Modulating Heat Pump
HMH7

1

HMH7

R-410A 2 to 5 Nominal Ton

Model Number Digits

Configuration	**H**	**H** = Horizontal discharge
Stages	**1**	**1** = 1 stage
		2 = 2 stage
		3 = 3 stage
		M = Modulating
		V = Variable capacity
Product type	**C**	**C** = Air conditioner
		H = Heat pump
Efficiency	7	**3** = 13 SEER
		4 = 14 SEER
		5 = 15 SEER
		6 = 16 SEER
		7 = 17 SEER
		8 = 18 SEER
		9 = 19 SEER
Voltage	**2**	**2** = 208/230-1-60
		3 = 208/230-3-60
		4 = 460-3-60
Refrigerant	**B**	**B** = R-410A
		D = R-454B
Capacity	**24**	**12** = 1 ton
		18 = 1.5 ton
		24 = 2 ton
		30 = 2.5 ton
		36 = 3 ton
		42 = 3.5 ton
		48 = 4 ton
		60 = 5 ton
Generation	**1**	**1** = 1st Generation
		2 = 2nd Generation
Control strategy	**S**	**C** =Communicating
		B = Wireless (communicating)
		S = Standard (conventional)
		W = Wireless (conventional)
Style	**A**	**A** = Style A
		B = Style B

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HMH7

R-410A 2 to 5 Nominal Ton

Serial Number

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Physical and electrical data

Table 2: Physical and electrical data

Model	HMH72B241S	HMH72B361S	HMH72B481S	HMH72B601S
Unit supply voltage	208/230 V, 1 phase, 60 Hz	208/230 V, 1 phase, 60 Hz	208/230 V, 1 phase, 60 Hz	208/230 V, 1 phase, 60 Hz
Normal voltage range (V)	198 to 253	198 to 253	198 to 253	198 to 253
Minimum circuit ampacity (A)	15	23	36	37
Maximum overcurrent device (A)	25	35	50	50
Minimum overcurrent device (A)	15	23	36	37
Compressor type	Twin rotary	Twin rotary	Twin rotary	Twin rotary
Compressor rated load (A)	11.0	16.1	26.0	26.5
Compressor locked rotor (A)	n/a	n/a	n/a	n/a
Crankcase heater (base heater)	Yes	Yes	Yes	Yes
Factory discharge muffler	Yes	Yes	Yes	No
HS kit required with TXV	N/A	N/A	N/A	N/A
Fan motor type	ECM	ECM	ECM	ECM
Fan motor quantity	1	1	2	2
Fan motor rated HP	1/12	1/6	1/6	1/6
Fan motor nominal RPM	880	810	850	850
Fan motor nominal CFM	1,825	2,350	3,525	3,525
Coil face area (sq. ft)	6.1	8.3	14.0	14.0
Coil rows deep	2	2	2	2
Coil fins per inch	18	19	17	18
Liquid lineset outdoor (field installed)	3/8	3/8	3/8	3/8
Vapor lineset outdoor (field installed)	5/8	3/4	7/8	7/8
Unit charge (lb-oz)	4-7	6-3	8-15	8-9
Charge (oz/ft)	0.38	0.38	0.60	0.60
Operating weight (lb)	112	157	227	251

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The HMH7 has a split "fin and tube" style condenser coil. It contains two layered condenser coils but it functions as a single condenser coil.

A clean, unobstructed coil maximizes heat transfer capabilities and improves the overall efficiency of the system. During installation, be sure to follow all recommendations regarding minimum spacing and clearances from surrounding structures and other equipment.

HMH7-36 Condenser Coil without Wire Coil Guard

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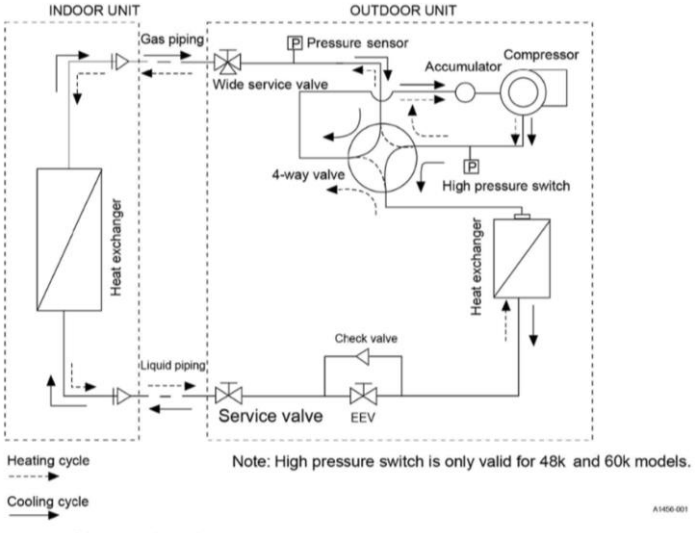
The refrigerant flow in heating modes of the HMH7 system is illustrated below. Note the presence of a 4-way valve (reversing valve) and an EEV (electronic expansion valve) in the outdoor unit.



HMH7 Refrigerant Flow Chart

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Dimensions

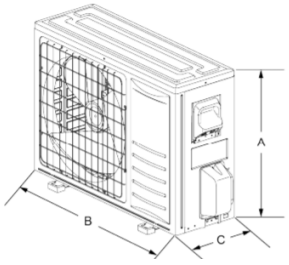
Table 3: Dimensions

Unit model	Dimensions (in.)			Refrigerant connections service valve size (in.)	
	A	B	C	Liquid	Vapor
HMH72B241S	26 3/8	33 7/8	12 1/4	3/8	5/8
HMH72B361S	33	37 3/8	13 3/8		3/4
HMH72B481S	54 5/8	37 3/8	13 3/8		7/8
HMH72B601S	54 5/8	37 3/8	13 3/8		7/8

ⓘ **Note:**

- All dimensions are in inches and are subject to change without notice.
- Overall length and width include screw heads.

Figure 2: Dimensions



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Applications

Ambient temperature limits	Outdoor coil °F (°C)	
	DB cool	DB heat
Minimum	35 (2)	-5 (-21)
Maximum	122 (50)	75 (24)

ⓘ **Note:** The maximum lineset equivalent length is 200 ft.

Sound power - cooling

Model number	Octave band sound power level (dB re. 1 pW)								dBA	SQI
	63	125	250	500	1000	2000	4000	8000		
HMH72B241S	70	70	63	62	61	55	50	43	65	19.1
HMH72B361S	72	71	67	63	64	58	56	50	68	19.1
HMH72B481S	73	70	67	64	65	60	57	48	69	19.2
HMH72B601S	78	79	71	66	66	62	64	52	73	19.0

Sound power - heating

Model number	Octave band sound power level (dB re. 1 pW)								dBA	SQI
	63	125	250	500	1000	2000	4000	8000		
HMH72B241S	70	72	64	62	61	55	50	42	65	19.1
HMH72B361S	68	71	68	65	66	62	60	56	70	19.1
HMH72B481S	74	72	70	67	67	63	59	53	71	19.2
HMH72B601S	77	77	73	70	68	63	61	52	73	19.0

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Components

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Compressor

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Compressor

Unit	ODU Model No.	Minimum Compressor Frequency (Hz)	Maximum Compressor Frequency (Hz)
24k	HMH72B241S	15	75
36k	HMH72B361S	22	95
48k	HMH72B481S	15	92
60k	HMH72B601S	18	95

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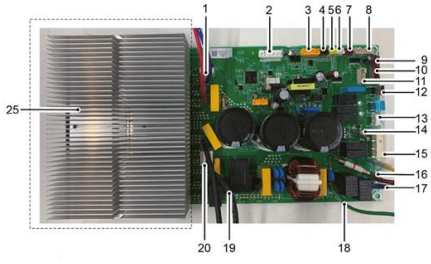
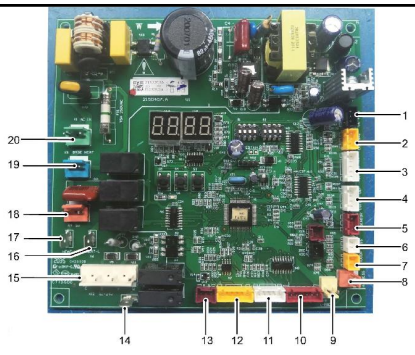


2 & 3 Ton Model (2 Boards)



4 & 5Ton Model (3 Boards)

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Control Board (2&3 Ton)

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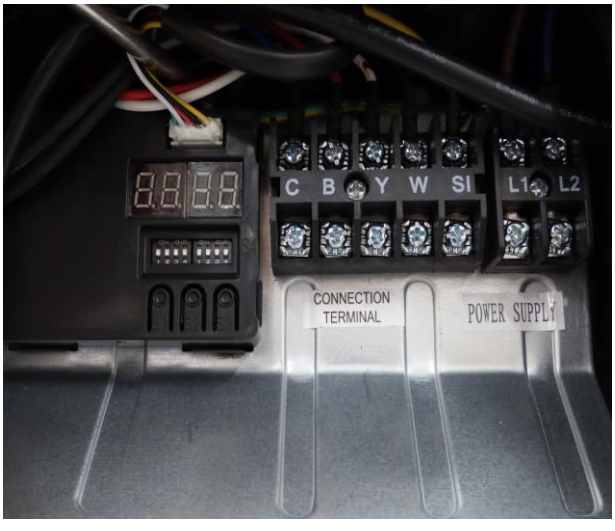
Display Board (2&3 Ton)



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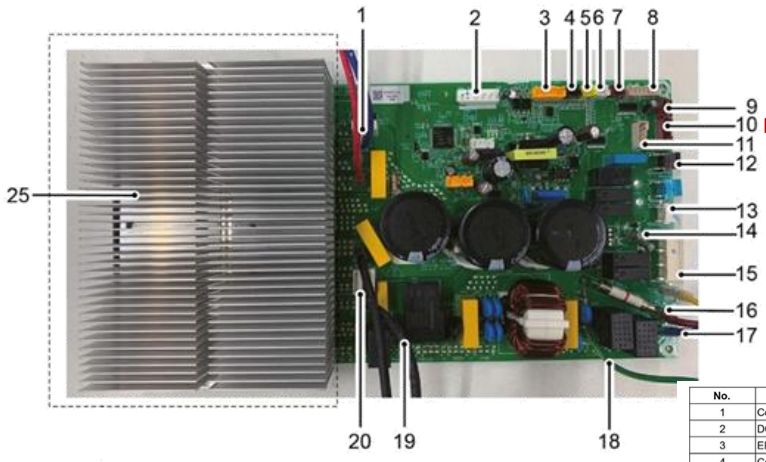
Control Board (2&3 Ton)



No.	Description	No.	Description
1	Compressor	14	Heater
2	DC fan	15	SI
3	EE	16	AC power LIN
4	Coil temperature sensor	17	AC power NIN
5	Ambient temperature sensor	18	GND
6	Discharge temperature sensor	19	Reactor L2
7	Overheat protector	20	Reactor L1
8	Electronic expansion valve	21	Rectifier bridge
9	High pressure	22	IGBT
10	NA	23	Diode
11	Computer/Checker	24	IPM
12	4-way valve	25	Radiator
13	Electric heating belt		

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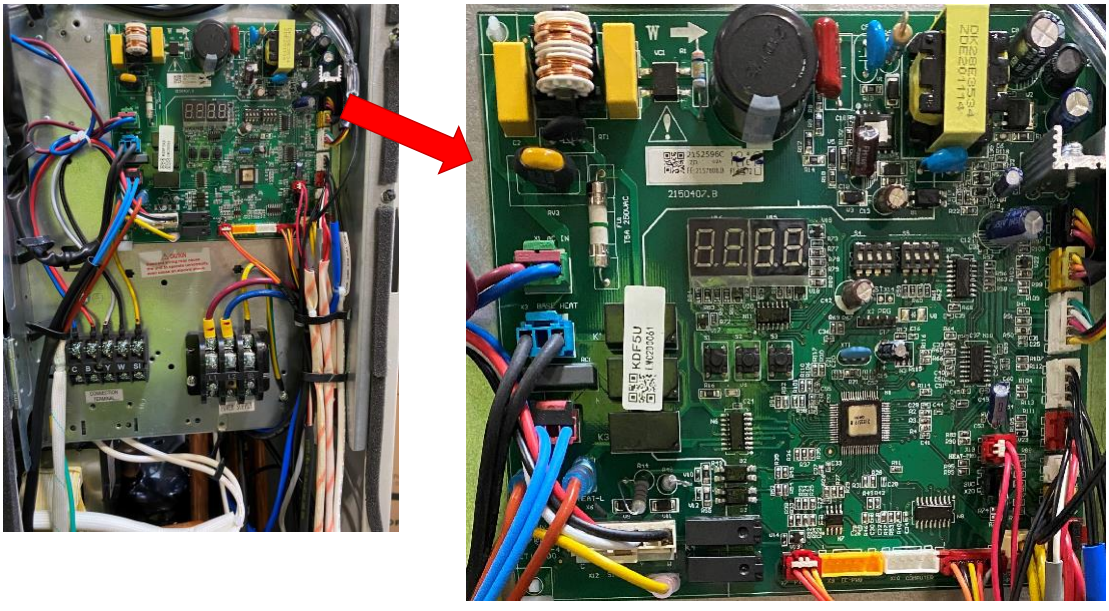
Control Board (4&5 Ton)



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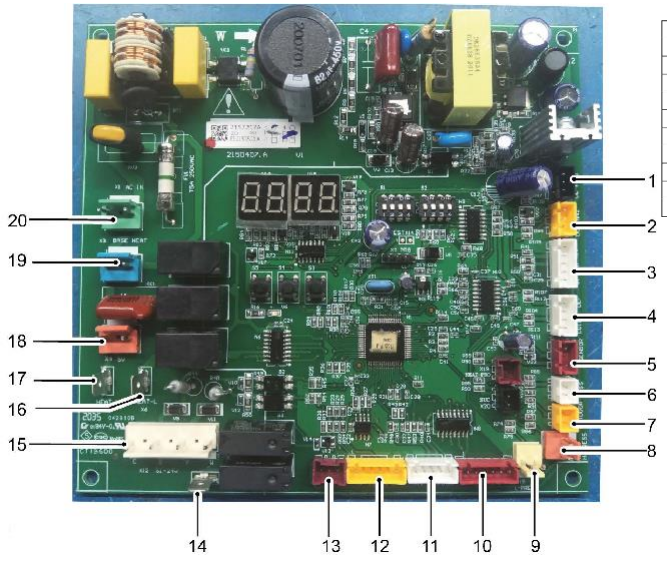
Control Board (4&5 Ton)



No.	Description	No.	Description
1	DC fan Driver1	11	Checker
2	DC fan Driver2	12	EEPROM
3	IPM-SI	13	PTC control signal
4	Defrost/Coil temperature sensor	14	H signal
5	Pressure sensor	15	Communication signal
6	Discharge temperature sensor	16	Electric heating belt
7	Ambient temperature sensor	17	Electric heating belt
8	High pressure switch	18	4-way valve
9	Low pressure switch	19	Base heater
10	Electronic expansion valve	20	AC power

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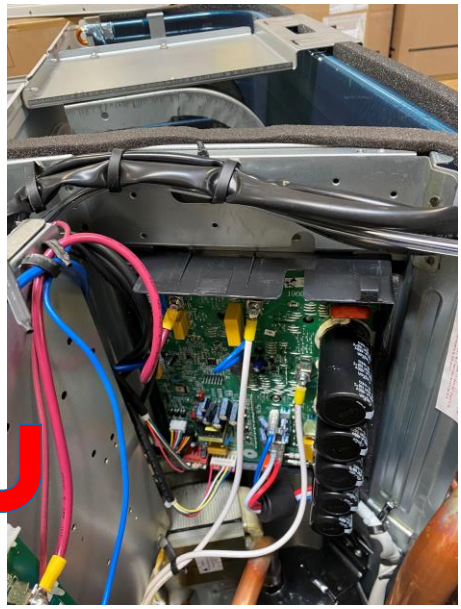
IPM Drive Board (4&5 Ton)

This is back of the control board panel. It is designed to swing out away from another panel which holds the IPM Drive Control (the board shown in this picture)



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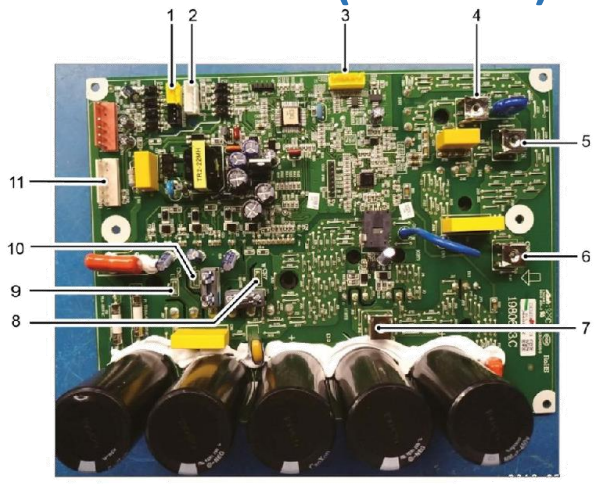
IPM Drive Board (4&5 Ton)



No.	Description	No.	Description
1	DC fan signal	7	Reactor L2
2	IPM-SI	8	Compressor W
3	EE	9	Compressor U
4	NIN	10	Compressor V
5	LIN	11	Driver
6	Reactor L1		

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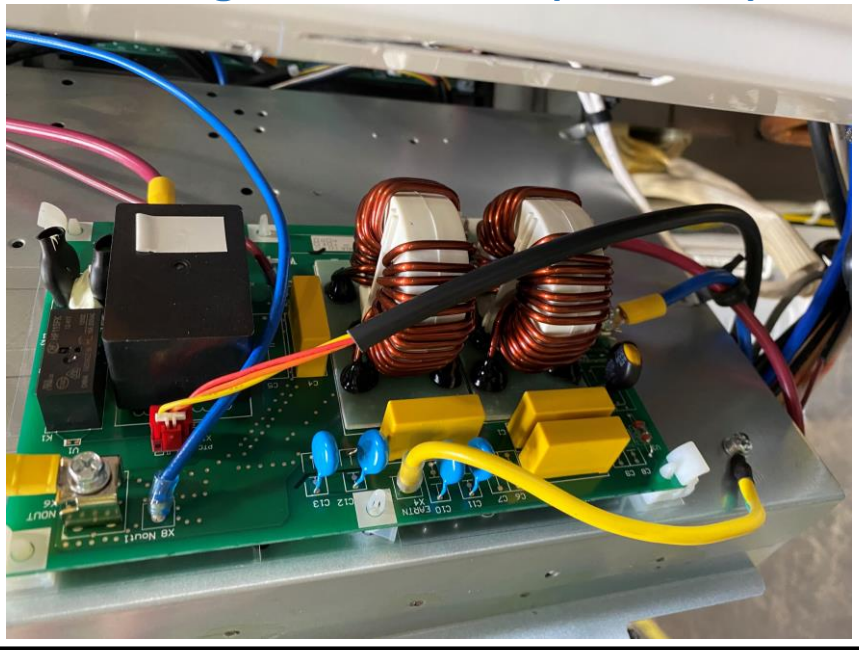
Voltage Filter Board (4&5 Ton)



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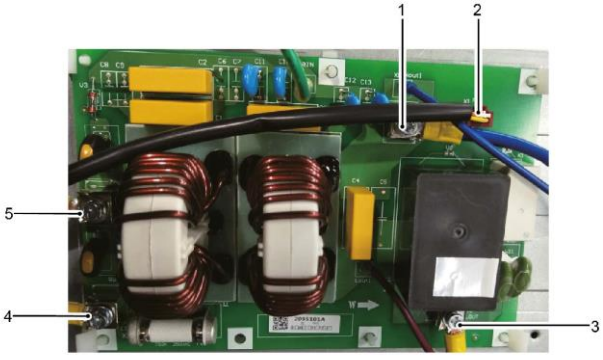
Voltage Filter Board (4&5 Ton)



No.	Description	No.	Description
1	N out	4	LIN
2	PTC control signal	5	NIN
3	L out		

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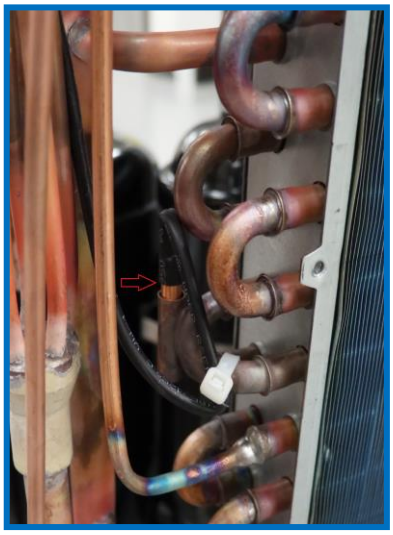
Sensors

Discharge Line Sensor



Coil Sensor

Outdoor Sensor

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Sensor Resistance vs Temperature

Temp. F (C)	Resistance Nom. K ohms
-22 (-33)	64.77
5 (-15)	30
32 (0)	15
59 (15)	8.02
86 (30)	4.55
113 (45)	2.7
140 (0)	1.65

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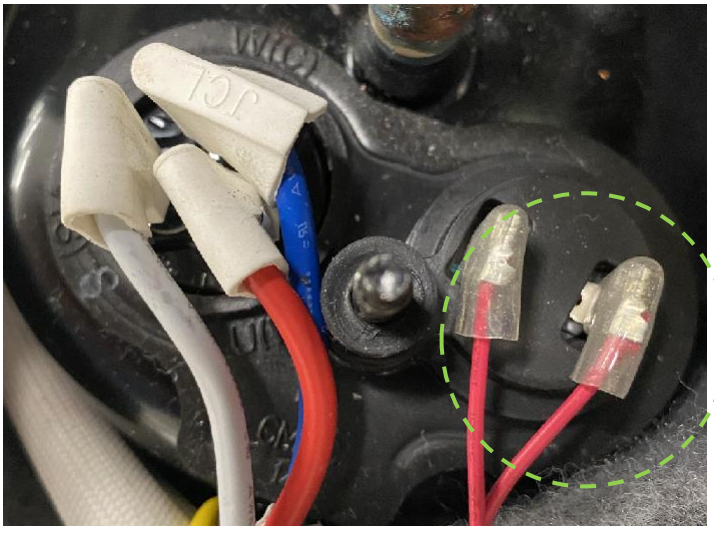
Compressor Thermal Over-Heat Disc



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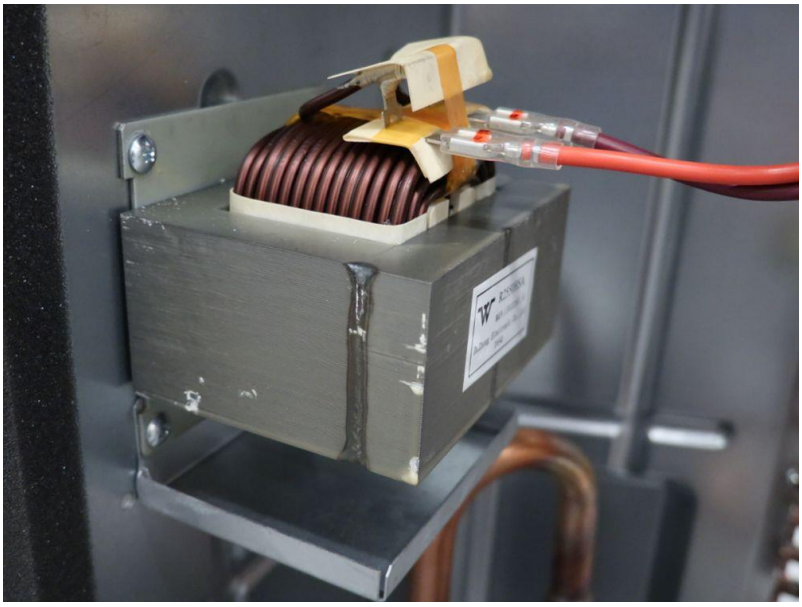
Reactor Coil



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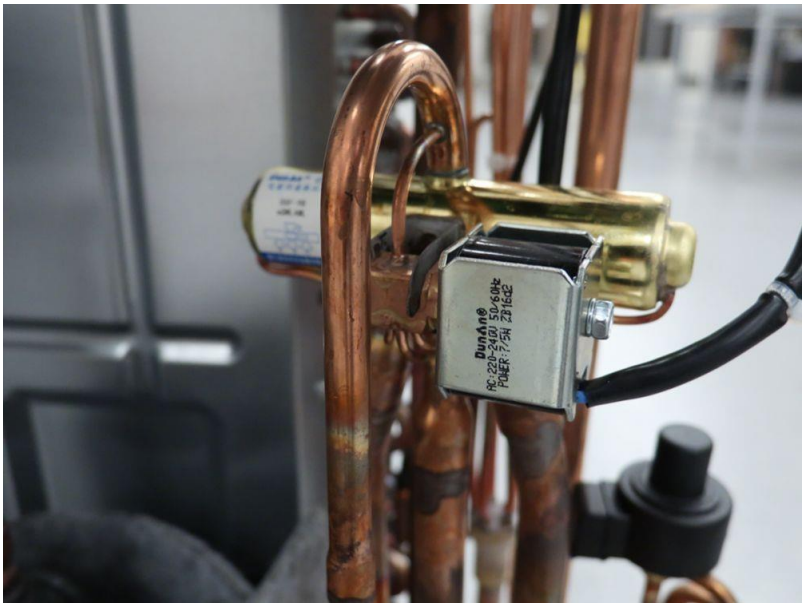
Reversing Valve

Energizes in Heat



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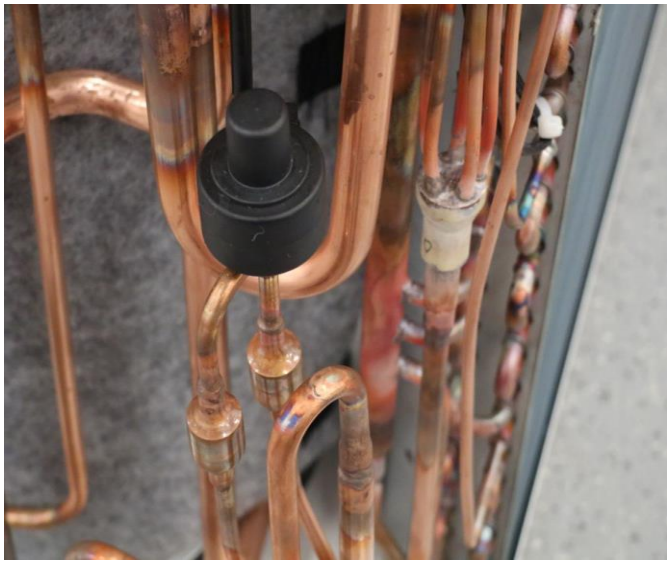
EEV (Electronic Expansion Valve)

The EEV meters the refrigerant flow in the heating mode only



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Outdoor Fan Motor(s)

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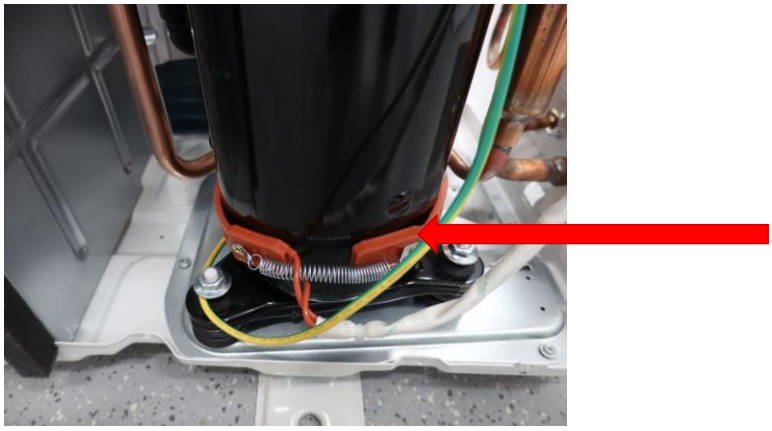
Compressor Crankcase Heater



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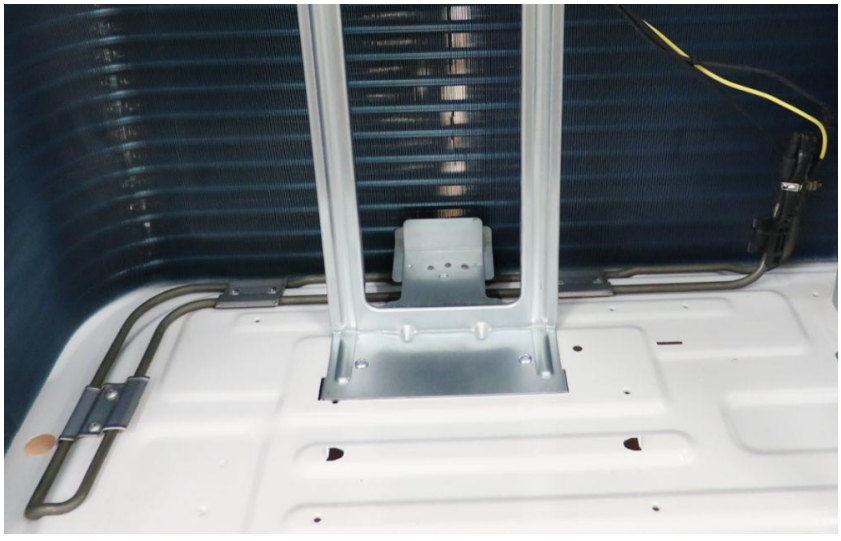
Base Heater



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HMH7AK001 & HMH7AK002 Blower Kits

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HMH7AK001

HMH7AK001 Blower Kit Contents

Item	Quantity
Relay plate	1
SPDT 24-V relay	1
5-wire 36-in. harness	1
#12 x 3/4 in. screw	4
Instruction sheet	1
Wiring diagram STD ECM	2
Drier	1

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HMH7AK002

HMH7AK002 Blower Kit Contents

Item	Quantity
Relay plate	1
SPDT 24-V relays	2
5-wire 36-in. harness	2
#8 x 1/2-in. screw	4
#12 x 3/4-in. screw	4
Instruction sheet	1
Wiring diagram VS ECM/furnace	1
Drier	1

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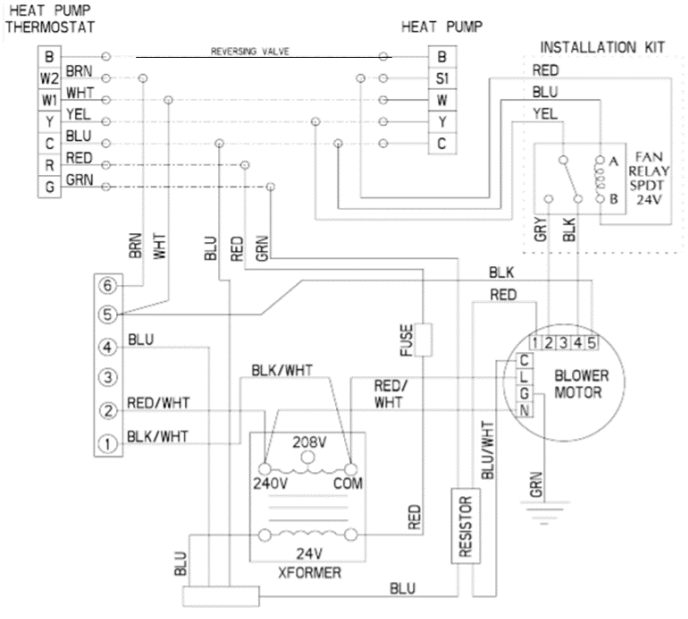
HMH7AK001 Wiring Diagram



Blower Kit
HMH7AK001

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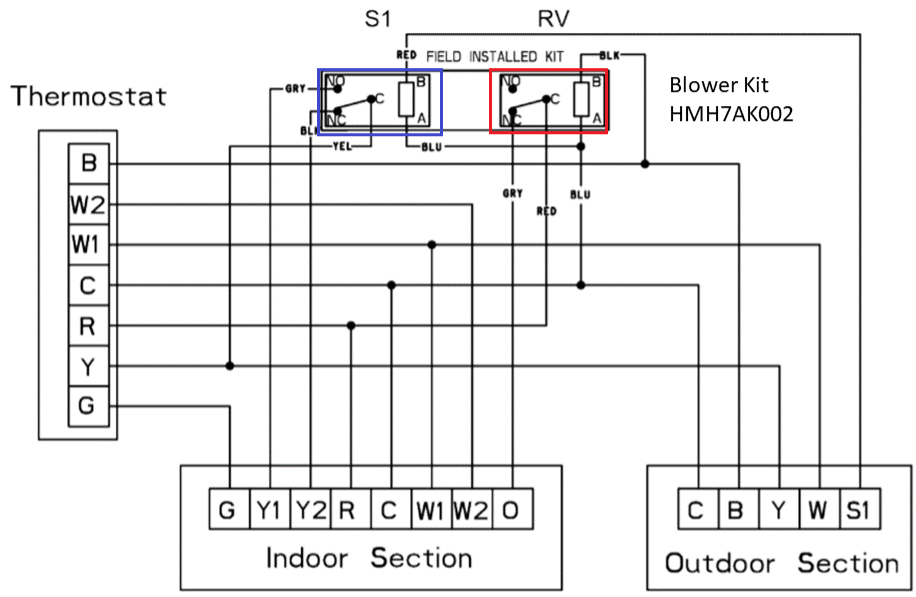
HMH7AK002 Wiring Diagram



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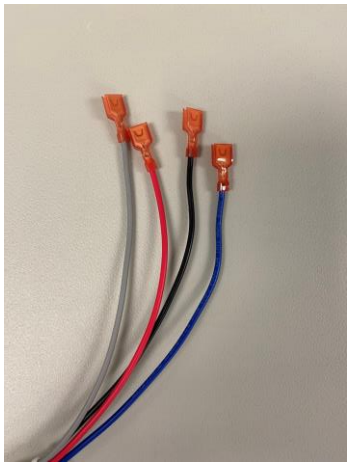
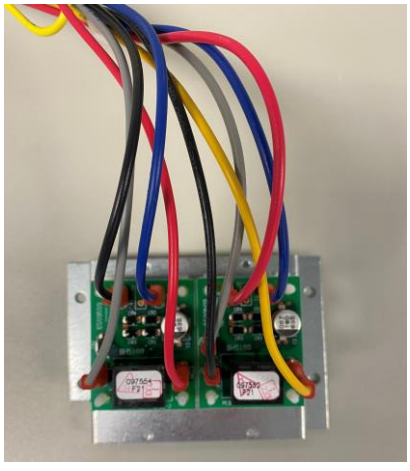
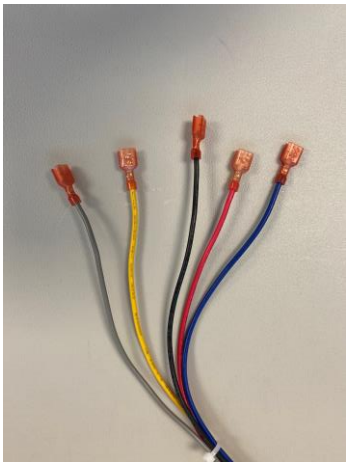
HMH7AK002 Wiring Diagram







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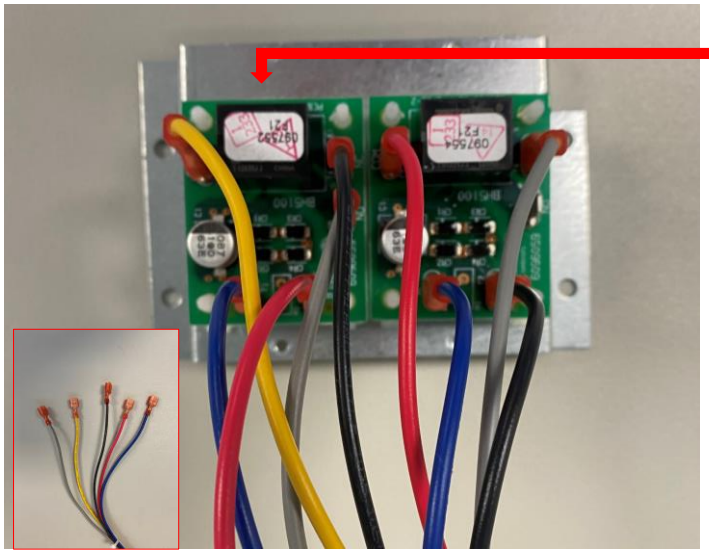
HMH7AK002 Wiring Diagram



Wiring the S1 relay

About this task: The S1 relay is the relay located nearest the relay plate mounting flange without the notch.

NOTICE

The harnesses contained in the kit have different size connectors on each end. Pay close attention to the connectors so the correct ones are removed.

1. On the first five-wire harness, remove the 1/4-in. connectors from the relay harness wires and strip the insulation.
2. Attach the harness as follows. See Figure 3.
   a. Connect the yellow wire to the room thermostat Y connection.
   b. Connect the red wire to terminal S1 of the outdoor section.
   c. Connect the blue wire to the C connection (C on the indoor control).
   d. Connect the black wire to the Y/Y2 connection (Y/Y2 on the indoor control).
   e. Connect the gray wire to the Y1 connection (Y1 on the indoor control).

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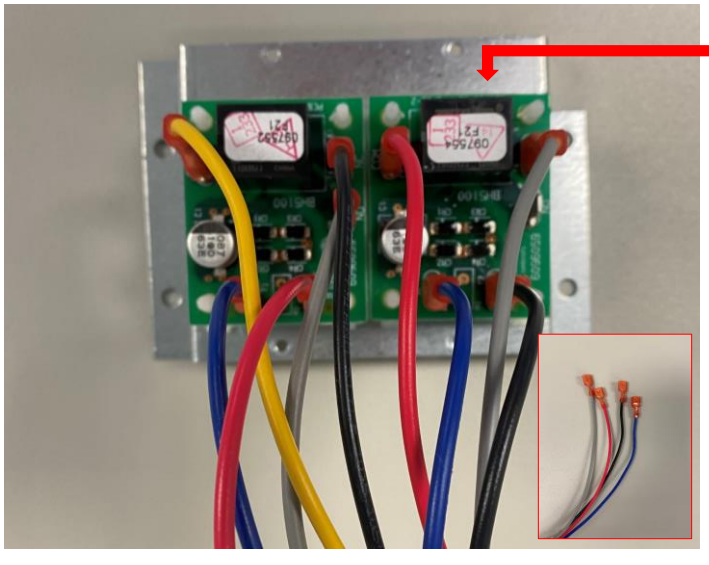
HMH7AK002 Wiring Diagram



Wiring the RV relay

About this task: The RV relay is the relay located nearest the notch in the relay plate mounting flange.

1. On the second five-wire harness, remove the 1/4-in. connector from the relay harness wires and strip the insulation.
2. Attach the harness as outlined in the following steps. See Figure 3.

Note: The yellow wire in this harness is not used.

a. Connect the red wire to the R connection (R on the indoor control).
b. Connect the blue wire to the C connection (C on the indoor control).
c. Connect the gray wire to the O connection (O on the indoor control).
d. Connect the black wire to the room thermostat O/B (reversing valve) wire.

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Installation

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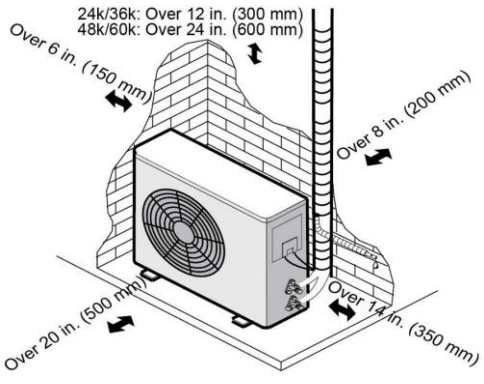
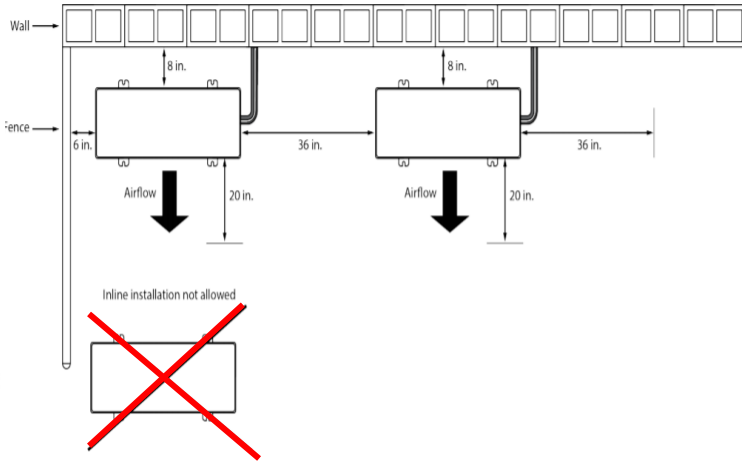
Clearances





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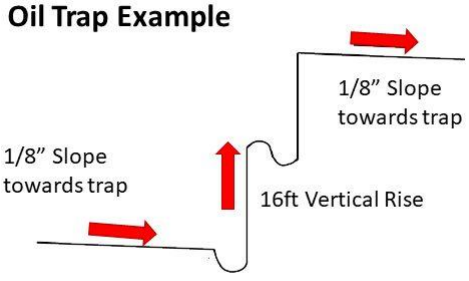
Line Set Limitations

Model	Maximum pipe length (L)	Maximum height difference (H)	Additional refrigerant - exceeding 15 ft (4.6 m)
	ft (m)	ft (m)	oz/ft (g/m)
HMH72B24	164 (50)	98 (30)	0.38 (11)
HMH72B36	246 (75)	98 (30)	0.38 (11)
HMH72B48, HMH72B60	246 (75)	98 (30)	0.60 (17)

Oil Trap Example



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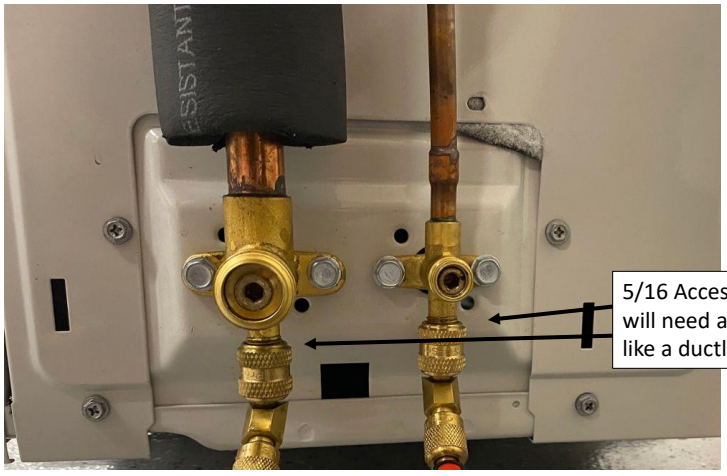
Evacuation/Post Evacuation

Note If there is any chance that liquid refrigerant is present in the compressor crankcase, the crankcase heater should be powered up for 24 hours prior to operating the compressor.



Refrigerant Access Valves (Caps Removed)

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Evacuation/Post Evacuation

5/16" to 1/4" Flare Adapter

The HMH7 access valves both suction and liquid have a 5/16” flare fitting. A 5/16” to 1/4” flare adapter is needed to use standard hoses for refrigeration manifold gauges. Also depending on the installation and the model number of the HMH7, the access fittings may be too close to the ground. In order to get your refrigeration manifold hoses connected to the access fittings a 5/16” to 1/4” adapter must be elbowed.

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Verifying Total System Charge

At this time, the only way charge the HMH7 is by weight.

Model	HMH72B241S	HMH72B361S	HMH72B481S	HMH72B601S
Liquid lineset outdoor (field installed)	3/8	3/8	3/8	3/8
Vapor lineset outdoor (field installed)	5/8	3/4	7/8	7/8
Unit charge (lb-oz)	4-7	6-3	8-15	8-9
Charge (oz/ft)	0.38	0.38	0.60	0.60
Operating weight (lb)	112	157	227	251

*Taken from the HMH7 Tabular Data Guide

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Verifying Total System Charge

1. Determine the condensing unit charge from Tabular Data Sheet.
2. Determine the evaporator coil adjustment from Tabular Data Sheet.
3. Calculate the line charge adjustment using the refrigerant adder in the Physical Data Sheet for the HMH7
    1. If line length is greater than 15 feet (4.6 m), add refrigerant using the adder listed **(.38 ounces/foot)** for 2 and 3 ton models **(.60 ounces /foot)** for the 4 and 5 ton, multiplied by the number of additional feet.
    2. If line length is less than 15 feet (4.6 m), subtract refrigerant using the adder listed (.38 ounces/foot) for 2 and 3 ton models (.60 ounces /foot) for the 4 and 5 ton, multiplied by the number of subtracted feet, by the number of feet the line set is reduced.

The HMH7 requires weighing-in the correct refrigerant charge.

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Verifying Total System Charge

Outdoor unit	HMH72B241S	HMH72B361S	HMH72B481S	HMH72B601S
Required TXV	BA1	BC1	BC1	BC1
Indoor unit	additional charge (oz)			
AE18B	-	-	-	-
AE24B	-	-	-	-
AE30B	-	-	-	-
AE36(C,B)	2	9	-	-
AE42C	-	-	-	-
AE43C	-	-	-	-
AE48(C,D)	-	-	-	-
AE60(C)	-	-	-	-
AE60(D)	-	-	7	8
AVC18B	-	-	-	-
AVC24B	-	-	-	-
AVC30B	-	-	-	-
AVC36(B,C)	2	9	-	-

Additional Charge for Air Handlers and Evaporator Coils

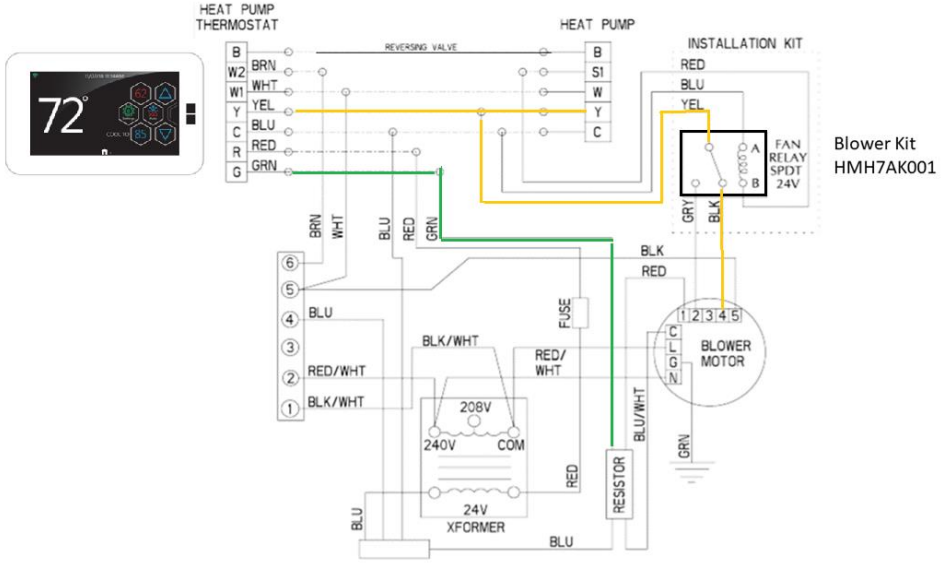
46

Verifying Total System Charge

Outdoor unit	HMH72B241S	HMH72B361S	HMH72B481S	HMH72B601S
AVC42C	-	-	-	-
AVC48(C,D)	-	-	-	-
AVC49(C)	-	-	-	-
AVC60(C)	-	-	-	-
AVC60(D)	-	-	7	8
CF/CM/CU18(A,B)	-	-	-	-
CF/CM/CU24(B,C)	-	-	-	-
CF/CM/CU30(A,B,C)	-	-	-	-
CF/CM/CU36(B,C,D)	2	9	-	-
CF/CM/CU42(B,C,D)	-	-	-	-
CF/CM/CU48(C,D)	-	-	-	-
CF/CM/CU60(C,D)	-	-	-	-
CF/CM64D	-	-	7	8

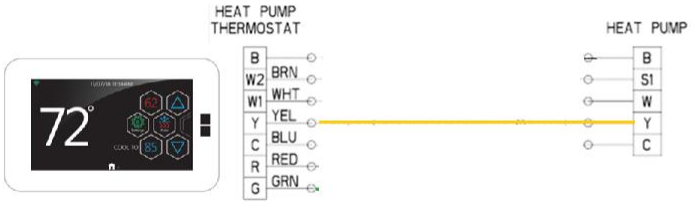
47

Sequence of Operation Cooling



48

Sequence of Operation Cooling



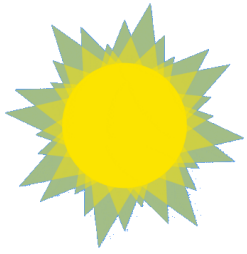
Bypasses

Begins Ramp UP

5-10 Second Delay Begins Ramping Up

49

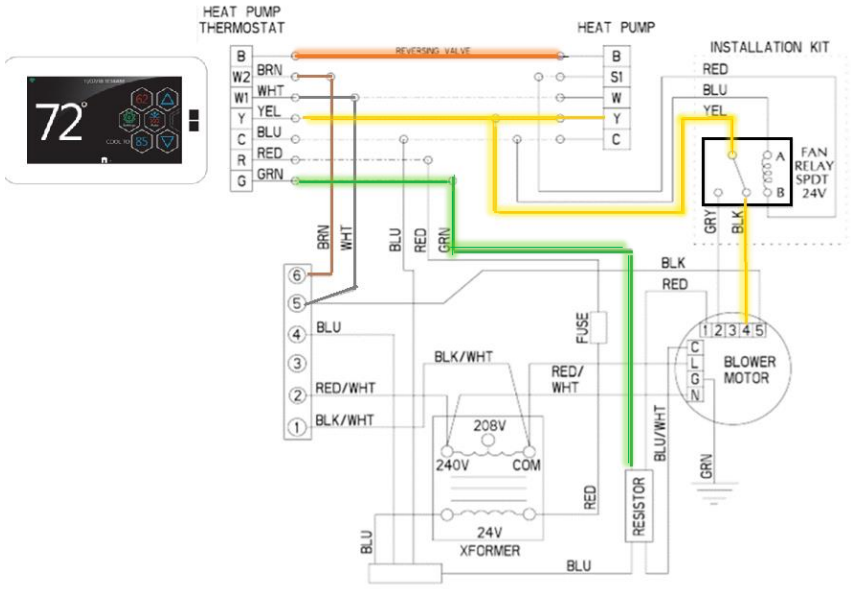
Sequence of Operation Cooling



157

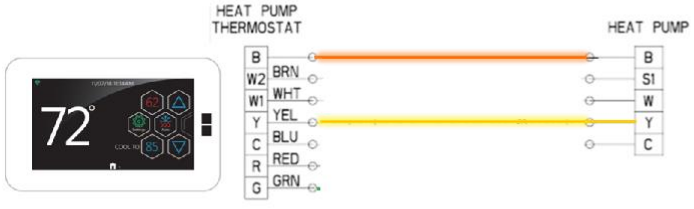
50

Sequence of Operation Heating



51

Sequence of Operation Heating



Meters

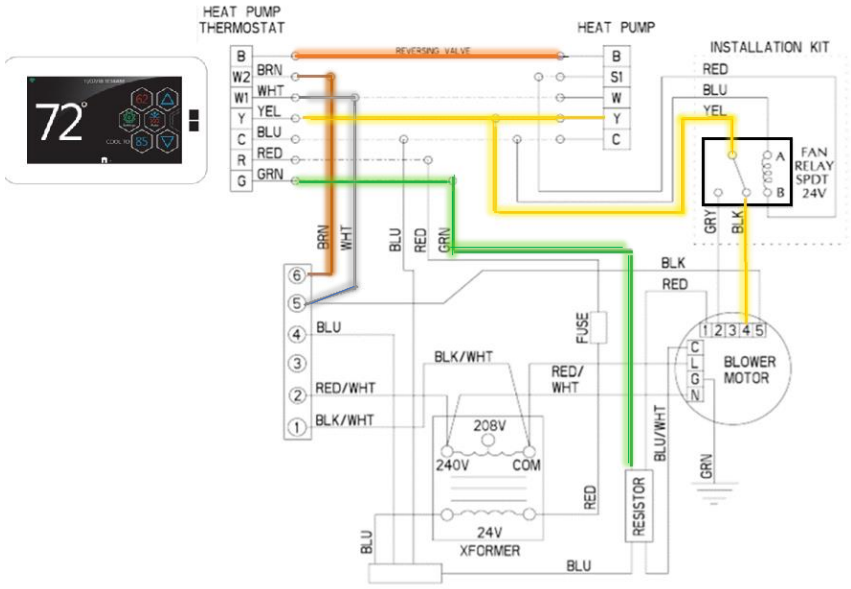
Energizes

Begins Ramp UP

5-10 Second Delay Begins Ramping Up

52

Sequence of Operation Heating



53

HMH7 with HMH7AK001Blower Relay Kit Installed

Thermostat	Field Wire Color	AHU W/ Relay	Field Wire Color	Outdoor Unit
C		Blue		C
R		Red		
G		Green		
W/W1		White		W
W2		Brown		
O/B				B
Y1		Yellow		Y
		Rly Red		S1

*Note: AHU has colored wires for connections

54

Sequence of Operation Defrost Initiation

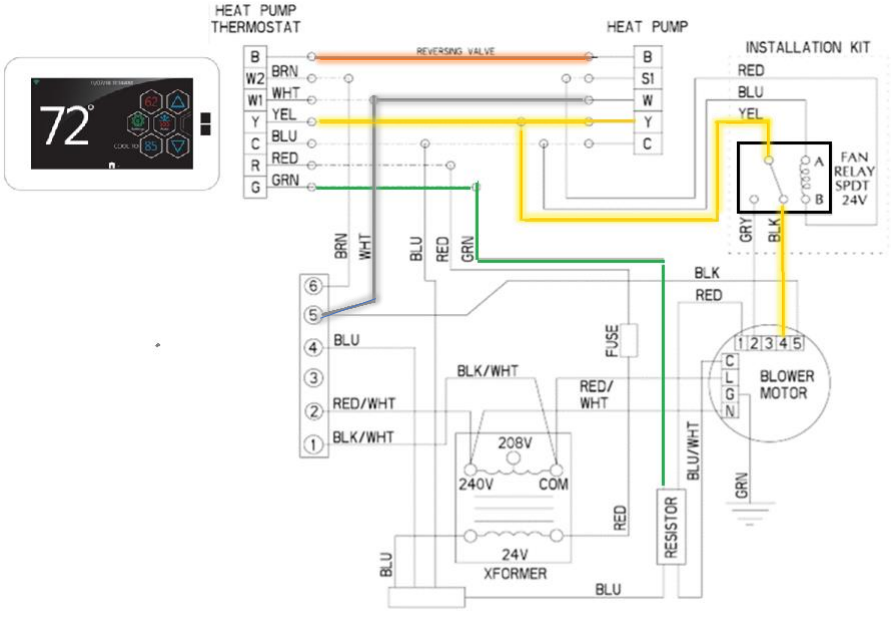
Ambient Temperature
Below 37 degrees F.

Coil temperature colder than ambient temperature for more than 2 minutes

Defrost Begins!

55

Sequence of Operation Defrost Initiation



56

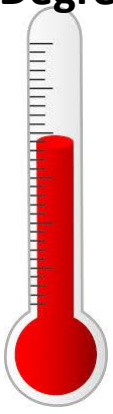
Sequence of Operation Anti-Freeze Mode (Cooling)

97

57

Sequence of Operation High Discharge Line Sensor

226 Degrees F.



58

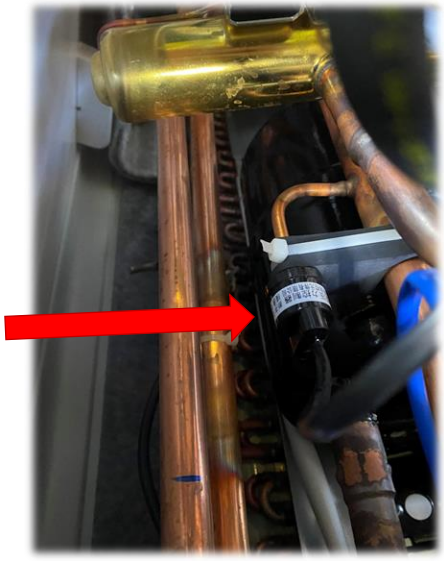
Sequence of Operation High Pressure Sensor (2 & 3 Ton)

550

59

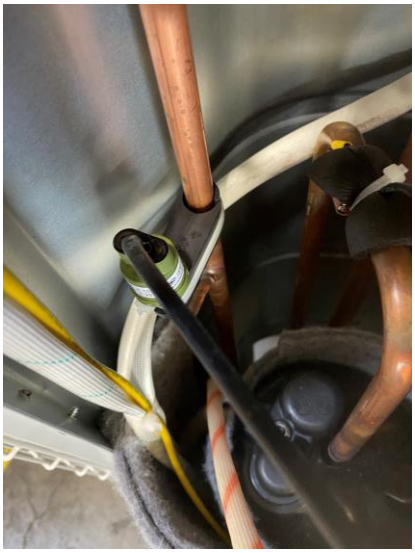
Sequence of Operation High Pressure Switch (4 & 5 Ton)

550



60

Sequence of Operation Low Pressure Switch (4 & 5 ton models)



Fault Code 15

61

Sequence of Operation Oil Return Mode

After 4 Hours

40 HZ

62

Compressor Time Delay On

3 Minute Time Delay

63

Flash Codes

Fault Code 13 (Compressor Overheat Protection Device)

64

Flash Codes

Fault code	Fault description	Possible reasons for fault	Resolution	Comments
1	Outdoor ambient temperature sensor fault	1. The outdoor ambient temperature sensor has a poor connection. 2. The outdoor ambient temperature sensor has failed. 3. The sampling circuit has failed.	1. Reconnect the outdoor ambient temperature sensor. 2. Replace the outdoor ambient temperature sensor components. 3. Replace the outdoor control board components.	
2	Outdoor coil temperature sensor fault	1. The outdoor coil temperature sensor has a poor connection. 2. The outdoor coil temperature sensor has failed. 3. Sensor circuit failure.	1. Reconnect the outdoor coil temperature sensor. 2. Replace the outdoor coil temperature sensor components. 3. Replace the outdoor control board components.	
3	Unit overcurrent turn-off fault	1. The control board current sampling circuit has failed. 2. Excessive current due to low supply voltage. 3. The compressor has failed. 4. Overload in cooling mode. 5. Overload in heating mode.	1. Replace the electrical control board components. 2. Normal protection. 3. Replace the compressor. 4. See Table 11. 5. See Table 12.	
4	EEprom data error	1. EE components fails. 2. EE components control circuit fails. 3. EE components are inserted incorrectly.	1. Replace the board. 2. Replace the outdoor control board components. 3. Reset the EE components.	

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Flash Codes

5	Cooling freezing protection (the indoor coil temperature is too low) or heating overload (the indoor coil temperature is too high)	1. Indoor unit airflow restriction. 2. The room temperature is too low in cooling mode or the room temperature is too high in heating mode. 3. The filter is dirty. 4. The duct resistance is too high resulting in low airflow. 5. The selected indoor fan speed is too low. 6. The indoor unit is not installed in accordance with the installation instructions, and the air inlet is too close to the air outlet.	1. Check if the indoor fan, indoor fan motor, and indoor coil function normally. 2. Normal protection. 3. Clean the filter. 4. Correct the duct system. 5. Correct the indoor fan speed. 6. Reinstall the indoor unit referring to the installation instructions to resolve issues.	
7	Communication fault between the indoor unit and outdoor unit	1. The low-voltage cable is connected incorrectly between the indoor unit and the outdoor unit. 2. The low-voltage connection is loose. 3. The low-voltage cable is damaged. 4. The outdoor control board has failed. 5. The low-voltage circuit fuse is open. 6. The low-voltage cable is incorrect.	1. Reconnect the connection cable referring to the wiring diagram. 2. Reconnect the low-voltage cable. 3. Replace the low-voltage cable. 4. Replace the outdoor control board. 5. Check the low-voltage circuit, and adjust the DIP switch and the short-circuit fuse. 6. Choose suitable low-voltage cable. Refer to the installation instructions.	

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Flash Codes

13	Compressor overheat protector device	1. The wiring of the overload protector has a poor connection. 2. Overload protector failure. 3. Low refrigerant charge. 4. Long lineset length applied without additional charge. 5. TXV/EEV valve failure. 6. Outdoor control board failure.	1. Reconnect the wiring of the overload protector. 2. Replace the overload protector. 3. Check the braze joints for leaks and recharge the refrigerant. 4. Add refrigerant. 5. Replace the expansion valve. 6. Replace the outdoor control board.	
14	The high-pressure switch operation or unit is turned off for high-pressure protection	1. The wiring of the high-pressure switch has a poor connection. 2. The high-pressure switch has failed. 3. The outdoor control board is abnormal. 4. Overload in cooling. 5. Overload in heating.	1. Reconnect the wiring of the high-pressure switch. 2. Replace the high-pressure switch. 3. Replace the outdoor control board. 4. See Table 11. 5. See Table 12.	Applies to models with high-pressure switch or pressure sensor.

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Flash Codes

15	The low-pressure switch protection or unit is turned off for low-pressure protection	1. The wiring of the low-pressure switch has a poor connection. 2. The low-pressure switch has failed. 3. The refrigerant charge is low. 4. The expansion valve fails in heating mode. 5. The outdoor control board is abnormal.	1. Reconnect the wiring of the low-pressure switch. 2. Replace the low-pressure switch. 3. Check for a refrigerant leak and adjust the refrigerant charge. 4. Replace the expansion valve. 5. Replace the outdoor control board.	Applies to models with low-pressure switch or pressure sensor.
16	Overload protection in cooling mode	System overload	See Table 11.	
17	Discharge temperature sensor fault	1. The wiring of the discharge temperature sensor has a poor connection. 2. The discharge temperature sensor has failed. 3. The sampling circuit is abnormal.	1. Reconnect the wiring of the discharge temperature sensor. 2. Replace the discharge temperature sensor. 3. Replace the outdoor control board.	

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Flash Codes

18	AC voltage is abnormal	1. The AC voltage is >275 V or <160 V. 2. The AC voltage of the sampling circuit on the drive board is abnormal.	1. Normal protection, check the supply power. 2. Replace the drive board.	
19	Suction temperature sensor fault	1. The wiring of the suction temperature sensor has a poor connection. 2. The suction temperature sensor has failed. 3. Sensor circuit failure.	1. Reconnect the suction pressure sensor wiring. 2. Replace the suction pressure sensor. 3. Replace the outdoor control board.	
22	Defrosting sensor fault	1. The wiring of the defrost temperature sensor has a poor connection. 2. The defrost temperature sensor has failed. 3. Sensor circuit failure.	1. Reconnect the wiring of the defrost sensor. 2. Replace the defrost sensor. 3. Replace the outdoor control board.	

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Flash Codes

43	High-pressure sensor fault	1. The wiring of the high-pressure sensor has a poor connection. 2. The high-pressure sensor has failed. 3. The high-pressure pressure sensor circuit has failed.	1. Reconnect the high-pressure sensor wiring. 2. Replace the high-pressure sensor. 3. Replace the outdoor control board.	
45	IPM fault	Drive or amplifier fault	See Table 13 and Table 14 for drive fault codes.	
46	IPM and control board communication fault	1. The cable between the control board and the drive board has a poor connection. 2. The cable between the control board and the drive board has failed. 3. The drive board has failed. 4. The control board has failed.	1. Reconnect the cable between the control board and the drive board. 2. Replace the communication cable between the control board and the drive board. 3. Replace the drive board. 4. Replace the control board.	

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Flash Codes

47	Excessive discharge temperature fault	1. Low refrigerant charge. 2. Low charge due to extended lineset. 3. Metering system failure. 4. Excessive outdoor ambient temperature.	1. Check for leaks. 2. Correct the refrigerant charge. 3. Replace the metering devices. 4. Normal protection.	
48	Outdoor DC fan motor fault (upper fan motor)	1. The DC fan motor connection is poor. 2. The wiring to the DC fan motor has failed. 3. The DC fan motor has failed. 4. The drive circuit of the upper DC fan motor has failed. 5. Outdoor airflow blockage.	1. Replace the DC fan motor wiring. 2. Replace the DC fan motor. 3. Replace the DC fan motor. 4. Replace the drive board of the fan motor. 5. Resolve the outdoor unit airflow restriction.	
49	Outdoor DC fan motor fault (lower fan motor)	1. The DC fan motor connection is poor. 2. The wiring to the DC fan motor has failed. 3. The DC fan motor has failed. 4. The drive circuit of the lower DC fan motor has failed. 5. Outdoor airflow blockage.	1. Replace the DC fan motor wiring. 2. Replace the DC fan motor. 3. Replace the DC fan motor. 4. Replace the drive board of the fan motor. 5. Resolve the outdoor unit airflow restriction.	

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Flash Codes

91	Unit stops due to IPM board overheating fault	1. The outdoor ambient temperature is too high. 2. The speed of the outdoor fan motor is too low. 3. The outdoor unit is not installed in accordance with the installation instructions. 4. The supply power is too low.	1. Normal protection. 2. Check the fan motor and replace if necessary. 3. Reinstall the outdoor unit in accordance with the installation instructions. 4. Normal protection.	
96	Low charge	Inadequate system charge	Recover the refrigerant and charge the refrigerant. Refer to the *Tabular Data Sheet*.	
97	4-way valve failure	1. The connecting wiring of the 4-way valve coil is poor. 2. The 4-way valve coil has failed. 3. The 4-way valve has failed. 4. The drive board of the 4-way valve has failed.	1. Repair the wiring of the 4-way valve. 2. Replace the 4-way valve coil. 3. Replace the 4-way valve. 4. Replace the drive board of the 4-way valve.	

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Flash Codes

Table 11: Overload in cooling mode

No.	Cause	Resolution
1	The refrigerant is excessive.	Recover the refrigerant, and recharge the refrigerant referring to the rating label.
2	The outdoor ambient temperature is too high.	Use within allowable temperature range.
3	Short-circuit occurs in the air outlet and air inlet of the outdoor unit.	Adjust the installation of the outdoor unit referring to the installation instructions.
4	The outdoor heat exchanger is dirty.	Clean the heat exchanger of the outdoor unit.
5	The speed of the outdoor fan motor is too low.	Check the outdoor fan motor operation and replace if necessary.
6	The outdoor fan is damaged or blocked.	Check the outdoor fan.
7	The air inlet and/or outlet has been blocked.	Remove the obstructions.
8	The expansion valve or the capillary has failed.	Replace the expansion valve or the capillary.

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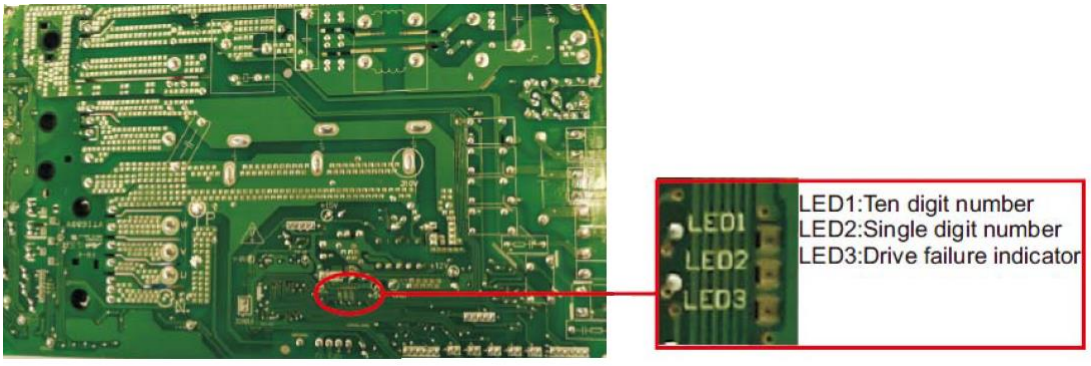
Flash Codes

Table 12: Overload in heating mode

No.	Cause	Resolution
1	The refrigerant is excessive.	Recover the refrigerant, and recharge the refrigerant referring to the rating label.
2	The indoor ambient temperature is too high.	Use within allowable temperature range.
3	Short-circuit occurs in the air outlet and air inlet of the indoor unit.	Adjust the installation of the indoor unit referring to the installation instructions.
4	The indoor filter is dirty.	Clean the indoor filter.
5	The speed of the indoor fan motor is too low.	Check the indoor fan motor speed setting.
6	The indoor fan is not operating correctly.	Check the indoor fan.
7	The air inlet and/or outlet has been blocked.	Remove the obstructions.
8	The expansion valve or the capillary fails.	Replace the expansion valve or the capillary.

74

Drive Fault Codes (2 & 3 ton)



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Drive Fault Codes (2 & 3 ton)

Fault code displayed by LED lamps on outdoor main control board.
There are 3 LED lamps on control board, LED1, LED2 and LED3.
LED1 indicates fault code represented by 2-digit number, LED2 indicates fault code represented by single digit number and LED3 indicates outdoor drive control fault.
When LED3 is off, LED1 and LED 2 indicate main control fault code.
When LED3 is on, LED1 and LED 2 indicate drive control fault code.
When LED3 is flickering and LED1, LED 2 are all off, it indicates the compressor is preheating.
Failures display with 5s interval. It means LED will be off for 5s to report the next fault code.
System protection codes display method is the same with main control fault code.
LED lamps will be off when there is no failure, protection or preheating.

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Drive Fault Codes (2 & 3 ton)

Table 13: Drive fault code - 24k/36k

Fault code	Fault description	Possible reasons for fault	Resolution
1	Inverter DC voltage overload fault	1. The power supply input is too high or too low. 2. Drive board fault.	1. Check the power supply. 2. Change the drive board.
2	Inverter DC low-voltage fault		
3	Inverter AC current overload fault		
4	Out-of-step detection	1. Compressor phase lost. 2. Bad drive board components. 3. Compressor insulation fault.	1. Check the compressor wire connection. 2. Change the drive board. 3. Change the compressor.
5	Loss phase detection fault (speed pulsation)		
6	Loss phase detection fault (current imbalance)		
7	Inverter IPM fault (edge)	1. System overload or current overload. 2. Drive board fault. 3. Compressor oil shortage, serious wear of crankshaft. 4. Compressor insulation fault.	1. Check the system. 2. Change the drive board. 3. Change the compressor. 4. Change the compressor.
8	Inverter IPM fault (level)		
9	PFC_IPM IPM fault (edge)		
10	PFC_IPM IPM fault (level)		
11	PFC power detection of failure	1. The power supply is not stable. 2. Instantaneous power off. 3. Drive board failure.	1. Check the power supply. 2. N/A 3. Change the drive board.
12	PFC overload current detection of failure	1. System overload, current is too high. 2. Drive board fails. 3. PFC fails.	1. Check the system. 2. Change the drive board. 3. Change the PFC.

77

Drive Fault Codes (2 & 3 ton)

Table 13: Drive fault code - 24k/36k

Fault code	Fault description	Possible reasons for fault	Resolution
13	DC voltage detected abnormal	1. The input voltage is too high or too low. 2. Drive board fails.	1. Check the power supply. 2. Change the drive board.
14	PFC LOW voltage detected failure		
15	AD offset abnormal detected failure	Drive board fails.	Change the drive board.
16	Inverter PWM logic set fault		
17	Inverter PWM initialization failure		
18	PFC_PWM logic set fault		
19	PFC_PWM initialization fault		
20	Temperature abnormal		
21	Shunt resistance unbalance adjustment fault		
22	Communication failure	1. Communication wire connection is poor. 2. Drive board fails. 3. Control board fails.	1. Check the wiring. 2. Change the drive board. 3. Change the control board.
23	Incorrect motor parameters	Initialization is abnormal.	Reset the power supply.
26	DC voltage mutation error	1. The power input changes suddenly. 2. Drive board fails.	1. Check the power supply to provide stable power supply. 2. Change the drive board.

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Drive Fault Codes (2 & 3 ton)

Table 13: Drive fault code - 24k/36k

27	D axis current control error	1. System overload, phase current is too high. 2. Drive board fails.	1. Check the system to see if it works normally. 2. Check the stop valve to see if it is open. 3. Change the drive board.
28	Q axis current control error	1. System overloads, phase current is too high. 2. Drive board fails.	1. Check the system to see if it works normally. 2. Check the stop valve to see if it is open. 3. Change the drive board.

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Drive Fault Codes (2 & 3 ton)

Table 13: Drive fault code - 24k/36k

Fault code	Fault description	Possible reasons for fault	Resolution
29	Saturation error of D axis current control integral	1. Momentary system overload. 2. The compressor parameter is not suitable. 3. Drive board fails.	1. Check the system to see if it works normally. 2. Check the stop valve to see if it is open. 3. Change the drive board.
30	Saturation error of Q axis current control integral	1. Momentary system overload. 2. The compressor parameter is not suitable. 3. Drive board fails.	1. Check the system to see if it works normally. 2. Check the stop valve to see if it is open. 3. Change the drive board.
35	EE data abnormal	Driver board EEPROM is abnormal.	1. Change the EEPROM. 2. Change the drive board.

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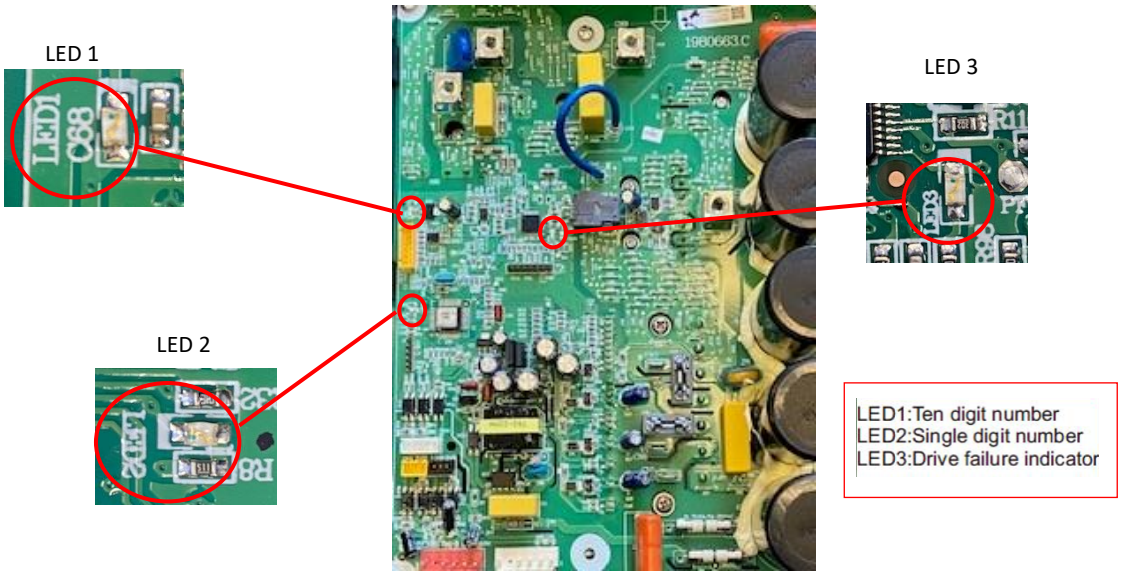
Drive Fault Codes (4 & 5 ton)



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Drive Fault Codes (4 & 5 ton)

82

Drive Fault Codes (4 & 5 ton)

Table 14: Drive fault code - 48k/60k

Fault code	Fault description	Possible reasons for fault	Resolution
1	Q axis current detection, failure in drive control	1. The compressor wire connection is poor. 2. Bad drive board components. 3. The compressor start load is too large. 4. Compressor demagnetization. 5. Compressor oil shortage, serious wear of crankshaft 6. The compressor insulation has failed.	1. Check the wire of the compressor. 2. Change the drive board. 3. Allow pressures to equalize and then resume unit operation. 4. Change the compressor. 5. Change the compressor. 6. Change the compressor.
2	Phase current detection, failure in drive control	1. Compressor voltage default phase. 2. Bad drive board components. 3. The compressor insulation has failed.	1. Check the compressor wire connection. 2. Change the drive board. 3. Change the compressor.
3	Initialization, phase current imbalance	Bad drive board components.	Change the drive board.
4	Speed estimation, failure in drive control	1. Bad drive board components. 2. Compressor shaft clamping. 3. The compressor insulation has failed.	1. Change the drive board. 2. Change the compressor. 3. Change the compressor.

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Drive Fault Codes (4 & 5 ton)

Table 14: Drive fault code - 48k/60k

Fault code	Fault description	Possible reasons for fault	Resolution
5	IPM FO output fault	1. System overload or current overload. 2. Drive board fails. 3. Compressor oil shortage, serious wear of crankshaft. 4. The compressor insulation has failed.	1. Check the outdoor section system. 2. Change the drive board. 3. Change the compressor. 4. Change the compressor.
6	Communication between drive board and control board fault	1. Communication wire connection is poor. 2. Drive board fault. 3. Control board fault.	1. Check the wiring. 2. Change the drive board. 3. Change the control board.
7	AC voltage, overload voltage	1. The supply voltage input is too high or too low. 2. Drive board fails.	1. Check the power supply. 2. Change the drive board.
8	DC voltage, overload voltage	1. The supply voltage input is too high. 2. Drive board fault.	1. Check the power supply. 2. Change the drive board.
9	AC voltage imbalance	Drive board fails.	Change the drive board.
10	PFC current detection circuit fault before compressor is **ON**	Bad drive board components.	Change the drive board.

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Drive Fault Codes (4 & 5 ton)

Table 14: Drive fault code - 48k/60k

11	AC voltage supply out of range	1. Power supply abnormal, power frequency out of range. 2. Drive board fails.	1. Check the system. 2. Change the drive board.
12	Products of single-phase PFC overcurrent, FO output low level	1. System overload, current is too large. 2. Drive board fault. 3. PFC fault.	1. Check the system. 2. Change the drive board. 3. Change PFC.
	Inverter overcurrent (3-phase power supply outdoor sections)	1. System overload, current is too large. 2. Drive board fault. 3. Compressor oil shortage, serious wear of crankshaft. 4. The compressor insulation has failed.	1. Check the system. 2. Change the drive board. 3. Change the compressor. 4. Change the compressor.
13	Inverter overcurrent	1. System overload, current is too large. 2. Drive board fault. 3. Compressor oil shortage, serious wear of crankshaft. 4. The compressor insulation has failed.	1. Check the system. 2. Change the drive board. 3. Change the compressor. 4. Change the compressor.

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Drive Fault Codes (4 & 5 ton)

Table 14: Drive fault code - 48k/60k

Fault code	Fault description	Possible reasons for fault	Resolution
14	PFC overcurrent (single-phase outdoor section)	1. System overload, current is too large. 2. Drive board fault. 3. PFC fault.	1. Check the system. 2. Change the drive board. 3. Change PFC.
	Phase imbalance, phase loss, or instantaneous power failure (only for 3-phase power supply outdoor sections)	1. 3-phase voltage imbalance. 2. 3-phase power supply phase lost. 3. The power supply wiring is incorrect. 4. Drive board fault.	1. Check the power supply. 2. Check the power supply. 3. Check the power supply wiring connection. 4. Change the drive board.
15	Instantaneous power off detection	1. The power supply is not stable. 2. Instantaneous power failure. 3. Drive board fault.	1. Check the power supply. 2. No fault. 3. Change the drive board.
16	Low DC voltage 200 V	1. The voltage input is too low. 2. Drive board fault.	1. Check the power supply. 2. Change the drive board.

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Drive Fault Codes (4 & 5 ton)

Table 14: Drive fault code - 48k/60k

18	Driver board read EE data error	1. EEPROM has no data or data error. 2. EEPROM circuit fault.	1. Change the EEPROM component. 2. Change the drive board.
19	PFC chip receives data fault	Abnormal communication loop.	Change the drive board.
20	PFC soft start abnormally	Abnormal PFC drive loop.	Change the drive board.
21	Compressor drive chip could not receive data from PFC chip	Communication loop fault.	Change the drive board.

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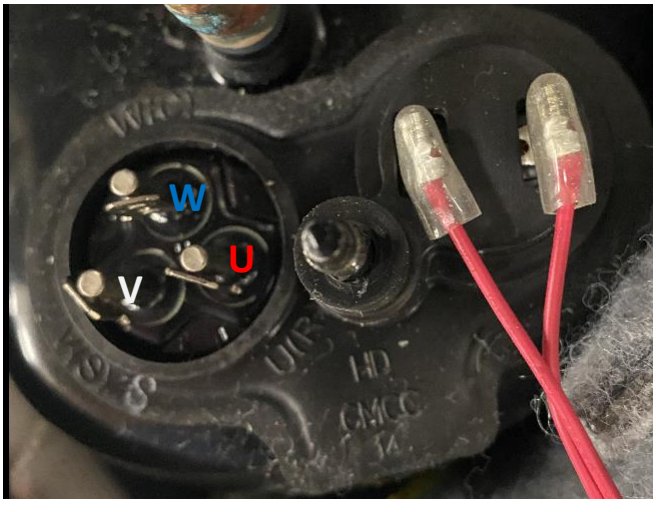
Drive Fault Codes (Compressor)

2 & 3 ton Drive Fault Codes 4-10

4 & 5 ton Drive Fault Codes 1-5 and 12,13



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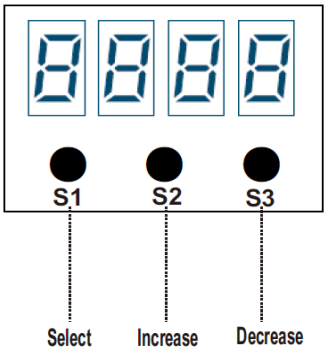
Checking Parameters (2 & 3 ton)



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Checking Parameters (2 & 3 ton)

Parameter code	Descriptions
P.0	Fault codes
P.1	Compressor actual frequency
P.2	Compressor driving frequency
P.4	Compressor target frequency
P.5	Compressor exhaust temperature
P.6	Outdoor suction Temperature
P.7	Outdoor ambient temperature
P.8	Outdoor coil temperature
P.9	Outdoor defrosting temperature
P.10	IPM module temperature
P.11	Outdoor capacity requirement
P.13	Outdoor DC Motor target speed
P.14	AC input current
P.15	AC input voltage
P.16	DC bus voltage
P.17	Compressor phase current
P.18	Frequency limit code
P.20	Target suction overheating
P.21	Target exhaust overheating
P.22	Actual suction overheating (heating)
P.23	Actual exhaust overheating (heating)

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Checking Parameters (2 & 3 ton)

After setting the desired Parameter, a few seconds later the reading for that Parameter displays

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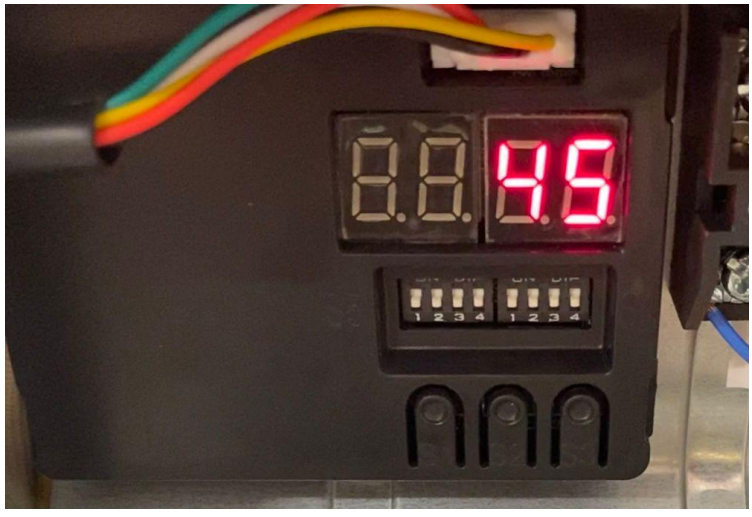
Checking Parameters (2 & 3 ton)



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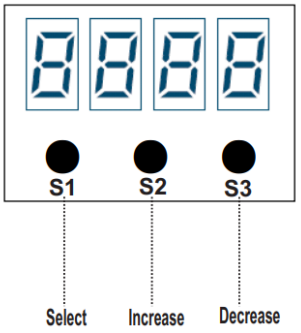
Checking Parameters (4 & 5 ton)



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Checking Parameters (4 & 5 ton)

Parameter code	Descriptions
0	Protection code or fault code
P.1	Target frequency
P.2	Driving frequency
P.4	Outdoor EEV opening
P.5	Outdoor EEV target opening
P.6	Upper DC motor revolving speed
P.8	AC Input voltage
P.9	Current
P.10	Modular temperature
P.11	Capacity needed
P.12	Modular fault
P.20	Outdoor ambient temperature
P.21	Outdoor coil temperature
P.22	Outdoor defrost temperature
P.23	Suction temperature
P.24	Discharge temperature
H.1	DSH actual value
H.2	DSH target value
H.3	Target pressure in cooling mode (Actual pressure= the displayed value/100)
H.4	Target pressure in heating mode (Actual pressure= the displayed value/100)
H.5	Actual pressure (Actual pressure=the displayed value/100)

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Dip Switch Settings (2 & 3 ton)

S4 Dip switch setting		S5 Dip switch setting	
Factory setting		Factory setting	
Pump Down Switch		Smart energy management	
Forced defrost		Cooling Only	

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Dip Switch Settings (4 & 5 ton)

S1 Dip switch setting		S2 Dip switch setting	
select setting		select setting	
Factory setting		Factory setting	
Forced defrost		Refrigerant recovery	

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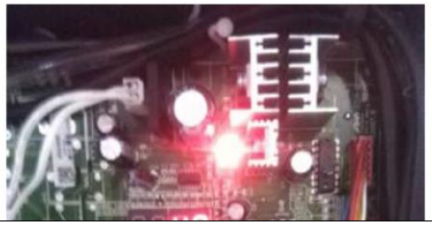
Pump Down

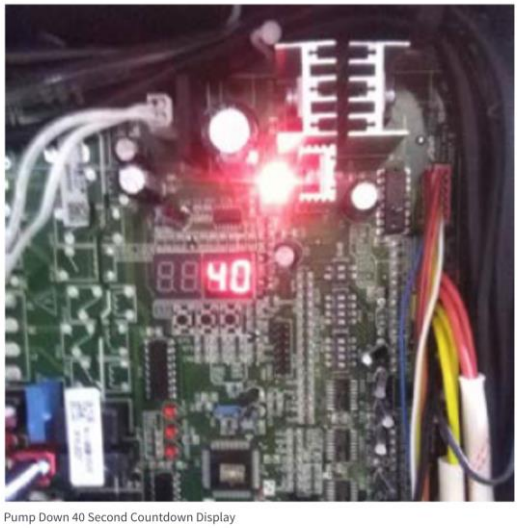
On the HMH7 2 and 3 ton models, the dip switches can be set up to accommodate four different settings. The dip switch can be reconfigured in order to assure an adequate pump down of the unit. Configuring the dip switch for the pump down drives the EEV fully open. The liquid line access valve is manually closed, and then the unit is started in the cooling mode. The display above the dip switches begins a countdown from 40 seconds. When the display gets to 0 seconds the 0 blinks. At this time, manually close the suction line access valve. Immediately de-energize the HMH7 and the pump down process is completed. Note: The HMH7 has an outdoor coil that can store all system refrigerant if the lineset is below 40 feet of equivalent length.

Turn hex wrench clockwise to close the liquid line access valve and begin pump down sequence.

Turn hex wrench clockwise to close suction line access valve at the end of the pump down sequence.



97



Pump Down 40 Second Countdown Display

Forced Defrost Mode

Set the Dip Switches in the "Forced Defrost Configuration". Note the dip switch settings are different on the 2 and 3 ton versus the 4 and 5-ton versions. Turn the thermostat control to heat and increase the heating setpoint to create a call for heat. The HMH7 will almost immediately go into the defrost mode.

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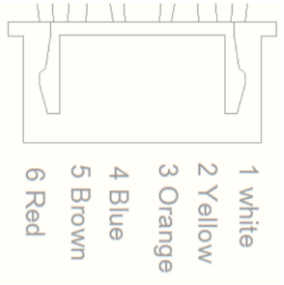
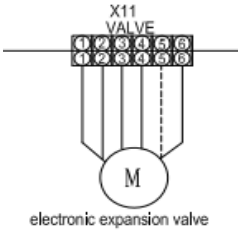
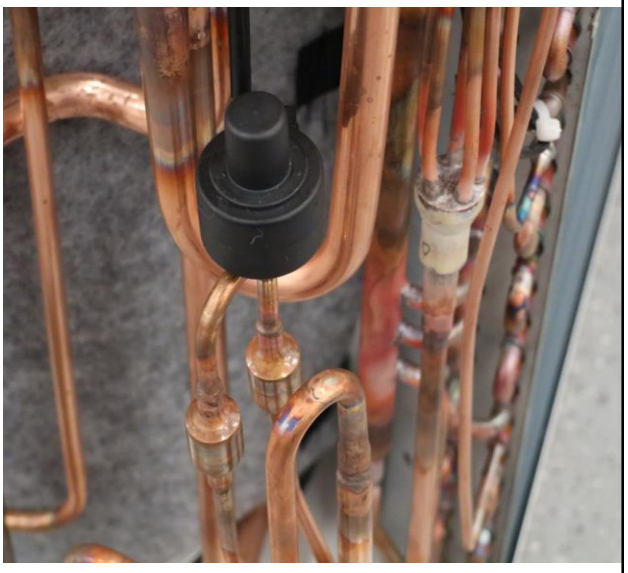
EEV Electronic Expansion Valve





Color of lead wire	Normal Value
Red- Blue	About 50Ω
Red - Yellow	
Brown-Orange	
Brown-White	



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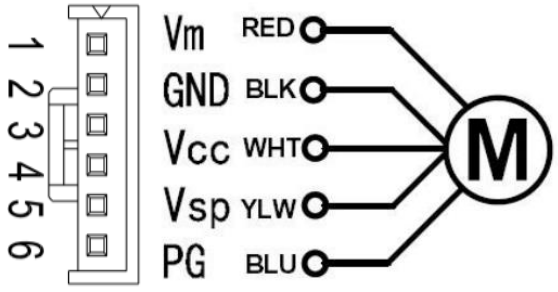
DC Condenser Fan Motor



NO.	Color	Signal	Voltage
1	Red	Vs/Vm	200V~380V
2	---	---	---
3	Black	GND	0V
4	White	Vcc	13.5-16.5V
5	Yellow	Vsp	0~6.5V
6	Blue	FG	13.5-16.5V

With power on, turn the thermostat setting to off. Measure the DC voltage from Pin1-Pin3. Pin4 – Pin3 at the fan motor connection on the control board.

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The HMH7 Twin Rotary Compressor with Accumulator and Crankcase Heater

The rotary compressor modulates speed based upon the frequency received from the control board. The minimum and maximum frequencies are illustrated below, separated by outdoor unit capacity.

Unit	ODU Model No.	Minimum Compressor Frequency (Hz)	Maximum Compressor Frequency (Hz)
24k	HMH72B241S	15	75
36k	HMH72B361S	22	95
48k	HMH72B481S	15	92
60k	HMH72B601S	18	95

Modulating Compressor Frequencies

Extrapolation of the frequency data appears below, assuming linear modulation between 25% and 110% with the frequency ranges stated above. Scroll the chart right and left for all values.

Compressor Modulation Frequency Data

Capacity	25%	26%	27%	28%	29%	30%	31%	32%	3
24K	15Hz	15.7059	16.4118	17.1176	17.8235	18.5294	19.2353	19.9412	20.
36K	22Hz	22.8588	23.7176	24.5675	25.4353	26.2941	27.1529	28.0118	28.
48K	15Hz	15.9059	16.8118	17.7176	18.6235	19.5294	20.4353	21.3412	22.
60K	18Hz	18.9059	19.8118	20.7176	21.6235	22.5294	23.4353	24.3412	25.

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Modulating Heat Pump
HMH7

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