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901-0000-346

## DANGER!



**Potentially hazardous voltages are present. Electrical shock can cause death or serious injury.**

**Installation should be done by qualified personnel following all National, State & Local Codes.**

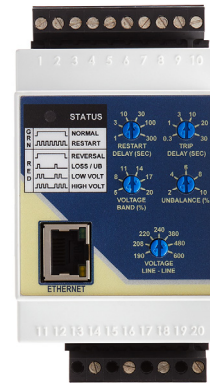
*Présence de tensions potentiellement dangereuses. Une décharge électrique peut causer la mort ou des blessures graves.  
 L'installation devrait être effectuée par du personnel qualifié suivant tous les codes nationaux, provinciaux et locaux.*



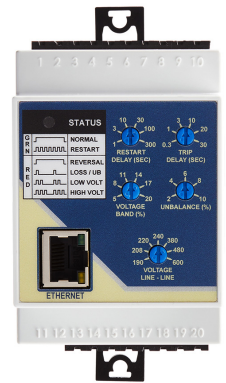
**BE SURE TO REMOVE ALL POWER SUPPLYING THIS EQUIPMENT BEFORE CONNECTING OR DISCONNECTING WIRING.  
 READ INSTRUCTIONS BEFORE INSTALLING OR OPERATING THIS DEVICE. KEEP FOR FUTURE REFERENCE.**

### Installation and Wiring

1. For DIN-rail mounting, snap the relay onto the 35mm DIN track. For panel mounting, remove both terminal connectors. Using a thumb, gently extend the two black DIN-rail clips from under the relay until they snap into panel-mount position and the mounting hole on each one is visible. Mount the relay to the panel using a #8 screw through the hole on each clip and then reinstall the terminals. See Figure 3 on page 3 for panel mounting template.
2. Use one 14-24 AWG solid or stranded wire, or two 18 AWG solid or stranded wires. A terminal tightening torque of 7 in-lbs should be used. Use conductors rated for 75°C or better when used in ambient air temperatures exceeding 60°C.
3. Set the VOLTAGE LINE-LINE dial to point directly at either 190, 208, 220, 240, 380, 480, or 600. Choose the line-to-line voltage closest to the actual line to line three phase system voltage. Note: Do not point this dial in between marked VOLTAGE LINE-LINE settings.
4. Set dials VOLTAGE BAND, TRIP DELAY and RESTART DELAY fully counter-clockwise. Set the UNBALANCE dial fully clockwise.
5. Reconnect the three-phase line-line voltage to terminals 16, 18 and 20; for Wye Systems connect neutral to terminal 14 if desired (see Wiring Diagram for details on the side of the relay or on page 2 of this document).
6. The PC1MDUL defaults to Automatic Reset mode. It will automatically reset once the fault has been corrected. However, they can be set up in the Manual Reset mode by connecting an external N.C. switch across terminals 5 and 6. The PC1MDUL will go into Manual Reset mode if it recognizes a N.C. switch across terminals 5 and 6 upon application of control power(startup). In manual reset mode, the relay will not energize following startup or fault conditions until the N.C. switch is opened and closed (pressed and released).
7. Apply control voltage and three-phase monitored voltage. The LED indicator should initially flash GREEN if in the Automatic Reset mode while the relay goes through its start-up delay or is waiting for the external switch to be operated for the Manual Reset mode. After the restart delay is completed(Automatic Restart) or the manual reset switch is operated(Manual Reset) the LED will then illuminate solid GREEN. If the LED turns RED solid or flashing, a fault condition exists and must be corrected. Check for proper phase rotation, presence of all three phases, and low or high voltage conditions. Use the LED Status Table at right or the Troubleshooting Guide to determine exact cause of fault. Make required corrections.
8. REMOVE CONTROL VOLTAGE AND THREE-PHASE MONITORED VOLTAGE.
9. Set the RESTART DELAY dial. This setting should be the time period required after a fault has been cleared before the relay should automatically energize. NOTE: RESTART DELAY dial is ignored when wired for the Manual Reset mode (see Step 6).
10. Set the VOLTAGE BAND dial between 80 and 95% of the VOLTAGE LINE-LINE setting. This value should encompass the minimum and maximum operating voltage for the equipment to be protected.
11. Set the TRIP DELAY dial. This is the amount of time that an unbalance, undervoltage or overvoltage condition can be present before a fault is triggered. Nuisance tripping can occur if this delay is set too short for the application, but if the delay is set too long it may not provide adequate protection. Note that the setting should be at least long enough to avoid tripping during the motor startup.
12. Set the UNBALANCE dial. This setting should be the maximum allowable unbalance in phase voltage that the three-phase system can tolerate. A low setting can cause nuisance tripping while a high setting may not adequately protect the system.



*Enclosure with terminal connectors*



*Enclosure with terminal connectors removed and clips extended*

(Continued on Page 2)



**Operation**

13. Connect the output terminal wires to terminals 8-10 as required by the application (see Wiring Diagram on the side of the relay or below).
14. Apply control voltage and three-phase monitored voltage. The LED indicator should initially flash GREEN if in the Automatic Reset mode while the relay goes through its start-up delay or is waiting for the external switch to be operated wired for the Manual Reset mode. After the restart delay is completed(Automatic Restart) or the manual reset switch is operated(Manual Reset) the LED will then illuminate solid GREEN. If the LED turns RED solid or flashing, a fault condition exists and must be corrected. Check for proper phase rotation, presence of all three phases, and low or high voltage conditions. Use the LED Status Table at right or the Troubleshooting Guide to determine exact cause of fault. Make required corrections.

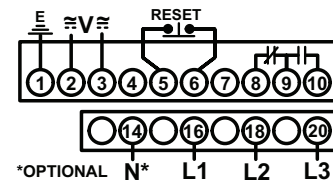
LED INDICATOR		STATUS
GREEN		NORMAL
		RESART
RED		REVERSAL
		LOSS / UB
		LOW VOLT
		HIGH VOLT

**Troubleshooting**

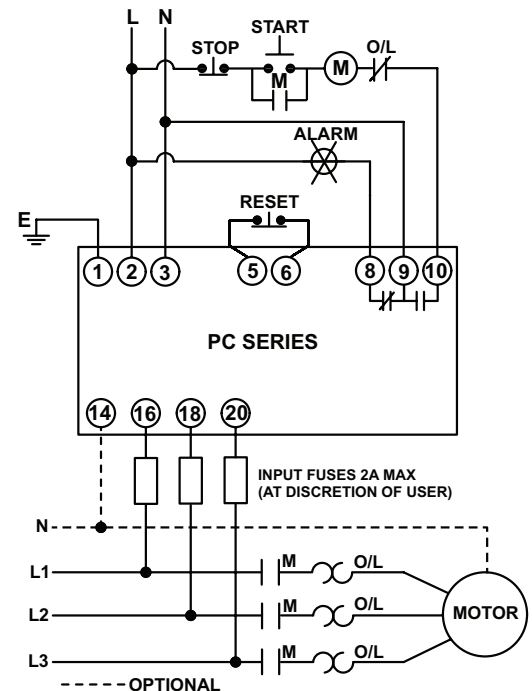
If the unit fails to operate properly, check that all connections are correct per the appropriate wiring diagram on the product. Check Troubleshooting table below. If problems continue, go to [www.macromatic.com/contact](http://www.macromatic.com/contact) for technical support.

**Troubleshooting Guide**

LED STATUS	SITUATION	SOLUTION
GREEN 	Motor is not starting	Either (a) the relay is going through its POWER-UP/ RESTART delay and will energize the output contacts when completed; or (b) the relay is in the Manual Reset mode and waiting for an external switch to be operated before energizing the output contacts.
GREEN 	Motor is not starting	The relay is in the run mode and working properly. Either another control device is preventing the motor from starting or all wiring should be checked.
NO INDICATION	Relay is not energized and/or motor is not running	Verify control voltage is connected to terminals 2 and 3. Measure the control voltage. If control voltage is below minimum specified voltage, the relay will not have enough power to operate.
RED 	On power-up or with motor running	The relay is sensing a phase reversal or phase out-of-sequence (rotation) condition. REMOVE THREE-PHASE VOLTAGE and switch any two of the three line connections to ensure the phase sequence (rotation) is correct.
RED 	Either a phase loss or voltage unbalance condition	Make sure all three phases are present. Check for a blown fuse or a loose or broken wire. Measure all three line-line voltages and calculate the percent unbalance—compare to UNBALANCE knob setting. Determine why unbalanced condition exists and correct it.
RED 	Low voltage (Undervoltage)	Measure the three line-to-line voltages. If the average of these three voltages is below the UNDERVOLTAGE TRIP knob setting, the relay has tripped due to a low voltage condition. Check for low voltage condition and correct it.
RED 	High voltage (Overvoltage)	Measure the three line-to-line voltages. If the average of these three voltages is > 10% of the VOLTAGE LINE-LINE knob setting, the relay has tripped due to a over voltage condition. Check for high voltage condition and correct it.



*Wiring Diagram 824*



*Figure 1: Typical Connections*

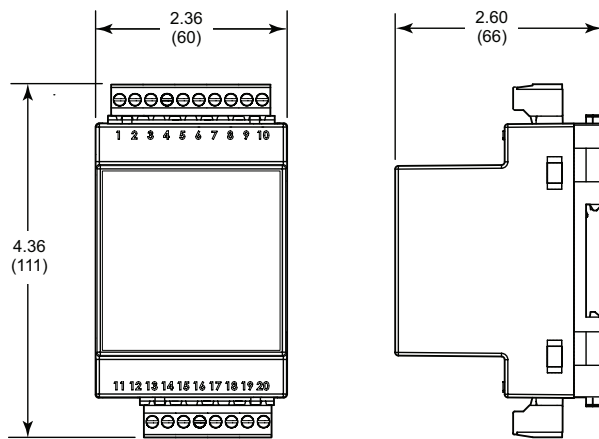


Figure 2: All Dimensions in Inches (Millimeters)

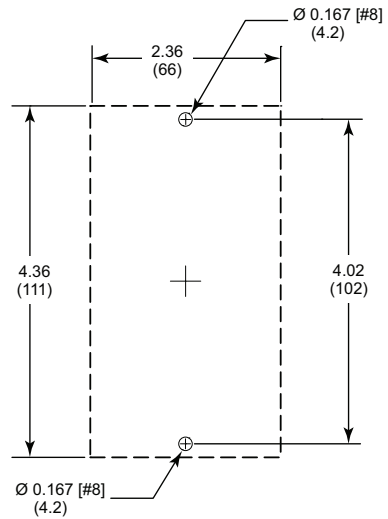


Figure 3: Panel Mounting Template

### Ethernet Configuration Using Web Browser

The PC1MDUL can be configured using a web browser on a computer or a mobile device.

- 1.) Connect the PC1MDUL Ethernet port to your network or directly to a computer or mobile device with a suitable ethernet cable.
- 2.) The computer or mobile device must be on the same subnet (192.168.0.X) in order to communicate with the PC1MDUL in its factory default state. If your computer or device already meets these criteria, proceed to step 3. If your computer or device is not on the 192.168.0.X subnet, change its IP address to an appropriate static/fixed IP address within that subnet. Then set the subnet mask to 255.255.255.0, and set the gateway to the appropriate address for your network(if unsure, this can typically be left blank). If you are unable to change these settings, contact your network administrator for assistance.

For information on how to configure your computer's or device's network IP configuration, visit [www.macromatic.com/ipconfigure](http://www.macromatic.com/ipconfigure).

- 3.) Connect control voltage to the PC1MDUL.
- 4.) In the web-browser address bar of your computer or mobile device, enter the IP address. (The factory set default IP address is 192.168.0.5) Alternatively, the webpage can be reached by entering the device name "pc1mdul" into the web-browser.
- 5.) The Device Status screen should be displayed showing real-time measurement data and the protection settings.
- 6.) To update the network settings, click on the "Network Settings" tab. This page requires login (Default username is "admin" and the default password is "admin"). The top of the Network Settings page shows all current network settings. The Device Name can be updated in the "Update Device Name" area in the center of the page.
- 7.) The PC1MDUL can be set for DHCP or static/fixed IP. To setup DHCP, set DHCP to "ON" from the dropdown list in "Update Network Settings". By default DHCP is set to OFF. To update fixed IP settings, set DHCP to "OFF" in "Update Network Settings." A form will appear where the new fixed IP settings can be assigned. **All fields must be completed** in order to submit new settings. Clicking "Submit Network Settings" will configure the PC1MDUL to the new settings. The device configuration page must now be accessed through the new IP address or Device Name.
- 8.) To set the device settings, click on the "Device Settings" tab. The top of the page will reflect show currently configured settings. The wiring configuration and system frequency can be updated in the "Update System Configuration" section of the page and clicking "Submit New Configuration" (**NOTE: L-N voltages will only be displayed when the device is set to 3P-4W. This setting can be configured on this page.**)
- 9.) The "Protection Settings" area on the bottom of the page reflects the settings of the dials on the face of the product. This area can be used to verify settings made on the device.



IP Configuration



10.) To update the login credentials, click on the “Administration” tab. This page requires login(Default username is “admin” and the default password is “admin”). Enter the current username and password and then the new username and password. The new username and password will be saved by clicking “Submit New Login.”

#### **Factory Reset**

Factory reset will return all settings to the default configuration and erase fault history data.

- 1.) **Important:** All factory reset steps must be completed **within 30 seconds** of control voltage applied to the PC1MDUL.
- 2.) **Important:** Do not connect monitored three phase voltage. The PC1MDUL will not allow Factory Reset if it senses voltage on the monitored three-phase voltage inputs (terminals 14, 16, 18, 20).
- 3.) Before connecting control voltage to the PC1MDUL, connect a N.O. switch across terminals 5 and 6.
- 4.) Apply control voltage, then close and open the N.O. switch at least 5 times(until the PC1MDUL’s power LED alternates Red/Green).
- 5.) Once the power LED is alternating Red/Green, hold the N.O. switch closed for at least 10 seconds or until the LED turns off indicating completion the factory reset process. The PC1MDUL will reset all configuration to the original factory settings, erase fault history, and then automatically turn back on. (**NOTE:** If the LED is alternating and the N.O. switch is not held closed for the 10 seconds, the device will time-out at the end of the 30 seconds and reset on its own. The device WILL NOT revert back to the factory settings.)
- 6.) Device configuration can be confirmed using a web-browser or by accessing associated registers and coils through Modbus.

#### **Ethernet Connection**

Supports RJ45 connector on both shielded and non-shielded cables, CAT5 or better. (RJ45 Receptacle Shield is grounded directly to terminal 1 providing full support for shielded cables.)

Connection Capacities(Maximum):

- 2 Modbus TCP Connections
- 2 Webserver Connections

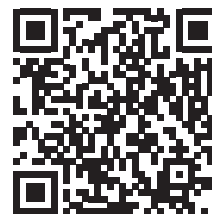
Factory Network Settings:

- IP Address: 192.168.0.5
- Subnet Mask: 255.255.255.0
- Default Gateway: 192.168.0.100
- Device Name: PC1MDUL

#### **Modbus Communication**

Modbus Map (PMD7Z04.xls) can be downloaded at: [www.macromatic.com/pc1mdul](http://www.macromatic.com/pc1mdul)

Measured Data Refresh Rate: 300ms



*Modbus Map*

#### **Warranty**

All PC1MDUL products manufactured by Macromatic are warranted to be free from defects in workmanship or material under normal service and use for a period of five (5) years from date of manufacture.