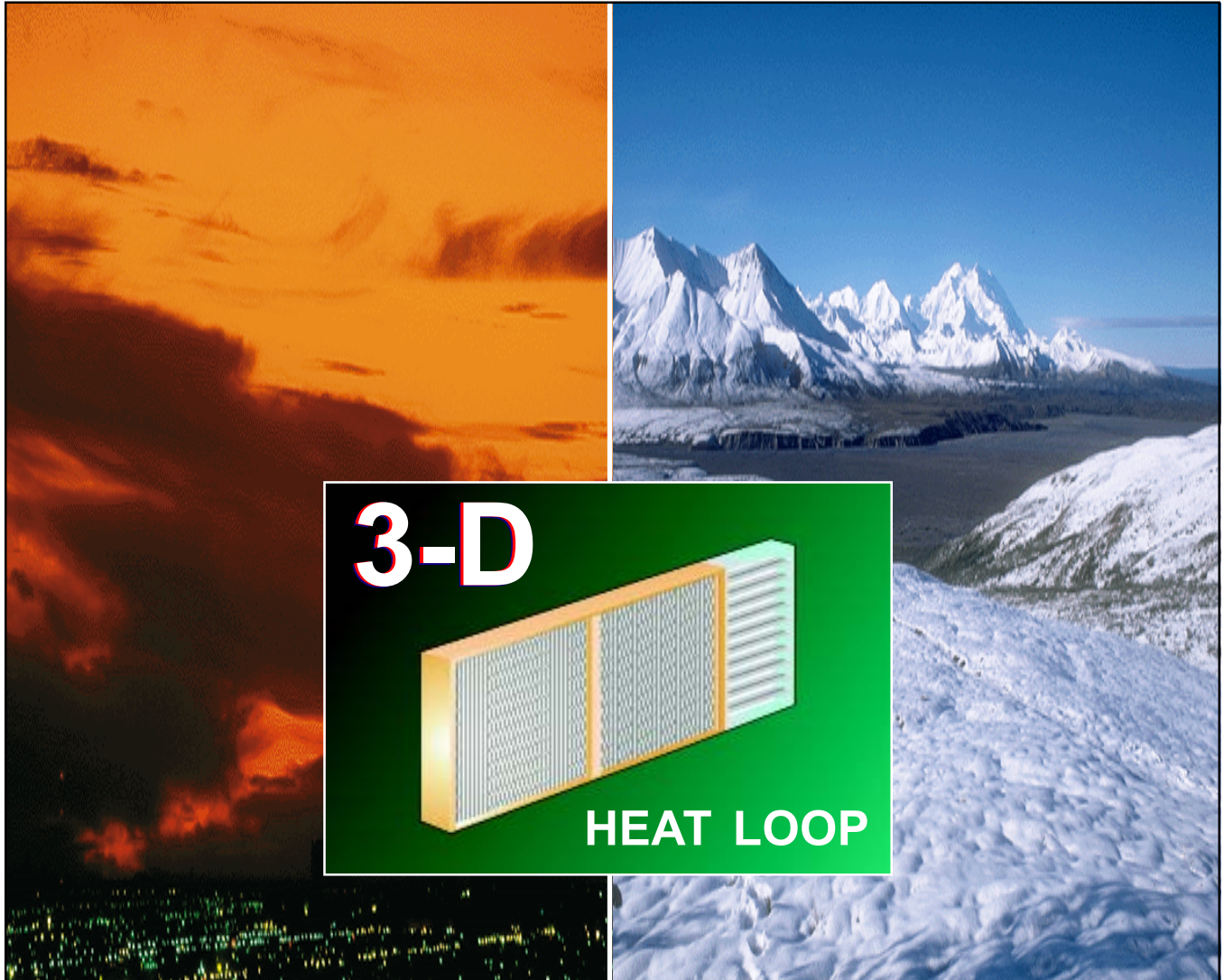


# **New** Series 2000 Controllable Heat Pipes for Energy Recovery Ventilation



**All Season Economizer Ventilation**  
Winter Heat Recovery / Summer Cooling Recovery



An Indoor Air Quality Product



**Heat Pipe  
Technology, Inc.**

*Introducing a new controllable low air pressure drop heat pipe:*

## The 3-D Heat Loop™ by HPT

### *Past methods and obstacles*

In cold climates recovering heat with heat pipes has proven to be reliable and economical, but had several drawbacks. Historically, a large difference between indoor and outdoor temperature was needed to justify the high blower energy as well as long hours of operation to justify the initial cost. Heat recovery in cold climates also required some form of frost control which was usually achieved by tilting the heat pipe array. The tilting mechanism was cumbersome, duct-work became complicated by flexible connections and the cost of the mechanism itself was often a considerable portion of an installation.

### *The new static controllable heat pipes from Heat Pipe Technology*

A new generation of controllable heat exchangers based on the **3-D Heat Loop™** by Heat Pipe Technology is opening doors to new applications with low air pressure drop, compact design, high effectiveness and trouble-free static installation.

The **3-D Heat Loop** is a breakthrough in multi-row heat pipe design, where the “pumping” of the working fluid is achieved not only by the differences of temperature between the two air stream, but also by the  $\Delta T$  between rows in the **same air stream**. By using the pumping forces from side to side and from front to back of the finned packs, the 3-D can transfer *two to three times more mass of working fluid* while using the same tubing diameter. (No mechanical pumps are used).

**Result:** *More capacity requiring less space, with lower air drag and less cost.*

The lower air drag and higher effectiveness invites many new applications. Heat recovery in moderate climates as well as cooling recovery for summer operations will pay for itself.

'3-D' because the Heat Loop is 3-Dimensional, Transferring heat both side to side and front to back!

### **Basic Comparison Information**

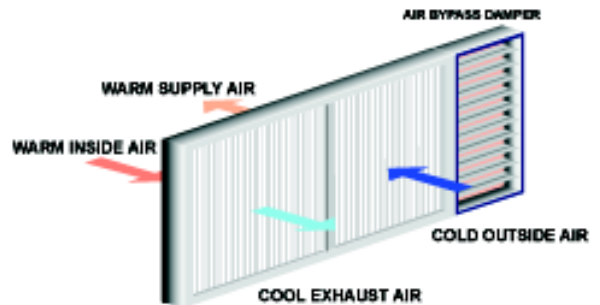
Many types of heat exchangers are available to perform heat recovery. However, each type of heat exchanger has certain advantages and drawbacks:

- **Heat pipes** offer all the benefits combined: no moving parts, high effectiveness, low air-pressure drop, easy drainage of condensation, no energy requirement, are totally passive and have zero cross-contamination. They are also proven to be long lasting and virtually maintenance free!
- **Run-around** loops are fairly inexpensive, but required a pump with inherent problems such as leakage and air bubbles in the line. Run-around loops used in cold climates must be filled with costly anti-freeze to prevent freeze damage and require an expansion tank. The energy to run the pump could be considerable.
- **Plate-to-plate** heat exchangers are quite effective, but are bulky, expensive and very difficult to clean. They can trap condensate resulting in the growth of molds.
- **Heat recovery wheels** are maintenance intensive and are prone to cross-contamination (and they do not effectively drain condensation.)



## Winter Heat Recovery Using Air By-Pass for Defrost

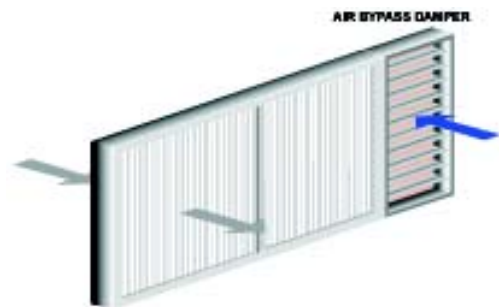
Using air by-pass combined with controlled reduced air flow over the coil rather than tilting, defrosting can be done with more precision and only as needed. Even in defrost mode, the 3-D Heat Loop still works, but stops short of 32°F to allow for ice melting! In contrast to traditional heat pipes which simply turn on and off, this new method of defrosting drastically improves the effective work hours.



## For Moderate Seasons...

Because indoor air quality is a year long concern and is not geographically limited, the 3-D Heat Pipe Loop is designed to work everywhere under all weather conditons.

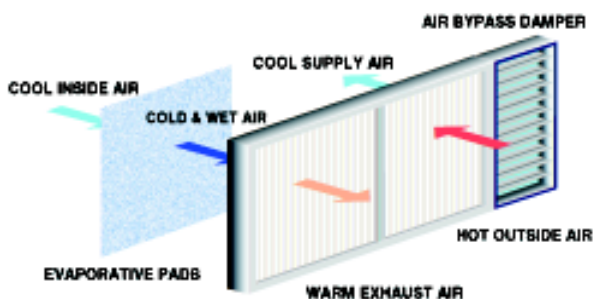
The air by-pass dampers also allow for “economizer” cycles when outdoor air is appropriate for direct cooling and high ventilation rates. This simple feature brings many hours of free air conditioning in moderate weather while naturally improving IAQ.



## Summer Cooling Recovery!

Traditionally, summer cooling recovery has eluded the HVAC designer because of the small difference of temperature between outdoors and indoors.

Now, with the 3-D Heat Loop, higher effectiveness in cooling recovery is possible, especially with evaporation of condensate from the main AC in the outgoing air stream. Condensation from the AC system is used to depress the temperature of the outgoing air stream to its wet bulb temperature, typically doubling the effectiveness of the heat exchanger.

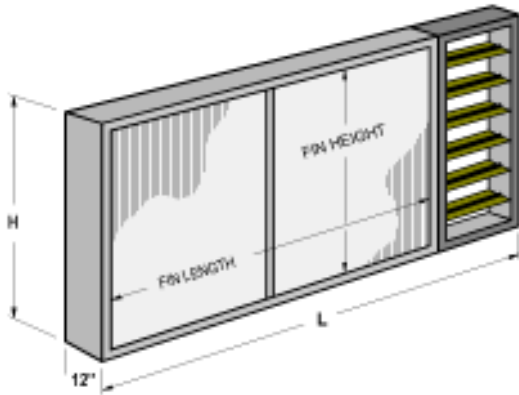


Condensate re-evaporation can be achieved directly by spraying condensate on the heat pipe or indirectly by the use of an evaporative pad. This option allows for operation in a much greater temperature range and extended hours of operation.



## New Series 2000 3-D Heat Loop™ Modules with 70%+ Effectiveness

The new Series 2000 Modules come with 8- row standard heat pipes made of copper tube with integral wicking structure, aluminum fins and galvanized steel frames and drain pans. With the patented 3-D design, the new Series 2000 match the effectiveness of heat wheels with no moving parts!



### Options:

- Anti-corrosive coatings
- Filter racks, directional louvers
- Custom sizes available
- Fresh air by-pass dampers with activators
- All or half copper fins with stainless steel end plates and drain pan

*"If standard sizes do not fit your needs, we will custom design for you."*

STANDARD 8-ROW MODULES SENSIBLE EFFECTIVENESS				
Face Velocity FPM (ft/min)	Pressure Drop (in. of H <sub>2</sub> O)	Sensible Effectiveness		
		Winter %	Summer Dry %	Summer with Spray %
200	0.17	0.75	0.72	0.86
300	0.33	0.70	0.68	0.85
400	0.54	0.67	0.64	0.83
500	0.78	0.63	0.62	0.82
600	1.06	0.61	0.59	0.81

### Calculation for Other Row Options:

Multiply Effectiveness by 0.90 for 6 Row  
 Multiply Effectiveness by 0.75 for 4 Row  
 Multiply Effectiveness by 0.48 for 2 Row

Multiply Pressure Drop by 0.75 for 6 Row  
 Multiply Pressure Drop by 0.50 for 4 Row  
 Multiply Pressure Drop by 0.25 for 2 Row

### Calculation of Temperature Recovery for Even Flow:

Winter

°F Energy Recovery = (outgoing °F - incoming °F) x Effectiveness Winter

Dry Summer

°F Energy Recovery = (incoming °F - outgoing °F) x Effectiveness Summer Dry

Sprayed Summer

°F Energy Recovery = (incoming °F - outgoing °F) x Effectiveness Summer Spray

## Application Examples



Manufacturing



Schools



Hospitals



Restaurants



Offices



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