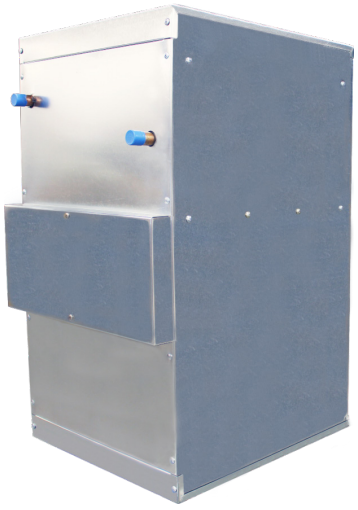
Energy Saving PRODUCTS LTD

www.hi-velocity.com

LV-B Series

Installation Manual



Includes:
LV-B Series Air Handlers
Product Specifications
Wiring and WEG Settings
Specifications & Sizing

From the Manufacturers of
Hi-Velocity Systems™
www.hi-velocity.com

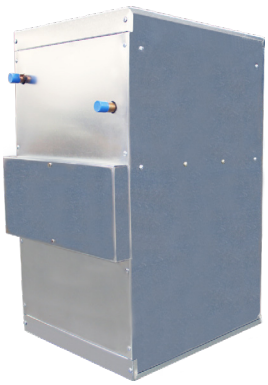
Manual-LV-B-Installation-120121

Table of Contents

The LV-B System

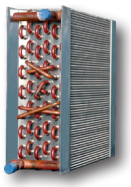
By Energy Saving Products Ltd.

All Product Sizing on Pg. 26



LV-B Air Handler
Specs Pg. 25

Heating Options



Hot Water Coil

Electric Strip Coil

Cooling Options

Refrigerant Coil

Chilled Water Coil

Other Options

Return Air

Hi-Velocity Air Purification System

When sizing an LV-B air handler for a residential system, it is necessary to have an accurate heat loss/gain done for the structure. This will ensure the proper equipment is used for cooling and heating. A heat loss/gain is done for each room, with all rooms added together to find the total BTUH load for the building. With the total load known, the appropriate air handler can be chosen from Pg. 25.

IMPORTANT: The LV-B Air Handler is not to be used for temporary heating or cooling during the construction of the structure. If used in this capacity all warranties will be null and void.

Air handler units specified in this section shall be designed as a closed loop hydronic air handler system, with published BTUH ratings and entering water temperatures between 110°F and 190°F. The system shall allow for heating, DX or chilled water cooling, and heat pump applications with electric coil back-ups. Entering water temperature and BTUH outputs shall match performances listed on Pg. 25.

Quality Assurance

Air handler units shall be a total indoor air quality system complete with heating, cooling and air filtration, with the possibility of humidity control and fresh air make up. The air handler must be factory manufactured, assembled and tested.

All equipment furnished under this specification shall comply with the standards set out by the following standards organizations:

CSA	Canadian Standards Association
CE	European Conformity
UL	Underwriters Laboratories

The air handler units shall be designed, rated, and approved by CSA/UL.

The air handler units shall have pre-wired controls consisting of a 24V transformer, printed circuit board and variable frequency drive. The circuit board shall be capable of providing heating, cooling and constant fan. Motors shall be 3 phase with published amp draws.

Sweat water connections are 3/4" for the LV-B-751/1051 and 1" for the LV-B-1751. All lines should be piped so as not to restrict use of the access panels, filter section, or electrical enclosure.

Refer to the back of this manual for all specifications, measurements, etc.

Air handlers are to be located indoors, however, attic, crawl space and garage conditions are fully acceptable. The air handler unit can be positioned in a Horizontal, Hi-Boy, or Counterflow position and can be suspended from the ceiling or placed directly on the floor.

When potential for gravity flow of the hot water exists, spring check valves may be needed on both the supply and return lines.

Please read the ENTIRE manual before beginning installation as this will help avoid mistakes that may cost time and money.

Air Handlers

The LV-B air handler is manufactured with a direct drive, permanently lubricated motor that is mounted within the blower. All LV-B air handlers are single side access. The blower assembly can be easily slid out by removing the electrical box and then removing the three mounting bolts that attach the blower to the center plate.

Disclaimer

Energy Saving Products Ltd. reserves the right to discontinue, make changes to, and add improvements upon its products at any time without public notice or obligatiion. The descriptions and specifications contained in this manual were in effect at printing. Some illustrations may not be applicable to your unit.

Air Handler Placement

When installing the air handler, keep these points in mind:

- Serviceability and access to the unit.
- Maximizing usable floor space.
- Location of heating/cooling source to the air handler.

As previously stated, the air handler can be positioned in many different orientations. When placed in the Hi-Boy position, supply air is fed from the top of the unit (Fig. 01). When placed in the Counterflow position, supply air is fed downwards from the unit (Fig. 02).

Fig. 01 - Hi-Boy

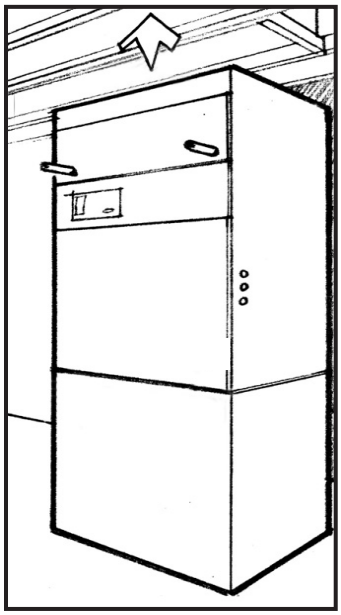


Fig. 02 - Counterflow

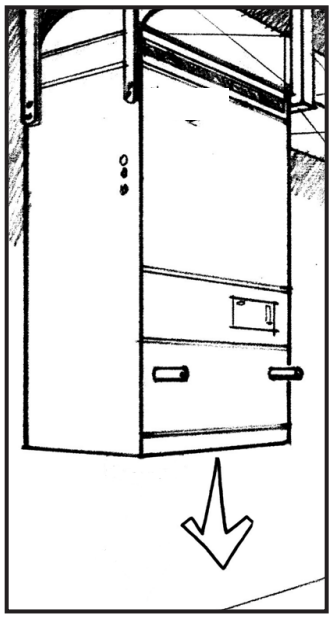
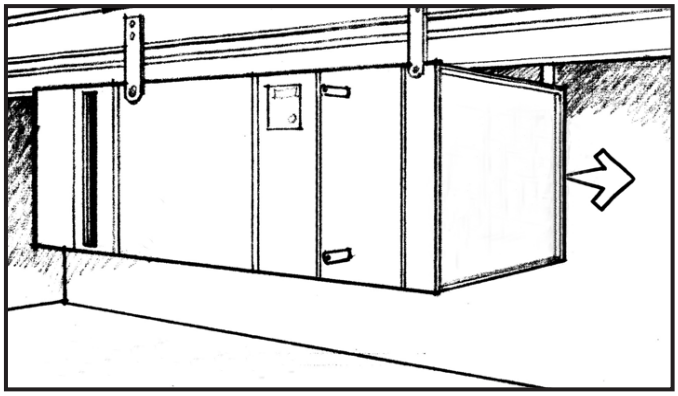


Fig. 03 - Horizontal installation



Hanging the Air Handler Unit

Quite often, the best location for the air handler unit is suspended from the ceiling of the mechanical room, in the horizontal position (Fig. 03). This will allow for more floor space in the room, and will minimize the duct work needed to connect to the air handler unit.

The air handler can be suspended in any position, using most industry standard hanging support systems. Redi-Rod, All Thread, C-Channel or Unistrut are some of the building code acceptable hanging systems. Use these in conjunction with spring or rubber isolators to ensure a sturdy hanging support system. These isolators will absorb most of the vibrations generated by the air handler system, eliminating any sound transfer.

Securing the Air Handler to the Hanging System

In most cases, fastening the hanging system near the corners of the outside cabinet of the air handler will be acceptable. However, in some cases, brackets may be needed to secure the air handler to the hanging system.

Clearances

Clearance is only needed on the access side of the units. However, ensure that there is a small space between the unit and any other surface to prevent vibration transfer. In order to maintain and service the air handler unit, the minimum clearances required on the access side are (Table 01).

Table 01 – Air Handler Clearances

Unit	**Inches (mm)**
LV-B-751	18″ (457mm)
LV-B-1051*	22″ (559mm)
LV-B-1751	32″ (813mm)

*Add an additional 4″ for Electric Strip Coils

Refrigerant Cooling Module

Due to the high volume of air produced by LV-B air handlers, the use of a third party blow-through coil such as an A-Frame or N-Frame coil is suitable. When using an RBM, RPM-E or RCM cooling module, consult with the parts list or the factory for proper match-up recommendations.

Water Coil Module (WCM/WM)

The water coil comes as a module and must be installed in the vertical position on the return air side of the air handler. The WCM/WM come supplied with two L mounting brackets for connection to the air handler (Fig. 06). For WCM/WM dimensional information and sweat water connection sizes refer to the manual shipped with the coil, also available on our website.

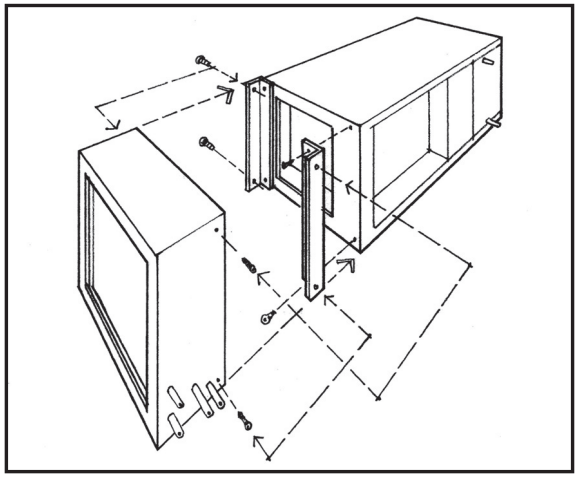
Piping the WCM/WM

When the potential for gravity flow of the hot water exists, check valves may be needed on both the supply and return lines. Figs. 08 and 09 give an example of this. All lines should be piped so as not to restrict access to the front panels, filter section, or electrical enclosure. Size your supply and return lines according to Table 02.

Table 02 – WCM/WM pipe sizing

Zone BTUH Heat loss	Pipe Size up to 40 feet	Pipe Size 40 – 100 feet
0 - 35,000	⅝″	¾″
35,001 - 70,000	¾″	1″
70,001 - 140,000	1″	1 ¼″

Fig. 06 - Mounting Brackets



Hot Water Coil Add-on

The Hot Water Coil Add-on is easily installed in the LV-B air handler. With heating, condensate is not a consideration and the coil can be mounted on the supply side of the blower (Fig. 07).

With the removal of the front panels, the coil can be slid in place on the supply side of the blower. For Hot Water Coil dimensional information refer to our website.

Piping the Hot Water Coil

Figs. 08 and 09 illustrate typical pipe runs from a dual purpose hot water tank to a air handler. These drawings are only for reference as all piping has to be run according to local code.

Fig. 07 - Hot Water Coil easily slides into the Air Handler

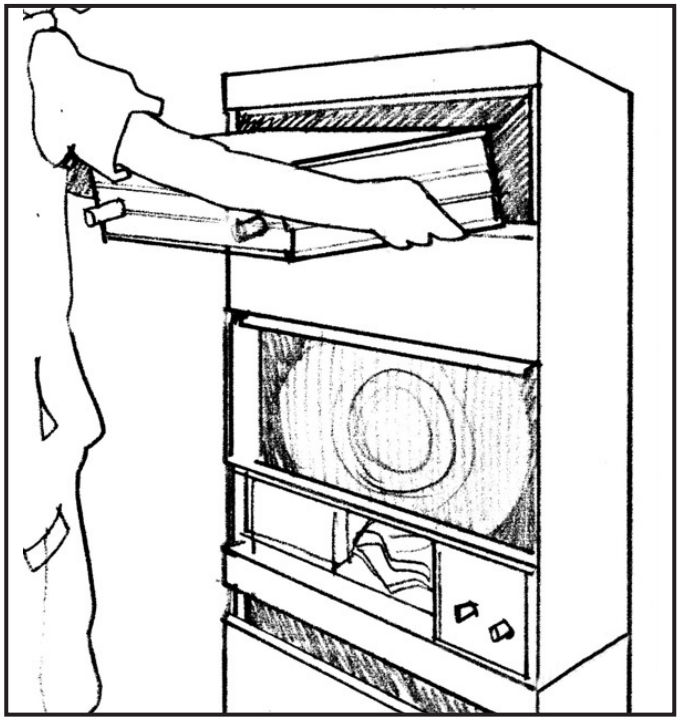


Fig. 08 - Hot water tank: Side take-offs

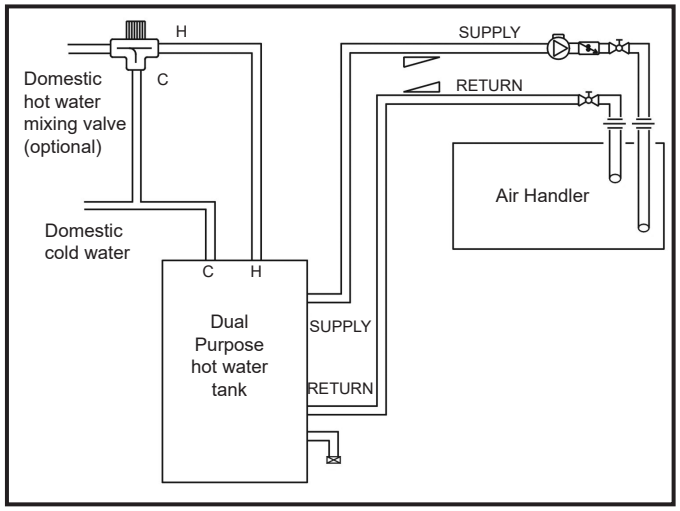
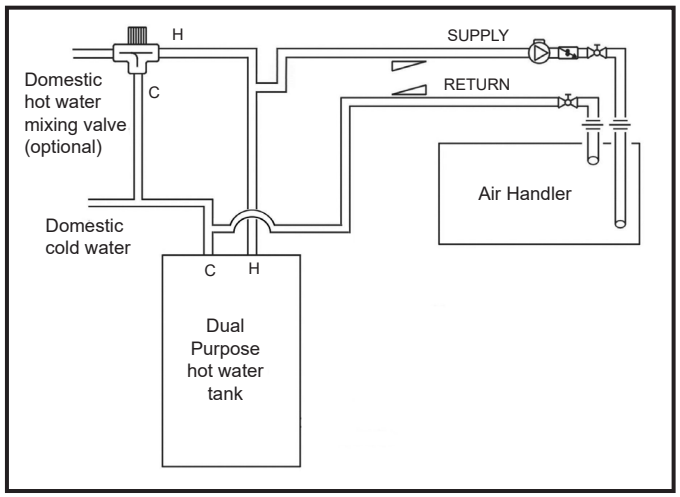


Fig. 09 - Hot water tank: Without side take-offs



Electrical Strip Heater (ESH)

The Electrical Strip Heater slides into the air handler, on the supply side of the blower (Fig. 07). Once the front access doors have been removed, the ESH can be slid into place.

The ESH is labeled with a directional airflow sticker; when placing the ESH the sticker shall be in the direction of the air flow.

Wiring the Electrical Strip Heater

Before wiring in the ESH, make sure all power sources are disconnected. The wiring diagram is on the inside of the ESH front panel, or refer to Pg. 10. Use only wires suitable for 167ºF (75ºC); wires shall be sized according to local electrical code.

Use only class 2 wiring for the Control Circuit connections between the heater terminal 1, terminal 2 and the zone valve terminals. Please note, the ESH must be wired to a dedicated breaker, separate from the air handler.

For Electrical Strip Heater Specifications, please refer to the manual shipped with the coil, also available on our website: www.hi-velocity.com

Return Air

The return air duct is not supplied with the LV-B Air Handler System. It is to be supplied and installed by the contractor. The return air and fresh air make-up ducts are to be installed according to local building code.

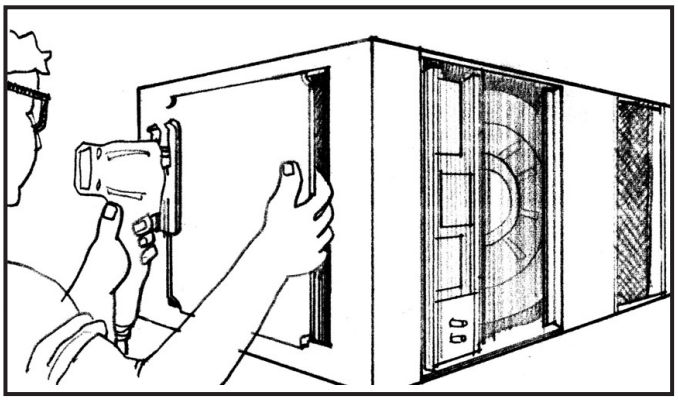
Return Air Cutout

All LV-B air handlers are shipped with the return air knockouts pre-measured for multiple configurations. Table 03 contains the pre-measured dimensions for the return air knockouts.

Table 03 – Return Air Cutout Dimensions

Model	Dimensions
LV-B-751	9 1/2" X 13 1/2" (241mm x 343mm)
LV-B-1051	14 1/2" X 13 1/2" (356mm x 343mm)
LV-B-1751	21" X 17 7/8" (533mm x 454mm)

Fig. 10 - Return air cutout

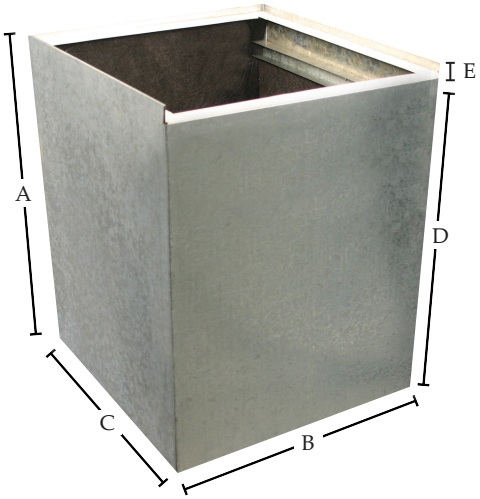


Once the placement of the return has been decided, the return air knockout(s) can be cut. (Fig. 10) **The premeasured guide cuts supplied with the air handler should always be used to make the initial cut. After the first cut using the return air knockout(s) a metal shear must be used to maximize the return air cutout opening size.** This allows it to match more closely to the filter, cooling coil or return air ducting size to maximize flow capacity.

Return Air Base (Optional)

Energy Saving Products manufactures a return air base that matches up to the air handler units.

The return air base provides a stand for the air handler when placed in vertical orientation, and provides an easy mounting location for modular coils and filter racks. It can also be used as a transition and mixing box for the return air. All return air bases come acoustically lined with half-inch sound absorbing insulation.



Hi-Velocity Return Air Base

Return Air Base Dimensions

	A	B	C	D	E
RA-50/750	22½" (572mm)	18½" (470mm)	14½" (368mm)	21½" (552mm)	1" (25mm)
RA-70/1050	22½" (572mm)	18½" (470mm)	19½" (495mm)	21½" (552mm)	1" (25mm)
RA-1750	22½" (572mm)	24½" (622mm)	26½" (673mm)	21½" (552mm)	1" (25mm)

Options & Add-Ons

Hi-Velocity Air Purification System

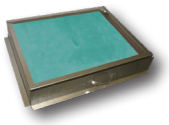
Easily installed on any Hi-Velocity or existing HVAC System, the optional HE PS gives consumers unsurpassed indoor air quality. The HE PS will work at the airflow rates of the LV-B-1051 only. For 3 stage filtration on the LV-B-1751, we recommend using the HE PS-1750.

Three powerful technologies in one Air Purification System:

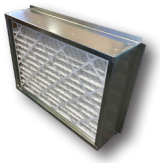
- Electrostatic MERV-13 Filter Removes Allergens
- Photo-Catalytic Oxidation destroys toxic chemicals and eliminates household odors
- Ultraviolet Light Kills Disease Germs on Contact

Filter Rack

Also available from Energy Saving Products is a FR Filter Rack (1") and a FR-4 Filter Rack (4"). The FR 1" filter is a MERV 3 which is 14% efficient and the FR-4 is a 4" MERV 13 which is 85% efficient. Aftermarket filters may be used with the Hi-Velocity filter racks. (See filter dimensions below)



1" Filter Rack and Filter



4" Filter Rack and Filter

Filter Dimensions

Unit	750/751	1050/1051	1750/1751
FR Filter	14" X 1" X 18" (355mm x 25mm x 457mm)	18" X 1" X 18" (457mm x 25mm x 457mm)	24" X 1" X 26" (609mm x 25mm x 457mm)
FR-4 Filter	14" X 4" X 18" (355mm x 101mm x 457mm)	19" X 4" X 18" (483mm x 101mm x 457mm)	N/A

Hi-Velocity Portable Air Purification System

For room to room air purification, Energy Saving Products also offers the P-20 Portable Hi-Velocity Air Purification System, a powerfully advanced stand-alone system that has 5 steps to give you the cleanest air possible:

LV-B User Guide

Indoor Air Quality (IAQ)

Ensure that there is always a filter in place and check every month to ensure that the filter is clean. The amount of time between filter changes and cleaning will be dependant upon the living habits of the homeowner. We recommend replacing filters every 6 months. With a clean air filter, you not only have cleaner air to breathe, but you will also help maintain unit efficiency, as well as increase the operating life of the unit.

System Efficiency/Performance

A big misconception that people have is that by turning off the air conditioning when they leave home, they save on cooling costs. This is not necessarily true as the system will need to run longer and harder when pulling the house down to temperature after being shut off for a large amount of time. Keeping the temperature within a small range when there are no loads from human use will result in less overall energy consumption.

Installation Checklist

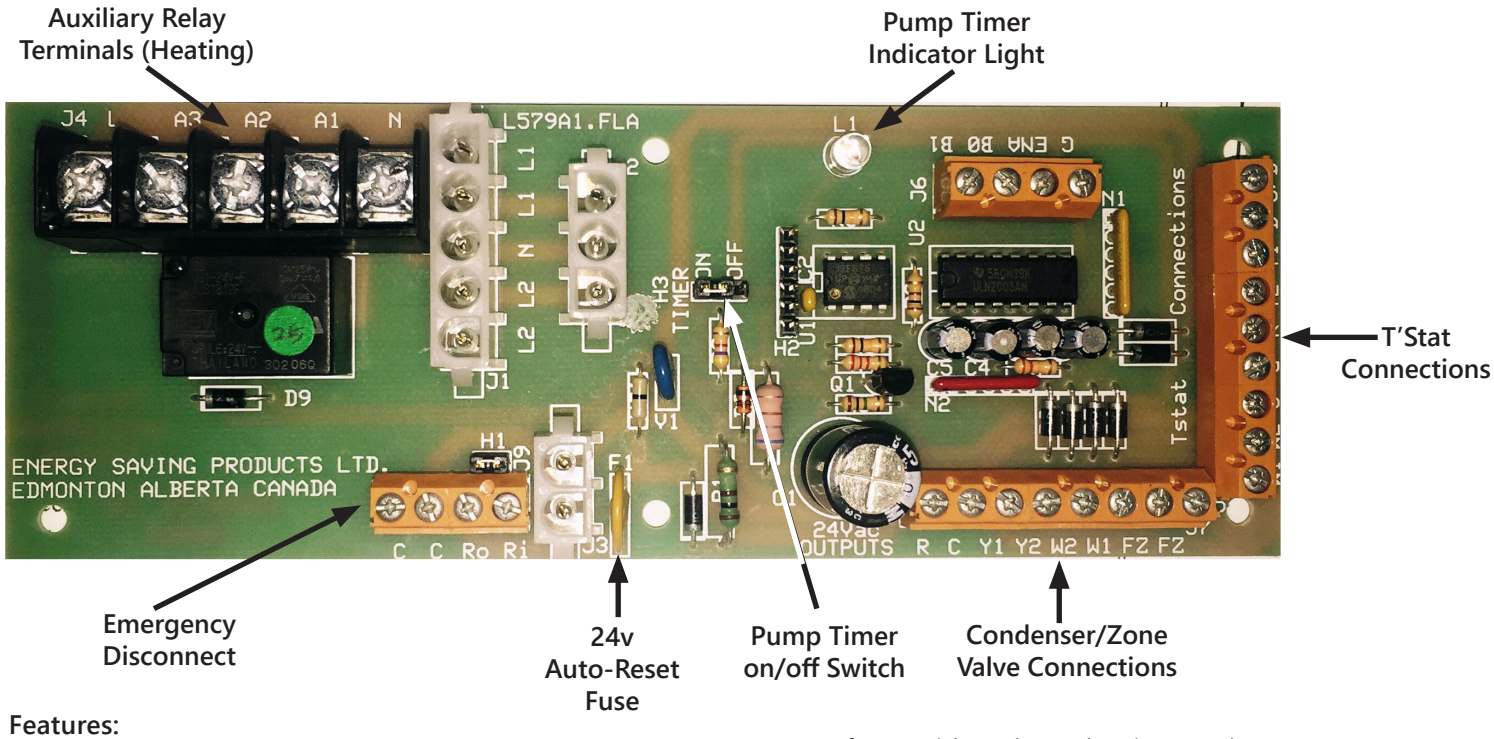
Ensure that all electrical connections are tight, and that any packing or shipping restraints are removed from both the air handler, and the outdoor unit. With the power to the condensing unit off, check the thermostat for normal operation and proper airflow from all vents. Do not run the air handler without a filter in place.

Observe the system pressures during the initial start-up and charging of the system. Refer to the outdoor or indoor coil manufacturer's charging guidelines. Check the voltage and amp draw of both the air handler, and the outdoor unit. The voltages must be within 10% of the rating plate data. If more than 10% is noted, contact your local electrical company. Check that the amp draws of both units are within the information printed on the unit rating plates.

In the event of difficulty during the start-up procedure, please refer to the trouble shooting flow charts (Pgs. 17-24) to assist you in determining the problem.

Hi-Velocity Systems HEB Circuit Board

The Hi-Velocity LV-B Series Air Handler utilizes our HEB Circuit Board. This circuit board manages thermostat calls and makes wiring in components (i.e. Boilers & Condensers) simple and easy.



Features:

- Wiring the circuit board is a quick and simple task.
- Clearly labeled connections.
- No additional relays typically required.
- Circuit Board manages thermostat calls and puts out appropriate control signals to the WEG VFD to initiate fan speed.
- Circuit board is capable of controlling boilers, dual purpose hot water heaters, heat pumps, and geothermal systems, as well as our manufactured slide-in electric strip heaters (ESH).
- The circuit board is also designed to send control signals to cooling sources such as condensing units, chillers, heat pumps and geothermal systems.
- Circuit board features an auxiliary relay with dry contact connections, so that any applications requiring 24v, 120v, 230v or dry contacts (boilers, hot water heaters, heat pumps & humidifiers) can be automatically started when there is a call for heat.
- Circulator timer chip is provided to prevent water stagnation in potable water systems and to provide pump rotor protection for water source heating and cooling.

- If you wish to have the timer cycle operate at a specific time of day, simply turn off power to the air handler unit for ten seconds at that time, and then turn the power back on.
- If you do not need to use the timer, move the jumper header from the On pins to the Off pins and it will be disabled.
- Circuit board is equipped with an emergency disconnect feature. If there's an emergency this feature will de-energize all fan speeds and 24 volt signals.
- For this emergency disconnect feature to be active, a jumper header must be removed from the pins located close to the emergency disconnect terminal strip. (H1)

Function:

- Manages input power and through the use of a transformer it supplies 24vac to additional equipment.
- Organizes all thermostat inputs and prioritizes them accordingly.
- Sends a control output signal to the VFD, dependent on thermostat call.

G=Ground F=Fan H=Heat C=Cool H&C=DH

Module LVB
LV-B Series Air Handler Installation (10/28)

www.hi-velocity.com

LV-B Air Handler - HEB Circuit Board/CFW300 WEG Wiring Diagram

PLEASE NOTE: CFW10 has slightly different appearance, terminals and wiring are the same.

CFW300 HE-B / LV-B / VFD POWER INPUT: 110-127/1/50-60

NOTE: CFW10 HAS SLIGHTLY DIFFERENT APPEARANCE - TERMINALS AND WIRING ARE THE SAME

THERMOSTAT CONNECTIONS
- **R** - 24 VAC OUTPUT
- **W1** - FIRST STAGE HEAT
- **W2** - SECOND STAGE HEAT (OR SINGLE STAGE)
- **Y1** - FIRST STAGE COOLING
- **Y2** - SECOND STAGE COOLING (OR SINGLE STAGE)
- **C** - 24 VAC COMMON
- **G** - THERMOSTAT FAN SWITCH
- **D** - DEHUMIDIFICATION SPEED
- **O/B** - HEATPUMP REVERSING

EMERGENCY DISCONNECT
- **C** - 24 VAC COMMON
- **C** - 24 VAC COMMON
- **Ro** - 24 VAC OUTPUT
- **Ri** - 24 VAC INPUT

AUXILIARY HEATING RELAY
- **N** - NEUTRAL
- **L** - LINE VOLTAGE
- **A1** - AUXILIARY NORMALLY OPEN
- **A2** - AUXILIARY NORMALLY CLOSED
- **A3** - AUXILIARY COMMON

24 VAC OUTPUT CONNECTIONS
- **FZ** - FREEZE STAT (FOR Y2)
- **FZ** - FREEZE STAT (FOR Y2)
- **W1** - HEATING (W1) 24 VAC OUTPUT
- **W2** - HEATING (W2) 24 VAC OUTPUT
- **Y2** - CONDENSING UNIT 24 VAC OUTPUT
- **Y1** - CONDENSING UNIT 24 VAC OUTPUT
- **C** - 24 VAC COMMON
- **R** - 24 VAC OUTPUT

JUMPER PIN SETTINGS

H1 EMERGENCY DISCONNECT: REMOVE PIN IF WIRED TO EMERGENCY DISCONNECT.

H3 TIMER: AUXILIARY RELAY TIMER (SEE NOTES).

LED LIGHT INDICATORS

LED - GREEN LIGHT, PUMP TIMER

PUMP TIMER STATUS	
ON: (ACTIVE)	☀ ▬ ☀ ▬
ON: (INACTIVE)	▬ ☀ ▬
OFF:	▬▬
2 SECONDS	

FAN SPEED ADJUSTMENT (COOLING, HEATING OR RECIRCULATION FAN)
- POWER FAN COIL UNIT.
- **ENSURE ALL OUTLETS ARE OPEN.**
- ENERGIZE THE THERMOSTAT SETTING TO BE ADJUSTED. (COOLING, HEATING OR RECIRCULATION FAN).
- ON THE WEG - **"CFW300"** PRESS THE PARAMETER BUTTON (P) UNTIL THE PARAMETER LIGHT (RED) IS ILLUMINATED.
- USING THE ARROW BUTTONS SCROLL DOWN TO PARAMETER **"000".**
- PRESS THE PARAMETER BUTTON (P) AGAIN TO ENTER THE PARAMETER **"000".**
- CHANGE **P 000** TO A VALUE OF **"005".** THIS UNLOCKS THE DRIVE AND ALLOWS YOU TO CHANGE OTHER PARAMETERS.
- ONCE PARAMETER **"000"** IS SET TO A VALUE OF **"005"** THE DRIVE IS UNLOCKED THE FAN SPEEDS CAN BE ADJUSTED VIA PARAMETERS **128, 129, 130 AND 131**.

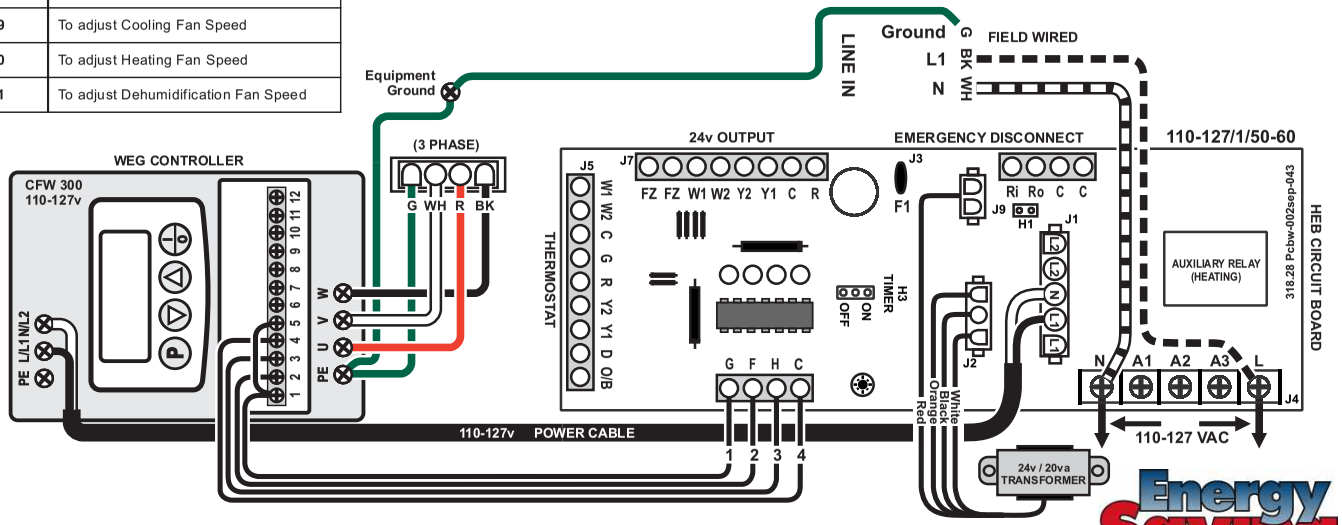
► **00.0 HZ** IS THE MINIMUM SPEED - **66.0HZ** IS THE MAXIMUM SPEED.

Useful Parameters

P 000	**To unlock drive change value to "005"**
P 002	To display Hz output
P 030 (CFW10= P 008)	Drive Heatsink Temperature
P 128	To adjust Constant Fan Speed
P 129	To adjust Cooling Fan Speed
P 130	To adjust Heating Fan Speed
P 131	To adjust Dehumidification Fan Speed

CAUTION
FOR SINGLE STAGE COOLING OPERATION USE Y2 OTHERWISE THE FREEZESTAT WILL BE BYPASSED

NOTES:
1) USE THERMOSTAT FAN SWITCH TO DISABLE/ENABLE CONTINUOUS FAN.
2) 'C' TERMINAL ON THERMOSTAT (COMMON) IS NOT NEEDED FOR SOME THERMOSTATS CONSULT THERMOSTAT INSTRUCTIONS FOR DETAILS.
3) W1 AND W2 ACTIVATES AUXILIARY RELAY (A3) ON CALL AND CAN BE USED WITH A1 AND/OR A2 AS DRY CONTACTS, ARMED 24VAC FROM THE 'R' TERMINAL, OR ARMED 110v FROM THE 'L' TERMINAL.
4) AUXILIARY HEATING RELAY TIMER ACTIVATES CIRCUIT FOR 5 MINUTES EVERY 24 HOURS STARTING WHEN POWER IS APPLIED TO THE UNIT.
5) SEE INSTALLATION MANUAL FOR MORE DETAILED WIRING DIAGRAMS.
6) **FOR SINGLE STAGE COOLING OPERATION USE Y2, OTHERWISE THE FREEZE STAT WILL BE BYPASSED.**
7) FAILURE TO SET PROPER AIR FLOW AND/OR OPERATION OF THE SYSTEM MAY RESULT IN DAMAGE TO EQUIPMENT.
8) FAILURE TO READ AND FOLLOW ALL INSTRUCTIONS CAREFULLY BEFORE INSTALLATION COULD CAUSE PERSONAL INJURY AND/OR PROPERTY DAMAGE.
9) ENSURE THAT THE FILTER IS KEPT CLEAN AT ALL TIMES.
10) MOTOR HAS PERMANENT LUBE BEARINGS AND DOES NOT REQUIRE OILING.
11) WARRANTY VOID IF FAN COIL UNIT IS USED DURING CONSTRUCTION.



REFER TO COMPLETE COMMISSIONING REPORT PRIOR TO NORMAL OPERATION. REPORT IS AVAILABLE WITH THE INSTALLATION MANUAL OR ONLINE AT **WWW.HI-VELOCITY.COM.**

HE-B/LV-B 110V
102020

LV-B Air Handler - HEB Circuit Board Wiring

24 VAC Input terminals (tstat connections):

W1:	1st stage Heating, Runs at the heating speed when 24v (R) is supplied.
W2:	2nd stage Heating, Runs at the heating speed when 24v (R) is supplied. The difference between a W1 call and a W2 call is the output terminal that will be energized with 24v. (W1 energized on t-stat terminal strip will provide 24v to W1 on output terminal strip, W2 energized on t-stat terminal strip will provide 24v to W2 on output terminal strip,)
C:	Common
G:	Constant Fan, Runs at the Constant Fan speed when 24v (R) is supplied.
R:	24 volt supply (Note: As long as Transformer is connected & the Fire Disconnect/Jumper Pin Header is Present)
Y2:	2nd stage Cooling, Runs at the Cooling speed when 24v (R) is supplied.
Y1:	1st stage Cooling, Runs at the Cooling speed when 24v (R) is supplied. The difference between a Y1 call and a Y2 call is the output terminal that will be energized with 24v. (Y1 energized on t-stat terminal strip will provide 24v to Y1 on output terminal strip, Y2 energized on t-stat terminal strip will provide 24v to Y2 on output terminal strip,)
D:	Runs at Dehumidification speed when 24v (R) is supplied.
O/B:	Heat Pump Reversing

Fan Speed Priority Sequence (from highest to lowest): D = 1st Y = 2nd W = 3rd G=4th

24 VAC Output terminals (24v output connections):

R:	24 volt Supply (Note: As long as Transformer is connected & the Fire Disconnect/Jumper Pin Header is Present)
C:	Common
Y1:	1st Stage Cooling Equipment
Y2:	2nd Stage Cooling Equipment*
W2:	24v Output to 2nd Stage Heating Equipment.
W1:	24v Output to 1st Stage Heating Equipment.
FZ:	Freeze Stat Connection*
FZ:	Freeze Stat Connection*

***Note: FZ to FZ** recommended to be wired to Freeze Stat (Anti-Ice Control). For chilled water applications, a jumper between FZ to FZ must be installed to complete the Y2 - 24V Signal to Y on Condenser.

LV-B Air Handler - HEB Circuit Board Wiring Cont'd

Emergency Disconnect:

C:	Common
C:	Common
Ro:	Provides 24VAC to the entire HEB board. In order for "Ro" to receive power it must be connected to terminal "Ri". This can be done via the two pin jumper header (H1) located above the terminal strip, a wire jumper or normally closed safety device installed between "Ro" and "Ri". **The jumper pin header (H1) will need to be removed to activate the emergency disconnect option.**
Ri:	Receives 24VAC direct from the transformer. Power must then be sent to the "Ro" terminal to be distributed throughout the rest of the HEB board.

3 Pin Jumper Terminals:

H1:	Emergency Disconnect
H3 Timer:	Pump timer cycles the pump on for 5 minutes every 24 hours to prevent stagnant water. (on/off) The jumper pin header (H3) will need to be in the ON position for the timer to be active.

Auxiliary Heating Relay:

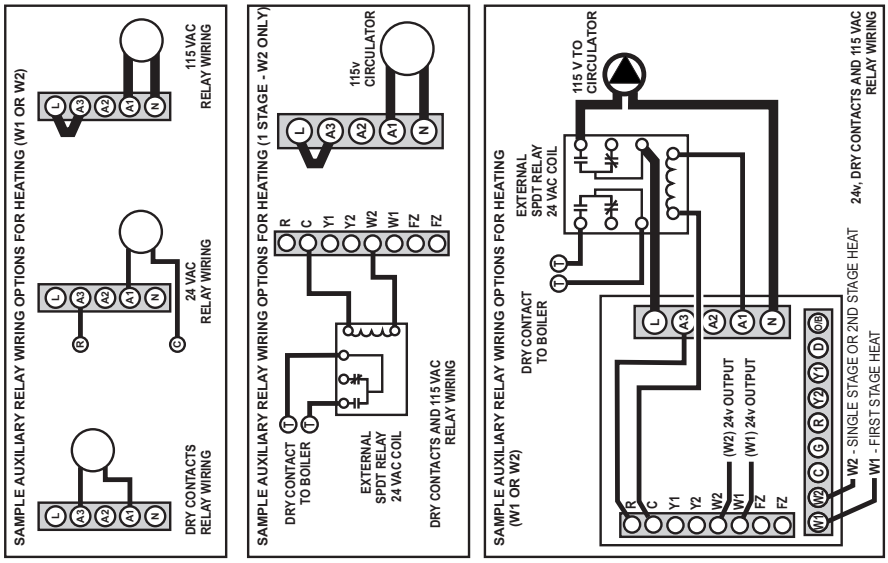
N:	Neutral
L:	Line Voltage
A1:	Auxiliary Relay Normally Open
A2:	Auxiliary Relay Normally Closed
A3:	Auxiliary Relay Common

Control Signal:

J6:	4 Terminal Control Signal sending appropriate call to WEG VFD

LV-B Air Handler - Extended Wiring Diagrams

Extended wiring diagrams for the various applications the Hi-Velocity LV-B model can be used for. If you do not find the wiring configuration you require, please call the technical department at Energy Saving Products Ltd. for further assistance.



FOR SINGLE STAGE OPERATION USE W2 & Y2 TERMINALS

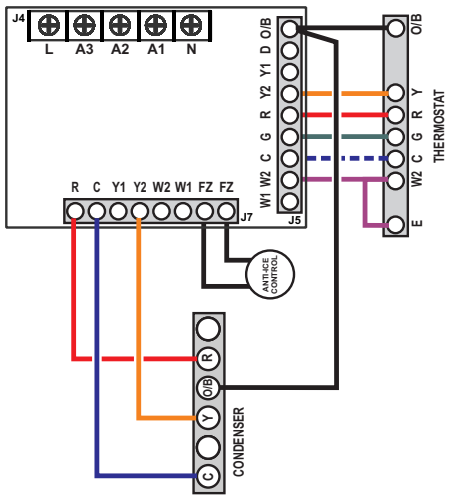
R - 24 VAC OUTPUT
W1 - FIRST STAGE HEAT
W2 - SECOND STAGE HEAT (OR SINGLE STAGE)
Y1 - FIRST STAGE COOLING
Y2 - SECOND STAGE COOLING (OR SINGLE STAGE)
C - 24 VAC COMMON
G - THERMOSTAT FAN SWITCH
D - PRIORITY (RUNS AT W SPEED)
O/B - HEATPUMP REVERSING VALVE

N - NEUTRAL
L - LINE VOLTAGE
A1 - AUXILIARY NORMALLY OPEN
A2 - AUXILIARY NORMALLY CLOSED
A3 - AUXILIARY COMMON

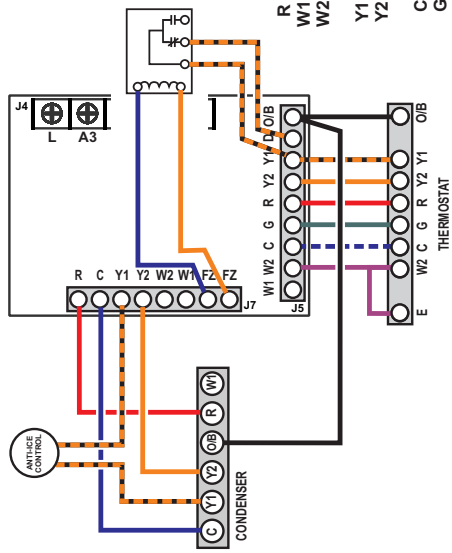
FZ - FREEZE STAT
FZ - FREEZE STAT
W1 - HEATING (W1) 24V OUTPUT
W2 - HEATING (W2) 24V OUTPUT
Y1 - CONDENSING UNIT (Y2) 24V OUTPUT
Y1 - CONDENSING UNIT (Y1) 24V OUTPUT
C - 24 VAC COMMON
R - 24 VAC OUTPUT

HE-B-Extended-Wiring-Pg-1-082615

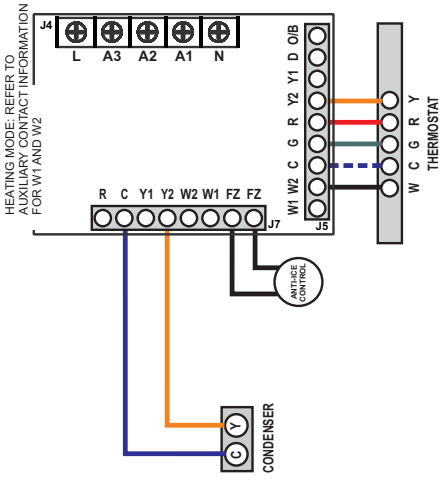
1 Stage Cooling 2 Stage Heating Heatpump



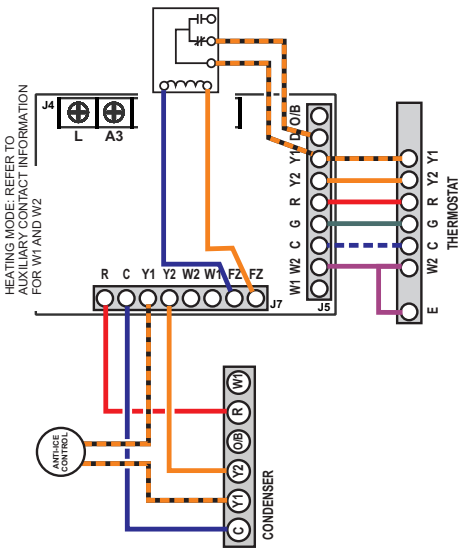
2 Stage Cooling 3 Stage Heating Heatpump



1 Stage Cooling 1 Stage Heating

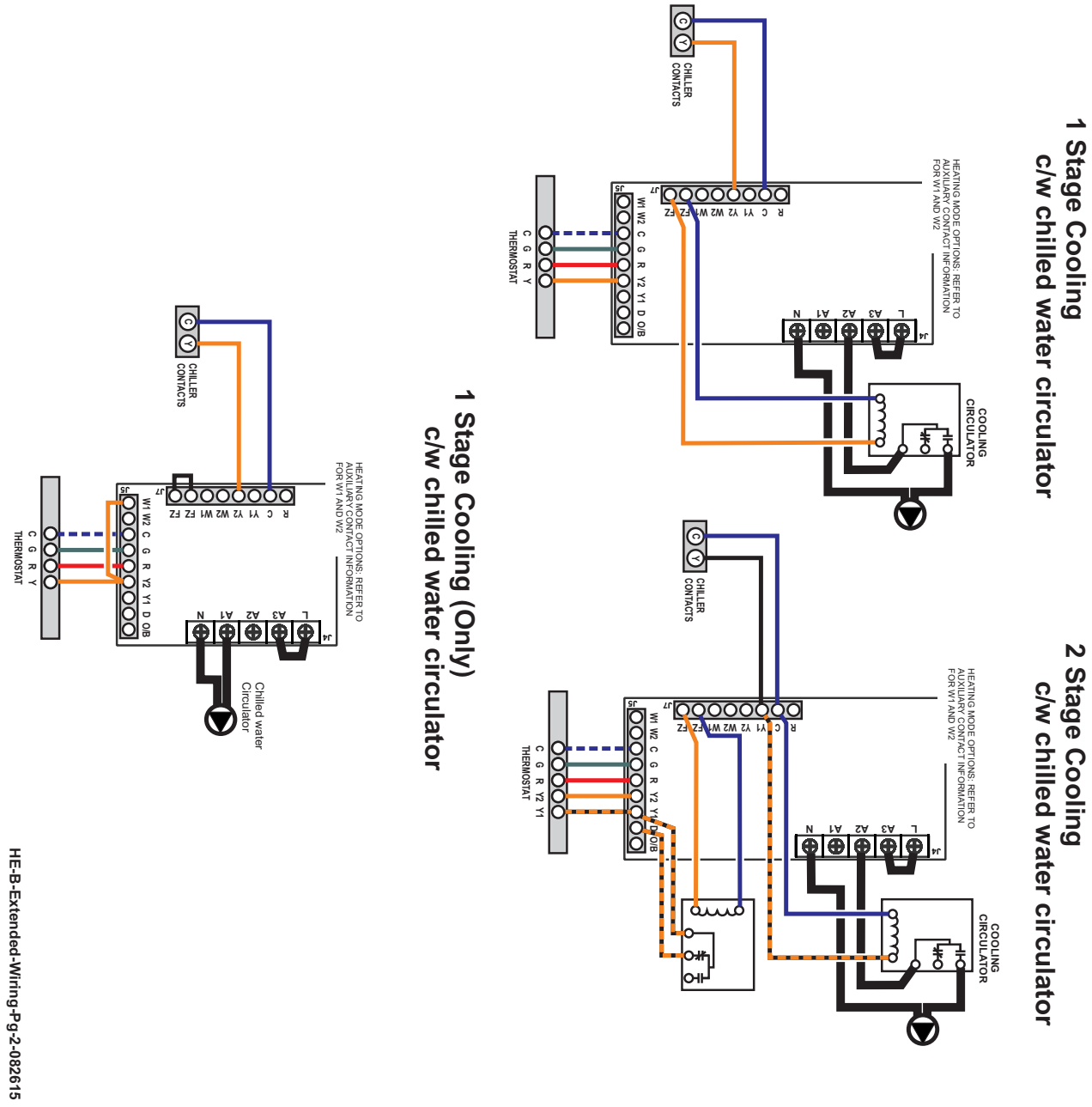


2 Stage Cooling 1 Stage Heating



LV-B Air Handler - Extended Wiring Diagrams

Extended wiring diagrams for the various applications the Hi-Velocity LV-B model can be used for. If you do not find the wiring configuration you require, please call the technical department at Energy Saving Products Ltd. for further assistance.

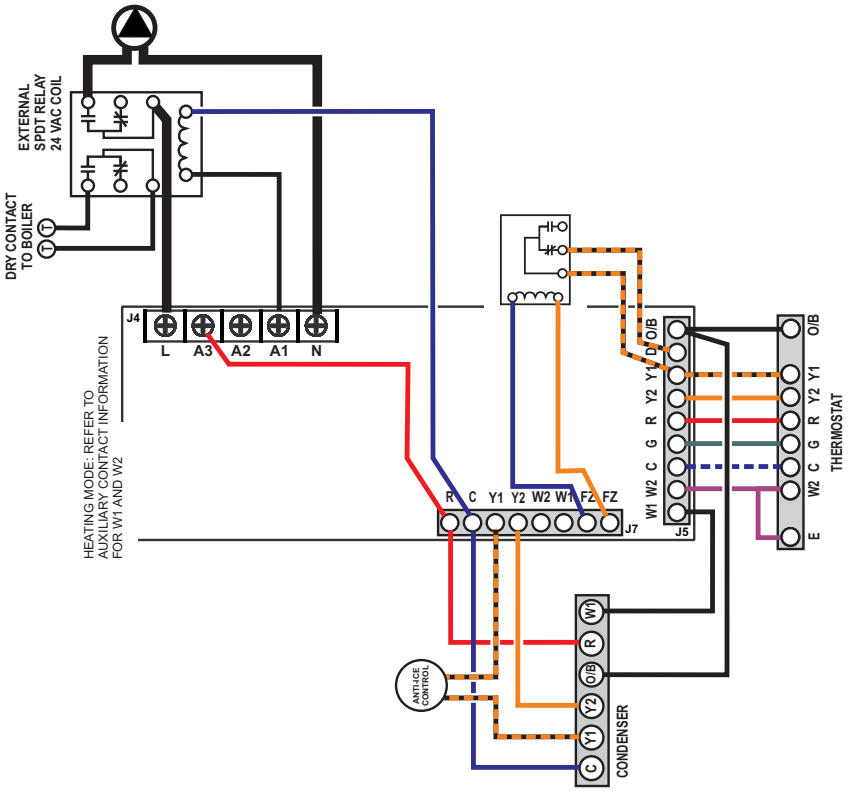


LV-B Air Handler - Extended Wiring Diagrams

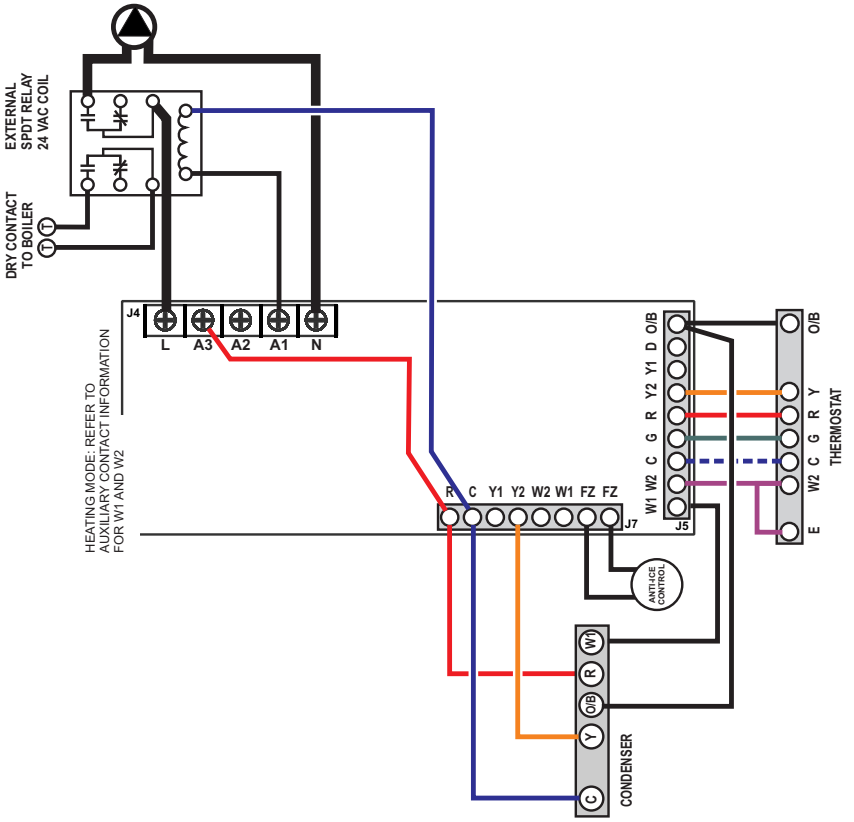
Extended wiring diagrams for the various applications the Hi-Velocity LV-B model can be used for. If you do not find the wiring configuration you require, please call the technical department at Energy Saving Products Ltd. for further assistance.

HEAT PUMP C/W CONDENSER DEFROST CYCLE - BOILER BACK-UP

2 Stage Cooling 3 Stage Heating
Heat pump c/w condenser defrost cycle



1 Stage Cooling 2 Stage Heating
Heat pump c/w condenser defrost cycle

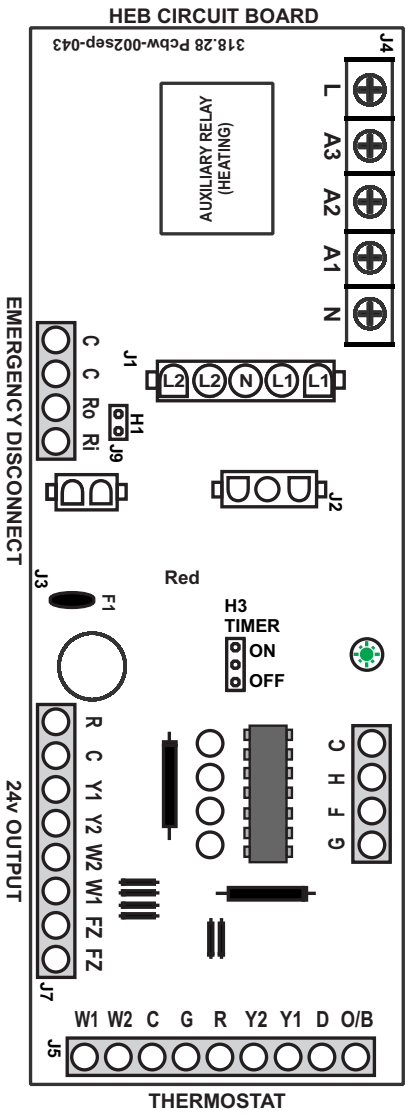


HE-B-Extended-Wiring-Pg-3-082615

Quick Reference Guide

Quick System Setting Reference

	Hertz Output	Outlet Velocity	Static Pressure
Cooling Mode:	55-66 Hz	1250-1400 FPM	0.8-1.2"wc
Heating Mode:	45-66 Hz	1100-1400 FPM	0.6-1.2"wc
Constant Fan:	25-35 Hz	500-900 FPM	0.2-0.5"wc



Note:
- Hertz will be displayed on the Variable Frequency Drive digital display.
- Outlet velocity is based on ideal noise levels.
- Static Pressure reading must be taken perpendicular to airflow, minimum of 18" away from supply air collar of air handler.
- Quick references should only be used to roughly set air handler, not to be used as primary air handler set up method.

Jumper Pin Settings

H1 Emergency Disconnect:	(Remove pin to activate)
H3 Timer:	Activates auxiliary relay for 5 min every 24 hours.

CFW300 WEG - Useful Parameters

P000	**To unlock drive change to 5**
P002	**To display Hz output**
P030 (CFW10 - P008)	**Drive Heatsink Temperature**
P128	**To adjust constant fan speed**
P129	**To adjust cooling fan speed**
P130	**To adjust heating fan speed**
P131	**To adjust dehumidification fan speed**

LED Description

LED 1 (Green Light) - Pump timer

See page 18 of the LV-B Installation Manual for fan speed adjustment instructions

Pump Timer Status:	
On: (Active)	
On: (Inactive)	
Off:	

2 SECONDS

= Light On
= Light Off

System Commissioning & Set-up

Determining Preliminary System Information

To set the air handler, the required airflow capacity must be determined for each operating mode. The required CFM/Ton is 250, 200, and 125 for Cooling, Heating and Recirculation Fan respectively. Divide the total CFM required for each fan speed by the total number of outlets. Keep in mind that each HE outlet represents two 2" outlets, and 2" outlets represent one. This will provide the average CFM per outlet. After all airflow capacities have been determined, convert the Airflow per outlet to Velocity per Outlet. This will make setting the air handler easier. Do this by dividing CFM per outlet by 0.022. This will provide FPM per 2" outlet. Divide CFM per outlet by 0.021 to provide FPM per HE outlet. Determining velocities per outlet for HE and 2" is important. The ideal outlet velocity that is calculated on page 2 & 3 of the commissioning report will be used when setting the airflow of the system. After the average outlet has been determined, the calculated ideal velocity per outlet will be what the average outlet should be set at.

Fan Speed Adjustment

- Power Air Handler Unit
- Ensure all outlets are open
- Energize the thermostat setting to be adjusted. (Cooling, Heating or Recirculation Fan)
- On the WEG drive press the Parameter button (P) until the parameter light (red) is illuminated
- Using the arrow buttons scroll down to Parameter "000"
- Press the Parameter button (P) again to enter the Parameter "000"
- Change P000 to a value of "005". This unlocks the drive and allows you to change other parameters
- Once parameter "000" is set to a value of "005" the drive is unlocked and the fan speeds can be adjusted via Parameters 128, 129, 130 and 131.

► 00.0 HZ is the minimum speed - 66.0HZ is the maximum speed

► Parameter 128 (P128) is to set the constant fan speed (G)

► Parameter 129 (P129) is to set the cooling speed (Y1 & Y2)

► Parameter 130 (P130) is to set the heating speed (W1 & W2)

► Parameter 131 (P131) is to set the Dehumidification speed (D)

- Fan speeds have been set in the factory for nominal CFM output. To ensure that supply airflow is sufficient for the specific application the speeds may need to be fine-tuned and confirmed via an airflow test. See the section "Finding Average Outlet & Fine Tuning the Fan Speeds" on pg. 30 of the HE-B Installation manual for details on the factory recommended method of setting airflow.

Finding Average Outlet & Fine Tuning the Fan Speeds

With the preliminary adjustment set, fine tuning the fan speeds may commence. With the power on, all zone dampers opened, and the cooling speed energized, allow the fan 45 seconds to fully ramp up. Once the fan is fully ramped up, record velocity readings from all of the outlets (FPM or Knots). These outlet locations and velocity readings can be recorded on page 4 of the commissioning report. Ensure HE outlet velocities are recorded in section A (HE) of the chart and 2" outlet velocity are recorded in section B (2") of the chart. When all outlet velocity reading have been recorded, pick a section (A or B) with the most outlets. Total all velocities in that section, and divide that number by the number of outlets in the section selected. This provides a true average velocity of that selected section. Now that the average velocity of one section (HE or 2") has been determined, select one outlet in that section to make your average outlet. Now that we know what type of outlet our average is (HE or 2"), we can go back to the "Determining Preliminary System Information" section on pages 2 & 3 of the commissioning report and select the FPM per outlet that is specific to the type of average outlet we have.

Use the average outlet to fine tune the system by matching the average outlet's velocity (FPM per outlet) to the velocity per outlet that was determined for each fan speed.

For full and proper tuning of the fan speeds, repeat the above process for heating and recirculation fan. The same average outlet that was determined in cooling mode can be used again for tuning the other modes.

When tuning is complete, change WEG parameter back to P002, this displays hertz output to the motor.

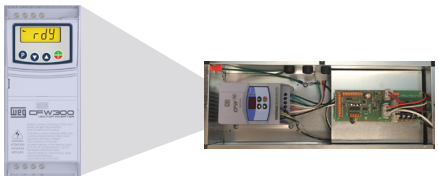
Important Notes:

• Initial adjustment of the fan speed for cooling, heating and recirculation fan must be done with all dampers in the open position, to verify maximum load capacities.

• To find outlet CFM:
Multiply Knots by 2.2 for 2", and by 4.2 for HE
Multiply FPM by 0.022 for 2" and by 0.042 for HE

CFW300 WEG Variable Frequency Drive

PLEASE NOTE: CFW10 has slightly different appearance, terminals and wiring are the same.



The Hi-Velocity LV-B Series Air Handler utilizes a WEG Variable Frequency Drive to run its 3-phase motor. The WEG VFD is a reliable and robust motor control that will provide many years of issue free operation.

Features:

- Purposely oversized to ensure increased reliability and higher efficiencies at peak load
- Features inherent with VFD allows for minimum power consumption at reduced loads (<100w average for constant fan speed)
- Error code read out allows for easy drive analysis in the event of a VFD fault
- Programmable drive parameters allow for acceleration and deceleration speed to be adjusted if necessary
- Digital display makes motor speed references simple
- Cooling fan in VFD Drive allows for excellent heat dissipation in high ambient environments

Function:

- Takes single phase input (110v or 200-240v) and converts it to 3 phase output for the fan motor
- Fan speed is determined by the PSB circuit board which provides a 0-10vdc output to control the VFD

CFW300 WEG Drive Read-Only Parameters (Brackets = CFW10)

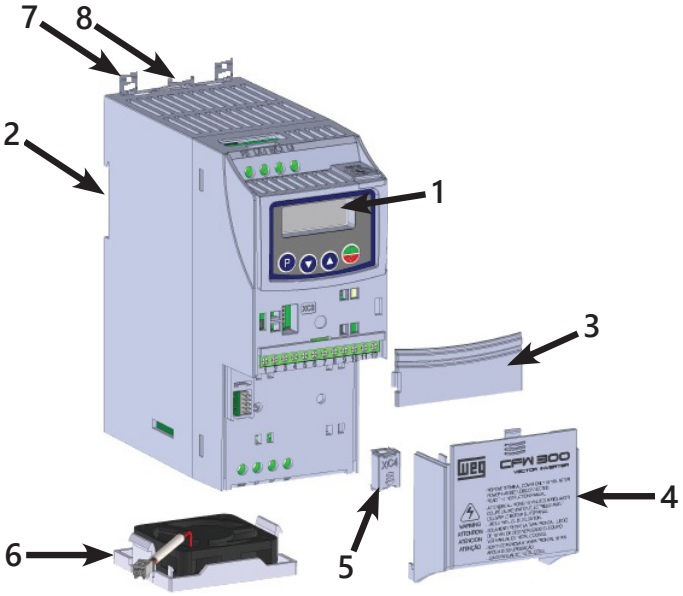
Parameter	Function	Range	Unit	Description
P002	Motor Speed Output	0 to 66	Hz	Indicates the VFD Output Frequency in Hertz
P003	Motor Current Output	0 to 1.5 x I_{nom}	A	Indicates the VFD Output Current in Amperes
P004	DC Link Voltage	0 to 524	V	Indicates the VFD DC Link Voltage in Volts
P007	Motor Voltage Output	0 to 240	V	Indicates the VFD Output Voltage in Volts
P030 (P008)	Module Temperature	25 to 110	ºC	Indicates the VFD Temp in Celsius
P050 (P014)	Last Fault	00 to 41	FXXX (EXX)	Indicates the Code of the last occurred Fault (Error)
P060 (P015)	Second Fault Occurred	00 to 41	FXXX (EXX)	Indicates the Code of the 2nd last occurred Fault (Error)
P070 (P016)	Third Fault Occurred	00 to 41	FXXX (EXX)	Indicates the Code of the 3rd last occurred Fault (Error)

WEG Drive Alarm/Fault Messages

When an alarm is detected, the drive continues to operate and an alarm code is displayed in the form AXXX to warn the user of critical operation conditions. When a fault is detected, the inverter is disabled and the fault code is displayed in the form FXXX (CFW10 = EXX).

See Diagnostics & Troubleshooting (page 19) for detailed descriptions of all alarm/fault messages.

CFW300 WEG Drive Breakdown



1 - HMI
2 - Mounting supports (for DIN rail mounting)
3 - Communication accessory cover
4 - Cover of the IO expansion accessory
5 - Protection cover of the connection of the IO expansion accessory
6 - Fan with mounting support
7 - Mounting feet (if DIN rail mounting isn't possible)
8 - DIN rail release button - to release drive from the DIN rail, depress the release button and pull

Diagnostics and Troubleshooting

CFW300 WEG Alarms/Faults and Possible Causes (Brackets = CFW10)

This section assists the user to identify and correct possible alarms/faults that can occur during the WEG operation. When an alarm is detected, the drive continues to operate and an alarm code is displayed in the form AXXX to warn the user of critical operation conditions. When a fault is detected, the inverter is disabled and the fault code is displayed in the form FXXX (CFW10 = EXX). To restart the inverter after an alarm/fault has occurred, the drive must be reset.

To reset WEG drive: Disconnect and reapply the AC power (power-on reset)

ALARM CODE	DESCRIPTION	POSSIBLE CAUSES
A046 **Motor Overload**	Motor overload alarm	▶ Settings of P156 is too low for the used motor ▶ Overload on the motor shaft
A050 **Power Module Overtemperature**	Overtemperature alarm from the power module temperature sensor [NTC]	▶ High temperature at IGBTs: P030 > 90 °C [> 194 °F] ▶ High ambient temperature around the inverter > 50 °C [> 122 °F] and high output current ▶ Blocked or defective fan ▶ Heatsink is too dirty, preventing the air flow
A090 **External Alarm**	External alarm via DIx [option "no external alarm" in P263 to P270]	▶ Wiring on DI1 to DI8 inputs are open or have poor contact
A700 **Remote HMI Communication**	No communication with remote HMI, but there is frequency command or reference for this source	▶ Check if the communication interface with the HMI is properly configured in parameter P312 ▶ HMI cable disconnected

FAULT CODE	DESCRIPTION	POSSIBLE CAUSES
F021 (E02) **Undervoltage on the DC Link**	Undervoltage fault on the intermediate circuit	▶ Wrong voltage supply; check if the data on the inverter label comply with the power supply and parameter P296 ▶ Supply voltage too low, producing voltage on the DC link below the minimum value - P004 Ud < 250 Vdc in 110 / 127 Vac - P296 = 1, or Ud < 200 Vdc in 200 / 240 Vac - P296 = 2 ▶ Phase fault in the input ▶ Fault in the pre-charge circuit
F022 (E01) **Overvoltage on the DC Link**	Overvoltage fault on the intermediate circuit	▶ Wrong voltage supply; check if the data on the inverter label comply with the power supply and parameter P296 ▶ Supply voltage is too high, producing voltage on the DC link above the maximum value - P004 Ud > 460 Vdc in 110 / 127 Vac - P296 = 1, or Ud > 410 Vdc in 200 / 240 Vac - P296 = 2 ▶ Load inertia is too high or deceleration ramp is too fast ▶ P151 setting is too high
F031 **Fault in Communication with IOs Expansion Accessory**	Main control cannot establish the communication link with the IOs expansion accessory	▶ Accessory damaged ▶ Poor connection of the accessory ▶ Problem in the identification of the accessory; refer to P027
F032 **Fault in Communication with IOs Communication Accessory**	Main control cannot establish the communication link with the communication acccessory	▶ Accessory damaged ▶ Poor connection of the accessory ▶ Problem in the identification of the accessory; refer to P028
F051 (E04) **IGBTs Overtemperatures**	Overtemperature fault measured on the temperature sensor of the power pack	▶ High temperature at IGBTs: P030 (P008) > 100 °C [> 212 °F] ▶ High ambient temperature around the inverter >50 °C [>122 °F] and high output current ▶ Blocked or defective fan ▶ Heatsink is too dirty, preventing the air flow
F070 (E00) **Overcurrent/Short-circuit**	Overcurrent or short-circuit on the output, DC link or braking resistor	▶ Short-circuit between two motor phases ▶ IGBTs module in short-circuit or damaged ▶ Start with too short acceleration ramp ▶ Start with motor spinning without the Flying Start function
F072 (E05) **Motor Overload**	Motor overload fault [60 s in 1.5 x I_{nom}]	▶ P156 setting is too low in relation to the motor operating current ▶ Overload on the motor shaft
F080 (E08) **CPU Fault (Watchdog)**	Fault related to the supervision algorithm of the inverter main CPU	▶ Electric noise ▶ Inverter firmware fault
F081 **End of User's Memory**	Fault of end of memory to save user's parameter table	▶ Attempt to save [P204 = 9] more than 32 parameters [with values different from the factory default] on the User parameter table
F082 **Fault in the Copy Function (MMF)**	Fault in the copy of parameters	▶ Attempt to copy the parameters from the flash memory module to the inverter with different software versions
F084 **Auto-diagnosis Fault**	Fault related to the automatic identification algorithm of the inverter hardware	▶ Poor contact in the connection between the main control and the power pack ▶ Hardware not compatible with the firmware version ▶ Defect on the internal circuits of the inverter
F091 (E06) **External Fault**	External fault via DIx ["no external fault" in P263 to P270]	▶ Wiring on DI1 to DI8 inputs are open or have poor contact
F701 **Remote HMI Communication Fault**	No communication with the remote HMI; however, there is command orfrequency reference for this source	▶ Check that the HMI communication interface is properly configured in parameter P312 ▶ HMI cable disconnected
(E09) **Program Memory Error (Checksum)**	Contact Energy Saving Products 1-888-652-2219	▶ Memory with corrupted values.
(E24) **Programming error**	It is automatically reset when the incompatible parameters are changed	▶ Incompatible parameters were programmed.
(E31) **Keypad (HMI) Connection Fault**	Contact Energy Saving Products 1-888-652-2219	▶ Inverter control circuit is defective. ▶ Electrical noise in the installation (electromagnetic interference).
(E41) **Self-Diagnosis Fault**	Contact Energy Saving Products 1-888-652-2219	▶ Inverter power circuit is defective.

Troubleshooting - Motor Running Too Fast

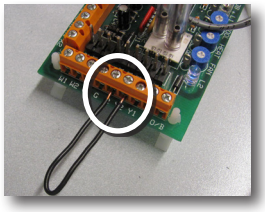


Fig. 001

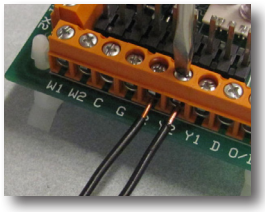


Fig. 002

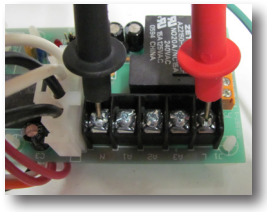


Fig. 003

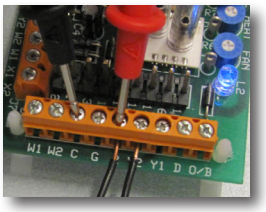


Fig. 004

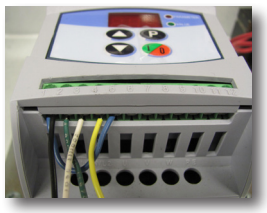


Fig. 005

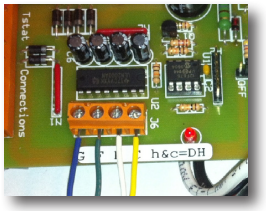


Fig. 006

Start

1. **Jumper desired Tstat setting** with R on the HEB Circuit Board *(Figs. 001-002)*
2. **Power** Air Handler
3. Verify that **Main Supply Voltage** is present on the HEB Circuit Board between the **L and N terminals** *(Fig. 003)*
4. **Supply Power** present?
   - N → Inspect **Supply Voltage**
     - Return to ***Step 4***
     - Replace **Transformer**
     - Turn off **Supply Power,** connect **Transformer**, turn on **Power** - Return to ***Step 5***
     - **Call Technical Support Toll Free 1-888-652-2219**
   - Y
5. Verify that **24VAC** is present between **R & C** on the HEB circuit board *(Fig. 004)*
   - N → Ensure **Transformer** is connected properly
     - Y → Replace **Transformer**
     - N → Turn off **Supply Power,** connect **Transformer**, turn on **Power** - Return to ***Step 5***
   - Y
6. Verify that **24VAC** is present between **C & desired T-Stat** setting
   - N → Ensure that **Jumper** is installed correctly *(Fig. 002)*
     - Y → **Call Technical Support Toll Free 1-888-652-2219**
     - N → **Install Jumper** and return to ***Step 6***
   - Y
7. **Input Voltage** and **T'Stat function** on HEB is functioning correctly
8. Verify that **the control signal** section of HEB is functioning properly
9. Ensure the **G, F, H & C terminals on terminal strip "J6"** are connected to the correct corresponding terminals.
   - **G** goes to **terminal 1** of WEG
   - **F** goes to **terminal 2** of WEG
   - **H** goes to **terminal 3** of WEG
   - **C** goes to **terminal 4** of WEG
   - Jumper between **1 & 5** *(Fig. 005)*

   N → Correct the wiring to the **WEG Controller** and return to **Step 9**

   Y
10. Depending on what setting was jumpered in **Step 1**, confirm you have the right voltages at terminals **G, F, H** & **C**
11. **Heating (W & W2)**
    -0.7VDC between ground **(G) & F**
    -0.7VDC between ground **(G) & H**
    -12.3VDC between ground **(G) & C**
    Cooling (Y1 & Y2)
    -0.7VDC between ground **(G) & F**
    -0.7VDC between ground **(G) & C**
    -12.3VDC between ground **(G) & H**
    Fan (G)
    -0.7VDC between ground **(G) & F**
    -12.3VDC between ground **(G) & C**
    -12.3VDC between ground **(G) & H**
    Dehumidification (D)
    -0.7VDC between ground **(G) & F**
    -0.7VDC between ground **(G) & C**
    -0.7VDC between ground **(G) & H** *(Fig. 006)*

    N → **Call Technical Support Toll Free 1-888-652-2219**

    Y
12. Refer to **Pg. 30** of this manual to set hertz output for all fan speeds

Troubleshooting - Motor Running Too Slow/Not Running

Start

1 **Jumper desired Tstat setting** with **R** on the HEB Circuit Board *(Fig. 001)*

2 **Unplug Motor Leads** and test resistance (ohms) between windings *(Figs. 002 & 003)*

3 **Power** Air Handler

4 Verify that **Main Supply Voltage** is present on the HEB Circuit Board between the **L and N Terminals** *(Fig. 004)*

5 **Supply Power** Present?
- N → Inspect **Supply Voltage** - Return to ***Step 5***
- Y

6 Verify that **24VAC** is present between **R & C** on the HEB Circuit Board *(Fig. 005)*
- N → Ensure **Transformer** is connected properly
  - Y → Replace **Transformer**
  - N → Turn off **Supply Power**, connect transformer, turn on power - Return to ***Step 6***
- Y

7 Verify that **24VAC** is present between **C & desired T-Stat** setting
- N → Ensure that **Jumper** is installed correctly *(Fig. 001)*
  - Y → **Call Technical Support Toll Free 1-888-652-2219**
  - N → Install **Jumper** and return to ***Step 7***
- Y

8 **Input Voltage** and **T'Stat section** on HEB is functioning correctly

9 Verify that **the Control Signal** section of HEB is functioning properly

10 Ensure the **G, F, H & C terminals on terminal strip J6** are connected to the correct corresponding terminals.
- **G** goes to **terminal 1** of WEG
- **F** goes to **terminal 2** of WEG
- **H** goes to **terminal 3** of WEG
- **C** goes to **terminal 4** of WEG
- Jumper between **1 & 5**

(Fig. 006)
- N → Correct the wiring to the **WEG Controller** and return to **Step 9**
- Y

11 Depending on what setting was jumpered in **Step 1**, confirm you have the right voltages at terminals **G, F, H** & **C**

12 **Heating (W & W2)**
-0.7VDC between ground **(G) & F**
-0.7VDC between ground **(G) & H**
-12.3VDC between ground **(G) & C**
Cooling (Y1 & Y2)
-0.7VDC between ground **(G) & F**
-0.7VDC between ground **(G) & C**
-12.3VDC between ground **(G) & H**
Fan (G)
-0.7VDC between ground **(G) & F**
-12.3VDC between ground **(G) & C**
-12.3VDC between ground **(G) & H**
Dehumidification (D)
-0.7VDC between ground **(G) & F**
-0.7VDC between ground **(G) & C**
-0.7VDC. between ground **(G) & H**
(Fig. 007)
- N → **Call Technical Support Toll Free 1-888-652-2219**
- Y → Refer to **Pg. 30** of this manual to set hertz output for all fan speeds

Resistance should be **equal** between all **Windings**. Black to Red, Black to White and Red to White. **Resistance** should be: **6.5 - 10.5 ohms**
- If **Resistance** is outside of the acceptable range (6.5 - 10.5 ohms) or uneven across any winding legs, **call Technical Support Toll Free @ 1-888-652-2219** - If **Resistance** is acceptable, re-connect **Motor Leads** and continue to ***Step 3***

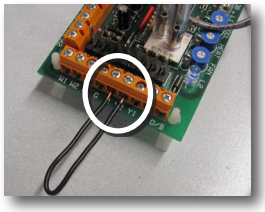


Fig. 001

Fig. 002

Fig. 003

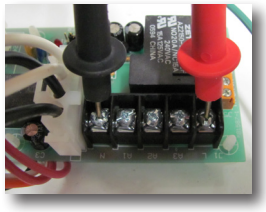


Fig. 004

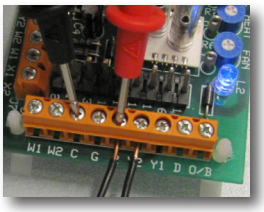


Fig. 005

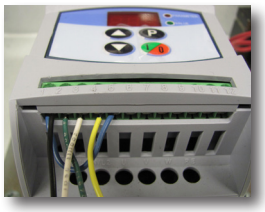


Fig. 006

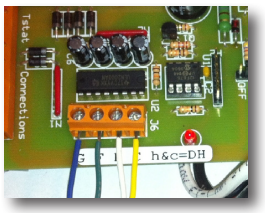
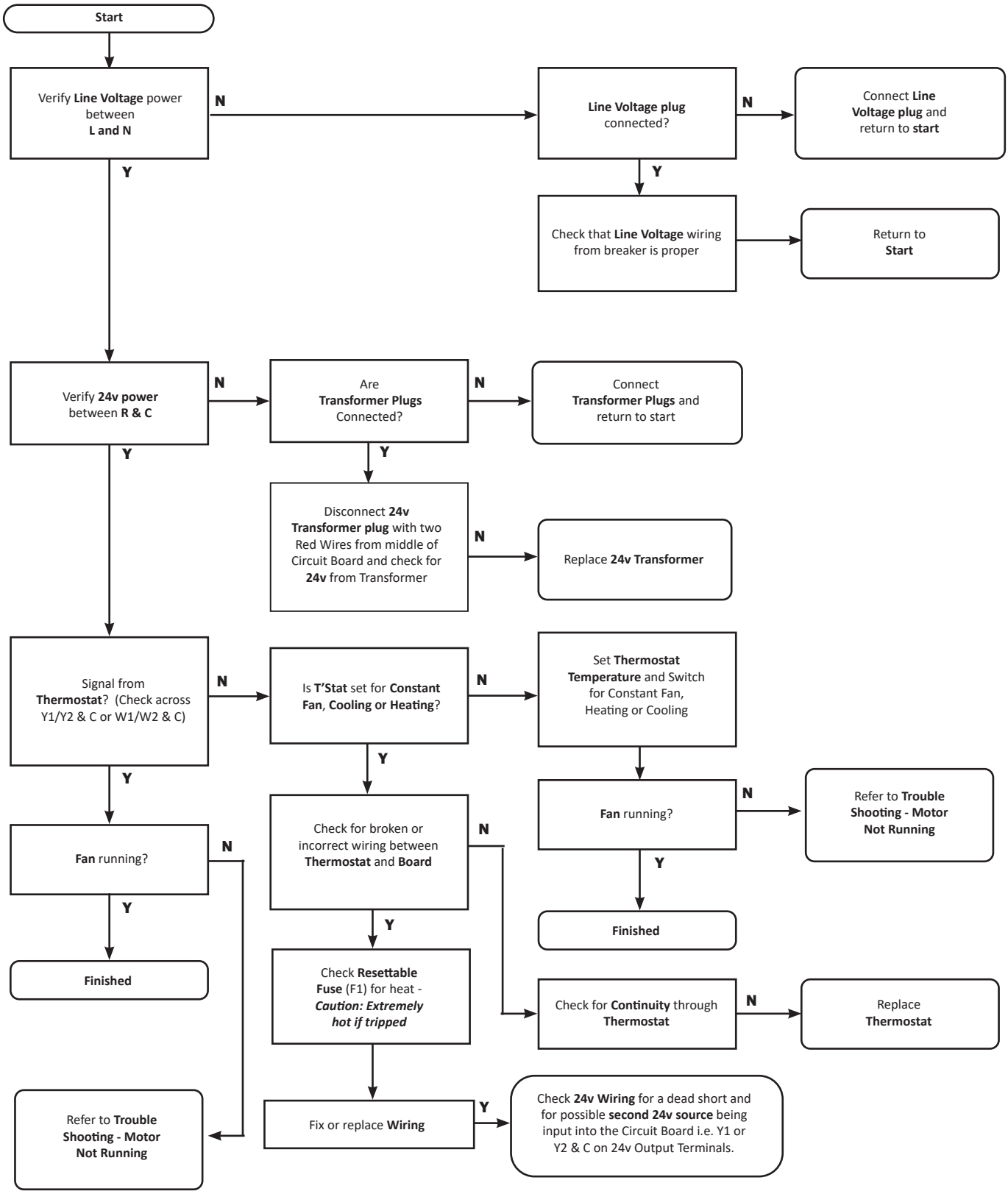
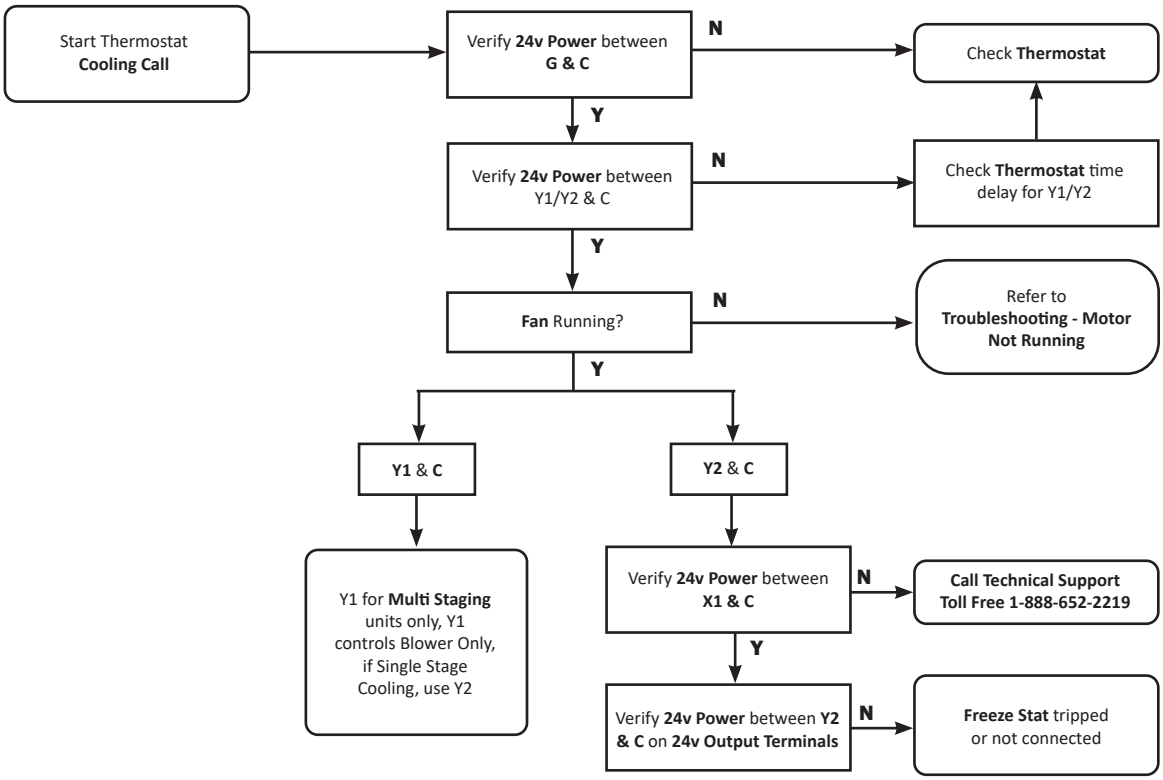


Fig. 007

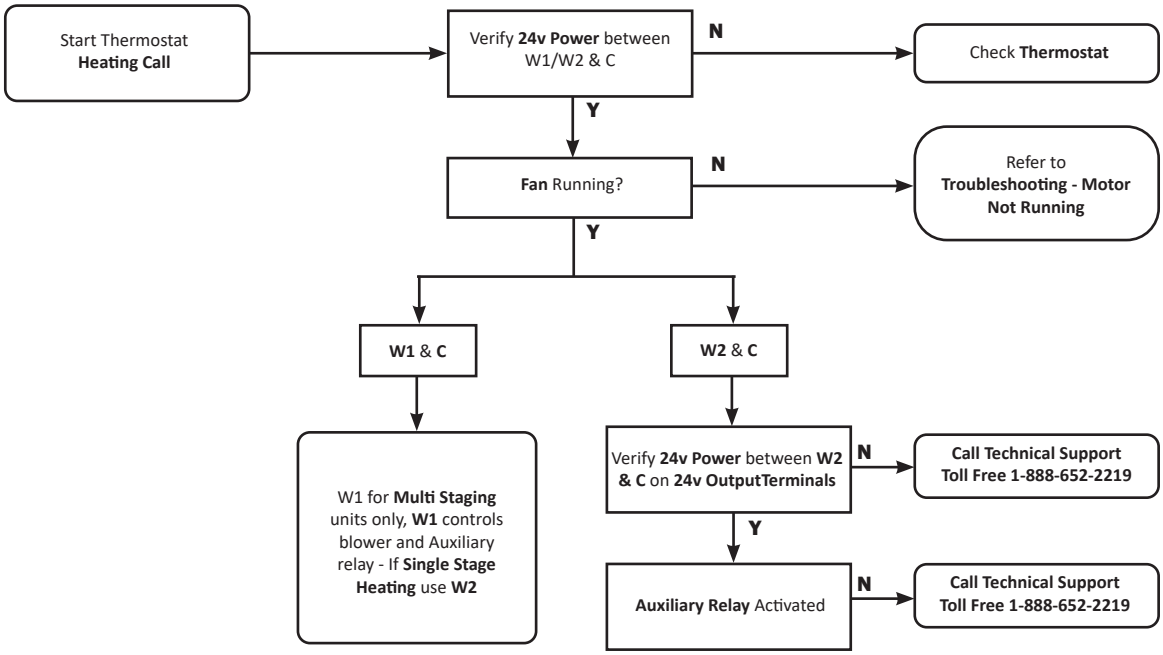
Troubleshooting - 24Volt Thermostat to HEB Circuit Board



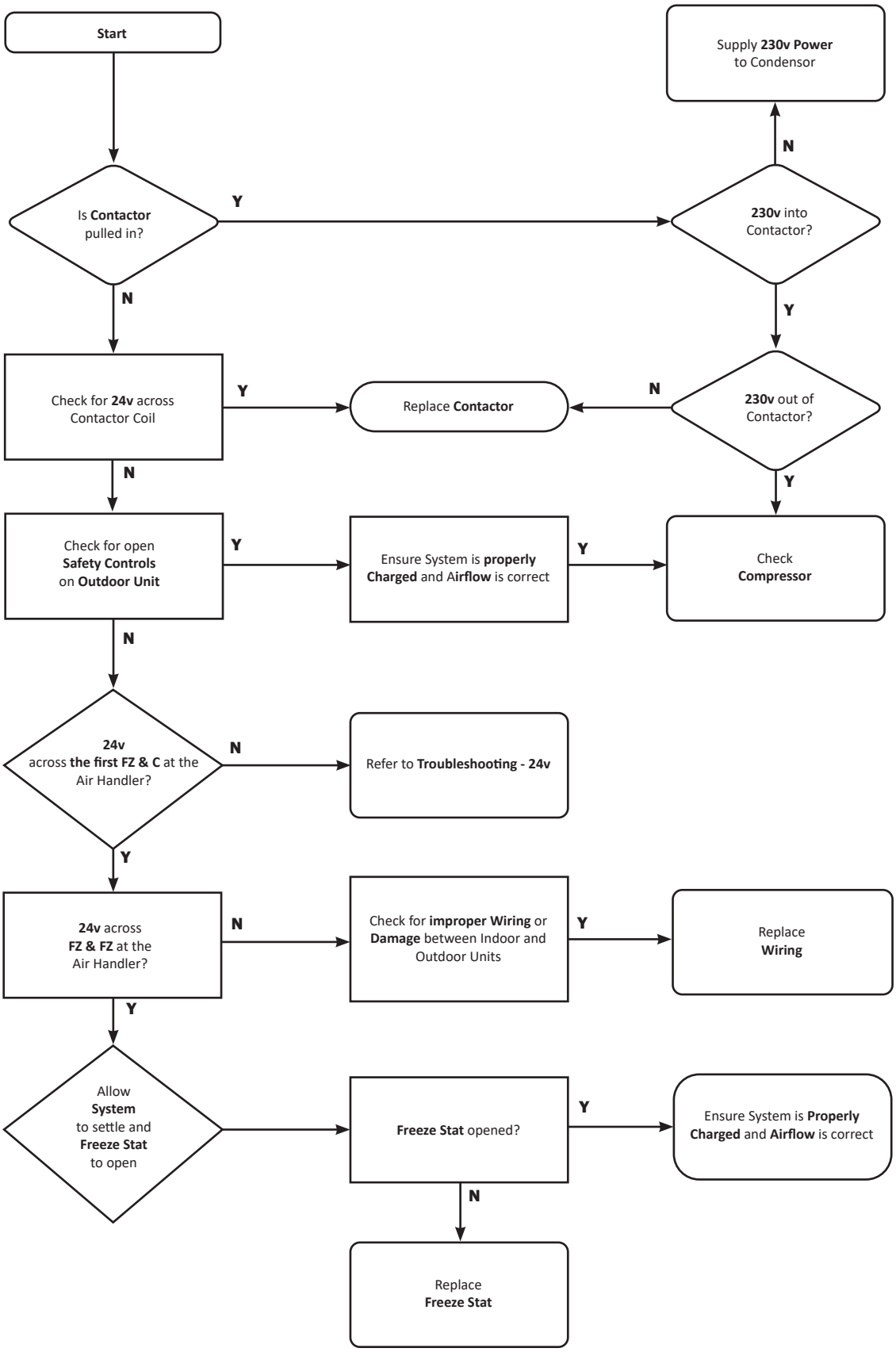
Troubleshooting - Cooling 24 Volt Circuit Board



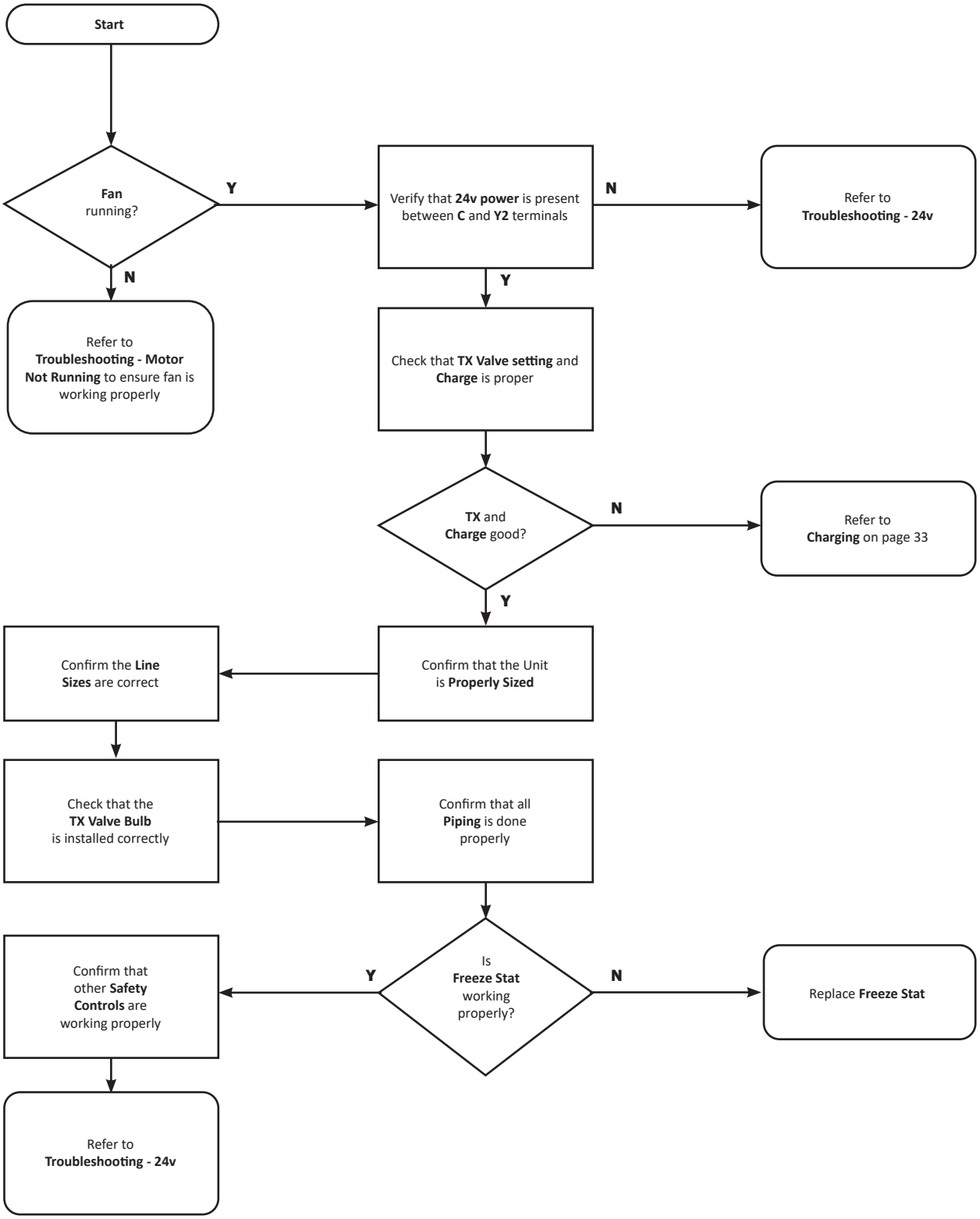
Trouble Shooting: Heating 24 Volt Circuit Board



Troubleshooting - Outdoor Unit - Electrical



Troubleshooting - Short Cycling

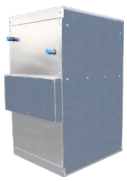


Matching Coils
Refrigerant Coils
RBM/RBM-I/RPM-E/RCM
RCM-I-50/750, 70/1050
Chilled Water Coils
WBM/WCM-50/750, 70/1050,
WM-1750
Hot Water Coils
HWC-50/750, 70/1050, 1750
Electrical Coils
ESH-650, 750, 2500

Hi-Velocity Systems
www.hi-velocity.com

LV-B Series Specifications

Low Velocity Builders Series w/ VFD



	LV-B-751		LV-B-1051		LV-B-1751	
Hot Water Heating[1]	1.5 Ton Airflow (5.3 kW)	2 Ton Airflow (7.0 kW)	2.5 Ton Airflow (8.8 kW)	3 Ton Airflow (10.6 kW)	4 Ton Airflow (14.1 kW)	5 Ton Airflow (17.6 kW)
Coil	HWC-50	HWC-50	HWC-70[2]	HWC-70	HWC-1750	HWC-1750
Coil Type	6 Row/10 FPI	6 Row/10 FPI	6 Row/10 FPI	6 Row/10 FPI	6 Row/12 FPI	6 Row/12 FPI
Max. BTUH @ 190°F E.W.T. (kW @ 88°C)	62,100 (18.2 kW)	76,000 (22.3 kW)	92,200 (27.0 kW)	112,700 (33.0 kW)	172,200 (50.5 kW)	201,500 (59.0 kW)
Max. BTUH @ 180°F E.W.T. (kW @ 82°C)	57,000 (16.7 kW)	69,700 (20.4 kW)	84,600 (24.8 kW)	103,300 (30.3 kW)	157,900 (46.3 kW)	184,800 (54.1 kW)
Max. BTUH @ 170°F E.W.T. (kW @ 77°C)	51,800 (15.2 kW)	63,300 (18.5 kW)	76,900 (22.5 kW)	93,900 (27.5 kW)	143,600 (42.1 kW)	168,100 (49.3 kW)
Max. BTUH @ 160°F E.W.T. (kW @ 71°C)	46,600 (13.7 kW)	57,000 (16.7 kW)	69,300 (20.3 kW)	84,600 (24.8 kW)	129,400 (37.9 kW)	151,300 (44.3 kW)
Max. BTUH @ 150°F E.W.T. (kW @ 66°C)	41,500 (12.2 kW)	50,700 (14.9 kW)	61,700 (18.1 kW)	75,200 (22.0 kW)	115,200 (33.8 kW)	134,600 (39.4 kW)
Max. BTUH @ 140°F E.W.T. (kW @ 60°C)	36,300 (10.6 kW)	44,400 (13.0 kW)	54,000 (15.8 kW)	65,900 (19.3 kW)	100,900 (29.6 kW)	118,000 (34.6 kW)
Max. BTUH @ 130°F E.W.T. (kW @ 54°C)	31,200 (9.1 kW)	38,100 (11.2 kW)	46,400 (13.6 kW)	56,600 (16.6 kW)	86,800 (25.4 kW)	101,300 (29.7 kW)
Max. BTUH @ 120°F E.W.T. (kW @ 49°C)	26,100 (7.6 kW)	31,800 (9.3 kW)	38,900 (11.4 kW)	47,300 (13.9 kW)	72,600 (21.3 kW)	84,800 (24.8 kW)
Max. BTUH @ 110°F E.W.T. (kW @ 43°C)	21,000 (6.2 kW)	25,600 (7.5 kW)	31,300 (9.2 kW)	38,100 (11.2 kW)	58,500 (17.1 kW)	68,200 (20.0 kW)
GPM Flow Ratings (L/s Flow Ratings)	5 (0.32 L/s)	5 (0.32 L/s)	7 (0.44 L/s)	7 (0.44 L/s)	10 (0.63 L/s)	10 (0.63 L/s)
Pressure Drop in Ft. H_2O (Drop in KPa)	2.4 (7.17KPa)	2.4 (7.17KPa)	4.6 (13.75 KPa)	4.6 (13.75 KPa)	4.5 (13.45 KPa)	4.5 (13.45 KPa)
Chilled Water Cooling[1]	WBM/WCM-50	WBM/WCM-70[3]	WBM/WCM-70	WBM/WCM-100[3]	WM-1750	WM-1750
Coil Type	6 Row/10 FPI	6 Row/10 FPI	6 Row/10 FPI	6 Row/10 FPI	6 Row/12 FPI	6 Row/12 FPI
Max. BTUH @ 48°F E.W.T. (kW @ 8.9°C)	18,700 (5.5 kW)	24,000 (7.0 kW)	28,300 (8.3 kW)	36,500 (10.7 kW)	51,600 (15.1 kW)	56,900 (16.7 kW)
Max. BTUH @ 46°F E.W.T. (kW @ 7.8°C)	20,400 (6.0 kW)	26,100 (7.6 kW)	30,800 (9.0 kW)	39,700 (11.6 kW)	56,000 (16.4 kW)	61,600 (18.0 kW)
Max. BTUH @ 44°F E.W.T. (kW @ 6.7°C)	22,000 (6.4 kW)	28,100 (8.2 kW)	33,300 (9.8 kW)	42,800 (12.5 kW)	60,400 (17.7 kW)	66,300 (19.4 kW)
Max. BTUH @ 42°F E.W.T. (kW @ 5.6°C)	23,600 (6.9 kW)	30,100 (8.8 kW)	35,800 (10.5 kW)	46,000 (13.5 kW)	64,800 (19.0 kW)	71,000 (20.8 kW)
Max. BTUH @ 40°F E.W.T. (kW @ 4.4°C)	25,100 (7.4 kW)	32,000 (9.4 kW)	38,200 (11.2 kW)	49,000 (14.4 kW)	69,000 (20.2 kW)	75,600 (22.2 kW)
S.H.R.						
Max. BTUH @ 48°F E.W.T. (kW @ 8.9°C)	77%	78%	76%	77%	77%	81%
Max. BTUH @ 46°F E.W.T. (kW @ 7.8°C)	74%	75%	73%	74%	74%	78%
Max. BTUH @ 44°F E.W.T. (kW @ 6.7°C)	71%	73%	71%	72%	72%	75%
Max. BTUH @ 42°F E.W.T. (kW @ 5.6°C)	69%	70%	69%	70%	69%	73%
Max. BTUH @ 40°F E.W.T. (kW @ 4.4°C)	68%	69%	67%	68%	68%	71%
GPM Flow Ratings (L/s Flow Ratings)	5 (0.32 L/s)	5 (0.32 L/s)	7 (0.44 L/s)	7 (0.44 L/s)	10 (0.63 L/s)	10 (0.63 L/s)
Pressure Drop in FT. H_2O (Drop in KPa)	2.71 (8.1 KPa)	3.05 (9.1 KPa)	5.44 (16.5 KPa)	6.42 (19.2 KPa)	5.33 (15.9 KPa)	5.33 (15.9 KPa)
Refrigerant Cooling[1]	RBM/RPM-E/ RCM-50/3rd Party		RBM/RPM-E/ RCM-70/3rd Party		N/A (3rd Party Only)	
RBM/RPM-E/RCM Modules BTUH Refrigerant TX Cooling	1.5 - 2.0 Tons (5.3-7.0 kW) 18,000 - 24,000 BTUH		2.5 - 3.0 Tons (8.8-10.6 kWh) 30,000 - 36,000 BTUH		3.5 - 5.0 Tons (12.3-17.6 kWh) 42,000 - 60,000 BTUH	
Electrical Heating	ESH/VESH-650		ESH/VESH-750		ESH/VESH-2500	
Kilowatt Range	5 - 15 kW		5 - 18 kW / 10 - 18 kW		10 - 25 kW	
Specifications	LV-B-751		LV-B-1051		LV-B-1751	
Rated CFM @ 0.6" E.S.P. (L/s @ 149 Pa)	800 (378 L/s)		1200 (566 L/s)		2000 (944 L/s)	
Voltage	115/230/1/50/60 F.L.A. 8 amp		115/230/1/50/60 F.L.A. 8 amp		115/230/1/50/60 F.L.A. 8 amp	
Nominal Operating Amperage	4 Amps		6 Amps		8 Amps	
Integral Surge and Fuse System	Yes		Yes		Yes	
Horse Power - Nominal Watts	3/4hp - 420W		1/3hp - 515W		3/4hp - 695W	
Motor RPM	Variable		Variable		Variable	
Supply Air Size	13" x 17 1/4" (330mm X 438mm)		18" x 17 1/4" (457mm X 438mm)		22 1/2" x 22 1/2" (572mm X 572mm)	
Return Size Needed	152 in^2 (0.1m^2)		182 in^2 (0.12m^2)		240 in^2 (0.15m^2)	
Shipping Weight (no coil)	63 lbs (28.6 kg)		71 lbs (32.2 kg)		107 lbs (48.5 kg)	
Air Handler Dimensions (L x W x H)	14 1/2" x 18 1/4" x 32 5/16" (368mm x 464mm x 821mm)		19 1/2" x 18 1/4" x 32 5/16" (495mm x 464mm x 821mm)		26 3/4" x 24 1/4" x 38 3/4" (679mm x 616mm x 984mm)	

[1] **Heating** specs are rated at 68°F E.A.T., **Cooling** specs are rated at 80/67°F dB/wB.

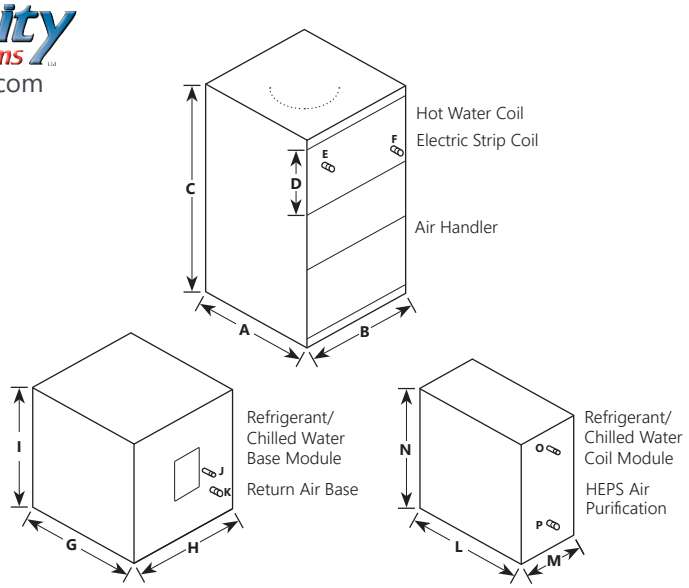
[2] WCM-100 will provide approximately the same heating capacities.

[3] Use a full transition when using mismatched coil to ensure even airflow across the coil.

BTUH - British Thermal Units per Hour
E.W.T. - Entering Water Temperature
S.H.R. - Sensible Heat Ratio
GPM - US Gallons per Minute
L/s - Litres per Second
CFM - Cubic Feet per Minute
F.L.A. - Full-Load Amperage
RPM - Revolutions per Minute
E.S.P. - External Static Pressure
E.A.T. - Entering Air Temperature
dB/wB - Dry Bulb/Wet Bulb

Quick Sizing Guide
ALL UNITS

Hi-Velocity Systems
www.hi-velocity.com



Item	Length	Width	Height
Cube Air Handlers	**A**	**B**	**C**
CU-31	14″ (356mm)	13 1/2″ (343mm)	14 1/2″ (368mm)
CU-51	14″ (356mm)	18 1/4″ (464mm)	16 1/4″ (413mm)
Hi-Velocity Air Handlers	**A**	**B**	**C**
HE-Z/HE-B/HE/HV-50/51	14 1/2″ (368mm)	18 1/4″ (464mm)	32 5/16″ (821mm)
HE-Z/HE-B/HE/HV-70/71	19 1/2″ (495mm)	18 1/4″ (464mm)	32 5/16″ (821mm)
HE-Z/HE-B/HE-P/HE/HV-100/101	25 1/2″ (648mm)	18 1/4″ (464mm)	32 5/16″ (821mm)
HE-P-240/241	26 3/4″ (679mm)	24 1/4″ (616mm)	38 3/4″ (984mm)
Lo-Velocity Air Handlers	**A**	**B**	**C**
JH-15/30	14″ (356mm)	12″ (304mm)	22″ (559mm)
LV-Z/LV-B-750, LV-50	14 1/2″ (368mm)	18 1/4″ (464mm)	32 5/16″ (821mm)
LV-Z/LV-B-1050, LV-70	19 1/2″ (495mm)	18 1/4″ (464mm)	32 5/16″ (821mm)
LV-120/140	25 1/2″ (648mm)	18 1/4″ (464mm)	32 5/16″ (821mm)
LV-Z/LV-B-1750	26 3/4″ (679mm)	24 1/4″ (616mm)	38 3/4″ (984mm)

RBM/RBM-I Refrigerant Base Modules		**Length G**	**Width H**	**Height I**	**Line Size J**	**Line Size K**
RBM/RBM-I-50	Fits HE-Z/HE-B/HE/HV-50/51/52, CU-51, LV-Z/LV-B-750/751, LV-50 (1.5 - 2 Tons)	14 1/2″ (368mm)	18 1/4″ (464mm)	18 1/4″ (464mm)	3/8″(RBM-I 1/2″)	7/8″ (22mm)
RBM/RBM-I-70	Fits HE-Z/HE-B/HE/HV-70/71, LV-Z/LV-B/LV-E-1050/1051, LV-70 (2.5 - 3 Tons)	19 3/8″ (492mm)	18 1/4″ (464mm)	18 1/4″ (464mm)	3/8″(RBM-I 1/2″)	7/8″ (22mm)
RBM/RBM-I-100	Fits HE-Z/HE-P/HE-B/HE/HV-100/101 (3.5 - 5 Tons), HE-P-240 (x2 Coils 5-10 Tons)	25 3/8″ (645mm)	18 1/4″ (464mm)	18 1/4″ (464mm)	3/8″(RBM-I 1/2″)	7/8″ (22mm)

RPM-E Refrigerant Modules - Pre-Piped		**L**	**M**	**N**	**O**	**P**
RPM-E-50	Fits HE-Z/HE-B/HE/HV-50/51/52, CU-51, LV-Z/LV-B-750, LV-50 (1.5 - 2 Tons)	19 1/4″ (489mm)	14 5/8″ (371mm)	18 1/2″ (470mm)	3/8″(9.5mm)	7/8″ (22mm)
RPM-E-70	Fits HE-Z/HE-B/HE/HV-70/71, LV-Z/LV-B/LV-E-1050/1051, LV-70 (2.5 - 3 Tons)	24 1/4″ (616mm)	14 5/8″ (371mm)	18 1/2″ (470mm)	3/8″(9.5mm)	7/8″ (22mm)
RPM-E-100	Fits HE-Z/HE-P/HE-B/HE/HV-100/101 (3.5 - 5 Tons), HE-P-240 (x2 Coils 5-10 Tons)	32″ (813mm)	14 5/8″ (371mm)	18 1/2″ (470mm)	3/8″(9.5mm)	7/8″ (22mm)

RCM/RCM-I Refrigerant Modules		**L**	**M**	**N**	**O**	**P**
RCM-30	Fits JH 15/30, CU-31 (1 Ton)	14 3/8″ (365mm)	12 1/4″ (311mm)	12 3/8″ (314mm)	3/8″(9.5mm)	5/8″ (15.9mm)
RCM/RCM-I-50	Fits HE-Z/HE-B/HE/HV-50/51/52, CU-51, LV-Z/LV-B-750/751, LV-50 (1.5 - 2 Tons)	14 3/8″ (365mm)	10 1/8″ (257mm)	18 1/2″ (470mm)	1/2″ (13mm)	7/8″ (22mm)
RCM/RCM-I-70	Fits HE-Z/HE-B/HE/HV-70/71, LV-Z/LV-B/LV-E-1050/1051, LV-70 (2.5 - 3 Tons)	19 3/8″ (492mm)	10 1/8″ (257mm)	18 1/2″ (470mm)	1/2″ (13mm)	7/8″ (22mm)
RCM/RCM-I-100	Fits HE-Z/HE-P/HE-B/HE/HV-100/101 (3.5 - 5 Tons), HE-P-240 (x2 Coils 5-10 Tons)	25 3/8″ (645mm)	10 1/8″ (257mm)	18 1/2″ (470mm)	1/2″ (13mm)	7/8″ (22mm)

WCM/WM Chilled Water Modules		**L**	**M**	**N**	**O**	**P**
WCM-50	Fits HE-Z/HE-B/HE/HV-50/51/52, CU-51, LV-Z/LV-B-750/751, LV-50	14 3/8″ (365mm)	10 1/8″ (257mm)	18 1/2″ (470mm)	3/4″ (19mm)	3/4″ (19mm)
WCM-70	Fits HE-Z/HE-B/HE/HV-70/71, LV-Z/LV-B/LV-E-1050/1051, LV-70	19 3/8″ (492mm)	10 1/8″ (257mm)	18 1/2″ (470mm)	3/4″ (19mm)	3/4″ (19mm)
WCM-100	Fits HE-Z/HE-P/HE-B/HE/HV-100/101, LV-Z/LV-B/LV-E-1050/1051, LV-120/140	25 3/8″ (645mm)	10 1/8″ (257mm)	18 1/2″ (470mm)	3/4″ (19mm)	3/4″ (19mm)
WM-1750	Fits LV-Z/LV-B/LV-E-1750/1751	26 1/4″(667mm)	8 1/4″ (209mm)	22 5/8″ (575mm)	1″ (25mm)	1″ (25mm)

WBM Chilled Water Base Modules		**G**	**H**	**I**	**J**	**K**
WBM-50	Fits HE-Z/HE-B/HE/HV-50/51/52, CU-51, LV-Z/LV-B-750/751, LV-50	14 1/2″ (368mm)	18 1/4″ (464mm)	18 1/4″ (464mm)	3/4″ (19mm)	3/4″ (19mm)
WBM-70	Fits HE-Z/HE-B/HE/HV-70/71, LV-Z/LV-B/LV-E-1050/1051, LV-70	19 3/8″ (492mm)	18 1/4″ (464mm)	18 1/4″ (464mm)	3/4″ (19mm)	3/4″ (19mm)
WBM-100	Fits HE-Z/HE-P/HE-B/HE/HV-100/101, LV-Z/LV-B/LV-E-1050/1051, LV-120/140	25 3/8″ (645mm)	18 1/4″ (464mm)	18 1/4″ (464mm)	3/4″ (19mm)	3/4″ (19mm)

HWC Hot Water Coils		**A**	**B**	**D**	**E**	**F**
HWC-30	Fits CU-31, JH-15/30	13 1/2″ (343mm)	12 1/2″ (317mm)	3 3/8″ (85mm)	3/8″(9.5mm)	3/8″(9.5mm)
HWC-50	Fits HE-Z/HE-B/HE/HV-50/51, CU-51, LV-Z/LV-B-750/751, LV-50	13 1/2″ (343mm)	16″ (406mm)	5 1/2″ (140mm)	3/4″ (19mm)	3/4″ (19mm)
HWC-70	Fits HE-Z/HE-B/HE/HV-70/71, LV-Z/LV-B/LV-E-1050/1051, LV-70	19″ (483mm)	16″ (406mm)	5 1/2″ (140mm)	3/4″ (19mm)	3/4″ (19mm)
HWC-100	Fits HE-Z/HE-P/HE-B/HE/HV-100/101, LV-120/140	25″ (635mm)	16″ (406mm)	5 1/2″ (140mm)	3/4″ (19mm)	3/4″ (19mm)
HWC-1750	Fits HE-P-240/241, LV-Z/LV-B/LV-E-1750/1751	26″ (660mm)	22″ (559mm)	6″ (152mm)	1″ (25mm)	1″ (25mm)

Heating Coil Add-on does not come as a module, it slides into the Hi-Velocity Air Handler. Comes installed in all "H" Air Handlers.

ESH/VESH Electrical Strip Heater		**A**	**B**	**D**
ESH/VESH-400 (5-10 kW)	Fits CU-31	13 3/4″ (349mm)	12 1/8″ (308mm)	5 5/8″ (143mm)
ESH/VESH-650 (5-15 kW)	Fits HE-Z/HE-B/HE/HV-50/51, LV-Z/LV-B-750/751, LV-50	13 3/4″ (349mm)	17″ (432mm)	5 5/8″ (143mm)
ESH/VESH-750 (5-18 kW)	Fits HE-Z/HE-B/HE/HV-70/71, LV-Z/LV-B/LV-E-1050/1051, LV-70	18 3/4″ (476mm)	17″ (432mm)	5 5/8″ (143mm)
ESH/VESH-1100 (10-23 kW)	Fits HE-Z/HE-P/HE-B/HE/HV-100/101, LV-120/140	24 3/4″ (629mm)	17″ (432mm)	5 5/8″ (143mm)
ESH/VESH-2500 (10-25 kW)	Fits HE-P-240 BU, LV-Z-1750/1751 BU	25 3/4″ (654mm)	21 7/8″ (556mm)	6″ (152mm)

Dimensions for the ESH do not include the electrical access panel, add 4" to Length (5" for 2500)

HEPS Hi-Velocity Air Purification System (See parts list for replacement filters)		**L**	**M**	**N**
HEPS w/ Merv 13 Filt.	Fits All 50/51/70/71/750/751/100/101/120/140/1050 Units	26 1/16″ (662mm)	10 5/16″ (262mm)	18 3/8″ (467mm)
HEPS-1750 w/ Merv 13	Fits HE-P-240/241, LV-Z/LV-B/LV-E-1750/1751	28 1/2″ (723mm)	10 5/16″ (262mm)	21 1/8″ (537mm)

Return Air Base		**G**	**H**	**I**
RA-50	Fits HE-Z/HE-B/HE/HV-50/51, CU-51, LV-Z/LV-B-750/751, LV-50	14 1/2″ (368mm)	18 1/2″ (470mm)	22 1/2″ (572mm)
RA-70	Fits HE-Z/HE-B/HE/HV-70/71, LV-Z/LV-B/LV-E-1050/1051, LV-70	19 1/2″ (495mm)	18 1/2″ (470mm)	22 1/2″ (572mm)
RA-100	Fits HE-Z/HE-P/HE-B/HE/HV-100/101, LV-120/140	25 1/2″ (648mm)	18 1/2″ (470mm)	22 1/2″ (572mm)
RA-1750	Fits HE-P-240/241, LV-Z/LV-B/LV-E-1750/1751	26 1/2″ (673mm)	24 1/2″ (622mm)	24″ (610mm)

HVS Series Variable Speed Heat Pump		**Length**	**Width**	**Height**
HVS-24	Can be used with HE-Z/HE-B/HE/HV-50/51, CU-51, LV-Z/LV-B-750/751, LV-50	38″ (965mm)	16.14″ (410mm)	32″ (813mm)
HVS-36	Can be used with HE-Z/HE-B/HE/HV-70/71, LV-Z/LV-B/LV-E-1050/1051	38″ (965mm)	16.14″ (410mm)	32″ (813mm)
HVS-60	Can be used with HE-Z/HE-P/HE-B/HE/HV-100/101, LV-120/140	37.5″ (953mm)	16.25″ (413mm)	52.5″ (1,334mm)

WARRANTY

Energy Saving Products Ltd. is proud to offer a limited warranty. This warranty applies strictly to the first purchaser at wholesale level and only to the Air Handler unit and module. It does not include connections, attachments and other products or materials furnished by the installer.

This warranty excludes any damages caused by changes, relocation to, or installation in a new site. This warranty does not cover any defects caused by failure to follow the installation and operating instructions furnished with the Air Handler. This warranty does not cover defects caused by failing to adhere to local building codes and following good industry standards. Failure to correctly install the Air Handler, or material related to the unit, may result in improper system performance and/or damages and will void this warranty. This warranty does not cover material installed in or exposed to a corrosive environment. This warranty does not cover products subjected to abnormal use, misuse, improper maintenance, or alteration of the product. Using the Air Handler and/or module as a source of temporary heating/cooling during construction will void this warranty.

A **Five (5) Year Limited Warranty** is extended on all components in products manufactured exclusively by Energy Saving Products. These components include Motors, WEG Controller, Circuit Boards, Dampers, Zoning Controls, Blowers, Motor & Blower Assemblies, Heating Coils, Chilled Water Coils, and Air Conditioning Coils. Note: If any product is installed in or exposed to a corrosive environment, warranty will be void.

A **Three (3) Year Limited Warranty** is extended on Electric Strip Heaters.

A **One (1) Year Limited Warranty** is extended on replacement parts.

Products sold by Energy Saving Products but manufactured by others, will carry the original manufacturer's warranty.

TERMS & CONDITIONS

- **Warranty will not be considered unless a contractor has contacted Energy Saving Products Ltd. Technical Support department for assistance, and received a tech code.**
- Any repair performed under warranty must be approved by Energy Saving Products Ltd. for this warranty to be valid.
- The liability of Energy Saving Products Ltd. is limited to and shall not exceed the cost of pre-approved replacement parts.
- This warranty does not cover shipping costs to and from the factory, labor costs or any other cost associated with the installation of the replacement part.
- Inoperative parts must be returned to Energy Saving Products Ltd. with an ESP RMA Form that includes model, serial number, and a detailed description of the entire problem. Inoperative parts must be returned in testable condition.
- Energy Saving Products Ltd. is not liable for any other damages, personal injury, or any other losses of any nature.

Follow these steps for Service or Repair:

1. Contact the installer of the product or a licensed service company
2. Contact the distributor
3. Contact Energy Saving Products Ltd. Mon-Fri 8 am – 4:30 pm MT 1-888-652-2219

This warranty replaces all other warranties expressed or implied.

www.hi-velocity.com

Energy Saving Products Ltd, established in 1983, manufactures the Hi-Velocity Systems™ product line for residential, commercial and multi-family markets. Our facilities house Administration, Sales, Design, Manufacturing, as well as Research & Development complete with an in-house test lab. Energy Saving Products prides itself on Customer Service and provides design services and contractor support.

For all of your Heating, Cooling and Indoor Air Quality needs, the Hi-Velocity System is the right choice for you!

Hi-Velocity Systems™

Small Duct Heating, Cooling and IAQ Systems

Build Smart, Breathe *Easy*

Hi-Velocity HE-Z Air Handlers, Green Technology

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