Hi-Velocity Systems™

Small Duct High Velocity Heating, Cooling and Home Comfort Systems

HE-Z Series Commissioning Report & User Guide

Manufactured By

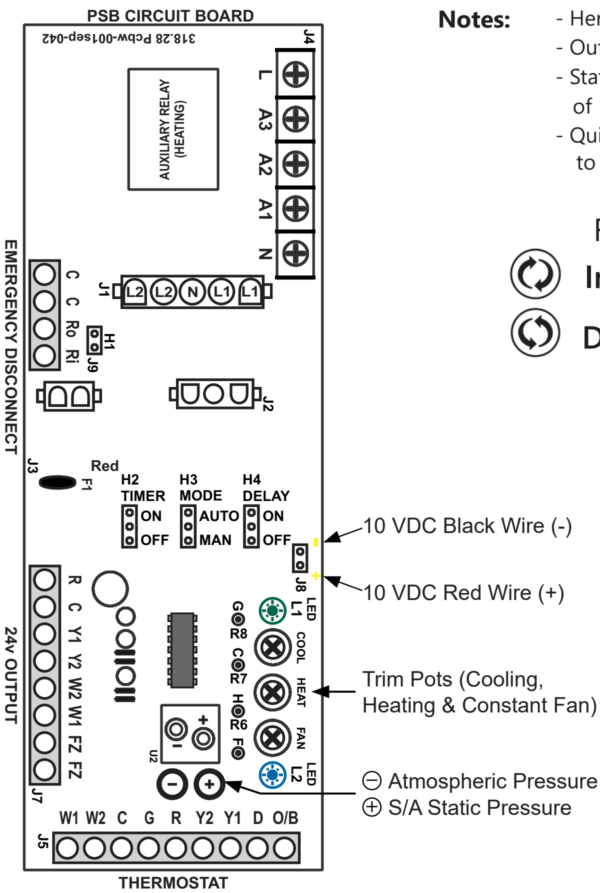
Energy Saving Products Ltd

Module-COM-HEZ-Commissioning-Report-and-User-Guide-111020

HE-Z Commissioning Report

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



Notes:
- 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 set up method.

Fan Adjustment Trim Pots

Increase Airflow (Clockwise)

Decrease Airflow (Counter Clockwise)

Jumper Pin Settings

H1 Emergency Disconnect:	(Remove pin to activate)
H2 Timer:	Activates auxiliary relay for 5 min every 24 hours.
H3 Mode (Auto):	Blower output speed modulates dependent upon static pressure.
H3 Mode (Manual):	Blower output speed operates at fixed flow rate.
H4 Delay:	Cooling/20second, heating/30 second fan delay, and 30 second post purge.

LED Description

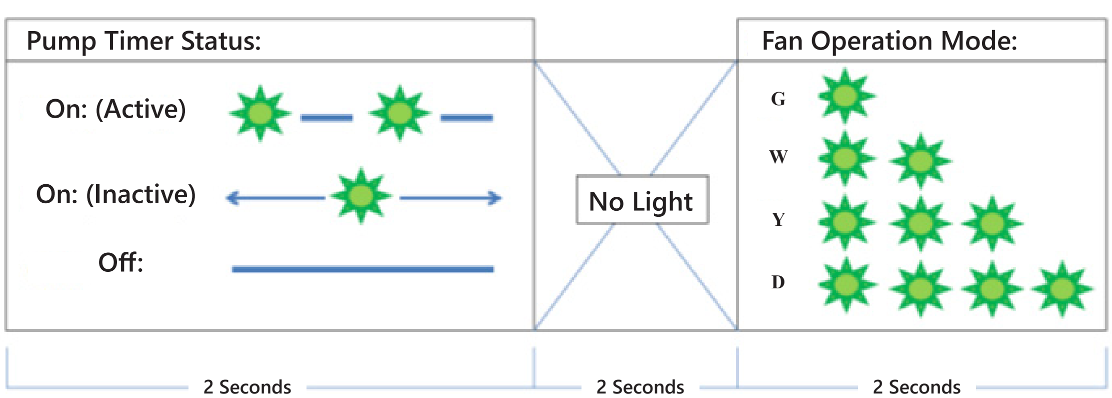
LED 1 - Pump timer/Operation Mode Indicator Light

LED 2 - Pressure Sensor Indicator Light

Note: If trim pots don't modulate the blower speed, check S/A Static Pressure pressure hose orientation and make sure the t-stat call is the same as the trimpot being adjusted.

Pump timer & Mode Indicator Light Sequence (Green LED1):

= Light On
= Light Off



Date: ____________________

HE-Z System Commissioning & Set-up

(Failure to complete this report may void Warranty)

Commissioned By: ____________________ Phone #: ____________________

Installed By: ____________________ Phone #: ____________________

Air Handler Model #: ____________________ Air Handler Serial #: ____________________

Refer to System Commissioning and set-up on page 30 of the "HE-Z Installation Manual" for help filling in the report requirements.

Determining Preliminary System Information

For Cooling (Heat pump & Electric Strip) 250 CFM per Ton Approximately 1250-1400 Ft/min (FPM) Outlet Velocity

HE-Z-50/51		**HE-Z-70/71**		**HE-Z-100/101**		
1.5 Tons	2 Tons	2.5 Tons	3 Tons	3.5 Tons	4 Tons	5 Tons
375 CFM	500 CFM	625 CFM	750 CFM	875 CFM	1000 CFM	1250 CFM

This formula can be used to find the desired **Cooling** "Velocity per Outlet" needed to achieve minimum airflow or refer to chart below:

250 CFM x Tonnage = Desired Cooling Airflow

Example:
A system with:
24 HE outlets and
4 2" outlets
will equal
24 HE outlets x 2 = 48
plus
4 2" outlets = 4

=52 system total outlets

Note: When finding systems total outlets, HE outlets = 2 and 2" outlets = 1

Desired Cooling Airflow ÷ Number of Systems Total Outlets = Airflow per Outlet

Airflow per Outlet ÷ 0.021 = FPM per HE Outlet

Airflow per Outlet ÷ 0.022 = FPM per 2" Outlet

Therefore,

250 CFM x ____Tons ÷ ____ Systems Total Outlets ÷ 0.021 = _______FPM per **HE** Outlet*1

250 CFM x ____Tons ÷ ____ Systems Total Outlets ÷ 0.022 = _______FPM per **2"** Outlet*2

Note: When using DX cooling maintaining minimum airflow is critical to proper system operation.

		Number of Total Outlets (2" Outlets) HE Outlets										
		(12) 6	(16) 8	(20) 10	(24) 12	(28) 14	(32) 16	(36) 18	(40) 20	(44) 22	(48) 24	(52) 26
HE-Z-50/51	**1.5 Tons**	(1420) 1488	(1065) 1116	(852) 893								
	2 Tons		(1420) 1488	(1136) 1190	(947) 992							
HE-Z-70/71	**2.5 Tons**			(1420) 1488	(1184) 1240	(1015) 1062						
	3 Tons				(1420) 1488	(1218) 1276	(1065) 1116					
HE-Z-100/101	**3.5 Tons**					(1420) 1488	(1243) 1302	(1105) 1157				
	4 Tons						(1420) 1488	(1263) 1323	(1136) 1190	(1033) 1082		
	5 Tons								(1420) 1488	(1291) 1353	(1184) 1240	(1093) 1145
		Outlet Velocity (FPM)										**(FPM ÷ 100 = Knots)**

HE-Z System Commissioning & Set-up

For Heating 200-250 CFM per Ton   Approximately 1100-1400 FPM Outlet Velocity

For **Heat Only** applications, it is recommended to use max airflow. Select the most appropriate tonnage or outlet range for your application:

HE-Z-50/51		HE-Z-70/71		HE-Z-100/101		
1.5 Tons	2 Tons	2.5 Tons	3 Tons	3.5 Tons	4 Tons	5 Tons
12-20 Outlets	16-24 Outlets	20-28 Outlets	24-32 Outlets	28-36 Outlets	32-44 Outlets	40-52 Outlets

This formula can be used to find the desired **Heating** "Outlet Velocity" needed to achieve ideal airflow:

200 CFM x Tonnage = Desired Heating Airflow
Desired Heating Airflow ÷ Number of Systems Total Outlets = Airflow per Outlet
Airflow per Outlet ÷ 0.021 = FPM per HE Outlet
Airflow per Outlet ÷ 0.022 = FPM per 2" Outlet
Therefore,
200 CFM x ____Tons ÷ ____ Systems Total Outlets ÷ 0.021 = _______FPM per HE Outlet*3
200 CFM x ____Tons ÷ ____ Systems Total Outlets ÷ 0.022 = _______FPM per 2" Outlet*4
Note: Heating speed is more lenient than cooling speed. If desired, airflow can be adjusted to noise instead of velocity or airflow, as long as this selected fan speed satisfies the structures heating needs. Higher velocities over 1500 to 1600 FPM are not recommended.

For Constant Fan 125 CFM per Ton   Approximately 500-900 FPM Outlet Velocity

This formula can be used to find the desired **Constant Fan** "Outlet Velocity" needed to achieve ideal airflow:

125 CFM x Tonnage = Desired Constant Fan Airflow
Desired Constant Fan Airflow ÷ Number of Systems Total Outlets = Airflow per Outlet
Airflow per Outlet ÷ 0.021 = FPM per HE Outlet
Airflow per Outlet ÷ 0.022 = FPM per 2" Outlet
Therefore,
125 CFM x ____Tons ÷ ____ Systems Total Outlets ÷ 0.021 = _______FPM per HE Outlet*5
125 CFM x ____Tons ÷ ____ Systems Total Outlets ÷ 0.022 = _______FPM per 2" Outlet*6
Note: Constant Fan is completely variable. Usually, Watt draw, velocity and noise are the determining factors in the selected fan speed. Constant Fan is an option that is suggested for maximum indoor air quality.

Summary

Fill in the ideal velocity per outlet that was calculated above:

Cooling _______ FPM per HE Outlet*1
_______ FPM per 2" Outlet*2

Heating _______ FPM per HE Outlet*3
_______ FPM per 2" Outlet*4

Constant Fan _______ FPM per HE Outlet*5
_______ FPM per 2" Outlet*6

Finding the Average Outlet

This page is dedicated specifically to finding an average outlet. After an average outlet is found, that outlet can be set to each specific ideal velocity that was calculated for all speeds/modes on previous pages.

1. Ensure all zone dampers & outlets are fully open.

2. Jumper or set thermostat to cooling speed.

3. Energize Air Handler.

4. Using the following chart, fill in outlet location and outlet velocities. HE outlets should go in the HE column (A) and 2” outlets in the 2” column (B).

5. When all outlet velocities are recorded, pick a column (A or B) with the most outlets.

6. Total all velocities in the selected column.

7. Then divided by the number of outlets in the selected column. This equals the average velocity of the selected column.
   ______FPM or knots ÷ ___ Number of outlets
   = ______FPM or knots Average Velocity

8. Now that the average velocity of the selected outlet type has been determined, from the column chosen select one outlet that is closest to the average velocity.

9. The average outlet is outlet #____

10. Now that the average outlet has been found, set this outlet to the determined “velocity per outlet” that was calculated in the preliminary system information section above.

11. This will have to be done for all speeds/modes.

Conversion Factors	
Knots to FPM =	x 100
FPM to Knots =	÷ 100
FPM to CFM of 2” outlets =	x 0.022
FPM to CFM of HE outlets =	x 0.042
Knots to CFM of 2” outlets =	x 2.2
Knots to CFM of HE outlets =	x 4.2

		Outlet Velocity	
Outlet #	Outlet Location	HE (A)	2” (B)
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			
17			
18			
19			
20			
21			
22			
23			
24			
25			
26			
27			
28			
29			
30			
31			
32			
33			
34			
35			
36			
37			
38			
39			
40			
Columns Total Velocity =			
Columns Total CFM =			
Grand Total CFM =			

Confirming Air Flow

		Outlet Velocity (Cooling)		Outlet Velocity (Heating)		Outlet Velocity (Constant)	
Outlet #	Location	HE	2″	HE	2″	HE	2″
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							
13							
14							
15							
16							
17							
18							
19							
20							
21							
22							
23							
24							
25							
26							
27							
28							
29							
30							
	Sections Velocity =						
	Sections CFM =						
	Total CFM =						

Conversion Factors	
Knots to FPM =	x 100
FPM to Knots =	÷ 100
FPM to CFM of 2″ outlets =	x 0.022
FPM to CFM of HE outlets =	x 0.042
Knots to CFM of 2″ outlets =	x 2.2
Knots to CFM of HE outlets =	x 4.2

Notes:
To find total CFM, add all HE outlet velocities and all 2″ outlet velocities separate. Multiply the totaled velocity in each section by the specific conversion factor relevant to the unit of measure used. After airflow is determined, compare the finding with the desired airflow for each speed (Cooling, Heating, Constant) and adjust the system accordingly.

Hi-Velocity HE-Z User Guide

Maintenance

It is recommended to have a service contractor perform a system check in both spring and fall for the cooling and heating season, on your entire HVAC system. For any secondary components such as boilers, geothermal, tankless heaters, condensing units etc., contact the manufacturer for any maintenance recommendations.

When it comes to servicing the Hi-Velocity HE-Z System itself, only the 1" air filter requires maintenance on a regular basis. With a clean air filter, you not only have cleaner air to breathe, but you will also help maintain unit efficiency, and increase operating life. Ensure that there is always a filter in place, and check every month to ensure that the filter is clean. To clean the filters, remove from system, wash the white side and vacuum the colored side. Once the filter has been washed, vacuumed and completely dried, replace in system (colored side to face the air handler). The amount of time between filter changes/cleaning will be dependent upon the living habits of the homeowner. It is recommended to replace the filter at least annually.

Please note that a dirty filter will increase motor power draw, and may reduce air flow and system performance.

Duct Cleaning

Because of the high speed of the airflow in the supply air ductwork of the Hi-Velocity System, the cleaning of these ducts is not a requirement.

Hi-Velocity Air Purification System (HEPS)

The optional Hi-Velocity Air Purification System installs in the air-inlet side of any heating and air conditioning system. Only operation of the air handler is required for air purification to take place. It is recommended to change the UV lights every 6 months, and the Merv Filter every 12 months.

Many new homes have smart programmable thermostats that allow for automatic operation of the air handler unit when there is no demand for heating or air conditioning. It is important that the HEPS Air Purification System is operating a minimum of 20-30 minutes per hour, (24) hours per day, to remove airborne contaminants from the indoor environment. Best practice for optimum performance is to operate the heating & cooling system fan at constant on.

Hi-Velocity Outlets

There may be cases when the number of outlets needed for heating is significantly different than the amount needed for cooling. This is usually caused by a large appliance load or an excessive amount of windows. In cooling mode the outlets must be in the fully open position or there will be a loss in system performance. The vents may need to be partially closed in heating mode, or it may be necessary to close off some of the outlets. The Rough-In Boots have built in dampers and can be adjusted for room comfort. Use the damper key supplied from Energy Saving Products for easy vent adjustments.

Outlet Cleaning

Periodically, the vent plates may need to be cleaned due to dust statically attracted to the grid insert of the vent plate. The grid insert or the whole vent plate can be removed and washed with soap and water.

Directional Grill Option

If a vent outlet has been installed in a location that is bothersome to the occupant, an optional directional louvered grill is available from the manufacturer. This grill can easily be inserted in place of the standard grill insert, and will direct air away from the occupied area. For information on how to obtain louvered grills visit the website at www.hi-velocity.com to find the vendor closest to you, or contact the factory toll-free at 1-888-652-2219

For Cooling Systems Only

When located in an unconditioned space (crawl space or attic), all of the vent outlets must be closed and the return air blocked during winter shutoff times unless the constant fan is being used, to prevent condensation in the ductwork.

System Efficiency/Performance

The following steps should be taken to increase the overall system performance, and decrease system costs.

There is great benefit with using the constant fan control. This will reduce the amount of stratified air (hot and cold spots) within the home, giving you more even temperatures between floors, as well as providing constant air filtration. The amount of power actually used with this constant fan operation can be less than a 60w light bulb.

Try to maintain your house temperature within a 5 degree temperature range. Residential heating/cooling systems are designed to maintain a set temperature within the home. A big misconception that people have is to turn off their heating/air conditioning when they leave the home, and "crank" it up/down when they get home thinking that this is efficient. For a residential heating/cooling system to bring up/down the temperature drastically like this (as an example lets say more than 5 degrees), the system will have to run much longer than it would have throughout the day, therefore consuming more power and making it much more inefficient.

Sequence of Operation

The HE-Z air handler has been specifically engineered to offer maximum flexibility for each installation. Constant fan sequence can be energized from the thermostat and can draw as little as 60 watts of power. The PSB Circuit board installed in every HE-Z series air handler offers two stage heating and cooling outputs to support high efficiency boilers, condensing units and thermostats when used. The PSB circuit board also offers three independently adjusted fan speeds, constant fan, heating, cooling. Unless you are a trained professional familiar with the functionality of the PSB circuit board any adjustments made can seriously hamper the unit operation and void all warranties.

For wiring details see the HE-Z Series Installation Manual or call Technical Support at 1-888-652-2219.

NOTES:

On some thermostats there is a "fan switch" which can be set in the "auto" or "on" position. For best operational efficiency and comfort, this setting should be set to "on" to run the constant fan, but can be turned off if desired.

Fan speed priority sequence from highest priority to lowest priority is listed below:

1 – De-Humidification

2 – Cooling

3 – Heating

4 - Constant Fan

In order for the multi-speed functions on the HE-Z air handler to operate, a supporting thermostat must be used.

Timer Chip - H2 - (Flashing Green Light - L1)

The printed circuit board (PSB) within the air handler contains a timer circuit that will energize the pump for 5 minutes every 24 hours. This timer will cycle the pump on potable water systems to flush the water through the system and prevent any water stagnation. The timer circuit is equipped with a green light labeled L1 on the PSB circuit board. Pump timer status is indicated through a flash sequence, for details on this see below. If you do not need to use the timer circuit, move the jumper header on "H2" from the ON pins to the OFF pins and it will be disabled.

Operational Mode Indicator Light (Flashing Green Light - L1)

The L1 light also gives a flash code to indicate the mode of operation that the air handler is currently operating in (constant fan, heating, cooling, de-humidification).

Fan Delay – H4

The PSB circuit board has a built in optional fan delay. This will delay the fan for 20/30 seconds on a call for cooling/heating. Fan delay can be turned on and off through the H4 jumper header.

Variable Frequency Drive (VFD or Motor Controller)

The VFD is what controls power output to the fan motor. The display on the front of the VFD shows power output to the motor measured in HZ. If the display is constantly displaying an FXXX or EXX error (Example – F021) contact the manufacturer toll free at 1-888-652-2219 or consult with a factory trained installer.