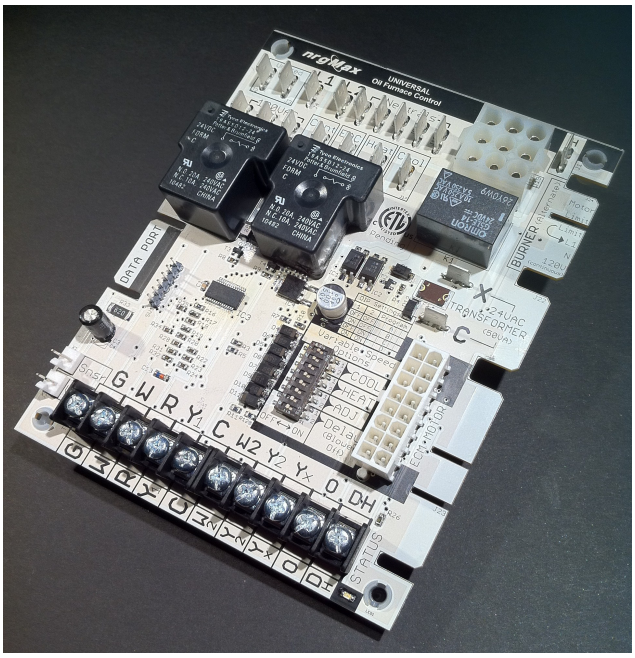
nrgMax

9103i

Advanced Universal Oil Furnace Control User's Guide

9103i Advanced Universal Oil Furnace Control



US and Canadian Patents Pending

OVERVIEW

The nrgMAX 9103i is the only oil-furnace control you will ever need. It is a feature-rich control designed to meet the needs of modern energy-efficient oil furnaces while still offering backwards compatibility with legacy products.

Mounting in the industry-standard footprint with familiar layout and connections this high quality design meets the needs of an entire industry sector. It eliminates the need for additional controls to accommodate Euro-style burners, and offers and array of variable speed options to suit any requirement.

The control is suitable for use with PSC motors and ECM motors. ECM motors can be controlled in the common “thermostat-mode”. PSC motors are controlled with traditional heavy-duty relay outputs.

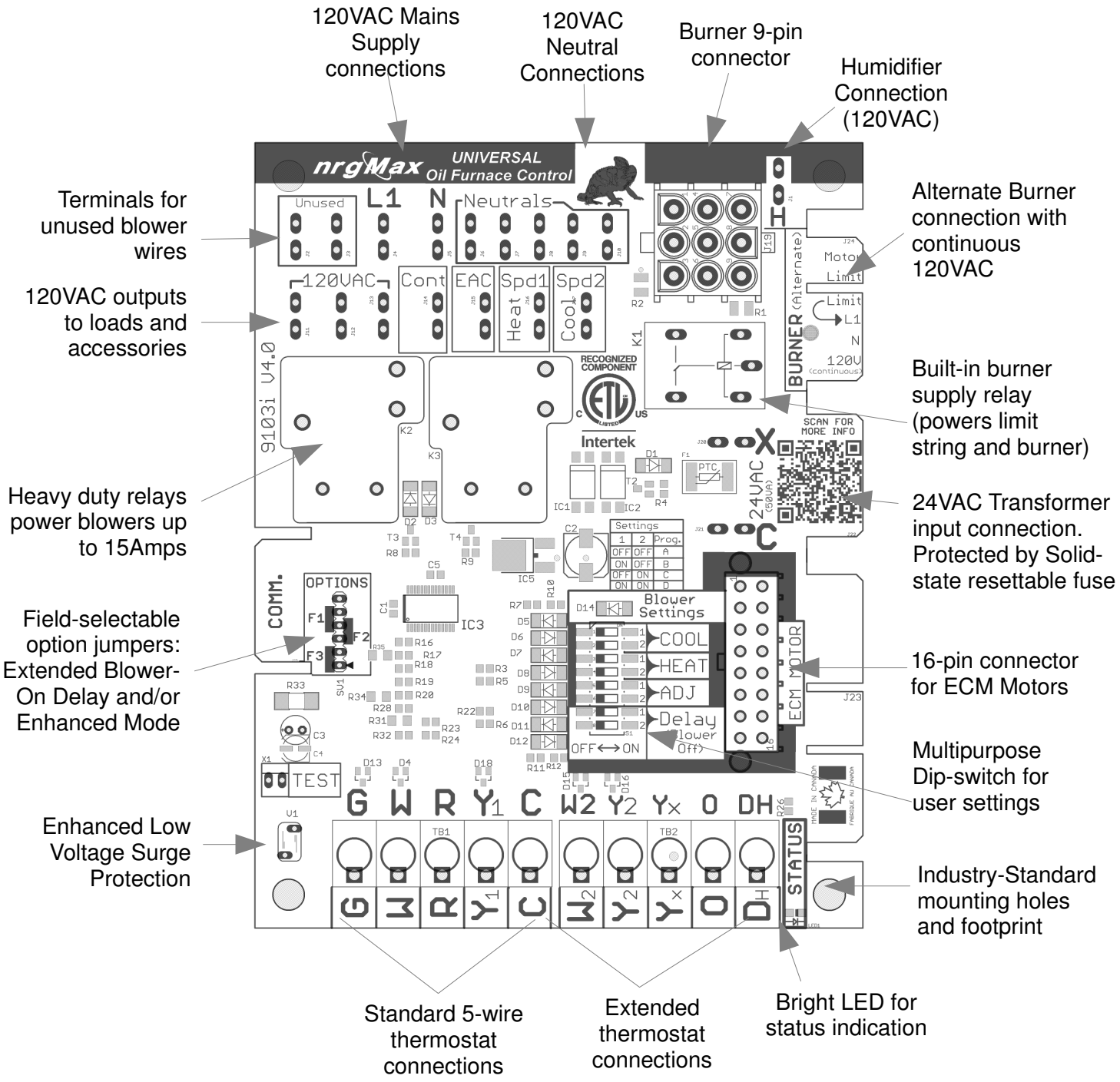
OPTIONAL ADVANCED FEATURES

- Enhanced operation of Standard PSC Blowers
- Alternate Burner Connection (for burners with post-purge capability)
- Automatic dehumidification

FEATURES

- Industry-standard footprint, mounting and connections
- compatible with American burners (Beckett, Carlin etc) as well as Riello Burners with no additional relays required
- Industry-standard 9-pin burner connection
- 120VAC Connections for:
  - Heat speed motor winding
  - Cool speed Motor winding
  - EAC
  - Humidifier
  - Continuous Fan
- 24VAC Thermostat Connections for:
  - 5-wire (R,C,W,Y,G), plus
  - W2 (Stage 2 Heating)
  - Y2 (Stage 2 cooling)
  - Yx (dummy connection)
  - O/B (Heat Pump reversing valve)
  - DH (Dehumidification)
- 16-pin connection to GE/Beloit-style ECM Motors
- LED Status indicator
- Solid-State resettable fuse for 50VA Transformer protection
- Double-sided Copper-clad PC board, soldered top and bottom for optimum strength and durability
- Multipurpose DIP-switch for field settings

Features and Highlights



SPECIFICATIONS

- **Electrical Ratings:**
  - Power Requirements:
    - Voltage: 24Vac, 50/60 Hz.
    - Current: 4 VA at 24 Vac.
    - PTC Fuse (resettable) trips at 4.5A
  - Contact Ratings:
    - Circulating Fan: 15A Full Load, 30A Locked Rotor at 115 Vac (includes optional EAC load).
    - Burner: 5.8 A Continuous Load (7.4A with interrupted ignition)
- **Settings: Standard Configuration**
  - **Heating:**
    - Blower On Delay: 30 or 75 seconds, field-adjustable
    - Blower Off Delay (BOD): 90, 120, 150, 180 seconds, field-adjustable.
  - Timing Tolerance: less than 1 second
- **Environmental Ratings:**
  - Temperature: -40 to +150° F [-40° to +66° C].
  - Humidity: 95% maximum, non-condensing.

Terminals and Connections:

Low Voltage:

- Thermostat:
  - G: Blower On
  - W: Call for heat (0.08A load)
  - R: 24VAC out to thermostat
  - Y1: Cooling, Stage 1
  - C: 24Vac common
  - W2: Heating, Stage1
  - Y2: Cooling, Stage2
  - Yx: Dummy terminal, no connection
  - O: Heat pump reversing valve
  - DH: Dehumidification

- **CLASS 2 TRANSFORMER 50VA Max** (overload protected)
  - X: 24VAC
  - C 24VAC Common
- 16-PIN ECM Connector: Convenient interface between 10-position thermostat, DIP-switches and ECM motors.
-
- Option Jumpers: Selectable Options:
  - F1 Reserved
  - F2 Enhanced PSC Mode
  - F3 Extended Blower On Delay (75 Sec)

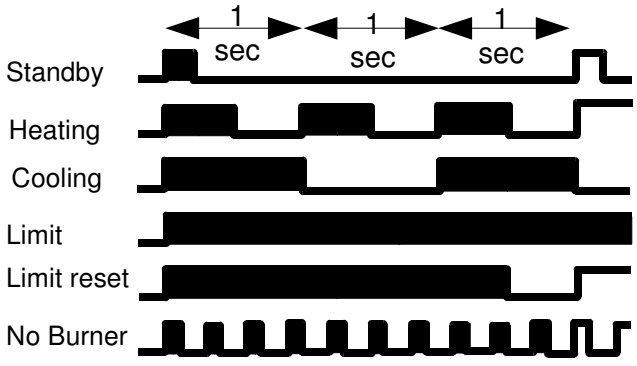
Line Voltage:

- Unused: No connection (2 terminals)
- L1: 120VAC 60Hz, 1ph, 15 A mp (Max) supply
- N: 120VAC Neutral supply
- Neutrals: Connection points for loads, tied internally to N (6 terminals)
- 120VAC : L1 supply to accessories, continuously powered (3 terminals)
- Cont. 120VAC to Continuous speed of blower. Normally energized, it is de-energized whenever Cool or Heat terminals are energized
- EAC: 120VAC to Electronic Air Cleaner. Energized along with Cool or Heat terminals
- Heat: 120VAC 15A, 1HP blower speed.
- Cool: 120VAC 15A, 1HP blower speed
- H: 120VAC 1A to Humidifier. Powered by burner motor feedback (Pins 7-8 on 9-pin burner connector).

Burner Connections:

- 9-PIN AMP Connector:
  (MATES WITH TYCO PART #350720)
  1) Safety Limit string (return)
  2) 120VAC to Oil Burner (high-limit protected)
  3) Burner T-T (internally connected to Pin 6)
  4) Neutral (internally connected to Pin5 and N)
  5) Neutral (internally connected to Pin 4 and N)
  6) Burner T-T (internally connected to Pin 3)
  7) Burner Motor (internally connected to Pin 8)
  8) Burner Motor (internally connected to Pin 7)
  9) 120VAC to Safety Limit string. Normally off, energized on call for heat by Relay K1
- Edge Connector (Alternate, 6 conductor) mates with Molex 09-01-6061.
  - Motor: Burner Motor
  - Limit: 120VAC to Safety Limit string. Normally off, energized on call for heat by Relay K1
  - Limit: Safety Limit string (return)
  - L1: 120VAC to Oil Burner (high-limit protected)
  - 120V: 120VAC Continuous (not limit protected)

Status LED Flashing Patterns



OPERATIONAL MODES:

All operational modes are simultaneously active on the 9103i, and the user needs only to make the appropriate connections to make use of them. The DIP-Switch is interpreted by the on-board software differently for each mode of operation.

- **Standard PSC:** Blower motor is driven by on-board heavy duty relays. Heat, Cool and Continuous speeds are available from 0.250" male spade terminals clearly marked on board. Compatible with all 5+ wire thermostats and responds to:
  - W: heating
  - Y1: cooling
  - Y2: cooling
  - G: Blower On
  - DIP-Switch:
    - Blower Off Delay (BOD):
      - A: 90 Seconds
      - B: 120 Seconds
      - C: 150 Seconds
      - D: 180 Seconds
    - Heat: no function
    - Cool: no function
    - Adj: no function

OPTION:
Enhanced PSC M**ode** is selected by placing the option jumper across position #3 and #4 on the Option Select pins (See "Setting Options"). All wiring and connections remain the same as the Standard PSC mode, however the operation is enhanced.

ENABLE THIS OPTION ONLY WHEN THE COOL TERMINAL IS CONNECTED TO A HIGHER BLOWER SPEED THAN HEAT OUTPUT.

EXAMPLE:
"HEAT" CONNECTED TO MED-HIGH
"COOL" CONNECTED TO HIGH

- H**eating:**
  - W (24V signal) activates Heat Speed output
  - W+W2 (24V signals) activate Cool Speed.
- **Cooling:** Blower is initially started on Heat Speed for 4 minutes to allow for dehumidification, after which the blower switches to Cool Speed. If the the 24VAC signal to the DH terminal opens this signals a call to dehumidify and the blower drops down to heat speed to encourage greater condensation across the cooling coil. When the 24VAC signal reappears on DH the blower is switched back up to Cool speed.
  - Y1 (24V signal): 4 minutes at Heat speed to dehumidify, then to Cool speed
  - DH (NO 24V signal): immediately drops from Cool speed to Heat speed to dehumidify.
  - DH (24V signal returns): Blower stepped up to Cool speed
  - Y2 (24V signal) overrides DH and Y1 keeping Cool terminal on as long as signal on Y2 is present
  - G (24V signal alone without Y1, Y2, or W): energizes Heat terminal

Note: *for 2-stage cooling in Enhanced mode use Yx and Y2. Yx is a dummy terminal and is ignored by the control logic but provides a convenient connection point for the AC compressor. When the thermostat calls for stage 1 cooling (a Y1 signal from the thermostat) it is terminated at Yx, but the thermostat also activates G simultaneously. The 9103i then energizes the lower speed Heat terminal as long as the condition exists. If Y2 is energized (together with Y1/G, or separately) the control will switch to Cool speed. This allows for 2 different blower speeds for 2-stage cooling*

- **ECM Mode: ECM** Motor handles all blower speed logic in factory-set "thermostat mode" and it monitors all ten thermostat inputs. The 9103i control energizes the EAC and H terminals normally. While the DIP-Switch settings are now directed to the ECM motor through the 16-pin connector the 9103i will continue to interpret the BOD settings to establish the delay period before de-energizing EAC terminal. Please note that the OEM factory -settings for the ECM blower-off delay may not co-ordinate with the EAC delay. The 9103i Controller has no influence over the ECM motor as all signals are "pass-through" only.

INSTALLATION

When Installing this Product...

1. Read these instructions carefully. Failure to follow them could damage the product or cause a hazardous condition.
2. Check the ratings and specifications given in the Instructions and on the product to assure the product is suitable for your application.
3. Installer must be a trained, experienced service technician.
4. After installation is complete, check out the product operation as provided in these instructions.

CAUTION

Disconnect power supply before wiring to prevent electrical shock or equipment damage.

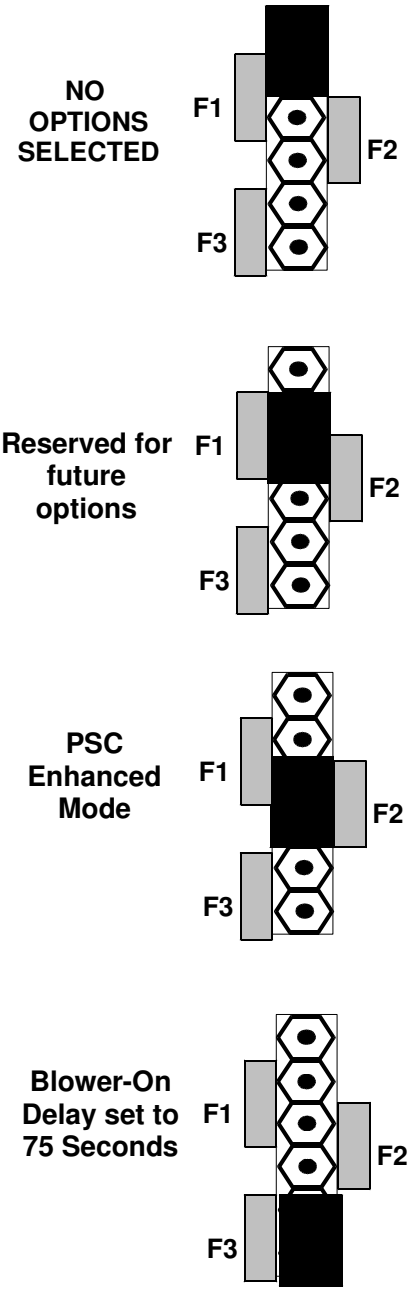
Location and Mounting

The 9103i is mounted in the appliance wiring compartment using four No. 6 screws (obtained locally) through standoffs on the corners of the board.

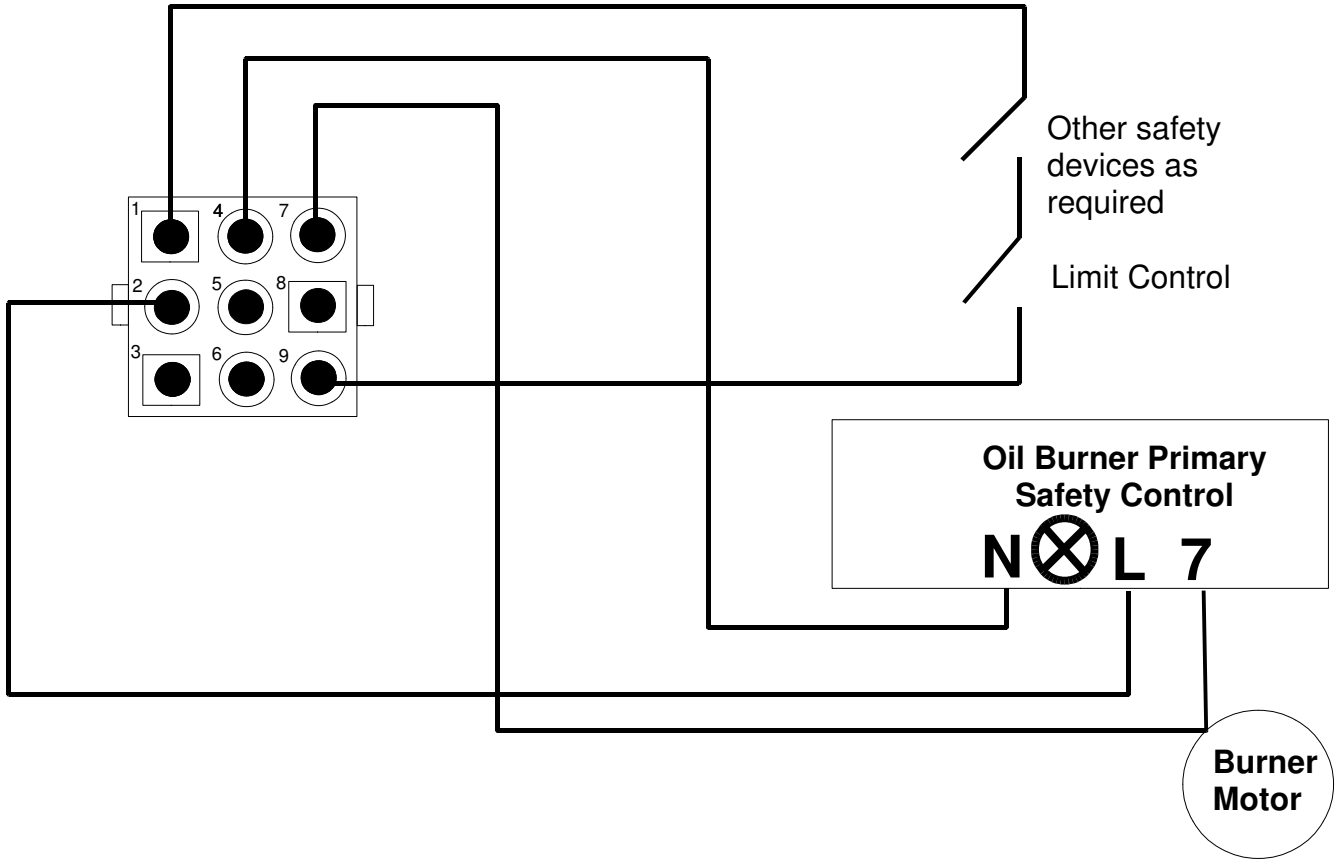
Wiring

All wiring must comply with local codes and ordinances.
Disconnect power before making wiring connecti

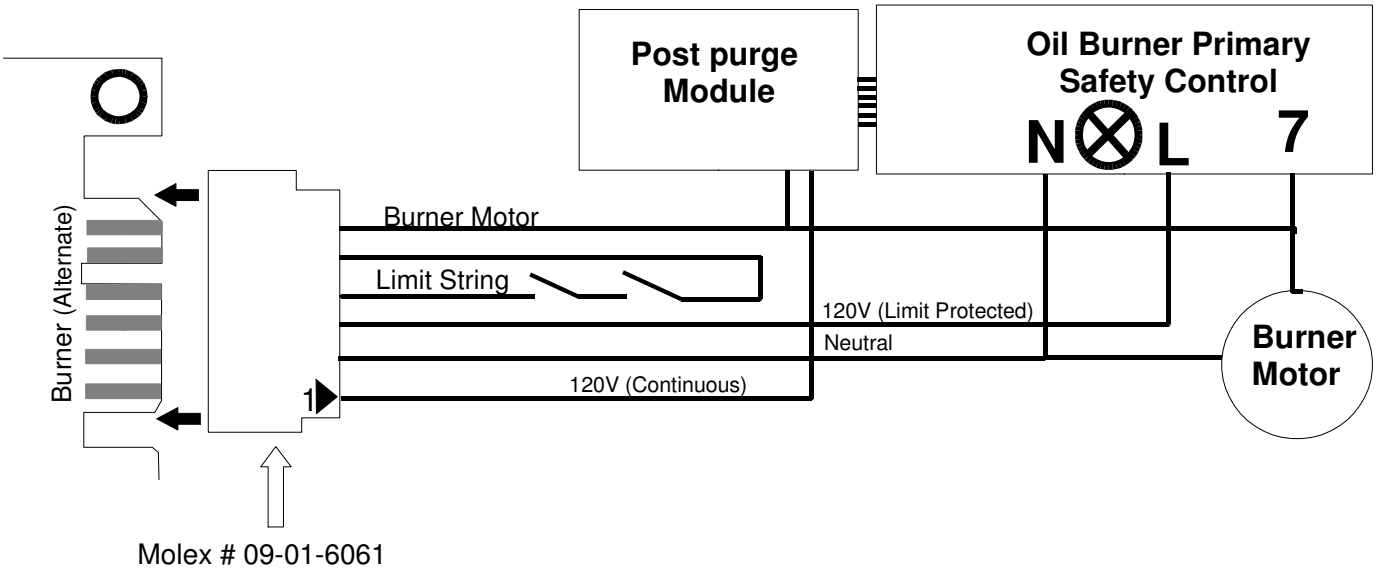
Setting Options



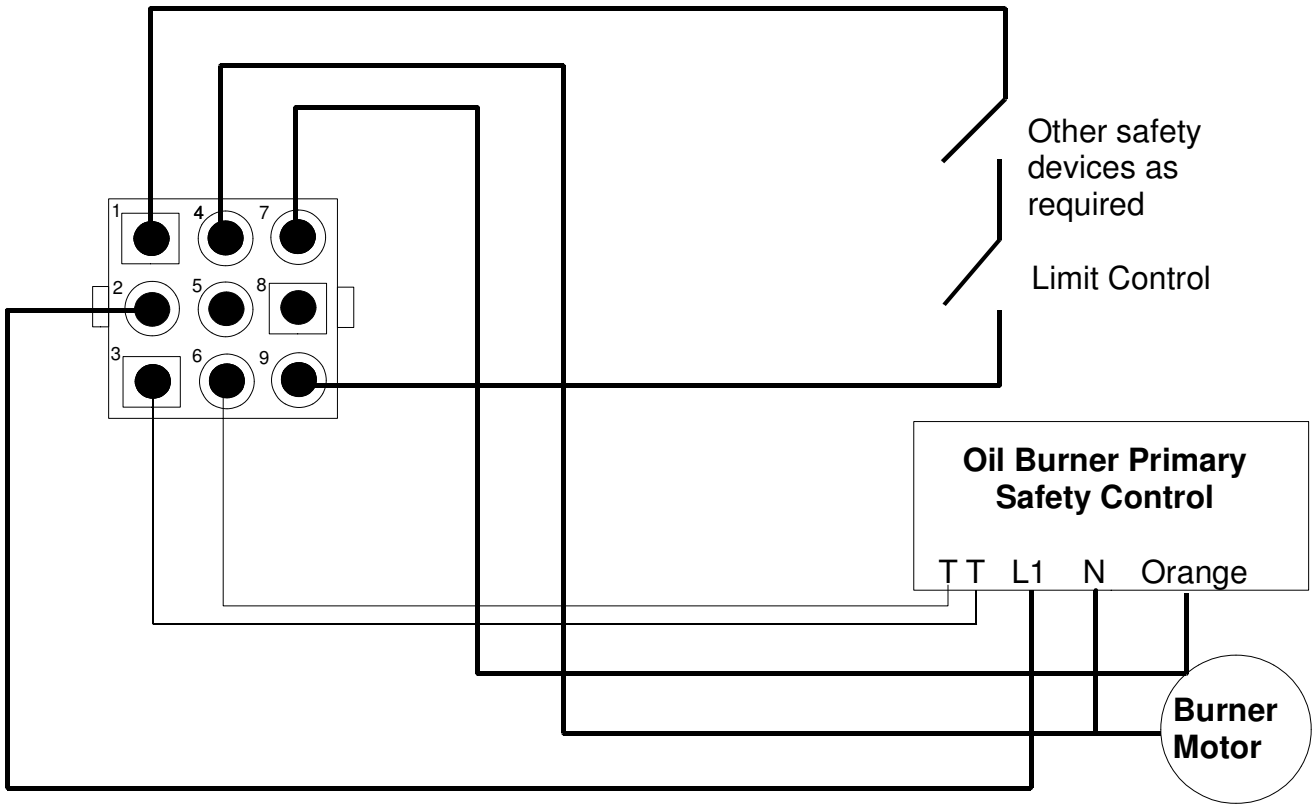
Burner Connections, Riello



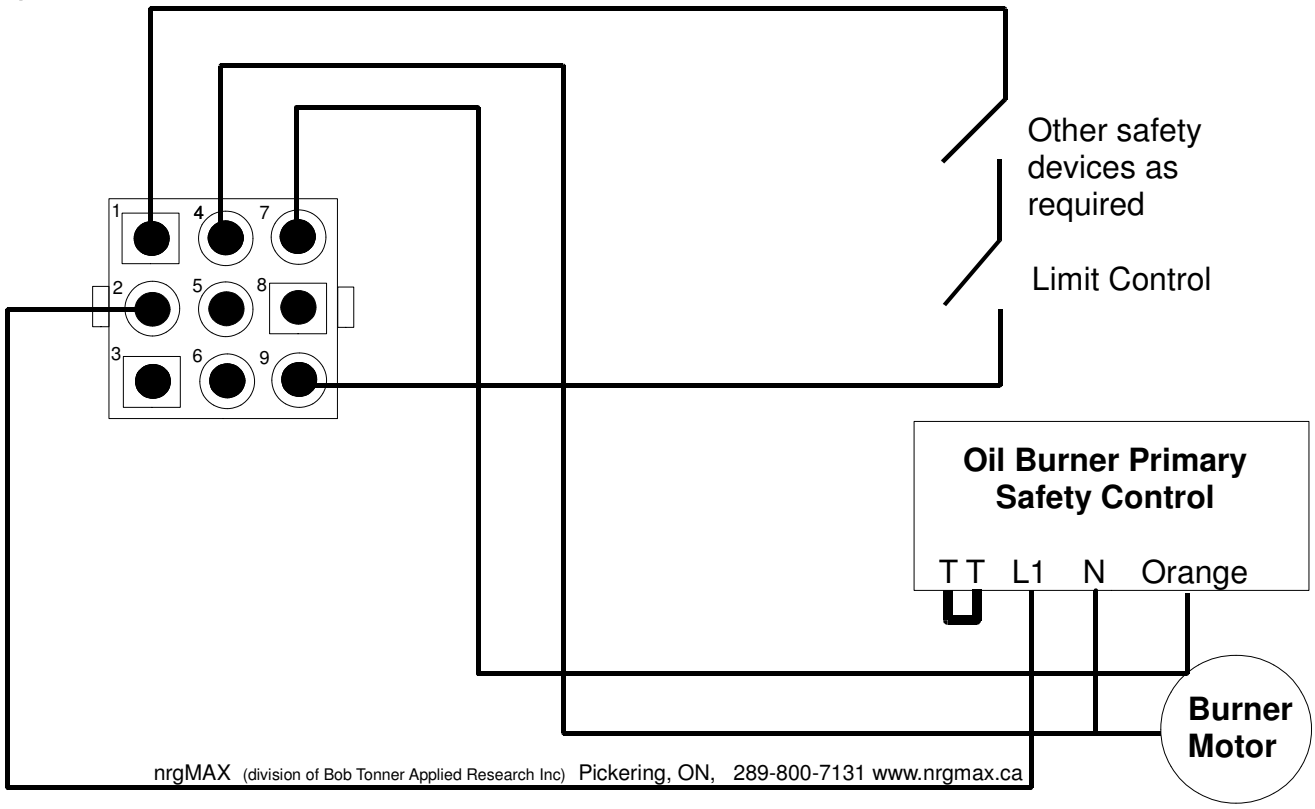
Burner Connections, Alternate , Riello with Post Purge Module



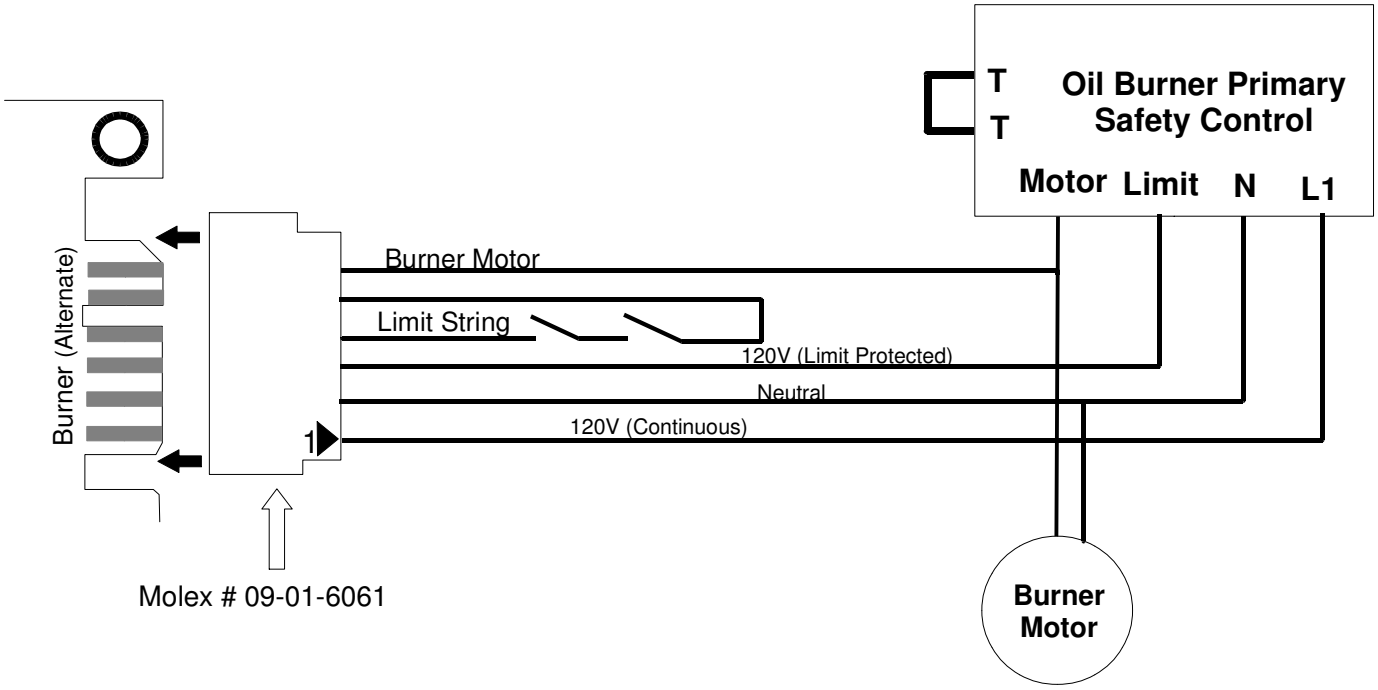
Burner Connections, Beckett/Carlin (no post-purge)



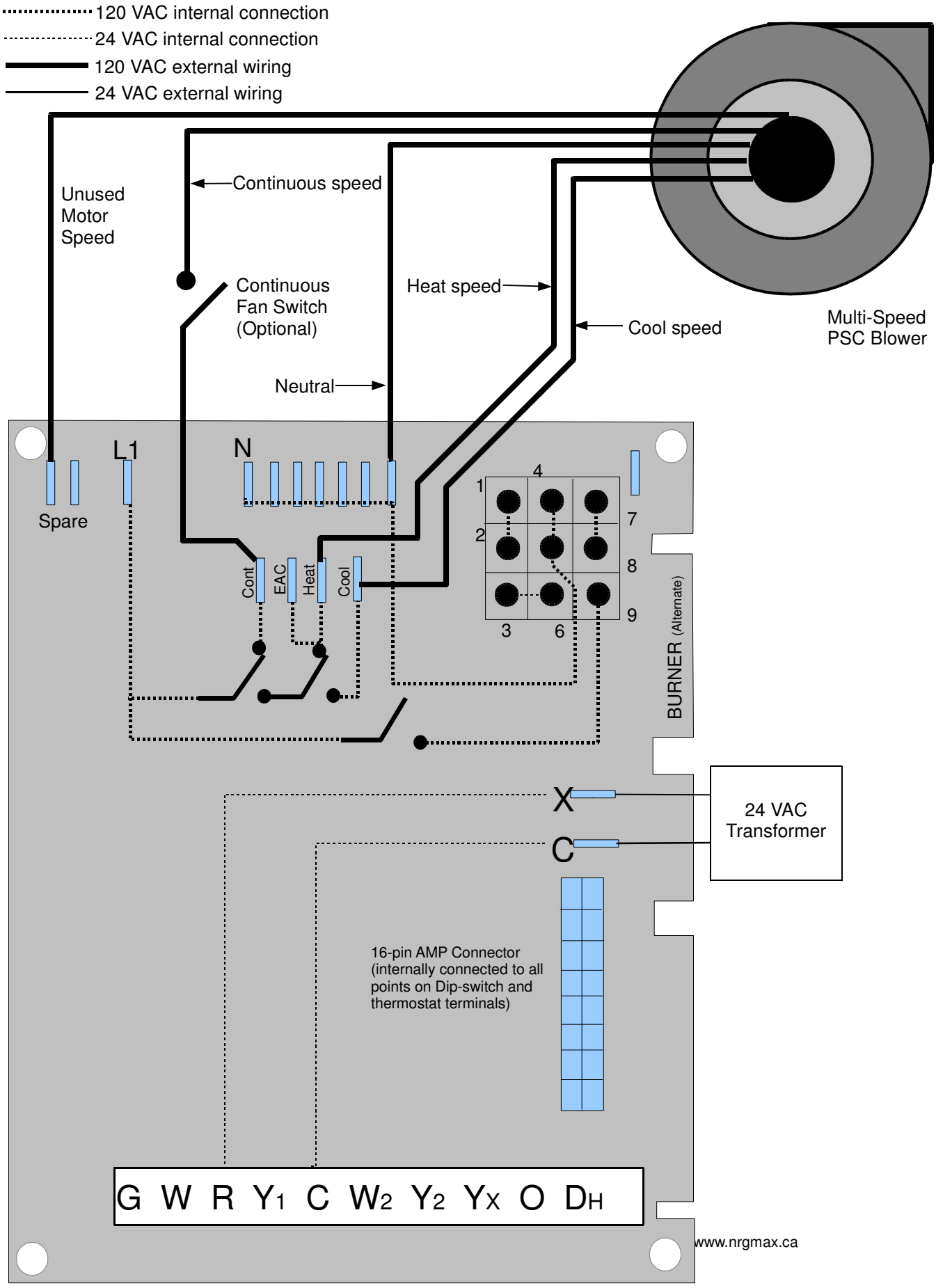
Burner Connections, Beckett/Carlin (no post-purge) Optional method with T-T jumpered



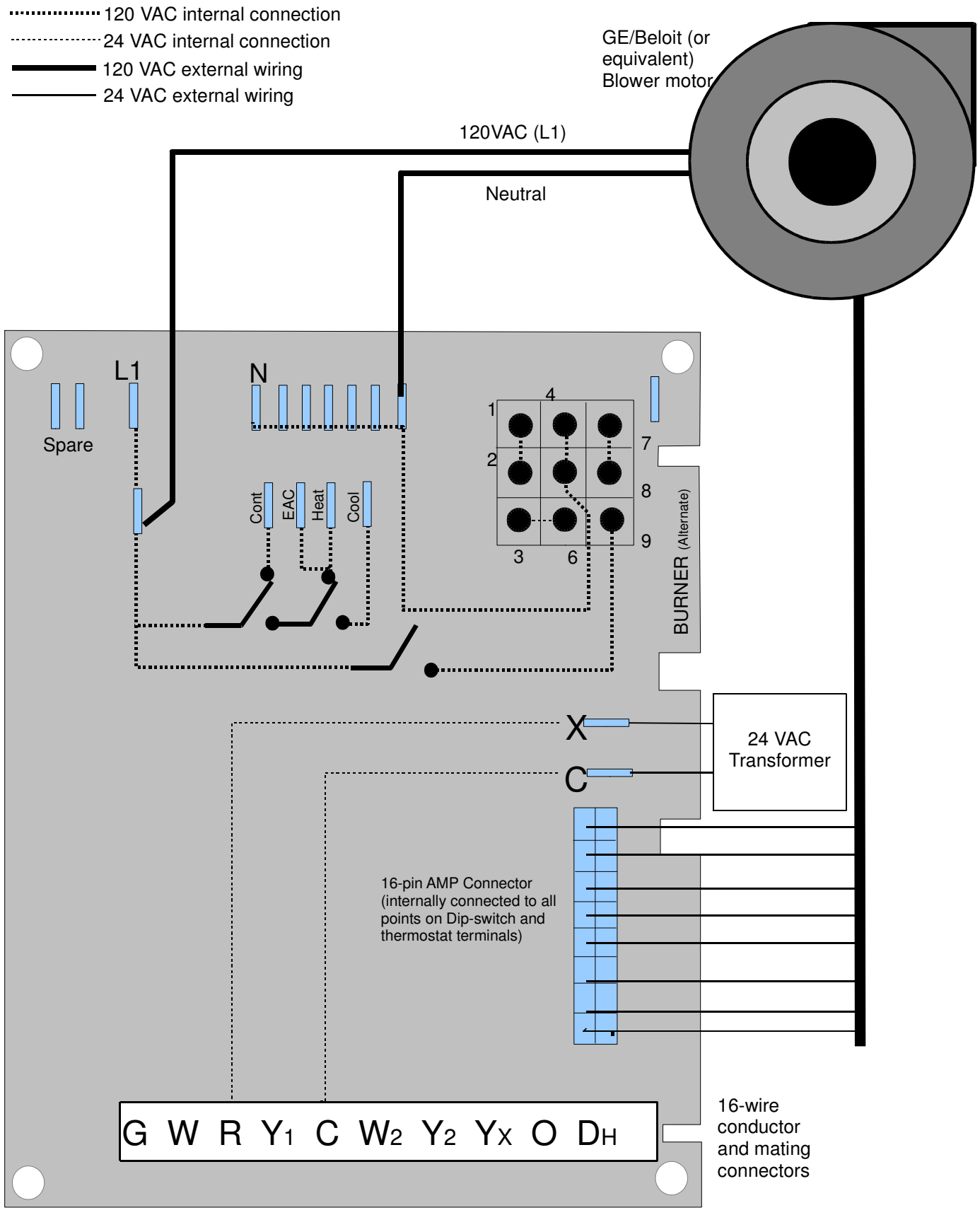
Burner Connections, Alternate, Beckett/Carlin with Post Purge



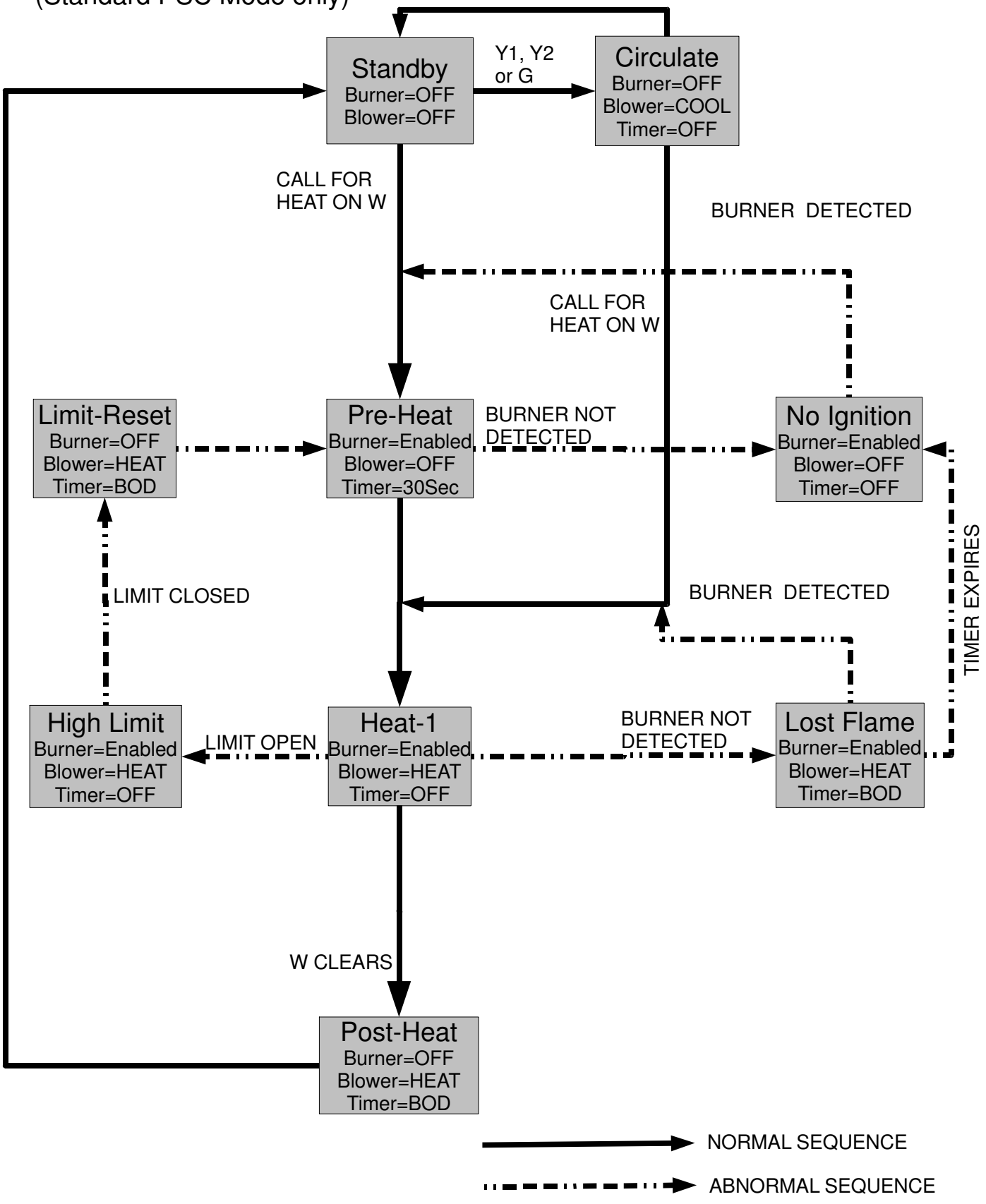
Blower Wiring: Multi-Speed PSC



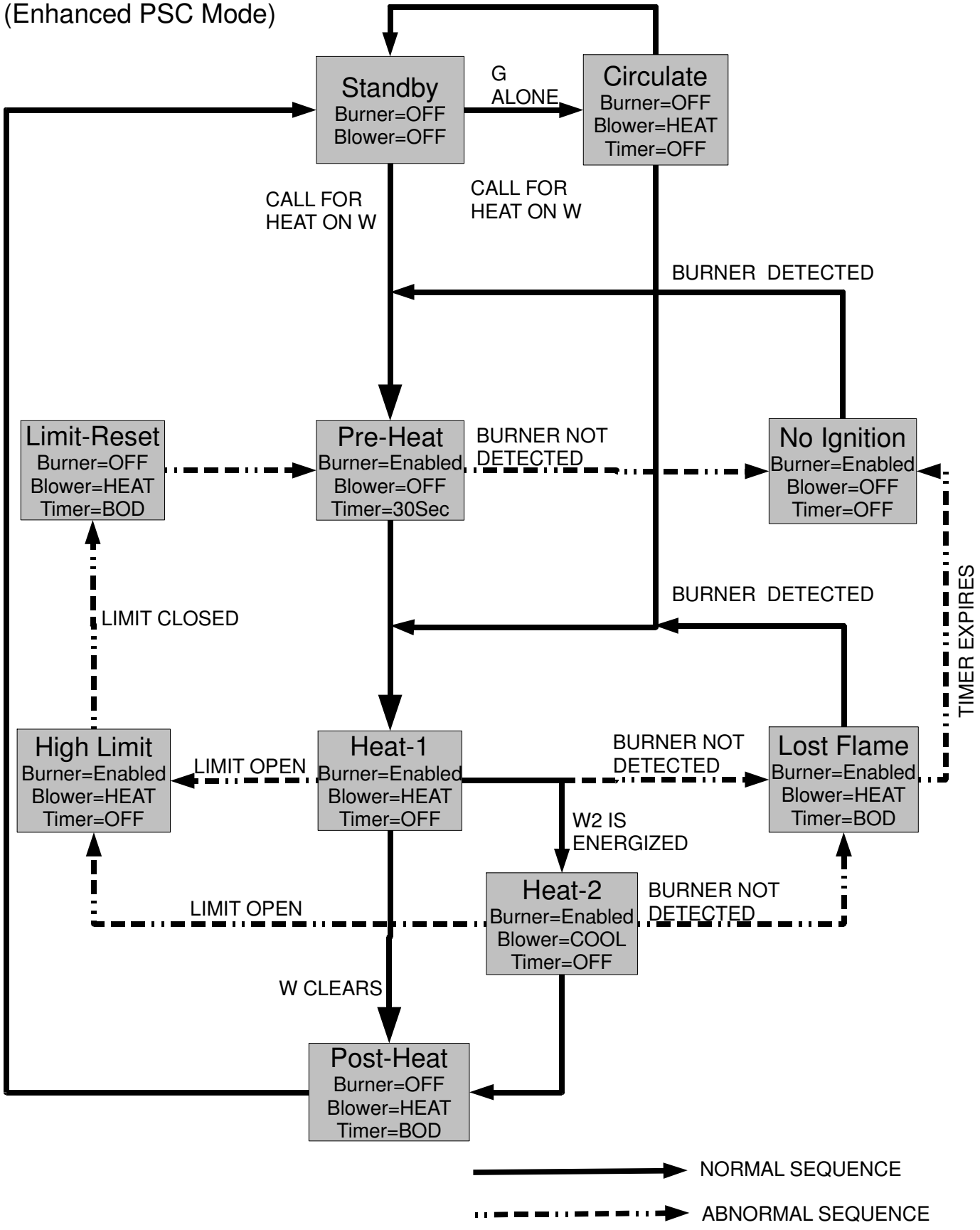
Blower Wiring: GE/Beloit ECM (or equivalent) Motor



Heat, Cool and Circulation Sequences
(Standard PSC Mode only)



HEATING SEQUENCE
(Enhanced PSC Mode)



COOLING SEQUENCE
Enhanced PSC Mode