



## ES50HVP / ES90HVP HIGH VELOCITY AIR HANDLER

### Service Manual



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P/N 14010A



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All technical information subject to change without notice.

## CONTROL ASSEMBLY LAYOUT

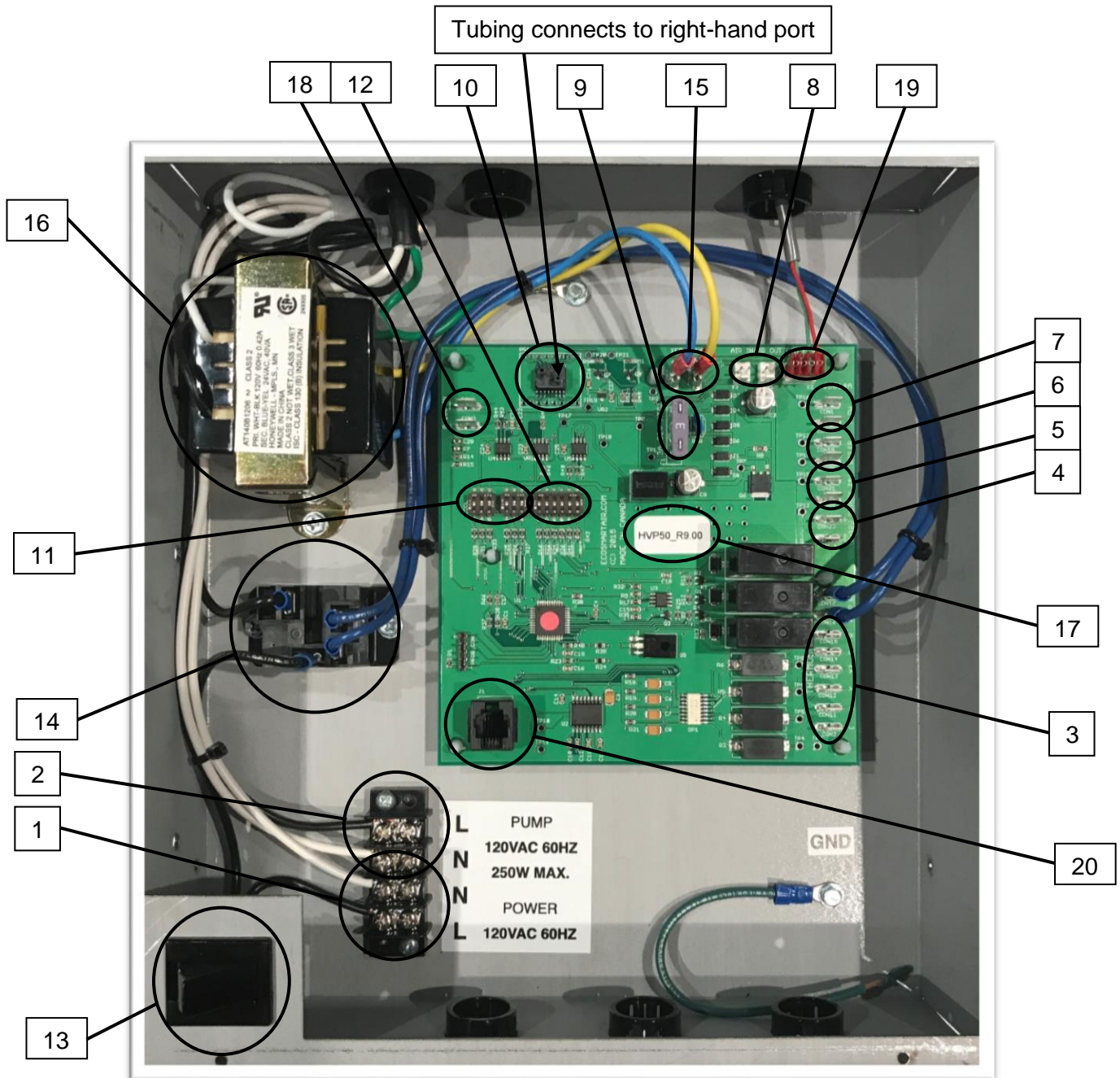


Figure 1 - HVP Control Assembly

## CONTROL ASSEMBLY LEGEND

Refer to Figure 1 (bolded numbers on left side are referred to in troubleshooting)

<b>1</b>	120VAC 60Hz single phase power input
<b>2</b>	120VAC 250W Max. pump output from relay
<b>3</b>	Thermostat connection: R, G, Y2, Y, W, interrupted C
<b>4</b>	0-10VDC output voltage for variable speed pump
<b>5</b>	Auxiliary 24VAC accessory output – active when heating
<b>6</b>	Dry contacts to bring on heat source
<b>7</b>	Flow switch input for domestic hot water priority
<b>8</b>	Air in/out temperature sensors
<b>9</b>	Fuse 3A 32V ATO type
<b>10</b>	Pressure sensor
<b>11</b>	Heat/cool CFM DIP switches
<b>12</b>	Options DIP switches
<b>13</b>	Door switch
<b>14</b>	Pump relay
<b>15</b>	24VAC output from transformer: Blue = R, Yellow = C*  * For smart/WiFi thermostats requiring constant power such as Nest, Ecobee, CÔR etc., use C connection at yellow wire using a double male/female adapter 0.25". Do not connect thermostat to C terminal in 3 above – this is only active when the A/C condenser is on
<b>16</b>	24VAC 40VA transformer
<b>17</b>	Software version identifier
<b>18</b>	Building automation system input
<b>19</b>	Variable speed output to EC motor
<b>20</b>	Diagnostic connector

## REMOVING BLOWER/CONTROL ASSEMBLY

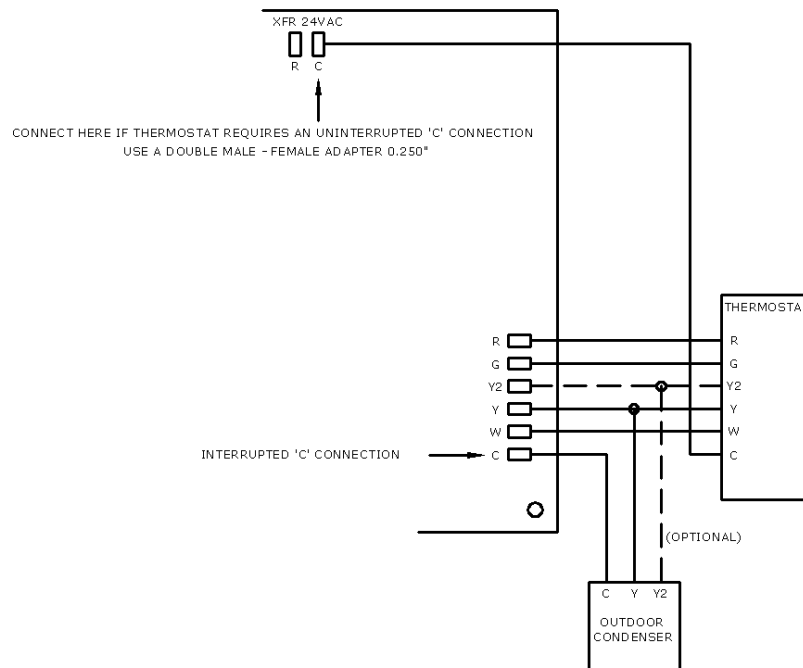
Blower and control assembly can be removed as a single piece:

- Turn off power to **ecosmart**
- Disconnect AIR OUT temperature sensor (white plug/socket) just above front centre plate **(8)** and pull up out of the way to prevent damage to the cable when sliding out assembly
- Disconnect power, thermostat and other wiring from within control box **(1, 2, 3, 4, 5, 6, 7)**
- Undo (Qty. 2) #1/4-20 bolts, lock washers and flat washers
- Slide out blower assembly

## TROUBLESHOOTING

### Smart/WiFi thermostat not working properly

Standard digital thermostats usually have internal batteries and do not require external power. Smart thermostats require a constant source of external power to operate internal electronics. This power is derived from a 'C' connection that is available at all times. Do not use the 'C' connection intended for the condenser **(3)** as this is switched on only when the outdoor condenser runs. Use a constant 'C' connection derived from the 24VAC transformer **(15)** connected as follows:



## Thermostat call error

If the **ecosmart** does not run when the thermostat is calling, jumper R to W for heating or R to Y (Y2) to verify if the problem is with the thermostat or **ecosmart** control. Note that some thermostats have a delay (typically five minutes) before they will re-start cooling to prevent compressor damage.

## Fan not running

The fan is driven by a variable speed EC motor. The PWM (Pulse Width Modulation) signal generated by the control board at connector **(19)** has a frequency of 80Hz and an amplitude of 24V and can provide up to 64 speed settings (0 to 100% duty). To determine if the fault is with the control board or the motor, use PWM tester P/N 22014. This tester has a single LED which lights dimly for lower duty cycles and brighter for higher duty cycles. No light indicates a faulty control board. To test, follow these steps:

1. Apply power and check for 120VAC on power connector at motor
2. If power is not present check door switch **(13)**
3. If power is still not present, check continuity of motor power cable
4. Unplug motor control cable at connector **(19)**
5. Connect PWM tester to the control board EC motor connector **(19)** with same orientation as motor control cable
6. Jumper R to G to bring on fan
7. The PWM tester should gradually increase in brightness indicating that a PWM signal is present. No light on the PWM tester indicates a faulty control board

## Fan runs for cooling but not for heating

The room thermostat may be connected improperly. Refer to Electrical section or wiring schematic on **ecosmart** for proper installation.

## External pump does not run (sticking issue)

In areas where hard water is present the pump may stick and fail to run. Often, closing the isolation valve on the return leg and opening the drain port so that water flows through the pump can free this. If this fails to free the pump, removal for cleaning or replacement is necessary. The daily pump exerciser will help prevent pump sticking.

## External pump does not run (electrical issue)

Two types of pumps can be used with the **ecosmart**: standard 120VAC pumps or variable speed pumps with a 0-10V control voltage input.

1. Jumper R to W **(3)** or set to test mode – Options DIP switch 6 on
2. Relay **(14)** will click on and 120VAC should appear on power connector **(2)**
3. 10VDC should also appear on 0-10V output **(4)** for variable pump operation

## External pump is noisy at start-up

If sound has not diminished within 1 minute, air may be present in the system and may need re-purging. If the heat source is a water heater, check to make sure branch connections for the heating loop are horizontal to prevent the collecting of air in the loop. Install air eliminating device at high point in system.

## Water heater temperature and pressure relief valve is weeping

A check valve or back-flow preventer may have been installed in the system. Some form of pressure relief is required. Inspect expansion tank for defects. If the system does not have an expansion tank, install one.

## Insufficient or no heat

- Check that the heat generator is functioning properly
- Plugged air filter or coil. Refer to maintenance section for filter care and coil cleaning
- Air in heating loop - purge system
- Inlet and outlet connections to **ecosmart** are backwards - reverse connections
- Water heater dip tube is restricted or damaged; check and/or replace
- Supply water temperature set too low or not calibrated properly - check water temperature
- Restrictions on heating loop - remove restrictions, check if valve is stuck, isolation valves could be too restrictive or left partially closed after purging, or a closed valve

## Cold water at hot faucet

When the heat source is a water heater, the most probable cause is reverse flow through the heating loop from a stuck check valve - repair or replace valve.



## Heating during standby mode

Probable cause is thermal siphoning.

## Pump and fan run continuously

### (test mode off and no call for heat/cool)

Air out sensor monitors the temperature above the heating coil in the supply airstream and will turn on the pump and fan if temperature goes below 40°F.

- Make sure Air out temperature sensor plug is properly seated into board connector **(8)**
- Sensor resistance should be approximately 10K at room temperature

## Constant Pressure Sensing (CPT™) not working

The HVP control board has an on-board solid state pressure sensor **(10)**. Air from the high pressure side of the fan is fed via a silicone tube to the right hand port of the sensor. Firstly, follow the calibration procedure as outlined in the User Manual:

### Calibrate procedure:

Constant Pressure Technology (CPT™) automatically maintains the desired airflow within the ductwork irrespective of outlet vents opening and closing when in heating mode. CPT™ is designed to reduce airflow noise caused when vents are partially or fully closed. CPT™ is unavailable when in cooling mode to prevent potential freezing of the DX coil. To enable the CPT™ function, follow the steps below:

### STEP 1

Set desired heat airflow rate using the HEAT DIP switch **(11)**.

### STEP 2

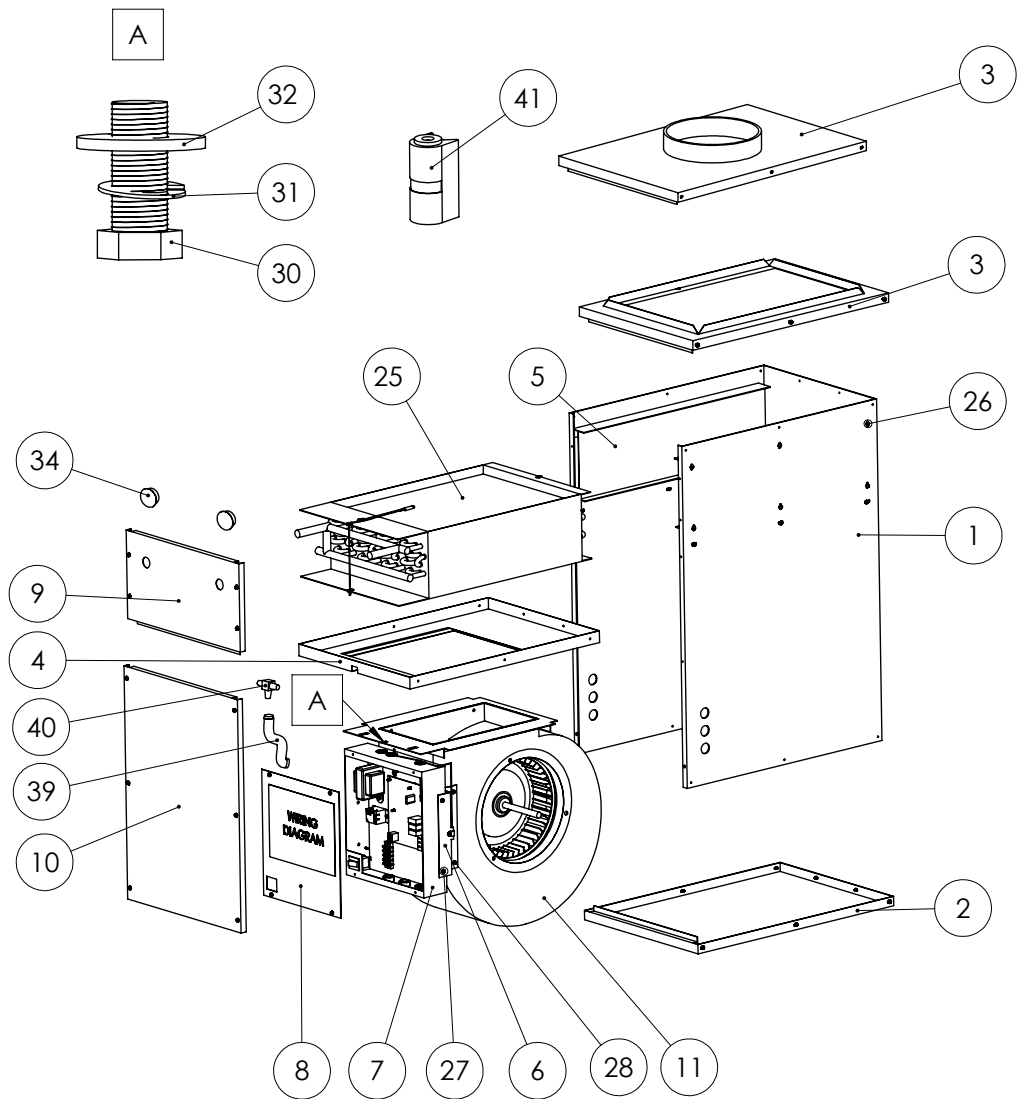
Set OPTION switch 6 to the ON position and allow the system to run for at least 1 minute, then set OPTION switch 6 to the OFF position. The calibration parameter is now permanently stored in the control board and will be retained even if power is removed from the **ecosmart**. If the heat airflow rate setting is changed, calibration must be repeated for correct operation.

To check that sensor is functioning correctly, pull off the silicone tube from the sensor port. The fan should gradually increase to its maximum value. Replacing the tube will result in the fan reducing speed to the calibrated value. This shows that the pressure sensor is working correctly.

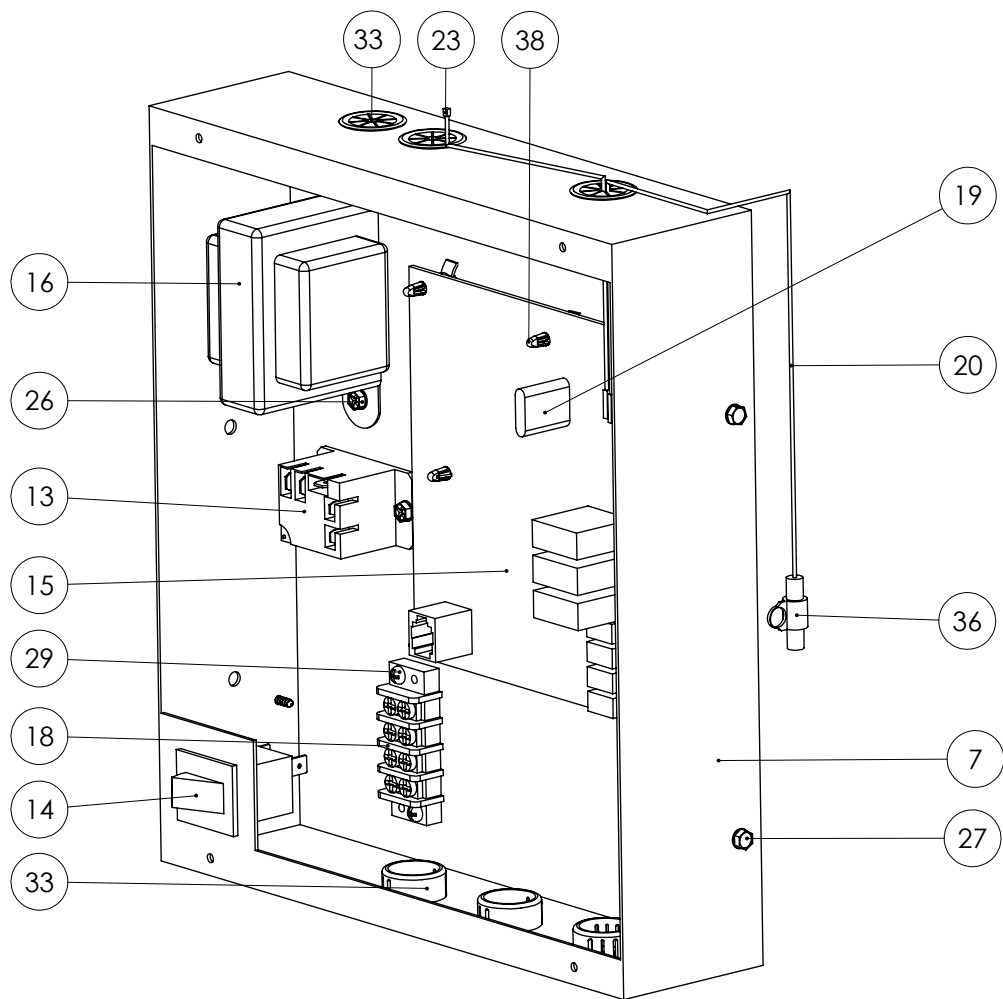
If the calibrate procedure above fails to work, check if the silicone tube is clear and there is no debris blocking the tube or the plastic inlet 'T' located on the centre plate. If the system still does not work, then sensor is defective and the board needs to be replaced.

As a workaround until the board is replaced, set OPTIONS switch 4 to the off position and the **ecosmart** will run in fixed airflow mode.

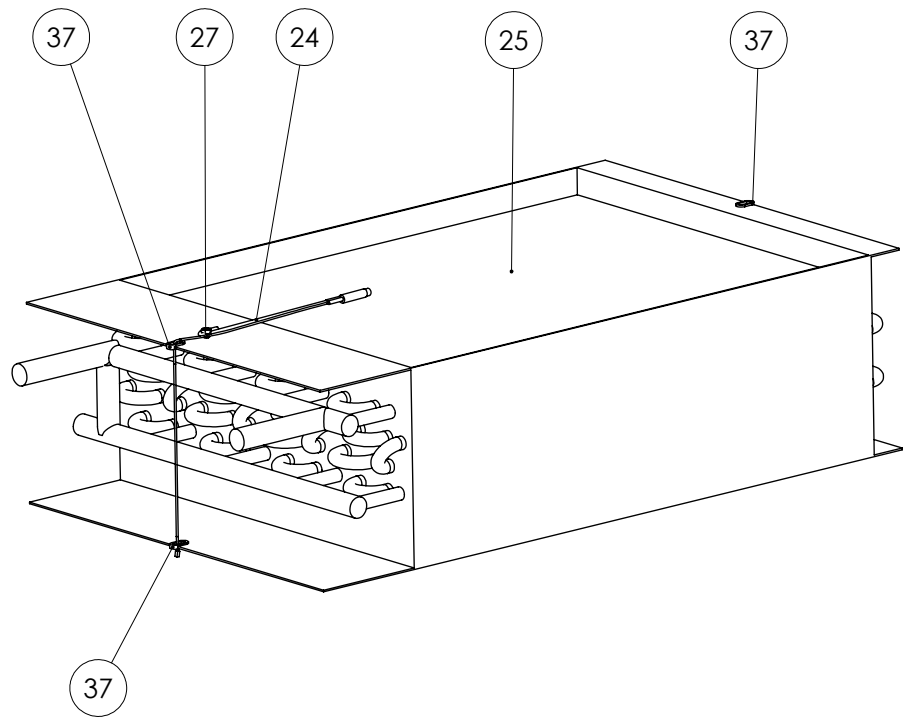
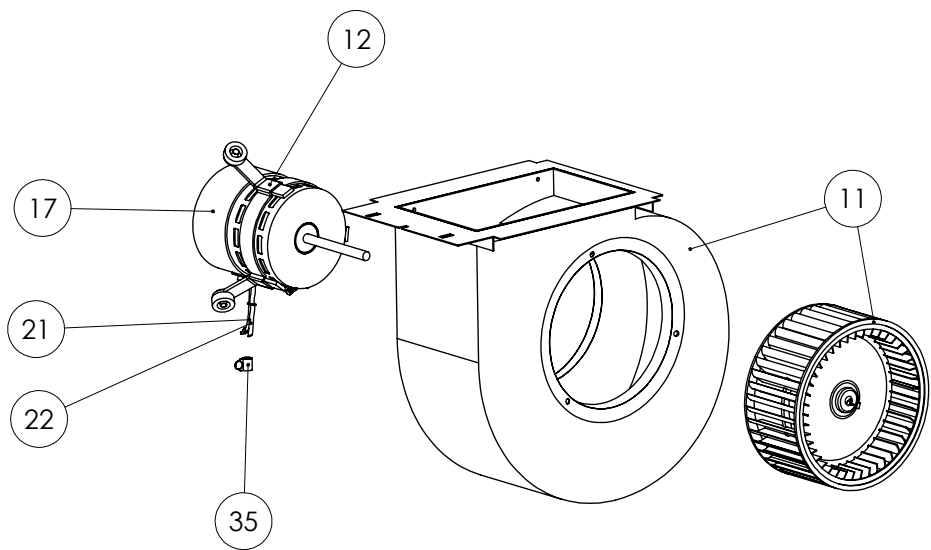
## Final Assembly – Exploded View



Electrical Box – Exploded View



Blower & Heating Coil – Exploded View



## Replacement Parts

Replacement Parts HVP Models					
Item	Part Number	Part Number	Part Number	Description	Qty.
	50HVP	90HVP	120HVP		
<b>METALWORK</b>					
1	16028	16023	16058	Wrapper	1
2	16029	16024	16060	Bottom cover	1
3	16039	16040	16052	Top cover	1
4	16016	16003	16056	Centre plate	1
5	16005	16005	16005	Coil rail	2
6	16036	16006	16036	Electrical box support	2
7	16007	16007	16007	Electrical box	1
8	16008	16008	16008	Electrical box cover	1
9	16031	16026	16062	Upper door	1
10	16032	16027	16064	Lower door	1
<b>BLOWER ASSY</b>					
11	16033	16004	16055	Blower assy	1
12	16035	16035	16035	Motor mount set BB-10-4 (short arm)	1
<b>ELECTRICAL</b>					
13	18010	18010	18010	Relay 24VAC 10A contact SPST	1
14	18000	18000	18000	Door Switch	1
15	1501450	1501590	15014120	PCA Ecosmart HVP Controller	1
16	18001	18001	18001	Transformer 120VAC 24VAC 40VA	1
17	18008	18009	18009	Motor EC Perfect Speed 1800	1
18	18011	18011	18011	Barrier block 20A 4 pos	1
19	18020	18020	18020	Fuse 3A	2
<b>WIRING</b>					
20	20000	20000	20000	Cable assy temp sensor 10K	1
21	20001	20001	20001	Cable assy motor control	1
22	20002	20002	20002	Cable assy motor power	1
23	20008	20008	20008	Cable assy temp sensor extension	1
24	20009	20009	20009	Cable assy supply temp sensor	1

Heating Coil					
25	17007	17003	17009	Hydronic Heating coil	1
HARDWARE					
26	19000	19000	19000	Screw Selftap #8 x 3/8in Type AB Hex/PHP Zinc	40
27	19001	19001	19001	Screw Selftap #8 x 3/8in Type B Serrated Hex Zinc	7
28	19018	19018	19018	Screw Selftap #8 x 3/8in Type Selfdrill Hex Zinc	4
29	19011	19011	19011	Screw Seltap #6 x 1/2in Type A PNP Zinc	2
30	19015	19015	19015	Bolt 1/4 x 20 x 3/4in zinc	2
31	19016	19016	19016	Lockwasher 1/4in zinc	2
32	19017	19017	19017	Washer 1/4in zinc	2
33	19012	19012	19012	Bushing universal 0.875 blk	5
34	19007	19008	19008	Dome plug blk	2
35	19013	19013	19013	Cable clip 7/16in blk	1
36	19014	19014	19014	Cable clip 3/16in blk	1
37	19003	19003	19003	Grommet 0.625OD 0.312ID blk	4
38	19004	19004	19004	Control board support	7
MISC					
39	19024	19024	19024	Silicone Tubing	1
40	19023	19023	19023	Pressure Inlet Tee	1
	14002	14002	14002	Ecosmart HVP Installation and Operations Manual	1
	14005	14005	14005	Ecosmart HVP Brochure	1
	14010	14010	14010	Ecosmart HVP Service Manual	1