

ILc-9000/16500/22500/30000-0338 Three-Phase Isolation Transformer & VRp-9000/16500/22500/30000-0338 Three-Phase Precision AVR

Total 14 pages

INSTALLATION AND MAINTAINENCE INSTRUCTIONS

1. Introduction

The three-phase Isolation Transformer Line Conditioners (ILc-9000/16500/22500/30000-0338) are designed and manufactured exclusively for operation with matching Precision Automatic Voltage Regulator models (VRp-9000/16500/22500/30000-0338). This highly engineered isolation transformer provides 100% isolation from the input AC line and the secondary neutral-to-ground bond eliminates all surge voltages between neutral and ground thus provide protection and noise filtering superior to conventional surge protection and filtering devices.

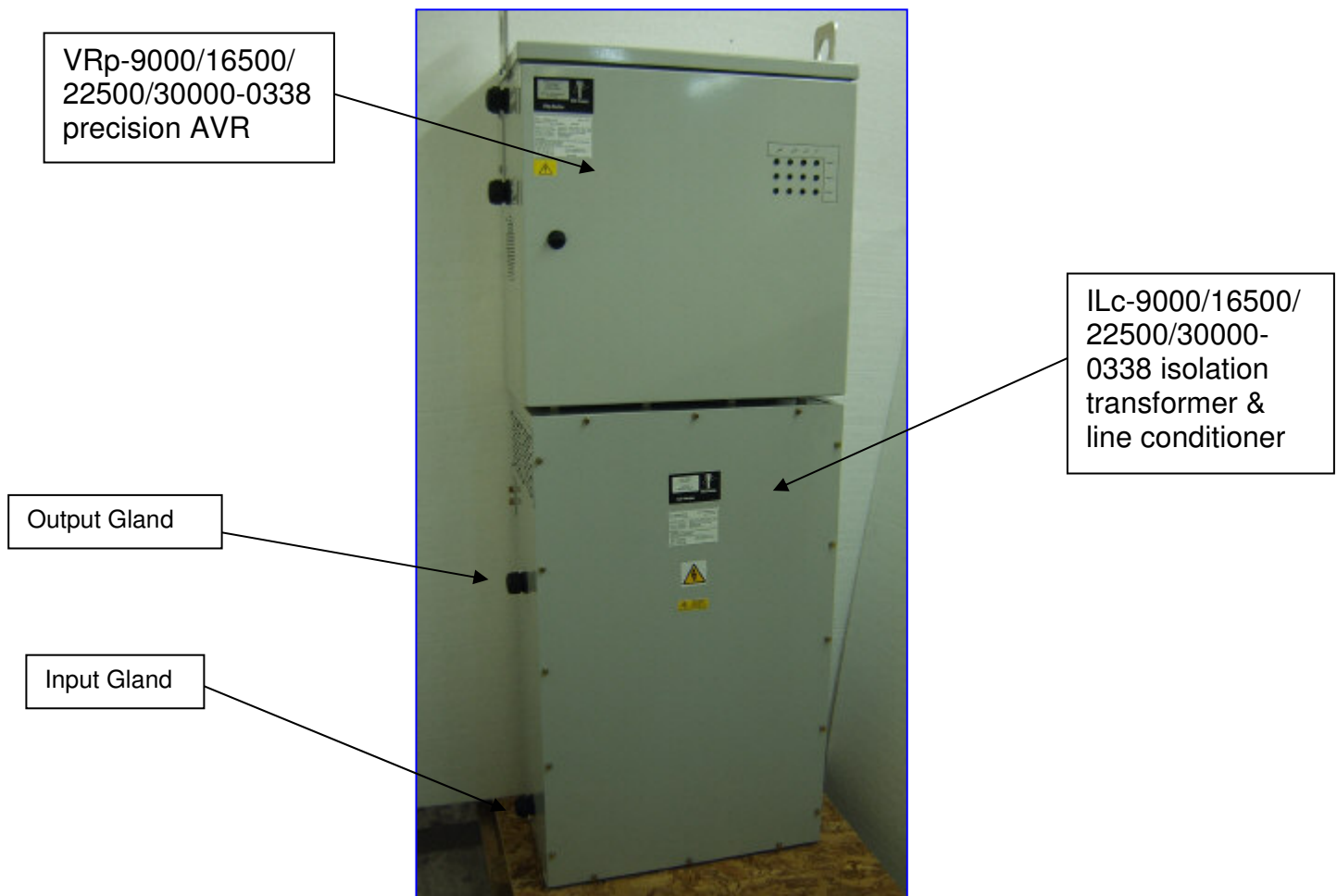
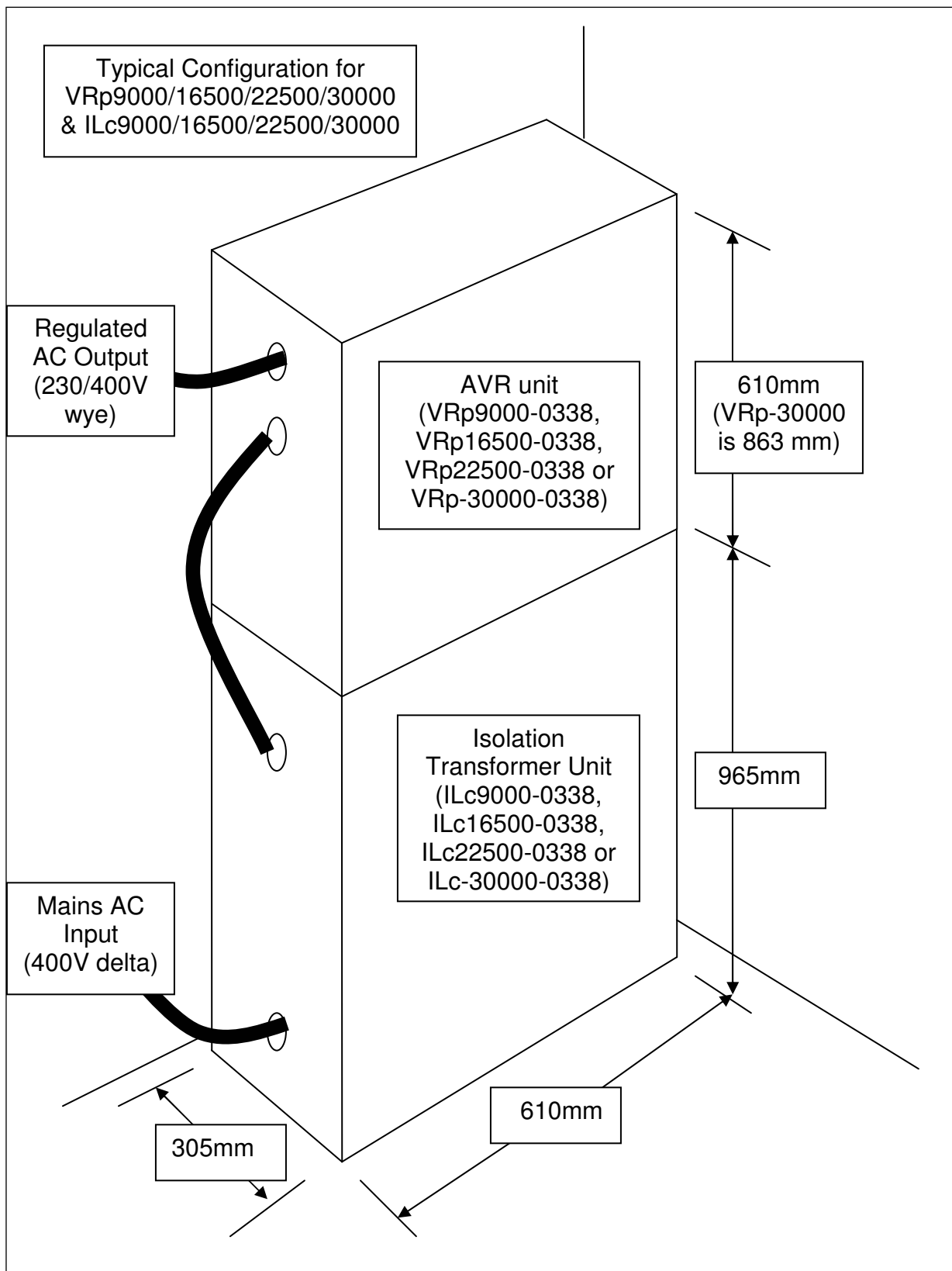


Figure 1

Please read and understand instructions and recommendation described in this document before installation & operation of these units.



2. Inspection and Unpacking

Inspect the packaging for obvious damage during transit. Normally one pallet package contains up to five units. Each unit is individually steel banded and suitably padded. The palletized package is protected by outer protection material and shrink-wrapped for water ingress protection.

If no visible damages to the packaging are found, proceed to remove the shrink wrap. If a Stanley knife or a sharp knife is used then care should be taken not to scratch the immaculate paintwork of the cabinet.

Proceed to remove the side packing materials to expose the units. Use a suitable steel cutter or a metal snip to cut off the steel band. Care should be taken as the steel bands are highly tensioned and can retract very rapidly when snipped and cause injury.

To remove the unit one by one from the pallet, use a suitable lifting device which is capable of lifting 250kg. For safety you must note the following:

- (i) All 4 removable lifting eyes must be used for lifting the unit (see figure 2)
- (ii) Centre of gravity is not at the centre of the cabinet so lifting the unit using less than 4 points will cause the unit to tilt and may cause accident.
- (iii) Under no circumstances should the unit be lifted by other anchorage points on the cabinet.
- (iv) The unit, once lifted up, may swing. It is therefore important to make sure that sufficient space is provided and that collisions with personnel or other units are avoided.

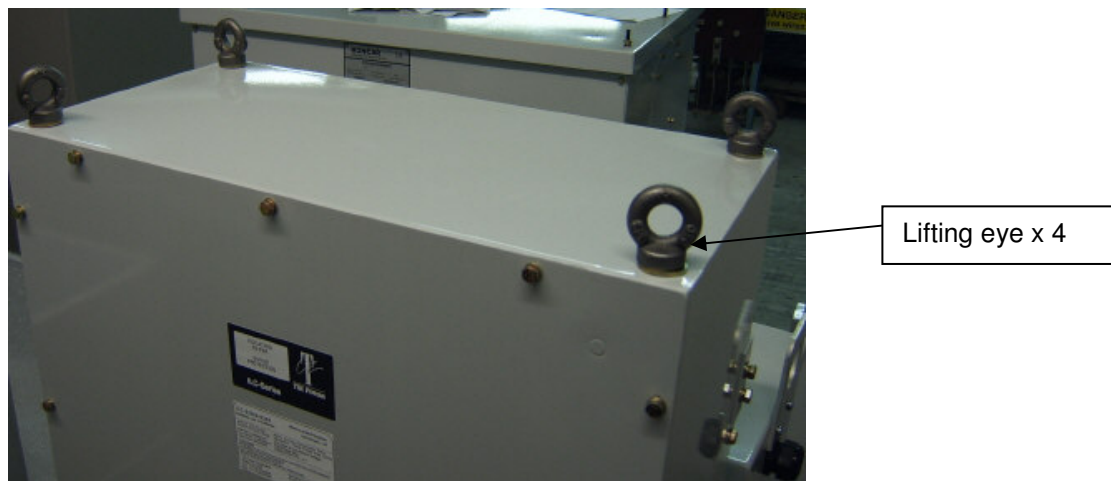


Figure 2

If damages are found on the packaging and on the units, record the damages with photographic evidence and file claim with the freight carriers. Contact Romarsh or TSi if a replacement unit needs to be purchased.

3. Mounting

Please note that ILc9000/16500/22500/30000-0338 isolation power conditioners are designed exclusively for use with the matching VRp9000/16500/22500/30000-0338 precision AC voltage regulators. It is important to note that ILc should be mounted on the floor and the matching VRp is mounted on top of the ILc unit (see figure 1). In no circumstances should the ILc be placed on top of the VRp.

Proceed as follows (for ease of reading, only ILc22500-0338 will be mentioned as an example):

- (i) Identify a suitable floor location for the ILc22500-0338 and use a suitable lifting device to position the unit. You should note that the ILc22500-0338 is designed to be positioned against a wall or any suitable anchorage points. Two wall brackets are facilitated to eliminate the danger of tilting fall.
- (ii) Once the unit is positioned, remove the 4 lifting eyes. The lifting eyes should be stored closed to the unit in case of future re-positioning, maintenance and service repairs.
- (iii) Remove the wall brackets and revert the position of the bracket for wall fixing.
- (iv) Place the ILc cabinet and mark the wall for holes to install the wall brackets. You may use suitable wood screws with wall plugs to suit the size of holes. For concrete walls, use a carbide tip drill bit and drill a hole deep enough for the insertion of a concrete anchor. Insert anchors and tighten screws. For drywall, you should consider using a piece of wood to bridge the gap between wall studs.
- (v) Once the ILc cabinet is secured with wall brackets, you can now proceed with the positioning of the VRp cabinet. Please refer to the VRp22500-0338 installation manual.

4. Electrical inspection and wiring

ILc-22500-0338 is designed to supply AC power to VRp-22500-0338 ONLY.

DO NOT INSTALL ILc TO ANY OTHER POWER DEVICES UNLESS THESE ARE APPROVED BY TSI POWER. INSTALLING ILc TO AN UNAPPROVED POWER DEVICE MAY INVALIDATE THE WARRANTY.

ILc22500-0338 requires a three-phase 400V (L-L), 50/60Hz supply (3 wire plus ground = 4 wire) to provide a three-phase 400V (L-L), 50/60Hz isolated output with neutral and ground (5 wire).

ILc-22500-0338 uses a three-pole, 50A circuit breaker for current protection and is connected in series with the input. THIS CIRCUIT BREAKER IS NOT AN ISOLATOR NOR DOES IT PROVIDE INPUT PROTECTION. The VRp-22500-0338 has a three-pole, 40A circuit breaker on its output.

The ILc and VRp units combination provide the necessary input/output protection.

WARNING: BEFORE COMMENCING WIRING ON THE ILc UNIT MAKE SURE THAT VOLTAGE SUPPLY TO ILc IS SWITCHED OFF. CONNECTION BETWEEN ILc AND VRp UNIT SHOULD BE ISOLATED. YOU SHOULD ALWAYS FOLLOW LOCAL ELECTRICAL CODES AND PRACTICES WHERE THE UNIT IS INSTALLED

Input and Output cables are entered through two cable glands provided. The cable glands and lock-nuts are not installed and are supplied in a PVC bags attached to the transformer inside the cabinet. Both cable glands will accommodate up to one inch (1”) cable conduit (not supplied). This conduit must be used if compliance with North-American electrical standards is required. You should note that:

- (a) the input cable (4 wire) from external power source is entered via the LOWER cable gland;
- (b) the output cable (5 wire) to VRp unit is exit via the UPPER cable gland.

Use minimum AWG 8 (8.4 square mm). All conductors must be of the same size. TSi recommends using stranded copper wire with a minimum 105 °C insulation system. Note that three wires plus ground are required for the input and three – wires plus neutral and ground are required for the output.

Now remove front panel by unscrewing and remove all fastening bolts.

Insert wire through the strain-relief connectors. Ensure that there is enough wire length to reach the respective terminal, take care to leave enough slack.

Strip approximately 3/8” (or 10 mm) insulation from the end of each pair of (5) wires. Input terminals; marked L1, L2, L3, E are located on a DIN-rail inside the bottom left of the cabinet.



Figure 3

Connect the 3 phase input cables to terminals L1, L2 and L3 such that L1 for phase A, L2 for phase B, L3 for phase C. The ground cable connect to terminal E. Carefully insert each wire into the appropriate terminal, taking care to ensure that all strands are inserted properly

Take special care to ensure phase rotation is in a correct sequence as incorrect sequence can cause system failure and damage to the ILC unit.

Connect the 3 phase output cables to DIN terminals I1, I2 and I3, and neutral to N and ground to E such that I1 for phase A, I2 for phase B and I3 for phase C. Carefully insert each wire into the appropriate terminal, taking care to ensure that all strands are inserted properly. Again the output connection phase sequence must be correct in reference to the input connection phase sequence.

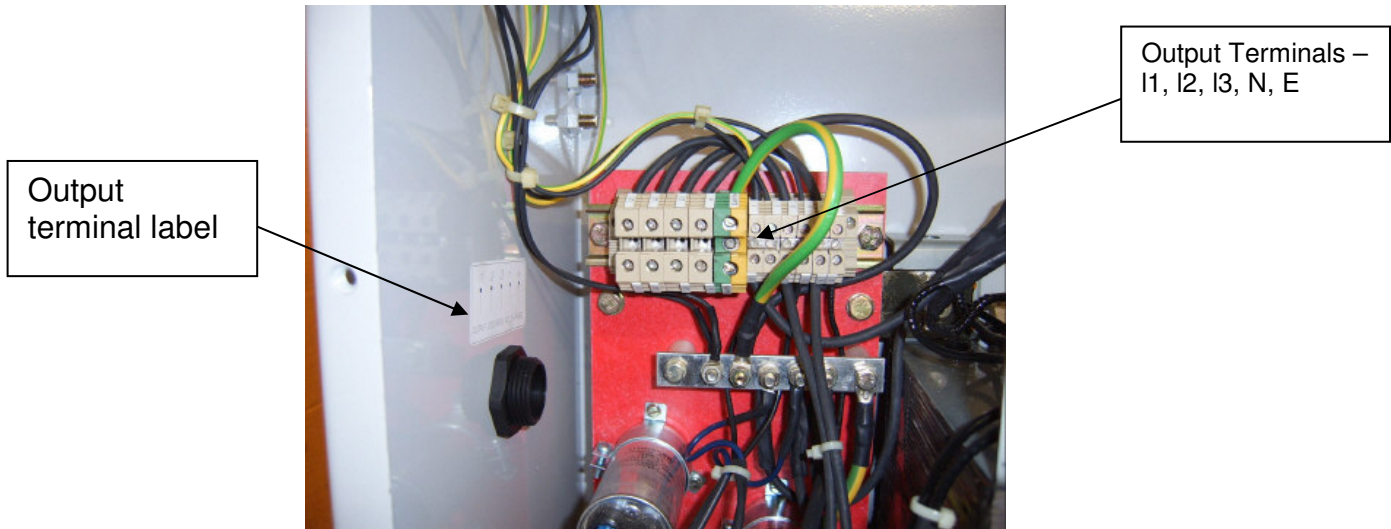


Figure 4

CHECK AGAIN ! - VERIFY PHASE SEQUENCE BEFORE PROCEEDING. MAKE ABSOLUTELY SURE THAT INPUT/OUTPUT ARE NOT REVERSED, AS SERIOUS DAMAGE WILL OCCUR WHEN ENERGIZING AN INCORRECTLY WIRED UNIT.

Tighten each 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.

Verification Test - before proceeding to the next step, ensure the circuit breaker is in the off position. Make sure that ILC-22500-0338 produces a phase to neutral output voltage of between $230.9V \pm 1\%$ AC at 400V (L-L) input. Use a voltmeter or DVM to verify the voltage. Check each phase to neutral in turn to verify correct voltage. If the voltage measurements are correct than proceed with connection to the VRp unit (refer to VRp-22500-0338 installation manual)

Re-install the front panel and secure fastening bolts as before.

5. Grounding and Bonding

VRp/ILC are not a replacement for proper site grounding and bonding. Be sure to follow proper site preparation procedures NOT CONTAINED HEREIN.

6. Extra Lightning Protection

VRp/ILC together are designed to withstand Normal and Common-Mode indirect surge voltages and have internally coordinated surge protection devices.

ILc ITSELF IS NOT A SURGE PROTECTIVE DEVICE (SPD) AND REQUIRES VRp TO PROVIDE PROTECTION FOR THE LOAD, AS WELL AS ITSELF. DO NOT INSTALL VRP WITHOUT ILc AS THIS WILL INVALIDATE WARRANTY AND RISK TO THE CONNECTED LOAD.

If immunity against the more severe surges resulting from lightning strokes (defined by LPZ0a and LPZ0b) is required, it is recommended that an external surge diverter capable of withstanding IEC-61312 specification must be installed.

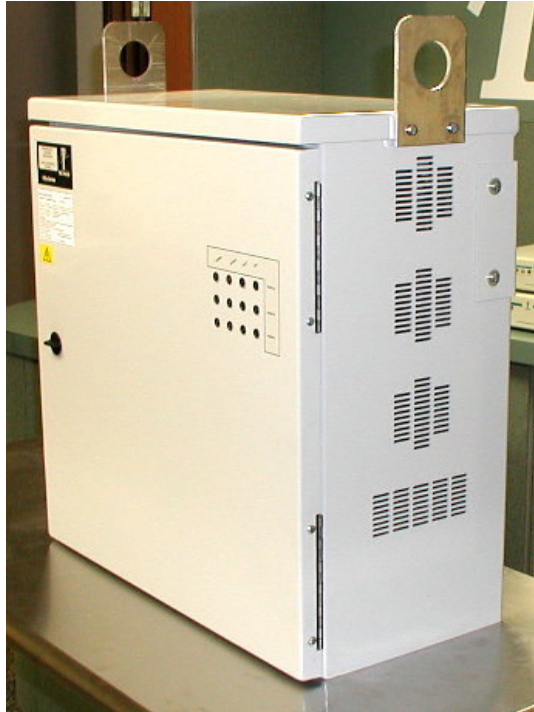
7. Routine Maintenance

The following periodic maintenance is recommended (minimum 3 monthly interval) :

- (i) The external surfaces of the cabinet should be free from accumulated dust. Clean dust with a soft cloth impregnated with small amount of mild detergent.
- (ii) The air inlet and air outlet grille should be cleared from accumulated dusts or debris. Use a short length brush to clean off blockages. It is vital that the airway is clear and unobstructive as these will affect cooling in the unit and overheating may occur as a result.
- (iii) If signs of insect trails or invasion to inside the cabinet are evident, the unit must be inspected internally to assess any possible damages. Insect infestation must be rectified immediately as short circuit and insulation failure can occur causing damage and failure to the unit. Consult Romarsh / TSi if damages have been resulted and replacement parts are required.
- (iv) The cooling fans installed in the ILc unit has a life span of 20,000 operating hours at 60°C operating temperature. Romarsh recommends that cooling fans should be replaced at a 2-year interval. Replacement fans are available direct from Romarsh and TSi.

Safety First – when carrying out maintenance work care should be taken if the unit is live. Any work carry out inside the cabinet must have the input power disconnected to avoid accident and electrocution of the maintenance personnel.

VRp-22500-0338 Three-Phase Precision AC Voltage Regulator (AVR)



Inspection and Unpacking

Please inspect the wooden crate for obvious shipping damage. Some crates contain up to six (6) units, each individually shrink-wrapped. If no visible damage to crate is found, proceed to remove the cover using a suitable Phillips screwdriver. Proceed to remove the sides to expose the units. Insert a lifting device into the lifting brackets on top of the VRp unit, remove the unit from the pallet—inspect for damages until all units are checked. 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 to remove the protective shrink-wrap film from each unit. Leave the lifting brackets in place, as they are required during installation.

Mounting

VRp-22500-0338 is designed for use with the ILC-22500-0338 isolation line conditioner cabinet. Proceed as follows:

1. Invert the wall fixing brackets on the VRp cabinet



Bracket

- 2 Place the VRp cabinet on top of the ILC cabinet and mark the wall for hole drilling.
- 3 Use wood screws of suitable size if holes line up with wooden studs; for concrete surfaces a carbide tip drillbit is required—drill a hole deep enough for insertion of a concrete anchor. Insert anchor, put VRp on top of ILC and tighten screws; if only drywall is available the installer should consider using a piece of wood to bridge the gap between wall studs.
- 4 After securing VRp remove lifting brackets and replace screws. Keep the lifting brackets in case they are required later.



Electrical

VRp-22500-0338 is designed to receive power from ILC-22500-0338 ONLY. DO NOT INSTALL VRP USING ANY OTHER POWER SOURCE UNLESS APPROVED BY TSI POWER. INSTALLING VRP WITHOUT AN APPROVED POWER SOURCE MAY RESULT IN VOIDED WARRANTY.

ILC-22500-0338 provides a three-phase output plus neutral and ground (5 wire). The voltage is either 400/230VAC or 415/240VAC depending on country of installation.

VRp-22500 uses a three-pole, 40A circuit breaker for over current protection and is connected in series with the output. THIS BREAKER IS NOT A DISCONNECT, NOR DOES IT PROVIDE INPUT PROTECTION. The ILC-22500-0338 has a three-pole, 50A circuit breaker on its input. The two (2) units together provide the necessary input/output protection.

Please refer to ILC-22500-0338 installation instructions for information on this unit. NOT CONTAINED HEREIN.

Grounding and Bonding

VRp/ILC are not a replacement for proper site grounding and bonding. Be sure to follow proper site preparation procedures. NOT CONTAINED HEREIN.

Extra Lightning Protection

VRp/ILC together are designed to withstand Normal and Common-Mode indirect surge voltages and have internally coordinated surge protection devices. VRP ITSELF IS NOT A SURGE PROTECTIVE DEVICE (SPD) AND REQUIRES ILC TO PROVIDE PROTECTION FOR THE LOAD, AS WELL AS ITSELF. DO NOT INSTALL VRP WITHOUT ILC AS THIS WILL RESULT IN VOIDED WARRANTY AND RISK TO THE CONNECTED LOAD.

If immunity against the more severe surges resulting from lightning strokes (defined by LPZ0a and LPZ0b) is required, it is recommended that an external surge diverter capable of withstanding IEC-61312 be installed.

WARNING: MAKE SURE THAT VOLTAGE SUPPLY TO VRp IS OFF BY SWITCHING OFF UPSTREAM ILC-22500-0338 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 upper left side of unit. Use the two provided strain-relief connectors to route cable between ILC and VRp. Use lower entry point for power supplied from ILC and the upper exit for output from VRp. If compliance with North-American electrical standards is required, use 1" conduit connectors (not provided).



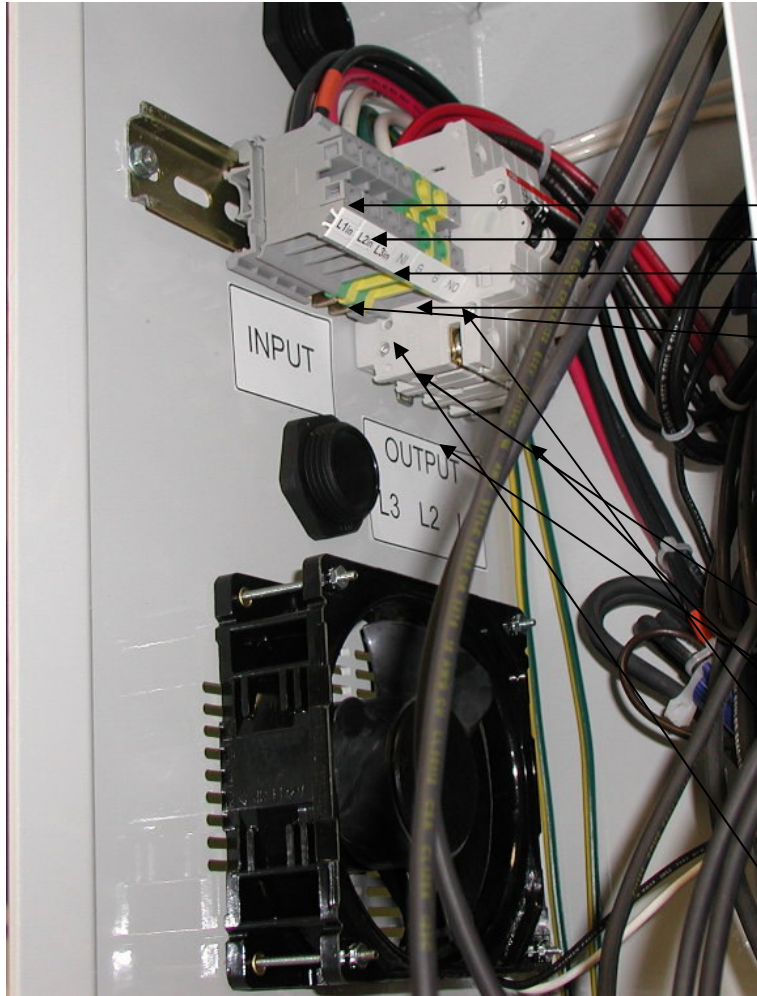
Use minimum AWG 8 (8.4 square mm). All conductors must be of the same size. TSi recommends using stranded copper wire with a minimum 105°C insulation system.

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

Insert wire through the strain-relief connectors. Ensure that there is enough wire to reach the respective terminal, take care to leave enough slack.

Strip approximately 3/8" (or 10 mm) insulation from the end of each pair of (5) wires.

Input terminals are located on a DIN-rail inside the VRp cabinet on the left side. The three-phase Output is provided by the three-pole circuit breaker on the left side of the cabinet—neutral and ground conductors must be connected to the DIN-rail terminals next to the circuit breaker.



The input terminals are marked as follows:

- L1in for phase A,
- L2in for phase B,
- L3in for phase C,
- NI for neutral in,
- G for input earth ground, terminal is green/yellow stripes.

The output terminals are marked as follows:

- The OUTPUT label below the circuit breaker from left to right:
- L3 for phase C,
- L2 for phase B,
- L1 for phase A.

The output neutral is located on the DIN-rail next to the circuit breaker and is marked: NO

The output earth ground, yellow/green stripe, is located to the left of the NO terminal on the

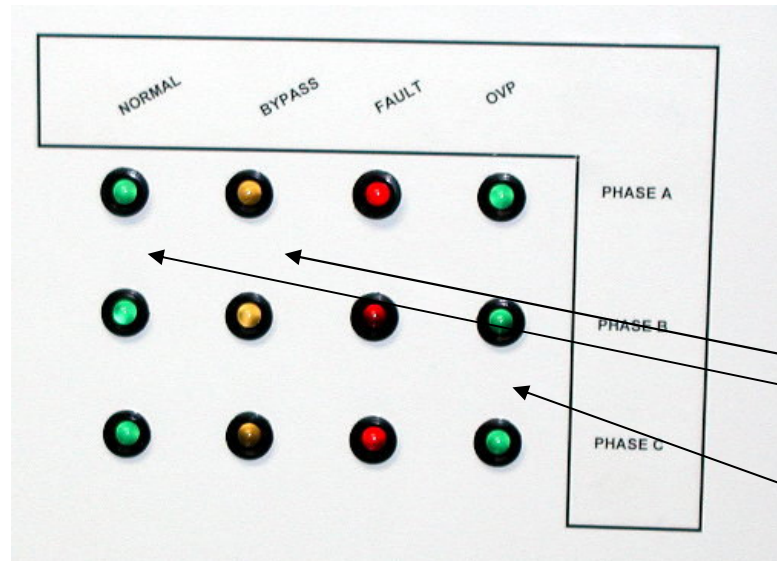
DIN-rail.

VERIFY PHASE SEQUENCE BEFORE PROCEEDING. MAKE ABSOLUTELY SURE THAT INPUT/OUTPUT ARE NOT REVERSED AS SERIOUS DAMAGE WILL OCCUR WHEN ENERGIZING AN INCORRECTLY WIRED UNIT.

Before proceeding to the next step, make sure that ILC-22500-0338 produces a phase to neutral output voltage of between 220 to 240VAC. Using a volt meter, check each phase to neutral to verify proper voltage. Turn the breaker off.

Carefully insert each wire into the appropriate terminal, taking care to ensure that all strands are inserted properly. Tighten each 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.

Energizing VRp



1. Close the front door,
2. Switch on the ILC-22500-0338 circuit breaker,
3. VRp is now energized,
4. After a short blink of the Amber BYPASS LED the Green NORMAL LED, located on the left of each row, should be ON.
5. The Green OVP LED, located to the right of each row, should also be ON,
6. VRp is now operational,
7. To turn on power to the load open the VRp cabinet door—be careful not to touch any live circuits.
8. Switch on the Output circuit breaker and close the door.

VRp is operating normally when the green LEDs in each of the three rows are lit. Please contact TSi or its representative in your country if any of the green LEDs are off; or if a Red or Amber LED is permanently lit.

Important Safety Instructions

When carrying out maintenance work care should be taken if the unit is live. Any work carry out inside the cabinet must have the input power disconnected to avoid accident and electrocution of the maintenance personnel.

Disclaimers

UNAUTHORISED MODIFICATIONS OR SERVICING OF THE EQUIPMENT WILL INVALIDATE THE WARRANTY

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- End of ILc & VRp Installation & Maintenance Procedure-