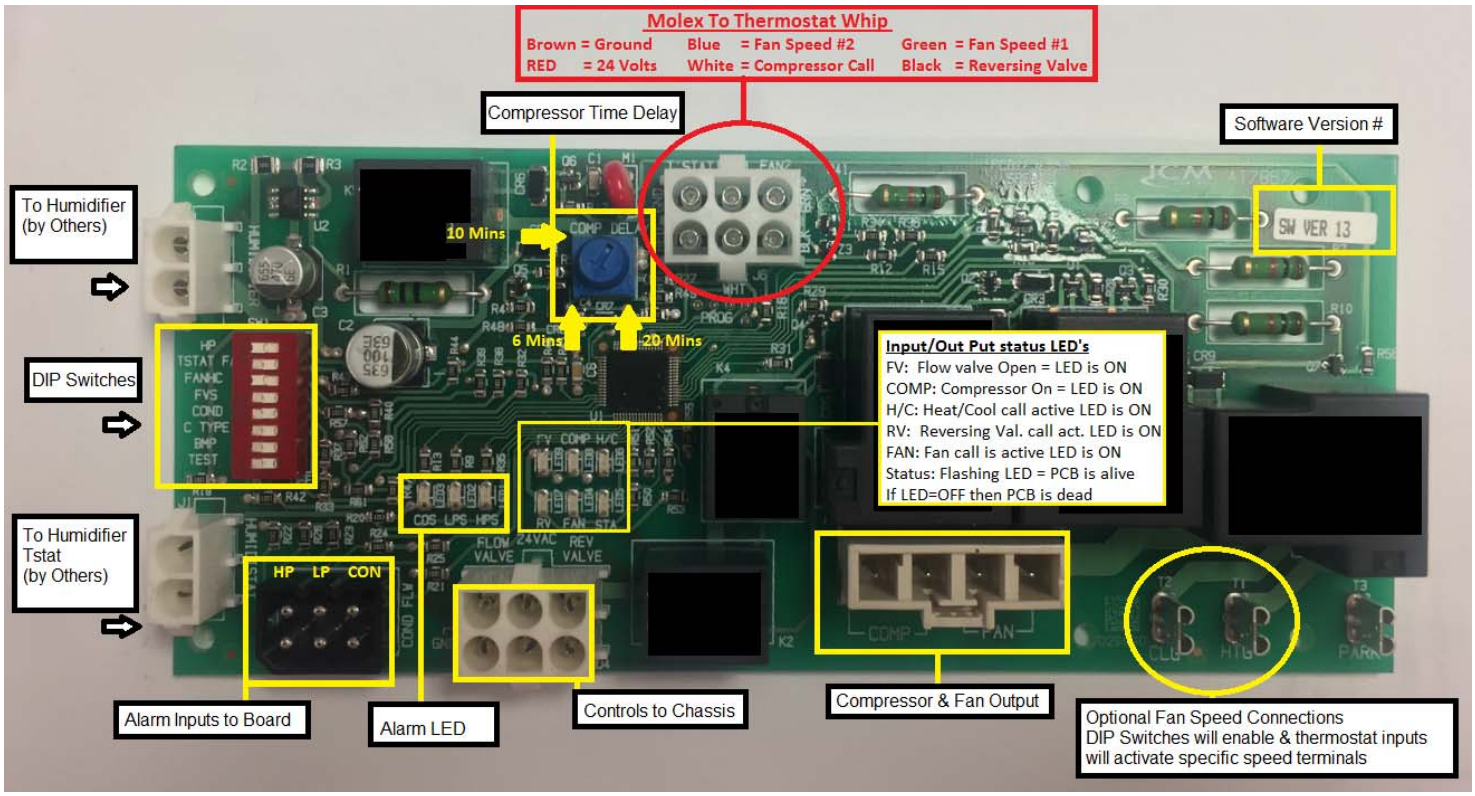
Omega PCB Installation/Operation – Dev A - Version 14

Note:

1) The installation of PCB & Thermostat has to be done by certified technician
2) Please make sure that thermostat is compatible with heat pump unit
3) Before turning ON the unit please make sure that all the wiring has been done properly & correct DIP switches are selected, PCB has multiple source of power 208VAC/24VAC

Figure 1 PCB Diagram



Version #14.2:

- A 5 second debounce was implemented on the High Pressure Switch. The High Pressure Switch must be OPEN for 5 continuous seconds to invoke a HP Alarm.

Version #13:

- The compressor delay timer (BLUE potentiometer dial on controller) was rescaled a minimum and maximum time delay of 6 to 20 minutes respectively. This now applies to the 1st call from when power is turned on (or cycle).
- Fully CCW = 6 minutes.
- Fully CW = 20 minutes.

Version #12:

- The compressor delay timer (BLUE potentiometer dial on controller) scale has a minimum and maximum time delay of 3 to 20 minutes respectively.
- When the board is turn on for the 1st time (IE: initial power up or after cycling power) the compressor's first time delay will default to 1.5 minutes. The 2nd time delay onwards will be whatever the blue potentiometer is set to.
- Fully CCW = 3 minutes.
- Fully CW = 20 minutes

DIP Switch Settings: (*) = Default settings from Factory

When making changes to the DIP switches it is a best practice to cycle the power to the board and verify the changes have been enabled.

DIP#8: HP (Thermostat Type)
On (*) = Standard Heat Pump (HP) Thermostat with G, Y, O inputs
Off= Heat/Cool (Conventional) Thermostat with G, H, C inputs

DIP#7: TSTAT FAN (Qty of fan speed controls on Thermostat)
On=thermostat has 2 or more fan speed controls
Off (*) = thermostat has only 1 fan speed controls

DIP#6: FANHC (Single or dual fan speed control for heating / cooling mode)
On (*) = use single fan speed for both cooling & heating mode
Off = use separate fan speeds for cooling and heating mode

DIP#5: FVS (Flow control valve action)
On= normally open valve (power to close)
Off (*) = normally closed valve (power to open)

DIP#4: COND (Condensate Overflow Switch Alarm Enable)
On= condensate switch alarms enabled
Off (*) = condensate switch alarms are disabled & ignored

Dip#3: C TYPE (Condensate overflow switch alarm action)
On = normally open condensate switch (alarm on close)
Off (*) = normally closed condensate switch (alarm on open)

Dip #2: BMP (Spare)
On = spare
Off (*) =spare

Dip#1: TEST (Test mode)
On= test mode enabled
Off (*) = test mode disabled

DIP Switch Functionality

DIP#1: TEST (Test mode)

On= test mode enabled
Off (*) = test mode disabled
When selected ON all the time delays will be reduce. The time delays in the each mode is as follows:

Timer	Description	Test Mode OFF	Test Mode ON
Low Pressure ByPass	Low Pressure ByPass Time	210 sec	2 sec
Flow Timer	On Valve Open- Delay to Enable Compressor On Compressor Disable - Delay to Close Valve	60 sec	2 sec
Compressor Time Delay	Compressor Anti Recycle Timer	Selected on Pot MIN = 6 minutes MAX = 20 minutes	10 sec

DIP#2: BMP (Spare)
On = spare
Off (*) =spare CURRENTLY
NOT USED

DIP#3: C TYPE (Condensate overflow switch alarm action)

On = normally open condensate switch (alarm on close)
Off (*) = normally closed condensate switch (alarm on open)

DIP#4: COND (Condensate Overflow Switch Alarm Enable)
On= condensate switch alarms enabled (condensate switch installed on the heat pump unit)
Off (*) = condensate switch alarms are disabled & ignored

DIP#5: FVS (Flow control valve action)

If the chassis of the heat pump has flow valve installed

On= normally open valve (power to close)
Off (*) = normally closed valve (power to open)

THERMOSTATS

DIP#8: HP (Thermostat Type)

On (*) = Standard Heat Pump (HP) Thermostat with G, Y, O inputs
Off= Heat/Cool (HC) Thermostat with G, H, C inputs

Heat Pump Thermostat **DIP**#8 = ON
If a Heat Pump thermostat is utilized, then the thermostat inputs correspond to the following:

Thermostat Terminal	Description at thermostat	Thermostat whip wire color (connects to PCB)
(G)	Fan Speed 1 Request	Green
(G2)	Fan Speed 2 Request	Blue
(Y)	Compressor Request	White
(O)	Reversing Valve energized	Black

Conventional Thermostat DIP#8 = OFF
If a conventional Heat/Cool thermostat is utilized, then the thermostat inputs correspond to the following:

Thermostat Terminal	Description at thermostat	Thermostat whip wire color (connects to PCB)
(G)	Fan Speed 1 Request	Green
(G2)	Fan Speed 2 Request	Blue
(Y)	Cooling Request	White
(W)	Heating Request	Black

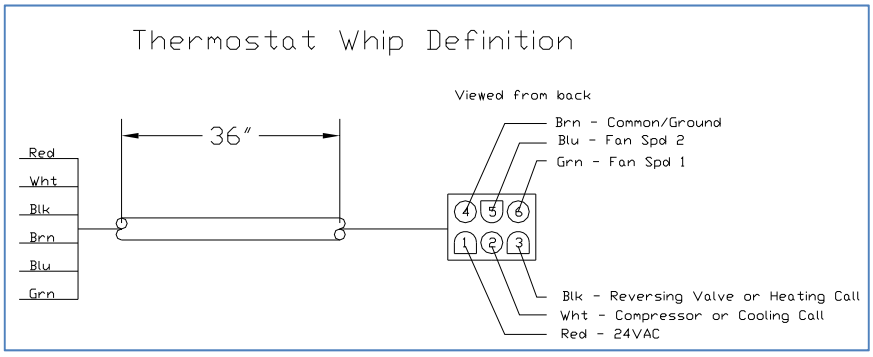
The request for heating and cooling by a conventional thermostat are converted to the following outputs accordingly.

On a call for cooling (Y), the compressor and reversing valve are energized.
On a call for heating (O), the compressor is energized and the reversing valve de-energized.

(* note: requests will only be satisfied if all safeties and permissive starts are in order.)

Thermostat Wiring Color Codes

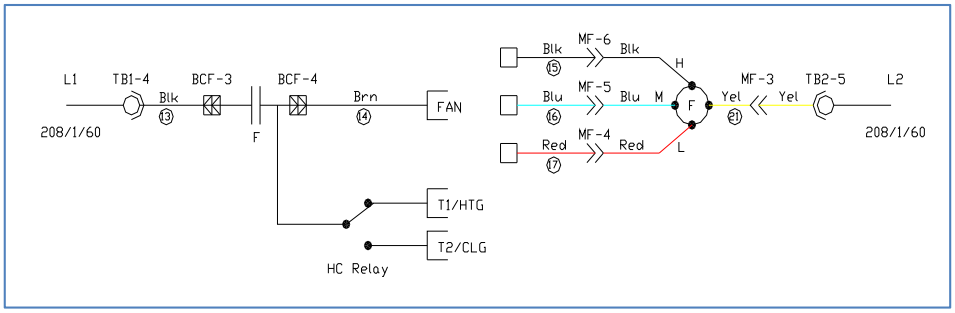
(R) Red wire = 24VAC
(G) Green wire = Thermostat Fan Speed 1 request
(G2) Blue wire = Thermostat Fan Speed 2 request
(Y) White wire = Thermostat Compressor (HP Stat) or Cooling (Conventional Stat) Request
(O) Black wire = Thermostat Reversing Valve Call (HP Stat) or Heating (Conventional Stat) Request
(C) Brown wire = Ground



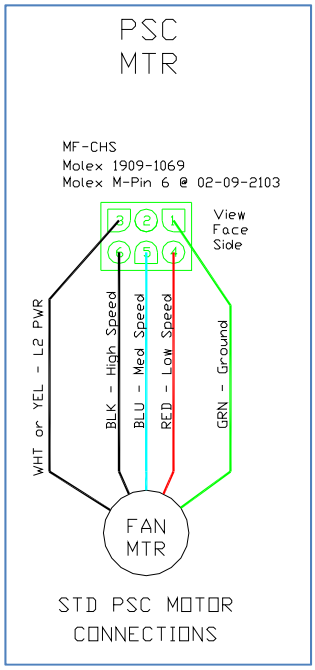
FAN CONTROL

A number of fan control strategies are accomplished with fan inputs G1 and G2 in conjunction with DIP#6 and #7.

The basic wiring of the fan/motor assembly is shown below for a 3 speed motor.



Motor connection wiring.



The “FAN”, “T1/HTG” and “T2/CLG” are ¼” quick connect terminals available on the controller to bring power an enable various fan speeds, depending on strategy employed. Below are a number of viable fan strategies.

Fan Control : SS - Single Speed Control

In this strategy the thermostat has a single fan speed request (G) which enables a single hard connected speed on the motor/fan assembly.

DIP SWITCH SETTINGS

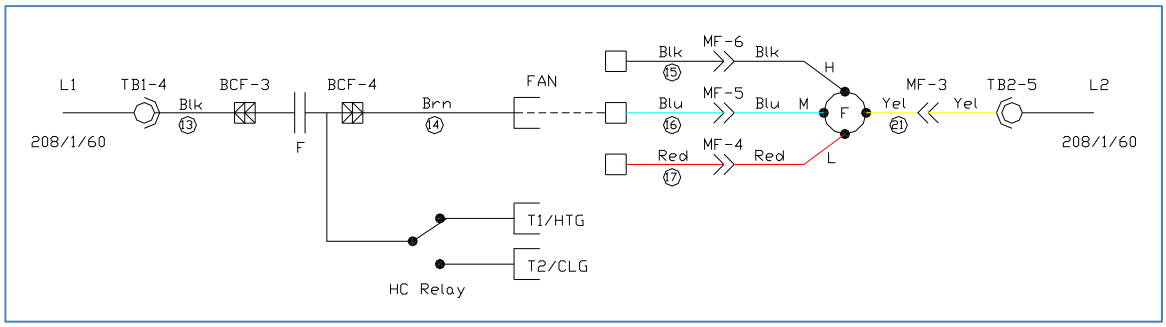
DIP#6 = ON = use single fan speed
DIP#7 = OFF= thermostat has only 1 fan speed control (or output)

CONNECTION AT THERMOSTAT

(R) Red wire = 24VAC
(G) Green wire = Thermostat Fan Speed 1 request
(Y) White wire = Thermostat Compressor (HP Stat) or Cooling (Conventional Stat) Request
(O) Black wire = Thermostat Reversing Valve (HP Stat) or Heating (Conventional Stat) Request

CONNECTION AT PCB

The “BRN” FAN quick connect is hard connected to the desired fan speed. In example below, the “medium speed” or BLUE wire is selected to run whenever the fan is enabled by the thermostat.



Fan Control : 2SPD/TGL - 2 Speed Fan control via Toggle Switch

In this strategy, the thermostat has a single fan speed request (G) which enables a MANUAL SWITCH selected fan speed.

DIP SWITCH SETTINGS

DIP#6 = ON = use single fan speed
DIP#7 = OFF= thermostat has only 1 fan speed control (or output)

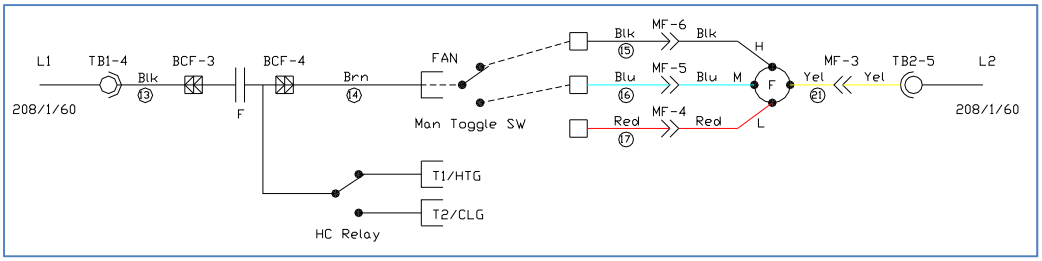
CONNECTION AT THERMOSTAT

(R) Red wire = 24VAC
(G) Green wire = Thermostat Fan Speed 1 request
(Y) White wire = Thermostat Compressor (HP Stat) or Cooling (Conventional Stat) Request
(O) Black wire = Thermostat Reversing Valve (HP Stat) or Heating (Conventional Stat) Request

CONNECTION AT PCB

The “BRN” FAN quick connect is hard connected to the common pole of the manual fan speed toggle switch. The pole of switch selects the desired fan speed on a fan enable by thermostat.

In the example below, the toggle switch is hardwired to the “high” (BLK) and “medium” (BLU) speeds of the fan motor.



The standard fan speed taps used for this configuration are shown below for the various unit sizes.

Fan Speed Taps		
Unit Size	High	Low
HRP020	Blu(Med)	Red(Low)
HRP030	Blk(Hi)	Blu(Med)
HRP040	Blk(Hi)	Blu(Med)
HRP060	Blu(Med)	Red(Low)
HRP080	Blu(Med)	Red(Low)
HRP100	Blk(Hi)	Blu(Med)
HRP120	Blk(Hi)	Blu(Med)

Fan Control : 2SPD/TS - 2 Speed Fan control via Thermostat

In this strategy, the thermostat has a 2 fan speed requests (G1 and G2) which are mapped to outputs T1(HTG) and T2(CLG). This provides 2 speed fan control originating from the thermostat.

DIP SWITCH SETTINGS

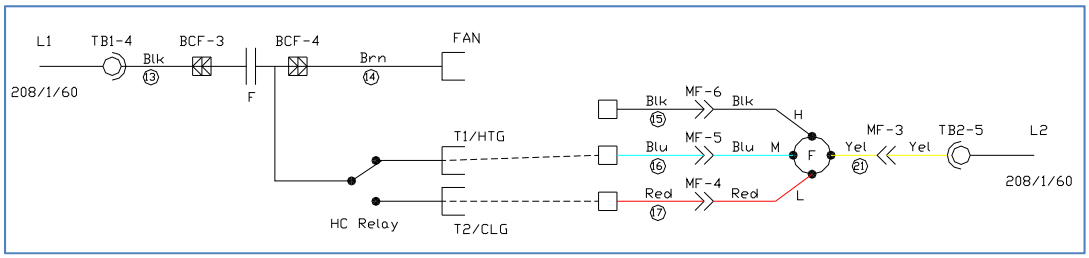
DIP#6 = OFF= use separate fan speeds T1 and T2
DIP#7 = ON = thermostat has 2 or more fan speed controls

CONNECTION AT THERMOSTAT

(R) Red wire = 24VAC
(G) Green wire = Thermostat Fan Speed 1 Request
(G2) Blue wire = Thermostat Fan Speed 2 Request
(Y) White wire = Thermostat Compressor (HP Stat) or Cooling (Conventional Stat) Request
(O) Black wire = Thermostat Reversing Valve (HP Stat) or Heating (Conventional Stat) Request
(C)Brown wire = Ground

CONNECTION AT PCB

Connect the fan speed wires (red, blue, or black) to the required fan speed output terminals of T1 (HTG) and T2 (CLG). When the thermostat calls for fan speed #1 (G), the fan output terminal T2 (CLG) will be energized. When the thermostat calls for fan speed #2 (G2), output terminal T1 (HTG) will be energized. If both are active G and G2 are called, fan speed #2 will take priority and fan output terminal T1 (HTG) will be energized. An example is shown below.



The standard fan speed taps used for this configuration are shown below for the various unit sizes.

Fan Speed Taps		
Unit Size	High	Low
HRP020	Blu(Med)	Red(Low)
HRP030	Blk(Hi)	Blu(Med)
HRP040	Blk(Hi)	Blu(Med)
HRP060	Blu(Med)	Red(Low)
HRP080	Blu(Med)	Red(Low)
HRP100	Blk(Hi)	Blu(Med)
HRP120	Blk(Hi)	Blu(Med)

Fan Control : 2SPD/HC - 2 Speed Fan control based on Heat/Cooling Mode

In this strategy, the thermostat has only 1 fan speed request (G) and runs at different fan speed for a heating or cooling call.

DIP SWITCH SETTINGS

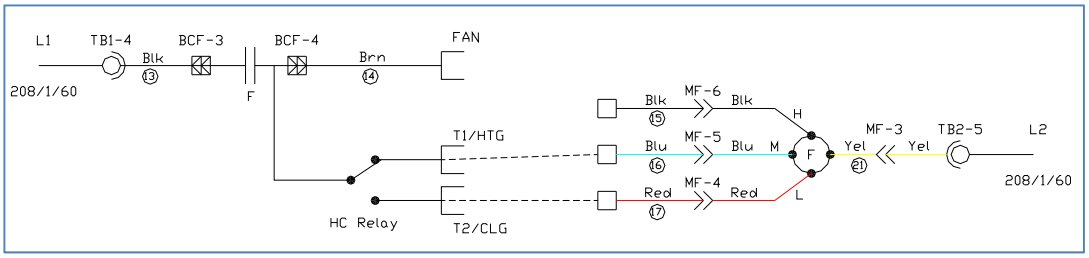
DIP#6 = OFF=use separate fan speeds for cooling and heating mode
DIP#7 = OFF = thermostat has only 1 fan speed controls

CONNECTION AT THERMOSTAT

(R) Red wire = 24VAC
(G) Green wire = Thermostat Fan Speed 1 request
(Y) White wire = Thermostat Compressor (HP Stat) or Cooling (Conventional Stat) Request
(O) Black wire = Thermostat Reversing Valve (HP Stat) or Heating (Conventional Stat) Request

CONNECTION AT PCB

Connect the fan speed wire (red, blue, or black) to the required fan speed output terminals of T1 (HTG) and T2 (CLG). In heating mode terminal T1 (HTG) will be active and in cooling mode terminal T2 (CLG) will be active. Heating and cooling modes will have different fan speeds when wired this way. The example below would call medium speed on a call for heating and low speed on a call for cooling.



Please see factory for determination of the heating and cooling fan speed taps.

LED Defintions

Status LEDs – Green

Status LED (STA):	PCB Status (Blinks green to indicate PCB Alive)
Heat/Cool LED (H/C):	Enabled on a call for heating or cooling

The following LEDs are generally utilized to validate the condition of PCB outputs against real field devices controlled.

Fan LED (FAN):	Enabled when Fan output is energized
Compressor LED (COMP):	Enabled when Compressor output is energized
Reversing Valve LED (RV):	Enabled when RV output is energized
Flow Valve LED (FV):	Enabled when FV output is energized

Alarm LEDs – Red

The ALARM LEDs light solid in the presence of alarm. If alarm causes a LOCKOUT (or LATCHING) condition, the respective LED will BLINK.

HPS Alarm:	Immediate LOCKOUT ALARM, blinks RED when High Pressure detected.
COS Alarm:	Immediate LOCKOUT ALARM, blinks RED when Condensate Overflow Switch detected.
LPS Alarm:	Blinks RED when a Low Pressure Lockout condition is detected.

The LPS Alarm is latched when the compressor is running and the low pressure switch is OPEN for 210 continuous seconds. Immediately after a LPS Alarm is detected, the unit activates a defrost cycle for 60 seconds (Unit goes into cooling for 60 seconds transferring heat the water loop) .

REVERSING VALVE SEQUENCE OF OPERATION

The reversing valve is energized on a cooling call from the thermostat (in HP or HC Mode). The reversing valve is de-energized on a heating call from the thermostat (in HP or HC Mode).

If there is NO call for heating OR cooling, the reversing valve remains in its LAST STATE to minimize excessive cycling of valve.

FLOW VALVE SEQUENCE OF OPERATION

The flow valve is coordinated with a compressor request in the following manner:

- On a call to enable the compressor, the flow valve is opened for 60 seconds prior to energizing the compressor to establish flow.
- On a call to disable the compressor, the flow valve remains open for 60 seconds after the compressor de-energized in order to flush coaxial coil.

The flow valve control action is determined by DIP#5 as follows:

DIP#5 On = Normally Open Valve (Power to Close)
DIP#5 Off = Normally Closed Valve (Power to Open) = Default

COMPRESSOR SEQUENCE OF OPERATION

A compressor request is made by the thermostat inputs per section “THERMOSTAT SEQUENCE OF OPERATION”.

Energizing of the compressor is dependent on the following conditions being met:

- A compressor request must be active (from thermostat)
- The fan output must be active (from thermostat)
- The compressor time delay timer must have expired. (This timer is reset after the compressor stops running).
- No alarms must be active (LP, HP or COS)

UNIT SEQUENCE OF OPERATION

When there is a call for heating or cooling from the thermostat:

- The flow valve will opened to permit flow to coax.
- The reversing valve will be position for call (energized for cooling, de-energized for heating)
- The compressor will be energized if
    - no alarms are present (LPS, HPS or COS) and
    - the flow valve has been opened for 60 seconds and
    - the fan has been energized

When the heating or cooling call is satisfied:

- The compressor will be de-energized
- The flow valve will remain open for 60 seconds to flush coax and then close.

Any alarms will immediately de-energize the compressor. All other controls (flow valve, reversing valve) will remain in their last state.