Service Data Application Guide: H Series - 17 SEER Horizontal Discharge Modulating Heat Pump

6062831-UAG-A-0321

General

WARNING: Cancer and Reproductive Harm – www.P65Warnings.ca.gov.

The units are tested in accordance with the following:

ETL LISTED c US Intertek

AHRI CERTIFIED www.ahridirectory.org Unitary Small HP AHRI Standard 210/240

ISO 9000 REGISTRATION ISO 9001 Certified Quality Management System

This Service Data Application Guide is intended to provide guidance for troubleshooting outdoor units in operation in the field. These data tables are developed using new matched systems with the outdoor unit paired with the Designated Test Combination (DTC). Variation from these published tables may exist for actual field installations, according to the specific application. The Service Data Tables provide reference refrigerant temperature and pressure, indoor delta temperature, and unit operating currents for a range of indoor and outdoor operating conditions. Refer to the *Technical Guide* for other technical information. Information on piping considerations and other installation instructions that may be useful to a servicing engineer have also been included in this document. For more comprehensive installation instructions, refer to the *Installation Manual*.

Safety

Read these safety precautions carefully to ensure correct installation.

Note the following:

- You must match the outdoor unit with an indoor unit with refrigerant R-410A.
- Use the specified filter drier on the liquid pipe when connecting the units.
- Carefully file the indoor and outdoor unit manuals away for future reference.

This is a safety alert symbol. When you see this symbol on labels or in manuals, be alert to the potential for personal injury.

Understand and pay particular attention to the signal words **DANGER**, **WARNING**, or **CAUTION**.

DANGER indicates an **imminently** hazardous situation, which, if not avoided, **will result in death or serious injury**.

WARNING indicates a **potentially** hazardous situation, which, if not avoided, **could result in death or serious injury**.

CAUTION indicates a **potentially** hazardous situation, which, if not avoided **may result in minor or moderate injury**. It is also used to alert against unsafe practices and hazards involving only property damage.

WARNING

Electrical Shock Hazard

Disconnect and lock out power before servicing. Wait 5 min to ensure that drive capacitors are discharged before servicing. Use compressor with grounded system only. Molded electrical plug must be used for connection to compressor.

WARNING

Do not tamper with or bypass safety devices incorporated in this outdoor section. Any modification may cause serious injury.

WARNING

Incorrect installation may create a condition where the operation of the product could cause personal injury or property damage. Incorrect installation, adjustment, alteration, service, or maintenance can cause injury or property damage. Refer to this installation manual for assistance or for additional information, consult a qualified contractor, installer, or service agency.

CAUTION

This heat pump uses R-410A refrigerant. R-410A systems operate at higher pressures than R-22 systems. Do not use R-22 service equipment or components on R-410A equipment. Service equipment must be rated for R-410A.

CAUTION

This product must be installed in strict compliance with the enclosed installation instructions and any applicable local, state, and national codes including, but not limited to building, electrical, and mechanical codes.

NOTICE

It is imperative to fasten this equipment to a sturdy base for protection against vibration, strong breeze, or earthquake. Use anchors and a base adequate to protect the unit against tipping or dislocation.

Inspection

Inspect the unit immediately after receiving it for possible damage during transit, including copper distributor lines that may have shifted and are touching either copper lines or the cabinet. If damage is evident, the extent of the damage must be noted on the carrier's delivery receipt. A separate request for inspection by the carrier's agent must be made in writing. Contact the local distributor for more information.

Requirements for installing or servicing R-410A equipment

- Gauge sets, hoses, refrigerant containers, and recovery system must be designed to handle the POE type oils, and the higher pressures of R-410A.
- Manifold sets must be high side and low side with low side retard.
- All hoses must have a 700 psig service pressure rating.
- Leak detectors must be designed to detect HFC refrigerant.
- Recovery equipment (including refrigerant recovery containers) must be specifically designed to handle R-410A.

Limitations

Install the unit in accordance with all national, state, and local safety codes, and the following limitations:

- Observe the limitations for the indoor unit, coil, and appropriate accessories.
- Do not install the outdoor unit with any duct work in the air stream. The outdoor fan is the propeller type and is not designed to operate against any additional external static pressure.
- Observe the maximum and minimum conditions for operation to ensure a system that gives maximum performance with minimum service.

Table 1: Minimum and maximum operating limit conditions

Air temperature	Outdoor coil °F (°C)		Indoor coil °F (°C)	
	DB cool	DB heat	WB cool	DB heat
Minimum	35 (2)	-5 (-21)	57 (14)	50 (10)
Maximum	122 (50)	75 (24)	72 (22)	80 (27)

Note: See the NOTICE in the *Reduced capacity conditions* section.

Reduced capacity conditions

NOTICE

Inverter temperature protection

If excessive inverter temperatures are sensed, the compressor speed/capacity is reduced until an acceptable condition is reached. When the inverter temperature returns to an acceptable level, the system returns to normal operation.

NOTICE

Overcurrent and undercurrent protection

If a low or high current condition is sensed, the compressor speed/capacity is reduced until an acceptable current level is reached. When the system reaches an acceptable current level, the compressor and fan return to normal operating conditions.

NOTICE

Overvoltage and undervoltage protection

If a low or high supply voltage condition is sensed (below 187 VAC or above 265 VAC), the compressor speed/capacity is automatically reduced until an acceptable voltage level is reached. When an acceptable voltage level is sensed, the system automatically returns to a normal state of operation.

NOTICE

Low ambient protection

Cooling mode: The unit automatically adjusts to maintain cooling operation in outdoor ambient conditions down to 35°F (2°C). The unit reduces capacity and low ambient protection (cooling mode) or cycles off if asked to provide cooling when the outdoor temperature is at or below these conditions. Heating mode: The unit provides compressor heat down to an outdoor ambient temperature of -5°F (-29°C). As the outdoor ambient temperature reduces, available heat reduces for all air source heat pumps.

Piping considerations

When using more than 15 ft of interconnecting tubing, see Table 2 for charging. For long-line applications, interconnecting lines over 100 ft must be installed with liquid line solenoid. Refer to the *Piping Application Guide* for more information.

Figure 1: Refrigerant piping

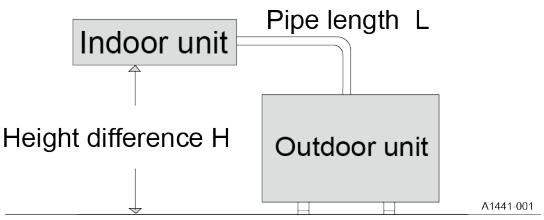


Table 2: Refrigerant piping

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)

The correction factor is based on the equivalent piping length in meters (EL) and the height difference between outdoor and indoor units in meters (H).

H: Height difference between indoor unit and outdoor unit (m).

- H>0: Position of outdoor unit is higher than position of indoor unit (m).
- H<0: Position of outdoor unit is lower than position of indoor unit (m).

L: Actual one-way piping length between indoor unit and outdoor unit (m).

EL: Equivalent one-way piping length between indoor unit and outdoor unit (m).

Table 3: Correction factor

Gas diameter - mm (in.)	90° elbow
9.52 (3/8)	0.15
12.70 (1/2)	0.2
15.88 (5/8)	0.25
19.05 (3/4)	0.35
22.22 (7/8)	0.40

Table 4: Cooling capacity correction factor

EL - ft (m)	HMH72B24	HMH72B36	HMH72B48	HMH72B60
25 (7.6)	1.00	1.00	1.00	1.00
38 (10)	0.95	0.98	0.98	0.98
50 (15)	0.93	0.97	0.97	0.97
75 (23)	0.89	0.93	0.94	0.94
100 (30)	0.85	0.89	0.90	0.90
125 (38)	0.81	0.86	0.87	0.87
150 (45)	0.78	0.82	0.82	0.82
164 (50)	0.75	0.81	0.81	0.81
200 (61)	-	0.75	0.74	0.74
246 (75)	-	0.69	0.65	0.65

Table 5: Heating capacity correction factor

EL - ft (m)	HMH72B24	HMH72B36	HMH72B48	HMH72B60
25 (7.6)	1.00	1.00	1.00	1.00
38 (10)	0.94	0.98	0.98	0.98
50 (15)	0.93	0.97	0.97	0.97
75 (23)	0.89	0.93	0.94	0.94
100 (30)	0.85	0.89	0.90	0.90
125 (38)	0.81	0.86	0.86	0.86
150 (45)	0.78	0.83	0.83	0.83
164 (50)	0.75	0.81	0.80	0.80
200 (61)	-	0.76	0.75	0.75
246 (75)	-	0.70	0.66	0.66

Table 6: Height correction factor between indoor and outdoor units

Height difference - ft (m)	Factor
16 (5)	0.01
33 (10)	0.02
108 (30)	0.025

Note:

- To ensure correct unit selection, consider the farthest indoor unit.
- The data in Table 6 assumes the height difference between indoor unit and outdoor unit is 0 m.
- Ensure to minimize the length of the connection pipes to optimize performance. If the outdoor unit is higher or lower than the indoor unit, apply the height correction factor in addition to the length correction factor to calculate cooling or heating. If the outdoor unit is higher, apply the correction factor to the cooling capacity. If the outdoor unit is lower, apply the correction factor to the heating capacity.

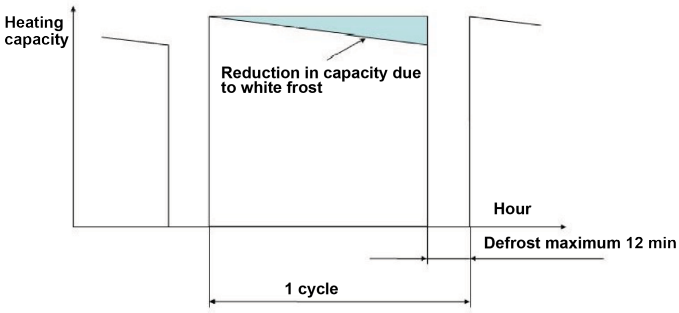
The heating capacity in Table 5 excludes defrost. In consideration of defrost, correct the heating capacity by the following equation:

corrected heating capacity = defrost correction factor x unit capacity

Table 7: Defrosting operation correction factors

Outdoor temperature - °F (°C) DB	Correction factor (humidity rating 85% RH)
5 (-15)	0.95
14 (-10)	0.95
23 (-5)	0.93
32 (0)	0.85
44.6 (7)	1.0
50 (10)	1.0
59 (15)	1.0

Figure 2: Correction factor



Note: The correction factor is not valid for special conditions such as snowfall or operation in a transitional period.

Liquid-line filter drier

This unit requires a bi-flow liquid line filter drier installed external to the unit. This is included in the wiring accessory kit HMH7AK001 required for installation.

R-410A filter-drier Source 1 Part Number	Apply with models
S1-404101	All

NOTICE

Using a larger than specified line size could result in oil return problems. Using too small a line results in loss of capacity and other problems caused by insufficient refrigerant flow. For the heat pump, maintain level horizontal refrigerant lines between the indoor unit and the outdoor unit to facilitate sufficient oil return.

Add-on replacement/retrofit

When using this unit as a replacement for an existing R-410A unit, these are matched systems. Replace the indoor coil and the outdoor unit. Perform the following steps to ensure correct system operation and performance.

1. Change out the indoor coil to an approved R-410A coil/air handling unit combination with the appropriate metering device.
2. Change out the lineset when replacing an R-22 unit with an R410A unit to reduce cross-contamination of oils and refrigerants. If change-out of the lineset is not practical, take the following precautions:
    a. Inspect the lineset for kinks, sharp bends, or other restrictions, and for corrosion.
    b. Determine if there are any low spots that might be serving as oil traps.
    c. Flush the lineset with a commercially available flush kit to remove as much of the existing oil and contaminants as possible.
3. If replacing the outdoor unit because of a compressor burnout, replace the refrigeration lines or, at a minimum, thoroughly flush the lines with a commercially available flush kit.

WARNING

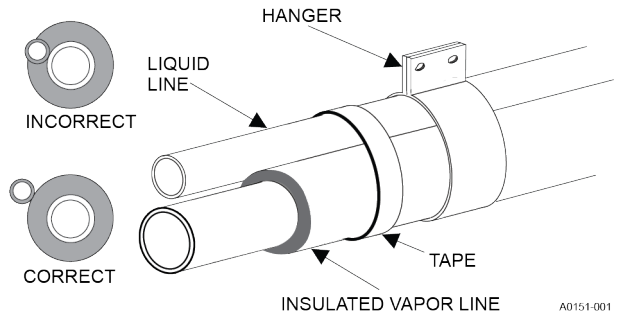
Never install a suction-line filter drier in the liquid line of an R-410A system. Failure to follow this warning can cause a fire, injury, or death.

Precautions for line installation

Adhere to the following during line installation:

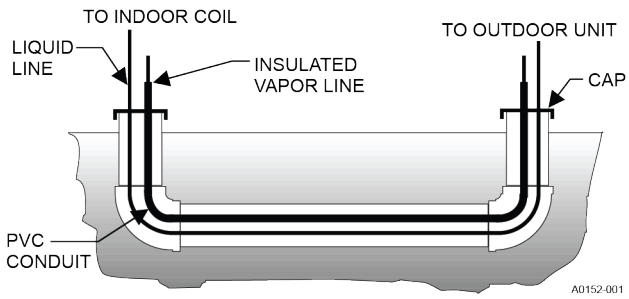
- Connect the outdoor unit to the indoor coil using field supplied refrigerant grade (ACR) copper tubing that is internally clean and dry. Units must only be installed with the tubing sizes for approved system combinations as specified in the *Tabular Data Sheet*. The charge given is applicable for total tubing lengths up to 15 ft (4.6 m).
- Install the refrigerant lines with as few bends as possible. Ensure not to damage the couplings or kink the tubing. Use clean hard drawn copper tubing where no appreciable amount of bending around obstruction is necessary. If soft copper must be used, ensure to avoid sharp bends that may cause a restriction.
- Install the lines so that they do not obstruct service access to the coil, indoor section, or filter.
- Isolate the refrigerant lines to minimize noise transmission from the equipment to the structure.
- Insulate the vapor line with a minimum of 1/2-in. foam rubber insulation (Armaflex or equivalent). Insulate liquid lines that may be exposed to direct sunlight, high temperatures, or excessive humidity.
- Tape and suspend the refrigerant lines correctly. Do not allow tube metal-to-metal contact. See Figure 3.

Figure 3: Installation of vapor line



- Use PVC piping as a conduit for all underground installations as shown in Figure 4. Keep buried lines as short as possible to minimize the build up of liquid refrigerant in the vapor line during long periods of shutdown.

Figure 4: Underground installation



- Pack fiberglass insulation and a sealing material such as permagum around refrigerant lines where they penetrate a wall to reduce vibration and retain some flexibility.

Additional refrigerant charge

The outdoor unit is precharged with enough R-410A refrigerant for the outdoor unit, the smallest indoor unit, and 15 ft of lineset. Additional refrigerant per foot of additional lineset is 0.38 oz for the 24k and 36k models, and 0.60 oz for the 48k and 60k models (see Table 2). Refer to the *Tabular Data Sheet* for more information on precharge amount and indoor combinations.

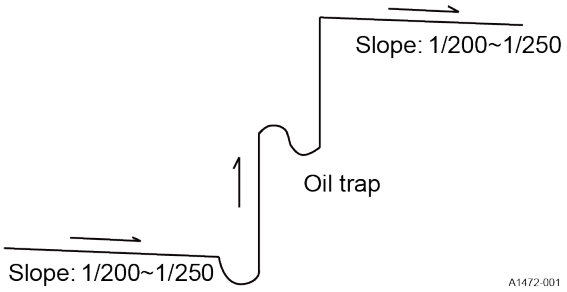
⚠ CAUTION

When installing the pipe through the wall, secure a cap at the end of the pipe. Do not place the pipe directly on the ground.

Oil trap

When the indoor unit is lower than the outdoor unit and the height difference is larger than 16 ft, install an oil trap every 16 ft in the suction piping.

Figure 5: Oil trap



Note:

1. To avoid storing too much oil in the oil trap and to ensure better cooling and heating performance, the oil trap must be as short and as straight as possible.
2. The horizontal piping must slope toward the trap or outdoor section at a slope of 1/8 in./ft for proper oil return.

Service data

The following are the service data tables for HMH7 outdoor units.

HMH72B241S cooling service data

Table 8: HMH72B241S with nominal coil at 82°F setting

Indoor DB / WB (°F)	Indoor airflow (SCFM)	Cooling service data							
		Outdoor temperature (°F)	**55**	**65**	**75**	**85**	**95**	**105**	**115**
75/62	600	Liquid pressure (PSIG)	210	255	300	344	389	434	478
		Liquid temperature (°F)	72	82	91	101	110	120	129
		Suction pressure (PSIG)	117	119	121	124	126	128	131
		Suction temperature (°F)	52	54	56	57	59	61	63
		Suction superheat (°F)	12	12	13	14	15	16	17
		Outdoor unit current (A)	5	6	7	8	9	10	11
		Indoor coil temperature drop (°F)	27	26	25	24	24	23	22
	800	Liquid pressure (PSIG)	212	257	301	346	391	435	480
		Liquid temperature (°F)	73	82	92	101	111	120	130
		Suction pressure (PSIG)	122	124	127	129	131	133	135
		Suction temperature (°F)	55	57	58	60	61	63	65
		Suction superheat (°F)	12	13	14	15	15	16	17
		Outdoor unit current (A)	5	6	7	8	9	10	11
		Indoor coil temperature drop (°F)	24	23	22	22	21	20	20
	1000	Liquid pressure (PSIG)	214	258	303	348	392	437	481
		Liquid temperature (°F)	74	83	92	102	111	121	130
		Suction pressure (PSIG)	127	130	132	134	136	138	140
		Suction temperature (°F)	58	59	61	62	64	65	67
		Suction superheat (°F)	13	14	15	15	16	17	17
		Outdoor unit current (A)	5	6	7	8	9	10	11
		Indoor coil temperature drop (°F)	20	20	19	19	18	18	17

Table 8: HMH72B241S with nominal coil at 82°F setting

Indoor DB / WB (°F)	Indoor airflow (SCFM)	Cooling service data							
		Outdoor temperature (°F)	**55**	**65**	**75**	**85**	**95**	**105**	**115**
80/57	600	Liquid pressure (PSIG)	204	248	292	336	380	424	469
		Liquid temperature (°F)	70	80	90	100	110	120	130
		Suction pressure (PSIG)	105	109	112	116	119	122	126
		Suction temperature (°F)	47	50	53	56	59	62	65
		Suction superheat (°F)	12	13	14	16	17	19	21
		Outdoor unit current (A)	5	6	7	8	9	9	10
		Indoor coil temperature drop (°F)	35	34	33	31	30	29	27
	800	Liquid pressure (PSIG)	211	255	300	344	389	433	478
		Liquid temperature (°F)	75	84	93	102	111	120	129
		Suction pressure (PSIG)	115	118	122	125	129	132	136
		Suction temperature (°F)	51	54	57	59	62	65	67
		Suction superheat (°F)	12	13	14	16	17	18	19
		Outdoor unit current (A)	5	6	7	8	9	10	11
		Indoor coil temperature drop (°F)	31	29	28	27	25	24	23
	1000	Liquid pressure (PSIG)	218	263	308	353	397	442	487
		Liquid temperature (°F)	80	89	97	105	113	121	129
		Suction pressure (PSIG)	124	128	131	135	138	142	146
		Suction temperature (°F)	56	58	61	63	65	68	70
		Suction superheat (°F)	13	13	14	15	16	17	19
		Outdoor unit current (A)	5	6	7	8	9	10	11
		Indoor coil temperature drop (°F)	26	24	23	22	21	20	19
80/62	600	Liquid pressure (PSIG)	211	254	297	340	383	427	470
		Liquid temperature (°F)	72	82	91	101	111	120	130
		Suction pressure (PSIG)	116	118	119	121	122	124	126
		Suction temperature (°F)	51	53	55	57	58	60	62
		Suction superheat (°F)	11	12	14	15	16	17	18
		Outdoor unit current (A)	5	6	7	8	9	10	11
		Indoor coil temperature drop (°F)	31	31	30	30	29	28	28
	800	Liquid pressure (PSIG)	212	256	301	345	389	433	478
		Liquid temperature (°F)	73	82	92	101	111	121	130
		Suction pressure (PSIG)	122	124	126	129	131	133	135
		Suction temperature (°F)	55	57	58	60	62	63	65
		Suction superheat (°F)	13	13	14	15	16	17	17
		Outdoor unit current (A)	5	6	7	8	9	10	11
		Indoor coil temperature drop (°F)	28	27	26	26	25	24	24
	1000	Liquid pressure (PSIG)	213	259	304	349	395	440	485
		Liquid temperature (°F)	73	83	92	102	111	121	130
		Suction pressure (PSIG)	127	130	133	136	139	142	145
		Suction temperature (°F)	59	60	62	63	65	67	68
		Suction superheat (°F)	14	14	15	15	16	16	17
		Outdoor unit current (A)	5	6	7	8	9	10	11
		Indoor coil temperature drop (°F)	24	24	23	22	21	20	19

Table 8: HMH72B241S with nominal coil at 82°F setting

Indoor DB / WB (°F)	Indoor airflow (SCFM)	Cooling service data							
		Outdoor temperature (°F)	**55**	**65**	**75**	**85**	**95**	**105**	**115**
80/67	600	Liquid pressure (PSIG)	214	258	303	348	393	438	483
		Liquid temperature (°F)	73	83	93	102	112	121	131
		Suction pressure (PSIG)	127	129	132	135	137	140	143
		Suction temperature (°F)	58	59	61	62	64	65	67
		Suction superheat (°F)	13	14	14	15	15	16	16
		Outdoor unit current (A)	5	6	7	8	9	10	11
		Indoor coil temperature drop (°F)	27	26	25	24	23	22	22
	800	Liquid pressure (PSIG)	216	261	305	350	395	440	485
		Liquid temperature (°F)	74	84	93	103	112	122	131
		Suction pressure (PSIG)	132	135	137	140	143	145	148
		Suction temperature (°F)	61	63	64	65	66	68	69
		Suction superheat (°F)	15	15	15	16	16	16	17
		Outdoor unit current (A)	5	6	7	8	9	10	11
		Indoor coil temperature drop (°F)	23	22	22	21	21	20	19
	1000	Liquid pressure (PSIG)	218	263	308	353	397	442	487
		Liquid temperature (°F)	75	84	94	103	113	122	132
		Suction pressure (PSIG)	138	140	143	145	148	150	153
		Suction temperature (°F)	65	66	67	68	69	70	71
		Suction superheat (°F)	16	16	17	17	17	17	17
		Outdoor unit current (A)	5	6	7	8	9	10	11
		Indoor coil temperature drop (°F)	19	19	19	18	18	17	17
80/72	600	Liquid pressure (PSIG)	220	264	308	353	397	441	486
		Liquid temperature (°F)	75	84	94	103	113	123	132
		Suction pressure (PSIG)	139	142	145	148	151	154	157
		Suction temperature (°F)	66	67	68	68	69	70	71
		Suction superheat (°F)	17	17	16	16	16	16	16
		Outdoor unit current (A)	5	6	7	8	9	10	11
		Indoor coil temperature drop (°F)	20	20	19	18	18	17	17
	800	Liquid pressure (PSIG)	220	265	310	356	401	446	491
		Liquid temperature (°F)	75	85	94	104	113	123	132
		Suction pressure (PSIG)	141	145	149	152	156	159	163
		Suction temperature (°F)	68	69	70	71	72	73	74
		Suction superheat (°F)	18	18	18	17	17	17	17
		Outdoor unit current (A)	5	6	7	8	9	10	11
		Indoor coil temperature drop (°F)	18	17	16	16	15	14	14
	1000	Liquid pressure (PSIG)	221	267	313	359	404	450	496
		Liquid temperature (°F)	76	85	95	104	114	123	133
		Suction pressure (PSIG)	144	148	152	156	160	165	169
		Suction temperature (°F)	70	71	73	74	75	76	77
		Suction superheat (°F)	19	19	19	19	18	18	18
		Outdoor unit current (A)	5	6	7	8	9	10	11
		Indoor coil temperature drop (°F)	15	14	14	13	12	12	11

HMH72B241S heating service data

Table 9: HMH72B241S with nominal coil at 82°F setting

Indoor temperature (°F)	Indoor airflow (SCFM)	Heating service data						
		Outdoor temperature (°F)	**60**	**47**	**40**	**30**	**17**	**10**
60	600	Liquid pressure (PSIG)	317	303	296	286	272	265
		Liquid temperature (°F)	99	96	94	92	89	87
		Outdoor unit current (A)	8	8	8	9	9	9
		Indoor coil temperature rise (°F)	37	34	32	29	26	25
	800	Liquid pressure (PSIG)	297	283	277	267	254	247
		Liquid temperature (°F)	93	91	88	86	83	81
		Outdoor unit current (A)	7	8	8	8	8	8
		Indoor coil temperature rise (°F)	31	28	27	24	21	20
	1000	Liquid pressure (PSIG)	276	263	257	247	235	228
		Liquid temperature (°F)	86	85	82	79	77	75
		Outdoor unit current (A)	7	7	7	7	7	7
		Indoor coil temperature rise (°F)	25	22	21	19	16	14
70	600	Liquid pressure (PSIG)	427	395	377	352	320	302
		Liquid temperature (°F)	96	90	88	84	78	76
		Outdoor unit current (A)	10	10	10	9	8	8
		Indoor coil temperature rise (°F)	38	33	30	26	20	17
	800	Liquid pressure (PSIG)	394	366	351	330	302	287
		Liquid temperature (°F)	90	86	84	81	77	74
		Outdoor unit current (A)	10	9	9	9	8	8
		Indoor coil temperature rise (°F)	31	27	24	21	16	14
	1000	Liquid pressure (PSIG)	360	337	325	307	285	272
		Liquid temperature (°F)	85	82	80	78	75	73
		Outdoor unit current (A)	9	9	8	8	8	8
		Indoor coil temperature rise (°F)	24	21	19	16	13	11
80	600	Liquid pressure (PSIG)	407	391	382	370	354	346
		Liquid temperature (°F)	117	114	113	110	107	105
		Outdoor unit current (A)	10	10	10	11	11	11
		Indoor coil temperature rise (°F)	36	33	31	28	25	23
	800	Liquid pressure (PSIG)	380	366	359	349	335	328
		Liquid temperature (°F)	112	110	108	106	103	102
		Outdoor unit current (A)	9	10	10	10	10	11
		Indoor coil temperature rise (°F)	32	29	27	24	21	20
	1000	Liquid pressure (PSIG)	352	341	335	327	316	310
		Liquid temperature (°F)	107	105	103	101	99	98
		Outdoor unit current (A)	9	9	9	10	10	10
		Indoor coil temperature rise (°F)	27	24	22	20	17	16

HMH72B361S cooling service data

Table 10: HMH72B361S with nominal coil at 82°F setting

Indoor DB / WB (°F)	Indoor airflow (SCFM)	Cooling service data							
		Outdoor temperature (°F)	**55**	**65**	**75**	**85**	**95**	**105**	**115**
75/62	900	Liquid pressure (PSIG)	224	271	318	364	411	457	491
		Liquid temperature (°F)	69	79	88	98	108	118	126
		Suction pressure (PSIG)	107	109	112	114	116	118	134
		Suction temperature (°F)	51	53	55	56	58	59	67
		Suction superheat (°F)	15	16	17	17	18	19	20
		Outdoor unit current (A)	9	11	12	13	15	16	12
		Indoor coil temperature drop (°F)	28	27	26	26	25	24	20
	1200	Liquid pressure (PSIG)	227	274	321	367	414	461	493
		Liquid temperature (°F)	70	80	90	100	109	119	127
		Suction pressure (PSIG)	114	116	117	119	121	123	139
		Suction temperature (°F)	54	55	57	58	60	61	68
		Suction superheat (°F)	15	16	16	17	17	18	19
		Outdoor unit current (A)	9	11	12	14	15	16	13
		Indoor coil temperature drop (°F)	25	24	23	23	22	21	18
	1500	Liquid pressure (PSIG)	230	277	324	371	417	464	494
		Liquid temperature (°F)	72	81	91	101	111	120	127
		Suction pressure (PSIG)	120	122	123	125	127	129	144
		Suction temperature (°F)	57	58	59	60	61	63	69
		Suction superheat (°F)	15	16	16	16	17	17	18
		Outdoor unit current (A)	9	11	12	14	15	17	13
		Indoor coil temperature drop (°F)	22	21	21	20	19	19	16
80/57	900	Liquid pressure (PSIG)	213	260	307	354	401	449	482
		Liquid temperature (°F)	66	76	87	97	107	117	122
		Suction pressure (PSIG)	104	105	106	107	108	109	138
		Suction temperature (°F)	50	51	52	53	54	55	64
		Suction superheat (°F)	16	16	17	17	18	18	15
		Outdoor unit current (A)	8	9	11	13	14	16	12
		Indoor coil temperature drop (°F)	34	34	33	33	32	31	24
	1200	Liquid pressure (PSIG)	223	271	318	365	412	459	486
		Liquid temperature (°F)	69	79	89	99	109	119	126
		Suction pressure (PSIG)	110	112	114	116	118	120	149
		Suction temperature (°F)	52	53	54	56	57	58	67
		Suction superheat (°F)	14	15	15	16	16	16	14
		Outdoor unit current (A)	8	10	12	13	15	16	12
		Indoor coil temperature drop (°F)	30	29	29	28	27	27	20
	1500	Liquid pressure (PSIG)	233	281	328	376	423	470	490
		Liquid temperature (°F)	72	82	92	102	112	122	129
		Suction pressure (PSIG)	117	120	123	125	128	131	159
		Suction temperature (°F)	54	55	57	58	60	61	69
		Suction superheat (°F)	13	14	14	14	15	15	13
		Outdoor unit current (A)	9	11	12	14	15	17	12
		Indoor coil temperature drop (°F)	26	25	24	23	22	22	16

Table 10: HMH72B361S with nominal coil at 82°F setting

Indoor DB / WB (°F)	Indoor airflow (SCFM)	Cooling service data							
		Outdoor temperature (°F)	55	65	75	85	95	105	115
80/62	900	Liquid pressure (PSIG)	223	269	315	362	408	454	503
		Liquid temperature (°F)	68	78	88	98	108	118	127
		Suction pressure (PSIG)	106	109	111	113	116	118	130
		Suction temperature (°F)	55	56	56	57	57	58	64
		Suction superheat (°F)	19	19	18	18	18	17	18
		Outdoor unit current (A)	9	11	12	13	15	16	14
		Indoor coil temperature drop (°F)	32	31	30	30	29	28	25
	1200	Liquid pressure (PSIG)	225	272	318	365	411	458	502
		Liquid temperature (°F)	70	80	90	100	110	119	129
		Suction pressure (PSIG)	113	115	118	120	122	124	141
		Suction temperature (°F)	58	58	59	59	59	60	67
		Suction superheat (°F)	19	18	18	17	17	16	17
		Outdoor unit current (A)	9	11	12	13	15	16	14
		Indoor coil temperature drop (°F)	29	28	27	26	26	25	22
	1500	Liquid pressure (PSIG)	227	274	321	368	415	462	501
		Liquid temperature (°F)	72	82	91	101	111	121	130
		Suction pressure (PSIG)	120	122	124	126	129	131	151
		Suction temperature (°F)	60	60	61	61	61	62	70
		Suction superheat (°F)	19	18	17	17	16	16	17
		Outdoor unit current (A)	9	11	12	14	15	17	14
		Indoor coil temperature drop (°F)	25	25	24	23	23	22	18
80/67	900	Liquid pressure (PSIG)	227	275	323	370	418	465	492
		Liquid temperature (°F)	71	81	91	101	111	120	127
		Suction pressure (PSIG)	118	120	123	125	127	129	148
		Suction temperature (°F)	59	59	60	60	60	61	69
		Suction superheat (°F)	18	17	17	16	16	15	17
		Outdoor unit current (A)	9	11	12	14	15	17	12
		Indoor coil temperature drop (°F)	28	27	26	26	25	24	20
	1200	Liquid pressure (PSIG)	230	278	325	373	420	468	494
		Liquid temperature (°F)	73	82	92	102	112	122	128
		Suction pressure (PSIG)	124	126	129	131	133	135	154
		Suction temperature (°F)	62	62	62	62	62	62	71
		Suction superheat (°F)	19	18	17	16	15	15	16
		Outdoor unit current (A)	9	11	12	14	15	17	12
		Indoor coil temperature drop (°F)	25	24	23	23	22	21	18
	1500	Liquid pressure (PSIG)	233	281	328	376	423	470	495
		Liquid temperature (°F)	74	84	93	103	113	123	129
		Suction pressure (PSIG)	130	133	135	137	139	141	159
		Suction temperature (°F)	65	65	65	64	64	64	72
		Suction superheat (°F)	19	18	17	16	15	14	16
		Outdoor unit current (A)	10	11	12	14	15	17	12
		Indoor coil temperature drop (°F)	22	21	20	20	19	19	16

Table 10: HMH72B361S with nominal coil at 82°F setting

Indoor DB / WB (°F)	Indoor airflow (SCFM)	Cooling service data							
		Outdoor temperature (°F)	**55**	**65**	**75**	**85**	**95**	**105**	**115**
80/72	900	Liquid pressure (PSIG)	234	281	329	376	423	471	503
		Liquid temperature (°F)	74	84	93	103	113	123	130
		Suction pressure (PSIG)	131	133	136	138	141	143	160
		Suction temperature (°F)	64	64	64	64	64	64	71
		Suction superheat (°F)	18	17	16	15	14	13	15
		Outdoor unit current (A)	9	11	12	14	15	17	13
		Indoor coil temperature drop (°F)	23	22	21	21	20	19	16
	1200	Liquid pressure (PSIG)	237	284	331	379	426	473	503
		Liquid temperature (°F)	75	85	95	104	114	124	131
		Suction pressure (PSIG)	137	139	141	144	146	148	165
		Suction temperature (°F)	67	67	67	67	66	66	73
		Suction superheat (°F)	19	18	17	16	15	14	15
		Outdoor unit current (A)	10	11	13	14	16	17	13
		Indoor coil temperature drop (°F)	20	19	19	18	17	17	14
	1500	Liquid pressure (PSIG)	240	287	334	381	429	476	503
		Liquid temperature (°F)	76	86	96	105	115	125	131
		Suction pressure (PSIG)	142	145	147	149	151	154	170
		Suction temperature (°F)	70	70	69	69	69	68	75
		Suction superheat (°F)	20	19	18	16	15	14	15
		Outdoor unit current (A)	10	11	13	14	16	17	13
		Indoor coil temperature drop (°F)	17	16	16	15	15	14	12

Note: Drive output is limited in the shaded area. Performance may vary and interpolation is not permissable.

HMH72B361S heating service data

Table 11: HMH72B361S with nominal coil at 82°F setting

Indoor temperature (°F)	Indoor airflow (SCFM)	Heating service data						
		Outdoor temperature (°F)	**60**	**47**	**40**	**30**	**17**	**10**
60	900	Liquid pressure (PSIG)	357	332	318	299	274	260
		Liquid temperature (°F)	107	101	98	93	87	84
		Outdoor unit current (A)	14	13	12	12	11	10
		Indoor coil temperature rise (°F)	41	36	33	29	24	21
	1200	Liquid pressure (PSIG)	326	305	294	279	259	248
		Liquid temperature (°F)	100	95	93	89	84	81
		Outdoor unit current (A)	13	12	12	11	10	10
		Indoor coil temperature rise (°F)	34	30	28	24	20	18
	1500	Liquid pressure (PSIG)	294	278	270	258	243	235
		Liquid temperature (°F)	93	89	87	84	80	78
		Outdoor unit current (A)	12	11	11	10	10	10
		Indoor coil temperature rise (°F)	27	23	22	19	16	14

Table 11: HMH72B361S with nominal coil at 82°F setting

Indoor temperature (°F)	Indoor airflow (SCFM)	Heating service data						
		Outdoor temperature (°F)	**60**	**47**	**40**	**30**	**17**	**10**
70	900	Liquid pressure (PSIG)	427	395	377	352	320	302
		Liquid temperature (°F)	96	90	88	84	78	76
		Outdoor unit current (A)	10	10	10	9	8	8
		Indoor coil temperature rise (°F)	38	33	30	26	20	17
	1200	Liquid pressure (PSIG)	394	366	351	330	302	287
		Liquid temperature (°F)	90	86	84	81	77	74
		Outdoor unit current (A)	10	9	9	9	8	8
		Indoor coil temperature rise (°F)	31	27	24	21	16	14
	1500	Liquid pressure (PSIG)	360	337	325	307	285	272
		Liquid temperature (°F)	85	82	80	78	75	73
		Outdoor unit current (A)	9	9	8	8	8	8
		Indoor coil temperature rise (°F)	24	21	19	16	13	11
80	900	Liquid pressure (PSIG)	442	414	400	379	351	337
		Liquid temperature (°F)	123	117	115	111	105	103
		Outdoor unit current (A)	16	15	14	14	12	12
		Indoor coil temperature rise (°F)	39	34	31	27	22	19
	1200	Liquid pressure (PSIG)	410	386	374	357	334	322
		Liquid temperature (°F)	117	112	110	107	102	100
		Outdoor unit current (A)	15	14	14	13	12	11
		Indoor coil temperature rise (°F)	32	28	26	22	18	16
	1500	Liquid pressure (PSIG)	377	358	348	334	316	306
		Liquid temperature (°F)	111	107	105	102	98	96
		Outdoor unit current (A)	14	13	13	12	12	11
		Indoor coil temperature rise (°F)	25	22	20	17	14	12

HMH72B481S cooling service data

Table 12: HMH72B481S with nominal coil at 82°F setting

Indoor DB / WB (°F)	Indoor airflow (SCFM)	Cooling service data							
		Outdoor temperature (°F)	**55**	**65**	**75**	**85**	**95**	**105**	**115**
75/62	1200	Liquid pressure (PSIG)	202	247	293	338	384	430	484
		Liquid temperature (°F)	65	75	85	94	104	114	121
		Suction pressure (PSIG)	107	110	113	115	118	120	124
		Suction temperature (°F)	49	51	53	55	58	60	63
		Suction superheat (°F)	13	14	15	16	17	18	20
		Outdoor unit current (A)	11	13	14	16	18	20	22
		Indoor coil temperature drop (°F)	29	28	27	26	25	24	24
	1500	Liquid pressure (PSIG)	203	248	294	340	386	432	485
		Liquid temperature (°F)	67	76	86	95	105	115	123
		Suction pressure (PSIG)	112	115	118	121	124	126	128
		Suction temperature (°F)	51	54	56	58	60	62	65
		Suction superheat (°F)	13	14	15	16	17	18	20
		Outdoor unit current (A)	11	13	15	16	18	20	22
		Indoor coil temperature drop (°F)	26	25	24	24	23	22	22
	1800	Liquid pressure (PSIG)	204	250	296	341	387	433	486
		Liquid temperature (°F)	68	77	87	96	106	116	125
		Suction pressure (PSIG)	117	120	123	126	129	132	131
		Suction temperature (°F)	54	56	58	60	62	64	67
		Suction superheat (°F)	14	15	15	16	17	17	21
		Outdoor unit current (A)	11	13	15	17	18	20	22
		Indoor coil temperature drop (°F)	23	23	22	21	21	20	20
80/57	1200	Liquid pressure (PSIG)	199	245	290	336	381	427	484
		Liquid temperature (°F)	63	73	83	94	104	114	124
		Suction pressure (PSIG)	99	102	106	109	112	116	120
		Suction temperature (°F)	45	48	50	53	55	58	61
		Suction superheat (°F)	13	14	15	16	17	18	21
		Outdoor unit current (A)	11	13	15	16	18	20	22
		Indoor coil temperature drop (°F)	37	36	35	33	32	30	29
	1500	Liquid pressure (PSIG)	203	249	295	340	386	431	484
		Liquid temperature (°F)	66	76	86	95	105	115	126
		Suction pressure (PSIG)	109	111	114	117	119	122	130
		Suction temperature (°F)	49	51	54	56	59	61	64
		Suction superheat (°F)	12	14	15	16	17	19	19
		Outdoor unit current (A)	11	13	15	16	18	20	22
		Indoor coil temperature drop (°F)	33	32	31	30	28	27	26
	1800	Liquid pressure (PSIG)	208	253	299	345	390	436	484
		Liquid temperature (°F)	68	78	88	97	107	117	127
		Suction pressure (PSIG)	118	120	122	125	127	129	139
		Suction temperature (°F)	53	55	58	60	62	65	67
		Suction superheat (°F)	12	13	15	16	18	19	18
		Outdoor unit current (A)	11	13	15	17	18	20	22
		Indoor coil temperature drop (°F)	30	28	27	26	25	23	22

Table 12: HMH72B481S with nominal coil at 82°F setting

Indoor DB / WB (°F)	Indoor airflow (SCFM)	Cooling service data							
		Outdoor temperature (°F)	55	65	75	85	95	105	115
80/62	1200	Liquid pressure (PSIG)	202	248	293	339	384	429	481
		Liquid temperature (°F)	65	75	85	95	104	114	119
		Suction pressure (PSIG)	105	108	111	114	117	120	129
		Suction temperature (°F)	50	52	54	56	58	60	56
		Suction superheat (°F)	14	15	16	16	17	18	10
		Outdoor unit current (A)	11	13	15	16	18	20	12
		Indoor coil temperature drop (°F)	34	33	32	31	30	29	25
	1500	Liquid pressure (PSIG)	203	249	294	340	385	431	482
		Liquid temperature (°F)	66	76	86	96	106	115	120
		Suction pressure (PSIG)	111	114	117	120	123	125	136
		Suction temperature (°F)	52	54	56	58	60	62	58
		Suction superheat (°F)	14	15	16	17	17	18	10
		Outdoor unit current (A)	11	13	15	16	18	20	12
		Indoor coil temperature drop (°F)	29	28	27	26	25	24	22
	1800	Liquid pressure (PSIG)	204	250	296	341	387	432	483
		Liquid temperature (°F)	68	78	87	97	107	116	120
		Suction pressure (PSIG)	117	119	122	125	128	131	143
		Suction temperature (°F)	55	57	59	61	63	64	61
		Suction superheat (°F)	15	15	16	17	18	18	11
		Outdoor unit current (A)	11	13	15	17	18	20	12
		Indoor coil temperature drop (°F)	23	22	22	21	20	19	20
80/67	1200	Liquid pressure (PSIG)	204	250	296	342	387	433	482
		Liquid temperature (°F)	67	77	87	97	106	116	125
		Suction pressure (PSIG)	117	120	123	127	130	133	124
		Suction temperature (°F)	55	57	59	60	62	64	60
		Suction superheat (°F)	14	15	15	16	17	17	17
		Outdoor unit current (A)	11	13	15	17	18	20	22
		Indoor coil temperature drop (°F)	29	28	27	26	25	23	28
	1500	Liquid pressure (PSIG)	206	252	297	343	389	435	484
		Liquid temperature (°F)	68	78	88	98	107	117	126
		Suction pressure (PSIG)	122	125	128	131	134	137	130
		Suction temperature (°F)	58	60	61	63	64	66	64
		Suction superheat (°F)	15	16	16	17	17	18	18
		Outdoor unit current (A)	11	13	15	17	18	20	22
		Indoor coil temperature drop (°F)	26	25	24	23	22	21	25
	1800	Liquid pressure (PSIG)	208	253	299	345	390	436	485
		Liquid temperature (°F)	69	79	89	99	108	118	127
		Suction pressure (PSIG)	128	130	133	136	139	142	136
		Suction temperature (°F)	61	63	64	65	67	68	67
		Suction superheat (°F)	17	17	17	17	18	18	19
		Outdoor unit current (A)	11	13	15	17	19	21	22
		Indoor coil temperature drop (°F)	23	22	22	21	20	19	22

Table 12: HMH72B481S with nominal coil at 82°F setting

Indoor DB / WB (°F)	Indoor airflow (SCFM)	Cooling service data							
		Outdoor temperature (°F)	**55**	**65**	**75**	**85**	**95**	**105**	**115**
80/72	1200	Liquid pressure (PSIG)	245	283	321	360	398	437	486
		Liquid temperature (°F)	79	87	95	103	111	118	126
		Suction pressure (PSIG)	136	138	140	142	144	145	138
		Suction temperature (°F)	60	62	63	65	67	68	67
		Suction superheat (°F)	12	13	14	15	16	17	18
		Outdoor unit current (A)	12	14	15	17	19	21	21
		Indoor coil temperature drop (°F)	22	21	21	20	19	19	16
	1500	Liquid pressure (PSIG)	244	283	322	361	400	439	488
		Liquid temperature (°F)	79	87	95	103	111	119	128
		Suction pressure (PSIG)	140	142	144	146	148	150	151
		Suction temperature (°F)	63	65	66	67	69	70	72
		Suction superheat (°F)	14	14	15	16	16	17	18
		Outdoor unit current (A)	12	14	15	17	19	21	21
		Indoor coil temperature drop (°F)	20	19	19	18	17	17	15
	1800	Liquid pressure (PSIG)	244	283	323	362	401	441	490
		Liquid temperature (°F)	79	87	95	104	112	120	129
		Suction pressure (PSIG)	144	146	149	151	153	155	163
		Suction temperature (°F)	66	67	69	70	71	72	76
		Suction superheat (°F)	15	16	16	17	17	17	19
		Outdoor unit current (A)	12	14	16	18	19	21	21
		Indoor coil temperature drop (°F)	18	17	16	16	15	15	13

Note: Drive output is limited in the shaded area. Performance may vary and interpolation is not permissable.

HMH72B481S heating service data

Table 13: HMH72B481S with nominal coil at 82°F setting

Indoor temperature (°F)	Indoor airflow (SCFM)	Heating service data						
		Outdoor temperature (°F)	**60**	**47**	**40**	**30**	**17**	**10**
60	1200	Liquid pressure (PSIG)	322	299	286	269	246	234
		Liquid temperature (°F)	100	94	91	87	81	78
		Outdoor unit current (A)	16	15	15	14	13	12
		Indoor coil temperature rise (°F)	40	34	34	26	21	17
	1500	Liquid pressure (PSIG)	297	278	268	254	235	225
		Liquid temperature (°F)	94	89	87	83	78	76
		Outdoor unit current (A)	15	15	14	13	13	12
		Indoor coil temperature rise (°F)	33	29	28	22	18	15
	1800	Liquid pressure (PSIG)	271	256	249	238	223	215
		Liquid temperature (°F)	88	84	82	79	75	73
		Outdoor unit current (A)	14	14	13	13	12	12
		Indoor coil temperature rise (°F)	26	23	21	18	15	13

Table 13: HMH72B481S with nominal coil at 82°F setting

Indoor temperature (°F)	Indoor airflow (SCFM)	Heating service data						
		Outdoor temperature (°F)	**60**	**47**	**40**	**30**	**17**	**10**
70	1200	Liquid pressure (PSIG)	427	395	377	352	320	302
		Liquid temperature (°F)	96	90	88	84	78	76
		Outdoor unit current (A)	10	10	10	9	8	8
		Indoor coil temperature rise (°F)	38	33	30	26	20	17
	1500	Liquid pressure (PSIG)	394	366	351	330	302	287
		Liquid temperature (°F)	90	86	84	81	77	74
		Outdoor unit current (A)	10	9	9	9	8	8
		Indoor coil temperature rise (°F)	31	27	24	21	16	14
	1800	Liquid pressure (PSIG)	360	337	325	307	285	272
		Liquid temperature (°F)	85	82	80	78	75	73
		Outdoor unit current (A)	9	9	8	8	8	8
		Indoor coil temperature rise (°F)	24	21	19	16	13	11
80	1200	Liquid pressure (PSIG)	406	379	364	343	317	302
		Liquid temperature (°F)	117	111	108	104	98	95
		Outdoor unit current (A)	20	18	18	17	15	15
		Indoor coil temperature rise (°F)	37	32	29	24	19	16
	1500	Liquid pressure (PSIG)	378	355	343	325	303	291
		Liquid temperature (°F)	112	107	104	100	95	93
		Outdoor unit current (A)	19	17	17	16	15	14
		Indoor coil temperature rise (°F)	31	27	24	20	16	13
	1800	Liquid pressure (PSIG)	349	331	321	307	289	279
		Liquid temperature (°F)	106	102	100	96	92	90
		Outdoor unit current (A)	17	17	16	15	14	14
		Indoor coil temperature rise (°F)	25	21	19	16	12	10

HMH72B601S cooling service data

Table 14: HMH72B601S with nominal coil at 82°F setting

Indoor DB / WB (°F)	Indoor airflow (SCFM)	Cooling service data						
		Outdoor temperature (°F)	**55**	**65**	**75**	**85**	**95**	**105**
75/62	1500	Liquid pressure (PSIG)	203	246	288	331	373	416
		Liquid temperature (°F)	69	80	90	101	111	122
		Suction pressure (PSIG)	97	100	103	107	110	113
		Suction temperature (°F)	54	55	57	58	59	60
		Suction superheat (°F)	24	23	22	22	21	21
		Outdoor unit current (A)	17	19	21	23	25	27
		Indoor coil temperature drop (°F)	26	26	25	24	24	23
	1750	Liquid pressure (PSIG)	204	247	290	332	375	417
		Liquid temperature (°F)	69	80	90	101	111	122
		Suction pressure (PSIG)	99	102	106	109	112	115
		Suction temperature (°F)	59	60	60	61	62	63
		Suction superheat (°F)	27	26	25	25	24	23
		Outdoor unit current (A)	17	19	21	23	25	27
		Indoor coil temperature drop (°F)	24	24	23	23	22	22
	2000	Liquid pressure (PSIG)	205	248	291	333	376	418
		Liquid temperature (°F)	69	80	90	101	112	122
		Suction pressure (PSIG)	102	105	108	111	114	117
		Suction temperature (°F)	63	64	64	65	66	66
		Suction superheat (°F)	30	29	28	27	26	26
		Outdoor unit current (A)	17	19	21	23	26	28
		Indoor coil temperature drop (°F)	22	21	21	21	20	20
80/57	1500	Liquid pressure (PSIG)	199	242	285	329	372	415
		Liquid temperature (°F)	69	79	90	100	111	121
		Suction pressure (PSIG)	92	95	98	101	103	106
		Suction temperature (°F)	58	59	59	60	61	62
		Suction superheat (°F)	30	29	28	27	27	26
		Outdoor unit current (A)	17	19	21	23	25	27
		Indoor coil temperature drop (°F)	34	34	33	32	32	31
	1750	Liquid pressure (PSIG)	204	247	291	334	377	420
		Liquid temperature (°F)	69	80	90	101	111	122
		Suction pressure (PSIG)	95	98	101	104	107	110
		Suction temperature (°F)	60	61	62	63	64	64
		Suction superheat (°F)	30	29	29	28	28	27
		Outdoor unit current (A)	17	19	21	23	25	27
		Indoor coil temperature drop (°F)	32	31	30	30	29	28
	2000	Liquid pressure (PSIG)	209	252	296	339	382	425
		Liquid temperature (°F)	70	80	91	101	112	122
		Suction pressure (PSIG)	98	101	105	108	111	114
		Suction temperature (°F)	62	63	64	65	66	67
		Suction superheat (°F)	31	30	29	29	28	28
		Outdoor unit current (A)	17	19	21	23	26	28
		Indoor coil temperature drop (°F)	29	28	28	27	26	26

Table 14: HMH72B601S with nominal coil at 82°F setting

Indoor DB / WB (°F)	Indoor airflow (SCFM)	Cooling service data						
		Outdoor temperature (°F)	**55**	**65**	**75**	**85**	**95**	**105**
80/62	1500	Liquid pressure (PSIG)	203	246	289	331	374	417
		Liquid temperature (°F)	69	80	90	101	111	122
		Suction pressure (PSIG)	98	101	104	107	110	112
		Suction temperature (°F)	60	61	61	62	62	63
		Suction superheat (°F)	29	28	27	26	25	25
		Outdoor unit current (A)	17	19	21	23	25	27
		Indoor coil temperature drop (°F)	30	30	29	29	28	28
	1750	Liquid pressure (PSIG)	204	247	290	333	376	418
		Liquid temperature (°F)	69	80	90	101	112	122
		Suction pressure (PSIG)	100	103	106	109	112	115
		Suction temperature (°F)	63	64	64	65	65	66
		Suction superheat (°F)	31	30	29	28	27	26
		Outdoor unit current (A)	17	19	21	23	25	28
		Indoor coil temperature drop (°F)	28	27	27	27	26	26
	2000	Liquid pressure (PSIG)	205	248	291	334	377	420
		Liquid temperature (°F)	69	80	90	101	112	123
		Suction pressure (PSIG)	103	106	109	112	115	118
		Suction temperature (°F)	66	67	67	67	68	68
		Suction superheat (°F)	32	31	30	29	28	27
		Outdoor unit current (A)	17	19	21	23	26	28
		Indoor coil temperature drop (°F)	25	25	25	24	24	24
80/67	1500	Liquid pressure (PSIG)	207	250	293	336	379	422
		Liquid temperature (°F)	69	80	91	101	112	123
		Suction pressure (PSIG)	103	107	111	115	118	122
		Suction temperature (°F)	66	67	67	68	68	69
		Suction superheat (°F)	32	31	30	28	27	26
		Outdoor unit current (A)	17	19	21	24	26	28
		Indoor coil temperature drop (°F)	25	25	24	24	23	23
	1750	Liquid pressure (PSIG)	208	251	294	337	380	424
		Liquid temperature (°F)	69	80	91	101	112	123
		Suction pressure (PSIG)	105	109	113	117	121	125
		Suction temperature (°F)	68	69	69	70	70	71
		Suction superheat (°F)	33	32	31	30	28	27
		Outdoor unit current (A)	17	19	22	24	26	28
		Indoor coil temperature drop (°F)	23	23	22	22	21	21
	2000	Liquid pressure (PSIG)	209	252	296	339	382	425
		Liquid temperature (°F)	69	79	90	101	112	123
		Suction pressure (PSIG)	107	111	115	119	123	127
		Suction temperature (°F)	70	71	71	72	72	73
		Suction superheat (°F)	35	33	32	31	29	28
		Outdoor unit current (A)	17	20	22	24	26	28
		Indoor coil temperature drop (°F)	21	20	20	20	19	19

Table 14: HMH72B601S with nominal coil at 82°F setting

Indoor DB / WB (°F)	Indoor airflow (SCFM)	Cooling service data						
		Outdoor temperature (°F)	**55**	**65**	**75**	**85**	**95**	**105**
80/72	1500	Liquid pressure (PSIG)	209	252	296	339	382	425
		Liquid temperature (°F)	68	79	90	101	112	123
		Suction pressure (PSIG)	107	112	116	120	124	129
		Suction temperature (°F)	71	71	72	72	73	73
		Suction superheat (°F)	35	33	32	30	29	28
		Outdoor unit current (A)	17	20	22	24	26	28
		Indoor coil temperature drop (°F)	20	20	20	19	19	19
	1750	Liquid pressure (PSIG)	210	254	297	341	384	428
		Liquid temperature (°F)	68	79	90	101	113	124
		Suction pressure (PSIG)	109	113	118	122	127	131
		Suction temperature (°F)	72	72	73	73	74	75
		Suction superheat (°F)	35	34	32	31	30	29
		Outdoor unit current (A)	17	20	22	24	26	29
		Indoor coil temperature drop (°F)	19	18	18	17	17	17
	2000	Liquid pressure (PSIG)	211	255	298	342	386	430
		Liquid temperature (°F)	67	79	90	101	113	124
		Suction pressure (PSIG)	110	115	119	124	129	133
		Suction temperature (°F)	73	74	74	75	75	76
		Suction superheat (°F)	36	34	33	31	30	29
		Outdoor unit current (A)	17	20	22	24	27	29
		Indoor coil temperature drop (°F)	17	16	16	16	15	15

Note: Drive output is limited in the shaded area. Performance may vary and interpolation is not permissable.

HMH72B601S heating service data

Table 15: HMH72B601S with nominal coil at 82°F setting

Indoor temperature (°F)	Indoor airflow (SCFM)	Heating service data						
		Outdoor temperature (°F)	**60**	**47**	**40**	**30**	**17**	**10**
60	1500	Liquid pressure (PSIG)	304	285	275	261	242	232
		Liquid temperature (°F)	96	91	89	85	81	78
		Outdoor unit current (A)	19	18	18	17	16	15
		Indoor coil temperature rise (°F)	35	31	28	25	21	18
	1750	Liquid pressure (PSIG)	288	272	263	251	234	225
		Liquid temperature (°F)	92	88	86	83	79	76
		Outdoor unit current (A)	19	18	17	16	16	15
		Indoor coil temperature rise (°F)	35	31	28	25	21	18
	2000	Liquid pressure (PSIG)	272	258	250	240	226	218
		Liquid temperature (°F)	88	85	83	80	76	74
		Outdoor unit current (A)	18	17	17	16	15	15
		Indoor coil temperature rise (°F)	35	31	28	25	21	18

Table 15: HMH72B601S with nominal coil at 82°F setting

Indoor temperature (°F)	Indoor airflow (SCFM)	Heating service data						
		Outdoor temperature (°F)	**60**	**47**	**40**	**30**	**17**	**10**
70	1500	Liquid pressure (PSIG)	427	395	377	352	320	302
		Liquid temperature (°F)	96	90	88	84	78	76
		Outdoor unit current (A)	10	10	10	9	8	8
		Indoor coil temperature rise (°F)	38	33	30	26	20	17
	1750	Liquid pressure (PSIG)	394	366	351	330	302	287
		Liquid temperature (°F)	90	86	84	81	77	74
		Outdoor unit current (A)	10	9	9	9	8	8
		Indoor coil temperature rise (°F)	31	27	24	21	16	14
	2000	Liquid pressure (PSIG)	360	337	325	307	285	272
		Liquid temperature (°F)	85	82	80	78	75	73
		Outdoor unit current (A)	9	9	8	8	8	8
		Indoor coil temperature rise (°F)	24	21	19	16	13	11
80	1500	Liquid pressure (PSIG)	380	357	344	326	303	290
		Liquid temperature (°F)	112	107	104	101	96	93
		Outdoor unit current (A)	23	21	20	19	18	17
		Indoor coil temperature rise (°F)	33	28	25	22	17	15
	1750	Liquid pressure (PSIG)	366	346	335	319	299	287
		Liquid temperature (°F)	110	105	103	100	95	93
		Outdoor unit current (A)	22	21	20	19	18	17
		Indoor coil temperature rise (°F)	30	26	23	20	16	14
	2000	Liquid pressure (PSIG)	352	334	325	311	294	284
		Liquid temperature (°F)	107	103	101	98	94	92
		Outdoor unit current (A)	21	20	20	19	18	17
		Indoor coil temperature rise (°F)	27	23	21	18	15	13

Unit installation

This system is intended for installation with a single indoor section.

For detailed installation instructions, refer to the *Installation Manual*.

Specifications

Table 16: Specifications

Outdoor model			HMH72B24	HMH72B36	HMH72B48	HMH72B60
Power supply		V/ph/Hz	208~230/1/60			
Cooling	Capacity	Btu/h	22,200	36,000	48,000	58,500
	Capacity (minimum – maximum)	Btu/h	6,700 – 26,000	11,800 – 36,800	18,300 – 52,000	18,300 – 59,400
	Capacity (minimum – maximum)	W	2,227 – 7,327	2814 – 10697	5363 – 15240	5363 – 17409
	Input	W	2,200	3,730	4,690	6,560
	Current	A	9.6	16.5	21	26.8
	SEER1	Btu/Wh	17.5	18	18	17
	SEER2	Btu/Wh	17	17.5	17	17
	EER	Btu/Wh	10	10	10.5	8.5
Heating	Capacity	Btu/h	24,000	36,000	48,000	56,000
	Capacity(minimum – maximum)	Btu/h	6,700 – 26,000	8,900 – 38,200	17,600 – 52,000	17,600 – 56,600
	Capacity heating (rated) at 47°F	Btu/h	22,000	36,800	46,000	56,500
	Capacity heating (rated) at 17°F	Btu/h	14,700	25,400	32,800	40,000
	Input	W	2,000	3,200	4,260	5,290
	Current	A	8.7	14.1	19.0	21.0
	HSPF1	Btu/Wh	10	11	10	10
	HSPF2	Btu/Wh	9	9	8	8
	COP	Qh/W	3.5	3.3	3.3	3.1
	COP	Qh/W	11.95	11.26	11.26	10.58
Minimum apacity		A	15	23	36	37
Maximum fuse/breaker (td)		A	25	35	50	50
Power cable		No / AWG	3/12	3/10	3/8	3/8
Communication cable			5/18	5/18	5/18	5/18
Outdoor fan motor	Type		DC	DC	DC	DC
	Model		ZWK511A805001	SIC-71FW-F8121-1	SIC-71FW-D8121-1/ SIC-71FW-D8121-2	SIC-71FW-D8121-1/ SIC-71FW-D8121-2
	Quantity		1	1	2	2
	Output	W	60	121	121	121
	Speed (high)	rpm	880	810	850	850
Outdoor airflow		m3/h	3,100	3,800	6,300	6,300
		CFM	1,826	2,235	3,706	3,706

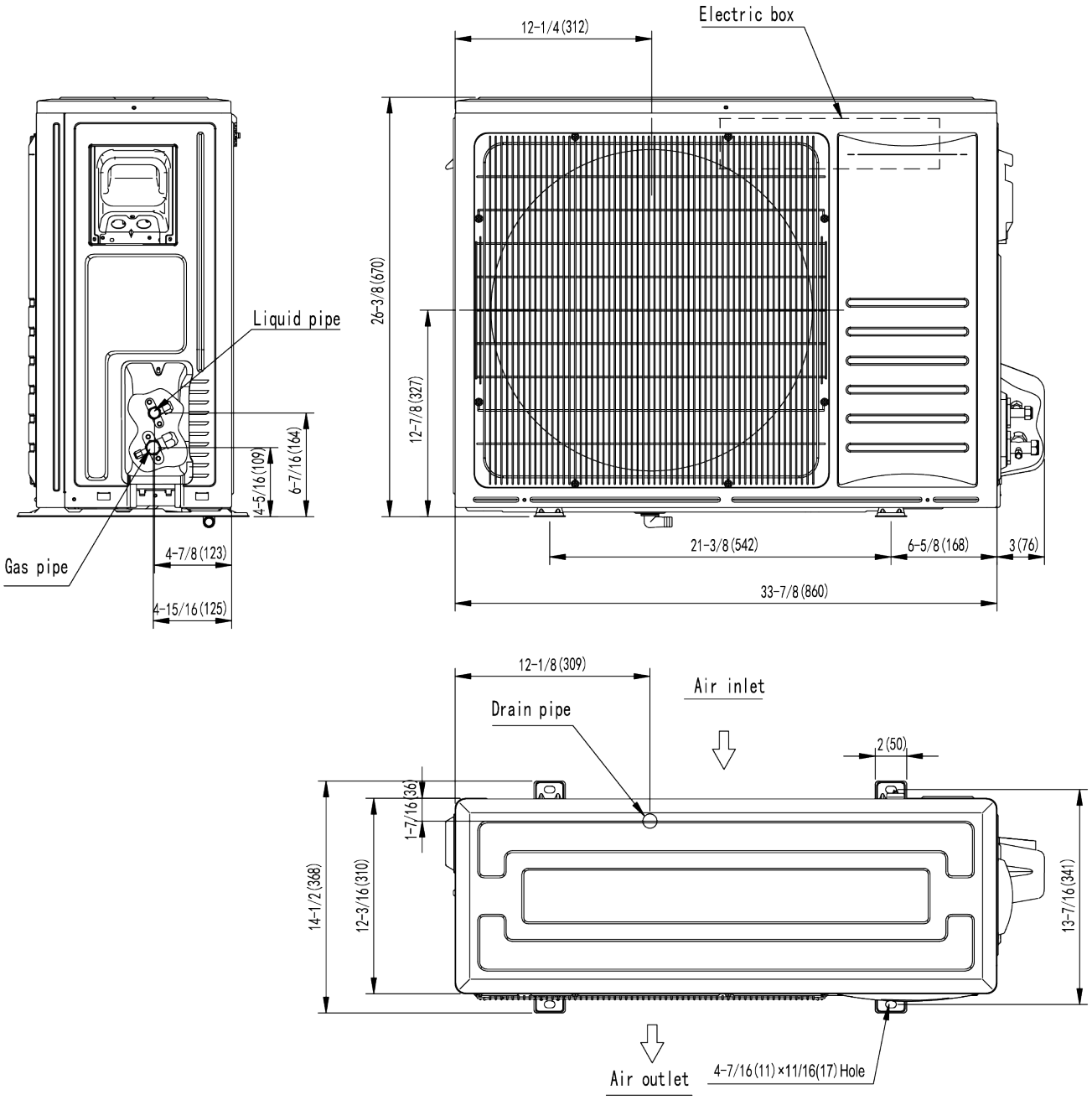
Table 16: Specifications

Outdoor model			HMH72B24	HMH72B36	HMH72B48	HMH72B60
Outdoor coil	No. of rows		2			
	Tube pitch (a)	in. (mm)	0.827 (21)			
	Row pitch (b)	in. (mm)	0.852 (21.65)			
	Fin spacing	Fins per inch	18	19	17	18
		mm	1.4	1.3	1.5	1.4
	Coil dimensions (WxHxD)	(in.)	(35 5/8 + 34) × 25 1/4 × 7/8	38 3/16 × 31 3/8 × 1 1/16	38 3/16 × 53 × 1 7/16	38 3/16 × 53 × 1 11/16
		mm	(900 + 866) × 630 × 21.65	970 × 798 × 43.3	970 × 1,344 × 36.38	970 × 1,344 × 43.3
	Fin type		Hydrophilic aluminum			
	Tube OD and type		Φ7.94, innergroove tube	Φ7.94, innergroove tube	Φ7.0, innergroove tube	Φ7.94, innergroove tube
	No. of circuits		6	5	6	6

Outdoor model			HMH72B24	HMH72B36	HMH72B48	HMH72B60
Outdoor sound (SPL) high speed		dBA	65	70	71	73
Compressor	Model		EATF250D22UMT	EATF250D22UMT	EATF400D64UMTA	EATF400D64UMTA
	Brand		GMCC	GMCC	GMCC	GMCC
	Type		Twin Rotary	Twin Rotary	Twin Rotary	Twin Rotary
	Capacity	CFM	26,085	26,085	41,865	41,865
	Input		2,080	2,080	3,385	3,385
	Rated current (RLA)	A	9.45	9.45	15.39	15.39
	Refrigerant oil	oz	VG74/22.7	VG74/22.8	VG74/33.9	VG74/33.9
		ml	VG74/670	VG74/671	VG74/1000	VG74/1000
Refrigerant / quantity	Type		R410A	R410A	R410A	R410A
	Refrigerant charge	oz (kg)	71.0 (2.0)	99 (2.8)	143 (4.1)	143 (4.1)
	Standard lineset	ft (m)	15 (4.6)	15 (4.6)	15 (4.6)	15 (4.6)
	Additional charge/ ft	oz	0.38	0.38	0.6	0.6
Outdoor metering device			EEV	EEV	EEV	EEV
Refrigerant piping	Liquid / suction	in. (mm)	3/8 / 5/8 (9.52/15.88)	3/8 / 3/4 (9.52/19.05)	3/8 / 7/8 (9.52/19.05)	3/8 / 7/8 (9.52/19.05)
	Maximum pipe length	ft (m)	164 (50)	246 (75)	246 (75)	246 (75)
	Maximum vertical rise	ft (m)	98 (30)			
Design pressure	H/L	MPa	3.8/1.6	3.8/1.6	3.8/1.6	3.8/1.6
		psig	550/240	550/240	550/240	550/240
Outdoor unit physical data	Dimension (WxHxD)	in.	33 7/8 × 26 3/8 × 12 1/4	37 3/8 × 33 × 13 3/8	37 3/8 × 54 5/8 × 13 3/8	37 3/8 × 54 5/8 × 13 3/8
		mm	860 × 670 × 310	950 × 840 × 340	950 × 1386 × 340	950 × 1,386 × 340
	Packaging (WxHxD)	in.	39 × 28 3/4 × 17 3/4	43 3/4 × 36 1/4 × 18 1/8	43 3/4 × 60 1/4 × 18 1/8	43 3/4 × 60 1/4 × 18 1/8
		mm	990 × 730 × 450	1,110 × 920 × 460	1,110 × 1530 × 460	1,110 × 1,530 × 460
	Net weight	lb (kg)	112.4 (51)	155.1 (70.5)	241.4 (109.5)	251.3 (114)
	Shipping weight	lb (kg)	121.3 (55)	166.4 (75.5)	267.9 (1,121.5)	277.5 (126)
Operating temperature	Cooling	°F (°C)	5 to 122 (-15 to 50)			
	Heating	°F (°C)	-13 to 75 (-25 to 24)			

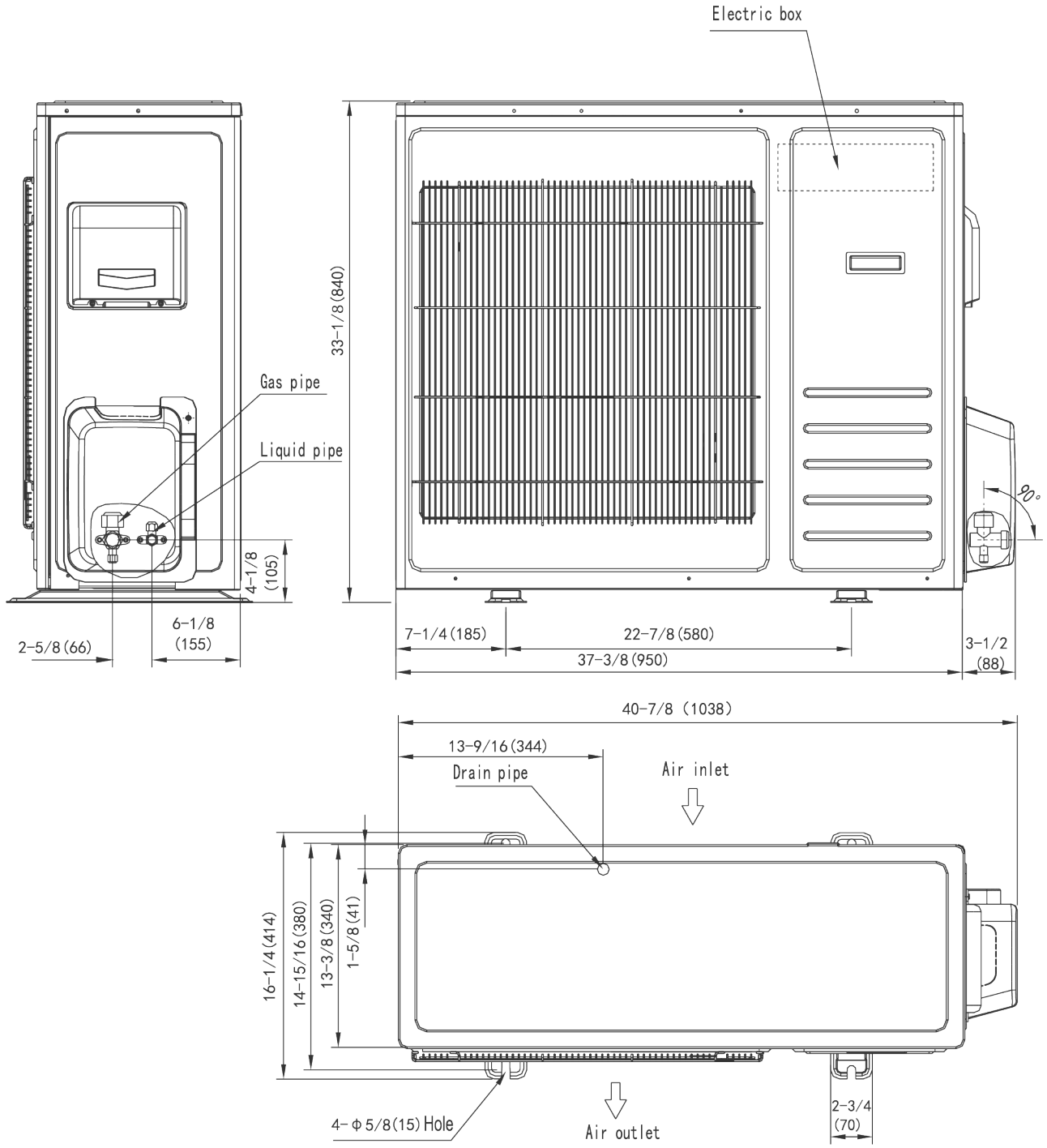
Outlines and dimensions

Figure 6: HMH72B24 dimensions



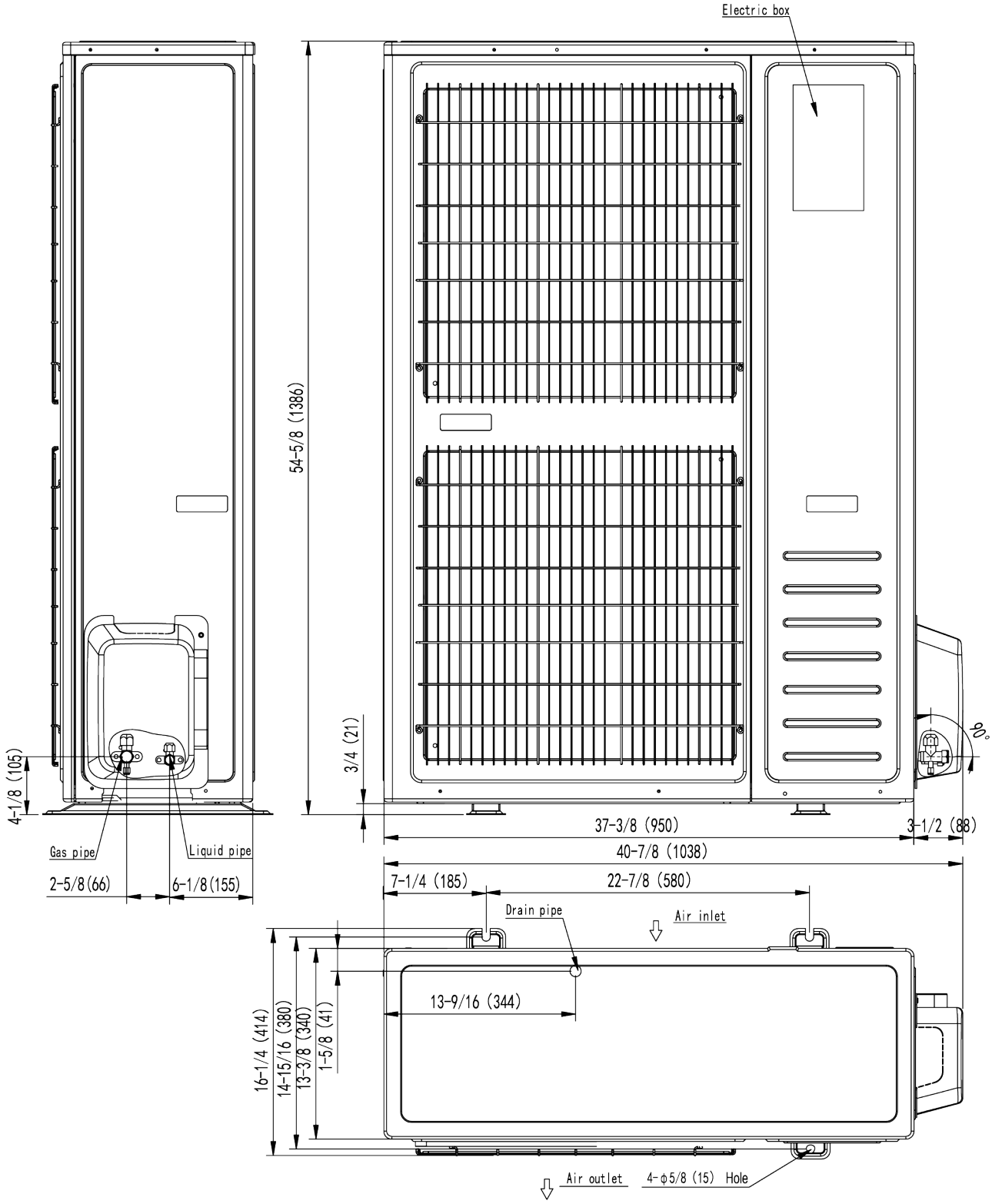
Unit : in. (mm)

Figure 7: HMH72B36 dimensions



Unit : in.(mm)

Figure 8: HMH72B48/HMH72B60 dimensions



Unit : in.(mm)

Electrical connections

General information and grounding

Note: This unit uses discrete thermostat wiring. Do not interface with TTSCC, Hx™ , or Hx™3 thermostat communication connections. It is possible to interface with Hx™ or Hx™3 conventional terminals.

CAUTION

This equipment uses an inverter drive that stores hazardous energy up to 5 min after power is removed. Wait for more than 5 min before performing electrical work after power is removed.

NOTICE

Local codes may require use of an ELB (Earth Leakage Breaker) or RCD (Residual Current Device) breaker. When required, use a breaker capable of handling harmonics to prevent failure of the ELB or RCD breaker.

Field connections wiring

About this task:

All field wiring must be in accordance with national electrical codes (NEC) and local city codes.

1. Install the correct size weatherproof disconnect switch outdoors and within sight of the unit, per local codes.
2. Run the power wiring from the disconnect switch to the unit.
3. Route the wires from the disconnect through the power wiring exit provided and into the unit control box as shown in Figure 10, Figure 11, Figure 12, and Figure 13 for the various models.
4. Make the power supply connections to the supplied terminal block.
5. Mount the thermostat 5 ft above the floor, where it is exposed to normal room air circulation. Do not place it on an outside wall or where it is exposed to the radiant effect from exposed glass or appliances, drafts from outside doors, or supply air grilles.
6. Route the 24-V control wiring (NEC Class 2) from the outdoor unit to the indoor unit and thermostat. Keep the low-voltage wiring 4 in. or more away from the high-voltage wires that are leaving the control box.
7. Wrap tape along the wire and seal any wiring holes to prevent entry of condensate water and insects. Tightly secure the power source wiring using the cord clamp inside the unit.
8. See the unit-specific connection instructions below.

Table 17: Tightening torque of each screw

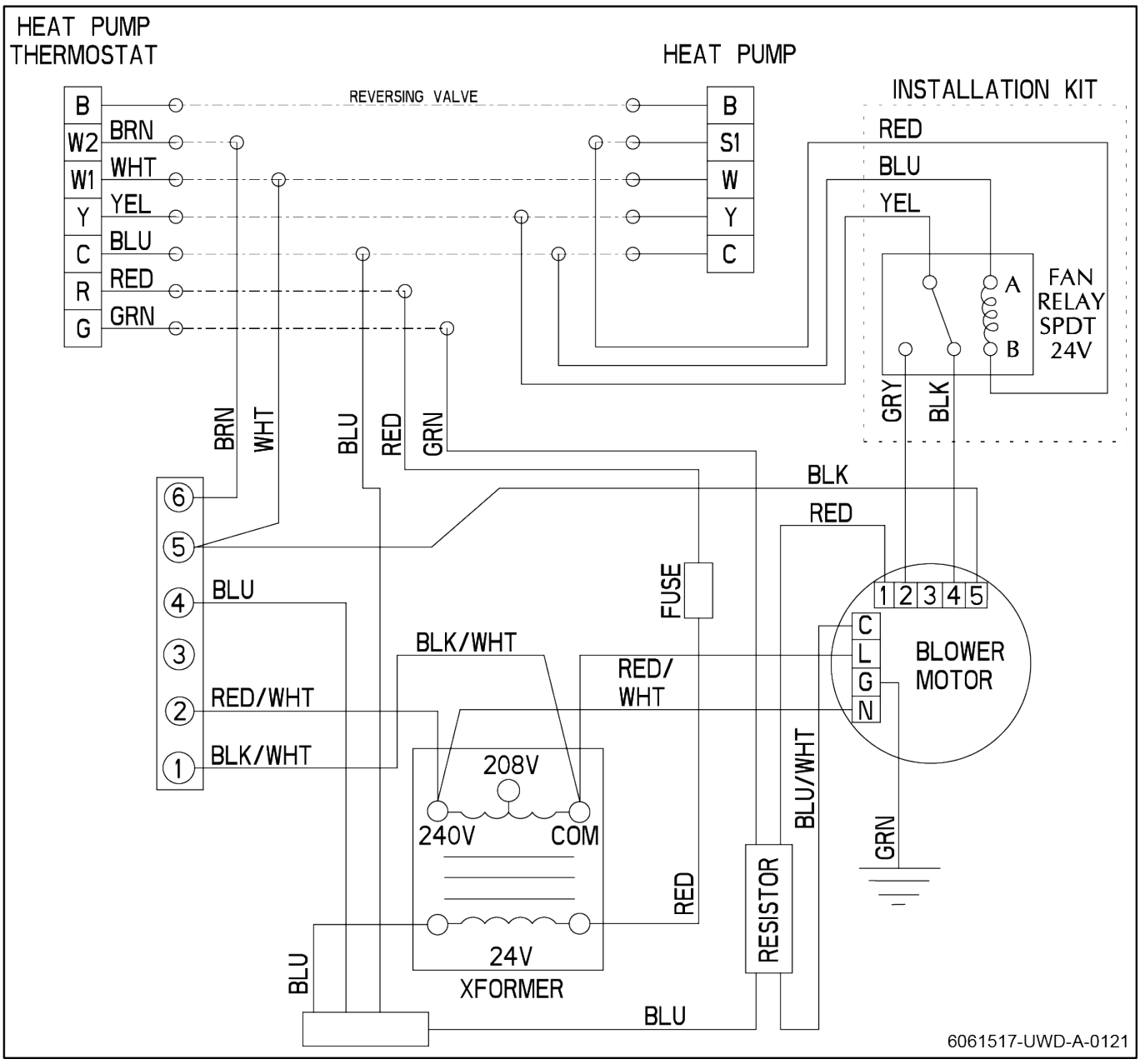
Screw	Minimum - lb·ft (N·m)	Maximum - lb·ft (N·m)
M4	0.7 (1.0)	1.0 (1.3)
M5	1.5 (2.0)	1.8 (2.5)
M6	3.0 (4.0)	3.7 (5.0)
M8	6.6 (9.0)	8.1 (11.0)
M10	13.3 (18.0)	21.7 (23.0)

Note: Apply adhesive to rubber bushings when not using conduit tubes to the outdoor unit.

General electrical checks

- Ensure that the field-selected electrical components (main power switches, circuit breakers, wires, conduit connectors, and wire terminals) have been properly selected according to the electrical data. Ensure that the components comply with the NEC.
- Ensure the voltage of the power supply is within 10% of nominal voltage and the ground is contained in the power supply wires. If not, electrical parts may be damaged.
- Ensure that the capacity of the power supply is of sufficient size. If not, an abnormal voltage drop when starting the unit may prevent the compressor from operating.
- Ensure that the ground wire is connected.
- Ensure that the electrical resistance is more than 2 MΩ, by measuring the resistance between the ground and the terminal of the electrical parts. If the electrical resistance is not more than 2 MΩ, do not operate the system until the electrical leakage is found and repaired.

Figure 9: Wiring diagram - HMH7 ACC STD ECM



Note:

- Use the B terminal on the thermostat for the reversing valve connection (energized in heat mode).
- The room thermostat must control fossil fuel operation if matched with a gas furnace.
- Refer to wiring and installation kit HMH7AK001 for additional wiring detail on the indoor unit.

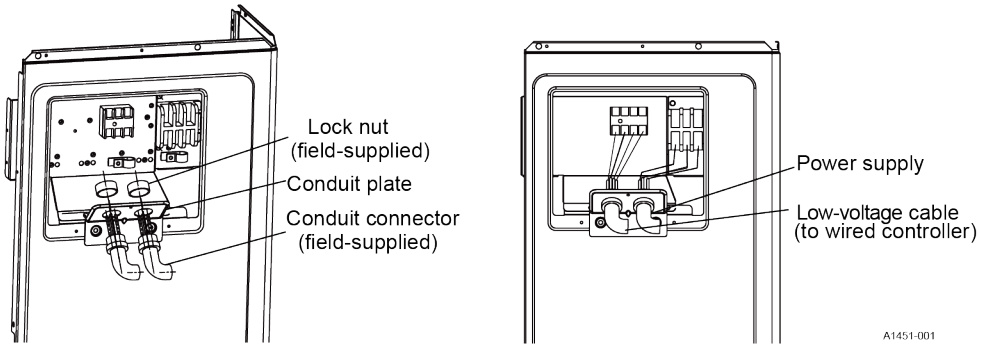
Connecting HMH72B24 and HMH72B36 wiring

About this task:
Connect wiring to the unit by completing the following steps.

1. Unscrew the mounting screws to remove the electric box cover.
2. Fasten the power supply cable and the low-voltage cable to the conduit holder using the lock nut.
3. Connect the power supply cable and the low-voltage cable to the terminal.
4. Fasten the power supply cable and the low-voltage cable with the cable clamp.
5. Make sure to seal any holes when wiring is complete. Place the cables side to side (do not overlap the cables).

6. Re-install the electric box cover when wiring is complete.

Figure 10: HMH72B24 and HMH72B36 wiring



Connecting HMH72B48 and HMH72B60 wiring

About this task:
Connect wiring to the unit by completing the following steps.

1. Remove the screws, maintenance plate, and the valve cover.
2. Pass the low-voltage cable and power supply through the two holes on the right side plate.
3. Fasten the conduit connection to the right side plate using the lock nut.
4. Connect the low-voltage cable and power supply to the terminal.
5. Secure the low-voltage cable and power supply with the clamp tightly.
6. Make sure to seal all holes when wiring is complete.
7. Replace the maintenance plate and the valve cover when wiring is complete.

Figure 11: HMH72B48 and HMH72B60 wiring (1)

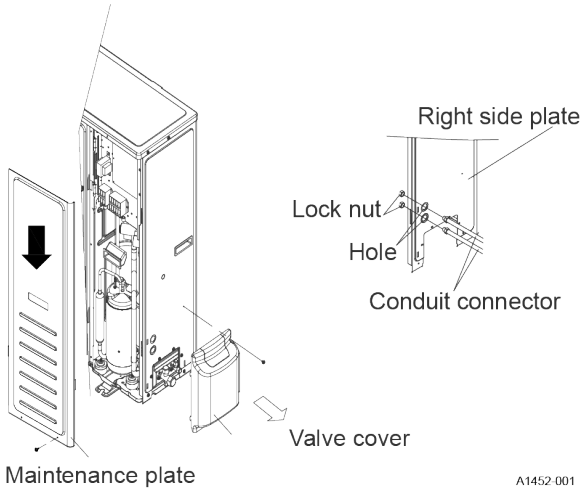


Figure 12: HMH72B48 and HMH72B60 wiring (2)

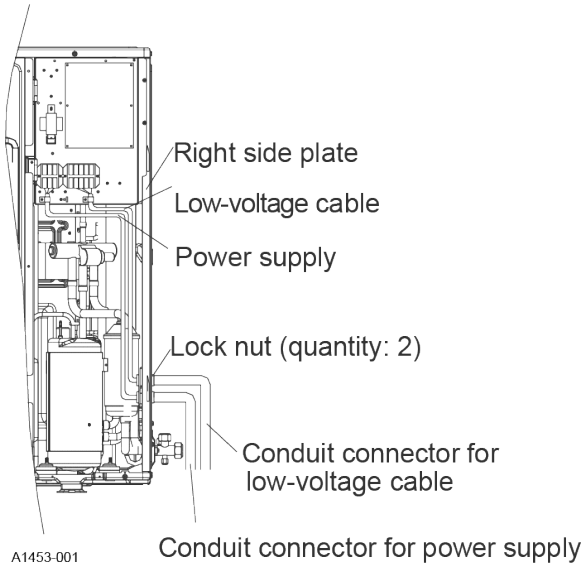
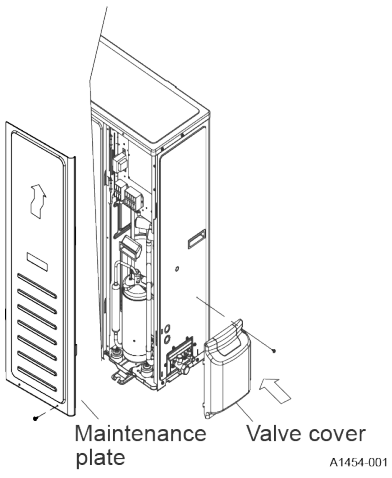


Figure 13: HMH72B48 and HMH72B60 wiring (3)



Electrical data

Table 18: Electrical data

Model (capacity)	Power supply	ELB/RCD rated current (A)*	ELB/RCD fault current (mA)*	Power source cable size	Low-voltage cable size	Circuit breaker (A)
HMH72B24	208/230 V~ /60 Hz	25	30	3 x 12 AWG	5 x 16 AWG	25
HMH72B36	208/230 V~ /60 Hz	35	30	3 x 10 AWG	5 x 16 AWG	35
HMH72B48, HMH72B60	208/230 V~ /60 Hz	50	30	3 x 8 AWG	5 x 16 AWG	50

*Where required by code

Note: Maximum running current (A): refer to the nameplate.

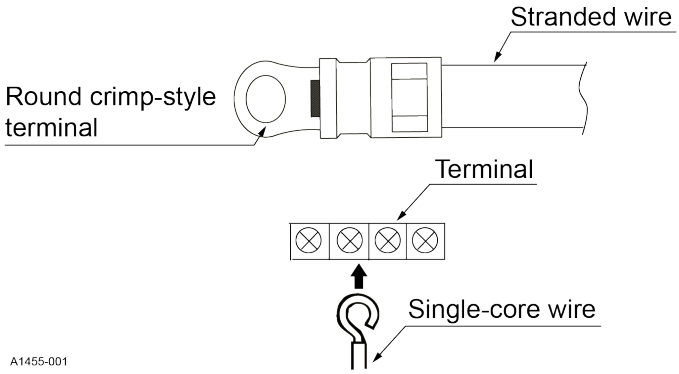
Note:

- Follow local codes and regulations when selecting field wires and ensure all wires are the minimum wire size.
- When the low-voltage cable is longer than 262 ft (80 m), select a larger wire size.
- Install a main switch and an ELB/RCD for each system separately. Select a high-response ELB/RCD that acts within 0.1 s.

NOTICE

When connecting to the terminal block using a stranded wire, make sure to use the round crimp-style solderless terminal.

Figure 14: Connecting the power supply



Performing a test run

About this task:

Perform a test run after the refrigerant piping, drain, and wiring are finished.

CAUTION

The outdoor section is provided with a compressor and base heater. Check to ensure the main power has been on for more than 6 h ahead of unit operation to avoid damage to the compressor.

CAUTION

Do not operate the system until all the checks have been performed.

1. Check to ensure that the service base valves of the outdoor unit are fully open.
2. Check to ensure that the electric wires are fully connected.
3. Use the thermostat to turn on the system and then proceed with the test run.
4. Turn off the power after the test run is finished.

WARNING

Do not touch any of the parts at the discharge gas side by hand. The compressor chamber and the pipes at the discharge side are heated to temperatures higher than 194°F (90°C).

WARNING

Electrical Shock Hazard

Disconnect and lock out power before servicing. Wait 5 min to ensure that drive capacitors are discharged before servicing. Use compressor with grounded system only. Molded electrical plug must be used for connection to compressor.

WARNING

Burn Hazard

Failure to follow these warnings could result in serious personal injury or property damage. Ensure that materials and wiring do not touch high temperature areas of the compressor. Personal safety equipment must be used.

CAUTION

Drive Handling

Caution must be used when lifting and installing the drive. Failure to use caution may result in bodily injury. Personal safety equipment must be used. Failure to follow these warnings could result in personal injury or property damage.

CAUTION

Safety Statements

Only qualified and authorized HVAC or refrigeration personnel are permitted to install, commission and maintain this equipment. Electrical connections must be made by qualified electrical personnel. All valid standards and codes for installing, servicing, and maintaining electrical and refrigeration equipment must be observed.

Refrigerant circuit

Figure 15: Refrigerant circuit diagram

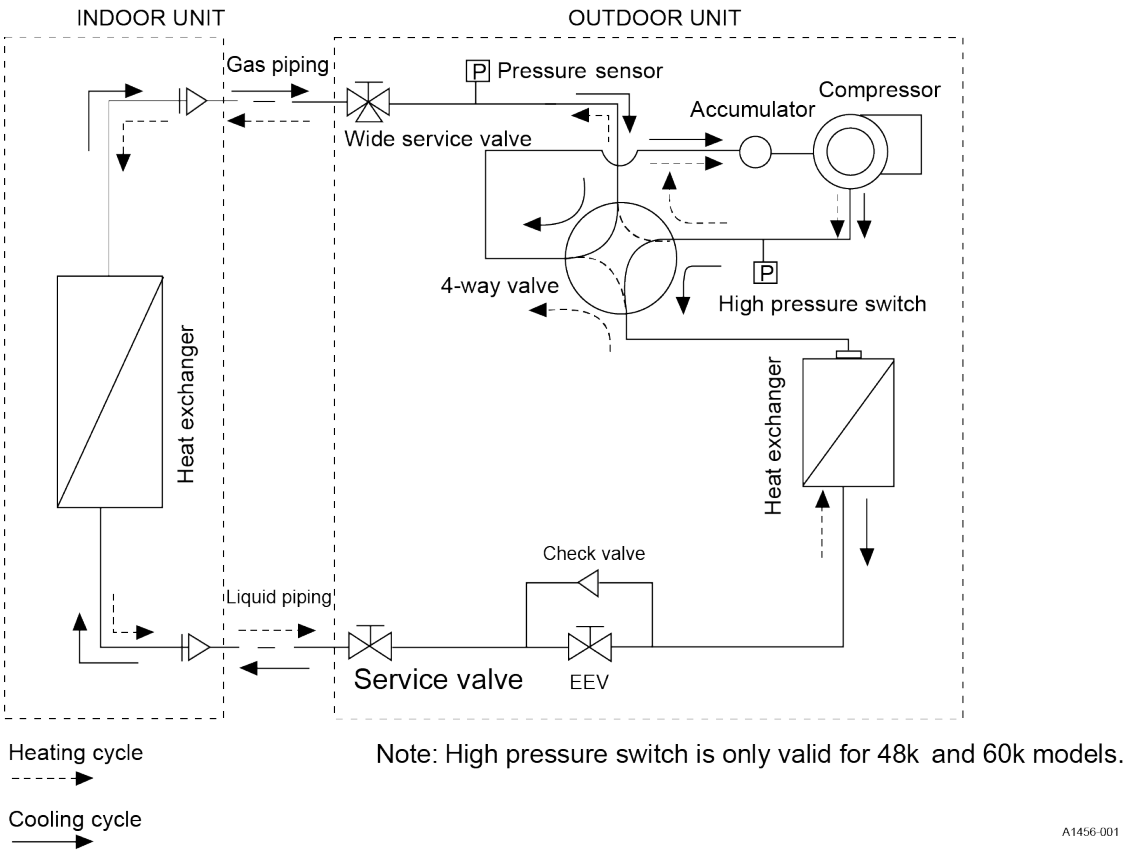
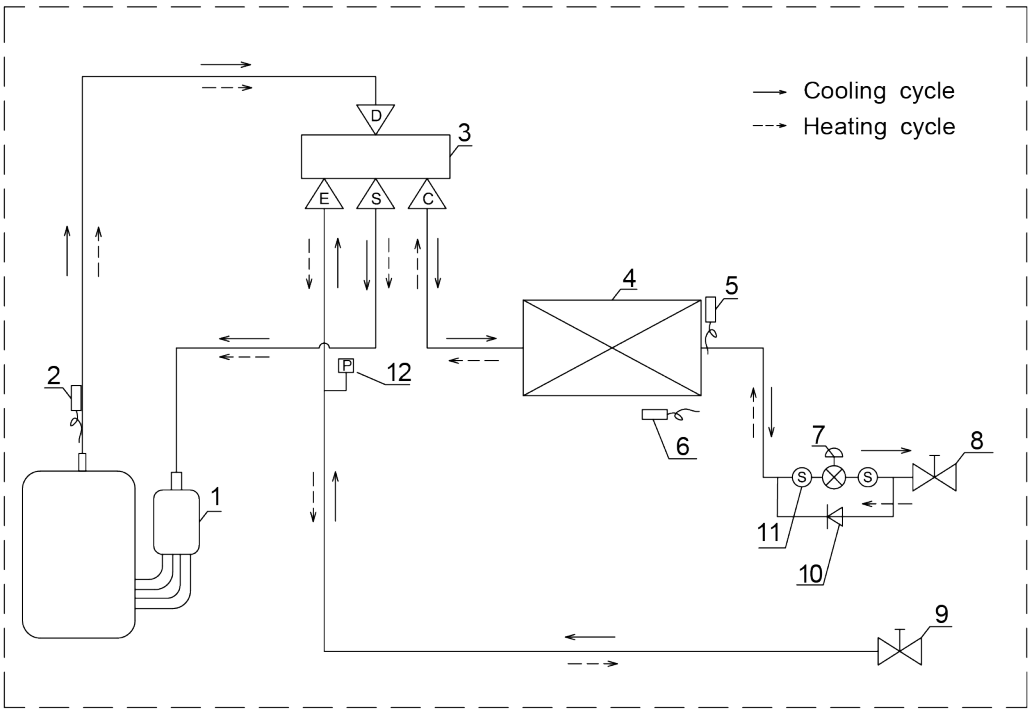


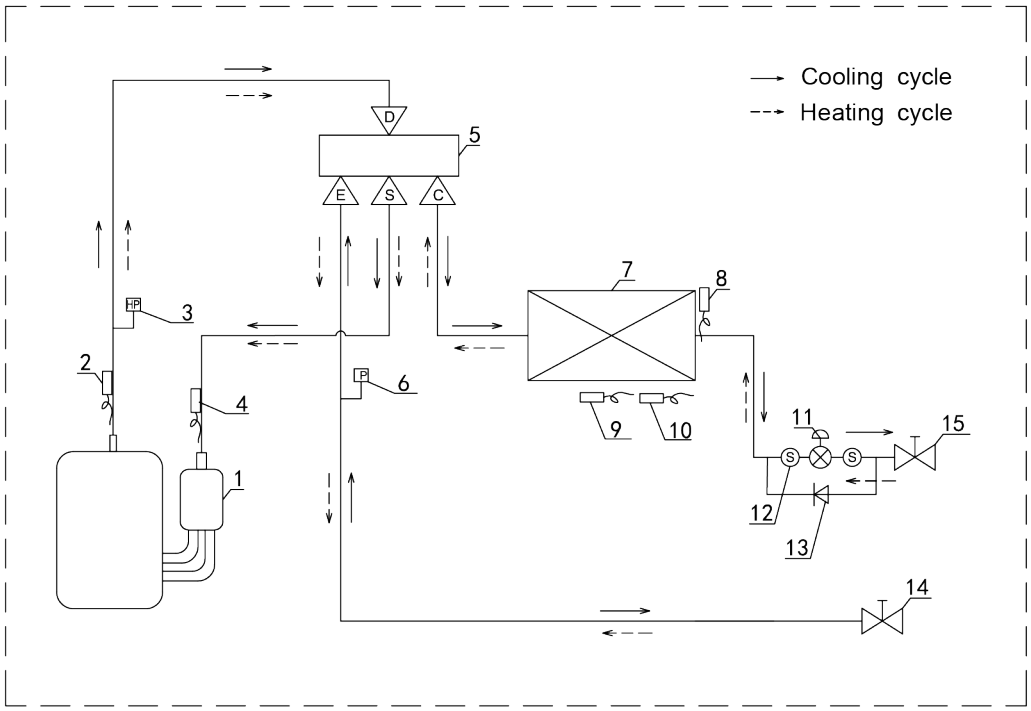
Figure 16: Outdoor unit - HMH72B24



List of components			
1	Compressor	7	Electronic expansion valve
2	Discharge temperature sensor	8	Stop valve (Liquid)
3	4-Way valve	9	Stop valve (Vapor)
4	Outdoor heat exchanger	10	One-way valve
5	Coil temperature sensor	11	Strainer
6	Ambient temperature sensor	12	Pressure sensor

A1457-001

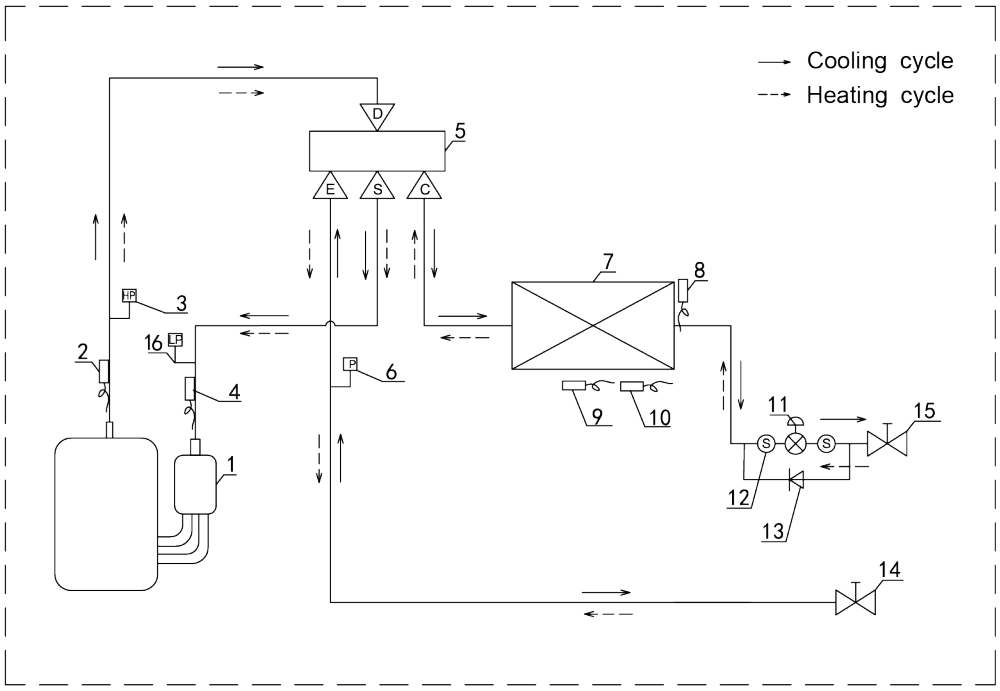
Figure 17: Outdoor unit - HMH72B36



List of components			
1	Compressor	9	Coil temperature sensor
2	Discharge temperature sensor	10	Defrost temperature sensor
3	High pressure switch	11	Electronic expansion valve
4	Suction temperature sensor	12	Strainer
5	4-Way valve	13	One-way valve
6	Pressure sensor	14	Stop valve (Vapor)
7	Outdoor heat exchanger	15	Stop valve (Liquid)
8	Ambient temperature sensor		

A1458-001

Figure 18: Outdoor unit - HMH72B48 and HMH72B60



List of components			
1	Compressor	9	Coil temperature sensor
2	Discharge temperature sensor	10	Defrost temperature sensor
3	High pressure switch	11	Electronic expansion valve
4	Suction temperature sensor	12	Strainer
5	4-Way valve	13	One-way valve
6	Pressure sensor	14	Stop valve (Vapor)
7	Outdoor heat exchanger	15	Stop valve (Liquid)
8	Ambient temperature sensor	16	Low pressure switch

A1459-001

WARNING

High voltage

The outdoor power supply must be disconnected before maintenance. This equipment uses an inverter drive that stores hazardous energy up to 5 min after power is removed. Wait for more than 5 min before performing electrical work after power is removed.

Figure 19: HMH72B24 and HMH72B36 electrical wiring diagram

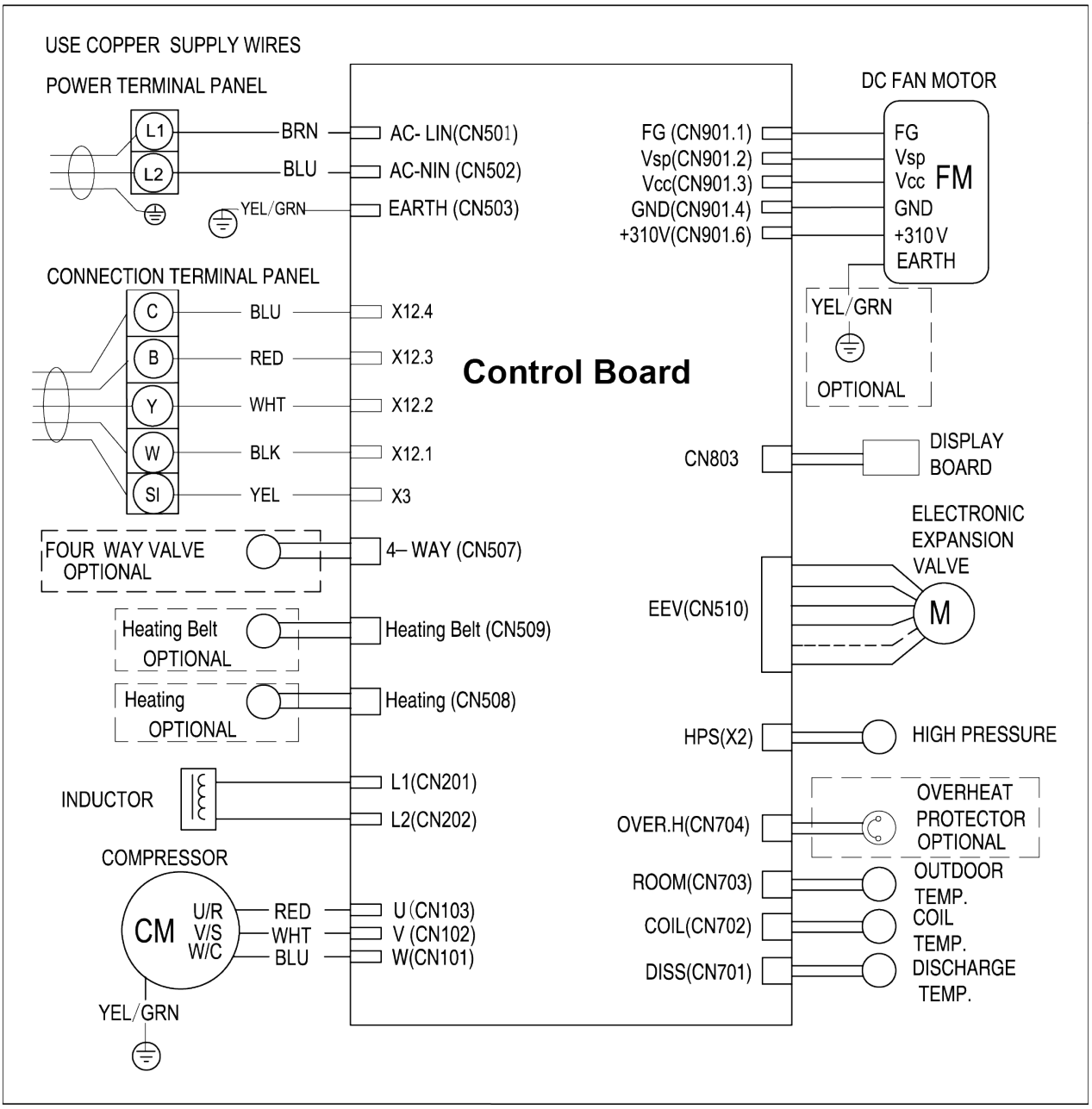
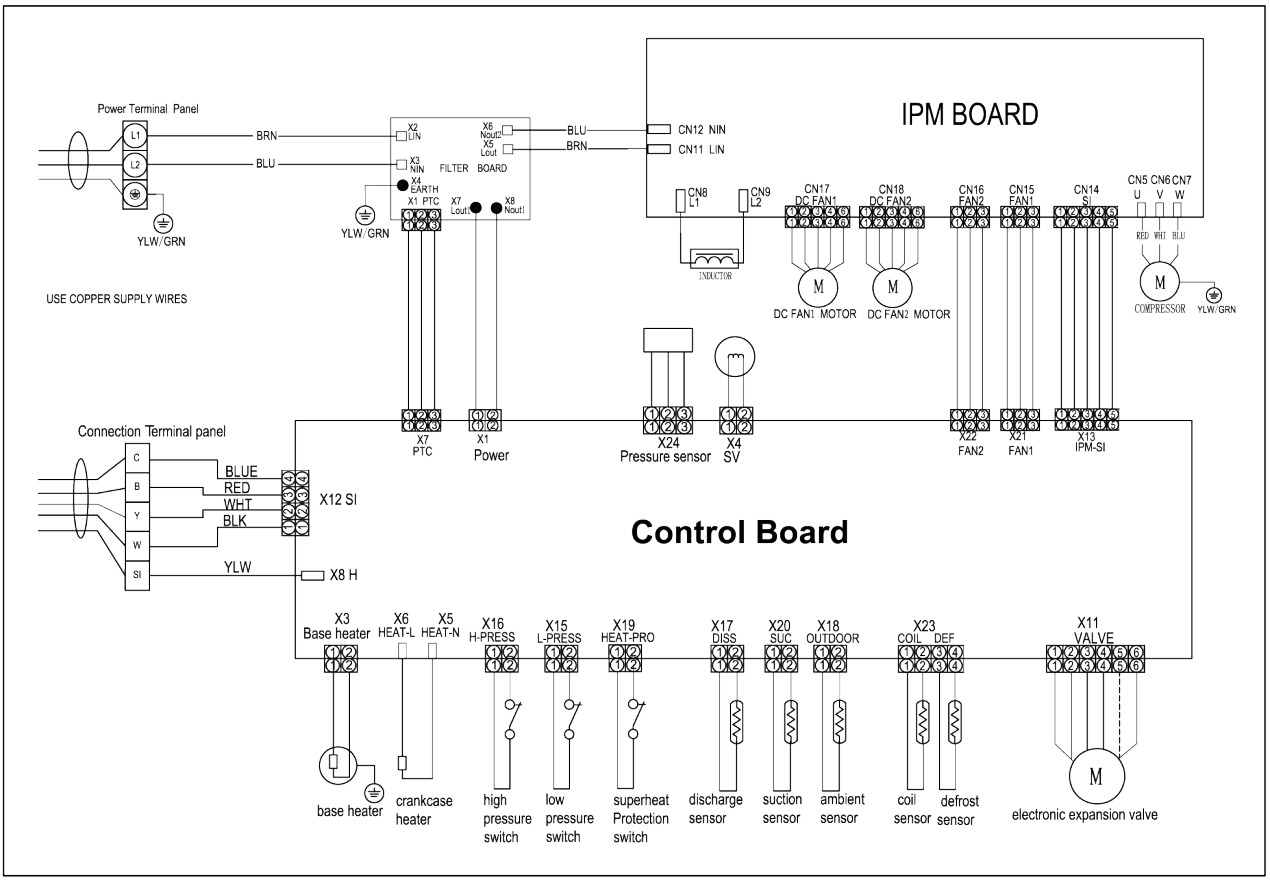


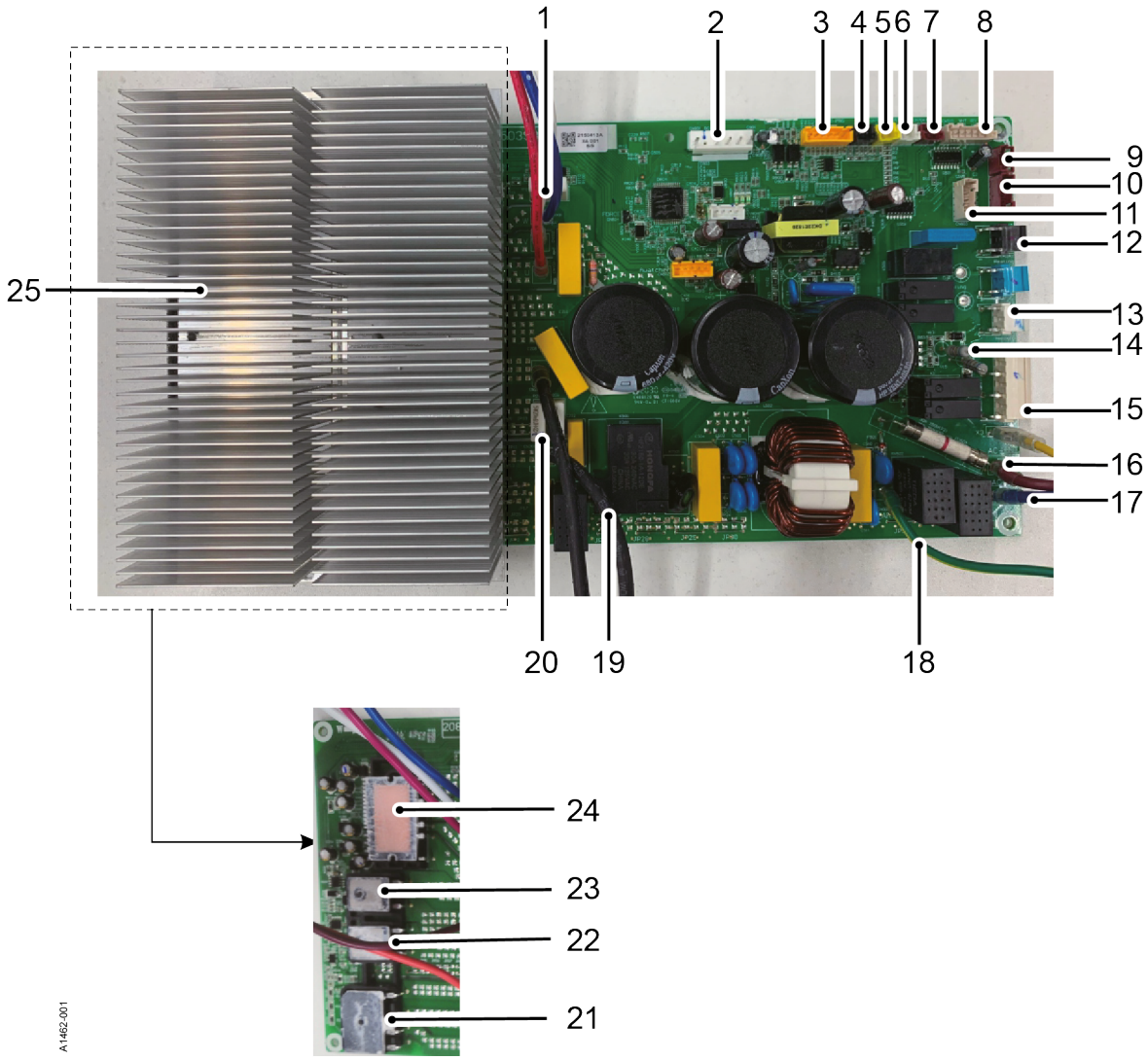
Figure 20: HMH72B48 and HMH72B60 electrical wiring diagram



For DIP switch settings, see Setting the DIP switch of the outdoor unit.

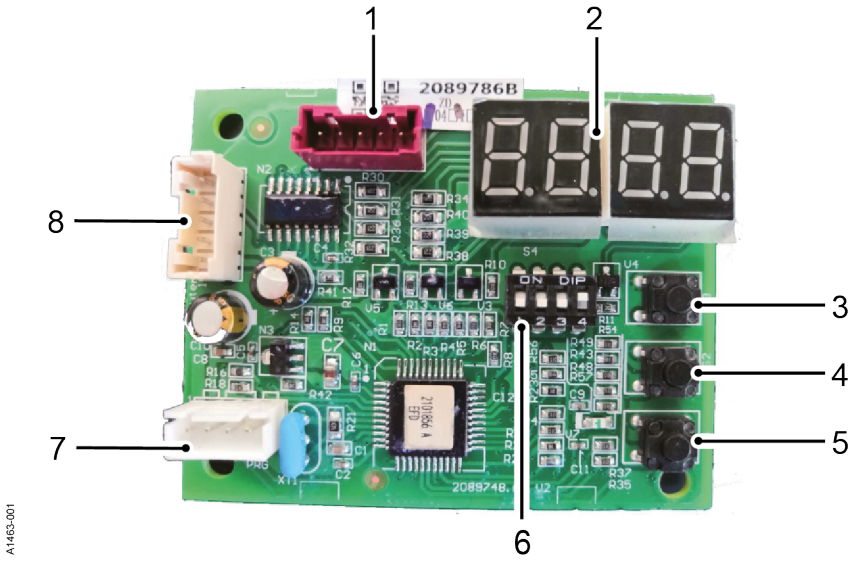
Control board

Figure 21: Main control board - HMH72B24/HMH72B36



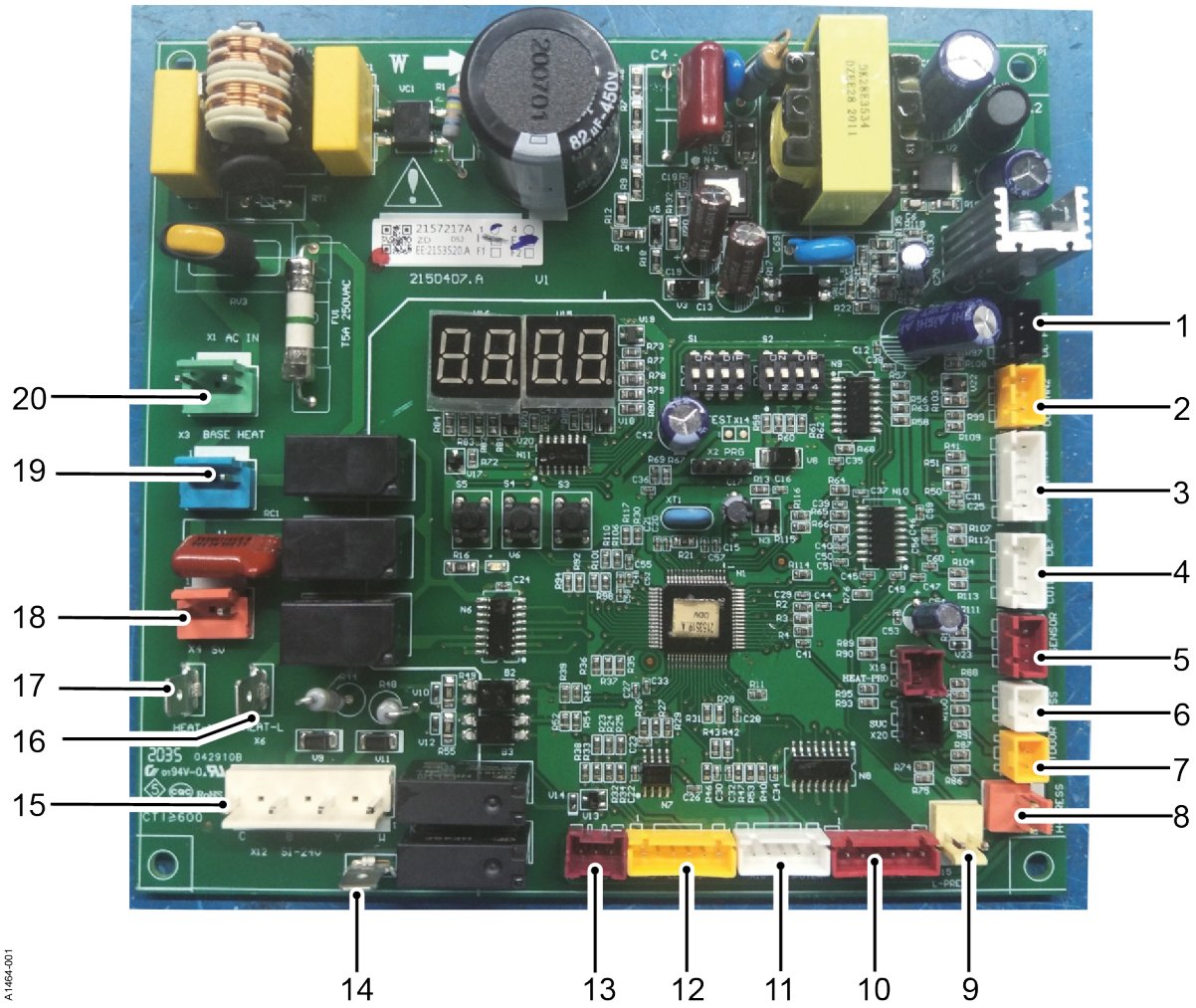
No.	Description	No.	Description
1	Compressor	14	Heater
2	DC fan	15	SI
3	EE	16	AC power LIN
4	Coil temperature sensor	17	AC power NIN
5	Ambient temperature sensor	18	GND
6	Discharge temperature sensor	19	Reactor L2
7	Overheat protector	20	Reactor L1
8	Electronic expansion valve	21	Rectifier bridge
9	High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

Figure 22: 7-segment display board - HMH72B24/HMH72B36



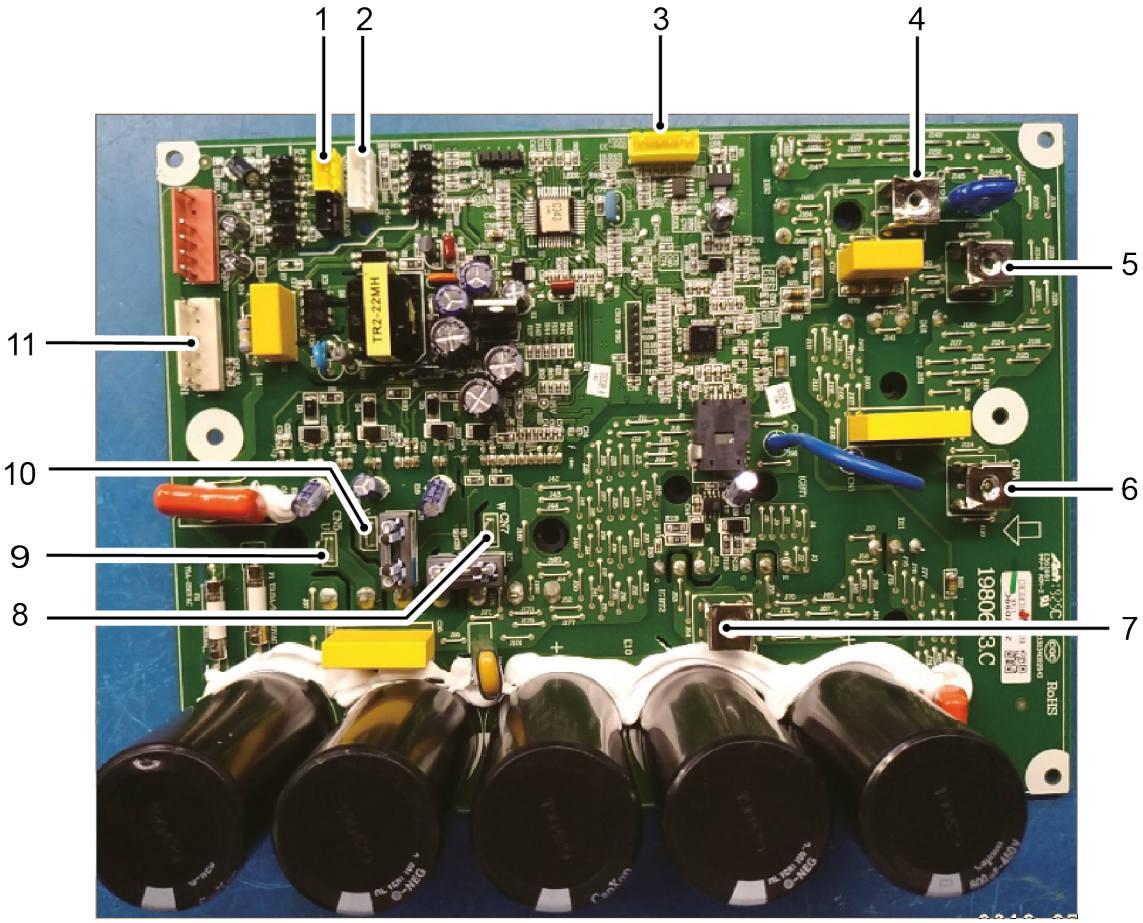
No.	Description	No.	Description
1	Switch to outdoor control board	5	S1- Select button
2	7-segment display	6	DIP switch
3	S3 - Decrease button	7	Program
4	S2 - Increase button	8	Computer/Checker to outdoor control board

Figure 23: Main control board - HMH72B48/HMH72B60



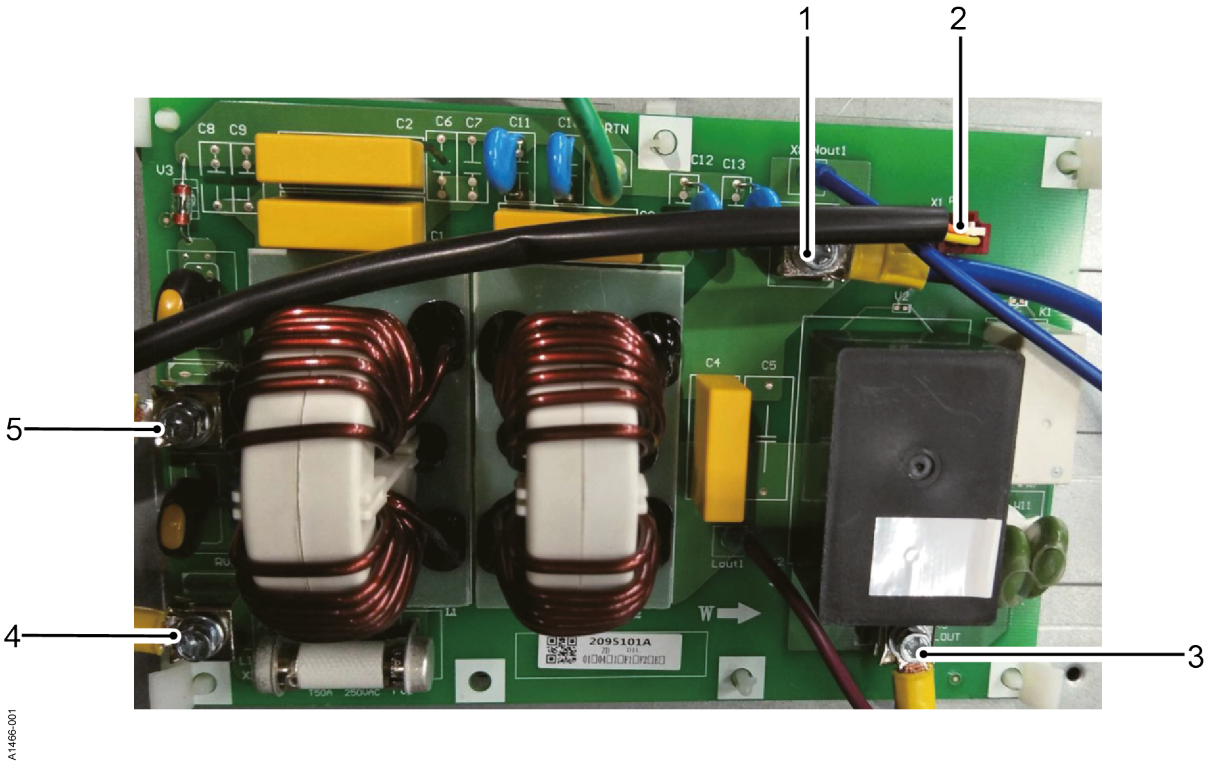
No.	Description	No.	Description
1	DC fan Driver1	11	Checker
2	DC fan Driver2	12	EEPROM
3	IPM-SI	13	PTC control signal
4	Defrost/Coil temperature sensor	14	H signal
5	Pressure sensor	15	Communication signal
6	Discharge temperature sensor	16	Electric heating belt
7	Ambient temperature sensor	17	Electric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

Figure 24: Drive board



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		

Figure 25: Filter board



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

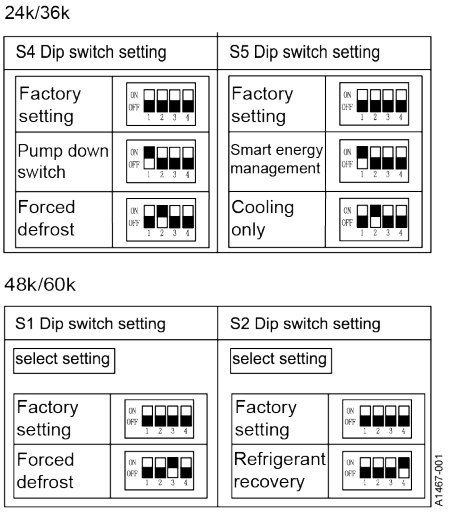
Field settings

Setting the DIP switch of the outdoor unit

1. Turn off all power sources before setting the switches to ensure settings are refreshed and valid.
2. Set switches according to the required setting as shown in Figure 26.

Note: Dip switch setting is optional.

Figure 26: DIP switch setting



Activating manual defrost mode

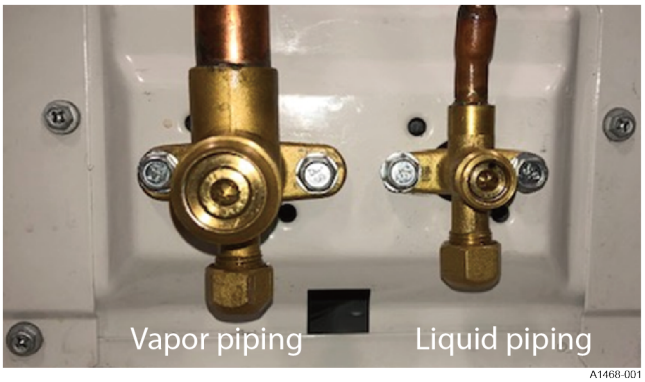
1. Change the switch from **OFF** to **ON** before applying power to the unit.
2. Set the room thermostat to heating mode, which then operates the unit in manual defrosting mode.

Activating pump down mode

The compressor runs with a target frequency and without any protection when the frequency rises. The EEV runs with an open setting. The outdoor unit fan runs with the set fan speed.

1. Remove line voltage power from the outdoor section.
2. Close the liquid line service valve using a hex head wrench by turning the valve stem fully clockwise until seated as shown in Figure 27.

Figure 27: Refrigerant collection



3. Open the maintenance panel.
4. Place the unit in pump-down mode by changing the dip switch setting on the main control board as shown in Figure 26.
5. Restore line voltage power to the outdoor section.
6. Note that the LED display on the main control board should display 40. This number then counts down to zero.
7. When the LED begins to blink zero, close the vapor line service valve using a hex head wrench by turning the valve stem fully clockwise until seated as shown in Figure 27.
8. Remove line voltage power from the outdoor section.

Note: Make sure to switch back the dip switch setting after the refrigerant recovery operation. If not, the unit enters the refrigerant recovery mode again after powering on.

NOTICE

The refrigerant in systems with linesets in excess of 40 ft cannot be recovered into the outdoor unit and requires recovery with external equipment.

Running a parameter query

Figure 28: 7-segment display query

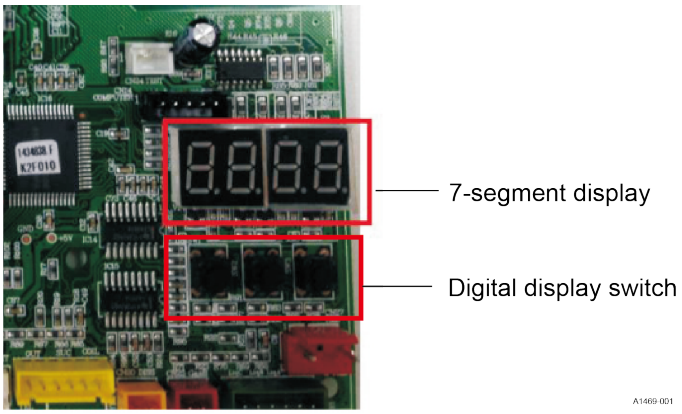
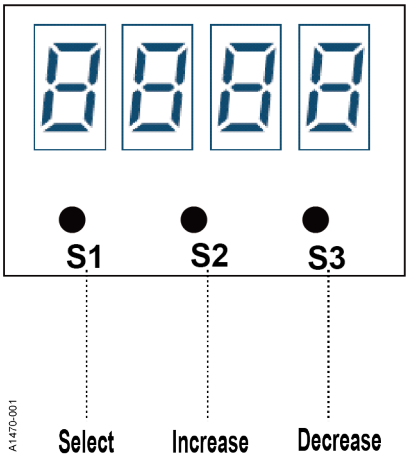


Figure 29: HMH72B24 and HMH72B36 digital display board parameters



There are three buttons on the digital display board:

- **Select**: Press to display outdoor or indoor unit parameter. P.= The parameter of the outdoor unit.
- **Increase**: Press to increase the number by one.
- **Decrease**: Press to decrease the number by one.

Note: The parameter content is automatically displayed after the parameter code is selected for 3 s.

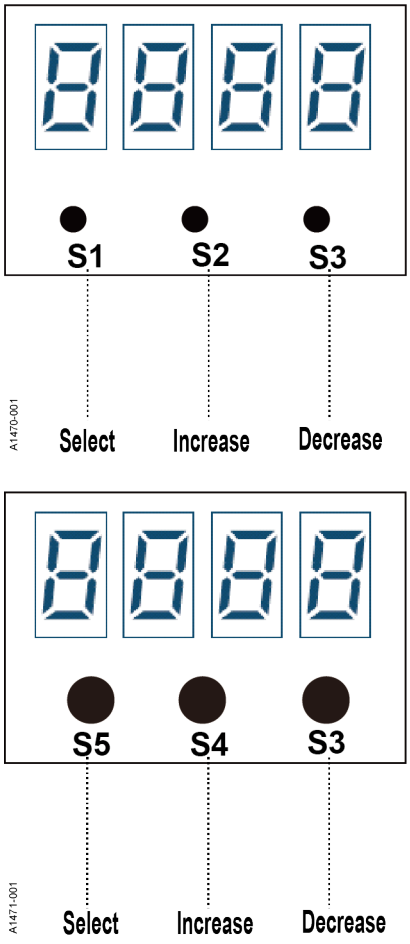
Table 19: Parameters - HMH72B24 and HMH72B36

Parameter code	Description
P.0	Fault codes
P.1	Compressor actual frequency
P.2	Compressor driving frequency
P.4	Compressor target frequency
P.5	Compressor discharge temperature

Table 19: Parameters - HMH72B24 and HMH72B36

Parameter code	Description
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

Figure 30: HMH72B48 and HMH72B60 digital display board parameters



There are three buttons on the digital display board:

- **Select**: Press to display outdoor or indoor unit parameter. P./H.= The parameter of the outdoor unit.
- **Increase**: Press to increase the number by one. Hold down to increase rapidly.
- **Decrease**: Press to decrease the number by one. Hold down to decrease rapidly.

Table 20: Parameters - HMH72B48 and HMH72B60

Parameter code	Description
0	Protection code or fault code
P.1	Compressor actual frequency
P.2	Compressor 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	AC input current
P.10	IPM module temperature
P.11	Outdoor capacity requirement
P.12	IPM module 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
H.4	Target pressure in heating mode)
H.5	Actual pressure (= the displayed value/100)

Control mode

Control function

1. **Cooling anti-freeze protection:** The outdoor pressure sensors monitor evaporator pressure and saturated temperature. This feature prevents the indoor unit evaporator temperature from becoming too low. If the indoor coil temperature is too low, the compressor automatically engages protection mode.

2. **Overload protection:** To prevent system overload caused by excessive pressure, the control implements real-time detection when the outdoor coil temperature is too high during cooling mode or the indoor coil temperature is too high during heating mode.
3. **Compressor discharge temperature protection:** To prevent damage due to a high compressor discharge temperature, the control monitors the discharge gas temperature and provides automatic protection if the temperature is too high.
4. **Oil-return control:** When the compressor runs at low frequencies for a long time, the control initiates an oil-return sequence to ensure oil is returned to the compressor.
5. **Operation mode:** Air conditioning mode is the operation mode set by users through the thermostat. Two modes are available: cooling and heating.
6. **Four-way valve control:** The four-way valve of the outdoor unit is de-energized in cooling and defrosting, and energized in heating. During heating, the four-way valve is de-energized for a period of time after the compressor stops.
7. **Start-up protection:** To prevent frequent compressor starts where the system pressure has not equalized, the control invokes a delay of 3 min between cycles to prevent short cycles.
8. **Pressure protection:** When the pressure increases to a preset value, the pressure switch automatically changes to protection mode. The compressor stops and reports the protection fault code.

Sensor parameter

These are the parameters for the outdoor compressor discharge sensor:
(R0=187.25K±6.3%, R100=3.77K±2.5K, B0/100=3979K±1%)

Table 21: Outdoor compressor discharge temperature sensor

Temperature [°F (°C)]	Rmin [KΩ]	Rnom [KΩ]	Rmax [KΩ]	Dev(MIN)%	Dev(MAX)%
-22.0 (-30)	908.2603	985.5274	1065.1210	-7.84	7.47
-20.2 (-29)	855.3955	927.6043	1001.9150	-7.78	7.42
-18.4 (-28)	805.9244	873.4324	924.8368	-7.73	5.56
-16.6 (-27)	759.6097	822.7471	887.5944	-7.67	7.31
-14.8 (-26)	716.2320	775.3041	835.9165	-7.62	7.25
-13.0 (-25)	675.5881	730.8775	787.5529	-7.56	7.20
-11.2 (-24)	637.4902	689.2583	742.2720	-7.51	7.14
-9.4 (-23)	601.7645	650.2533	699.8601	-7.46	7.09
-7.6 (-22)	568.2499	613.6835	660.1191	-7.40	7.03
-5.8 (-21)	536.7970	579.3832	622.8658	-7.35	6.98
-4.0 (-20)	507.2676	547.1989	587.9307	-7.30	6.93
-2.2 (-19)	497.5332	516.9882	555.1565	-3.76	6.88
-0.4 (-18)	453.4748	488.6192	524.3977	-7.19	6.82
1.4 (-17)	428.9819	461.9693	495.5191	-7.14	6.77
3.2 (-16)	405.9517	436.9251	486.3954	-7.09	10.17
5.0 (-15)	384.2888	413.3808	442.9105	-7.04	6.67
6.8 (-14)	363.9047	391.2386	418.9563	-6.99	6.62
8.6 (-13)	344.7169	370.4072	396.4325	-6.94	6.56
10.4 (-12)	326.6497	350.8019	375.2461	-6.88	6.51
12.2 (-11)	309.6286	332.3441	355.3104	-6.83	6.46
14.0 (-10)	293.5903	314.9620	336.5448	-6.79	6.41
15.8 (-9)	278.4719	298.5822	318.3744	-6.74	6.22
17.6 (-8)	264.2156	283.1464	302.2294	-6.69	6.31
19.4 (-7)	250.7678	268.5936	286.5448	-6.64	6.26
21.2 (-6)	238.0783	254.8686	271.7603	-6.59	6.22
23.0 (-5)	226.1003	241.9200	257.8193	-6.54	6.17
24.8 (-4)	214.7903	229.6997	244.6593	-6.49	6.11

Table 21: Outdoor compressor discharge temperature sensor

Temperature [°F (°C)]	Rmin [KΩ]	Rnom [KΩ]	Rmax [KΩ]	Dev(MIN)%	Dev(MAX)%
26.6 (-3)	204.1073	218.1630	232.2612	-6.44	6.07
28.4 (-2)	194.0135	207.2681	220.5495	-6.39	6.02
30.2 (-1)	184.4732	196.9759	209.4913	-6.35	5.97
32.0 (0)	175.4533	187.2500	199.0468	-6.30	5.93
33.8 (1)	166.8952	178.0255	189.1529	-6.25	5.88
35.6 (2)	158.8023	169.3067	179.8058	-6.20	5.84
37.4 (3)	151.1467	161.0633	170.9724	-6.16	5.80
39.2 (4)	143.9026	153.2667	162.6216	-6.11	5.75
41.0 (5)	137.0455	145.8905	154.7246	-6.06	5.71
42.8 (6)	130.5528	138.9097	147.2544	-6.02	5.67
44.6 (7)	124.4033	132.3011	140.1856	-5.97	5.62
46.4 (8)	118.5769	126.0429	133.4946	-5.92	5.58
48.2 (9)	113.0550	120.1146	127.1591	-5.88	5.54
50.0 (10)	107.8202	114.4973	121.1586	-5.83	5.50
51.8 (11)	102.8560	109.1728	115.4734	-5.79	5.46
53.6 (12)	98.1470	104.1246	110.0855	-5.74	5.41
55.4 (13)	93.6787	99.3367	104.9778	-5.70	5.37
57.2 (14)	89.4378	94.7946	100.1342	-5.65	5.33
59.0 (15)	85.4114	90.4842	95.5398	-5.61	5.29
60.8 (16)	81.5875	86.3926	91.1805	-5.56	5.25
62.6 (17)	77.9551	82.5076	87.0430	-5.52	5.21
64.4 (18)	74.5034	78.8177	83.1150	-5.47	5.17
66.2 (19)	71.2227	75.3122	79.3848	-5.43	5.13
68.0 (20)	68.1036	71.9808	75.8414	-5.39	5.09
69.8 (21)	65.1373	68.8141	72.4746	-5.34	5.05
71.6 (22)	62.3155	65.8032	69.2746	-5.30	5.01
73.4 (23)	59.6306	62.9395	66.2324	-5.26	4.97
75.2 (24)	57.0752	60.2152	63.3395	-5.21	4.93
77.0 (25)	54.6424	57.6227	60.5877	-5.17	4.89
78.8 (26)	52.3258	55.1551	57.9695	-5.13	4.85
80.6 (27)	50.1192	52.8058	55.4778	-5.09	4.82
82.4 (28)	48.0168	50.5684	53.1058	-5.05	4.78
84.2 (29)	46.0133	48.4371	50.8472	-5.00	4.74
86.0 (30)	44.1034	46.4046	48.6960	-4.96	4.71
87.8 (31)	42.2825	44.4711	46.6466	-4.92	4.66
89.6 (32)	40.5458	42.6261	44.6937	-4.88	4.63
91.4 (33)	38.8891	40.8668	42.8323	-4.84	4.59
93.2 (34)	37.3084	39.1890	41.0576	-4.80	4.55
95.0 (35)	35.7998	37.5883	39.3653	-4.76	4.51
96.8 (36)	34.3596	36.0609	37.7511	-4.72	4.48
98.6 (37)	32.9844	34.6030	36.2109	-4.68	4.44
100.4 (38)	31.6710	33.2113	34.7412	-4.64	4.40

Table 21: Outdoor compressor discharge temperature sensor

Temperature [°F (°C)]	Rmin [KΩ]	Rnom [KΩ]	Rmax [KΩ]	Dev(MIN)%	Dev(MAX)%
102.2 (39)	30.4164	31.8823	33.3383	-4.60	4.37
104.0 (40)	29.2176	30.6130	31.9988	-4.56	4.33
105.8 (41)	28.0718	29.4004	30.7197	-4.52	4.29
107.6 (42)	26.9765	28.2417	29.4979	-4.48	4.26
109.4 (43)	25.9293	27.1342	28.3306	-4.44	4.22
111.2 (44)	24.9277	26.0755	27.2150	-4.40	4.19
113.0 (45)	23.9697	25.0632	26.1488	-4.36	4.15
114.8 (46)	23.0530	24.0950	25.1293	-4.32	4.12
116.6 (47)	22.1757	23.1688	24.1545	-4.29	4.08
118.4 (48)	21.3360	22.2826	23.2221	-4.25	4.05
120.2 (49)	20.5321	21.4345	22.3301	-4.21	4.01
122.0 (50)	19.7623	20.6226	21.4766	-4.17	3.98
123.8 (51)	19.0261	19.8468	20.6612	-4.14	3.94
125.6 (52)	18.3211	19.1040	19.8808	-4.10	3.91
127.4 (53)	17.6458	18.3926	19.1338	-4.06	3.87
129.2 (54)	16.9986	17.7113	18.4185	-4.02	3.84
131.0 (55)	16.3784	17.0537	17.7335	-3.96	3.83
132.8 (56)	15.7839	16.4332	17.0774	-3.95	3.77
134.6 (57)	15.2139	15.8338	16.4488	-3.92	3.74
136.4 (58)	14.6673	15.2592	15.8464	-3.88	3.71
138.2 (59)	14.1430	14.7083	15.2690	-3.84	3.67
140.0 (60)	13.6400	14.1799	14.7154	-3.81	3.64
141.8 (61)	13.1573	13.6730	14.1846	-3.77	3.61
143.6 (62)	12.6941	13.1868	13.6756	-3.74	3.57
145.4 (63)	12.2494	12.7202	13.1872	-3.70	3.54
147.2 (64)	11.8224	12.2723	12.7186	-3.67	3.51
149.0 (65)	11.4124	11.8424	12.2690	-3.63	3.48
150.8 (66)	11.0185	11.4295	11.8373	-3.60	3.45
152.6 (67)	10.6401	11.0331	11.4230	-3.56	3.41
154.4 (68)	10.2765	10.6522	11.0251	-3.53	3.38
156.2 (69)	9.9271	10.2863	10.6429	-3.49	3.35
158.0 (70)	9.5912	9.9348	10.2756	-3.46	3.32
159.8 (71)	9.2682	9.5968	9.9231	-3.42	3.29
161.6 (72)	8.9576	9.2720	9.5841	-3.39	3.26
163.4 (73)	8.6589	8.9597	9.2583	-3.36	3.23
32.9844	8.3716	8.6594	8.9451	-3.32	3.19
167.0 (75)	8.0951	8.3705	8.6440	-3.29	3.16
168.8 (76)	7.8290	8.0926	8.3544	-3.26	3.13
170.6 (77)	7.5730	7.8252	8.0758	-3.22	3.10
172.4 (78)	7.3264	7.5679	7.8078	-3.19	3.07
174.2 (79)	7.0891	7.3202	7.5499	-3.16	3.04
176.0 (80)	6.8605	7.0818	7.3018	-3.12	3.01

Table 21: Outdoor compressor discharge temperature sensor

Temperature [°F (°C)]	Rmin [KΩ]	Rnom [KΩ]	Rmax [KΩ]	Dev(MIN)%	Dev(MAX)%
177.8 (81)	6.6403	6.8522	7.0629	-3.09	2.98
179.6 (82)	6.4282	6.6311	6.8329	-3.06	2.95
181.4 (83)	6.2239	6.4182	6.6115	-3.03	2.92
183.2 (84)	6.0269	6.2131	6.3982	-3.00	2.89
185.0 (85)	5.8371	6.0154	6.1928	-2.96	2.86
186.8 (86)	5.6542	5.8249	5.9949	-2.93	2.84
188.6 (87)	5.4777	5.6413	5.8042	-2.90	2.81
190.4 (88)	5.3076	5.4644	5.6205	-2.87	2.78
192.2 (89)	5.1435	5.2937	5.4433	-2.84	2.75
194.0 (90)	4.9853	5.1292	5.2726	-2.81	2.72
195.8 (91)	4.8326	4.9705	5.1079	-2.77	2.69
197.6 (92)	4.6852	4.8174	4.9492	-2.74	2.66
199.4 (93)	4.5430	4.6697	4.7960	-2.71	2.63
201.2 (94)	4.4058	4.5272	4.6483	-2.68	2.61
203.0 (95)	4.2733	4.3896	4.5058	-2.65	2.58
204.8 (96)	4.1453	4.2568	4.3683	-2.62	2.55
206.6 (97)	4.0218	4.1287	4.2355	-2.59	2.52
208.4 (98)	3.9024	4.0049	4.1074	-2.56	2.50
210.2 (99)	3.7872	3.8854	3.9837	-2.53	2.47
212.0 (100)	3.6758	3.7700	3.8643	-2.50	2.44
213.8 (101)	3.5661	3.6585	3.7512	-2.53	2.47
215.6 (102)	3.4601	3.5509	3.6419	-2.56	2.50
217.4 (103)	3.3577	3.4468	3.5362	-2.59	2.53
219.2 (104)	3.2588	3.3463	3.4341	-2.61	2.56
221.0 (105)	3.1632	3.2491	3.3353	-2.64	2.58
222.8 (106)	3.0708	3.1551	3.2398	-2.67	2.61
224.6 (107)	2.9816	3.0643	3.1475	-2.70	2.64
226.4 (108)	2.8953	2.9765	3.0582	-2.73	2.67
228.2 (109)	2.8118	2.8915	2.9717	-2.76	2.70
230.0 (110)	2.7311	2.8093	2.8881	-2.78	2.73
231.8 (111)	2.6531	2.7299	2.8072	-2.81	2.75
233.6 (112)	2.5776	2.6530	2.7289	-2.84	2.78
235.4 (113)	2.5046	2.5785	2.6531	-2.87	2.81
237.2 (114)	2.4340	2.5065	2.5798	-2.89	2.84
239.0 (115)	2.3656	2.4368	2.5087	-2.92	2.87
240.8 (116)	2.2995	2.3693	2.4400	-2.95	2.90
242.6 (117)	2.2354	2.3040	2.3733	-2.98	2.92
244.4 (118)	2.1734	2.2407	2.3088	-3.00	2.95
246.2 (119)	2.1134	2.1795	2.2463	-3.03	2.97
248.0 (120)	2.0553	2.1201	2.1858	-3.06	3.01
249.8 (121)	1.9991	2.0626	2.1271	-3.08	3.03
251.6 (122)	1.9446	2.0070	2.0702	-3.11	3.05

Table 21: Outdoor compressor discharge temperature sensor

Temperature [°F (°C)]	Rmin [KΩ]	Rnom [KΩ]	Rmax [KΩ]	Dev(MIN)%	Dev(MAX)%
253.4 (123)	1.8918	1.9530	2.0151	-3.13	3.08
255.2 (124)	1.8406	1.9007	1.9617	-3.16	3.11
257.0 (125)	1.7911	1.8500	1.9099	-3.18	3.14
258.8 (126)	1.7430	1.8009	1.8597	-3.22	3.16
260.6 (127)	1.6965	1.7533	1.8110	-3.24	3.19
262.4 (128)	1.6514	1.7071	1.7638	-3.26	3.21
264.2 (129)	1.6076	1.6623	1.7180	-3.29	3.24
266.0 (130)	1.5652	1.6189	1.6736	-3.32	3.27

These are the parameters for the suction, ambient, coil, and discharge sensors: (R0=15K±2%, B0/100=3450K±2%)

Table 22: Suction, ambient, coil, and discharge sensors

Temperature [°F (°C)]	Rmin [KΩ]	Rnom [KΩ]	Rmax [KΩ]	Dev(MIN)%	Dev(MAX)%
-22.0 (-30)	60.78	64.77	68.99	-6.16	6.12
-20.2 (-29)	57.75	61.36	65.16	-5.88	5.83
-18.4 (-28)	54.89	58.15	61.58	-5.61	5.57
-16.6 (-27)	52.19	55.14	58.23	-5.35	5.31
-14.8 (-26)	49.63	52.30	55.08	-5.11	5.05
-13.0 (-25)	47.21	49.62	52.13	-4.86	4.81
-11.2 (-24)	44.92	47.10	49.37	-4.63	4.60
-9.4 (-23)	42.76	44.73	46.78	-4.40	4.38
-7.6 (-22)	40.71	42.49	44.34	-4.19	4.17
-5.8 (-21)	38.77	40.38	42.05	-3.99	3.97
-4.0 (-20)	36.93	38.39	39.90	-3.80	3.78
-2.2 (-19)	35.18	36.51	37.87	-3.64	3.59
-0.4 (-18)	33.53	34.74	35.97	-3.48	3.42
1.4 (-17)	31.96	33.06	34.17	-3.33	3.25
3.2 (-16)	30.48	31.47	32.49	-3.15	3.14
5.0 (-15)	29.07	29.97	30.89	-3.00	2.98
6.8 (-14)	27.73	28.56	29.39	-2.91	2.82
8.6 (-13)	26.46	27.22	27.98	-2.79	2.72
10.4 (-12)	25.26	25.95	26.64	-2.66	2.59
12.2 (-11)	24.11	24.75	25.38	-2.59	2.48
14.0 (-10)	23.03	23.61	24.19	-2.46	2.40
15.8 (-9)	21.99	22.53	23.06	-2.40	2.30
17.6 (-8)	21.01	21.51	22.00	-2.32	2.23
19.4 (-7)	20.08	20.54	20.99	-2.24	2.14
21.2 (-6)	19.19	19.62	20.04	-2.19	2.10
23.0 (-5)	18.35	18.74	19.14	-2.08	2.09
24.8 (-4)	17.55	17.92	18.29	-2.06	2.02
26.6 (-3)	16.78	17.13	17.48	-2.04	2.00
28.4 (-2)	16.06	16.38	16.71	-1.95	1.97
30.2 (-1)	15.36	15.67	15.98	-1.98	1.94

Table 22: Suction, ambient, coil, and discharge sensors

Temperature [°F (°C)]	Rmin [KΩ]	Rnom [KΩ]	Rmax [KΩ]	Dev(MIN)%	Dev(MAX)%
32.0 (0)	14.70	15.00	15.29	-2.00	1.90
33.8 (1)	14.08	14.36	14.64	-1.95	1.91
35.6 (2)	13.48	13.75	14.02	-1.96	1.93
37.4 (3)	12.91	13.17	13.43	-1.97	1.94
39.2 (4)	12.36	12.62	12.87	-2.06	1.94
41.0 (5)	11.85	12.09	12.34	-1.99	2.03
42.8 (6)	11.35	11.59	11.83	-2.07	2.03
44.6 (7)	10.88	11.11	11.35	-2.07	2.11
46.4 (8)	10.43	10.66	10.89	-2.16	2.11
48.2 (9)	9.999	10.230	10.450	-2.26	2.11
50.0 (10)	9.590	9.816	10.040	-2.30	2.23
51.8 (11)	9.199	9.422	9.647	-2.37	2.33
53.6 (12)	8.826	9.047	9.269	-2.44	2.40
55.4 (13)	8.470	8.689	8.910	-2.52	2.48
57.2 (14)	8.129	8.347	8.567	-2.61	2.57
59.0 (15)	7.804	8.021	8.240	-2.71	2.66
60.8 (16)	7.493	7.709	7.928	-2.80	2.76
62.6 (17)	7.196	7.412	7.630	-2.91	2.86
64.4 (18)	6.912	7.127	7.346	-3.02	2.98
66.2 (19)	6.640	6.855	7.074	-3.14	3.10
68.0 (20)	6.381	6.595	6.815	-3.24	3.23
69.8 (21)	6.132	6.347	6.567	-3.39	3.35
71.6 (22)	5.894	6.109	6.330	-3.52	3.49
73.4 (23)	5.667	5.882	6.103	-3.66	3.62
75.2 (24)	5.449	5.664	5.886	-3.80	3.77
77.0 (25)	5.240	5.456	5.678	-3.96	3.91
78.8 (26)	5.048	5.260	5.478	-4.03	3.98
80.6 (27)	4.864	5.072	5.286	-4.10	4.05
82.4 (28)	4.687	4.891	5.101	-4.17	4.12
84.2 (29)	4.517	4.717	4.924	-4.24	4.20
86.0 (30)	4.355	4.550	4.753	-4.29	4.27
87.8 (31)	4.198	4.390	4.589	-4.37	4.34
89.6 (32)	4.048	4.236	4.431	-4.44	4.40
91.4 (33)	3.904	4.089	4.280	-4.52	4.46
93.2 (34)	3.766	3.946	4.134	-4.56	4.55
95.0 (35)	3.663	3.810	3.994	-3.86	4.61
96.8 (36)	3.506	3.679	3.859	-4.70	4.66
98.6 (37)	3.383	3.552	3.729	-4.76	4.75
100.4 (38)	3.265	3.431	3.604	-4.84	4.80
102.2 (39)	3.152	3.314	3.484	-4.89	4.88
104.0 (40)	3.043	3.202	3.368	-4.97	4.93
105.8 (41)	2.938	3.094	3.257	-5.04	5.00

Table 22: Suction, ambient, coil, and discharge sensors

Temperature [°F (°C)]	Rmin [KΩ]	Rnom [KΩ]	Rmax [KΩ]	Dev(MIN)%	Dev(MAX)%
107.6 (42)	2.838	2.990	3.149	-5.08	5.05
109.4 (43)	2.741	2.890	3.046	-5.16	5.12
111.2 (44)	2.648	2.793	2.946	-5.19	5.19
113.0 (45)	2.558	2.701	2.850	-5.29	5.23
114.8 (46)	2.472	2.611	2.758	-5.32	5.33
116.6 (47)	2.389	2.525	2.669	-5.39	5.40
118.4 (48)	2.309	2.443	2.583	-5.49	5.42
120.2 (49)	2.232	2.363	2.500	-5.54	5.48
122.0 (50)	2.158	2.286	2.421	-5.60	5.58
123.8 (51)	2.087	2.212	2.344	-5.65	5.63
125.6 (52)	2.018	2.140	2.269	-5.70	5.69
127.4 (53)	1.952	2.072	2.198	-5.79	5.73
129.2 (54)	1.888	2.005	2.129	-5.84	5.82
131.0 (55)	1.827	1.941	2.062	-5.87	5.87
132.8 (56)	1.767	1.880	1.998	-6.01	5.91
134.6 (57)	1.710	1.820	1.936	-6.04	5.99
136.4 (58)	1.655	1.763	1.876	-6.13	6.02
138.2 (59)	1.602	1.707	1.818	-6.15	6.11
140.0 (60)	1.551	1.654	1.762	-6.23	6.13
141.8 (61)	1.502	1.602	1.709	-6.24	6.26
143.6 (62)	1.452	1.553	1.657	-6.50	6.28
145.4 (63)	1.409	1.505	1.606	-6.38	6.29
147.2 (64)	1.364	1.458	1.558	-6.45	6.42
149.0 (65)	1.322	1.413	1.511	-6.44	6.49
150.8 (66)	1.280	1.370	1.466	-6.57	6.55
152.6 (67)	1.241	1.328	1.422	-6.55	6.61
154.4 (68)	1.202	1.288	1.379	-6.68	6.60
156.2 (69)	1.165	1.249	1.339	-6.73	6.72
158.0 (70)	1.129	1.211	1.299	-6.77	6.77
159.8 (71)	1.095	1.175	1.261	-6.81	6.82
161.6 (72)	1.061	1.140	1.224	-6.93	6.86
163.4 (73)	1.029	1.106	1.188	-6.96	6.90
32.9844	0.9977	1.073	1.153	-7.02	6.94
167.0 (75)	0.9676	1.041	1.120	-7.05	7.05
168.8 (76)	0.9385	1.011	1.088	-7.17	7.08
170.6 (77)	0.9104	0.9810	1.056	-7.20	7.10
172.4 (78)	0.8833	0.9523	1.026	-7.25	7.18
174.2 (79)	0.8570	0.9246	0.9971	-7.31	7.27
176.0 (80)	0.8316	0.8977	0.9687	-7.36	7.33
177.8 (81)	0.8071	0.8717	0.9412	-7.41	7.38
179.6 (82)	0.7834	0.8466	0.9146	-7.47	7.43
181.4 (83)	0.7604	0.8223	0.8888	-7.53	7.48

Table 22: Suction, ambient, coil, and discharge sensors

Temperature [°F (°C)]	Rmin [KΩ]	Rnom [KΩ]	Rmax [KΩ]	Dev(MIN)%	Dev(MAX)%
183.2 (84)	0.7382	0.7987	0.8639	-7.57	7.55
185.0 (85)	0.7167	0.7759	0.8397	-7.63	7.60
186.8 (86)	0.6958	0.7537	0.8161	-7.68	7.65
188.6 (87)	0.6755	0.7322	0.7933	-7.74	7.70
190.4 (88)	0.6560	0.7114	0.7712	-7.79	7.75
192.2 (89)	0.6371	0.6913	0.7498	-7.84	7.80
194.0 (90)	0.6188	0.6718	0.7291	-7.89	7.86
195.8 (91)	0.6011	0.6530	0.7051	-7.95	7.39
197.6 (92)	0.5840	0.6348	0.6897	-8.00	7.96
199.4 (93)	0.5674	0.6171	0.6709	-8.05	8.02
201.2 (94)	0.5514	0.6000	0.6527	-8.10	8.07
203.0 (95)	0.5359	0.5835	0.6350	-8.16	8.11
204.8 (96)	0.5209	0.5675	0.6179	-8.21	8.16
206.6 (97)	0.5064	0.5519	0.6014	-8.24	8.23
208.4 (98)	0.4923	0.5369	0.5853	-8.31	8.27
210.2 (99)	0.4787	0.5224	0.5698	-8.37	8.32
212.0 (100)	0.4655	0.5083	0.5547	-8.42	8.36
213.8 (101)	0.4528	0.4946	0.5401	-8.45	8.42
215.6 (102)	0.4404	0.4814	0.5259	-8.52	8.46
217.4 (103)	0.4284	0.4685	0.5121	-8.56	8.51
219.2 (104)	0.4168	0.4561	0.4988	-8.62	8.56
221.0 (105)	0.4056	0.4440	0.4859	-8.65	8.62
222.8 (106)	0.3947	0.4323	0.4733	-8.70	8.66
224.6 (107)	0.3841	0.4210	0.4611	-8.76	8.70
226.4 (108)	0.3739	0.4100	0.4493	-8.80	8.75
228.2 (109)	0.3640	0.3993	0.4379	-8.84	8.81
230.0 (110)	0.3544	0.3890	0.4267	-8.89	8.84
231.8 (111)	0.3450	0.3789	0.4159	-8.95	8.90
233.6 (112)	0.3360	0.3692	0.4055	-8.99	8.95
235.4 (113)	0.3272	0.3597	0.3953	-9.04	9.01
237.2 (114)	0.3187	0.3505	0.3854	-9.07	9.06
239.0 (115)	0.3104	0.3416	0.3758	-9.13	9.10
240.8 (116)	0.3024	0.3330	0.3665	-9.19	9.14
242.6 (117)	0.2947	0.3246	0.3574	-9.21	9.18
244.4 (118)	0.2871	0.3164	0.3468	-9.26	8.77
246.2 (119)	0.2798	0.3085	0.3401	-9.30	9.29
248.0 (120)	0.2727	0.3008	0.33	-9.34	9.34

Troubleshooting

Variable capacity systems can be difficult to troubleshoot considering integrated fault isolation and protection algorithms. When the HP system is not operating within acceptable parameters or there is a need to verify system or component operation, it may be necessary to perform specific system checks. Follow the troubleshooting steps, component checks, and fault code/resolution tables in this section to isolate potential root causes.

Checking components

Check the refrigerant system.

Test system flow

Conditions:

- The compressor is running.
- The outdoor section is installed in a well-ventilated area.

Tool

Pressure gauge:

- See: Tube defrost
- Feel: The difference between the tube's temperature
- Test: Test pressure

Figure 31: Refrigerant system

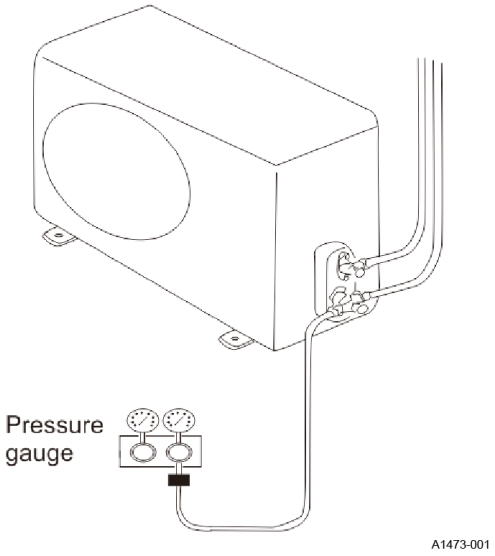


Figure 32: Cooling mode flow chart

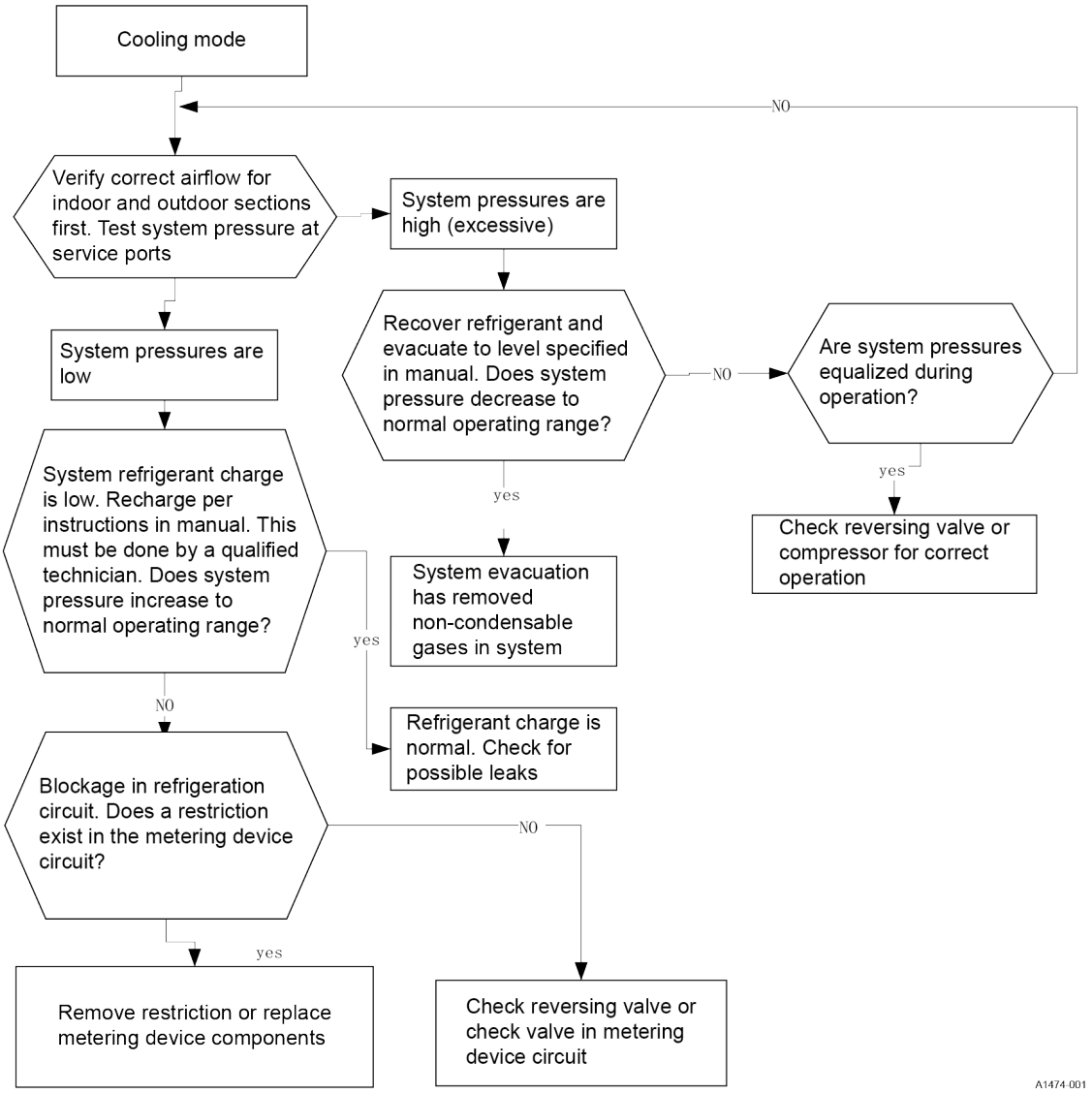
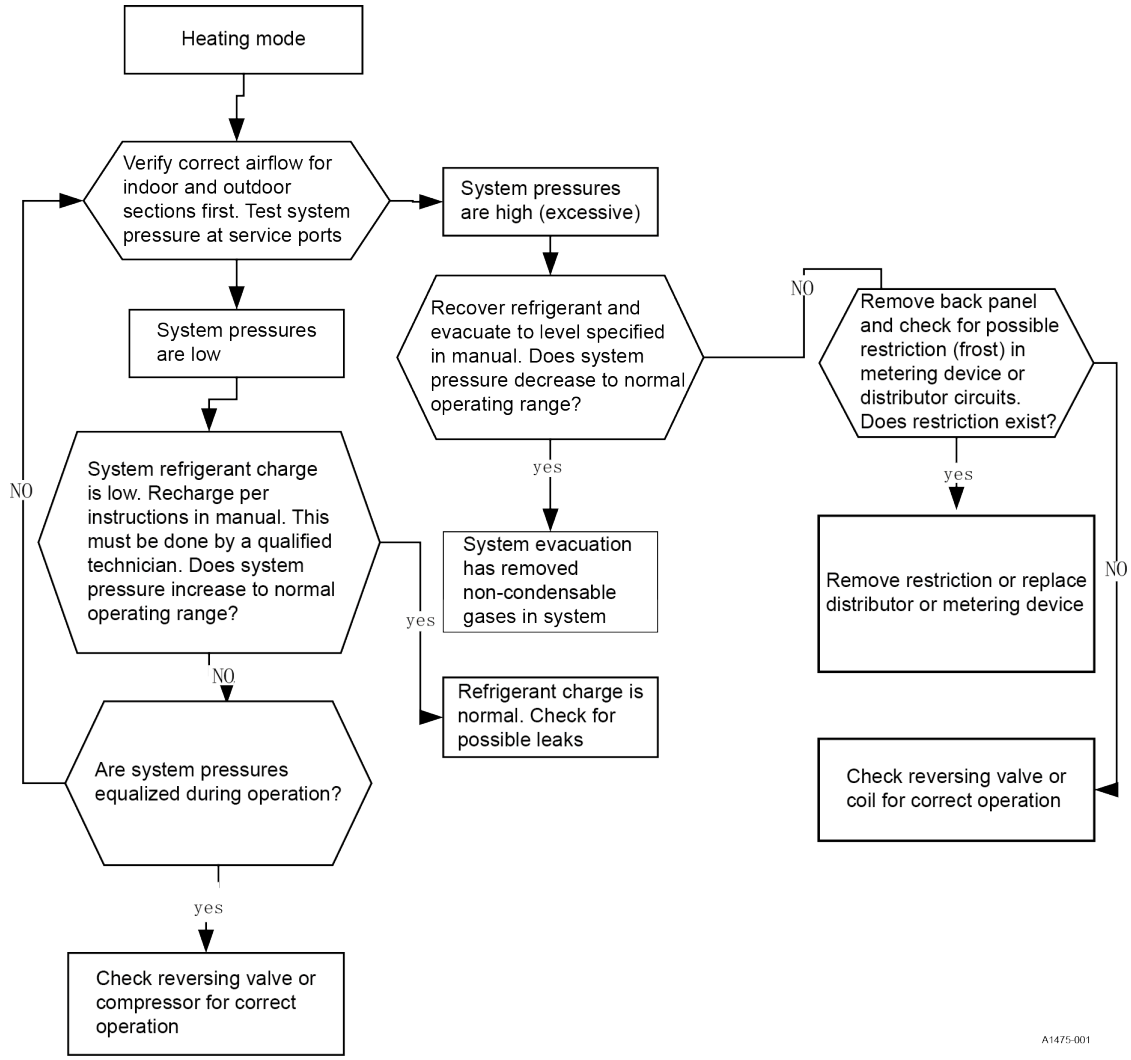


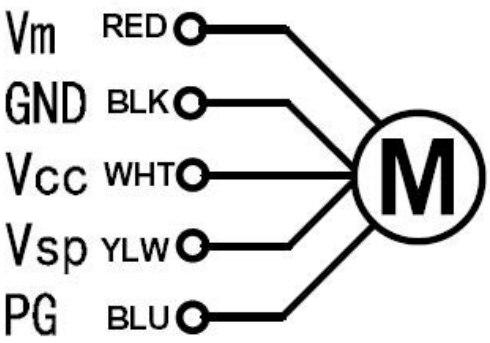
Figure 33: Heating mode flow chart



Checking unit parts

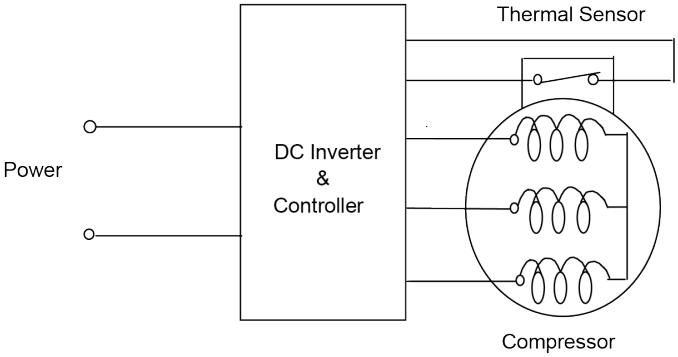
Outdoor unit fan motor

Figure 34: BLDC motor - outdoor unit fan



Compressor

Figure 35: BLDC motor - compressor



Testing resistance using a multi-meter:

Check the resistance of the winding. The compressor motor winding must not be 0 Ω (shorted).

Typical failures:

- Compressor motor lock

- Discharge pressure approaches static pressure value
- Compressor motor winding issue

Note:

- Do not put the compressor on its side or turn it over.
- Do not leave the compressor open to air for more than 10 min.
- Do not allow the compressor to operate in reverse rotation (caused by miswiring).

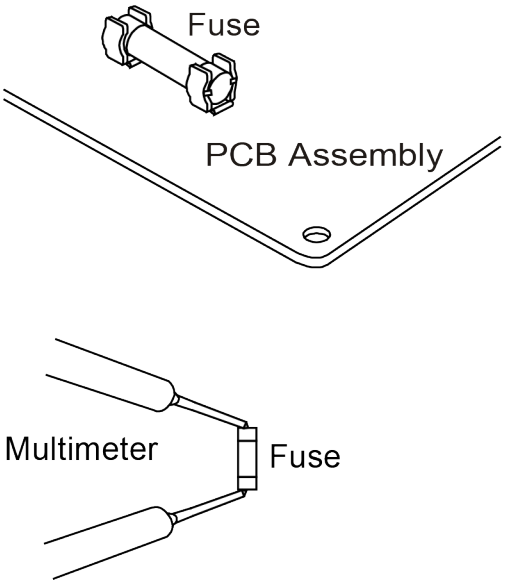
WARNING

Do not apply AC voltage to the compressor. It is for use solely with a matched inverter.

Fuse

Remove the PCB assembly from the electrical component box and then, pull out the fuse from the PCB assembly. Check for continuity of the fuse with a multimeter as shown in .

Figure 36: Fuse continuity check



Fault codes

Table 23: Outdoor unit fault 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 24. 5. See Table 25.	

Table 23: Outdoor unit fault codes

Fault code	Fault description	Possible reasons for fault	Resolution	Comments
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.	
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.	
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 24. 5. See Table 25.	Applies to models with high-pressure switch or pressure sensor.

Table 23: Outdoor unit fault codes

Fault code	Fault description	Possible reasons for fault	Resolution	Comments
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 24.	
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.	
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.	
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 26 and Table 27 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.	

Table 23: Outdoor unit fault codes

Fault code	Fault description	Possible reasons for fault	Resolution	Comments
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.	
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.	

Note:

- If the indoor unit fails to start or the indoor unit stops after 30 s and the unit does not display the fault code, check the voltage and connection to the control board.
- Verify indoor unit control operation and setup.

Table 24: 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.

Table 24: Overload in cooling mode

No.	Cause	Resolution
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.

Table 25: 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.

Table 26: Drive fault code - 24k and 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.
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		

Table 26: Drive fault code - 24k and 36k

Fault code	Fault description	Possible reasons for fault	Resolution
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.
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.
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.

Table 27: Drive fault code - 48k and 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.
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.
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.

Table 27: Drive fault code - 48k and 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.
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.

Troubleshooting guide

Table 28: Troubleshooting for normal malfunction

Malfunction	Possible reasons for malfunction	Suggested action
Outdoor section does not start	1. Power supply failure. 2. Trip of breaker or open fuse. 3. Supplied voltage is too low. 4. Incorrect setting of the thermostat. 5. No power to the thermostat.	1. Check the power supply circuit. 2. Measure the insulation resistance to ground to see if there is any leakage. 3. Check if there is a defective contact or leakage current in the power supply circuit. 4. Check and set the thermostat. 5. Check the thermostat and thermostat wiring.
Compressor starts or stops frequently	The air inlet and/or outlet has been blocked or restricted.	Remove the blockage.
Poor cooling/heating	1. The outdoor heat exchanger is dirty. 2. Air leakage into the conditioned space or excessive load due to persons entering and exiting frequently. 3. Blockage of outdoor heat exchanger. 4. Incorrect temperature setting.	1. Clean the heat exchanger of the outdoor unit. 2. Keep certain air tightness indoors. 3. Remove the blockage. 4. Check and try to set the temperature again.
Sound from deforming parts	During system starting or stopping, a sound might be heard. This is due to thermal deformation of plastic parts.	Note that this is normal and the sound disappears quickly.
Water leakage	1. The drainage pipe is blocked or broken. 2. The insulation of the refrigerant piping is inadequate.	1. Change the drainage pipe. 2. Correct the refrigeration piping insulation.

LED-displayed fault codes - HMH72B24 and HMH72B36

Fault codes are displayed by LED lamps on the outdoor main control board (**DC - inverter unitary**). Remove the system top cover to expose the indicator LED lamps.

There are three LED lamps on the main control board:

- LED1 indicates the fault code represented by a two-digit number.
- LED2 indicates the fault code represented by a single-digit number.
- LED3 indicates an outdoor drive control fault.

When LED3 is off, LED1 and LED 2 indicate the main control fault code.

When LED3 is on, LED1 and LED 2 indicate the drive control fault code.

When LED3 is flashing, and LED1 and LED 2 are both off, it indicates the compressor is preheating.

Failures display with 5-s intervals. This means the LED is off for 5 s to report the next fault code.

The system protection code display method is the same as the main control fault code.

LED lamps are off when there is no failure, protection, or preheating.

Figure 37: LED lamps

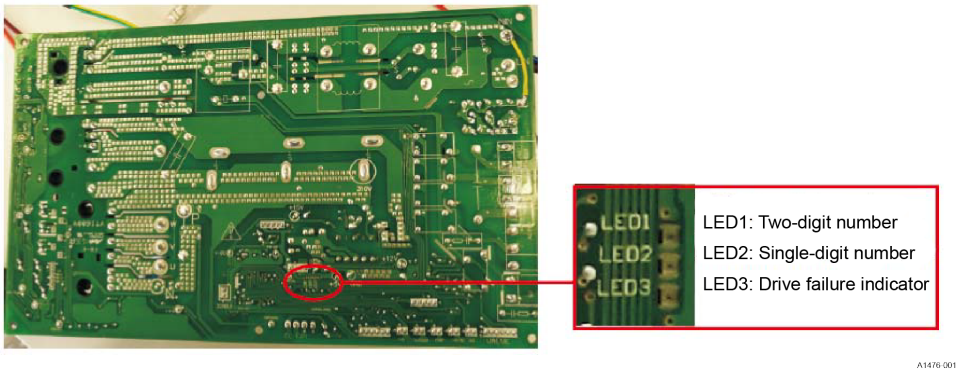


Figure 38: Example - outdoor main control fault 32

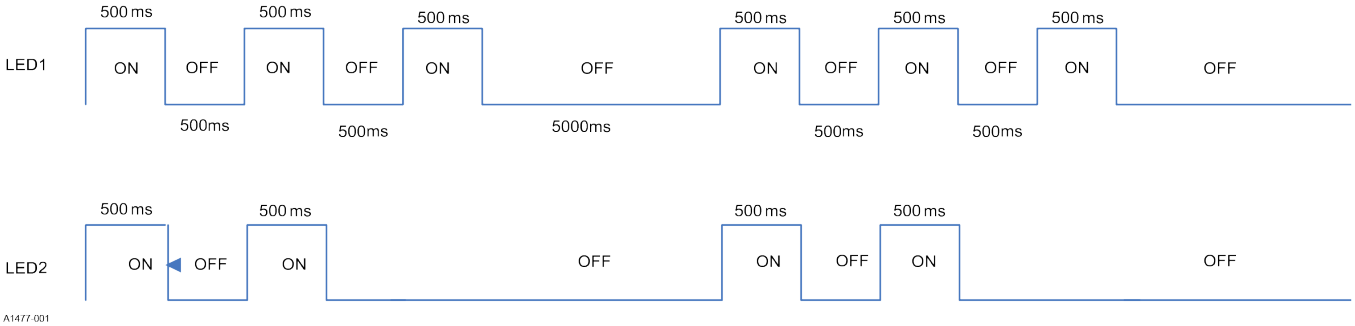


Figure 39: Example - outdoor drive fault 32

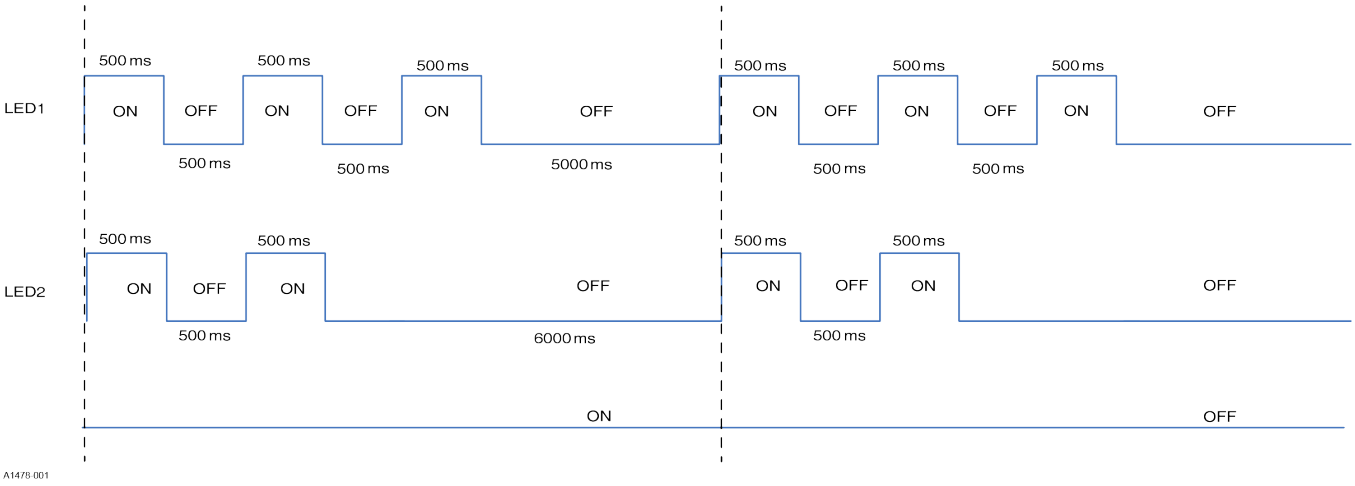
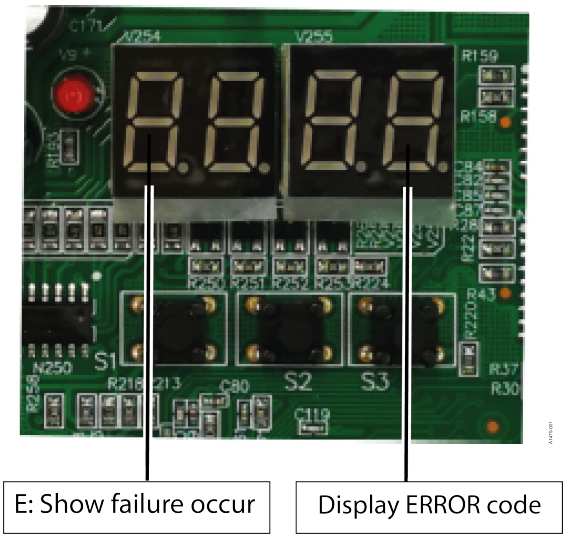
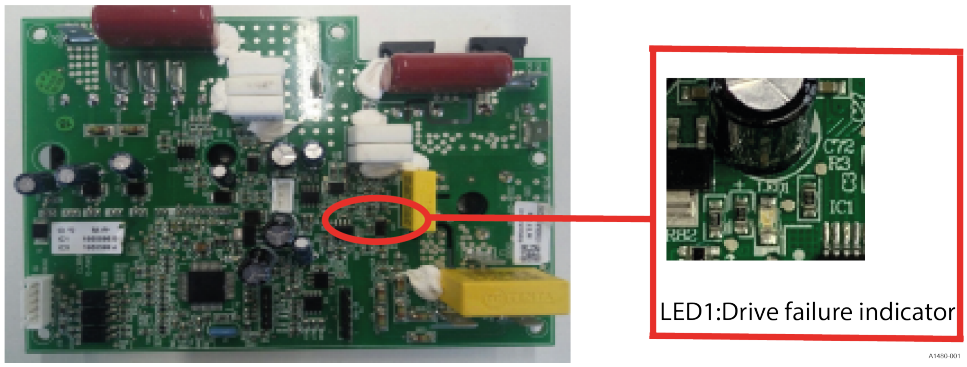


Figure 40: Main control fault display - HMH72B48 and HMH72B60



Note: The fault code is displayed by the 7-segment display on the main control board.

Figure 41: Drive fault code display



Note:

- The lamp of the drive board flashing shows that a failure has occurred.
- The number of times the drive failure lamp flashes shows the failure code.

Control logic description

Control of the indoor and outdoor units:

Control of the indoor and outdoor sections is achieved through 24 V AC signals connected as shown in figure below. The thermostat controls the operation of the outdoor section through the Y and B lines. If Y is energized, the outdoor unit starts in cooling mode; if both Y and B are energized, the outdoor unit starts in heating mode. When the outdoor unit determines defrost is necessary in heating mode, W is energized, and when defrost mode exits, W is de-energized.

Cooling mode

Starting conditions:

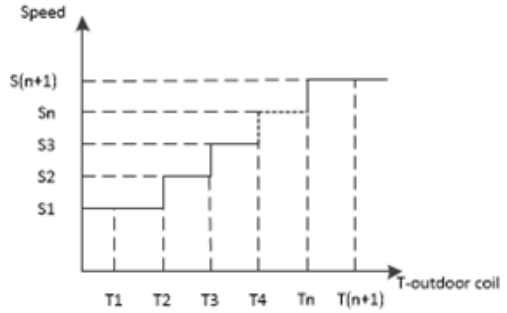
When Y signal is energized and B terminal is de-energized, the unit starts in cooling mode.

When the unit starts in cooling mode, the compressor adjusts operating frequency according to the system pressure verses a target pressure. If the actual pressure is higher than the target pressure, the compressor frequency increases; if the actual pressure is lower than the target pressure, the compressor frequency decreases (when the target pressure is reached, the compressor frequency is stable).

The outdoor fan operates in the following fashion:

- A single outdoor fan first operates in a steady state for a short time and then regulates the speed according to the outdoor-coil temperature.
- For a double outdoor fan, the upper fan regulates the speed according to preset conditions and the lower fan speed adjusts according to the outdoor-coil temperature.

Figure 42: Operating speed - cooling mode



Stopping conditions:

When Y signal is de-energized the control operates as follows:

The compressor continues to operate at the current frequency while monitoring suction pressure.

If the pressure drops more than than 6 psi in 10 s, the compressor stops.

If the pressure changes less than 6 psi in 10 s, the compressor continues to operate and adjusts compressor speed to achieve a suction pressure 29 psi higher than the original pressure. While in this mode, the control algorithms remain in effect for OD fan speed, oil-return, and compressor protections.

The unit continues to operate with the adjusted suction pressure target for up to 30 min. If the Y signal is energized again during this time period (B de-energized), the unit returns to normal operation with normal operating parameters restored.

Heating mode

Starting conditions:

When Y signal is energized with B energized, the unit starts in heating mode.

When the unit starts in heating mode, the compressor adjusts operating frequency according to the system actual verses target pressure. If the actual pressure is higher than the target pressure, the compressor frequency decreases; if the actual pressure is lower than the target pressure, the compressor frequency increases (when the target pressure is reached, the compressor frequency is stable).

Stopping conditions:

When Y and B signals are de-energized, the control operates as follows:

The compressor continues to operate at the current frequency while monitoring liquid pressure.

If the pressure exceeds 522 psi or rises more than 14 psi in 10 s, the compressor stops.

If the pressure changes less than 14 psi in 10 s, the compressor continues to operate and adjusts compressor speed to achieve a liquid pressure 43 psi lower than the original pressure. While in this mode, the control algorithms remain in effect for OD fan speed, EEV, oil-return, and compressor protections.

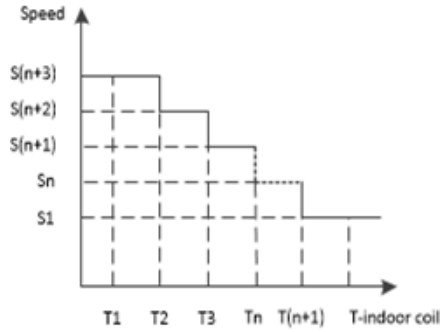
The unit continues to operate with the adjusted liquid pressure target for up to 30 min. If the Y signal is energized again during this time period (with B energized), the unit returns to normal operation with normal operating parameters restored.

Outdoor fan control

The outdoor fan operates in the following fashion:

- A single outdoor fan first operates in a steady state for a short time and then regulates the speed according to the saturated temperature.
- For a double outdoor fan, the upper fan regulates the speed according to preset conditions and the lower fan speed adjusts according to the saturated temperature.

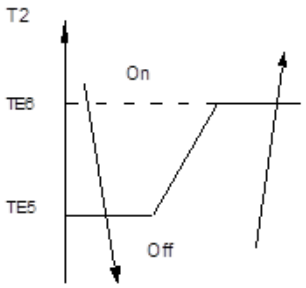
Figure 43: Operating speed - heating mode



Evaporator low-temperature protection

The OD unit enters evaporator low-temperature protection if the following condition occurs:

Figure 44: Entering evaporator low-temperature protection

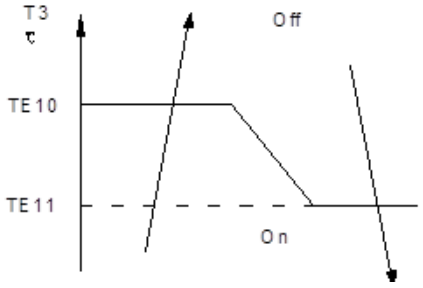


Condition 1: Cooling mode - When the sensed suction pressure (T2) remains lower than the lower threshold (TE5) for 120 s, the outdoor unit stops. When T2 rises to the upper threshold (TE6), the outdoor unit restarts.

Condenser high-temperature protection

The OD unit will enter condenser high-temperature protection if any of the following conditions occurs:

Figure 45: Entering condenser high-temperature protection



Condition 1: Cooling mode - If the outdoor coil temperature (T3) exceeds the upper threshold (T10) for 10 s, the outdoor unit stops. When the outdoor coil temperature falls below the lower threshold (T11) the outdoor unit restarts.

Condition 2: Heating mode - Similar to cooling, when the sensed liquid pressure exceeds the upper threshold for 10 s, the outdoor unit stops. When the pressure falls below the lower threshold, the outdoor unit restarts.

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Supersedes: Nothing