

### Are uncontrollable humidity problems costing you a bundle?

Why put up with humidity problems when you can have true climate control with the installation of an FHP water source heat pump with the **Hot Gas Reheat Option (Humidimiser option)**.

When your FHP unit contains this Underwriters Laboratory (UL) approved optional feature...your normal air conditioning cycle converts, as required, to an air drying operation.

Your FHP unit with the **Humidimiser** option will provide cooling, heating, and dehumidification by setting our combination thermostat/humidistat control.\*\*

This option is available on the full range of FHP products.

This option is ideal for any application where a high level of dehumidification is required. Typical applications are:

- Indoor Pool Areas\*
- Outside/Make-Up Air Applications\*\*
- Computer Rooms
- Hotel rooms during non-occupancy

\* Note: Special coil and/or cabinet coating may be necessary

\*\* Note: Cooling always takes priority over dehumidification.



ISO 9001:2000 Certified

### FHP MANUFACTURING COMPANY

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heat pumps



**ENERGY WISE  
HVAC EQUIPMENT**

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**SAFETY APPROVALS:**

This factory installed option is Underwriter Laboratories (UL), (CUL) and The City of New York Materials Equipment Acceptance Division (MEA) safety listed.

**COMMON REHEAT APPLICATIONS:**

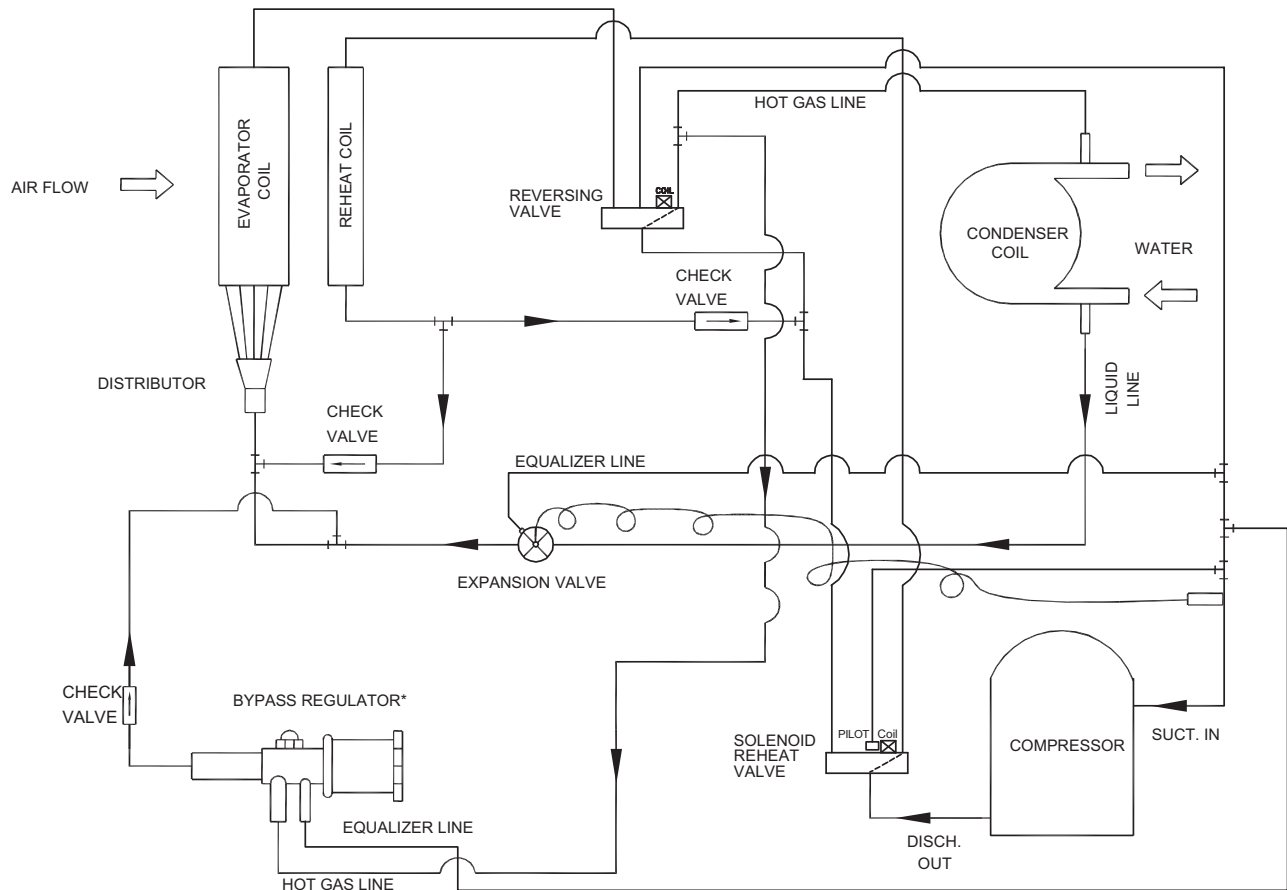
Below are a list of common reheat applications:

- Indoor swimming pool space conditioning.
- Computer room space conditioning.
- Auditoriums, theaters, etc... with large latent load requirements.
- Outside air units delivering air directly to the space.
- Any location where humidity infiltration is a problem.

**REHEAT FUNCTION:**

The reheat function is utilized to maintain a specified humidity level within the conditioned space. When in the reheat mode the return air from the space is cooled, dehumidified and reheated. By reheating the air along a constant sensible heat line the relative humidity of the leaving air is reduced. The leaving air dry bulb temperature is usually 2 to 5 degrees F. cooler than the return air temperature. This will vary model by model. This cycle will continue until the humidistat is satisfied.

**HUMIDIFIER**  
 HOT GAS REHEAT  
 APPLICATION MANUAL  
 ISO 9001:2000 Certified



\*Optional

( Figure #1 )

The amount of moisture removal capacity of a specific heat pump is determined by the the unit latent capacity rating. A heat pumps latent capacity can be determined by reviewing the heat pump specification data sheets. Depending upon the entering water and air conditions a total and sensible capacity can be interpolated from the data sheets. Subtracting sensible capacity from total capacity yields latent capacity. Dividing the latent capacity by 1069 (BTU/LB of water vapor at 80° DB and 67° WB moist air enthalpy) yields the amount of moisture removal in pounds per hour.

### REFRIGERANT FLOW PATH:

In the cooling and heating modes the refrigerant flow path is identical to standard heat pumps. In the reheat mode the compressor discharge gas is diverted through the reheat valve to the reheat coil which is located behind the primary air coil. The hot gas then passes through the water to refrigerant coil. At this point the rest of the cooling cycle is completed. There are (2) check valves to prevent refrigerant flow into the reheat coil during standard cooling/heating cycles. A small copper bleeder line is connected to the outlet line of the reheat coil and between the expansion valve outlet and distributor to the air coil. This line is necessary to let any liquid that may have migrated to the reheat coil during reheat to escape during standard cooling/heating modes. (See Figure #1)

### SEQUENCE OF OPERATION:

Three modes of operation are available with heat pumps equipped with hot gas reheat. They are as follows:

- Cooling mode only
- Heating mode only
- Cooling mode in conjunction with hot gas reheat mode

### COOLING MODE:

On a call from the front end controller for cooling the blower relay is energized through the "G" circuit run through the normally closed contacts on the reheat relay. The reversing valve is energized through the "O" circuit. The compressor contactor is energized through the "Y" circuit which energizes the cooling relay coil closing the cooling relay normally open contacts and energizing the compressor contactor from the "R" side of the transformer. At the same time the reheat solenoid valve is disabled by opening the normally closed contacts of the cooling relay. (Note: On most front end controllers the "O" terminal is constantly energized when the system's switch is in the cooling position or the auto position.)

## HEATING MODE:

On a call from the front end controller for heating the blower relay is energized through the "G" circuit run through the normally closed contacts of the reheat relay. The reversing valve is de-energized by the absence of the "O" circuit signal. The rest of the sequence is identical to that of cooling. (Note: The compressor contactor is still energized through the cooling relay contacts.)

## REHEAT MODE:

On a call from the front end controller (humidistat signal) the reheat relay coil is energized through the "H" circuit. The blower relay is energized through the "R" side of the transformer run through the normally open contacts of the reheat relay coil. The "O" circuit is energized thus energizing the reversing valve. The compressor contactor is energized through the "R" side of the transformer run through normally open contacts on the reheat relay. The cooling relay remains de-energized thus the reheat solenoid is enabled. (Note: The reheat mode always operates simultaneously with the cooling mode.)

## FRONT END CONTROLLERS: (THERMOSTATS & HUMIDISTAT)

There are many ways to control heat pumps with hot gas reheat. You should choose the means that best fits your specific application.

(Figure #2) illustrates one possible control sequence. Most other heat pump compatible thermostats in conjunction with a humidistat is acceptable for use, (Note: "O" output for reversing valve energized in cooling mode required.)

## SPECIAL CONSIDERATIONS:

Some applications require special attention to maximize the performance of the hot gas reheat function:

- Low Temperature Well Water
- Indoor Pool Dehumidifying During Winter Months (Re: Heating Mode)
- Heating To Reheat Circuit

Consult the factory for special application considerations.

## LOW TEMPERATURE WELL WATER:

When low temperature well water is utilized as the water source (below 55 degrees F), a means of establishing (2) two flow rates, (1) one for the cooling/reheat mode and (1) one for heating mode is recommended. In the cooling mode at low entering water temperatures and standard flow rates discharge pressures and corresponding discharge gas

temperatures are relatively low. At these conditions when the reheat mode is initiated the low temperature discharge gas can condense in the reheat coil thus yielding minimal reheat capacity. A means to reduce the water flow rate and elevate the discharge pressure/ temperature in cooling/reheat mode should be provided. Conversely, at low entering water temperatures in the heating mode system suction pressure is reduced causing a loss in heating capacity. A means of providing higher flow in the heating mode should be provided. The simplest way to accomplish the above is to install water regulating valves.

## INDOOR POOL DEHUMIDIFYING DURING WINTER MONTHS (RE: HEATING MODE):

It is important to remember that when in the reheat/dehumidification mode the heat pump is cooling and reheating. A secondary means of heating the space during the dehumidification mode should be provided. The indoor space temperature should be kept at least (2) degrees F above the pool water temperature. If this is not done the warm pool water attempts to heat the space and the humidity levels increase exponentially. The heat pump is normally sized to handle the design latent load moisture removal. A second heat pump or resistance heat should be provided to handle the structures shell loss load. A water to water heat pump pool heater can be provided to heat the pool. If questions arise on an indoor pool space conditioning application, please consult the factory for engineering assistance.

**NOTE:** BRONZ-GLOW COATING IS HIGHLY RECOMMENDED FOR ALL POOL APPLICATIONS DUE TO THE HIGHLY CORROSIVE CHEMICAL ENVIRONMENT.

Cabinet and coil fins are warranted for 1 year. FHP will not warrant cabinets or coils from corrosion unless BRONZ-GLOW coatings are factory supplied.

## HEATING TO REHEAT CIRCUIT:

An automatic change over relay and corresponding control circuit is available as an optional feature. An example of this type of application would be a school locker room where latent loads would be high during the occupied mode. This circuit allows the unit to shift from heating to reheat without changing the system switch on the front end controller. Another application that this has been used on is indoor swimming pool applications where additional heating means have not been provided. This application is only successful where structure shell loss is minimal. This is not recommended in large enclosed pool areas where structure heating loads are substantial.

**OPERATING PRESSURES AND TEMPERATURES: (REHEAT MODE)**

Operating pressures and temperatures in the reheat mode vary slightly from standard cooling mode operating characteristics. The variations are as follows:

- Discharge Pressure: (-) 5 to 20 PSIG
- Discharge Gas Temperature: (-) 5 to 15 Degrees F.
- Suction Pressure: (+) 5 to 10 PSIG
- Suction Gas Temperature: (+) 5 to 10 Degrees F.

**CONTROLS BY OTHERS:**

Please consult the factory for engineering assistance if any controller other than the Climatouch CT03TSHB FHP Part Number 641-186 is being used to control the heat pump with this hot gas reheat option.

**UNIT DIMENSIONS:**

All models except the EM007, EM009 and EM012 horizontals remain the same. The EM007, EM009 and EM012 will have the same cabinet footprint as the EM015 HZ and EM007, EM009 and EM012 height remains the same.

( Figure #2 )

