

Premium User Interface Installation, Operation, Maintenance Manual

Energy Saving Modulating Plus Controller
for Re-Verber-Ray® Brand MP Series Heaters

RE-VERBER-RAY

Keep these instructions for future reference.

⚠ WARNING



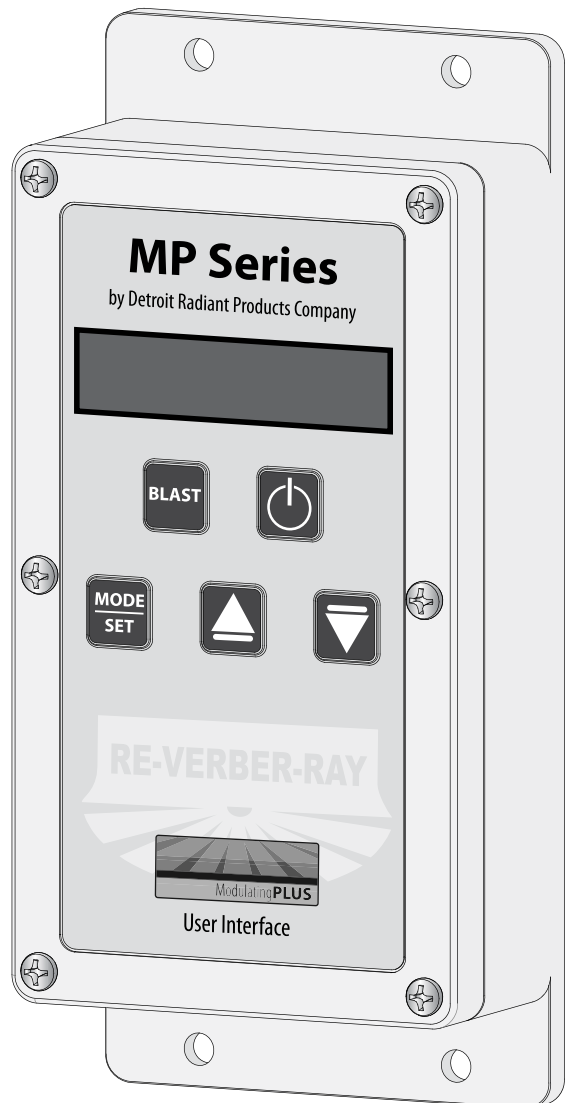
Failure to read and follow all instructions carefully before installing or operating this control could cause personal injury and/or property damage.

⚠ CAUTION



ELECTRICAL SHOCK HAZARD.

To prevent electrical shock and/or equipment damage, disconnect electric power to the system at the main fuse or circuit breaker box until installation is complete.



RoHs
Compliant

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1.0 Introduction and Overview

The Premium User Interface is a smart logic controller that offers the optimal performance out of the MP Series heater. It modulates the heater(s) with a full PID controller considering various inputs and outputs. It utilizes the current set temperature, room temperature, mode selected, and other items to set the speed of modulation. Therefore, the heater output optimally matches the heat loss of the space.

Specifications

Physical Dimensions:

Height: 7-3/4 Inches

Width: 3-5/8 Inches

Depth: 1-7/8 Inches

Programming Choices:

Non-programmable

7-Day programmable

Temperature Range:

35°F – 120°F

Differential:

1.0°F

Electrical Rating:

Connection Type – RS485

Constant Power – 15VDC (from heater)

Battery – 3VDC (CR2032s)

Maximum Operating Humidity Level:

85% Non-Condensing

Additional Features:

Optional remote temperature sensor

Optional outdoor air sensor

Positive off

BMS compatibility

4-20mA

0-10VDC



Quick Reference

Figure 1.1 • TH-PUI Controller Features

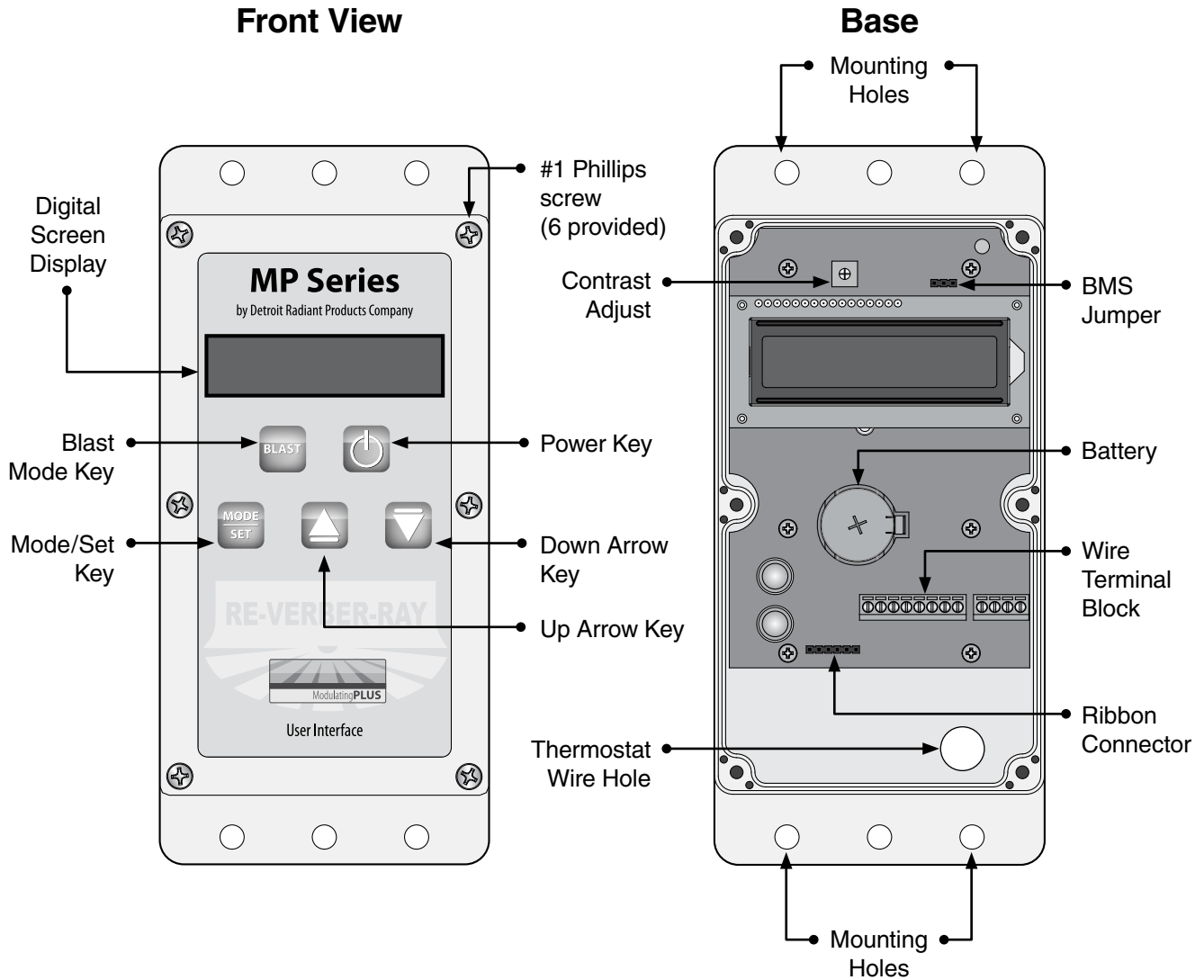
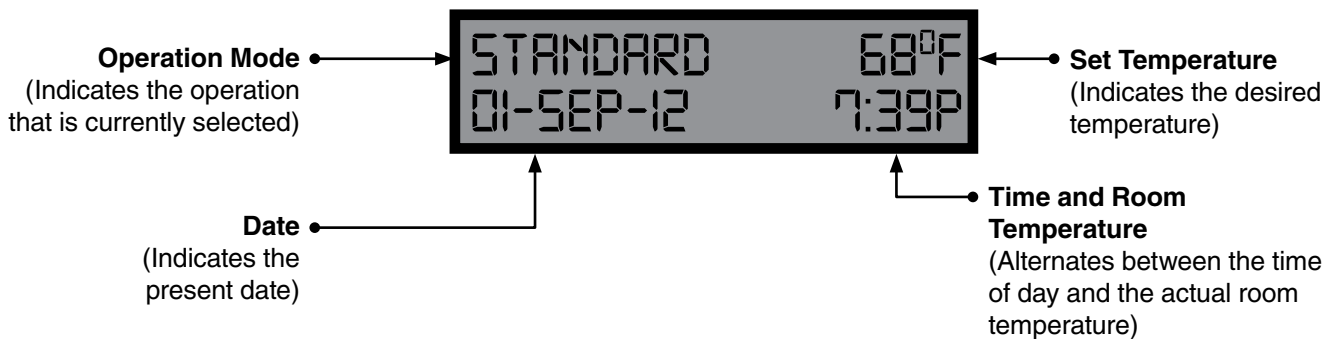
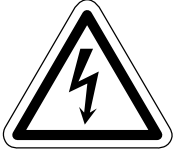


Figure 1.2 • TH-PUI Controller Home Screen Readout Description



2.0 Installation

WARNING



Electrical Shock Hazard

Disconnect power at the main fuse or breaker prior to installing this unit.

Installation

- ➊ Using the template on page 16, mark hole locations for mounting and wire inlets.
- ➋ Drill mounting holes. Ensure that the wires will feed through the wire opening in the base of the thermostat.
- ➌ Remove cover from the base by unscrewing the two (2) #1 Phillips screws from the base. Carefully disconnect ribbon connector from the base by pulling it straight off of the board.

CAUTION

Forcing or straining the ribbon cable will cause damage to the unit.

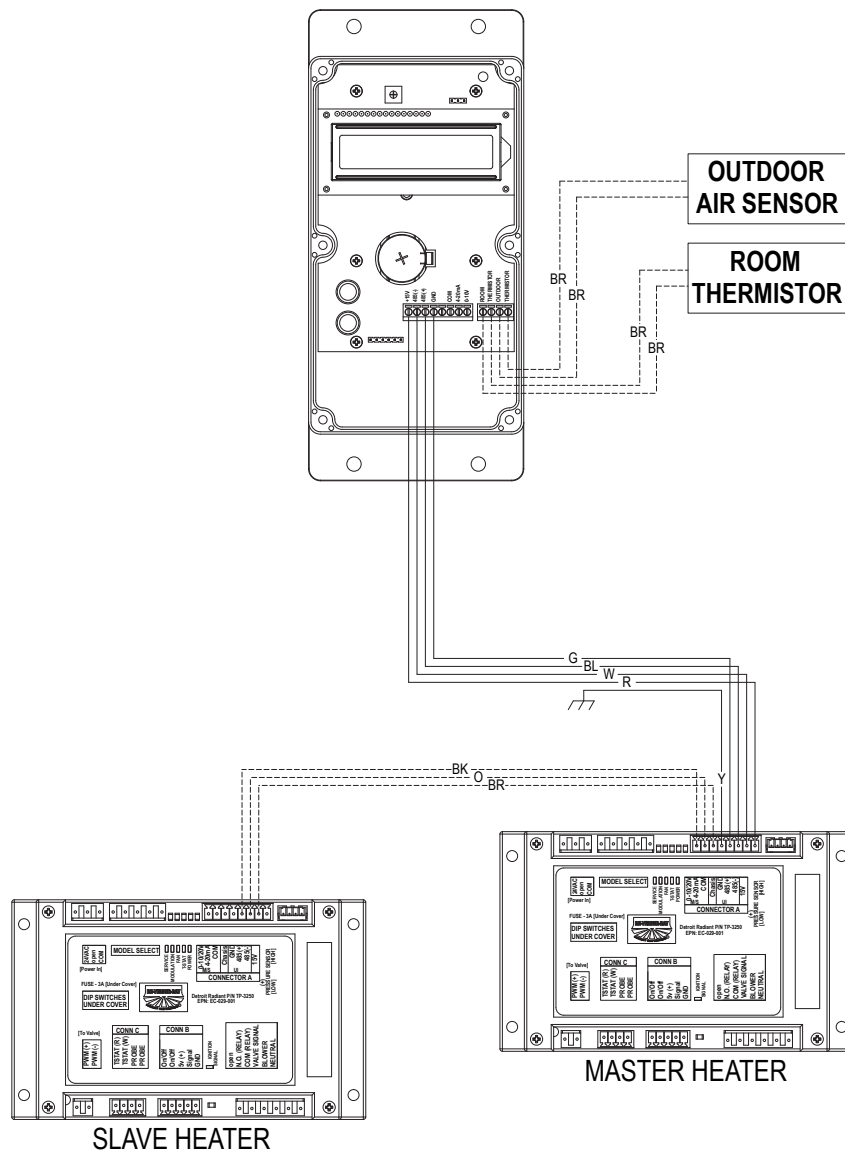
- ➍ Fasten base snugly to the wall or mounting surface utilizing the mounting holes provided. Level as necessary for visual purposes (unit being out of level will not affect performance).
- ➎ Route 18 ga. shielded thermostat wire through the hole provided in the back of the base.
- ➏ Connect wires to the terminal block following the appropriate wiring diagram.
- ➐ Carefully re-connect the ribbon connector to the base and set the cover in place. Secure with the six (6) screws provided.

Wiring Connections









Chart 2.1 • Terminal Wiring Designations

Terminal Designation	Description
R (15+)	Constant power 15VDC from heater
W (485-)	RS485 communication wire, negative inverting pin
B (485+)	RS485 communication wire, positive non-inverting pin
G (GND)	Ground, reference for RS485, connection point for shield drain wire
COM	Common wire from 4-20mA or 0-10V signal (OPTIONAL)
4-20mA	4-20mA signal from BMS system (OPTIONAL)
0-10VDC	0-10VDC signal form BMS system (OPTIONAL)
0-20VDC	0-20VDC signal controller (OPTIONAL)
Room Thermistor	Connector for remote temperature sensor, 10kΩ (OPTIONAL)
Room Thermistor	Connector for remote temperature sensor, 10kΩ (OPTIONAL)
Outdoor Thermistor	Connector for outdoor temperature sensor, 10kΩ (OPTIONAL)
Outdoor Thermistor	Connector for outdoor temperature sensor, 10kΩ (OPTIONAL)



Figure 2.1 • General Wiring Diagram



Installer Configuration




To enter the menu, press  Mode/Set. This displays the main menu of the controller. Press  up arrow or  down arrow to cycle through the menu items. Press  Mode/Set to adjust the selected menu item. Cycle through the adjustment options with the  up arrow or  down arrow keys. Press  Mode/Set to enter the selected value. To return to the home screen, press the  power key. Menus will auto exit after a predetermined time if no action is taken.

Main Menu

- ❶ **Set the Desired Temperature:** When the programmed schedule is turned off, this feature will allow the user to select the desired temperature. If the unit is set to operate within the scheduled program, the set point temperature is bypassed.
- ❷ **Select Mode:** This feature allows the user or installer to select the desired operating mode of the heater(s). There are three modes to choose from: Economy, Standard, or Comfort. For more information on the modes, see pages 8 & 9 or refer to the MP Series Insert Manual (LIOMP).
- ❸ **Run Program:** This controller has the ability to run on a 7-day programmable schedule or operate as a non-programmable thermostat. In this menu, user can turn the program on or off, or enter the sub-menu to adjust the program schedule.
- ❹ **Set Date:** Adjust the date to the current calendar date.
- ❺ **Set Time:** Adjust the time to the current time of day.
- ❻ **Service Mode:** This menu will allow the installer to enter into a sub-menu of configurations that is not normally accessed by the user. To enter this menu, press the  Mode/Set key twice.
- ❼ **Exit:** Select this menu item to exit to the previous menu, or simply press the  power key to return to the home screen.

Service Mode Menu

- ❶ **Set Temperature Sensor:** This allows user to select the method of sensing the temperature. The options are Local, Heater, and Remote.
 - A. **Local:** Utilizes the built in thermistor on the Premium User Interface.
 - B. **Remote:** Utilizes a remote thermistor connected to the Premium User Interface.
 - C. **Heater:** Utilizes a thermistor connected to the modulating controller on the heater.
- ❷ **Outdoor Sensor:** The installer can specify if an outdoor air temperature sensor is attached. This allows additional features to be activated on the Premium User Interface. For more information, reference the MP Series Insert Manual (LIOMP).
- ❸ **High Temperature Lockout:** This feature allows user to turn on or off the ability to keep the heater from coming on if the outdoor temperature is higher than the desired temperature.
- ❹ **Set Temperature Lockout:** User can adjust the set point temperature for the high temperature lockout. The factory default is 100°F.
- ❺ **Set °F / °C Display:** Select the desired temperature unit of measure. Factory default is °F.

- ⑥ **Format Time:** Select the desired time format from 12hr to 24hr. Factory default is 12hr.
- ⑦ **Daylight Savings:** Select if the unit is to automatically correct for daylight savings. Factory default is off.
- ⑧ **Backlight Format:** This feature allows user to have the backlight on continuously or just on with the touch of a key. In low light conditions, the continuous backlight improves contrast.
- ⑨ **Software Version:** This will display the software version of the Premium User Interface.
- ⑩ **Lifetime Statistics:** This will allow the user to view some key statistics of the heater, such as the number of cycles, total runtime hours, total heating hours, and number of faults. For troubleshooting purposes, user can reset the statistics if needed.
- ⑪ **Building Management System (BMS):** The Premium User Interface can be connected to most building management systems. This menu item allows the installer to select the type of BMS employed. In addition, the jumper on the base must also be set to the proper type (4-20mA or 0-10VDC). For more information, see Building Management Systems on page 13 of this manual.
- ⑫ **Commissioning:** This feature allows the installer to enter another sub-menu where they can select certain tools for troubleshooting or commissioning. The code to enter this menu is a three (3) character code:
 - A. **Press in sequence:**  Mode/Set,  up arrow,  down arrow.
- ⑬ **Reset Control:** This feature allows the controller to be reset to the factory default settings.
- ⑭ **Exit Service:** This will allow user to exit back to the main menu.

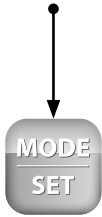
Commissioning Menu

- ① **Model of Heater:** This will display the model of the Master heater as well as the heater's software version.
- ② **Test Firing Rate:** To assist in measuring a stable manifold pressure this feature allows the unit to be temporarily locked into a test firing rate of 100% or 1%. Please reference the MP Series Insert Manual (LIOMP) for proper manifold pressures.
- ③ **Pressure Differential:** This feature allows the technician or installer to read the pressure differential of the master heater as it is running. This is measured by the pressure transducer of the modulating controller.
- ④ **% Open Gas Valve:** This feature allows the technician or installer to read the heaters % open of the gas valve as determined by the modulating controller. This is for reference only, and does not necessarily indicate proper operation of the heater.
- ⑤ **Exit:** This feature will return user to the previous menu, the Service Mode Menu.

Mode Map



Home Screen



MAIN MENU
(Auto exit after 20 sec.)

- SET TEMPERATURE
70°F
- SELECT MODE
ECONOMY
STANDARD
COMFORT
- RUN PROGRAM
ON
OFF
- ADJUST SCHEDULE
- EXIT
- SET DATE
DD-MMM-YY
- SET TIME
12:00A
- SERVICE MODE
ENTER SERVICE
- EXIT

PROGRAM MENU
(Auto exit after 5 min.)

MONDAY
OCCUPIED 70°F
UNOCCUPIED 62°F

TUESDAY
OCCUPIED 70°F
UNOCCUPIED 62°F

WEDNESDAY
OCCUPIED 70°F
UNOCCUPIED 62°F

THURSDAY
OCCUPIED 70°F
UNOCCUPIED 62°F

FRIDAY
OCCUPIED 70°F
UNOCCUPIED 62°F

SATURDAY
OCCUPIED 70°F
UNOCCUPIED 62°F

SUNDAY
OCCUPIED 70°F
UNOCCUPIED 62°F

TIMING ADJUST

EXIT

TIMING ADJUST
(Auto exit after 20 sec.)

WEEKDAYS
OCCUPIED 06:00A
UNOCCUPIED 05:00P

SATURDAY
OCCUPIED 08:00A
UNOCCUPIED 05:00P

SUNDAY
OCCUPIED 08:00A
UNOCCUPIED 05:00P

EXIT

SERVICE MODE
(Auto exit after 5 min.)

- SET TEMP SENSOR
LOCAL
REMOTE
HEATER
- OUTDOOR SENSOR
NOT INSTALLED
INSTALLED
- HIGH TEMP LOCK
ON
OFF
- SET TEMP LOCKOUT
100°F
- SET °F/°C DISPLAY
°F
°C
- FORMAT TIME
12 Hr
24 Hr
- DAYLIGHT SAVINGS
AUTO ADJUST
OFF
- BACKLIGHT FORMAT
ON WITH TOUCH
ALWAYS ON
- SOFTWARE VERSION
VERSION X.X
- LIFETIME STATS
CYCLES: XXXXXX
HOURS: XXXXXX
FAULTS: XXXXXX
RESET STATISTICS
- STATE OF CONTROL
(STATES OR ERRORS)
- BLDG MGMT SYSTEM
4-20mA
0-10VDC
OFF
- COMMISSIONING
CODE ACCESS ONLY
- RESET CONTROL
RESET TO DEFAULT
EXIT
- EXIT

COMMISSIONING
(Auto exit after 30 min.)

- MODEL OF HEATER
MP-115N V 8.0
- TEST FIRING RATE
OFF
100% (BLAST)
1% (MINIMUM)
- PRESSURE DIFF
0.200
% Open Gas Valve
35
- EXIT

3.0 Programming

Programming

Prior to adjusting the program schedule, verify that the date and time are properly set. The program will run on a 7 day schedule. The controller will offer two set points for each day of the week. One for occupied, and one for unoccupied. The times and temperatures of these are adjustable to the users needs to reach their comfortable temperature.

Chart 3.1 • Factory Pre-Set Programming

Day of the Week	Occupied		Unoccupied	
	Time	Temperature	Time	Temperature
Monday	6:00A	70°F	5:00P	62°F
Tuesday	6:00A	70°F	5:00P	62°F
Wednesday	6:00A	70°F	5:00P	62°F
Thursday	6:00A	70°F	5:00P	62°F
Friday	6:00A	70°F	5:00P	62°F
Saturday	6:00A	70°F	5:00P	62°F
Sunday	6:00A	70°F	5:00P	62°F

To Adjust the Program:




























- ❶ Press the  Mode/Set key to bring up the main menu.
- ❷ Press the  down arrow key twice (2X) until the screen called 'Run Program' is displayed.
- ❸ Press the  Mode/Set key to activate the selection field.
- ❹ Press the  down arrow key until the selection 'Adjust schedule' is flashing, then press  Mode/Set.
- ❺ Press the  up arrow or  down arrow key to cycle through the days of the week and the occupied and unoccupied desired temperature.
- ❻ To adjust the desired temperature, press the  Mode/Set key to initiate the temperature to start flashing. Using the  up arrow or  down arrow, adjust the temperature to the desired set point.
- ❼ Repeat steps 5-6 until all of the program temperatures are set to the desired set point.
- ❽ To set the time schedule for the occupied and unoccupied times, select 'Timing adjust' from the menu and press  Mode/Set.
- ❾ Select the desired timing to adjust and press the  Mode/Set key. Press the  up arrow or  down arrow to adjust the hours. Press  Mode/Set again to adjust the minutes. Press  Mode/Set to lock in the adjusted timing.
- ❿ Once all timings have been selected, press  power key or select Exit to return to the home screen.

Chart 3.2 • Worksheet for Re-Programming the 7-Day Program

Day of the Week	Occupied		Unoccupied	
	Time	Temperature	Time	Temperature
Monday				
Tuesday				
Wednesday				
Thursday				
Friday				
Saturday				
Sunday				

Manual Operation for Non-programmable Mode

The TH-PUI controller has the ability to run like a standard non-programmable thermostat. To activate this ability, the 'run program' must be off. To verify this, from the home screen, press the  Mode/Set key, then the  down arrow key twice. The header will display 'RUN PROGRAM'. The bottom line should read 'OFF'. If it does not, press the  Mode/Set key until the bottom line is flashing and then select off with the  up arrow or  down arrow key.

- ① Press  Mode/Set key to bring up the main menu.
- ② Press the  down arrow key twice until the screen called 'Run Program' is displayed.
- ③ Press the  Mode/Set key to activate the selection field.
- ④ Press the  down arrow key until the selection 'Adjust schedule' is flashing, then press  Mode/Set.

BLAST Mode

The BLAST Mode allows users to temporarily override the preset program or temperature setting by turning on the heater(s) to 100% input rate and not allowing it to modulate. This feature would be used to compensate for rapid changes in the environment, such as a loading door open, a cold mass introduced into the environment, or other high demand situations. This is a temporary, timed option that is selected by the user on demand.




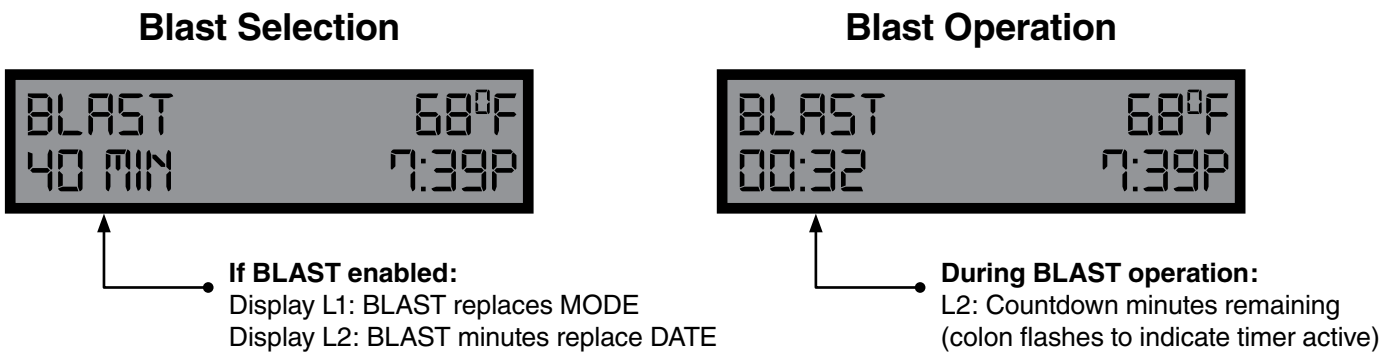

When the  Blast key is pressed, it will initiate the blast mode. The desired timer for the mode can then be selected by pressing the  up arrow or  down arrows. The timing is set in 10 minute increments, with a maximum time of 50 minutes. During the sequence, the operation mode indicator will read BLAST, and the remaining time will be read in the date indicator area. Once the timer has expired, the unit will revert back to the normally scheduled program.

Figure 3.1 • Blast Mode Display



Blast mode can never be locked on indefinitely. If the heater is transitioning from BLAST mode to the normally scheduled program, the heater may not shut off if the program is not satisfied. However, it will revert back to the ability to fully modulate. To discontinue Blast Mode, press  down arrow until no time remains.

Mode Selection Guide

The MP Series heater is programmed to operate on several different performance curves, or ‘MODES’. These curves are to allow the user to select their desired operation that best accommodates their specific need. The performance curves can be selected by the Premium User Interface (TH-PUI) under the main menu.

The three available modes are:

- Economy Mode:** Unit operates to maximize thermal efficiency.
- Comfort Mode:** Unit operates to maximize perceived human comfort.
- Standard Mode:** Unit operates as a balance between comfort and economy mode.








These modes can be selected at any time during normal cycles of the heater. The currently selected mode will be displayed in the upper left hand corner of the home screen. Factory default is ‘Comfort Mode’.

Chart 3.3 • Mode Selection and Application Chart

Comfort Mode	Standard Mode	Economy Mode
<ul style="list-style-type: none"> • Patios • Loading docks • Break areas and lunch rooms • Kennels • Parts counters and service desks • Golf driving ranges • Woodworking shops 	<ul style="list-style-type: none"> • Service garages • Fire stations • Populated warehouse heating • Manufacturing • Auto showrooms 	<ul style="list-style-type: none"> • Aircraft hangars • Car washes • Pole barns • Foundries • Unpopulated warehouses

For more information about the modes and their performance curves, please see the MP Series Insert Manual (LIOMP).






To Select the Desired Mode:

- ① Press the  Mode/Set key to bring up the main menu.
- ② Press the  down arrow key twice until the 'Select Mode' screen is displayed.
- ③ Press the  Mode/Set key to activate the selection field.
- ④ Press the  up arrow key or  down arrow key to select the desired mode.
- ⑤ Press the  Mode/Set key to lock in the selection.
- ⑥ Press the  power key to exit and return to the home screen.

Connecting to a BMS System

The Premium User Interface allows a building management system or remote analog signal to be used to dictate the firing rate of the MP Series. Most building management systems output a PID loop control for this purpose. The Premium User Interface can receive a 4-20mA signal, 0-10VDC signal, or 0-20VDC signal. The input rate of the heater is varied linearly according to the percentage of the signal. If a positive off is desired, the control signal can be wired in series through another set of contacts on the BMS controller.

Configuring the Premium User Interface for a BMS System

- ① Ensure the proper wire connections are made per the selected system's signal (see wiring diagram).
- ② Configure the BMS Jumper located in the upper right corner of the base to the proper position for the system's signal (see figure 2.2).
- ③ Under the Service mode Menu (See page 7, Service Mode), select 'BLDG MGMT SYSTEM'. Press  Mode/Set key.
- ④ Press  up arrow or  down arrow key to select the appropriate signal being connected.
- ⑤ Press the  Mode/Set key again to lock in the selection.
- ⑥ Press the  power key to return back to the home screen.

NOTE: The Building Management System (BMS) option under the Service Access Menu must be turned on to the correct configuration in order for the heater to operate according to the signal. If it is 'OFF' then the heater will revert back to the normal operation of the schedule built into the Premium User Interface.

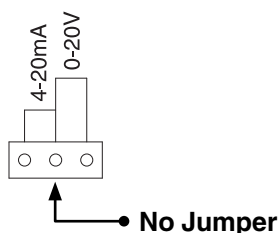
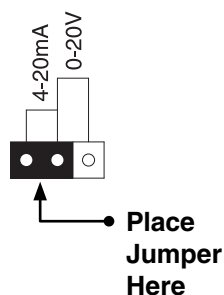
Figure 3.2 • BMS Jumper Configurations**0-10VDC
Configuration****4-20mA
Configuration**

Figure 3.3 • 0-10VDC Wiring Diagram

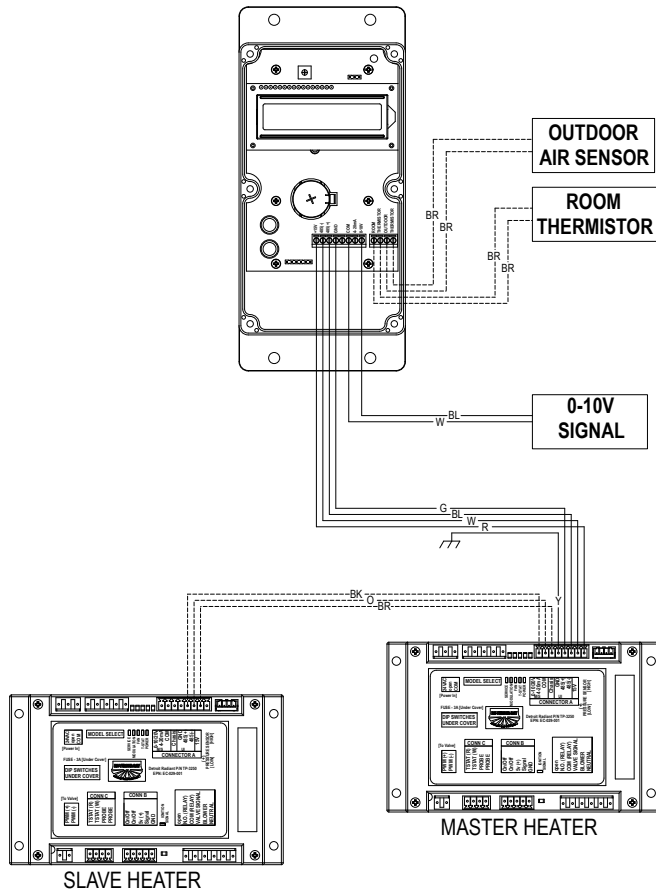
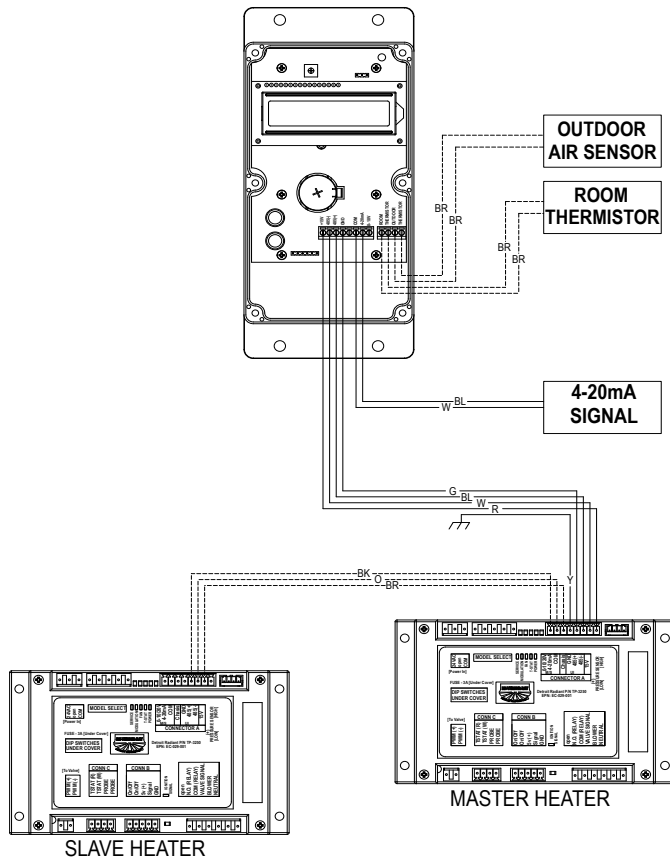


Figure 3.4 • 4-20mA Wiring Diagram



4.0 Troubleshooting and Service

Troubleshooting

When 'Reset Control' is performed, installer configurations and programming will reset to default factory settings.

Chart 4.1 • Troubleshooting Chart

Symptom	Cause	Corrective Action
Blank Screen	Control is wired improperly. Power to heater is off. Heater control board has open fuse.	Correct wiring. Restore power to heater. Replace 3A ATO or APS (Violet) fuse.
No Heat	Improper wiring. Improper control set-up.	Correct wiring. Verify proper control set-up. Heater requires service.
Blower	Flue or intake obstruction. Motor seized. Improper wiring to motor. Pressure tubes incorrectly installed. Bad pressure sensor.	Remove obstruction. Verify blower operation. Correct wiring. Repair pressure tube connections. Replace modulating circuit board.
Ignition Module Failure	Failed ignition module. Faulty pressure switch. Faulty wiring.	Correct wiring. Replace faulty pressure switch. Replace faulty ignition module.
Ignition Soft Lockout	Flame sense failure. Faulty gas valve. Faulty heater wiring. Broken glo-bar.	Heater needs service. Replace ignition module. Replace gas valve. Correct faulty heater wiring.
Ignition Hard Lockout	Multiple flame sense failures. Faulty gas valve. Faulty heater wiring. Broken glo-bar.	Reset main power to heater. Reset controller. Heater needs service. Replace ignition module. Replace gas valve. Correct faulty heater wiring. Consult factory.
Sensor Error	Incorrect sensor selected in set-up. Open or shorted thermistor. Improper thermistor type. Incorrect displayed temperature.	Verify proper control set-up. Correct wiring. Replace thermistor.
Internal Software Error	Bad checksum.	Reset control. Replace control. Consult factory.
Model Selection or Setup Error	Invalid model. Incorrect DIP configuration.	Verify model selector jumper with factory. Verify DIP switch settings.
Communication Error (MC)	Control cannot establish communication with heater. Faulty wiring. Software failure.	Reset control. Verify correct wiring. Consult factory.
Communication Error (UI)	Heater cannot establish communication with controller.	Reset control. Verify correct wiring. Consult factory.
Error with User Interface	Key pad shorted or closed for a time greater than 1 minute. Ribbon connector is not properly connected.	Verify proper connection of ribbon connector. Reset control. Replace keypad. Consult factory.

5.0 Limited Warranty

One-Year Limited Warranty. Detroit Radiant Products Company (hereinafter referred to as the Company) warrants to the original purchaser or original user that the control covered in this manual is free from defects in material or workmanship under normal use and service. The Company's sole obligation under this warranty shall be limited to furnishing replacement parts, F.O.B. Warren, Michigan, for 12 months from the date of initial installation of the heater, but not to exceed 18 months from the date of shipment by the Company of the heaters, for any parts which the Company's examination shall disclose to its satisfaction to be defective. Defective parts are to be returned to the Company, transportation charges prepaid.

The warranties herein shall be null and void if the unit is not installed by a competent heating contractor and/or if the unit is not installed according to Company instructions, normal industry practices and/or if the unit is not maintained and repaired according to Company's instructions. Normal product degradation and wear (rust, oxidation, etc.) does not constitute a material defect and applicable warranty claim.

Written permission is required for the return of any parts or equipment and any such return must be made on the basis of transportation charges prepaid. Shipment may be refused unless prior written permission is obtained and goods returned prepaid.

This Warranty applies only within the United States.

6.0 Mounting Pattern

