



Technical Topics

Hot Gas Reheat

Catalog Section: Hot Gas Reheat
September, 2001

An important function of any air conditioning installation is humidity control. We have all read or heard of installations with the 'sick building syndrome' that results from improper humidity control and the millions of dollars it can take to rectify. The FHP HUMIDIMISER option is ideal for applications where a high level of dehumidification is required and is especially useful on outside air applications.

FHP was the first heat pump manufacturer to incorporate hot gas reheat into their units and has remained the industry leader in this application. Based on our experience in the field we have devised a new control scheme for the hot gas reheat circuit that will allow for improved temperature and humidity control especially during low load conditions when proper control is most critical.

The refrigerant flow path and components of the reheat circuit remain the same. The only changes we have made from before is to the unit control logic and internal control wiring. The external control circuit wiring remains unchanged.

Previously the unit (dual circuit units) would only operate in the reheat mode once the control temperature was satisfied, and could not operate in reheat whenever the controller was set for heating (heat pump models) operation. FHP's new schematic allows for simultaneous cooling and reheat operation (two stage units), and can operate in reheat, when required, if the system is set on heating and without using special relays. An example of this requirement would be on a day where the outside temperature is cool and the humidity is high.

The major advantage of this new control schematic is that it will allow you to remove moisture from the space at a faster rate during part load conditions allowing you to reach set point quicker and provide better temperature and humidity control.

It is still important to take special consideration when low temperature water (below 70° F) is utilized as your water source. A means to reduce the water flow rate and elevate the discharge pressure/temperature in the reheat mode should be provided.

Examples: water regulating based on discharge pressure.

All heat pump models have the following possible modes of operation available:

Single compressor units

- Cooling only
- Heating only
- Hot gas reheat
- Automatic change from heat-to-reheat

Dual compressor units

- First stage cooling
- First stage cooling with second stage reheat
- First and second stage cooling
- First stage heating

Technical Topics

Hot Gas Reheat

- First stage heating with second stage reheat
- First and second stage heating
- Automatic change from heat-to-reheat.

Following is a sequence of operation for both single and two-stage units.

SINGLE STAGE UNIT (Refer to typical wiring diagram # EM111047)

Cooling and heating take priority over dehumidification. This means that hot gas reheat will only be allowed once the thermostat has been satisfied. The new reheat scheme on single compressor units allows the unit to operate in the reheat mode with the system switch set for heating without the need for special relays. This means that on those cool days when cooling is not called for but the humidity is above set point, the unit can run in the reheat mode and remove excess humidity.

DUAL COMPRESSOR UNITS (Refer to typical wiring diagram # LC322102)

COOLING MODE:

On a call for Y1 and H from the front-end controller circuit # 1 will operate in cooling, circuit # 2 will operate in reheat. In this mode of operation the unit will remove excess humidity faster without overshooting the temperature setting. Once the humidity level drops circuit #2 will drop out and circuit #1 will continue to operate in cooling only till the temperature is satisfied.

On an increase in temperature both circuits Y1 and Y2 will be energized regardless if H is calling, both circuits will operate in cooling only mode providing maximum cooling and dehumidification capacity.

Once the cooling is satisfied but humidity remains above set point both circuits will operate in the reheat mode ensuring maximum removal of moisture.

HEATING MODE:

Identical to that of cooling with the ability for the unit to switch from heating to reheat without special relays if the humidity remains high once the set point has been satisfied.

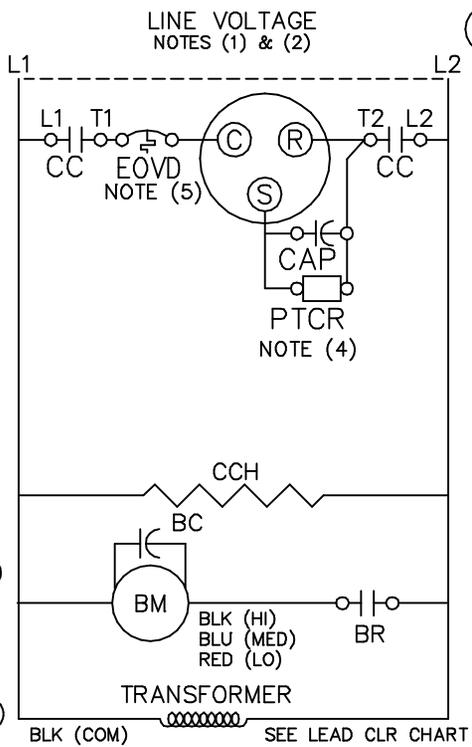
Hot gas reheat is the answer to a problem on many jobs has been a very successful option on FHP units. You need to understand the application and the control sequence in order to have it specified

For additional information please refer to the hot gas reheat application manual or contact the factory with any questions

TRANSFORMER PRIMARY LEAD CLR:	
120	- WHT
208	- RED
240	- ORG
277	- BRN
380	- PUR OR YEL
460	- BLK/RED
575	- GRY



LINE VOLTAGE
NOTES (1) & (2)



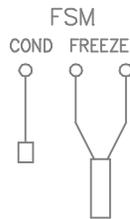
FACTORY WIRE —————
FIELD WIRE - - - - -

STANDARD COMPONENTS LEGEND:

- BC - BLOWER MOTOR CAPACITOR
- BM - BLOWER MOTOR
- BR - BLOWER RELAY
- CAP - COMPRESSOR CAPACITOR
- CC - COMPRESSOR CONTACTOR
- CCH - CRANKCASE HTR (WHEN SUPPLIED)
- CR - CLG/HTG RELAY (DISABLES H, ENERGIZES Y)
- EOVD - EXTERNAL OVERLOAD (NOTE 5)
- HGSV - HOT GAS SOLENOID VALVE
- HPS - HIGH PRESSURE SWITCH
- LPS - LOW PRESSURE SWITCH
- PTCR - POS TEMP COEFF RSTR (NOTE 4)
- RH - REHEAT RELAY (ENERGIZES Y, O AND G)
- RV - REVERSING VLV (HEAT PUMPS)

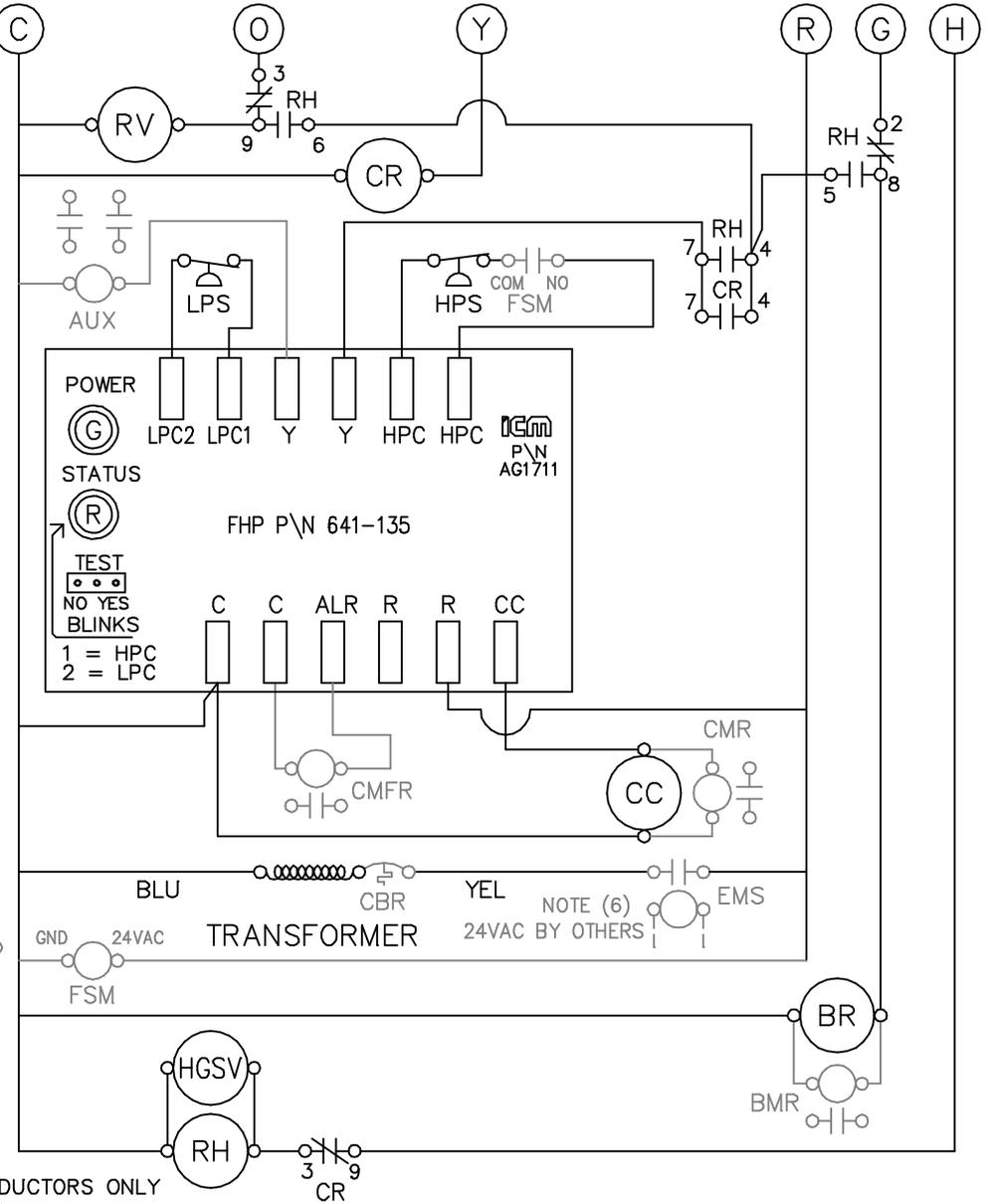
OPTIONAL COMPONENTS LEGEND:

- [] AUX - AUXILIARY RELAY (FOR LOOP PUMP, ETC.)
- [] BMR - BLOWER MONITOR RELAY
- [] CBR - 24V CIRCUIT BREAKER
- [] CMFR - COMPR MALFUNCTION RELAY
- [] CMR - COMPR MONITOR RELAY
- [] EMS - ENERGY MGMT SYSTEM RELAY
- [] FSM - FREEZE STAT/CONDENSATE MODULE
- [] FSM WIRED FOR CONDENSATE SENSING
- [] FSM WIRED FOR FREEZE PROTECTION (JUMPED IF NOT USED)

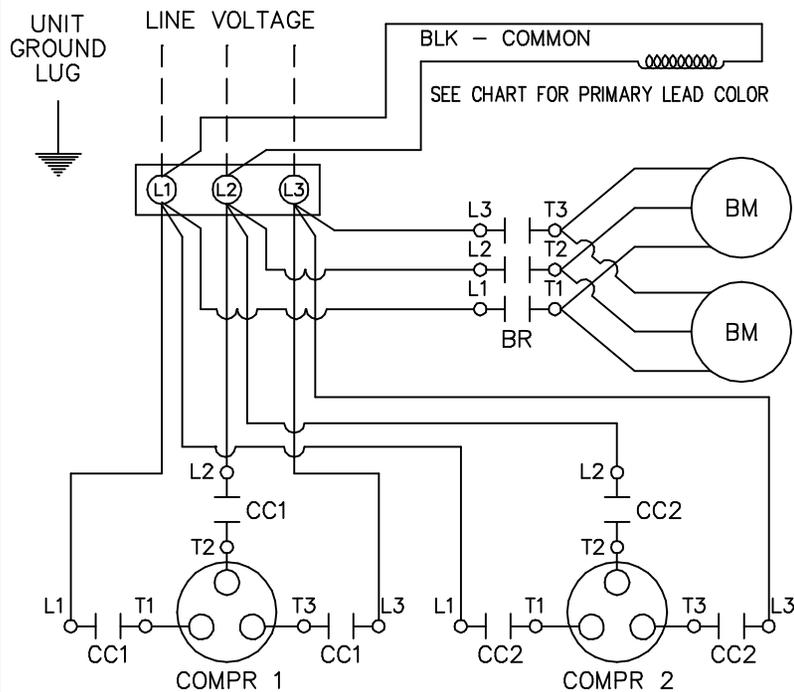


NOTES:

- SEE UNIT NAME PLATE FOR ELECTRICAL RATING
- ALL FIELD WIRING MUST BE IN ACCORDANCE WITH N.E.C.—N.F.P.A. #70, COPPER CONDUCTORS ONLY
- 208/230V UNITS ARE FACTORY WIRED FOR 230V OPERATION. FOR 208V OPERATION, REMOVE ORG LEAD AND REPLACE WITH RED LEAD. CAP ALL UNUSED LEADS
- PTCR IS STANDARD ON SELECT UNITS.
- EXTERNAL OVERLOAD STANDARD ON ALL UNITS EQUIPPED WITH ROTARY COMPRESSORS.
- FOR ALTERNATE EMS COIL VOLTAGES CONSULT FACTORY.
- CCM-1 INCLUDES BUILT IN: 30-60 SECOND RANDOM START
5 MINUTE DELAY ON BREAK
90 SECOND LOW PRESSURE BYPASS
- SETTING THE TEST MODE JUMPER TO YES REDUCES ALL TIME DELAYS TO 5 SECONDS.
- "FREEZE" PINS ON FSM MUST BE JUMPED TOGETHER IF FREEZE SENSOR IS NOT INSTALLED.



WIRING DIAGRAM - SINGLE PHASE - ALL VOLTAGES SINGLE PHASE DIRECT DRIVE BLOWER MOTOR				
SINGLE STAGE 1/2 THROUGH 6 TON CAPACITY WITH HOT GAS REHEAT				
SIZE	CSSN.	DWG NO.	DRAWN BY	REV
	EM111047	EM111047	RKS	2
SCALE			DATE 7-24-01	



TRANSFORMER PRIMARY LEAD CLR:	
120	- WHT
208	- RED
240	- ORG
277	- BRN
380	- PUR OR YEL
460	- BLK/RED
575	- GRY

FACTORY WIRE ———
FIELD WIRE - - - - -

STANDARD COMPONENTS LEGEND:

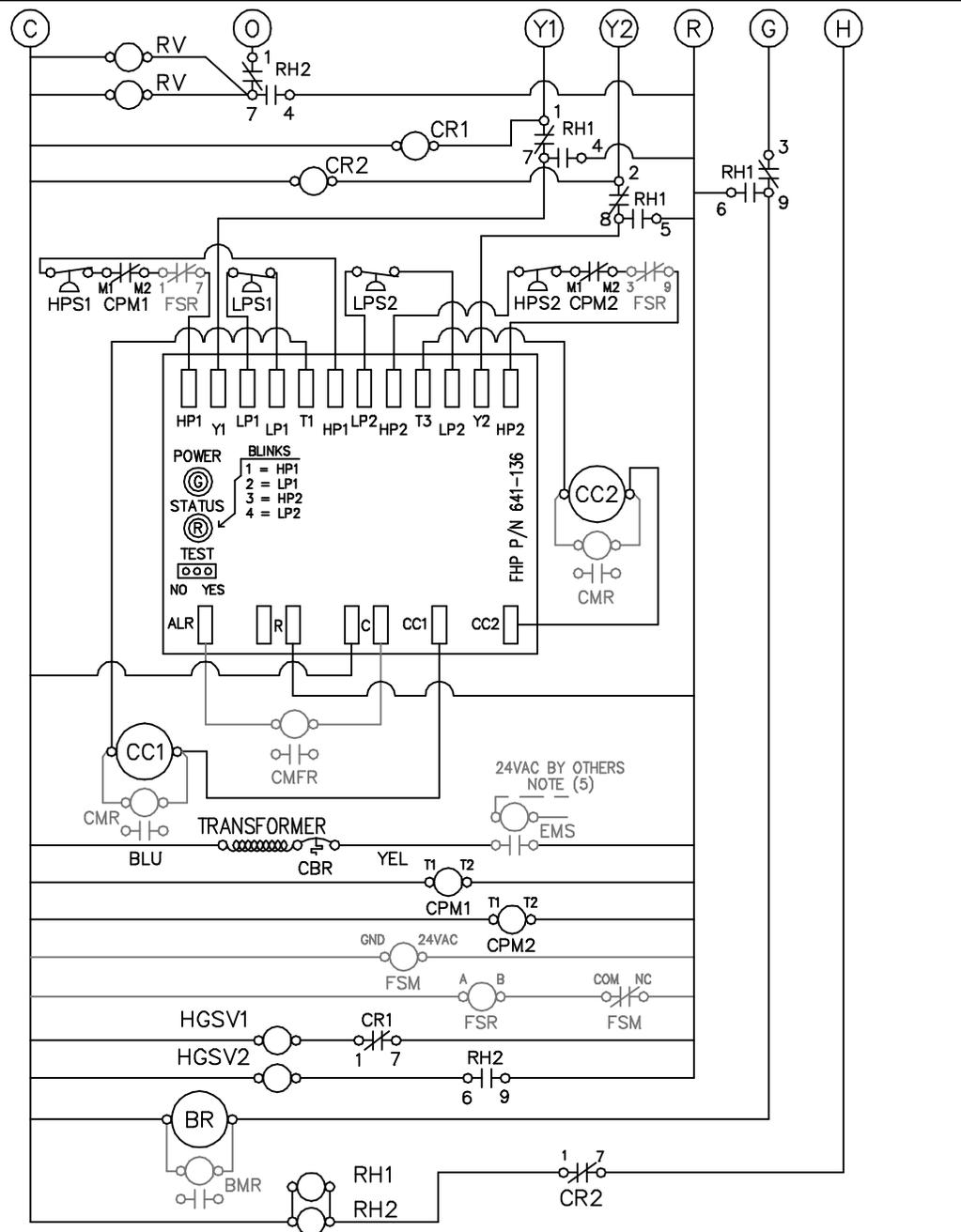
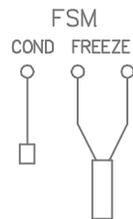
- #1 - FIRST STAGE
- #2 - SECOND STAGE
- BM - BLOWER MOTOR (1 OR 2 PER UNIT)
- BR - BLOWER RELAY
- CC - COMPRESSOR CONTACTOR
- CBR - 24VAC CIRCUIT BREAKER
- CPM - COMPR PROTECTION MODULE (15 TON AND LARGER COMPR)
- CR1 - COMPRESSOR RELAY 1 (DISABLES 1 STG REHEAT VALVE)
- CR2 - COMPRESSOR RELAY 2 (DISABLES REHEAT RELAYS)
- HGSV1 - HOT GAS REHEAT VALVE, STG 1
- HGSV2 - HOT GAS REHEAT VALVE, STG 2
- HPS - HIGH PRESSURE SWITCH
- LPS - LOW PRESSURE SWITCH
- RH1 - REHEAT RELAY 1 (ENERGIZES Y1, Y2 AND G)
- RH2 - REHEAT RELAY 2 (ENERGIZES O AND 2ND STG REHEAT VALVE)
- RV - REVERSING VALVE (HEAT PUMPS ONLY)

OPTIONAL COMPONENTS LEGEND:

- [] BMR - BLOWER MOTOR RELAY
- [] CMFR - COMPRESSOR MALFUNCTION RELAY
- [] CMR - COMPRESSOR MONITOR RELAY
- [] EMS - ENERGY MANAGEMENT SYSTEM RELAY
- [] FSM - FREEZE/CONDENSATE MODULE COMES WITH:
 - FSR - FREEZE/CONDENSATE RELAY
 - [] - FSM WIRED FOR CONDENSATE SENSING
 - [] - FSM WIRED FOR FREEZE PROTECTION (JUMPED IF NOT USED)

NOTES:

1. SEE UNIT NAME PLATE FOR ELECTRICAL RATING
2. ALL FIELD WIRING MUST BE IN ACCORDANCE WITH N.E.C.-N.F.P.A. #70
3. 208/230V UNITS ARE FACTORY WIRED FOR 230V OPERATION. FOR 208V OPERATION, REMOVE ORG LEAD AND REPLACE WITH RED LEAD. CAP ALL UNUSED LEADS
4. CHECK PHASE ROTATION ON ALL SCROLL COMPRESSOR UNITS. REVERSE ROTATION WILL DAMAGE THE COMPRESSOR AND VOID UNIT WARRANTY.
5. FOR ALTERNATE EMS COIL VOLTAGES CONSULT FACTORY.
6. CCM-II INCLUDES BUILT IN:
 - 30-60 SECOND RANDOM START
 - 5 MINUTE DELAY ON BREAK
 - 90 SECOND LOW PRESSURE BYPASS
 - 5 SECOND 2ND STAGE DELAY
7. SETTING THE CCM-II TEST MODE JUMPER TO YES REDUCES ALL TIME DELAYS TO 5 SECONDS.
8. IF SUPPLIED WITH FSM, 1 COND SENSOR PER DRAIN PAN IS USED IF REQUIRED. FREEZE PINS JUMPED IF NOT USED.



WIRING DIAGRAM - THREE PHASE - ALL VOLTAGES			
DUAL COMPRESSOR & BELT DRIVE BLOWER(S) HOT GAS REHEAT			
DWG NO. LC322102	DRAWN BY RKS	DATE 7-17-01	REV 0