EL8000 Mach 3 Tech Sheet

Balboa Instruments
System PN 55064-04

System Model # EL8-EL8000M3-YCAH

Software Version # 32

EPN # 2833

Base PCBA – PN 53858-03
PCB EL8000 – PN 22041 Rev A or B
HEX File – 10013432

Base Panels
ML900 – PN 52654-01

Template used: 40575-v32_A.pdf 04/15/2008
55064-04_97_A.pdf 05/06/2008

BALBOA water group

System Revision History

System PN	EPN	Date	Requested By	Changes Made
55064-02	2130	11.27.2006	Balboa	Software update to v28
55064-03	n/a	07.23.2007	Balboa	Software update to v30
55064-04	2833	05.06.2008	Balboa	Software update to v32

Basic System Features and Functions

Power Requirements

- 240VAC, 60Hz, 48A, Class A GFCI-protected service (Circuit Breaker rating = 60A max.)
- 4 wires (hot, hot, neutral, ground)

System Outputs

Setup 1 (As Manufactured)

- 240V Pump 1, 2-Speed
- 240V Pump 2, 2-Speed
- 240V Pump 3, 2-Speed
- 240V Blower, 1-Speed
- 120V Ozone
- 12V Spa Light
- 120V Fiber Optic Light and Wheel
- 120V AV (Stereo)
- 120V Mister
- 240V 5.5kW 800 Incoloy Heater *

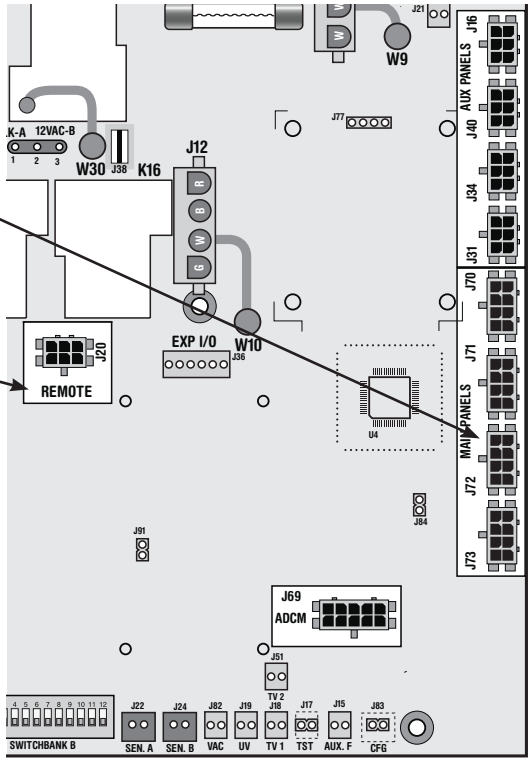
Optional Devices

- 240V Circ Pump

* Heater wattage is rated at 240V. When running 120V to heater, output is approximately 25%.

Additional Options

- Full Feature Dolphin Remote
  and Spa-only Dolphin Remote
- Spa Monitor
  Connects to Main Panel terminal J70, J71, J72, or J73
- IR or RF Dolphin Receiver Modules
  Connects to Remote terminal J20
- Ozone Generator
  Connects to terminal J4
- MoodEFX Lighting
  Connects to Spa Light terminal J8
- FiberEFX Lighting
  Connects to Spa Light terminal J8
- Stereo System
  Connects to A.V. terminal J5



Persistent Memory and Powering Up

Any time you change DIP Switches or Software Configuration Settings that affect parameters the user can change (any filter settings, set temperature default, Celsius vs Fahrenheit, 12-hour vs 24-hour time, reminders suppression, etc), you must reset Persistent Memory for your DIP Switch or Software Configuration Settings changes to take effect. You should also reset Persistent Memory after loading a new file into a board (using the ESM, purchased seperately).

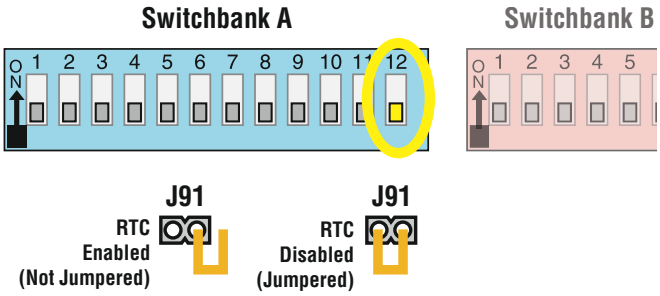
To reset Persistent Memory:

- Power down.
- Set A12 ON (See illustration below).
- Power up.
- Wait until "Pr" or "PRIMING MODE" is displayed on your panel. Note: If "CFE" appears see section below.
- Set A12 OFF. (This can be done safely with power on if you use a non-conductive tool such as a pencil to push the switch back to the OFF position. Otherwise, power down before setting A12 OFF)
- Power up again (if you powered down in the previous step).
- For all other power ups, leave A12 OFF.

About Persistent Memory and Time of Day Retention:

This system uses memory that doesn't require a battery to store a variety of settings. What we refer to as Persistent Memory stores all the User Preferences, as well as all the filter settings, the set temperature, and the heat mode.

Persistent Memory is not used for Time of Day. Time of Day needs to be "kept running" (not just stored) while the power is off, so a separate Real Time Clock feature (on all models except the EL1000) keeps track of Time of Day while the unit is off. Time of Day Retention, and Time of Day Retention alone, is controlled by the J91 jumper. J91 must be set according to main system panel used.



CFE message on power up:

If "CFE" appears before (and instead of) "Pr" or "PRIMING MODE", you have not configured DIP Switches and/or Software Configuration Settings in a valid manner. This must be corrected before you can reset Persistent Memory.

The switch numbers, jumpers, or configuration settings displayed after "CFE" are ones with which the system has found a configuration problem. For example:

- "CFE A5 b2" would mean that the combination of how you've set A5 and how you've set B2 is not supported on this system.
- "CFE J99" would mean that there is a problem with jumper J99
- "CFE P3.1 bL.1" would mean that the combination of how you've set pump 3 for 1-speed and blower for 1-speed is not supported on this system.
- "CFE P3._ bL._" would mean that the combination of how you've set DIP switches which have been assigned to pump 3 and blower is not supported on this system.

Power Up Display Sequence

Upon power up, you should see the following on the display:

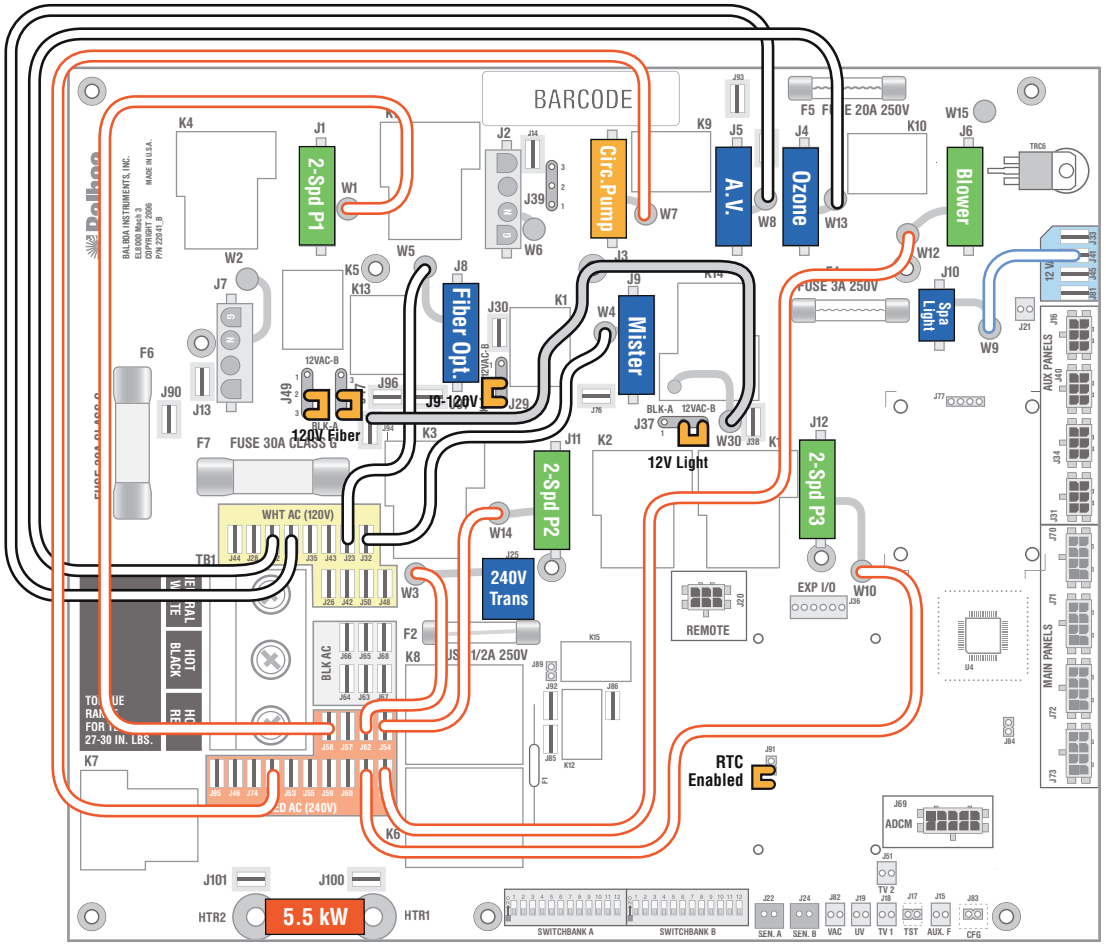
- Three numbers in a row, which are the SSID (the System Software ID). The third display of these numbers is the Software Version, which should match the version of your system. For example, if these three numbers are 100 134 26, that is a Mach 3 EL8000 at version 26.
- If there is a Configuration Error, the CFE message (see above) will appear at this point (and none of the messages below will display). Otherwise what comes next is:
- An indication of either the input voltage detected (EL1000/EL2000), or the heater wattage range supported (EL8000/GL2000/GL8000).
  - Heater wattage display: "1-3" means the system supports a heater from 1 kW to 3 kW. "3-6" means the system supports a heater from 3 kW to 6 kW. "3-3" means the system supports a 3 kW heater only. (These ranges may be modified slightly in the case of special heaters, which the next bullet covers.)
  - Input voltage display: A system showing "240" supports 3 kW to 6 kW heaters. A system showing "120" supports the very same heaters, although at 120V those heaters will function at only 1/4 of their 240V rated wattage. (The system shows only either "240" or "120" as a general indication of input voltage; it does not show the actual input voltage.)
- If your system is using a special type of heater, a display such as "H 6" may appear next. If your system is using the generic Balboa heater, no heater type display will appear.
- "Pr" or "PRIMING MODE" will appear to signal the start of Priming Mode.

At this point, the power up sequence is complete. Refer to the User Guide for the ML Series panel on your system for information about how the spa operates from this point on.

Wiring Configuration and DIP Settings

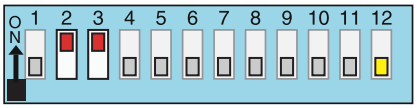
Setup 1 (As Manufactured)

- 240V Pump 1, 2-Speed
- 240V Pump 2, 2-Speed
- 240V Pump 3, 2-Speed
- 240V Blower, 1-Speed
- 12V Spa Light
- 120V Ozone
- 120V Fiber w/ Wheel
- 120V Mister
- 120V A\V (Stereo)
- 240V 5.5kW 800 Incoloy Heater
- ML900 Main Panel
- 240V Circ Pump (optional)



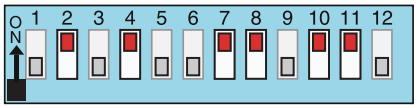
WARNING: Main Power to system should be turned OFF BEFORE adjusting DIP switches.
WARNING: Persistent Memory (A12) must be RESET to allow new DIP switch settings to take effect. (See Persistent Memory page)

Switchbank A



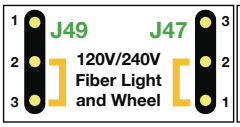
A1, Test Mode OFF
A2/A3, Four H.S. Pumps w/Heater
A4, 12 Hour Time
A5, Degrees F
A6, Short Timeouts
A7, Cleanup Cycle OFF
A8, 1Hr O_3 Disable OFF
A9/A10, No Circ Pump
A11, Ozone w/P1 low
A12, Memory ON

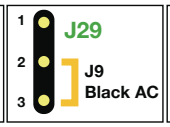
Switchbank B

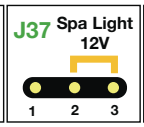


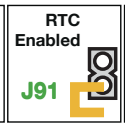
SSID #
100
134
32

B1, Pump 2 2-Speed
B2/B3, Single Speed Blower (On/Off)
B4, F/O Light ON
B5, Pump 4 OFF
B6, Scrunching OFF
B7, Spa Light On/Off
B8, Spa Light Button
B9, Pump 3 2-speed
B10, Pump 3 Enabled
B11, Mister Enabled
B12, Mist Aux Pnl OFF





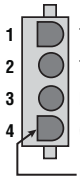




Wiring Color Key

- 120 Volt Connections
- 240 Volt Connections
- Black AC Jumpers
- 12 Volt Connections
- Relay Control Wires

Board Connector Key



1 Typically Line voltage
2 Typically Line voltage for 2-speed pumps
3 Neutral (Common)
4 Ground

Note flat sides in connector

DIP Switches Definitions

WARNING:
- Setting DIP switches incorrectly may cause abnormal system behavior and/or damage to system components.
- Refer to Switchbank illustration on Wiring Configuration page for correct settings for this system.
- Contact Balboa if you require additional configuration pages added to this tech sheet.

DIP Switchbank A Key

A1 . . . . . Test Mode (normally Off)

A2 and A3. . . . . Control amp draw requirements. See **Table 1**

A4* . . . . . In "ON" position, displays time in 24 hours (military\European time)

. . . . . In "OFF" position, displays 12 hour time

A5* . . . . . In "ON" position, displays temperature in Celsius

. . . . . In "OFF" position, displays temperature in Fahrenheit

* Sets default for user preferences - only applies when persistent memory is reset (A12 On) during power-up

A6 . . . . . In "ON" position, Equipment timeout 30 minutes (4 hours for Pump 1 Low)

. . . . . In "OFF" position, Equipment timeout 15 minutes (2 hours for Pump 1 Low)

A7 . . . . . In "ON" position, Cleanup Cycle – 30 minutes after spa use/timeout, Pump 1 Low & Ozone run for 1 hour

. . . . . In "OFF" position, NO Cleanup Cycle

A8 . . . . . In "ON" position, Ozone suppressed for 1 hour after pump or blower button press

. . . . . In "OFF" position, NO Ozone suppression

A9 and A10. . . . . Circ Pump Behavior settings. See **Table 2**

A11 . . . . . In "ON" position *(non-circ mode operation)* Pump 1 is two-speed, Ozone is ON in Filter & Cleanup Cycles only *(in any circ mode)*, Pump 1 is one-speed, Ozone is ON with Circ Pump

. . . . . In "OFF" position *(non-circ mode operation)* Pump 1 is two-speed, Ozone is ON with Pump 1 Low

(in any circ mode) Pump 1 is two-speed, Ozone is ON with Circ Pump

A12 . . . . . Persistent Memory Reset (used when the spa is powering up)

Table 1

A2	A3	# of Hi-Speed Pumps/Blower Before Heat Disabled
OFF	OFF	0
ON	OFF	1
OFF	ON	2
ON	ON	Up to 4

Table 2

A9	A10	Circ Pump Behavior
OFF	OFF	No Circ Pump
ON	OFF	24 Hr
OFF	ON	24 Hr w/3°F Shut-Off
ON	ON	Acts like Pump 1 Low (Filter Cycles, Polls)

DIP Switchbank B Key

B1 . . . . . In "ON" position, single-speed Pump 2

. . . . . In "OFF" position, two-speed Pump 2

B2 and B3. . . . . Blower Speeds. See **Table 3**

B4 and B8 . . . . . Fiber Optic and Color wheel control; Spa Light Enable

Note: The Light button on an ML900 panel is a SpaLight button. The Light button on most other panels is an EitherLight button.

B5 . . . . . Pump 4 enable when On. Jets 4 replaces Blower on Aux panel

B6 . . . . . In "ON" position, Alternate Panel layout (ML900 scrunching enabled; ML550 and ML700 Jets 3 replaces Blower)

. . . . . In "OFF" position, Normal Panel layout

B7 . . . . . In "ON" position, Spa Light operation is On/Off

. . . . . In "OFF" position, Spa Light operation is dimmable

B9 . . . . . In "ON" position, single-speed Pump 3

. . . . . In "OFF" position, two-speed Pump 3

B10 . . . . . In "ON" position, Pump 3 enabled (Jets 3 replaces Light button on Aux panel)

. . . . . In "OFF" position, Pump 3 disabled

B11 . . . . . In "ON" position, Mister enabled

. . . . . In "OFF" position, Mister disabled

B12 . . . . . In "ON" position, Mister or Option replaces Blower button on Aux panels

. . . . . In "OFF" position, no button replacement on Aux panels

Table 3

B2	B3	Blower Speeds
OFF	OFF	0 (No Blower)
ON	OFF	1 (on/off)
OFF	ON	2
ON	ON	3

	B8 OFF	B8 ON
B4 OFF	No separately-controlled fiber light; spa light enabled on both SpaLight and EitherLight buttons; fiber light (not wheel) comes on with spa light (at any intensity)	
B4 ON	No separately-controlled spa light; fiber light enabled on both FiberLight and EitherLight buttons; spa light comes on with fiber light	Spa light and fiber light each separately controlled; fiber light enabled on both FiberLight and EitherLight buttons; spa light enabled on SpaLight buttons only

Jumper Definitions

WARNING:
- Setting DIP switches incorrectly may cause abnormal system behavior and/or damage to system components.
- Refer to Switchbank illustration on Wiring Configuration page for correct settings for this system.
- Contact Balboa if you require additional configuration pages added to this tech sheet.

Jumpers Key

J29 . . . . . Jumper on Pins 1 and 2 will power J9-pin 1 (Mister) at 12 Volts AC.
Jumper on Pins 2 and 3 will power J9-pin 1 (Mister) at 120/240 Volts AC.
Note: W4 controls voltage on return line of J9-pin 3 and must be set for the same voltage.

J37 . . . . . Jumper on Pins 1 and 2 will power one leg of J10-pin 2 (Spa Light) at 120/240 Volts AC.
Jumper on Pins 2 and 3 will power one leg of J10-pin 2 (Spa Light) at 12 Volts AC.
Note: W9 controls voltage on the return line of J10-pin 1 and must be set for the same voltage.

J39 . . . . . Jumper on Pins 1 and 2 will power J2 pin 2 with Pump 1 Low.
Jumper on Pins 2 and 3 will power J2 pin 2 with the Circ Pump.
Note: W6 controls voltage on common line of J2-pin 3

J47 . . . . . Jumper on Pins 1 and 2 will power J8 pin 2 (Fiber Optic Light) and J7 at 120/240 Volts AC.
Jumper on Pins 2 and 3 will power J8 pin 2 (Fiber Optic Light) at 12 Volts AC.
Note: J47 and J49 must be set for the same voltage. W5 controls voltage on return line of J8-pin 3 and must be set to the same voltage.

J49 . . . . . Jumper on Pins 2 and 3 will power J8 pin 1 (Fiber Optic Wheel) at 120/240 Volts AC.
Jumper on Pins 1 and 2 will power J8 pin 1 (Fiber Optic Wheel) at 12 Volts AC.
Note: J47 and J49 must be set for the same voltage. W5 controls voltage on return line of J8-pin 3 and must be set to the same voltage.

J91 . . . . . Jumper on 1 Pin only enables Real Time Clock function, for use with time capable panels.
Jumper on Pins 1 and 2 will disable RTC function, for use with non-time capable panels.

Ozone Connections

Ozone Connector Voltage: The EL circuit board is factory configured to deliver a preset voltage (120V or 240V) to the on-board ozone connector (J4). See the ratings table on the wiring diagram attached to the cover of the enclosure for the configured voltage. For 240V output W13 connects to Red AC and for 120V output W13 connects to White AC.

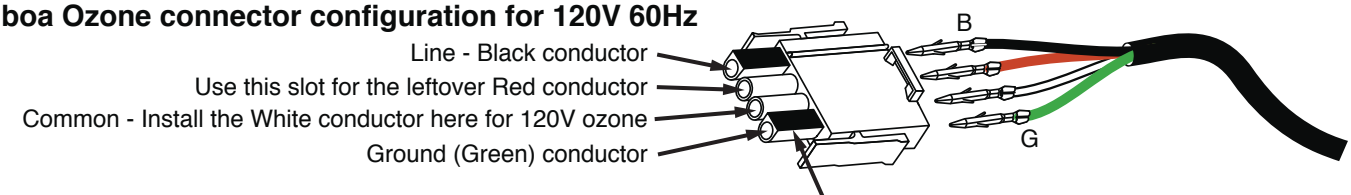
The voltage to the ozone connector can be changed in the field if required. W13 just needs to be set for the required voltage.

Balboa Ozone Generator: If the board is set up to operate a 120V ozone generator, the connector on the ozone generator is likely to be configured correctly, but should be compared to the illustration below.

If a 240V ozone generator is required, be sure the red wire in the ozone cord is positioned in the connector next to the green ground wire as described below.

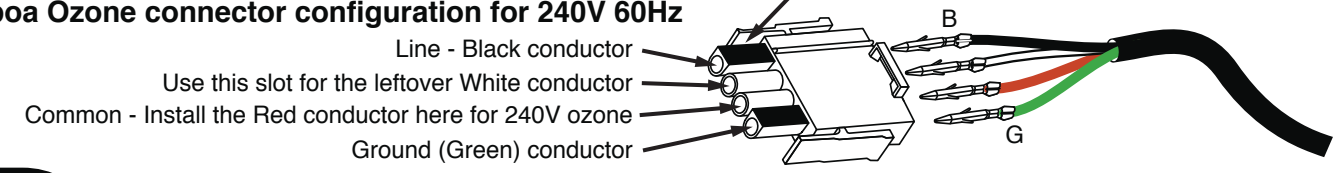
Note: A special tool is required to remove the pins from the connector body once they are snapped in place. Check with your Balboa Account Manager for information on purchasing a pin-removal tool.

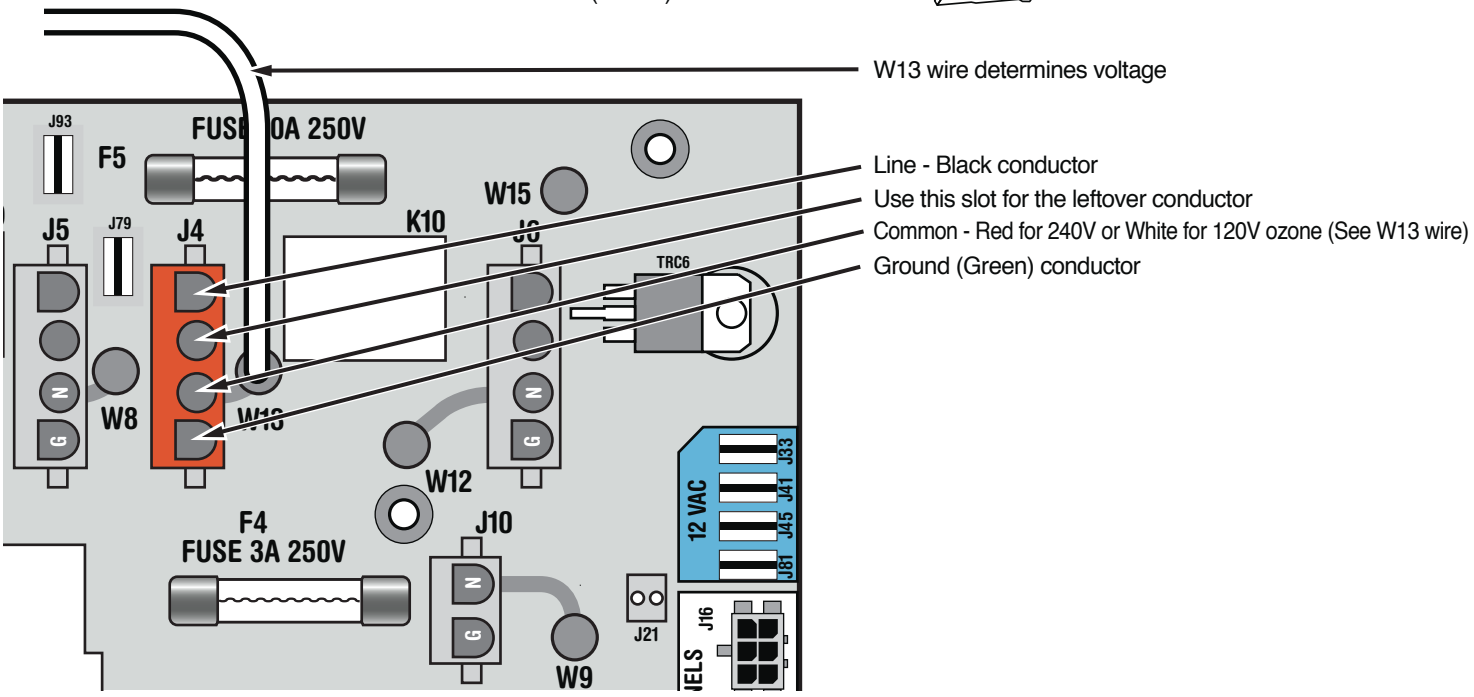
Balboa Ozone connector configuration for 120V 60Hz



Flat sides of sockets as shown

Balboa Ozone connector configuration for 240V 60Hz





Panel Configurations

TIME CAPABLE

Note: RTC jumper (J91) on Main PCBA must be OFF (1 pin only)

ML900
PN 52654-01 with Overlay PN 40026
• Connects to Main Panel terminal J70, J71, J72, or J73