

# OPERATION AND INSTALLATION MANUAL

## OMPQ Series Control Panels

Models OMPQ-3 through OMPQ-100 | 240 Volts | Delta

### **WARNING**

To reduce the risk of injury or death, the installer must read and understand this manual in full before installing or operating this equipment.

Installation must be performed by a qualified, licensed electrician familiar with phase converter and control panel installations.

This equipment operates at high voltage. Electrical shock can cause serious injury or death.

**SAVE THIS MANUAL FOR FUTURE REFERENCE**

# Table of Contents

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## **Section 1** Introduction and Safety Notes

1.1 How It Works

1.2 Safety Rules

## **Section 2** Installation

2.1 Typical Line Diagram

2.2 Branch Circuit and Wire Sizing

2.3 Suggested Wire Size by Breaker Size

2.4 Mounting the Control Panel

2.5 Control Panel Wiring Connections

2.6 Connecting the Idler Motor

2.7 Switch Assembly

## **Section 3** Checking the Phase Converter

3.1 Checking Single-Phase Input Voltage

3.2 Checking Three-Phase Output Voltage

## **Section 4** Operation and Maintenance

4.1 Operation Guidelines

4.2 Routine Maintenance

4.3 Lubrication

## **Section 5** Troubleshooting

## Section 1: Introduction and Safety Notes

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The OMPQ Series control panel is designed to work with your own three-phase idler motor (idler generator) to produce reliable three-phase power from a standard single-phase utility service. The OMPQ panel provides all the starting and running circuitry. You supply and connect the motor.

OMPQ Series control panels are available from OMPQ-3 through OMPQ-100, corresponding to the horsepower rating of the idler motor you will connect to the panel.

### 1.1 How It Works

The OMPQ panel takes the two hot legs of single-phase utility power at L1 and L2 and uses the idler motor to manufacture a true third leg of three-phase power. The result is three-phase output at T1, T2, and T3 that can power your equipment.

The output voltage will always be close to your input voltage. If you need a different output voltage, a step-up or step-down transformer will be required in addition to the control panel.

### 1.2 Safety Rules — Read Before You Begin

#### **DANGER: HIGH VOLTAGE**

This equipment is connected to line voltage that can cause serious injury or death. Always confirm that power is OFF at the breaker before working on this equipment. After disconnecting power, wait at least 1 minute before opening the control panel. Capacitors retain a charge.

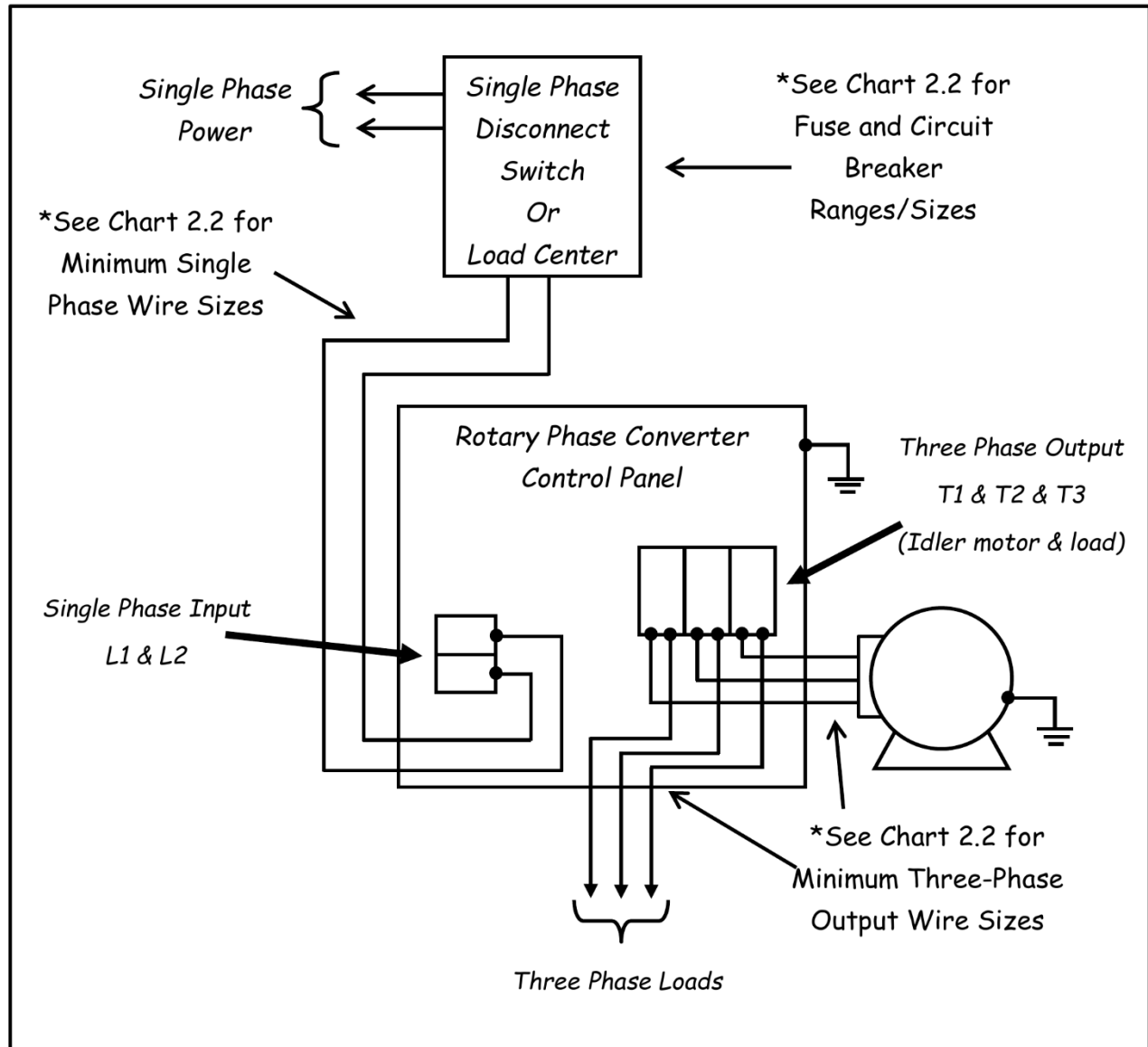
#### **Installation Requirements:**

- Installation must comply with all national, state, and local electrical codes.
- Installation must be performed by a qualified, licensed electrician.
- Input voltage must be between 208 and 250 volts single-phase before connecting.
- All connected loads, including transformers, must be turned off and disconnected before starting the panel each time.
- Do not connect control circuits or single-phase loads to T3. T3 is the manufactured (generated) leg only.
- Do not connect a ground or neutral wire to T3.
- Do not bolt the idler motor down solid. Mount it on rubber isolation feet or a rubber pad.
- Make sure the control panel, idler motor, and all connected equipment are properly grounded.
- Wire size recommendations are minimums based on copper wire. Increase the wire size by one gauge for every additional 50 feet of wire run beyond the first 50 feet.
- The input wire must be sized for the full single-phase input current.
- If using aluminum wire, use the copper equivalent rating for the same current amount.
- Single-phase loads must always be powered from T1 and T2 only.
- The horsepower rating of the control panel must match the horsepower rating of the customer-supplied idler motor.

## Section 2: Installation

### 2.1 Typical Line Diagram

The diagram below shows a standard OMPQ Series installation. Your installation may vary depending on your facility and load configuration. Confirm all details with your licensed electrician before



#### Key rules shown in the diagram:

1. Installation must comply with all national, state, and local electrical codes.
2. Installation must be performed by a licensed electrician.
3. The CP panel must be started, and the idler motor should reach full speed, before any loads are energized, including transformers.
4. T3 is the generated leg. Do not connect it to single-phase loads or control circuits.
5. Do not bolt the idler generator down solid.
6. The motor should reach full speed within 2 to 3 seconds of pressing the start button.
7. Ground the control panel, idler generator, and all connected equipment.

## 2.2 Branch Circuit and Wire Sizing

### Breaker Sizing

The OMPQ Series control panel has a minimum and maximum circuit breaker range. Size your circuit protection anywhere within that range. Use the table below as your guide and always verify with your electrician and local code requirements.

**To calculate the single-phase branch circuit, you need to:**

- Add the full-load amperage (FLA) of all three-phase loads together, then multiply by 1.732. This gives you the minimum single-phase current draw at full load.
- For proper circuit protection per NEC Article 455, multiply your total three-phase load amperage by 2.5. This is the recommended minimum circuit protection size.

**Formula:** Total 3-phase load amperage  $\times$  1.732 = Single-phase current draw

**Formula:** Total 3-phase load amperage  $\times$  2.5 = Minimum recommended circuit protection size

| CP Model | Min. Breaker / Fuse | Max. Breaker / Fuse | Min. Single-Phase Wire           | Min. 3-Phase Wire (Idler and Load) |
|----------|---------------------|---------------------|----------------------------------|------------------------------------|
| OMPQ-3   | 10 amps             | 20 amps             | #12 AWG or 125% of breaker size  | #12 AWG or based on load           |
| OMPQ-5   | 20 amps             | 30 amps             | #10 AWG or 125% of breaker size  | #12 AWG or based on load           |
| OMPQ-7   | 20 amps             | 40 amps             | #8 AWG or 125% of breaker size   | #10 AWG or based on load           |
| OMPQ-10  | 30 amps             | 50 amps             | #6 AWG or 125% of breaker size   | #10 AWG or based on load           |
| OMPQ-15  | 40 amps             | 80 amps             | #4 AWG or 125% of breaker size   | #8 AWG or based on load            |
| OMPQ-20  | 50 amps             | 100 amps            | #2 AWG or 125% of breaker size   | #6 AWG or based on load            |
| OMPQ-25  | 60 amps             | 125 amps            | #1/0 AWG or 125% of breaker size | #4 AWG or based on load            |
| OMPQ-30  | 70 amps             | 150 amps            | #2/0 AWG or 125% of breaker size | #2 AWG or based on load            |
| OMPQ-40  | 100 amps            | 200 amps            | #4/0 AWG or 125% of breaker size | #1 AWG or based on load            |
| OMPQ-50  | 125 amps            | 250 amps            | 250 MCM or 125% of breaker size  | #2/0 AWG or based on load          |
| OMPQ-60  | 150 amps            | 300 amps            | 300 MCM or 125% of breaker size  | #3/0 AWG or based on load          |
| OMPQ-75  | 175 amps            | 325 amps            | 350 MCM or 125% of breaker size  | #4/0 AWG or based on load          |
| OMPQ-100 | 200 amps            | 350 amps            | 350 MCM or 125% of breaker size  | #4/0 AWG or based on load          |

**Wire Size Notes**

All wire size recommendations are minimums based on copper wire and wire runs of 50 feet or less.

Increase wire size by one gauge for every additional 50 feet of wire run beyond 50 feet.

If using aluminum wire, use the copper equivalent rating for the same current amount.

Voltage drop depends on wire length and gauge. When in doubt, go one size larger.

## 2.3 Suggested Wire Size by Breaker Size (NEC 310.16)

Use this table to match your circuit breaker size to the correct minimum wire gauge. Columns 2 and 3 are based on NEC Table 310.16, using copper wire rated at 90°C insulation. These recommendations apply to both your single-phase input wiring and your three-phase output wiring to the load.

### Note:

Wire can never be too large, but undersized wire is one of the most common causes of starting problems and poor performance. Always confirm your wire selection with a licensed electrician and verify it meets all local code requirements.

| Breaker Size (Amps) | Minimum Wire Size (AWG / MCM) | Ampacity Rating at 90°C |
|---------------------|-------------------------------|-------------------------|
| 15 amps             | #14 AWG copper                | 25 amps                 |
| 20 amps             | #12 AWG copper                | 30 amps                 |
| 30 amps             | #10 AWG copper                | 40 amps                 |
| 40 amps             | #8 AWG copper                 | 55 amps                 |
| 50 amps             | #6 AWG copper                 | 75 amps                 |
| 60 amps             | #4 AWG copper                 | 95 amps                 |
| 70 amps             | #4 AWG copper                 | 95 amps                 |
| 80 amps             | #3 AWG copper                 | 115 amps                |
| 90 amps             | #2 AWG copper                 | 130 amps                |
| 100 amps            | #1 AWG copper                 | 145 amps                |
| 110 amps            | #1/0 AWG copper               | 170 amps                |
| 125 amps            | #1/0 AWG copper               | 170 amps                |
| 150 amps            | #2/0 AWG copper               | 195 amps                |
| 175 amps            | #3/0 AWG copper               | 225 amps                |
| 200 amps            | #4/0 AWG copper               | 260 amps                |
| 225 amps            | 250 MCM copper                | 290 amps                |
| 250 amps            | 250 MCM copper                | 290 amps                |
| 300 amps            | 350 MCM copper                | 350 amps                |
| 325 amps            | 400 MCM copper                | 380 amps                |
| 350 amps            | 500 MCM copper                | 430 amps                |

\*Reference: NEC Table 310.16, 2020 edition. Copper conductors, 90°C insulation rating (THWN-2 or equivalent). Based on not more than three current-carrying conductors in a raceway, cable, or earth (directly buried) with an ambient temperature of 86°F (30°C).

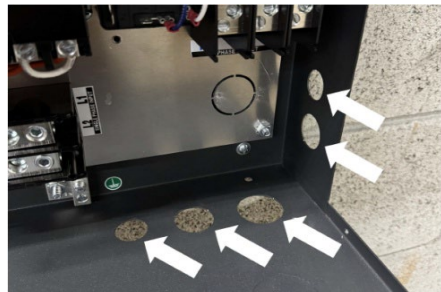
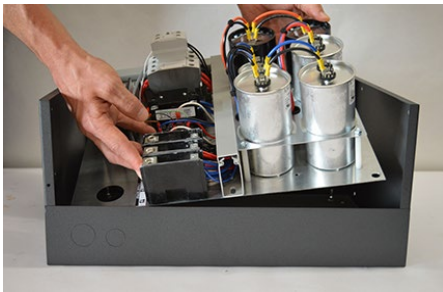
### Code Compliance Notice:

This manual includes information about the National Electrical Code (NEC) and local electrical codes. That information is provided for general guidance only. It does not replace the NEC or local code requirements and should not be used as proof of code compliance.

## 2.4 Mounting the Control Panel

The control panel should be mounted to a solid, non-vibrating wall surface as close to your single-phase power source as practical. Keeping the single-phase supply run short reduces voltage drop and improves phase converter performance.

1. Choose a location that is clean, dry, and protected from excessive dust, moisture, and corrosive fumes. The unit is rated for indoor installation by default. If the installation environment requires outdoor or washdown-rated enclosures, contact us before proceeding.
2. Remove the panel cover by removing the screws on the front and sides of the panel.
3. To make the enclosure lighter and easier to mount, you may remove the converter's backplate by unscrewing the 4 bolts in each corner.
4. Remove the conduit knockouts (available on NEMA 1 enclosures) that you will use for your wire entry points. The panel can be mounted with knockouts accessible from the side or bottom.
5. Mark your mounting hole locations on the wall. Mounting hardware is not included.
6. Secure the panel to the wall and reinstall the backplate (if removed).



### Image Descriptions

**Image 1:** The removable backplate lets you reduce the enclosure's weight before mounting. Remove the 4 bolts in each corner to detach the backplate.

**Image 2:** The lightweight enclosure mounts easily to the wall. Secure it using the mounting hole locations you marked in step 5.

**Image 3:** The NEMA 1 enclosure has 5 conduit-entry knockouts: 3 on the bottom and 2 on the right-hand side. **Remove only the knockouts you need for your wiring.**

| Enclosure Size   | Right Side Knockouts | Bottom Knockouts       |
|------------------|----------------------|------------------------|
| 18" × 12" × 8"   | 3/4" and 1"          | 3/4", 1", and 1-1/4"   |
| 18" × 18" × 8"   | 1" and 1-1/4"        | 1", 1-1/4", and 1-1/2" |
| 26" × 18" × 8.5" | 1-1/2" and 2"        | 1-1/2", 2", and 2-1/2" |

**Note:** Additional holes can be drilled or punched if needed.

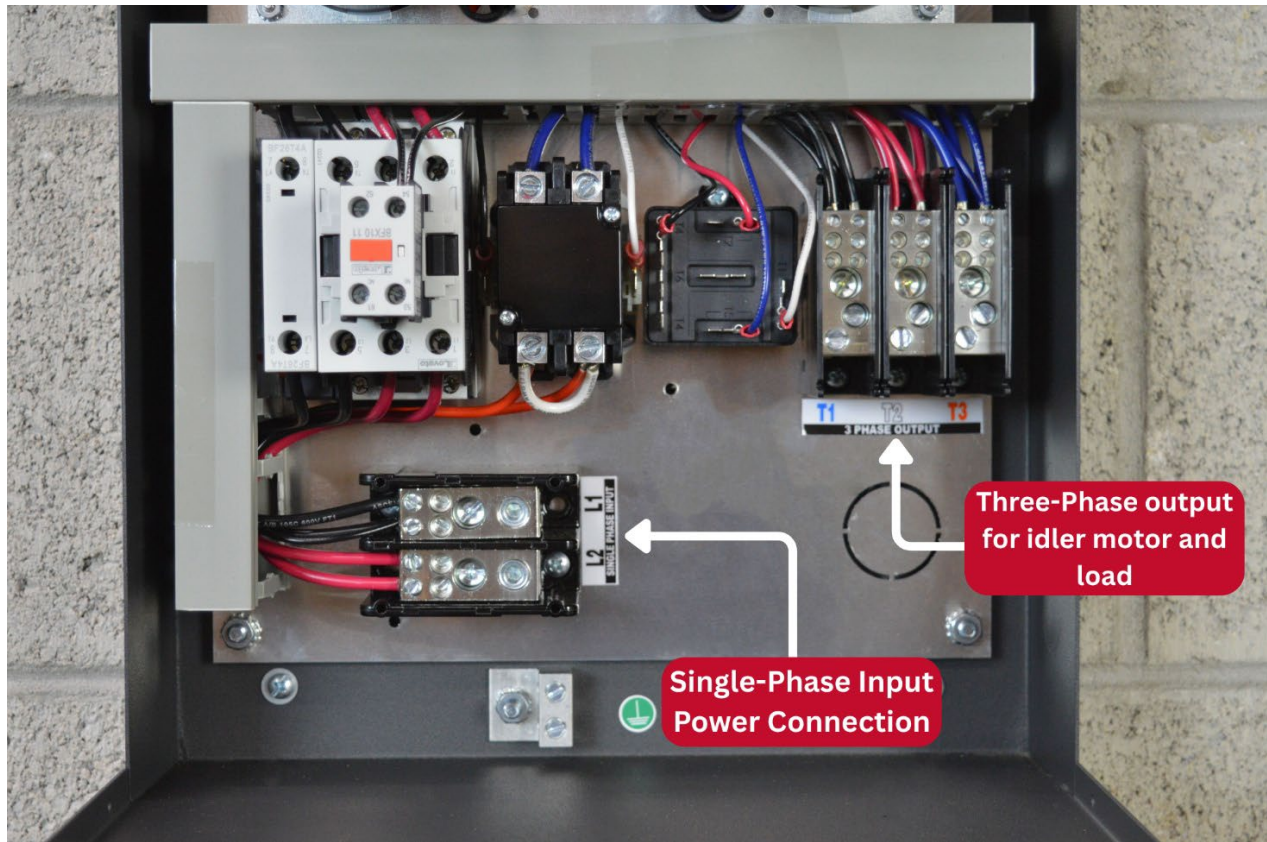
**Note:** Each enclosure also includes a 6th pre-punched knockout for an optional twist-lock outlet.

## 2.5 Control Panel Wiring Connections

The CP Series panel is equipped with clearly labeled power distribution blocks for all wire terminations.

**L1 and L2** Single-phase input power. Connect your two hot conductors from your single-phase panel here.

**T1, T2, T3** Three-phase output to your idler motor and connected load. T3 is the manufactured leg.



### Recommended Tightening Torque

| Wire Size          | Torque     |
|--------------------|------------|
| #10 AWG – #14 AWG  | 35 lb.-in  |
| #8 AWG             | 40 lb.-in  |
| #6 AWG – #2/0 AWG  | 120 lb.-in |
| #3/0 AWG – 400 MCM | 275 lb.-in |

#### Note:

Use a calibrated torque wrench for all lug connections. Check and re-torque all connections after the first 50 hours of operation. New wire tends to compress and settle under the lugs.

## 2.6 Connecting the Idler Motor

The OMPQ Series panel is designed to work with a variety of customer-supplied motors. Wire your motor to the OMPQ panel at terminals T1, T2, and T3 following the wiring diagram on your motor's nameplate or in the motor junction box.

### Important

Do NOT use wire nuts on any idler motor connections. Use only mechanical terminations such as lugs, pressure connectors, or terminal blocks.

Do NOT ground any of the idler lead connections at the junction box. Ground only the motor frame at the designated ground terminal. Follow your motor manufacturer's specific grounding instructions.

Refer to the wiring diagram on your motor's nameplate or inside the motor junction box for the correct lead groupings for your specific motor. Lead configurations vary by motor manufacturer and voltage rating.

Failure to wire the motor correctly will prevent the converter from starting and may damage the unit.

### Mounting the Idler Motor

1. Place the idler motor on a clean, flat surface in a location with good airflow and away from excessive dust, moisture, and corrosive fumes.
2. Mount the motor on rubber isolation mounting feet. Do not bolt it down solid to the floor. The isolation feet absorb vibration and extend bearing life.
3. Keep the junction box accessible for future inspection.

### General Idler Motor Connection Guidelines

- Run wires from T1, T2, and T3 on the OMPQ panel to the corresponding lead groups in the motor junction box per the motor's nameplate diagram.
- Insulate all connections inside the motor junction box with electrical tape or heat-shrink tubing after making each connection.
- After all lead connections are made, ground the motor frame to earth ground using the motor's designated ground terminal.
- Do not ground any of the motor lead connections themselves. Ground only the motor frame to earth ground.

### Note:

This is a low-voltage (208 to 250 volt) installation.

If your motor has only 3 leads, connect Lead 1 to T1, Lead 2 to T2, and Lead 3 to T3.

If your motor has 9 or 12 leads, group and connect them per the motor nameplate diagram for low-voltage wiring. Configurations vary by manufacturer.

## 2.7 Switch Assembly

The start/stop switch assembly is pre-wired into the control panel. Follow these steps to install it correctly in the panel cover.

### Caution

The switch can only be installed in one direction. Installing it in the wrong direction will break the switch. Read all four steps before beginning.

1. Press the red OFF button on the front of the panel cover. While pressing it, look at the back of the cover and note which side the red tab pushes forward. This tells you the correct orientation.
2. Securely push the terminal blocks into the back of the switch. The red terminal block matches the red tab.
3. Slide the locking tab on top of the terminal blocks to the right (when looking at the back of the switch) to lock the terminal blocks in place.
4. Give the assembly a firm tug to confirm it is fully locked before closing the panel.



## Section 3: Checking the Phase Converter

Before powering any loads, verify that the panel is producing the correct output voltage. This step protects both the panel and your connected equipment.

### 3.1 Checking Single-Phase Input Voltage

With the single-phase power on and the control panel off, measure the voltage between L1 and L2 with a voltmeter. Record the reading below.

**Input Voltage L1 to L2:** \_\_\_\_\_ volts

The reading should be between 208 and 250 volts. If the voltage is outside this range, contact us before proceeding.

### Note:

If your input voltage is below 208 volts, do not start the converter. Contact your power company or us before proceeding. Low input voltage is one of the most common causes of starting problems.

## 3.2 Checking Three-Phase Output Voltage

Start the converter by pressing the green ON button. The indicator light will illuminate, and the idler motor should reach full speed within 2 to 3 seconds.

### Important

If the idler motor does not start within 5 seconds, press the red OFF button immediately. Do not attempt to restart until you have identified and corrected the problem. Refer to Section 5 for troubleshooting guidance.

With the phase converter running and no connected loads turned on, measure the output voltage at each of the three output terminals and record the readings below.

**T1 to T2:** \_\_\_\_\_ volts

**T1 to T3:** \_\_\_\_\_ volts

**T2 to T3:** \_\_\_\_\_ volts

- T1 to T2 should match your L1 to L2 input voltage or be within 1 to 2 volts.
- T1 to T3 and T2 to T3 will read 5 to 15 volts higher than T1 to T2 with no load connected. This is normal. These voltages will drop and balance once a load is running.
- Do not measure line-to-ground voltages. Line-to-ground readings are not meaningful on a delta system.

### Tip:

Record your baseline voltage readings above and keep this manual with the unit for future reference. If a load motor runs backward when first started, switch any two of the three output connections at the motor to reverse rotation.

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## Section 4: Operation and Maintenance

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### 4.1 Operation Guidelines

1. Always start the OMPQ panel first and allow the idler motor to reach full speed before energizing any connected loads or transformers.
2. Do not start the panel with a load already energized. **This includes transformers.**
3. The panel may run continuously with or without a load. Running the converter at idle is normal and does not harm the unit.
4. Avoid starting multiple loads at the same time whenever possible. Starting loads one at a time reduces strain on the converter and your electrical service.
5. If you hear excessive noise or unusual vibration from the control panel or idler motor, shut the unit down immediately and contact us before restarting.
6. Frequent start and stop cycles are harder on the phase converter than continuous operation.

## 4.2 Routine Maintenance

Your rotary phase converter control panel requires very little routine maintenance. The following checks, performed periodically, will keep the unit running reliably for years.

### Every 6 Months

1. Inspect all vents on the control panel and idler motor. Clear any dust, dirt, or debris that may block airflow.
2. Wipe down the exterior of the idler motor. Dust buildup on the motor housing acts as insulation, leading to overheating.

### Annually

1. Open the control panel and inspect all internal components for heat damage, discoloration, or corrosion.
2. Check all wire connections and confirm they are tight. Check all lug nuts and re-torque to the values in Section 2.5 if needed.
3. Inspect all wires for cuts, nicks, or damaged insulation. Replace any damaged wire before restarting the unit.
4. Test capacitors with a capacitor meter and replace any that are out of spec. Contact us for replacements.
5. Confirm that the switch assembly is secure and operating correctly.

#### **Safety Reminder**

Always disconnect power at the breaker and wait at least 1 minute before opening the panel or working on any component.

Capacitors inside the control panel retain a charge even after power is disconnected.

## 4.3 Lubrication

Idler motor bearing lubrication requirements will vary depending on the motor you supply. Refer to your motor manufacturer's documentation for the correct lubrication type, quantity, and service interval.

As a general guideline, if your motor uses grease fittings (zerks), use a high-temperature polyurea-based bearing grease such as Exxon Polyrex EM or equivalent. Do not use lithium-based greases.

## Section 5: Troubleshooting

Use the table below to identify and resolve the most common issues. Please contact our technical support team if you are unable to resolve a problem after working through the relevant steps.

| Symptom                                                          | What to Check                                                                                                                                                                                                                                                                        |
|------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| The converter does not start; no sound or movement.              | Check the input voltage between L1 and L2. Check the circuit breaker and fuses. Check for loose wire connections. Confirm that the switch terminal blocks are fully seated.                                                                                                          |
| The converter tries to start but will not reach full speed.      | Verify that input voltage (L1-L2) is within the correct range (208 to 250 volts). Confirm that all loads are off and disconnected downstream. Check idler motor wiring per the motor nameplate. Verify input wire size is adequate. Check the kVA of any transformer in the circuit. |
| The converter vibrates excessively or runs louder than expected. | Confirm the idler motor is NOT bolted down solid. Check the idler motor wiring. Check the input voltage (L1-L2).                                                                                                                                                                     |
| Load will not start or run.                                      | Check input voltage (L1-L2). Verify that the CP panel is sized correctly for the load. Check wire sizes. Measure voltage at the load while starting — additional capacitors may be needed. Check that the load motor is wired for the correct voltage.                               |
| Load motor runs backward.                                        | Switch any two of the three connections at the load motor. Do not change anything at the OMPQ panel.                                                                                                                                                                                 |
| Control relays chatter or lights flicker on the load equipment.  | Check input voltage (L1-L2). Confirm that T3 is not connected to any control circuit. All control circuits must run from T1 and T2 only.                                                                                                                                             |
| Output voltage is too high or too low.                           | Check the input voltage. Contact us — capacitors may need to be adjusted. A buck-boost transformer may be needed if the single-phase input is outside the normal range.                                                                                                              |
| The breaker keeps tripping.                                      | Check for improper grounding in the wiring. Confirm breaker is correctly sized per Section 2.2. Verify that wire sizes are adequate. Check that no idler lead connections are grounded.                                                                                              |

### Note:

If you have 480V incoming power or any single-phase voltage other than 208 to 250 volts, do not install or operate this unit.