

INSTALLATION INSTRUCTIONS**VRp-3000 and 5500 230VAC 50/60Hz Line Conditioner/Voltage Regulator
Hardwired versions****INSTALLATION INSTRUCTIONS****Inspection and Unpacking**

Please inspect the shipping container for obvious damage. If no visible damage is found proceed to open the box using a utility knife. After removing the VRp from the box, proceed to check unit for dents or other external damage. File claim with the freight carrier if any damage is found, contact TSi if a replacement unit needs to be purchased.

If no damage is found, proceed with installation as per below.

Mounting

The VRp is designed to be placed on a horizontal surface such as a floor or a desk; or be mounted to a wall using the optional MK-5000C brackets with hardware. VRp MUST BE PLACED IN A WELL—VENTILATED AREA AND TO ASSURE MAXIMUM RELIABILITY AS COMPONENT OVERHEATING DRASTICALLY REDUCES LIFE EXPECTANCY.

Electrical

VRp receives power from either of the following sources:

European

220/230/240V 50 Hz, single phase plus neutral and protective earth
L1 + N + G

USA, Canada, Mexico

208/240/220V 60 Hz, dual phase plus protective earth
L1 + L2 + G

Power supply to VRp-3000 must be provided from an upstream two-pole, 30A circuit breaker to provide coordination with VRp's internal two-pole, 20A circuit breaker.

Power supply to VRp-5500 must be provided from an upstream two-pole, 40A circuit breaker to provide coordination with VRp's internal two-pole, 30A circuit breaker.

**WARNING: MAKE SURE THAT VOLTAGE SUPPLY TO VRp
IS OFF BY SWITCHING OFF UPSTREAM SUPPLY CIRCUIT BREAKER BEFORE
PROCEEDING!**

Take care to follow local electrical codes where unit is installed.

Power entry is through two circular holes on the lower rear plate of unit—*remove rear plate before proceeding*. If flexible input cable is used, use provided liquid-tight fittings. Use 3/4" conduit connectors (not provided) for liquid-tight conduit if required by local code or custom. It is possible to use 1/2" conduit if reduction washers are used (not provided).

Use minimum AWG 10 preferably AWG 8 for both power and earth conductors. TSi recommends using stranded copper wire with a minimum 105°C insulation system.

Note that two wires plus ground are required for both input and output.

Insert wire through liquid-tight fittings or conduit connectors. Ensure that there is enough wire to reach the terminal strip, and take care to leave enough slack.

Strip approximately 3/8" (or 10 mm) insulation from the end of each of the six (6) wires.

Input terminals are located on the left side of the terminal strip while output wires are located to the right.

Input terminals are marked:

LI for input phase 1

NI for input neutral (European system); input phase 2 (North-American systems)

G for input earth ground

Output terminals are marked:

LO for output phase 1

NO for output neutral (European system); output phase 2 (North-American systems)

G for output earth ground

WARNING!!!!

TO PREVENT DAMAGE DO NOT REVERSE INPUT AND OUTPUT

LI, NI = INPUT

LO, NO =OUTPUT

Carefully insert each wire into the appropriate terminal, taking care to ensure that all strands are inserted properly. Tighten the terminal screw, and perform a pull test to make sure the connection is adequate. Note that failure to follow these instructions can lead to malfunction or short circuit.

Double-check to ensure that all wires are connected properly.

*Before proceeding to the next step, make sure that VRp's internal circuit breaker is in the **Off** position.*

Switch on panel board circuit breaker. Check for proper input terminal voltage across terminals LI and NI, using an AC voltmeter—insert probe tips to make contact with terminal screws. The nominal voltage must be between 200 – 240VAC. Switch off panel board circuit breaker and, *replace rear plate.*

Energizing VRp

Switch on panel board circuit breaker.

Turn on the internal circuit breaker.

After VRp is powered the Amber LED should flash briefly—the Green LED will then illuminate and should stay on. At this time the internal fan should be on—this is NORMAL.

After VRp stabilizes the Green LED should be ON.

Switch off the circuit breaker and close the door.

CONSULT VRp TROUBLE-SHOOTING PROCEDURE IF THE GREEN LED IS NOT LIT AND/OR THE RED LED ILLUMINATES.

VRp is now operational

REPAIRING VRp

VRp should only be repaired by persons with a general knowledge of electronics and electrical safety procedures. Others should contact TSi Power Corp. for an RMA (Return Material Authorization) the TSi representative will ask a few simple questions and issue an RMA if factory repair is required.

REPAIRING VRp IN THE FIELD

VRp is designed to facilitate quick replacement of modules in the field. Therefore, trouble shooting procedures described in this manual are limited to identification of faulty modules that can be replaced by persons with a general knowledge of electronics. The major heatsink/circuit board assembly used in VRp is not designed to be repaired in the field as it utilizes a microcontroller and programmable logic device.

Spare parts can be ordered from TSi directly, please contact us prior to ordering parts to ensure that you will receive the correct ones for your particular version of VRp.

Note 1: For customers with a large number of VRp units:

Since board exchange is the quickest way to repair a failed VRp unit, TSi Power recommends that customers keep at least 3% (one board set for every 30 VRp units) in spare main boards in order to minimize VRp downtimes while failed spare boards are being repaired at TSi Power.

Note 2: For international customers with a large number of VRp units:

Keeping about 5% (one board set for every 20 VRp units) in spare boards is highly recommended to minimize VRp repair time. Also, shipping costs (per each repaired board) can be reduced dramatically by always shipping a group of three or more boards in the same box, as the cost of international air shipment can be very high.

HOW TO RETURN DEFECTIVE MODULES FOR REPAIR OR REPLACEMENT

1. Contact TSi via telephone, fax or e-mail to obtain a Return Material Authorization number (RMA).
2. Make sure that returned parts are properly protected and packed in suitable shipping box, especially when sending parts via United Parcel Service.
3. Mark shipping box with RMA number, using indelible marker pen.
4. We recommend that DHL be used for shipments originating outside the USA and FedEx for US domestic shipments. Do not use UPS if possible.
5. Upon receiving the part TSi will determine if it is covered by warranty—warranty repair or replacement is performed without charge. TSi will quote repair costs for out-of-warranty parts prior to starting any repair work. If repair is not cost effective TSi will quote the cost of a replacement part.
6. Shipping costs, duty and brokerage costs are the responsibility of the customer.

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RECOMMENDED SPARE PARTS AND PART NUMBERS

PC Board assembly: PZ00073-1

Fan: VF00005

Solid State Relay: QR00004

VRp TROUBLE-SHOOTING PROCEDURE

Visual Status Indicators

1. Green LED on indicator board must be ON
2. If Green LED is not on, it could mean any of following:
 - a. There is no AC power present,
 - b. Internal circuit breaker is in off position,
 - c. Supply circuit breaker is in off position,
 - d. Solid state relay failure,
 - e. Bypass Fuse on PCB assembly blown thus indicating failure of power switching transistors.
3. If Amber LED is ON, the internal bypass is activated. This state indicates that VRp is either overloaded or is receiving an insufficient input voltage.
4. If the Red LED is ON, VRp is in the electronic fault mode. The cause could be a failed component or circuit that prevents normal operation. Turn off VRPs's input circuit breaker after orderly shut down of the equipment connected—restart VRp by switching circuit breaker back on. The Red LED will turn OFF if the fault is temporary.
5. Follow the below steps to decommission VRp:
 - a. Switch off internal breaker
 - b. Switch off supply breaker
 - c. Remove all connectors from the board assembly; a pair of needle-nose pliers might be required
 - d. Remove the fasteners holding the PCB assembly

6. Put the PCB board assembly on a well-lit repair bench to perform inspection:
 - a. Check continuity of Bypass Fuse
 - b. Look for any obvious burn marks
 - c. Look for any other burned, damaged, cracked, or discolored parts which might provide a clue as to what might have caused the failure of the board.
 - d. If no defect is found following inspection, you may decide to ship the entire board back to TSi Power for factory repair or a replacement board.

Replacement of FAN

- Verify that fan is operating properly—check for airflow through heatsink and replace fan if there is any doubt that it is operating properly. **DO NOT IGNORE A POORLY OPERATING FAN AS SERIOUS DAMAGE TO POWER SWITCHING TRANSISTORS CAN OCCUR.**
- Contact TSi for replacement fan (Part number: VF00005)
- Follow these steps to replace:
 - a. Loosen and remove the two (2) 6-32 nuts on front of board using a 6-32 socket or nutdriver,
 - b. Loosen the two (2) 8-32 screws that fasten the heatsink bracket to case base,
 - c. Lift the heatsink assembly sufficiently so all four screws, attaching fan to heatsink, are exposed,
 - d. Using a new (not worn) 6-32 Phillips screw driver, remove all four (4) 6-32 screws and washers and set aside,
 - e. Disconnect fan connector from JP/12 header on board and remove old fan,
 - f. Install new fan with label side facing heatsink.

Repair Procedure

- Contact TSi Power for a replacement board (Part number: PZ00073-1).
- When a new spare PCB board assembly is received, examine to make sure there is no damage resulting from mishandling during shipment.
- Take care to assure that the board is not damaged by static electricity by using properly grounded wrist strap.

Reinstallation of PCB Board Assembly

- Connect AC line voltage wiring to board fast-on tabs as follows:

LO voltage sense QDT connector to J16/A0
NO voltage sense QDT connector to J17/C
Transformer primary 1 connector to J15B1
Transformer primary 2 connector to J14/A1

Take care to assure that above leads are not reversed as malfunction or damage can result.

- Connect low-voltage wiring to board headers as follows:

Green LED connector to JP5/On
Amber LED connector to JP3/BP
Red LED connector to JP4/FT
Current transformer connector to JP1/CT
Fan connector to JP12/Fan

- Lower board onto stand-offs, and tighten nut (6-32) fasteners by turning clockwise. Be careful not to over-torque.
- Turn supply circuit breaker back on
- Turn on internal breaker
- Green LED should be ON
- Follow final steps from Installation Procedure