure is NEMA 3R rated with extra door sealing gaskets to protect the internal components against direct ingress of water and dust. The internal electronic circuit boards are protected by a layer of conformal coating.

Figure 1: The Outdoor UPs-8229 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 FEATURES/COMPONENTS

- NEMA 3R metal enclosure with a front access door,
- Screened air exhaust vents at top and bottom of the cabinet,
- One to four 12V, 31Ah @ 20hr rate, sealed lead acid (VRLA) batteries forming a 12V, 31 to 124AH battery bus (various options),
- AC input surge protection circuit board,
- AC fan for cooling,
- AC/DC input/output wiring terminals mounted for ease of termination,
- AC to DC rectifier module,
- Main circuit board with microprocessor controlled, temperature compensated charger,
- AC on/off switch,
- Battery fuse,
- Four status/alarm signals (alarm interface),
- Optional battery heater pads and battery heater controller with thermostat

1.4 OVERALL DIMENSIONS – Outdoor UPS-8229 cabinet (two battery cabinet)

22.43" (57cm) H x 16" (40.6cm) W x 8.62" (21.6cm) D Weight: 86lbs/39kg

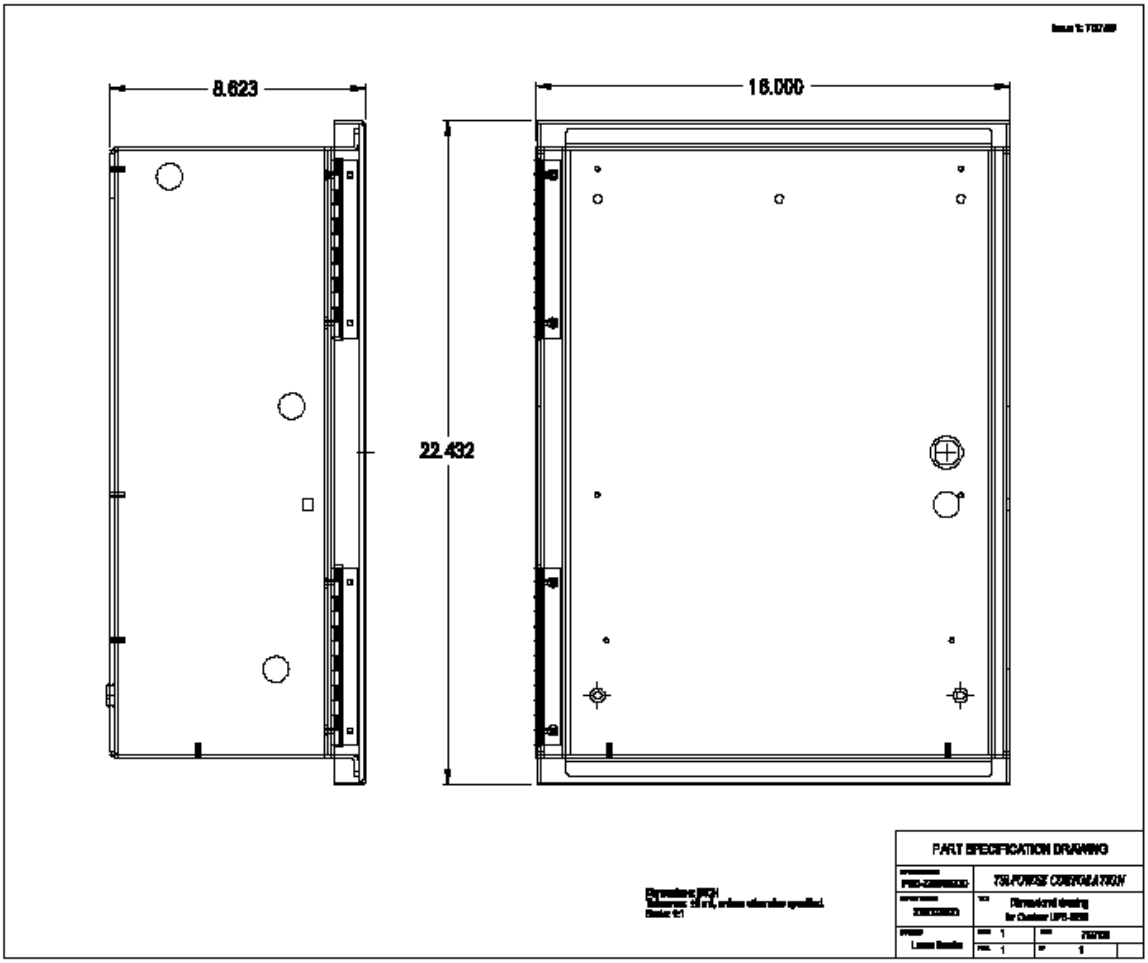

Figure 2: Outdoor UPS-8229 Dimensions

1.5 CONSTRUCTION – The Outdoor UPs-8229 cabinet is constructed of 5052-H32 Aluminum and finished with a gray polyester powder coat that is designed to meet Telcordia specifications for protection against corrosion, water intrusion beyond NEMA 3R, UV radiation and impact resistance.

1.6 DOOR & LOCK – The cabinet door is retained by two stainless steel hinges and secured by a telco tool actuated, quarter–turn lock. This lock provides for proper

compression gasket sealing and prevents unauthorized entry. In addition, an Agbay Barrel type Lock Head Protector and bracket are provided. This enables the customer to choose the proper short barrel and key combination for added security.

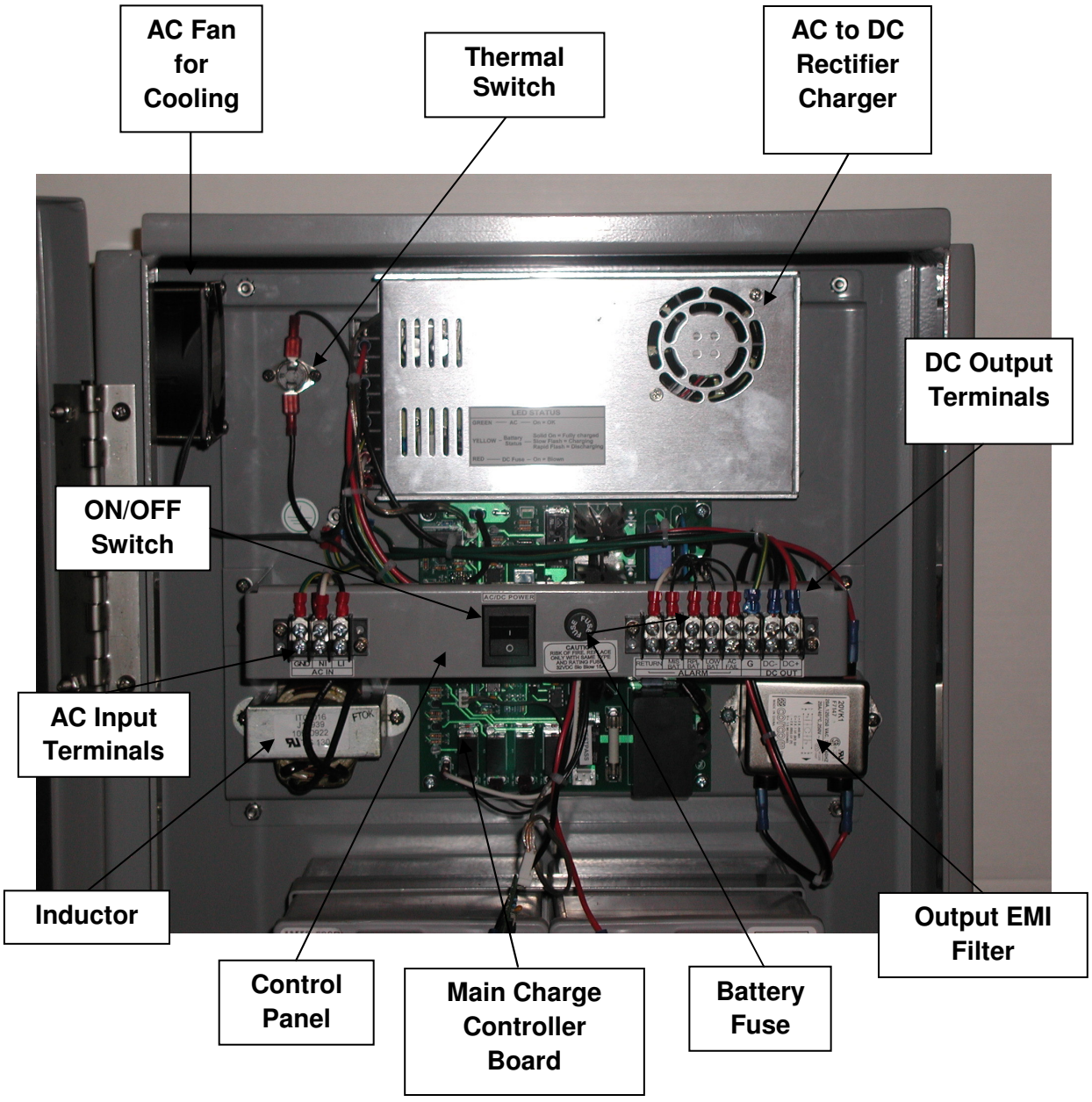

Figure 3: Cabinet with Front Door Open

2. MAJOR COMPONENT/CIRCUIT DESCRIPTIONS

2.1 AC SURGE PROTECTION CIRCUIT – The Outdoor UPs-8229 is protected against AC surge voltages by a proprietary circuit which uses a 40mm MOV in combination with two, 3-element, gas tubes and a series inductor. This surge protection circuit assures that the UPS functions continuously by protecting against dangerous and harmful surge voltages and noise, appearing on the AC mains.

2.2 INPUT FILTER INDUCTOR – This 1mh, iron core filter inductor is off board and is an integral part of the surge protection circuit. It filters out normal mode noise between the line and neutral branches of the incoming AC.

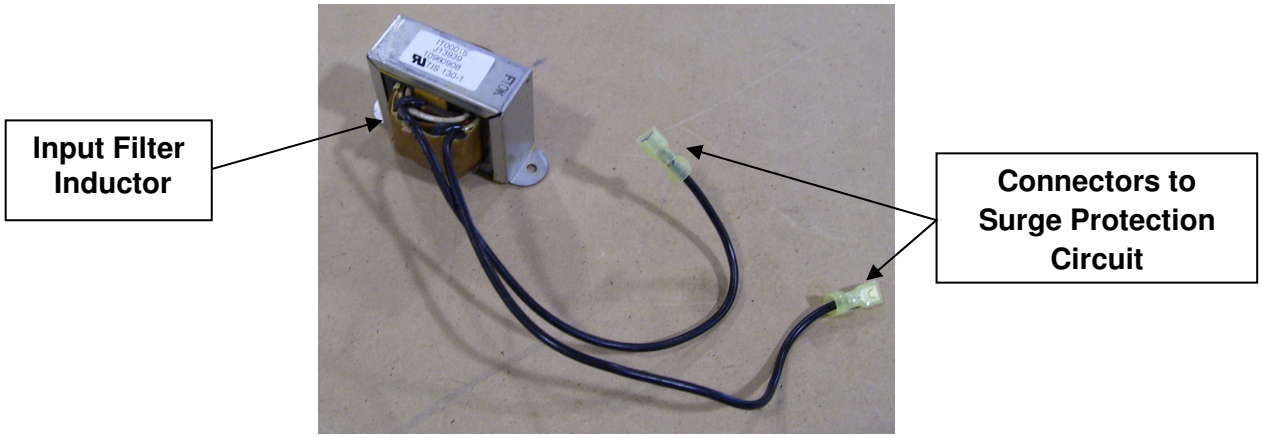

Figure 4: Input Filter Inductor

2.3 MAIN CHARGE CONTROLLER CIRCUIT BOARD – The proprietary main circuit board uses a rugged design with a microprocessor-controlled battery charger controller along with a temperature compensated battery charger circuit. The design reduces the number of solid-state devices and has been conformally coated for use in severe outdoor environments.

2.4 BATTERY TEMPERATURE SENSOR MODULE – This temperature sensor module is placed on (or near) the batteries and sends accurate battery temperature readings continuously to the microprocessor on the main charger controller circuit board.

2.5 AC TO DC RECTIFER/CHARGER MODULE – DC output voltage is controlled by a microprocessor in order to provide optimized battery charging voltage for a wide temperature range of 14° to 122°F (-10° to +50°C) or [-40 to 122°F (-40 to +50°C) with optional battery heaters].

3. INSTALLATION INSTRUCTIONS

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

This product is intended for installation in "RESTRICTED ACCESS LOCATION" only.

3.1 SITE SELECTION & PREPARATION – The following should be observed when making this installation:

- The cabinet should be mounted on the provided wall mounting bracket
- Make sure that clearances around the unit provide for unobstructed access.
- Provide a 15A, 120V service with a disconnect switch in the near vicinity of the UPS unit.

3. 2 REQUIRED TOOLS

- A 216-type tool to open the compartment doors
- A standard telco socket wrench set and standard mechanic telco tools
- Appropriate lifting equipment to lift and seat the unit onto the mounting bracket on the power pole. Note: The weight of the UPS is 94.6 lbs (43 kg
- A method of lifting the cabinet w/batteries onto pole-mounting bracket in accordance with local practices.
- Standard set of craftsman hand tools and ¾" deep socket set w/ratchet.

3.3 UNPACKING & INSPECTION

3.31 The unit is shipped in a cardboard box with foam inserts. Multiple units are placed on a pallet, shrink-wrapped and steel-banded.

3.32 Carefully remove steel bands and shrink wrap, making sure not to damage the units.

3.33 Visually inspect each box for physical damage.

3.34 If no damage is found, remove each unit from its box , 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 for assistance if necessary.

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

IMPORTANT SAFETY INSTRUCTIONS—SAVE THESE INSTRUCTIONS

This document contains important information for the Outdoor UPS-8229. This information should be followed during installation and maintenance.

3.4 INSTALLING THE UPS

3.41 Using the provided wall mounting bracket as a template, drill three (3) holes into the wall and insert ¼-20 wall mount anchors in accordance with local practices.

3.42 Install the wall mounting bracket using three (3), ¼-20 hex bolts and lockwashers from the hardware bag.

3.43 Hang the cabinet on the installed wall mounting bracket and mark two (2) holes in the bottom rear wall of cabinet. Drill two (2) holes and insert wall anchors as above.

3.44 Insert ¼-20 hex bolts through bottom holes in rear of cabinet and tighten into anchors carefully.

⚠ **CAUTION: Make sure that appropriate lifting procedures are observed and that company safety practices are followed.**

4. POWER-UP

CONNECTION

- **For permanently connected equipment, a readily accessible disconnect device shall be incorporated in the building installation wiring.**
- **Ensure that disconnect is on the Off position. Ensure that AC input switch is in the Off position.**

4.1 AC INPUT DC OUTPUT CONNECTIONS

4.11 Make sure that an 120 vac, 15A service with a disconnect switch is provided near the UPS and make sure that it is switched **OFF.**

4.12 Use ½" Cantex Enviroflex, liquid tight conduit type B. UL/CSA. Part number: V06AEA1, or similar.

4.13 Use ½" Cantex Enviro-Flex, straight conduit connector. Part number: 6441001B, or similar.

4.14 Use 14 AWG or larger wire with a 105°C insulation system for all AC input wires.

4.15 Use 8' conduit cable assembly for Motorola installations. TSi drawing number: PSD-WZ00288. *See Figure 5.

4.16 Use 18" conduit cable assembly for Innomedia installations. TSi drawing number: PSD-ZZ00289. *See Figure 6.

4.17 Terminate the Incoming wires on the AC INPUT terminals marked as follows:

- **LI** is for phase conductor (black)
- **NI** is for neutral conductor (white)
- **GND** is for safety earth ground (yellow/green)

4.18 Terminate the one end of the cable assembly wires to terminals marked as follows:

- **+** 12V to terminal marked **DC+**
- 0V to terminal marked **DC-**
- Return to terminal marked **GND**
- Alarm 1 to terminal marked **MIS BAT**
- Alarm 2 to terminal marked **RPL BAT**
- Alarm 3 to terminal marked **LOW BAT**
- Alarm 4 to terminal marked **AC FAIL**

4.19 Terminate the other end of the cable assembly wires to the appropriate terminals in the Motorola or Innomedia unit.

4.20 In terminating the wires as outlined in 4.17 & 4.18 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 screws have been tightened, gently pull on the wires to make sure that they are securely connected.

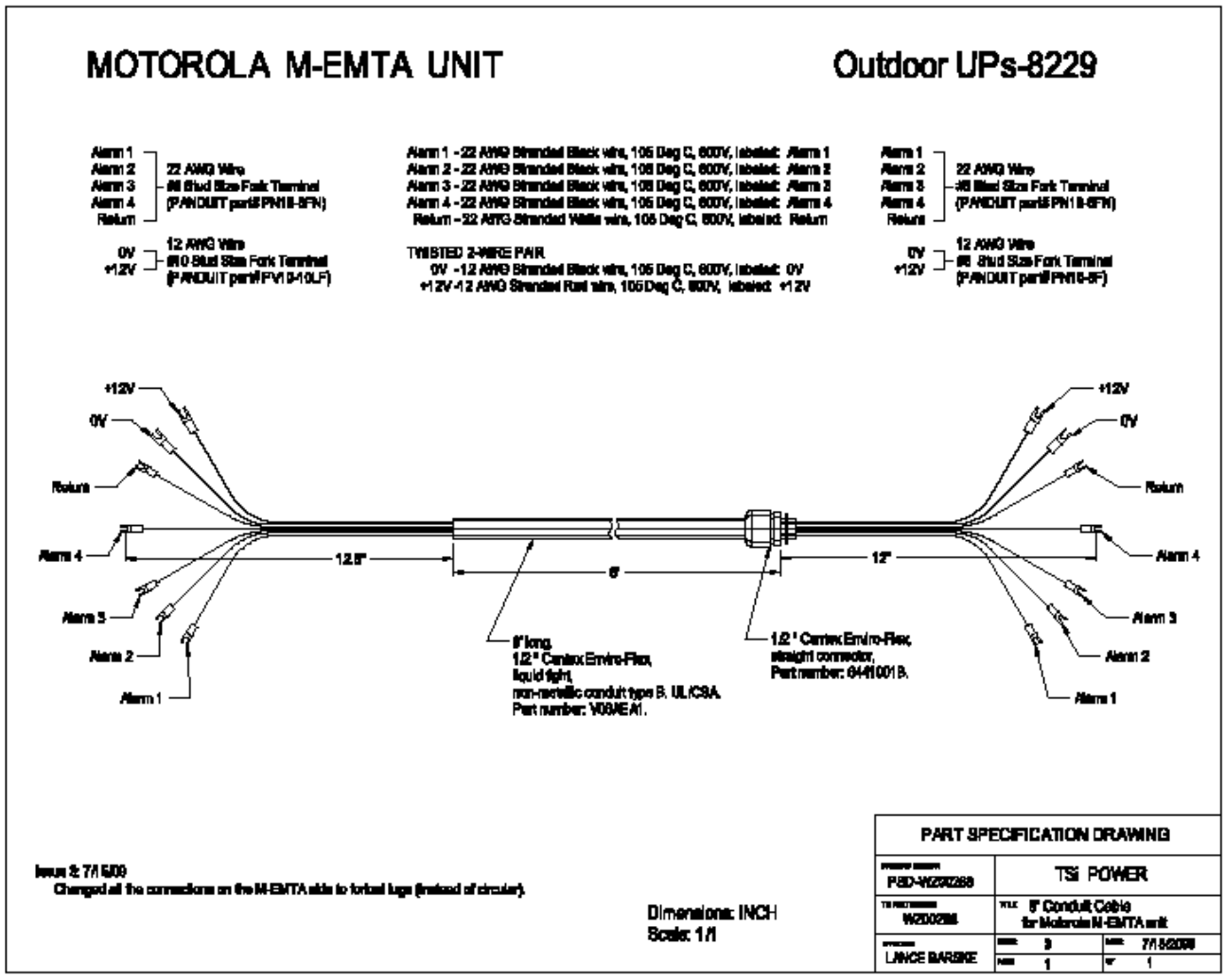

Figure 5: PSD-WZ00288 Motorola Cable Assembly

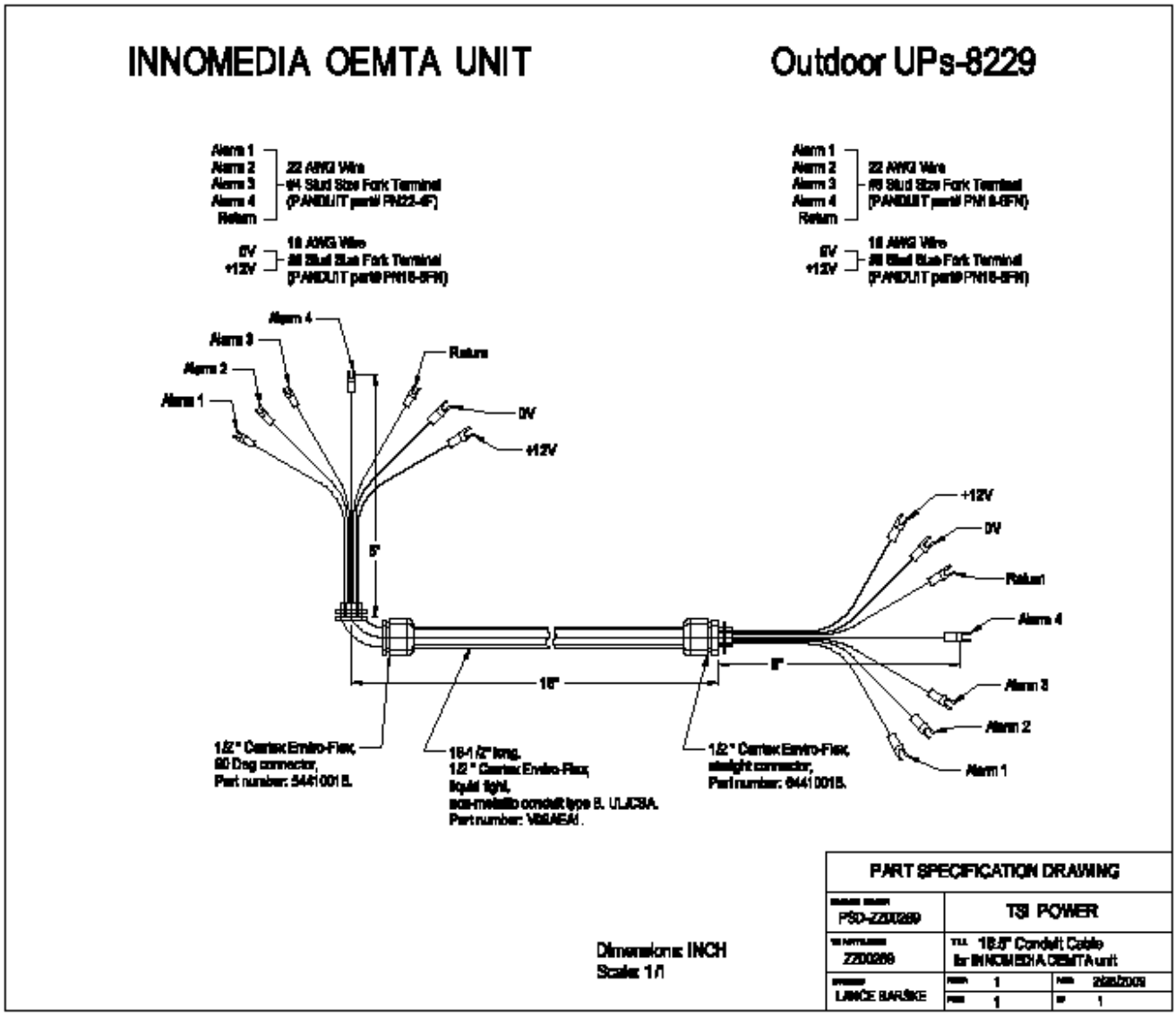

Figure 6: PSD-ZZ00289 Innomedia Cable Assembly

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

4.2 ENERGIZING THE UPS – The following steps outline the procedures for putting the UPS into operation:

4.21 Turn on the AC, 15A, 120V service by putting the disconnect switch to the **ON** position.

4.22 Put the battery fuse in its socket.

4.23 Switch the On/Off switch inside the UPS to the **ON** position.

4.24 Verify that the green and amber LEDs on the PC board are illuminated. This may take approximately five (5) seconds.

LED Indicators	
Output OK DC (Float charging)	Green, Solid
Output OK DC (Charging)	Amber, Slow Blink
Backup ON DC	Amber, Quick Blink
DC output is FAULTY (Fault Condition)	Red, Solid

4.25 Switch AC disconnect switch to Off position. The Amber LED should blink quckly meaning that the unit is in back-up mode. Switch AC disconnect to On position.

THE SYSTEM IS NOW READY FOR OPERATION.

5. MAINTAINING THE UPS

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

5.1 UPS OPERATION TEST

5.11 Switch-off the AC input disconnect.

5.12 Verify that the UPS operates in **Battery Mode** (**Amber LED is blinking quickly).**

5.13 Check the operation of the cooling fan. Replace if necessary.

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 and 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 fully charged battery should have a terminal voltage of 13.5Vdc ±0.3V. Replace **All** batteries if the difference is larger than ±0.3V.

6. TROUBLESHOOTING & COMPONENT REPLACEMENT

6.1 STATUS ALARMS – Relay contact status alarm signals are available through the terminal block on the right side of control panel. See the table below for the output signal assignment.

Terminal Block Markings (Relay Contact Closures) (Common Return)	
BATTERY OK	LOW BAT
AC OK	AC FAIL
REPLACE BATTERY	RPL BAT
BATTERY MISSING	MIS BAT

6.11 Closed contact between LOW BAT and RETURN signifies “LOW BATTERY" condition. (Battery voltage less than 11Vdc)

6.12 Closed contact between AC FAIL and RETURN signifies “AC FAILURE" condition. Relay contact closes again when utility AC power is restored.

6.13 Closed contact between RPL BAT and RETURN signifies “REPLACE" condition.

6.13 Closed contact between MIS BAT and RETURN signifies “MISSING BATTERY" condition.

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 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 battery terminal.**
- **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.**

SAVE THESE INSTRUCTIONS

⚠ 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 Only the 8GU1 battery (12 volt, 31Ah rated gelled, valve-regulated lead-acid battery made by MK Battery) should be used. Never mix battery brands or different age batteries.

⚠ **CAUTION**: **The following precautions should be observed when working on batteries:**

a. Remove watches, rings, or other metal objects.

b. Use tools with insulated handles.

c. Wear rubber gloves and boots.

d. Do not lay tools or metal parts on top of batteries.

e. Disconnect charging source prior to connecting or disconnecting battery terminals.

f. 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.

6.22 The following battery replacement procedure should be followed:

- Turn off AC circuit breaker,
- Switch off disconnect,
- Remove DC battery fuse,
- Remove the 3 battery jumper wires first and set them aside,
- Remove the last (+) and (-) battery wires from battery terminals,
- Remove battery brackets,
- Pull out old batteries carefully, set them aside,
- If heating pads are used, set them aside, follow the instructions in section 7,
- Install new batteries,
- Reinstall battery brackets,
- Connect battery jumpers and cables securely to the battery terminals,
- Check all connections,
- **Reset battery alarm***,**
- Re-energize the UPS system,
- Dispose of old batteries in accordance with battery manufacturer's instructions.

* Duration of storage will determine the need for supplemental charge, especially at elevated temperatures.

** Extended exposure to temperature > 104° F (40° C) may shorten battery life.

***Battery Alarm Reset Procedure**

1. With power off, press and hold Switch 1 on PCB,
2. While holding Switch 1, turn AC On/Off Switch ON,
3. Amber LED should turn on SOLID for one second,
4. When amber LED transitions from SOLID ON to BLINKING, the battery bank is reset,
5. Release switch, system is ready for normal operation.

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. The AC current flows through the resistors to generate heat. By being pressed against both internal walls of the batteries, the batteries are heated. Installation procedure for the heater pads is as follows:

- Turn the AC circuit breaker off,
- Remove the DC battery fuse,
- Remove jumper wires between batteries (and save the jumper wires),
- Remove battery brackets,
- Remove batteries from the cabinet,
- Put batteries back in, form a wedge,
- Place a heating pad between each pair of batteries, pull batteries until tight,
- Replace battery brackets,
- Run the wires back to the heater control PCB and mate connector with header,
- Follow remaining steps in 6.22.

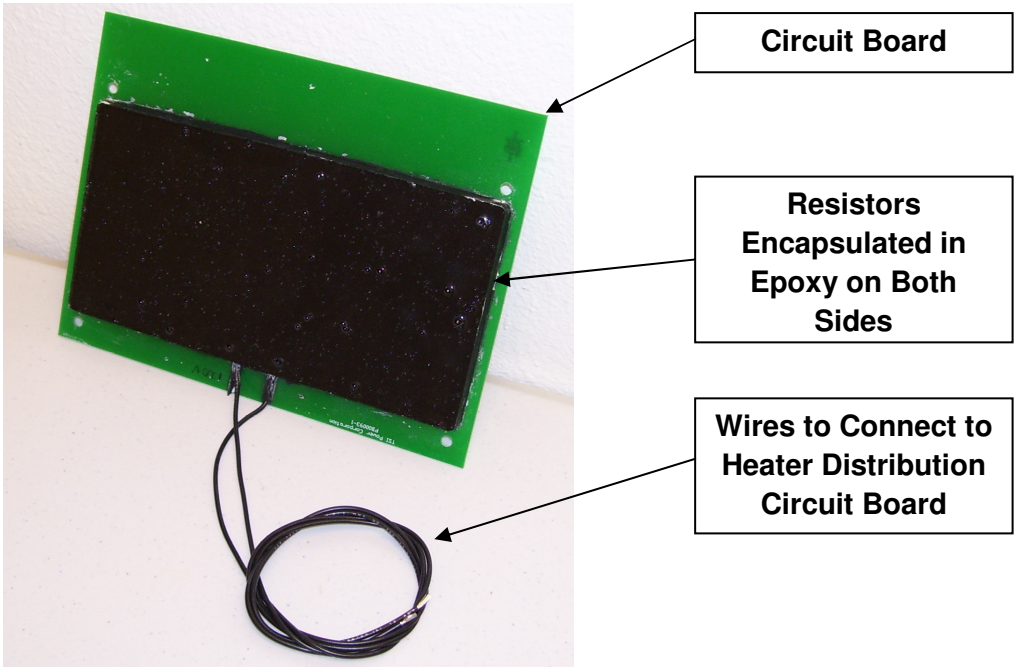

Figure 6: Optional Battery Heater Circuit Board

8. REPAIRS, SERVICE & SPARE PARTS

8.1 REPAIRS - The Outdoor UPs-8229 should be repaired only 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 if the unit must be repaired at TSi Power.

A replacement unit will be shipped to certain customers with service agreements. TSi retains the repaired unit to be used as a next "replacement" or "exchange" 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.
Heater PCB	PB00093-1	TSi Power	N/A
Main charge controller PCB	PZ00099-1	TSi Power	N/A

Input inductor	IT00016	Johnson Electric Coil	J13939
AC input switch	SE00001A	CW Industries	GR-2022-0007
Battery fuse	313020	Littelfuse	TBD
AC cooling fan	VF00015	Minebea	3115FS-12T-B30
12V, 31Ah battery	VB00010	MK Battery	MU-1 SLD G-8GU1
12Vdc recitifier/charger	VP00062-X	TSi Power	N/A

9. REFERENCE

9.1 Outdoor UPs-8229 Specifications

Input	
Voltage Range	95 to 140Vac
Frequency	60Hz +-5%
Current	5A
Fuse	10A, 250Vac
Output	
Output Power	120W
Output Voltage	12Vdc
Current	10A
Power Efficiency in AC Line Mode	>79%
Power Efficiency in Backup Mode	>99%
Transfer Time Line to Backup	0ms
Fuse	12A
Battery	
Type	Sealed 12Vdc gelled, valve-regulated, lead-acid, maintenance free (sold separately) 8GU1, MK Battery

Temperature (Charge/Discharge/Storage)	60℃
Battery Bus Voltage	12Vdc
Capacity	31Ah @ 20 hour rate per battery
Battery Fuse	15A
Weight (lb/kg) per battery	23 / 10.5
Dimensions (in/mm)	7.71L x 5.18W x 7.22H / 196L x 132W x 183H
Runtime Option: (A/B/C/D)	5/ 8/ 12/ 15hr @ 60W
Recharge Time (31Ah/62Ah/93Ah/124Ah)	8 / 12/ 18/ 24 hrs to 90% after full discharge
Battery Heater Pad (One/two required)	34W x 1/2
LED Indicators	
Output OK DC (Float charging)	Green, Solid
Output OK DC (Charging)	Amber, Slow Blink
Backup ON DC	Amber, Quick Blink
Fault DC	Red, Solid
Alarms	
Alarm 1	Low Battery
Alarm 2	AC Lost
Alarm 3	Replace Battery
Alarm 4	Battery Missing
Mechanical	
Dimensions (in/mm) Base cabinet—A/B options	16W x 8.38D x 21.88H / 406W x 213D x 556H
Dimensions (in/mm) Large cabinet—C/D options	16W x 8.38D x 30.63H / 406W x 213D x 778H
Weight (lb/kg) w/o batteries, Base and Large cabinet	40 / 18—46 / 20.9
Base with (1/2) batteries	63 / 28.6—86 / 39
Large with (4/4) batteries	69 / 31.3—92 / 41.8
Environmental	
Operating Temperature* (with heater) ℉/℃	-40 to 122/-40 to 50
Operating Temperature** (without heater) ℉/℃	-10℃ to 50℃

Storage Temperature ℉/℃	-4 to140/-20 to 60
Humidity	0 to 95% non-condensing
Mounting Configuration	
Wall-mount	
Agency Compliance	
FCC part 15 Class B	
cETLus tested to UL 60950-1 and UL 1778	
RoHS compliant, per EU Directive 2002/95/EC, Restrictions of Hazardous Substances	
NEMA 3R	

9.2 ORDERING CONFIGURATION – When ordering the **Outdoor UPs-8229**, the following example provides the methodology that is used to arrive at the product ordering number:

9.21 -8229: Standard two-battery cabinet; **-8229X**: Special four-battery cabinet

9.22 The following suffixes are added to represent the heater and battery configurations:

- **-00**: No batteries, no heaters
- **-01**: No batteries, one heater
- **-10**: One battery, no heater
- **-11**: One battery, one heater
- **-20**: Two batteries, no heater
- **-21**: Two batteries, one heater
- **- 02**: No batteries, two (2) heaters, -8229X only
- **- 30**: Four (4) batteries, no heaters, -8229X only
- **- 32**: Four (4) batteries, two (2) heaters, -8229X only

9.23 Example 1, the following ordering number represents a complete X unit with four (4) batteries and two (2) heaters:

Outdoor Ups-8229X-32

9.24 Example 2, the following ordering number represents a complete standard unit without batteries and heaters:

Outdoor Ups-8229-00

9.3 TSi POWER CONTACT INFORMATION

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