PRODUCTS

SPLIT PASSIVE ENERGY RECOVERY HEAT PIPES

HRM-V™ Series

Heat Pipe Technology, Inc.

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Split Passive HRM-V™ Energy Recovery Heat Pipes

- **Passive, No Moving Parts – Except for DSO™ Option**
- **Heat and Cool or Heat Only, Cool Only Recovery**
- **Made with High Quality Copper Tubes for Reliability and Longevity**
- **Multiple Circuits for Enhanced Performance**
- **Dynamic Seasonal Offset (DSO™) Option With Integral Dampers for Equal Cool and Heat Recovery**
- **Optional Control Valves for Capacity, Defrosting, or Economizer Control**
- **Separate Liquid and Vapor Lines for Maximum Performance**
- **Flexibility in Dimensions and Configurations**
- **ZERO Cross Contamination Between Air Streams**
- **Applicable to Retrofits and New Construction**
- **Site Completion by HPT Factory Technicians**
- **AHRI Performance Certified**
- **ETL Listed to UL STD 207 and Certified to Canadian STD C22.2#140.3**

SYSTEM DESCRIPTION

Heat Pipe Technology split passive (HRM-V™) energy recovery heat pipes are an air to air heat exchange system designed to move heat from one air stream to another. Split passive HRM-V™ heat pipes provide economical and reliable recovery for summer only, winter only, or summer and winter applications, where supply and exhaust air streams are remotely located. These systems are designed for both process and comfort applications to pre-cool or pre-heat outside air using otherwise wasted heat from exhaust air. A combination of pressure differentials, circuit design, and thermosiphon effect, help circulate the working fluid from the supply air section to the exhaust air section where it changes phase from a liquid to a vapor and back to a liquid. Because of this natural phase change unique to heat pipes, the HRM-V™ system can produce higher heat transfer capabilities than a comparable water glycol system. Best of all, because they have no moving parts HPT heat pipes require minimal maintenance and provide passive, reliable energy recovery with Zero Cross Contamination.

Construction

Coil construction consists of tube and fin design with copper tubes and aluminum or copper fins. The coils are encased on top, bottom and sides with either galvanized or stainless steel casing for easy installation into air handling units or duct work. Top and bottom headers are type L copper. Header size will vary based on the capacity of the coil. Each coil is made up of two rows that make up one circuit, to be piped in a counter flow arrangement, and individually charged for maximum heat transfer effectiveness. The tubes of the coil are configured vertically with fins oriented horizontally. The HRM-V™ system can be configured with 2, 4, or 6 rows. However, a typical HRM-V™ heat pipe system will use 6-rows. Air pressure drop and fan power increase with each row. Coil depth is based on the number of rows.

Dimensions shown in fig 1, are typical. Overall dimensions vary with header size.

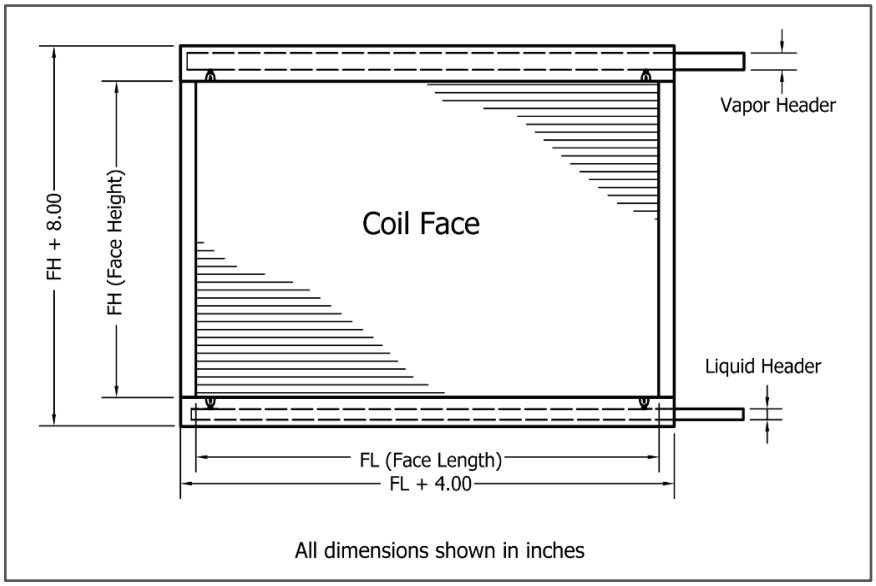
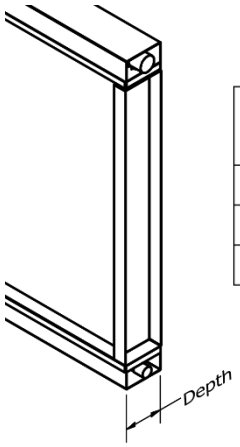


Figure 1 - Typical dimensions

- **Tubes** – 1/2 inch OD copper
- **Fins** – aluminum or copper, sine wave pattern
- **Casing** – G90 galvanized, or 304 stainless steel
- **Headers** – Type L, ACR copper, pipe sizes based on capacity
- **Coil Sizing**
- **Face Height** – maximum face height is 75” inches per coil for systems with fixed offset, 60” for the two season DSO™.
- **Face Length** – maximum face length is 155 inches per coil
- **Coatings** – E Coat, Phenolic, or other commercially available coatings are provided when specified.



Number of Rows	Coil Depth (in)
2	7.25
4	14.5
6	21.75

Figure 2 - Typical Dimensions

Installation Configurations

When installed on the same elevation, the HRM-V™ system can transfer heat in both directions, delivering summer and winter recovery. For installations where one air stream is elevated, the HRM-V™ system will work well in one recovery mode (heat or cool), with some to no recovery in the other season, depending on the vertical separation difference between supply and exhaust. Fixed offset systems tend to be the more economical and higher performing from total BTUs stand point, especially in predominantly heating recovery climates. However this is dependent on climate and specific conditions entering the system. An energy analysis should help determine which of the below arrangements will yield the best results and the lowest cost.

A. Optimized For Heat Recovery

When cooler outside air is above warmer exhaust air
-Maximum 120 ft. separation

This system is suited to mainly heat (winter) recovery climates, but usually yields the most BTUs annually even in most southern US climates. This is due to the higher temperature differential in winter recovery mode. Depending on the vertical offset between supply and exhaust, appreciable summer recovery can take place as well.

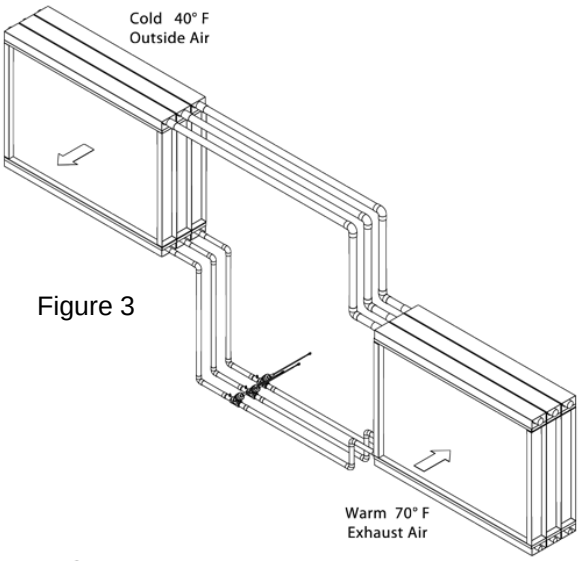


Figure 3

B. Optimized For Cool Recovery

When warmer outside air is below cooler exhaust air
-Maximum 120 ft. separation

This system is suited to mainly cold (summer) recovery climates where summers are long with high temperatures. Again, depending on vertical offset between supply and exhaust section, appreciable recovery can take place in winter as well.

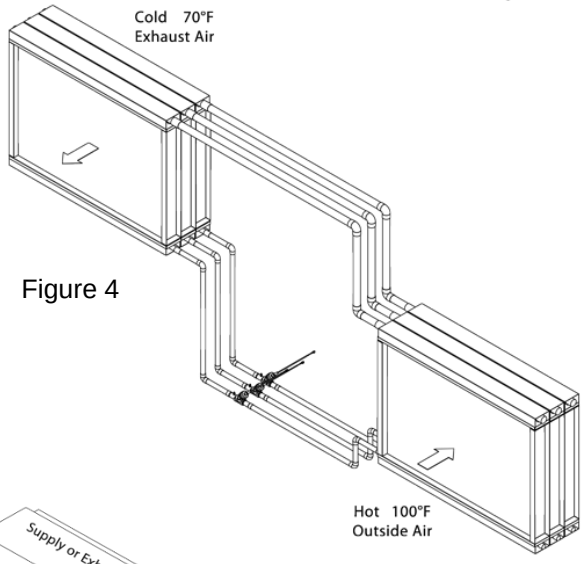


Figure 4

C. Dynamic Seasonal Offset (DSO™) For Equal Heat/Cool Recovery

When outside air is on the same elevation as exhaust air
-Maximum 120 ft. separation

This unique design allows for a side by side system where Supply and exhaust are on the same level to attain equal cool and heat recovery through a Dynamic Seasonal Offset, utilizing integral partial face dampers and actuators that optimize performance by directing air flow through sections of the heat pipes to create an offset effect. Actuators and dampers are set up to take 115 VAC signal for one mode of operation and, when power is removed, the dampers switch to their opposite state (open to close and close to open) for the other season.

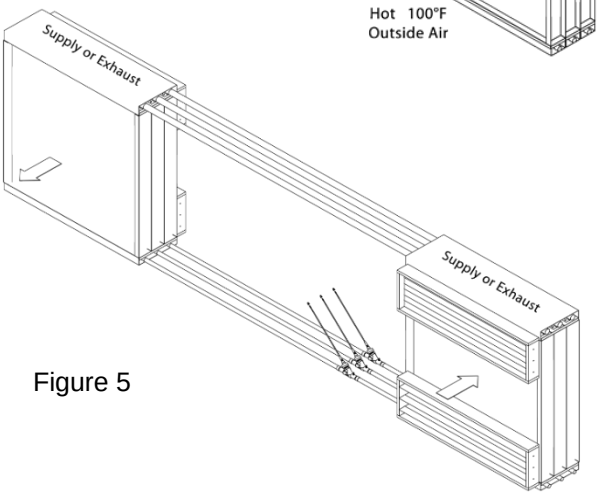


Figure 5

Comfort Energy Recovery

HPT split passive energy recovery heat pipes can be used for comfort-to-comfort or for process applications. Comfort-to-comfort applications include heating only recovery, cooling only, or more often, both heating and cooling recovery. Split passive energy recovery heat pipe systems are used for heating/cooling recovery from cold northern zones with harsh winters to the heat of more southern climates.

Process Energy Recovery

For process applications, heating/cooling recovery can also take place in either direction. Process applications frequently involve air temperatures elevated above normal room conditions. The heat pipes can be made to withstand temperatures up to 150°F. For air streams with corrosive components, the heat pipes can be provided with a protective coating. Heat pipes can also be fabricated with both fins and tubes made of copper.

Design Considerations

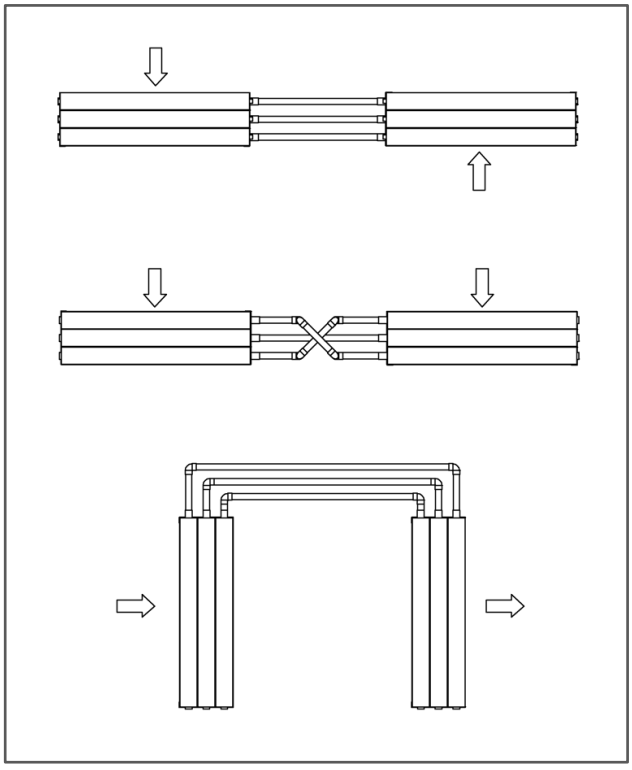


Figure 6 - Counter flow piping

The HRM-V™ system allows for multiple coil sections to be utilized for applications with larger airflows. The HRM-V™ system design permits one supply section to be used for each exhaust coil section Furthermore, supply and exhaust coils can be sized differently to handle unequal supply and exhaust airflows. Figures. For maximum heat transfer, air streams must be piped in counter flow. Counter flow operation is where two air streams are arranged such that they flow in opposite directions through the heat pipe coils. If necessary, due to design considerations, the air streams may need to flow in the same direction through the heat pipe, then counter flow can still be achieved through connecting the liquid and vapor headers in a counter flow fashion. See Figure 6. Other piping arrangements are show as well.

Operation

For an HRM-V™ system where supply and exhaust coils are located on the same level with a Dynamic Seasonal Offset ™, the integral partial face dampers and actuators will optimize performance by directing air flow through sections of the heat pipes to create an offset effect. Dampers and actuators are operated in the on/off position and installed on the dampers so, when there is no power, the system defaults to the heating optimized mode. Heat transfer is driven by air temperature differentials which cause the working fluid to change phase liquid to vapor in the warm side and from vapor to liquid in the cold side. This phase change absorbs and releases tremendous amount of energy to the air streams in both directions. The higher the temperature differential between supply and exhaust the better the system performs. Operation of heat pipes is automatic by refrigerant circulation and needs no further attention. The coils are fully pressure tested and will give many years of trouble-free operation.

System Control

HRM-V heat pipes can be selected with control valves that are installed in the liquid lines of each circuit. HPT provides a control panel that receives power (120VAC) and one or more analog signals from the Building Automation System (BAS) – both 0-10VDC and 4-20mA can be used. When fully open the valve does not restrict refrigerant flow and as the valve closes it restricts refrigerant flow with progressively larger pressure drop until it is fully closed, when there is no refrigerant flow and therefore no energy recovery.

For best control the valves can be operated using individual stages that cascade, one valve after the other, (a 6 row system could have three stages) or, for more economy, valves can be grouped.

An alternative to using valves is bypass dampers, where air is routed around the heat pipe coil to reduce the amount of energy recovery. These are not provided by HPT. A bypass damper alone is insufficient to provide a full control range. A more complete solution is full face and bypass dampers that block air from flowing though the coil whilst offering an alternate flow path. If dampers are applied in one airstream only, and if frosting is a concern, the dampers should be installed into the supply side.

The Dynamic Seasonal Offset (DSO) option is used when coils are installed level and the user wants optimized performance for both summer and winter conditions. Partial face dampers (provided by HPT) are installed in the top and bottom of each heat pipe module and direct air through the modules in a way that always places the condenser higher than the evaporator, so gravity promotes better refrigerant flow. The dampers are linked together so a single signal (115VAC supply) operates them either open or closed and, when power is removed, a spring return changes them to normally closed or normally open respectively. For example, when there is no signal power the DSO defaults to optimize for heating, when most recovery is achieved in the year in the majority of North America. With no power applied, the upper and lower supply dampers are open and closed respectively and the upper and lower exhaust dampers are closed and open respectively (see Figure 5). When the outside air temperature rises above the return air temperature, the damper positions should change to optimize for cooling.

Table 1 shows the different control scenarios seen through the year as outside air temperature changes.

Outside Air Condition	Control Type	DSO	Comments
Very Cold (e.g. <0°F)	Frost Control	Optimized for Heating	Maintain an Exhaust Air leaving temperature ≥36°F
Below Supply Air set point (e.g. <55°F)	Modulate Heating		Maintain Supply Air at set point or if not enough recovery, full performance
Economizer (e.g. ≥55°F and <75°F)	Economizer		No recovery wanted
Summer cooling (e.g. ≥75°F)	Full Recovery	Optimized for Cooling	Allow full heat pipe performance

Table 1 – Control Types for Various Outside Air conditions assuming a Supply Air Set Point of 55°F and 75°F Return Air

System Installation Logistics

Due to the split nature of the HRM-V™ system and the long distance that separates the air streams, a complete factory installation into an air handling unit is not always feasible. The heat pipe coils can be installed into air handling units at HPT or at a manufacturer's facility, and then shipped to the project location where the remaining work such as piping, and controls is completed on site. HPT trained technicians then travel to the job site to vacuum and charge the system if it passes the 48 hours pressure test. Below are guidelines for a standard scope of work involved for an HRM-V™ split passive heat pipe system installation.

Heat Pipe Technology -

1. Heat pipes, supply and exhaust which will be shipped in sections of two rows each with an upper and lower headers.
2. Stepper control valves, if required.
3. Control box that includes PCBs and transformer.
4. Dampers and actuators for Dynamic Seasonal Offset (DSO™) systems.
5. Moisture eliminators if specified.
6. Verify pressure test on site.
7. Vacuum and charge.

Equipment Vendor -

1. Space to facilitate installation into air handlers and or special sections for the exhaust heat pipes
2. Mounting and securing hard ware
3. Extended drain under both supply and exhaust

Equipment Vendor or Mechanical Contractor -

1. Receiving and installation of heat pipe coils in the supply and exhaust air streams.
2. Provide and install type L, ACR copper piping, fittings and control valves between the heat pipe

sections per HPT guidelines.

3. Insulation for all exposed piping, condensate drains including appropriate traps for both coils
4. Nitrogen for purging and pressure testing per Heat Pipe Technology's specified pipe sizes and guidelines.
5. Provide the refrigerant to charge the system per Heat Pipe Technology's estimate amount plus any extra that may be needed due to changes in estimated piping lengths.
6. Follow piping between the coils shall be run overhead and properly supported without creating traps per Heat Pipe Technology drawings and guidelines.

Drain Pans -

A drain pan is required to retrieve moisture from both supply and exhaust sides of the heat pipe coils. Due to the vertical orientation of the tubes, the fins are horizontal. Condensate does not drain to the bottom of the coil as it does with a conventional coil. The condensate can build on each fin until it is pushed away at the leaving face by airflow. Therefore, condensate management must be taken into account during the initial layout of the system. A moisture eliminator or an extended drain pan should be utilized for capturing condensate.

Filters

To ensure a clean fin surface and optimal performance, suitable filters should be installed. Filter racks should be placed upstream of the supply and exhaust coils even if the exhaust is from clean indoor air. The types of filters should be compatible with the specific environmental conditions for a given application. It is recommended that inspection doors be installed adjacent to the heat pipe on both supply and exhaust sections.

Selection Criteria

The effectiveness of the heat pipe system expressed in a percent is the ratio of the amount of heat transferred to the amount of heat available. The predicted effectiveness is calculated for a system based on the below design parameters. Several factors go into the effectiveness calculation and if these factors change, the expected effectiveness can change. Construction variables such as difference in coil dimensions between supply and exhaust will impact the calculated effectiveness. Unequal airflows between the supply and the exhaust will also change the effectiveness.

- Air face velocity
- Number of rows
- Fin type and density
- Working fluid
- Ratio of supply and exhaust airflows
- Temperature differential between supply and exhaust. The higher the differential, the better is the effectiveness.

Features

Passive Operation

No energy input is required to operate the heat pipes (except for the dampers in the DSO option). When two air streams pass through the heat pipe, with one air stream through one coil and the other air stream through the other coil, the temperature difference between the two air streams activates the heat pipes and causes them to exchange heat. Heat pipe operation utilizes the heat capacity available when the working fluid changes phase, from a liquid to a vapor and back again. Because heat pipes use a phase change fluid, more heat transfer is achievable than with convection flow.

Long Life

There is nothing in the heat pipes to break or fail! They provide passive heat recovery where the only moving parts are the working fluid inside the tubes and the air to be treated. To guard against corrosion, the heat pipes can be ordered with a protective coating.

No Cross Contamination

Spilt passive energy recovery heat pipes are suitable for all applications, especially those where cross contamination is not acceptable. Airstreams can be located remotely with a horizontal and/or vertical separation to completely isolate hazardous exhaust from fresh intake air. Heat Pipe Technology also offers coatings and special materials of construction to protect coils from contaminated exhaust airstreams.

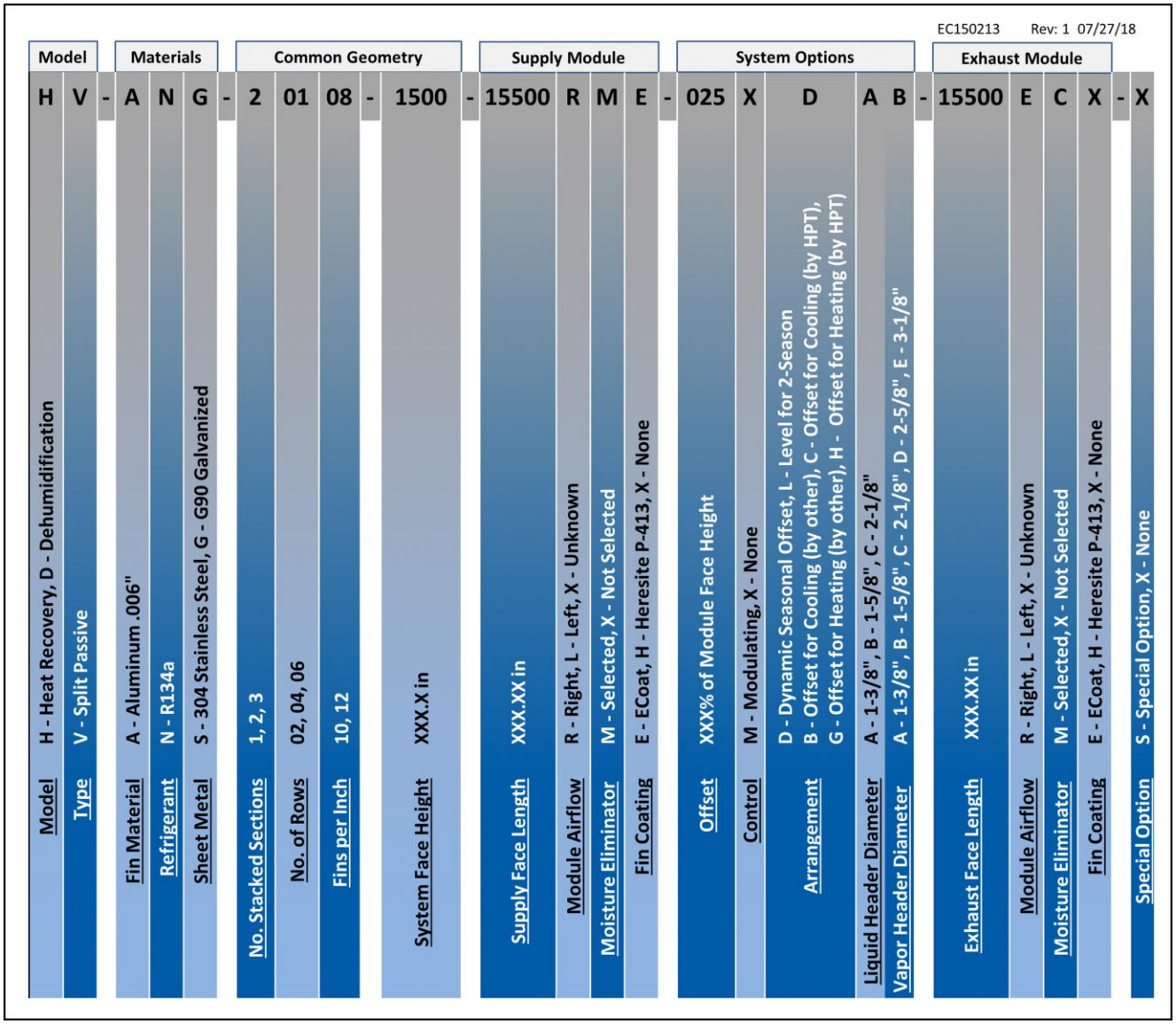
Minimal Maintenance

Since the heat pipes have no moving parts (except for optional dampers or control valves) no complex maintenance is needed. A periodic cleaning is the only required maintenance. A coil cleaner may be applied for this purpose just as for any cooling coil.

Design Flexibility

Split passive energy recovery heat pipes are custom designed for your particular application. Heat Pipe Technology's manufacturing processes offer variations in materials of construction, fin density, circuiting, working fluids, and configurations. And since split passive heat pipe systems are suitable for remote supply and exhaust airstreams, they provide more design flexibility for applications where large ductwork cannot be positioned side-by-side.

Order Code - Split Passive System



EC150213 Rev: 1 07/27/18

Model			Materials				Common Geometry					Supply Module					System Options						Exhaust Module					
H	V	-	A	N	G	-	2	01	08	-	1500	-	15500	R	M	E	-	025	X	D	A	B	-	15500	E	C	X	-	X

Model	H - Heat Recovery, D - Dehumidification
Type	V - Split Passive
Fin Material	A - Aluminum .006"
Refrigerant	N - R134a
Sheet Metal	S - 304 Stainless Steel, G - G90 Galvanized
No. Stacked Sections	1, 2, 3
No. of Rows	02, 04, 06
Fins per Inch	10, 12
System Face Height	XXX.X in
Supply Face Length	XXX.XX in
Module Airflow	R - Right, L - Left, X - Unknown
Moisture Eliminator	M - Selected, X - Not Selected
Fin Coating	E - ECoat, H - Heresite P-413, X - None
Offset	XXX% of Module Face Height
Control	M - Modulating, X - None
Arrangement	D - Dynamic Seasonal Offset, L - Level for 2-Season B - Offset for Cooling (by other), C - Offset for Cooling (by HPT), G - Offset for Heating (by other), H - Offset for Heating (by HPT)
Liquid Header Diameter	A - 1-3/8", B - 1-5/8", C - 2-1/8"
Vapor Header Diameter	A - 1-3/8", B - 1-5/8", C - 2-1/8", D - 2-5/8", E - 3-1/8"
Exhaust Face Length	XXX.XX in
Module Airflow	R - Right, L - Left, X - Unknown
Moisture Eliminator	M - Selected, X - Not Selected
Fin Coating	E - ECoat, H - Heresite P-413, X - None
Special Option	S - Special Option, X - None

Split Passive HRM-V™ Energy Recovery Heat Pipes

ENGINEERING SPECIFICATIONS

HRM-V™ Series with Permanent Offset or Dynamic Seasonal Offset ™ (DSO™) Option and Control Valves

1. GENERAL

❑ Air Handler(s) ❑ Packaged Air Conditioning Equipment shall be equipped with Energy Recovery Heat Pipes supplied by Heat Pipe Technology, Inc. to transfer heat from the exhaust air to the incoming supply air. Supply and Exhaust heat pipe sections are separated horizontally on the same level or separated horizontally and vertically as specified below:

❑ Level, with Dynamic Seasonal Offset ™ (DSO)™: Supply and exhaust are on the same level equipped with integral partial face dampers and actuators on supply and exhaust sections, as specified, for optimized performance and to attain equal amounts of recovery for both heating and cooling. Optimized performance shall be achieved in both heating and cooling seasons by using the dampers to direct flow through sections of the heat pipes to create an offset effect, thus enhancing performance. Actuators and dampers are set up to take 115 VAC signal for one mode of operation and, when power is removed, the dampers switch to their opposite state (open to close and close to open) for the other season.

❑ Fixed offset installation whereby supply side is elevated higher than the exhaust side, as specified, for optimized recovery in heating mode with some or no recovery in the cooling mode.

❑ Fixed offset installation whereby exhaust side is elevated higher than the supply side, as specified, for optimized recovery in cooling mode with some or no recovery in heating mode.

Energy recovery heat pipes shall be tested and certified to AHRI standard 1060. Performance printouts as well as the product itself to carry AHRI 1060 compliance logo. Documents showing testing in accordance with AHRI 1060, but not certified by AHRI, will not be acceptable. Any deviation from the specifications must be approved by the engineer no less than ten days prior to the project bid date. No consideration of alternates will be given after that time. Heat pipes shall be completely manufactured and fully assembled at the manufacturer's facility by factory personnel.

2. CONSTRUCTION

❑ Coil tubes shall be oriented vertical and the fins run horizontal. Each two rows shall be manifolded together into one liquid line at bottom and one vapor line at top and constitute one circuit. Lines shall be sized according to the performance requirements of the circuit. Each heat pipe section

shall be installed level and connected to the other section by two horizontal copper lines, for each circuit, one for liquid and one for vapor. ❑ Extended drain pans (by others) to be provided downstream of supply as well as exhaust sections, or ❑ Moisture eliminators shall be installed immediately downstream of the supply and exhaust sections of the heat pipe to capture condensate that may spit from the heat pipe fins. Condensate shall drain out of the bottom into a drain pan (supplied by others). The moisture eliminator shall be capable of capturing at least 99.75% of condensate when the coil is producing condensate at a rate of 0 to 15 lbs. water/sqft/hour and coil airflow is ≤ 700 SFPM. Static pressure loss shall not exceed 0.18 in. wg. at 500 SFPM.

The moisture eliminator blades will be constructed of ABS plastic and meet UL Standard 94 classification V-0, which requires blades to self-extinguish within 10 seconds. It will incorporate an additive that protects against fungal and bacterial deterioration to provide long-term protection against fungal and bacterial attack and help prevent surface growth, permanent staining, embrittlement and premature product failure. The anti-fungal and anti-bacterial additive shall be mixed with the polymer and shall not be a coating, which could wear off over time.

3. OPTIONAL MODULATING CONTROL VALVE FEATURE

All or a portion [SPECIFY] of the Heat Pipe circuits shall be equipped with modulating control valves to control the operation of the Heat Pipe circuits. Each circuit shall have one modulating step motor valve in the lower liquid line in an accessible location. Each valve will connect to a control printed circuit board in a NEMA 12 enclosure that contains the number of control boards to control all valves in the system and the appropriate power conversion. The customer supplied electrical power to the control panel power supply transformer shall be: ❑ 120 VAC ❑ 208 VAC ❑ 230 VAC 1 phase 60 Hz. The NEMA box shall be located on the ❑ exterior or ❑ interior surface of the equipment cabinet as indicated ❑ or on a nearby surface.

The Building Automation System (BAS) shall provide the sensors necessary for determination of heat pipe modulation operation and the BAS computer shall be programmed to send the operating control signals to the modulating valves' control boards as required for correct system operation. The control signal shall go through a BAS interface installed near the heat pipe NEMA box. The BAS control signal provided shall be ❑ 0 to 10 volt DC or ❑ 4-20 mA.

All additional wiring shall be provided and installed by others. With all control valves open, the energy recovery heat pipe assembly will operate at full capacity. Modulating one valve closed restricts the liquid return flow and reduces the heat transferred by the heat pipe until closing the valve shuts off that circuit. Frost control, if needed, is accomplished by closing or shutting off one or more circuits. Economizer operation is also accomplished by shutting off circuits to achieve desired heat transfer.

4. HEAT PIPES

1) The Heat Pipe supplier shall have a minimum of 5 years of experience designing, manufacturing, and installing Heat Pipes specifically for split energy recovery applications. Heat pipes must be manufactured and assembled at the heat pipe supplier's own facility by supplier's own staff.

2) The tubes shall be copper only, of specific design for Heat Pipe application, permanently expanded onto the fin collar to form a firm, rigid, and complete pressure contact at all operating conditions. Aluminum tubes will not be allowed.

3) The fin surface shall be continuous plate type ❑ aluminum or ❑ copper fins of specific design to produce maximum heat transfer efficiency for Heat Pipe applications. Airside pressure loss shall be as given on the schedule, or otherwise specified. Fin density and the number of rows of tubes shall be as specified.

4) The Heat Pipe modules shall have an optional protective coating of ❑ E-Coat, similar to Electrofin or ❑ phenolic, similar to Heresite. Heat pipes shall be dipped and completely submerged to insure full coverage of coating - spray coatings are not acceptable.

5) Heat transfer fluid shall be classified as Safety Group A1 in ASHRAE Standard 34-2013.

6) Heat Pipe capacities, entering and leaving dry and wet bulb temperatures, and face velocity shall be as specified.

7) The Heat Pipes shall be installed as specified.

8) Frames and mounting structure shall be minimum 16 gauge ❑ galvanized steel or ❑ stainless steel.

9) Heat Pipe interconnecting piping and circuitry shall be as specified by Heat Pipe Technology design. Each circuit shall be individually processed, charged, hermetically sealed, and tested.

10) The heat pipe system shall be pressure tested on site under the supervision of the manufacturer's crew. Manufacturer's crew shall vacuum and charge the system. Vacuuming and charging by parties other than the manufacturer's own crew shall not be acceptable.

11) Scheduled effectiveness or heat recovery shall be met at a minimum and total pressure drop shall not be exceeded. The resulting Recovery Efficiency Ratio, or RER, shall therefore be met at a minimum.

12) The Heat Pipes shall be ETL listed to UL standard 207 and CSA C22.2.140.3.

13) The Heat Pipe heat exchanger shall have a five (5) year limited warranty. All components such as valves and dampers shall carry a 12 month warranty.

Split Passive HRM-V™ Energy Recovery Heat Pipes

INSTALLATION LIST

Recent Installations

State	City	Location
Alberta	Edmonton	Edmonton Clinic
	St. Albert	Fountain Park Recreation Centre
Colorado	Colorado Springs	Valor Gym
	Denver	Data Center
Florida	Orlando	VA Hospital
	Gainesville	UF Pathogen
Idaho	Idaho Falls	Idaho National Laboratory
Illinois	Waukegan	Lake City Permit
	University Park	Governors State University
Indiana	South Bend	Notre Dame Innovation Park
Maryland	Germantown	Montgomery College
	Fairfax	Fairfax City Hall
	Towson	Towson University
Massachusetts	Chatham	Chatham WWTP
Minnesota	Hinckley	Hinckley Elementary School
Nebraska	Lincoln	McPhee Elementary School
	Lincoln	Whittier Building
New York	New York City	PS 276
North Carolina	Kings Mountain	Infocrossing Data Center
	Chapel Hill	University of North Carolina Locker Room
	Greenville	Vector Mau
North Dakota	Grand Forks	University of North Dakota Dorms
Ohio	Columbus	Franklin County Courthouse
Ontario	Scarborough	St. Sylvester School
Pennsylvania	Mansfield	Mansfield University
Tennessee	Franklin	Franklin Police Department
Texas	Houston	Lone Star College
Virginia	Charlottesville	University of Virginia IRDF
Washington	Lynnwood	Edmonds Community College
	Seattle	Madrona Pathfinder Elementary School
	Seattle	James Monroe Elementary School
	Seattle	Hawthorne Elementary School
Wisconsin	Wausau	Wausau School District
Wyoming	Laramie	University of Wyoming Berry Center

Split Passive HRM-V™ Energy Recovery Heat Pipes
(Heat Exchangers Only)
Five-Year Limited Warranty

Subject to the following conditions, **Heat Pipe Technology, Inc. (HPT)**, warrants this product to be free from defects in material and workmanship for a period of FIVE YEARS from the date of installation but not to exceed 90 days from date of shipment for the heat exchangers only and 12 months for HPT supplied valves, control box, dampers, and actuators. This warranty is in lieu of all other warrants not expressly set forth herein, whether expressed or implied by operation of law or otherwise. In the event this product fails under normal use and service within the applicable period, HPT will correct, repair or, at its sole discretion, replace the defective product or refund the purchase price of products which are returned freight prepaid to HPT for inspection, when accompanied by proof of purchase and written claims of defect, and which upon inspection by HPT, do comply with the terms of this warranty.

This warranty applies to the first retail buyer and extends to any subsequent owners of the systems.

The cost of replacement parts or components shall be determined by the price schedule in effect at the time of submission of warranty claim.

Repair or replacement parts will be furnished F.O.B. factory in all cases.

If HPT elects to replace or provide a refund, the defective product must be returned to HPT free and clear of liens or other encumbrances.

Limitations on Liability

This warranty does not cover and no warranty is made with respect to:

A. Failures not reported to HPT within the period specified above;
B. Failures or damage due to misapplication, misuse, abuse, improper storage or handling, abnormal conditions of temperature, water, dirt, corrosive substances or other contaminants;
C. Products which have been repaired with parts or materials not furnished or approved by HPT or by its authorized dealers or representatives, or products which have been in any way tampered with or altered;
D. Products damaged in shipment or storage or otherwise without fault of HPT;
E. Normal maintenance as outlined in the installation and servicing instructions or owner's manual including coil cleaning, filter cleaning and periodic flushing of systems;
F. Damage or repairs required as a consequence of faulty installation or application by others;
G. Damage or repairs required as a consequence of any misapplication, abuse, improper servicing, unauthorized alteration or improper operation;
H. Damage as a result of floods, winds, fires, lightning, accidents, corrosive atmosphere or other conditions beyond the control of HPT;
I. Damage resulting from freezing of domestic water or condensate, inadequate or interrupted water supply, use of corrosive water, fouling or restriction of the water circuit by foreign material or like causes;
J. Damage resulting from operation with an inadequate supply of air or water;
K. **Dampers or other mechanical options.**

HPT total responsibility for any claims, damages, losses or liabilities related to the product covered hereunder shall not exceed the purchase price of such product. In no event shall HPT be liable for any special, indirect, incidental or consequential damages of any character, including but not limited to loss of use of productive facilities or equipment, lost profits, property damage, transportation, installation or removal, lost production, or personal injury whether suffered by Purchaser or any third party. HPT disclaims all liability for any and all costs, claims, demands, charges, expenses or other damages, either direct or indirect, incident to personal injury or property damage arising out of any cause of action based on strict liability.

Some states do not allow the exclusion or limitation of incidental or consequential damages or limitations on how long an implied warranty lasts, so the exclusion or limitation above of consequential damages or the limitation of time above on implied warranties may not apply to you.

This warranty gives you specific legal rights and you may have other rights which may vary from state to state.

Split Passive HRM-V™ Energy Recovery Heat Pipes (Coils Only)

Warranty Registration

To ensure your warranty protection, please fill in the Warranty Registration Form and mail or e-mail it to:

Heat Pipe Technology, Inc.
6904 Parke East Blvd.
Tampa, FL 33610
info@heatpipe.com
Phone: (813) 470-4250

WARRANY REGISTRATION FORM	
Customer Name:	
Customer Address:	
Phone: ( ) -	Fax: ( ) -
Please check one: ☐ Homeowner	☐ Dealer
Serial No:	Model No:
Type of Product:	
Date of Installation:	Dealer/Installer:
Name & Address of Dealer/Company You Purchased from	
Name:	
Address:	
Customer Signature:	