Service Manual

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Fig. 1 —Unit Image (Size 036)

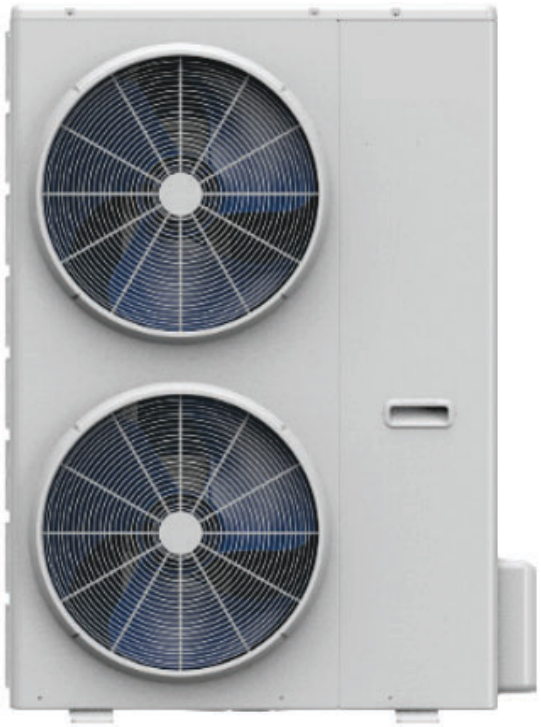


Fig. 2 —Unit Image (Size 048/060)

NOTE: Carrier is committed to continuously improving its products to ensure the highest quality and reliability standards, and to meet local regulations and market requirements. All features and specifications are subject to change without prior notice.

GENERAL INFORMATION

INDOOR AND OUTDOOR UNIT CAPACITIES

Indoor Units

Table 1 — Indoor unit abbreviation codes

Abbreviation Code	Type
45VMC	Compact Four-way Cassette
45VMF	Four-way Cassette
45VML	Low Static Pressure Duct
45VMM	Medium Static Pressure Duct
45VMW	Wall-mounted
45VMV	AHU

Table 2 — Indoor unit capacity range

Capacity			Capacity index	Q4C	Q4	T3	T2	V	G
kW	kBtu/h	HP							
1.5	5	0.5	15	—	—	05	—	—	05
2.2	7	0.8	22	07	—	07	07	—	07
2.8	9	1	28	09	09	09	09	—	09
3.6	12	1.25	36	12	12	12	12	12	12
4.5	15	1.6	45	15	15	15	15	—	15
5.6	18	2	56	—	18	18	18	18	18
7.1	24	2.5	71	—	24	24	24	24	24
8.0	27	3	80	—				—	27
9.0	30	3.2	90	—	30	30	30	30	—
11.2	36	4	112	—	36	36	36	—	—
14.0	48	5	140	—	48	—	48	—	—

OUTDOOR UNITS

Table 3 — Outdoor unit capacity range

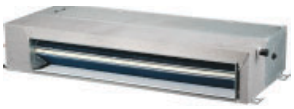
Capacity (kBtu/h)	Model Name
36.0	37VMB036HDS3-1
48.0	37VMB048HDS3-1
60.0	37VMB060HDS3-1

NOTE: Mini Series outdoor units could not be combined.

EXTERNAL APPEARANCE

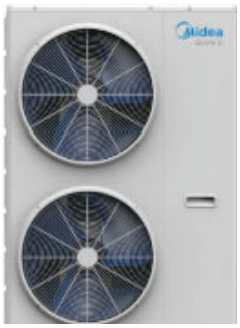
Indoor Units

Table 4 — Indoor unit appearance

Compact Four-way Cassette 45VMC 	Four-way Cassette 45VMF 
Low Static Pressure Duct 45VML 	Medium Static Pressure Duct 45VMM 
AHU 45VMV 	Wall-mounted 45VMW 

Outdoor Units

Table 5 — Outdoor unit appearance

37VMB036HDS3-1	37VMB048HDS3-1 37VMB060HDS3-1
	

NOMENCLATURE

Indoor Units

45 VM F 007 A - - 3

Equipment Type
45 — Indoor Fan Coil Unit

Product Type
VM — Carrier VRF

Model Number Modifier
A — Outside Air
C — Compact 4-Way Cassette
D — Multiport Distribution Controller
F — 4-Way Cassette
H — High Static Duct
I — 1-Way Cassette
L — Low Static Duct
M — Medium Static Duct
R — Floor Console Recessed
U — Underceiling / Floor
V — Vertical AHU
W — High Wall
Z — Reheat Unit

Cooling Capacity (Btuh)

005 — 5,000	007 — 7,000
009 — 9,000	012 — 12,000
015 — 15,000	018 — 18,000
024 — 24,000	030 — 30,000
036 — 36,000	048 — 48,000
054 — 54,000	072 — 72,000
096 — 96,000	

Not Defined
A — Design Revision

Not Defined
- — Blank

Not Defined
- — Blank

Electrical
3 — 208/230-1-60

Outdoor Units

37 VM B 036 H D S 3

Equipment Type
37 — Outdoor Unit

Product Type
VM — Carrier VRF

Model Number Modifier
B---Revision Number

Cooling Capacity (Btuh)
036 — 36,000
048 — 48,000
060 — 60,000

System Type
H Heat Pump

Variation
D —Domestic

Cabinet Type
S —Standard

Electrical
3 — 208/230-1-60

COMBINATION RATIO

$$\text{Combination ratio} = \frac{\text{Sum of capacity indexes of the indoor units}}{\text{Capacity index of the outdoor unit}}$$

Table 6 — Indoor and outdoor unit combination ratio limitations

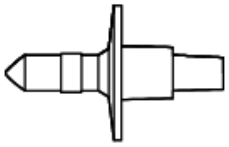
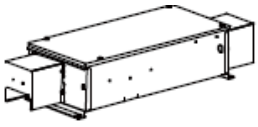
Units (kBtu/h)	Minimum combination ratio	Maximum combination ratio
36/48/60	50%	130%

Table 7 — Combinations of Indoor and outdoor units

Outdoor unit capacity		Sum of capacity indexes of connected VRF indoor units	Maximum number of connected VRF indoor units
Ton	Capacity index		
3.0	36	70 to 224	5
4.0	48	77.5 to 248	7
5.0	60	87.5 to 280	9

ACCESSORIES

Table 8 — Standard Accessories

Name	Shape	Quantity
Outdoor unit operation and installation manual		1
T10 sensor (optional)T10 sensor (optional)		1
Refrigerant shut-off device (optional)		1

SELECTION PROCEDURE

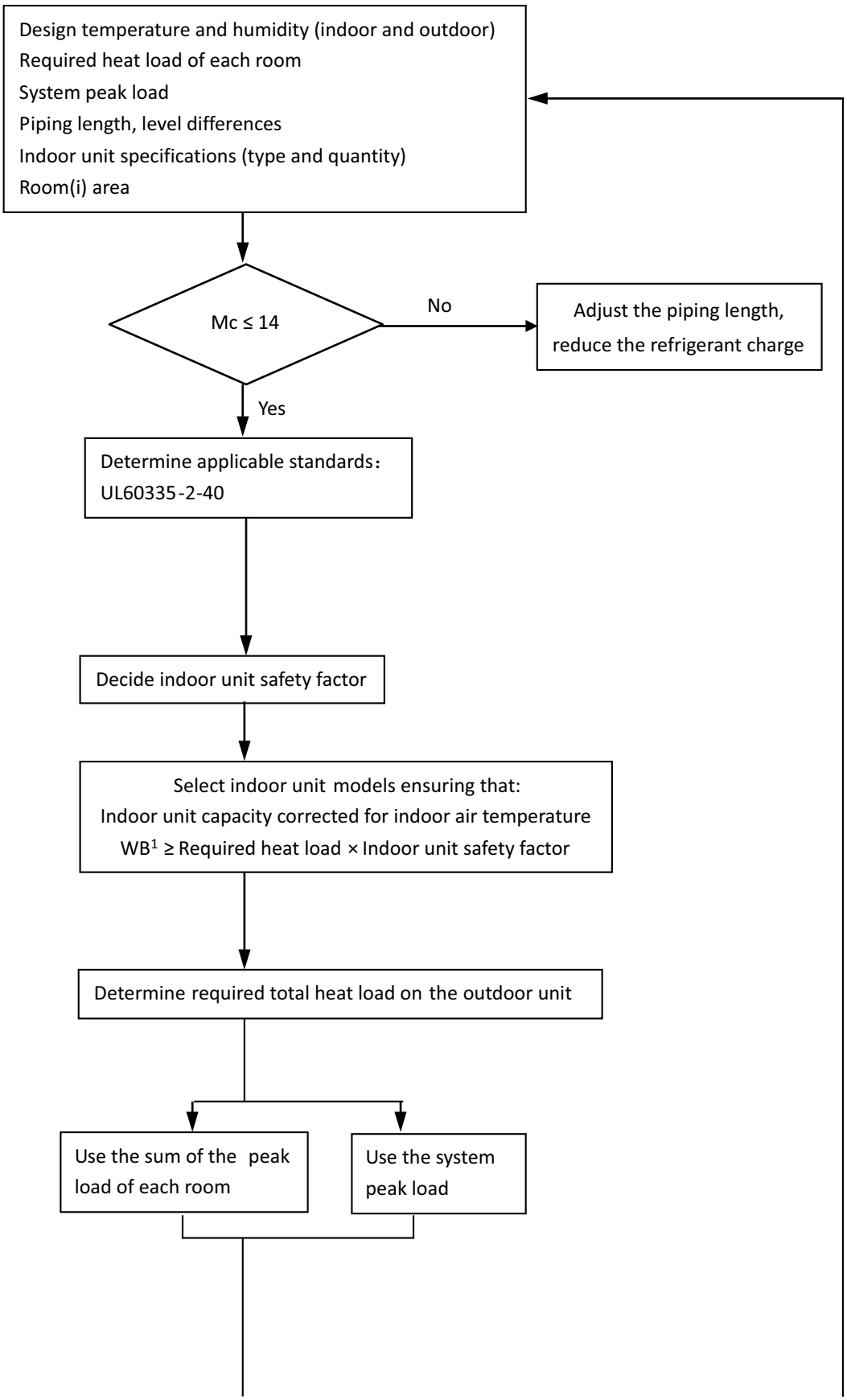
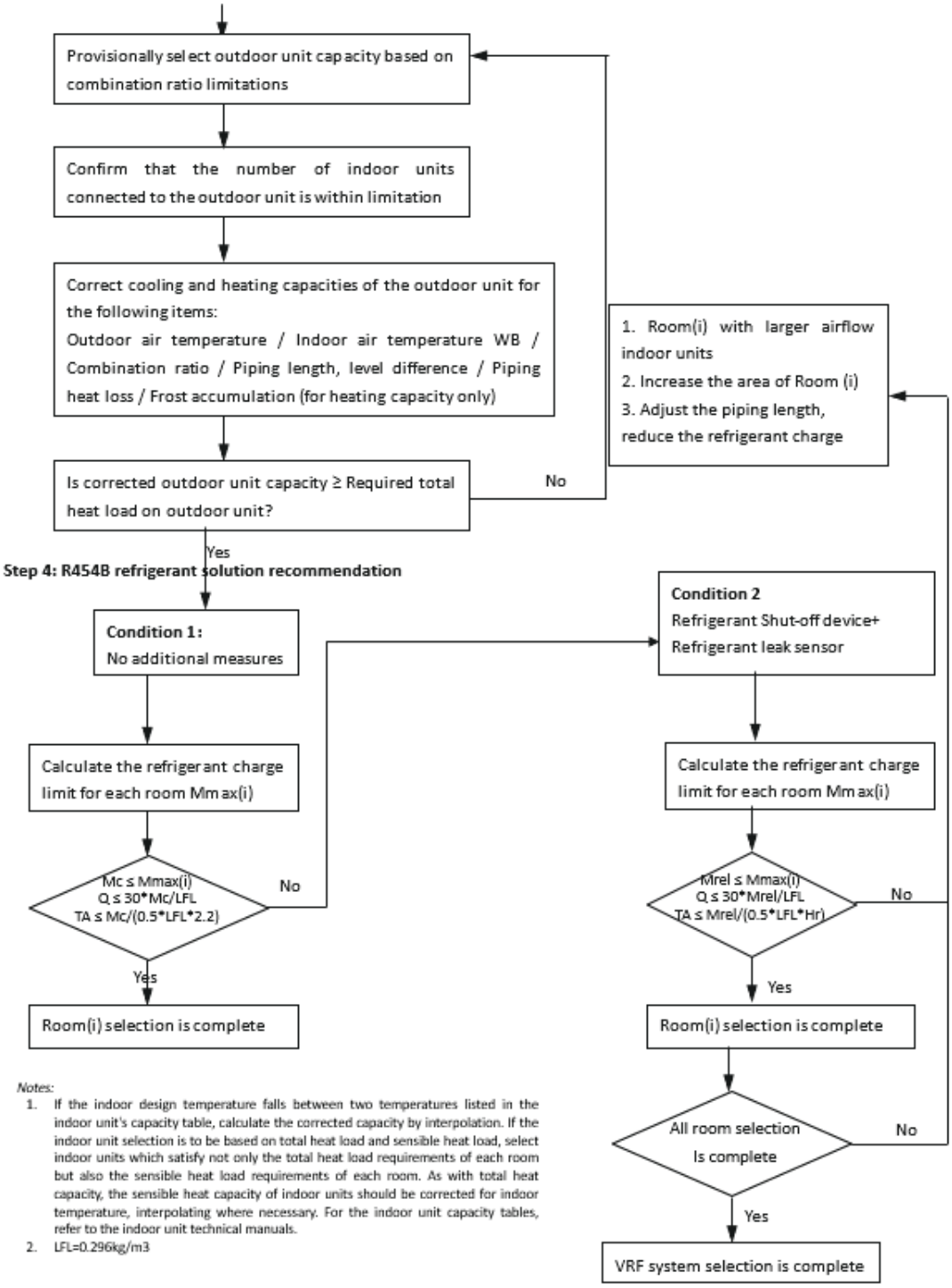


Fig. 3 —Selection Procedure



Notes:

1. If the indoor design temperature falls between two temperatures listed in the indoor unit's capacity table, calculate the corrected capacity by interpolation. If the indoor unit selection is to be based on total heat load and sensible heat load, select indoor units which satisfy not only the total heat load requirements of each room but also the sensible heat load requirements of each room. As with total heat capacity, the sensible heat capacity of indoor units should be corrected for indoor temperature, interpolating where necessary. For the indoor unit capacity tables, refer to the indoor unit technical manuals.
2. LFL=0.296kg/m3

Fig. 4 —Selection Procedure (Cont.)

SPECIFICATIONS

Table 9 — Specifications - All Sizes

Sale Model			3Ton	4Ton	5Ton
			37VMH036HDS3	37VMH048HDS3	37VMH060HDS3
Power supply			208/230V-60Hz		
Cooling Capacity[1]	With Unitary Ducted Indoor[4]	Btu/h	34000	48000	52000
	With VRF Ductless Indoor[5]	Btu/h	36000	48000	60000
EER2[1]	With Unitary Ducted Indoor[4]	Btu/W	11.70	10.3	10
	With VRF Ductless Indoor[5]	Btu/W	13.3	11.7	9.5
SEER2[1]	With Unitary Ducted Indoor[4]	Btu/W	17.2	17.0	16.0
	With VRF Ductless Indoor[5]	Btu/W	20	20	19.5
Heating Capacity[2]	With Unitary Ducted Indoor[4]	Btu/h	36000	48000	54000
	With VRF Ductless Indoor[5]	Btu/h	40000	50000	60000
COP2[2]	With Unitary Ducted Indoor[4]	W/W	3.60	3.56	3.50
	With VRF Ductless Indoor[5]	W/W	4.1	3.9	3.9
HSPF IV[2]	With Unitary Ducted Indoor[4]	Btu/W	9.40	9.40	9.30
	With VRF Ductless Indoor[5]	Btu/W	10.1	10.1	10.1
HSPF V[2]	With Unitary Ducted Indoor[4]	Btu/W	7.70	7.30	7.20
	With VRF Ductless Indoor[5]	Btu/W	7.5	7.0	6.6
Heating Capacity[3]	With Unitary Ducted Indoor[4]	Btu/h	36000	41000	45000
	With VRF Ductless Indoor[5]	Btu/h	34000	40000	42000
COP[3]	With Unitary Ducted Indoor[4]	W/W	1.90	1.95	1.95
	With VRF Ductless Indoor[5]	W/W	2.0	2.0	1.9
Connected indoor unit	Total capacity		50%~130% of ODU capacity		
	Maximum quantity		5	7	9
Compressor	Type		DC inverter		
	Quantity		1		
	Oil type		VG75R		
Fan	Motor type		DC		
	Quantity		1	2	
	Motor output	W	200	100+100	100+100
Refrigerant	Type		R454B		
	Charge Amount	oz.	109.3	144.6	144.6
Pipe connections[3]	Gas pipe	in. (I.D.)	5/8	3/8	3/8
	Liquid pipe	in. (I.D.)	3/8	3/4	3/4
Sound Data		dB(A)	59	60	60
Outdoor Unit	Dimension(W x H x D)	in.	40-11/16×34×20-9/16	38-1/2×52-1/4×15-3/4	
	Packing (W x H x D)	in.	44-1/16 × 38-9/16 × 22-1/16	42-5/8 × 56-1/2 × 17-1/8	
	Net/Gross weight	lbs	207/229	227/249	227/249
Ambient temp. operation range	Cooling (DB)	?	5~125		
	Heating (WB)	?	-22~86		

NOTES:

1. 95°F dry bulb/75°F wet bulb outdoor air temperature and 80°F dry bulb/67°F wet bulb entering indoor coil air;
2. 47°F dry bulb/43°F wet bulb outdoor air temperature and 70°F dry bulb/60°F wet bulb entering indoor coil air;
3. 5°F dry bulb/3°F wet bulb outdoor air temperature and 70°F dry bulb/60°F wet bulb entering indoor coil air;
4. When matched with ducted multi-position air handler unit;
5. When matched with ductless indoor unit;
6. The above data may be changed without notice for future improvement on quality and performance.

DIMENSIONS

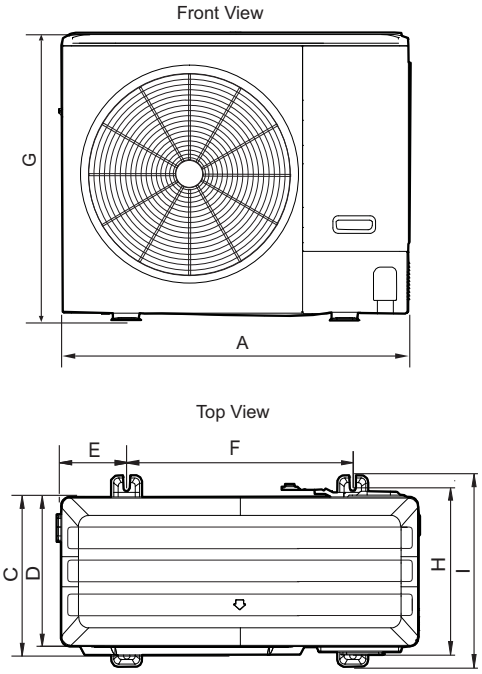


Fig. 5 —3.0 ton unit

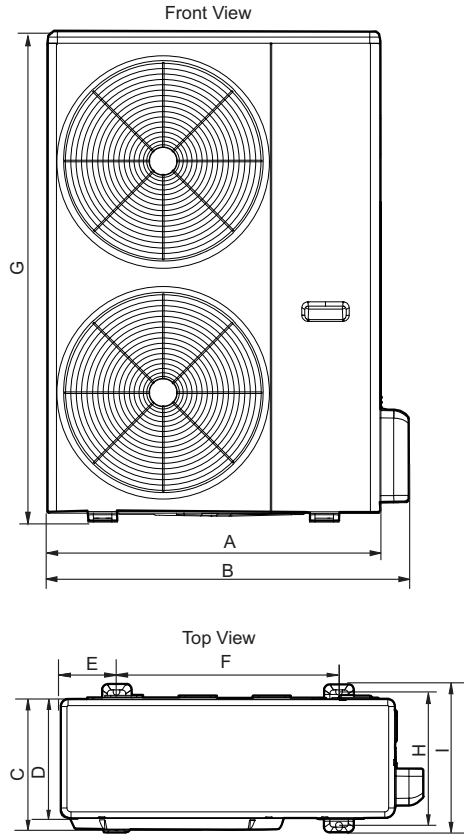


Fig. 6 —4.0 / 5.0 ton unit

Table 10 — Dimensions

Model (Ton)	A	B	C	D	E	F	G	H	I
3.0	40-11/16	/	17-1/16	16-1/8	7-1/2	25-13/16	34	18	20-9/16
4.0/5.0	35-5/8	38-1/2	13-7/8	12-11/16	5-15/16	23-5/8	52-1/4	14-3/16	15-3/4

CLEARANCE SPACE REQUIREMENTS

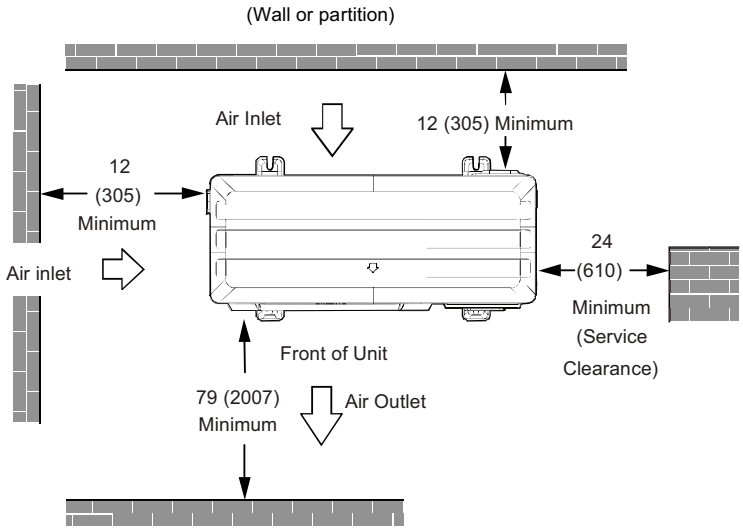


Fig. 7 —Single Unit Installation

NOTE: If unit is surrounded on three or four sides by walls or partitions that are taller than 10ft (3m), call your dealer to discuss additional requirements.

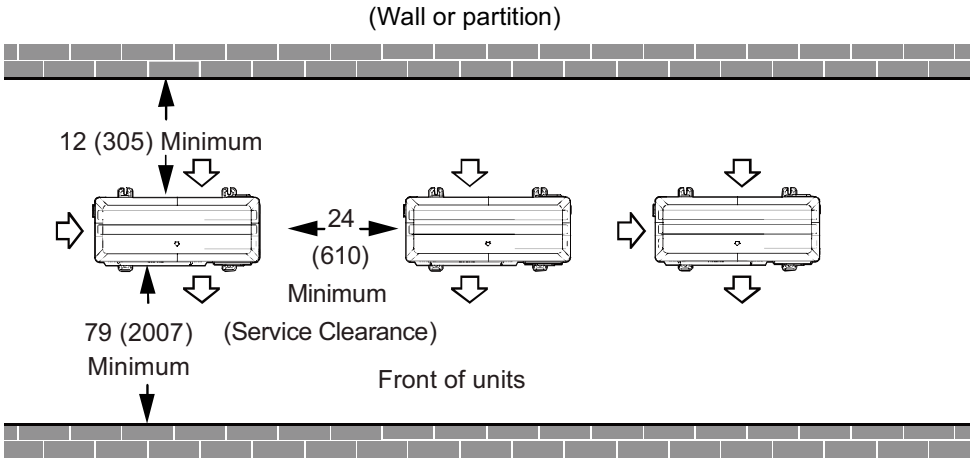


Fig. 8 —Multiple Unit Installation (Top View)

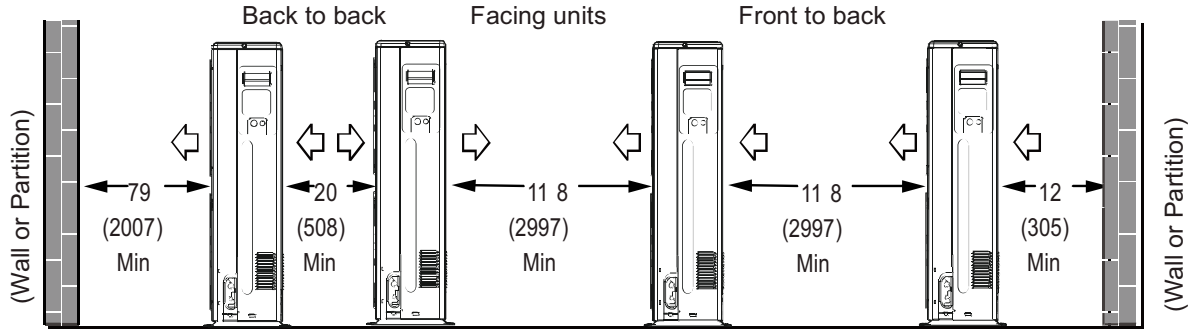


Fig. 9 —Multiple Unit Installation (Side View)

ELECTRICAL CHARACTERISTICS

Table 11 — Outdoor Unit Electrical Characteristics

Model	Power Supply[1]						Compressor		OFM	
	Hz	Volts	Min. volts	Max. volts	MCA[2]	MOP[3]	MSC[4]	RLA[5]	kW	FLA
MDV-V36WMN10T	60Hz	208/230	178	264	25	30	-	16.5	0.215	1.9
MDV-V48WMN10T	60Hz	208/230	178	264	28	40	-	19.0	0.123*2	1.1*2
MDV-V60WMN10T	60Hz	208/230	178	264	35	40	-	24.0	0.123*2	1.1*2

Legend:

MCA: Minimum Circuit Amps

MOP: Maximum overcurrent protection amps (A)

MSC: Maximum Starting Current (A)

RLA: Rated Load Amps

FLA: Full Load Amps

NOTES:

1. Units are suitable for use on electrical systems where voltage supplied to unit terminals is not below or above listed range limits. Maximum allowable voltage variation between phases is 2%.
2. Select wire size based on the value of MCA.
3. MOP is maximum overcurrent protection amps and used to select the overcurrent circuit breaker and residual current circuit breaker.
4. MSC indicates the maximum current on compressor start-up in amps.
5. RLA is based on the following conditions: 80 ºF (26.7°C) DB, 67 ºF (19.4°C) WB; outdoor temperature: 104 ºF (40°C) DB.

COMPONENT LAYOUT AND REFRIGERANT CIRCUITS

LAYOUT OF FUNCTIONAL COMPONENTS

4.0/5.0 ton layout of functional components

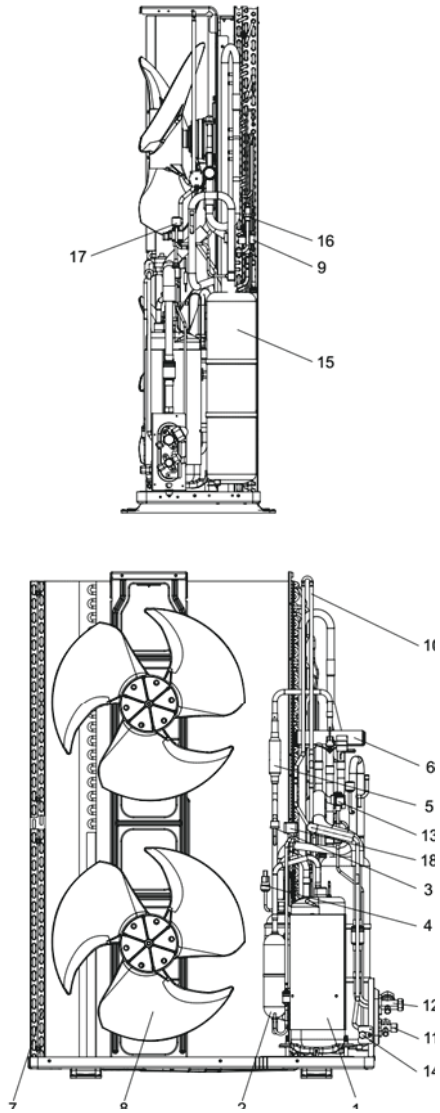


Fig. 10 —4.0/5.0 ton layout of functional components

Table 12 — Legend

No.	Parts Name
1	Compressor
2	Oil separator
3	High pressure switch
4	High pressure sensor
5	One way valve
6	4-way valve(ST1)
7	Heat exchanger
8	Fan
9	Electronic expansion valve (EEVA)
10	Radiator
11	Stop valve (liquid side)
12	Stop valve (gas side)
13	Electronic expansion valve (EEVD)
14	Services valve
15	Gas-liquid separator
16	Fusible plug
17	Low pressure sensor
18	Solenoid valve

PIPING DIAGRAMS

1.5/2.0 ton piping diagram

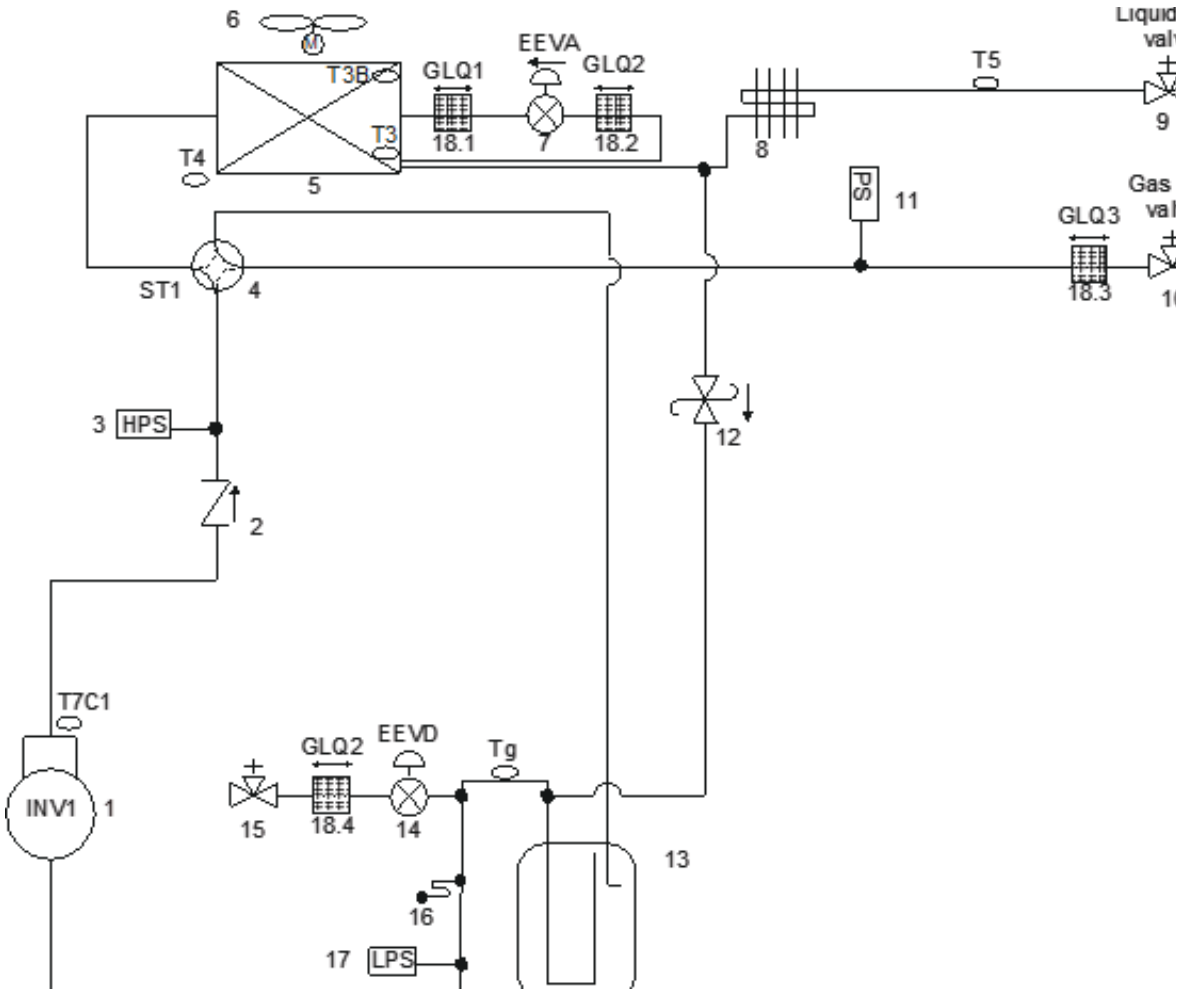


Fig. 11 —1.5/2.0 ton piping diagram

Table 13 — Legend

No.	Parts Name		No.	Parts Name
1	Compressor		14	Electronic expansion valve (EEVD)
2	One-way valve		15	Services valve
3	High pressure switch		16	Fusible plug
4	Four-way valve		17	Low pressure switch
5	Fan		18.1-18.3	Filter
6	High pressure sensor		**Sensor Code**	**Description**
7	Electronic expansion valve (EEVA)		T3	Heat exchanger deicer temperature sensor
8	Radiator		T4	Outdoor air temperature sensor
9	Stop valve (gas side)		T5	Liquid pipe temperature sensor
10	Stop valve (liquid side)		T7C1	Compressor discharge temperature sensor
11	Pressure sensor		T3B	Temperature sensor in the middle of the heat exchanger pipe
12	Pressure relief valve		Tg	Gas pipe temperature sensor
13	Gas-liquid separator			

2.5/3.0 ton piping diagram

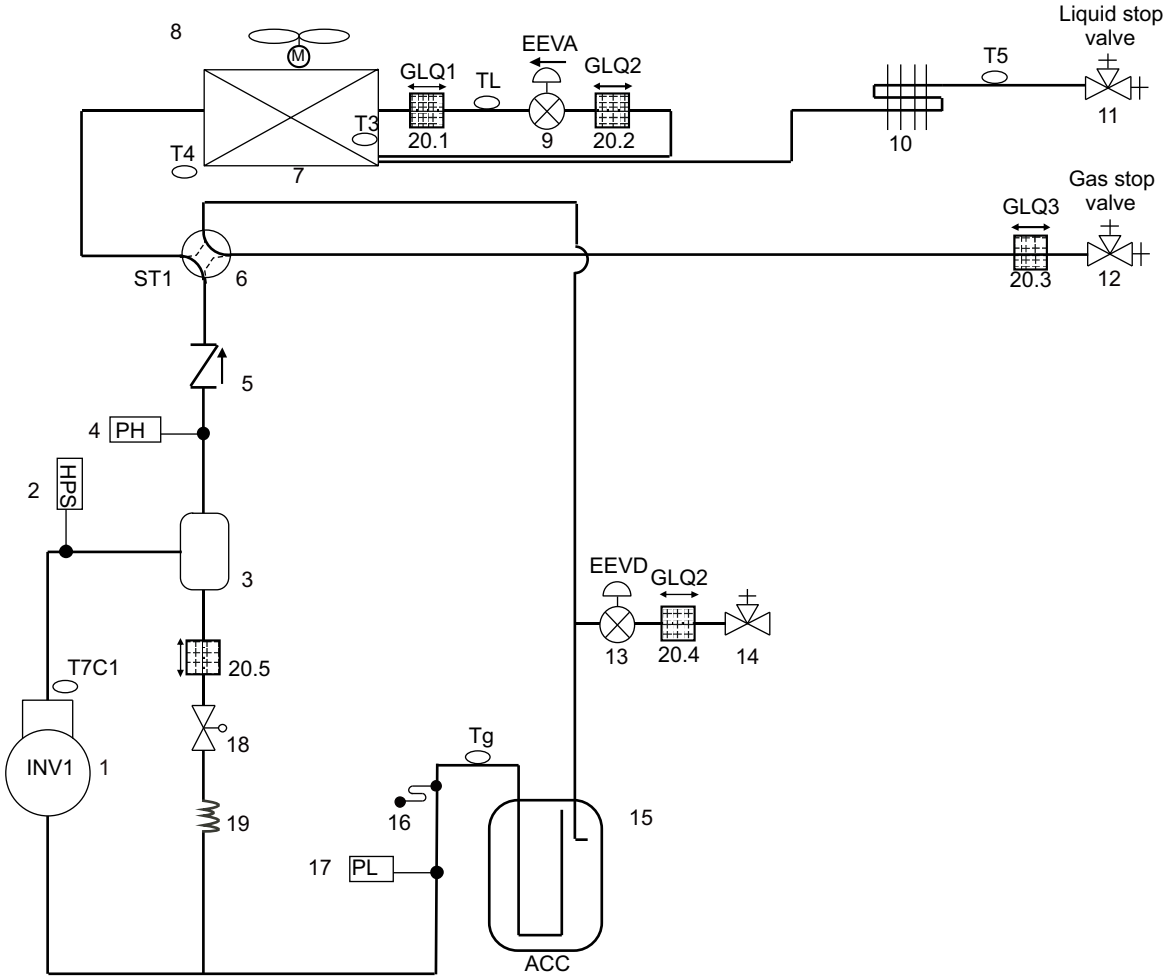


Fig. 12 —2.5/3.0 ton piping diagram

Table 14 — Legend

No.	Parts name		No.	Parts name
1	Compressor		15	Gas-liquid separator
2	High pressure switch		16	Fusible plug
3	Oil separator		17	Low pressure sensor
4	High pressure sensor		18	Solenoid valve
5	One-way valve		19	Capillary tube
6	Four-way valve		20.1-20.5	Filter
7	Heat exchanger		**Sensor Code**	**Description**
8	Fan		T3	Heat exchanger deicer temperature sensor
9	Electronic expansion valve (EEVA)		T4	Outdoor air temperature sensor
10	Radiator		T5	Liquid pipe temperature sensor
11	Stop valve (liquid side)		T7C1	Discharge temperature sensor
12	Stop valve (gas side)		Tg	Gas pipe temperature sensor
13	Electronic expansion valve (EEVD)		TL	Heat exchanger liquid temperature sensor
14	Services valve			

4.0/5.0 ton piping diagram

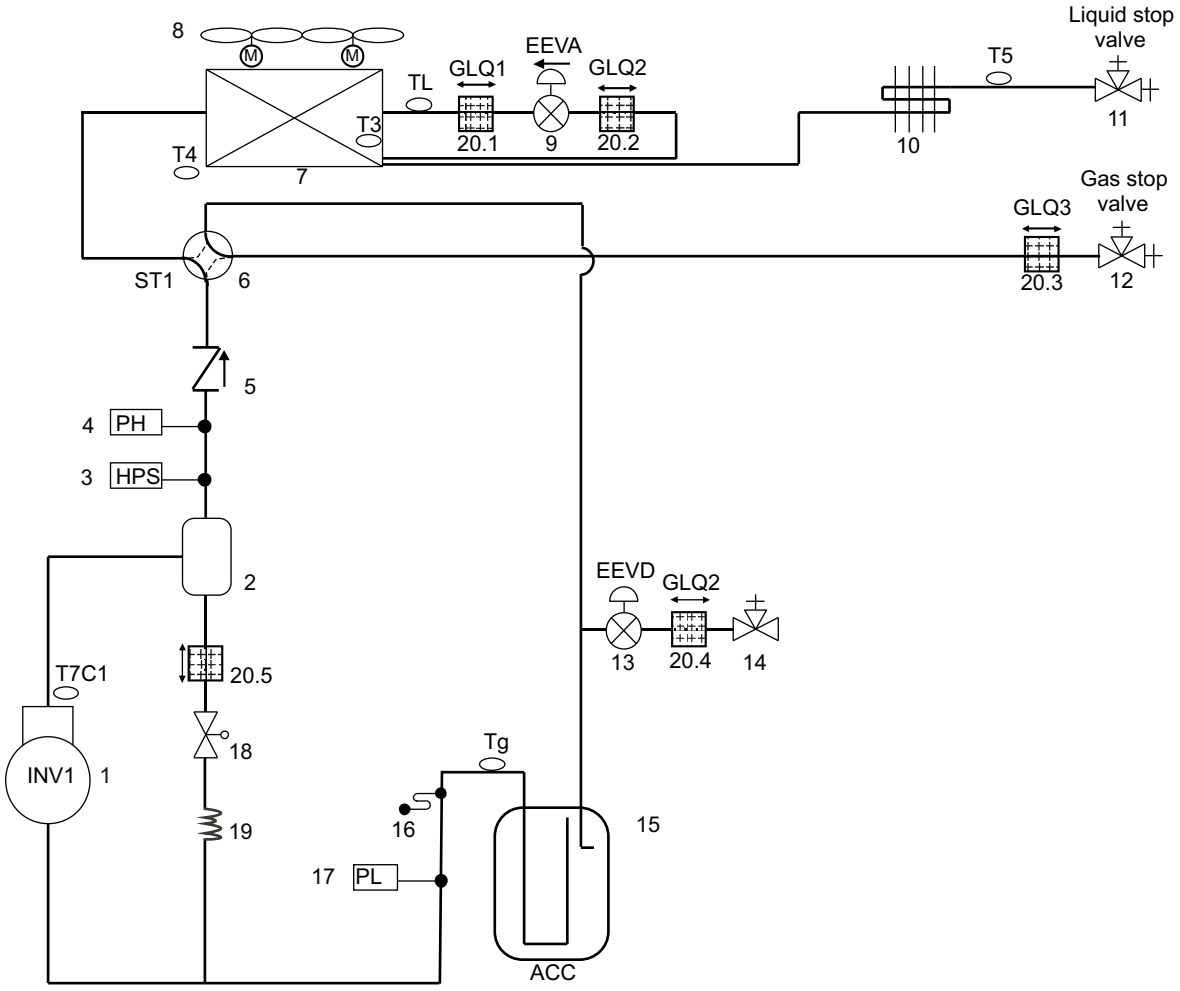


Fig. 13 —4.0/5.0 ton piping diagram

Table 15 — Legend

No.	Parts name		No.	Parts name
1	Compressor		15	Gas-liquid separator
2	Oil separator		16	Fusible plug
3	High pressure switch		17	Low pressure sensor
4	High pressure sensor		18	Solenoid valve
5	One-way valve		19	Capillary tube
6	Four-way valve		20.1-20.5	Filter
7	High pressure sensor		**Sensor Code**	**Description**
8	Fan		T3	Heat exchanger deicer temperature sensor
9	Electronic expansion valve (EEVA)		T4	Outdoor air temperature sensor
10	Radiator		T5	Liquid pipe temperature sensor
11	Stop valve (gas side)		T7C1	Discharge temperature sensor
12	Stop valve (liquid side)		Tg	Gas pipe temperature sensor
13	Electronic expansion valve (EEVD)		TL	Heat exchanger liquid temperature sensor
14	Services valve			

Key components

1. **Oil separator:**
   Separates oil from gas refrigerant pumped out of the compressor and quickly returns it to the compressor. Separation efficiency is up to 99%.
2. **Gas-liquid separator:**
   Separates liquid refrigerant from gas refrigerant, stores liquid refrigerant and oil to protect compressor from liquid hammering.
3. **Electronic expansion valve:**
   Controls refrigerant flow and reduces refrigerant pressure.
4. **Four-way valve:**
   Controls heat exchanger function. When open, the heat exchanger functions as an evaporator; When closed, the heat exchanger functions as a condenser. Refer to part 3, “Heat Exchanger Control”.
5. **High pressure switch:**
   Regulate system pressure. When system pressure rises above the upper limit, the high pressure switch turn off, stopping the compressor. When the high pressure protection recovers, the compressor restarts.
6. **High/Low pressure sensor**
   Used to detect the system high/low pressure.

REFRIGERANT FLOW DIAGRAMS

COOLING OPERATION

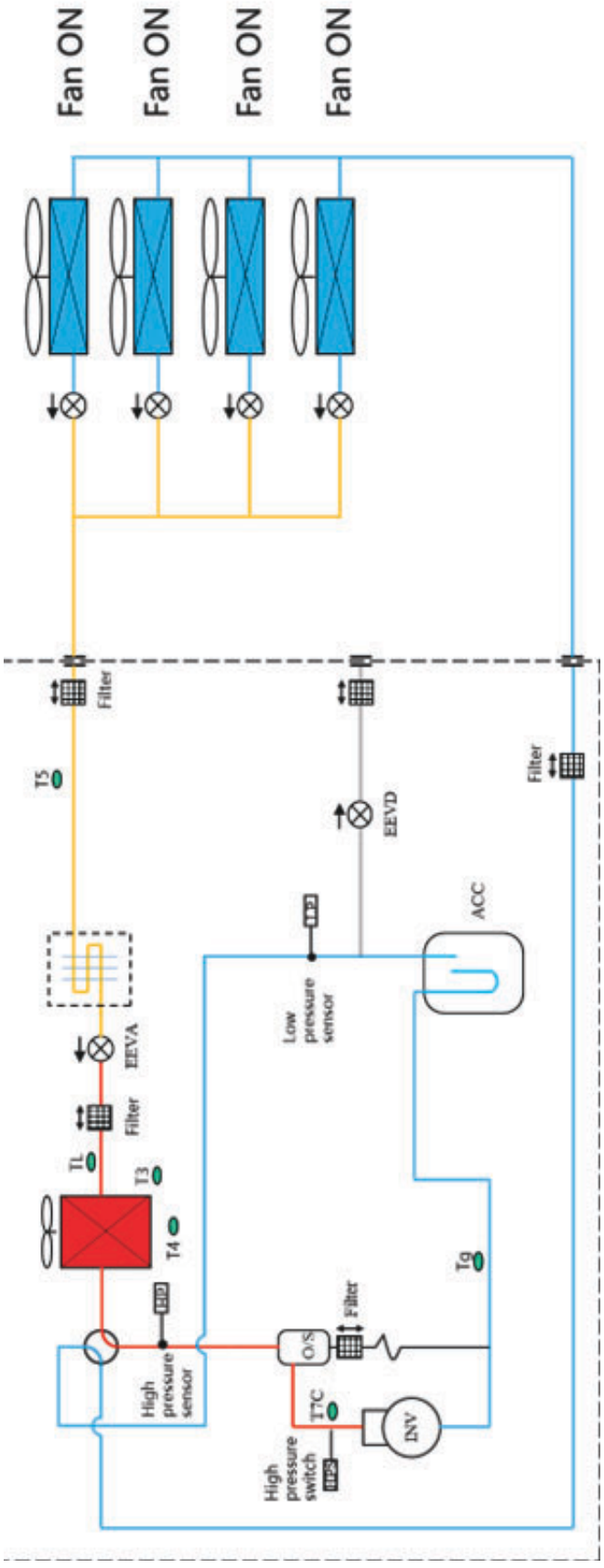


Fig. 14 —Refrigerant flow during cooling operation

REFRIGERANT FLOW DIAGRAMS

HEATING OPERATION

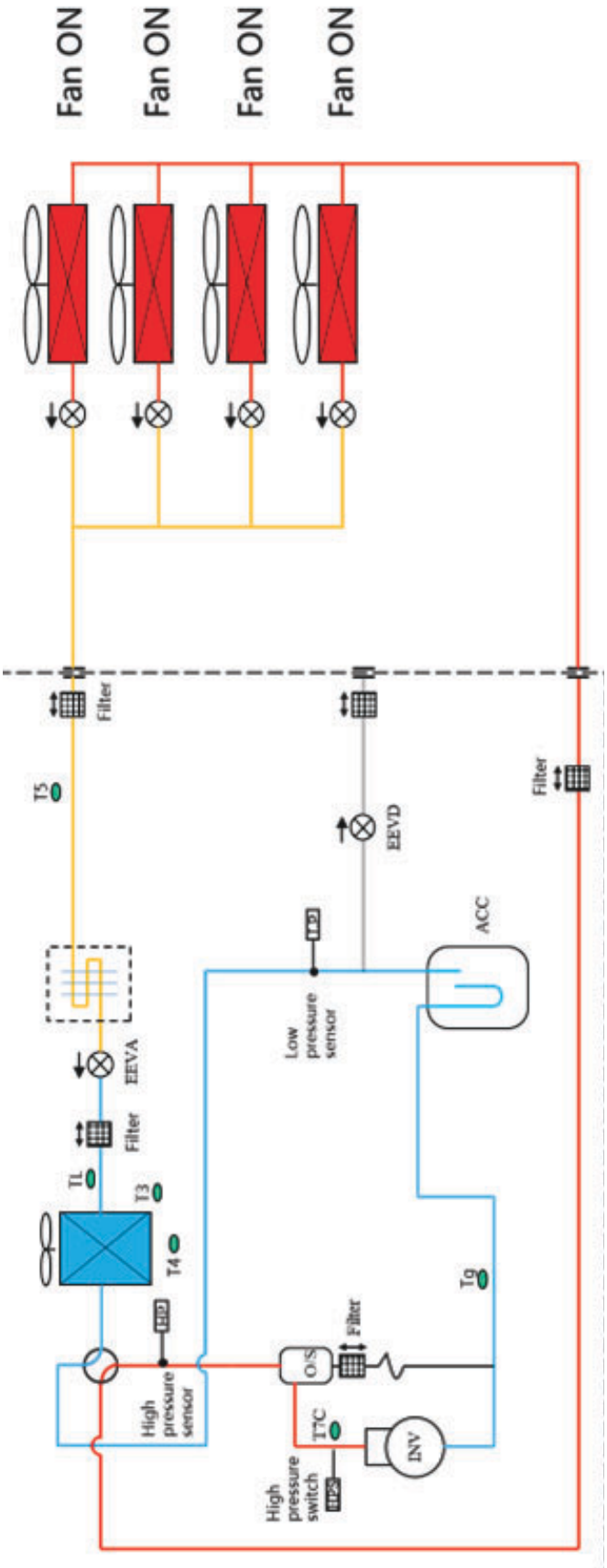


Fig. 15 —Refrigerant flow during heating operation

OIL RETURN OPERATION

COOLING MODE

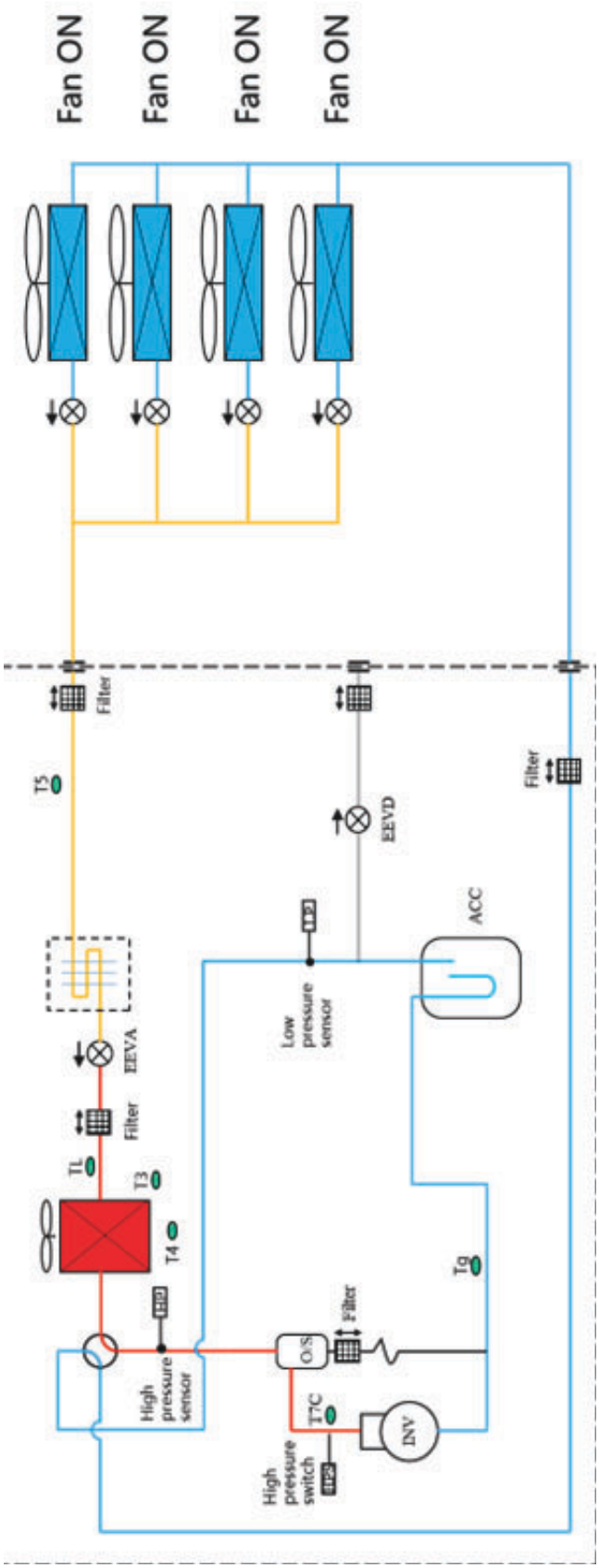


Fig. 16 —Refrigerant flow during oil return operation in cooling mode

OIL RETURN / DEFROSTOPERATION

HEATING MODE

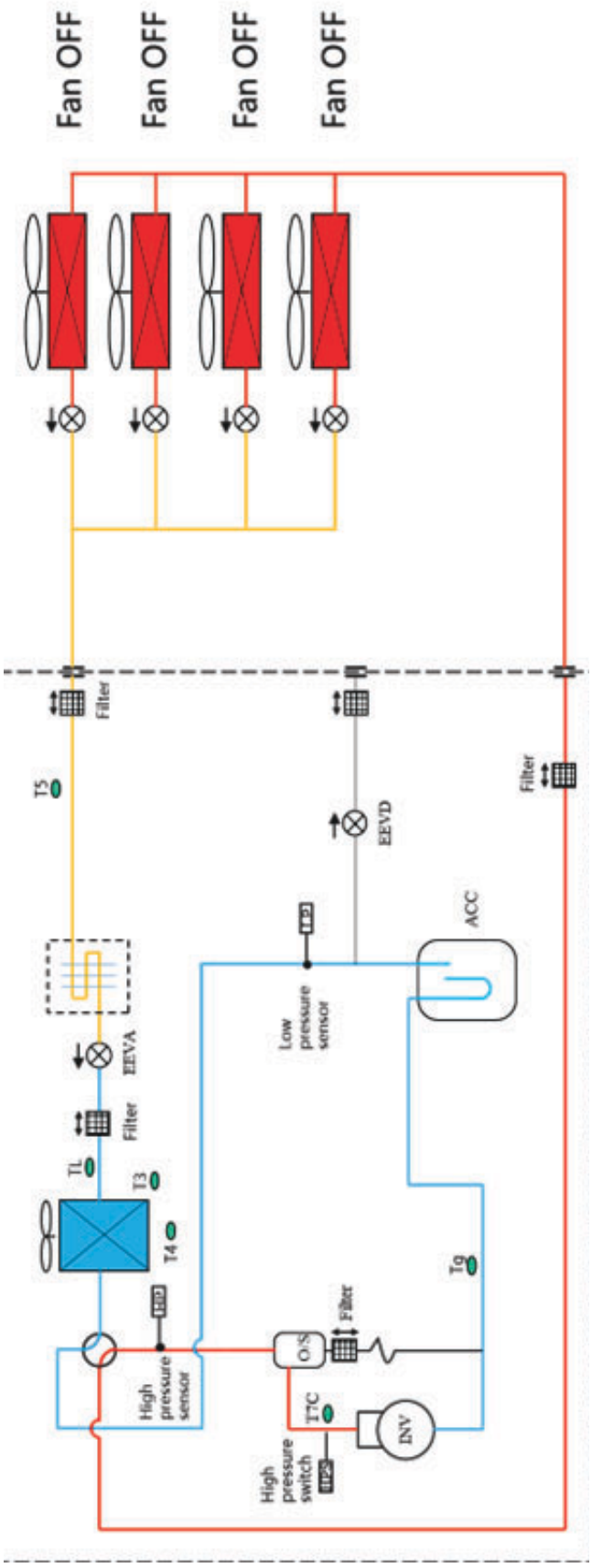


Fig. 17 —Refrigerant flow during oil return defrost operation in heating mode

CONTROL

STOP OPERATION

The stop operation occurs for one of the four following reasons:

1. Abnormal shutdown: in order to protect the compressors, if an abnormal state occurs, the system will makes a 'stop with thermos-off' operation and an error code will be displayed on the outdoor unit digital displays.
2. The system stops when the set temperature of all indoor unit has been reached, or all indoor units has stop or error.
3. The ambient temperature is out of range, the thermo-ON capacity of cooling IDU is lower than 12 MBH (1.5-3ton) and the thermo-ON capacity of cooling IDU is lower than 18 MBH (4-5ton).
4. The system stops when the operation mode is switching

Table 16 — Component control during stop operation

Part Name		Symbol	Stop control
ODU	Inverter compressor	INV	OFF
	Inverter fan	FANA	Keeps for 2 min, then OFF
		FANB[2]	
	Four way valve	ST1	Keep the state before stop
	Electronic expansion valve	EEV	300 pulse
IDU	Fan	Fan	Low speed for 40sec. then OFF
	Electronic expansion valve	EEV	Keeps for 3min, then open to 1200 pulse (2000P EEV) or 300 pulse (500P EEV)

NOTE: The Inverter fan FANB is only available for 4/5ton.

STANDBY CONTROL

Crankcase Heater Control

The crankcase heater is used to prevent refrigerant from mixing with compressor oil when the compressors are stopped. The crankcase heater is controlled mainly according to the minimum of discharge temperatures.

When the minimum of discharge temperatures is above 113°F, the crankcase heater is off;

When the minimum of ambient temperature < 50°F and the compressor stops for more than 4 hours, the crankcase heater turns on.

STARTUP CONTROL

a. Third-part AHU start control

Outdoor unit receives 24V electrical signal from thermostat and determines operation mode. Continuous square signal from 30 to 80 Hz which lasts more than 3 seconds is effective signal.

O type:

When thermostat is set with O type, and run into cooling mode, it will send 24V electrical signal from O/B and Y port on thermostat to B and Y port on signal board of outdoor unit. Outdoor unit receives the signal and operates in cooling mode.

When thermostat is set with O type, and run into heating mode, it will send 24V electrical signal from Y port on thermostat to Y port on signal board of outdoor unit. Outdoor unit receives the signal and operates in heating mode.

B type:

When thermostat is set with B type, and run into cooling mode, it will send 24V electrical signal from Y port on thermostat to Y port on signal board of outdoor unit. Outdoor unit receives the signal and operates in cooling mode.

When thermostat is set with B type, and run into heating mode, it will send 24V electrical signal from O/B and Y port on thermostat to B and Y port on signal board of outdoor unit. Outdoor unit receives the signal and operates in heating mode.

b. Startup Control for Cooling Operation

Table 17 — Component control during startup in cooling mode

Part Name		Symbol	Startup control
ODU	Inverter compressor	INV	32Hz for 60s, then start platform
	Inverter fan	FANA	Keeps for 2 min, then OFF
		FANB[2]	
	Four way valve	ST1	OFF (cooling)
	Electronic expansion valves	EEV	320 pulse
IDU	Fan	Fan	Self-judge
	Electronic expansion valve	EEV	Initial open value for 5min, then PI control

Note: The Inverter fan FANB is only available for 4/5ton.

c. Startup Control for Heating Operation

Table 18 — Component control during startup in heating mode

Part Name		Symbol	Startup control
ODU	Inverter compressor	INV	32Hz for 60s, then start platform
	Inverter fan	FANA	Keeps for 2 min, then OFF
		FANB[2]	
	Four way valve	ST1	ON (heating)
	Electronic expansion valves	EEV	More than 80 pulse
IDU	Fan	Fan	Self-judge
	Electronic expansion valve	EEV	Initial open value for 5min, then PI control

Note: The Inverter fan FANB is only available for 4/5ton.

NORMAL OPERATION CONTROL

d. Component Control during Normal Operation

Table 19 — Outdoor unit component control during normal operation

Part Name	Symbol	Function of Functional Part	
		Cooling	Heating
Inverter compressor	INV	Pressure control: Compressor is used to maintain constant evaporating pressure in cooling mode, and constant condensing pressure in heating mode Protection control: High pressure protection, Low pressure protection, Discharge temperature Protection, Inverter protection	
Inverter fan	FANA	Pressure control	
	FANB[2]		
Four way valve	ST1	OFF	ON
Electric expansion valve	EEVA	EEV is used to control discharge superheat, HEX outlet subcool and liquid pipe pressure	EEV is used to control discharge superheat and HEX outlet superheat

NOTE: The Inverter fan FANB is only available for 4/5ton.

Table 20 — Indoor unit component control during normal operation

Indoor unit actuator		Normal cooling	Normal heating
Fan	Thermo-ON unit	Remote controller setting	Remote controller setting
	Stopping unit	OFF	OFF
	Thermo-OFF unit	Remote controller setting	Remote controller setting
Electronic expansion valve (EEV)	Thermo-ON unit	PI control : Evaporator outlet superheat degree (SH) constant	PI control : Condenser outlet subcooling (SC) constant
	Stopping unit	0 pulse (500P EEV) or 24 pulse (2000P EEV)[1]	54~96 pls adjust(500P EEV) or 120~288pls adjust(2000P EEV)[2][3]
	Thermo-OFF unit	0 pls(500P EEV) or 24pls(2000P EEV)[1]	72 pls(500P EEV) or 224pls(2000P EEV)*3

NOTES:

1. **Different IDU may adopt 500P or 2000P EEV. More detailed information, refer to indoor unit service manual.**
2. **The standby opening changes according to high pressure to keep reliability of the system.**
3. **On the case ODU stopping, the standby opening should be 1200pls (2000P EEV) or 300pls(500P EEV) for pressure equalization.**

b. Compressor Control

Cooling operation

Compressor frequency is controlled to keep IDU evaporating pressure (Te) at target pressure (Tes).

- The default target pressure in cooling mode is 39.2℉, which could be changed by menu settings on main board;
- Target evaporating pressure would decrease if cooling capacity of indoor unit is too low;
- Target evaporating pressure would increase if cooling capacity of indoor unit is too much;

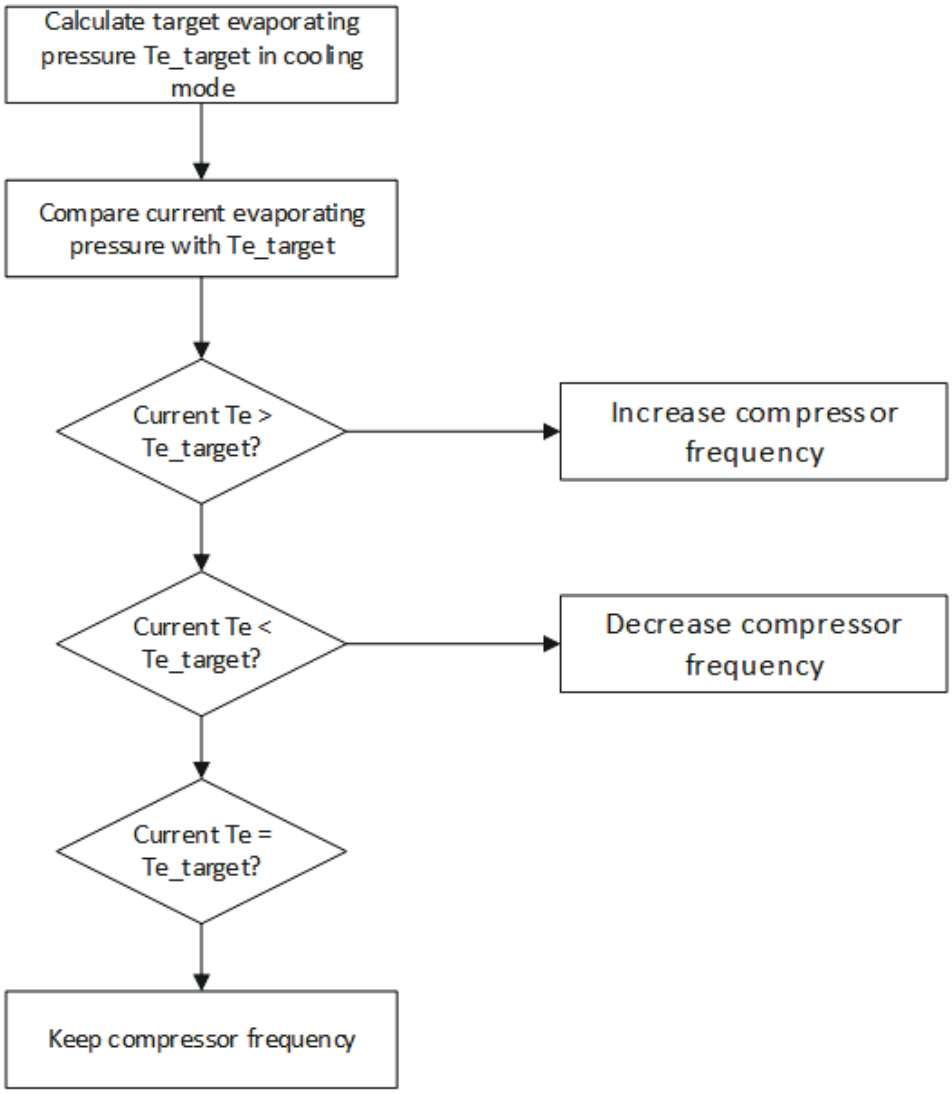


Fig. 18 —Cooling Operation

Heating operation

Compressor frequency is controlled to keep IDU condensing pressure (Tc) at target pressure (Tcs).

- **The default target pressure in heating mode is 46°C, which could be changed by menu settings on main board;**
- **Target condensing pressure would increase if heating capacity of indoor unit is too low;**
- **Target condensing pressure would decrease if heating capacity of indoor unit is too much;**

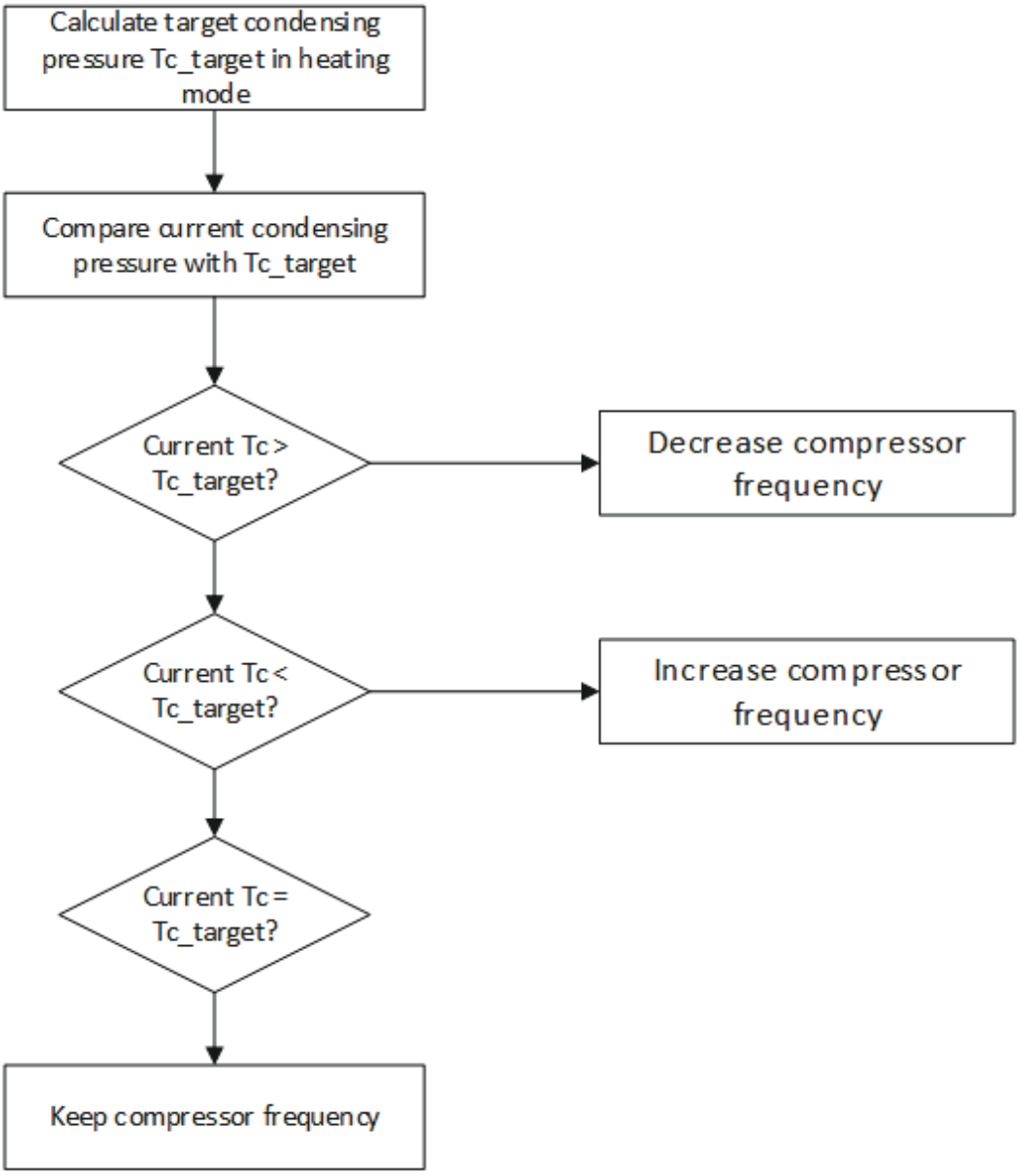


Fig. 19 —Heating Operation

Operating frequency ranges

During normal operation, the minimum frequency is always 18Hz for all outdoor units and the maximum one is limited as the table below.

Table 21 — Outdoor unit frequency ranges during operation

Model	Frequency Range in Cooling or main Cooling		Frequency Range in Heating or main Heating	
	Min	Max	Min	Max
MDV-V18WMN10TM	18 Hz	80 Hz	18 Hz	100 Hz
MDV-V24WMN10TM	18 Hz	90 Hz	18 Hz	108 Hz
MDV-V30WMN10TM	18 Hz	76 Hz	18 Hz	100 Hz
MDV-V36WMN10TM	18 Hz	80 Hz	18 Hz	110 Hz
MDV-V48WMN10TM	18 Hz	90 Hz	18 Hz	110 Hz
MDV-V60WMN10TM	18 Hz	90 Hz	18 Hz	110 Hz

c. Heat Exchanger Control

The ODU heat exchanger operates as condenser in cooling mode, and operates as evaporator in heating mode.

Table 22 — Heat exchanger arrangement

Operation mode	State	Four-way Valve
Cooling	Condenser	OFF
Heating	Evaporator	ON
Oil return/Defrost	Condenser	OFF

d. Electronic Expansion Valve Control

In cooling mode:

The target of EEVA control in cooling mode, is to keep compressor superheat, heat exchanger outlet subcooling, and liquid pipe pressure in proper range.

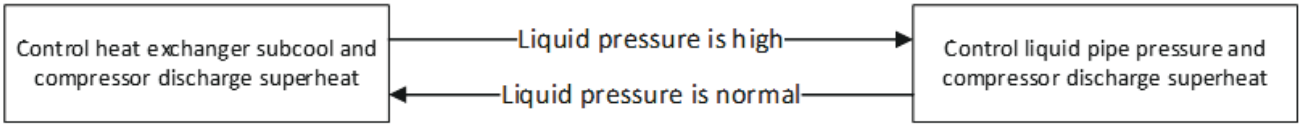


Fig. 20 —EEV Control in Cooling Mode

In heating mode:

The target of EEVA control in heating mode, is to keep compressor superheat and heat exchanger outlet superheat in proper range.

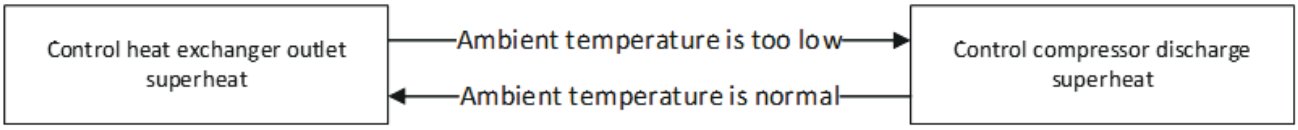


Fig. 21 —EEV Control in Cooling Mode

e. Outdoor Fan Control

The speed of the outdoor unit fans is adjusted in steps, as shown in Table 24.

Table 23 — Outdoor fan speed steps

Fan speed index	Fan speed (rpm)				
	1.5/2.0ton	2.5/3.0ton	2.5/3.0ton		
			FANA		FANB
0	0	0	0	\	\
1	120	210	150	\	\
2	130	210	180	\	\
3	140	210	210	\	\
4	150	240	240	\	\
5	170	280	270	150	170
6	190	320	300	180	200
7	250	360	330	210	230
8	250	410	360	240	260
9	250	460	\	260	280
10	280	510	\	280	300
11	310	570	\	310	330
12	340	630	\	340	360
13	370	690	\	370	390
14	400	730	\	400	420
15	430	760	\	460	460
16	460	800	\	480	500
17	\	\	\	520	540
18	\	\	\	560	580
19	\	\	\	600	620
20	\	\	\	640	660
21	\	\	\	690	710
22	\	\	\	740	760
23	\	\	\	780	800

SPECIAL CONTROL

Oil Return Operation

In order to prevent compressors from running out of oil, the oil return operation is conducted to recover oil that has flowed out of the compressor and into the piping system. This operation is performed for all units including units that are in standby.

When the outdoor unit is running in Oil Return Operation, the digital display on outdoor main PCB will display “d0”.

a. Cooling Mode Oil Return Control

Timing of oil return operation:

- Calculated oil discharge has reached to specified level. The higher the compressor frequency step is, the more oil discharge.
- Cumulative compressor operating time reaches 8 hours.

Tables 25 shows component control during oil return operation in cooling mode.

Table 24 — Outdoor unit control during oil return operation in cooling mode

Part Name		Symbol	Step1	Step2			Step3
			Prepare for oil returning	Oil returning			After oil returning
ODU	Inverter compressor	INV	Pressure control	1.5/ 2.0ton: 40 Hz	2.5/3.0ton: 37 Hz	4.0/ 5.0ton: 56Hz	Pressure control
	Inverter fan	FANA FANB[1]	Pressure control				
	Fourwayvalve	ST	OFF				
	Expansion valve	EEV	Discharge superheat control	Max			Discharge superheat control

NOTE: The Inverter fan FANB is only available for 4/5ton.

b. Heating Oil Return Control

Timing of oil return operation:

Cumulative compressor operating time reaches 8 hours.

Table 25 — Component control during oil return operation in heating mode.

Part Name		Symbol	Step1	Step2	Step3
			Prepare for oil returning	Oil returning	After oil returning
ODU	Inverter compressor	INV	Decrease to 32Hz	45-82 Hz	Start platform
	Inverter fan	FANA FANB[1]	Normal control	OFF	Pressure control
	Four way valve	ST	ON	OFF	ON
	Expansion valve	EEV	Discharge temperature control	300	Self-judge

NOTE: The Inverter fan FANB is only available for 4/5ton.

Defrosting Operation

In order to recover heating capacity, the defrosting operation is conducted when the outdoor unit heat exchanger is performing as an evaporator. The defrosting operation is controlled according to outdoor ambient temperature, outdoor heat exchanger temperature, indoor heat exchanger temperature and outdoor units running time. When the outdoor unit is running in defrosting, the digital display on outdoor main PCB will display “df”.

Reverse Cycle Defrosting Operation:

Timing of reverse cycle defrosting operation:

- If cumulative operating time is more than 40 minutes, and T3 is continuously below X°C for more than 5 minutes after the last defrosting or oil returning, the system would enter defrosting mode according to T3. X = -12 + 0.6 x T4
- If cumulative operating time is more than Y minutes after the last defrosting or oil returning, the system would enter defrosting mode.

Table 26 — Reverse Cycle Defrosting Operation

Ambient Temperature T4	Y
-5 ≤ T4 < 4	120
-15 ≤ T4 < 5	180
T4 < -15	240

Table 27 — Outdoor unit component control during defrosting operation

Part Name		Symbol	Step1	Step2	Step3
			Prepare for oil returning	Oil returning	After oil returning
ODU	Inverter compressor	INV	Decrease to 32Hz	45-82 Hz	Start platform
	Inverter fan 1	FANA	Normal control	OFF	Pressure control
	Inverter fan 2	FANB			
	Four way valve	ST	ON	OFF	ON
	Expansion valve	EEV	Discharge temperature control	300	Self-judge

Note: The Inverter fan FANB is only available for 4/5ton.

Refrigerant auto-charge

Refrigerant auto-charging is only recommended when the conditions below are met:

- Refrigerant pipe's length is uncertain;
- Only one indoor unit , which is AHU with thermostatic expansion valve, is connected to outdoor unit;
- The matching ratio (IDU/ODU) is between 80% and 100%;
- The ambient temperature is met with table below:

Table 28 — Ambient Temperature

Outdoor ambient temperature	5 ~ 43 °C
Indoor ambient temperature	21 ~ 32 °C

Procedure

1. Before connecting refrigerant source to outdoor unit's refrigerant auto-charging port, make sure refrigerant supply from refrigerant source is cut off.
2. Connect refrigerant source (e.g. refrigerant canister with enough R 454B refrigerant) to outdoor unit's refrigerant auto-charging port, and make sure only refrigerant in the charging pipe.

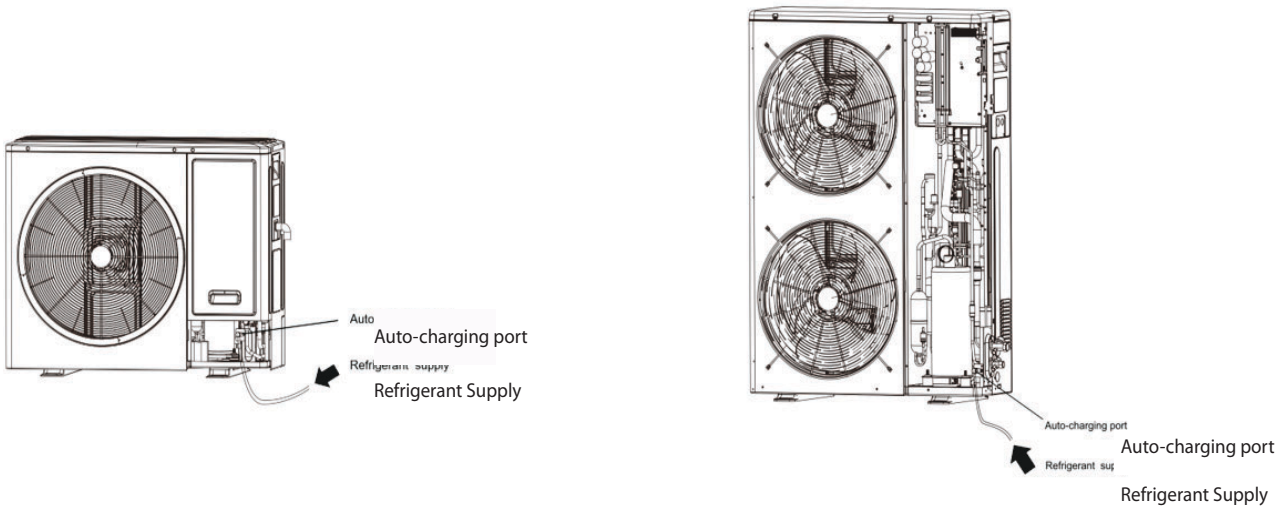


Fig. 22 —Connect refrigerant source to outdoor unit's refrigerant auto-charging port

3. Refrigerant auto-charging is available only after successfully commissioning. Do not enter auto-charging mode when the system is initializing.
4. The refrigerant auto-charging function is only available in cooling operation. Before entering auto-charging mode, please check the indoor unit operation mode:

Table 29 — Indoor unit operation mode during auto-charging mode

Indoor unit operation mode	Operation
Off mode	Enter refrigerant auto-charging function, then operate IDU in cooling mode, or Operate IDU in cooling mode, then enter refrigerant auto-charging function.
Cooling mode	Enter refrigerant auto-charging function
Heating mode	Change IDU into cooling mode, then enter refrigerant auto-charging function.

NOTES:

a. Before entering auto-charging mode, make sure the system is not in heating mode.
b. Indoor unit should run in high fan mode.
c. If no refrigerant in the system after vacuum operation, the outdoor unit may display "P22/P25" error.

5. Enter refrigerant auto-charging mode from outdoor unit menu:

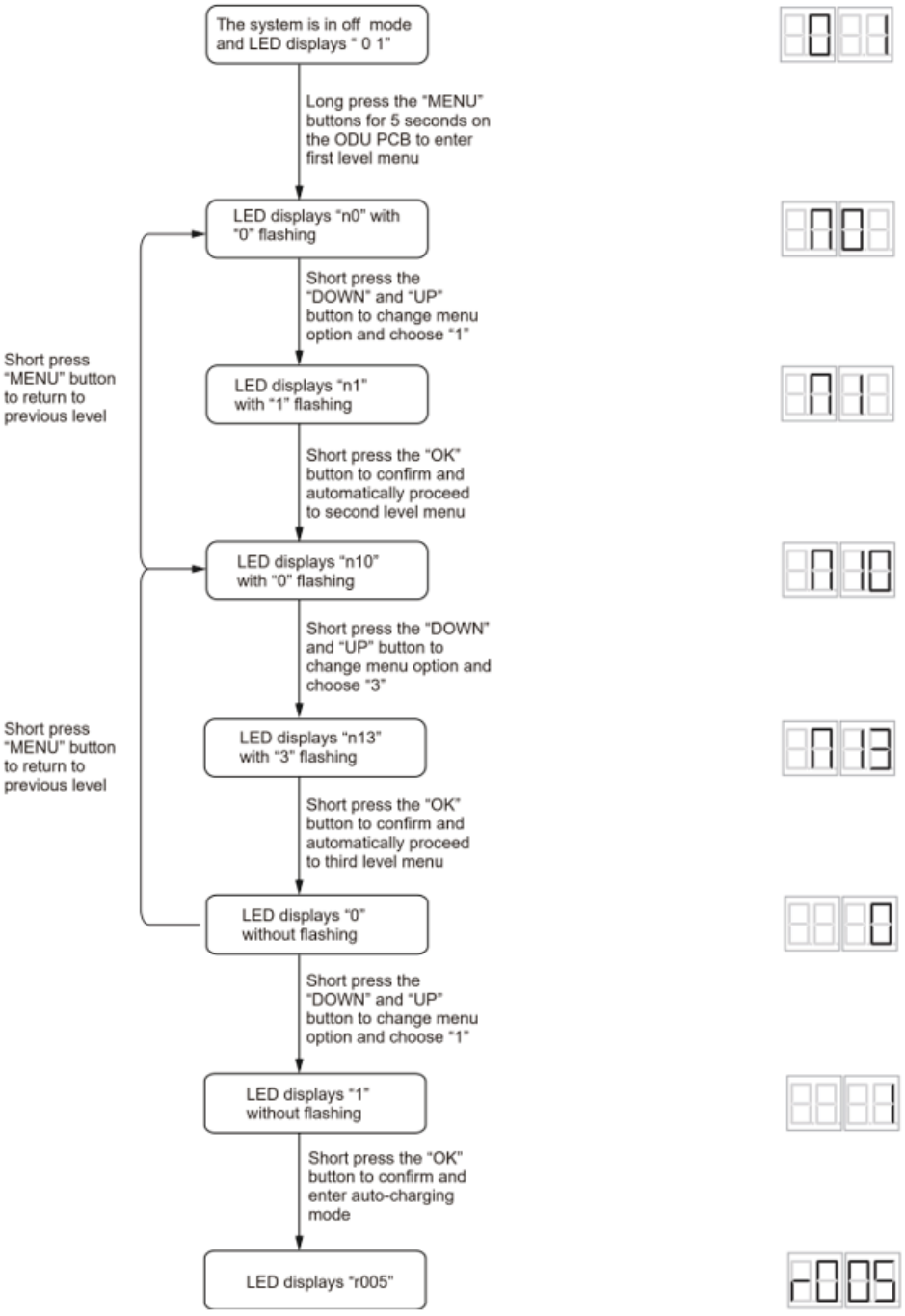


Fig. 23 —Enter refrigerant auto-charging mode from outdoor unit menu

NOTES:

1. During refrigerant auto-charging, do not power off the system.
2. The refrigerant charging amount should be calculated and recorded.
3. Operate IDU in cooling mode with highest fan speed (high fan mode).
4. Turn on refrigerant supply, the system will charge refrigerant automatically in 30 to 60 minutes. The refrigerant amount charged should be calculated and recorded.
5. When refrigerant auto-charging is over successfully, the LED will display “END”, then press “OK” for 5s to quit auto-charging mode.
6. Stop refrigerant supply, and remove refrigerant charging pipe.
7. Turn on refrigerant supply, the system will charge refrigerant automatically in 30 to 60 minutes. The refrigerant amount charged should be calculated and recorded.
8. When refrigerant auto-charging is over successfully, the LED will display “END”, then press “OK” for 5s to quit auto-charging mode.
9. Stop refrigerant supply, and remove refrigerant charging pipe.

The situation below could lead to a display of “FAIL” on LED after entering refrigerant auto-charging mode. Be sure to check:

1. The refrigerant auto-charging time is too long

Table 30 — Auto-Charge Time

Ambient Temperature (°F)	Auto-charging time (min.)
41 ≤ T4 < 50	120
50 ≤ T4 < 59	110
59 ≤ T4 < 68	105
68 ≤ T4 < 77	100
77 ≤ T4 < 86	90
86 ≤ T4 < 95	85
95 ≤ T4 < 104	75
104 ≤ T4 < 111.2	65

There are several reasons could lead to this situation:

Refrigerant supply is not enough

The refrigerant needed is more than the refrigerant charged, and the refrigerant supply is not enough (e.g. refrigerant canister is empty). Please check the refrigerant supply, press “OK” on mainboard for 5 seconds to quit auto-charging mode, and reenter this mode as described above.

Sensors of outdoor unit go wrong

If temperature sensors and pressure sensors of outdoor unit are broken, the auto-charging function may not go well.

Check the sensors whether any of them is broken.

Indoor unit runs in heating mode

The auto-charging function can only work in cooling mode.

Chassis electric heating belt control

Chassis electric heating belt control is used to prevent chassis from being freeze by condensate water and ice rain, when ambient temperature is less than 89.6℉. Accumulated ice on chassis would block drain hole and damage condenser, which can melted by electrical heating.

The heater will take effect when both conditions below are met

1. Ambient temperature T4 is less than 35.6℉.
2. Outdoor unit is in heating mode, or stop heating within 30 minutes.

The heater will be turned off when either condition below is met

1. Ambient temperature T4 is no less than 35.6℉.
2. Outdoor unit has stopped heating for more than 30 minutes.

W/D signal control

When ambient temperature is too low, and during defrosting period, “W/D” would send 24V signal to thermostat and indoor unit to turn on auxiliary heating source to prevent indoor temperature drop.

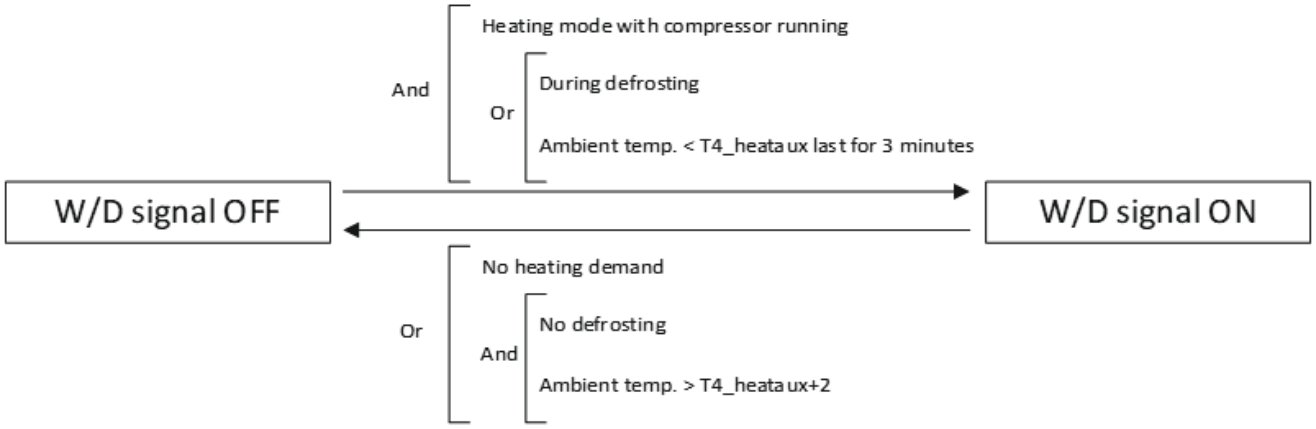


Fig. 24 —WD Signal Control

Test Operation Control

Test operation is used to debug malfunction because of incorrect installation. Press “1-1-2” on PCB to enter test operation.

Basic procedure of test operation

Before entering test operation, debug malfunction in stop mode, such as temperature sensor error, communication error and so on.

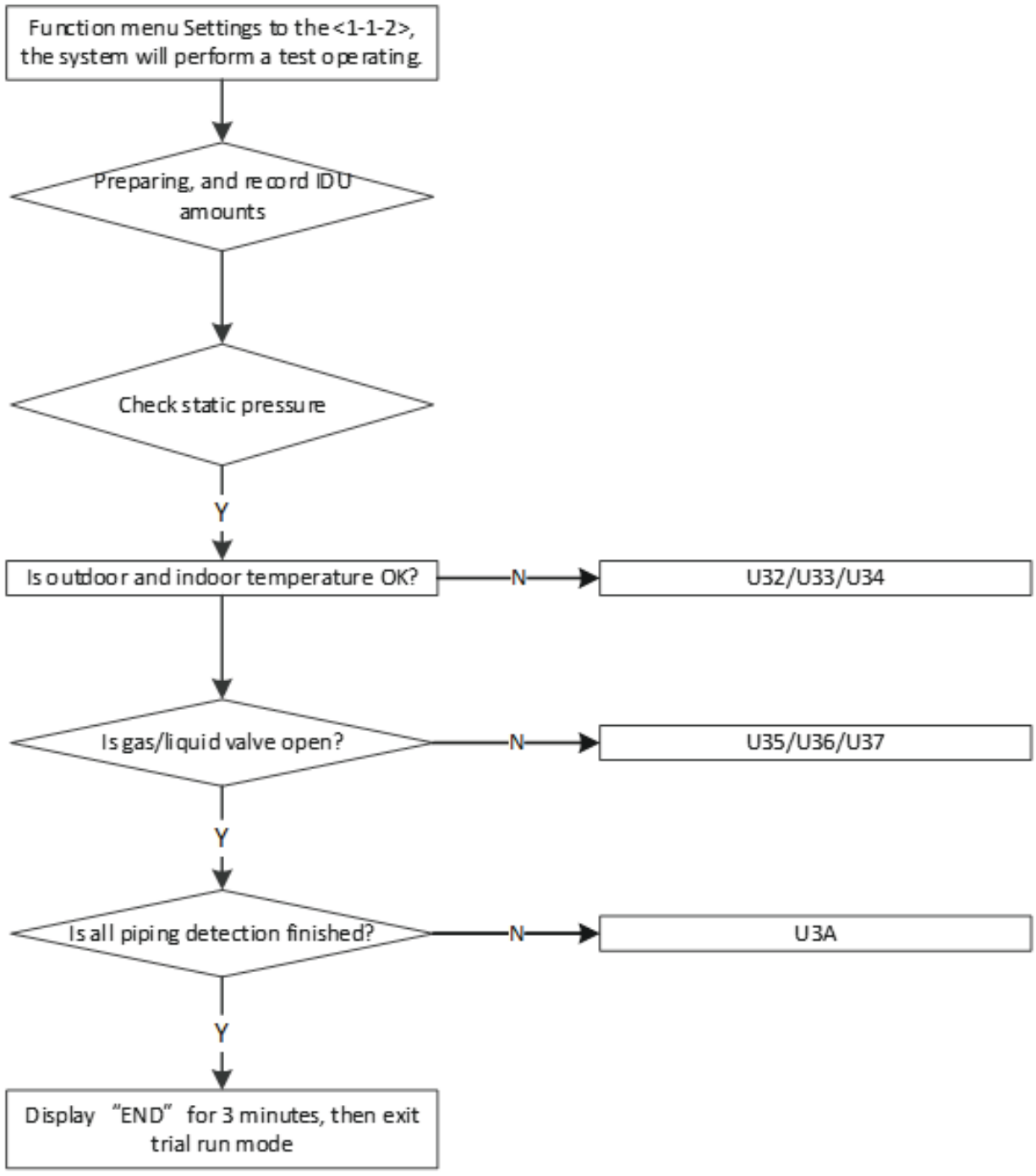


Fig. 25 —Basic Procedure of Test Operation

Table 31 — Error code during test operation

Test item	Object	Malfunction reason	Error code
Outdoor ambient temperature	T4	and [T1 < 109.4℉ ; or [T4 < -22℉ ; T1 ≥ 53.6℉ and T4 ≥ 131℉ ; T1 < 53.6℉ and T4 ≥ 86℉]]	U32
Indoor ambient temperature	Average T1	and [-22℉ ≤ T4 ≤ 131℉ ; or [T1 ≥ 95℉ and T4 < 23℉ ; T1 ≥ 109.4℉ and T4 ≥ 23℉]]	U33
Indoor and outdoor ambient temperature	T4 and average T1	Average T1 ≥ 109.4°F, T4 ≥ 131°F	U34
Gas/liquid valve is open or not	High/Low pressure	Pressure protection	U35/U36/U37
Refrigerant and electrical signal are matching		Refrigerant and electrical signal are not matching	U3A

Heating prohibition control

This control is used to set ambient temperature T4 for heating permitted temperature range. When T4 < T4set, the indoor units operating in heating mode with auxiliary heating source (please check function instruction of indoor unit) will turn to thermo-OFF. When T4 ≥ T4set+1°C, the indoor units will recover to operate in heating mode.

Table 32 — Heating prohibition T4 settings

"8-b-" settings	Centigrade (℉)
0	No limitation (default)
1	-22.0
2	-14.8
3	-7.6
4	-0.4
5	6.8
6	14.0
7	21.2
8	28.4
9	35.6
10	42.8
11	50.0
12	57.2
13	64.4
14	71.6
15	78.8
16	86.0

Operation Limits Control

Before compressors are about to start, the outdoor unit judge whether it's suitable to operate or not by the value of ambient temperature (T4).

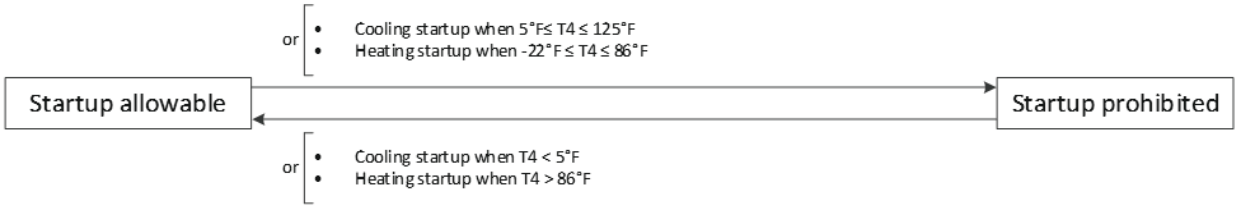


Fig. 26 —Operational Limits Control

NOTE: When T4 < 23°F, there is a minimum operating capacity for cooling start and operation, which is 50%.

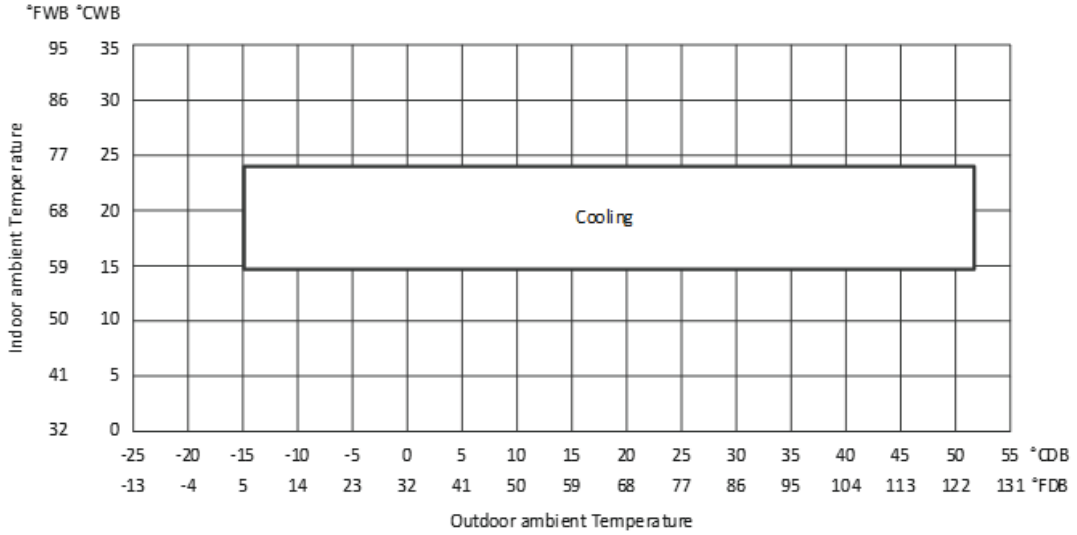


Fig. 27 —Cooling

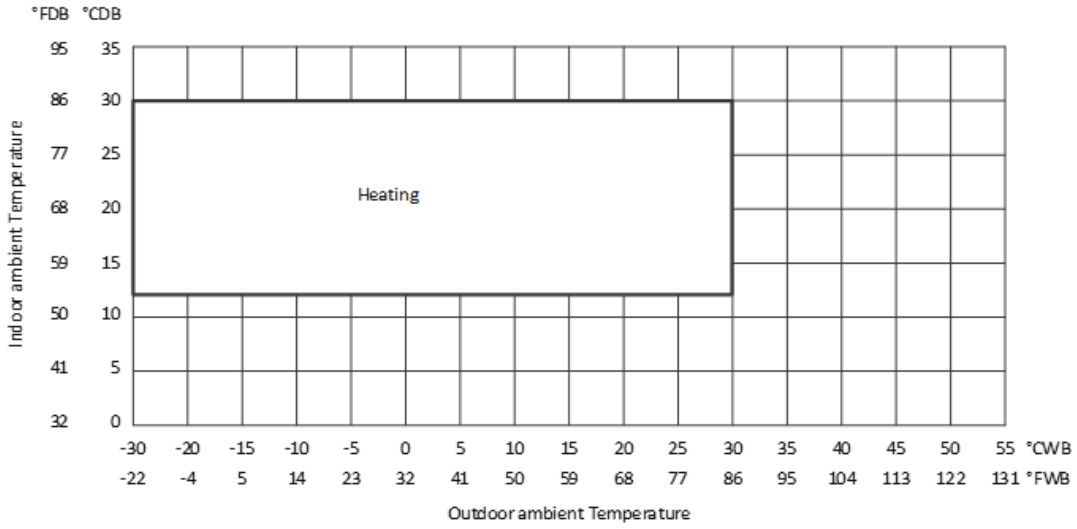


Fig. 28 —Heating

Table 33 — Operating Temperature Range

Mode	Outdoor Temperature	Indoor Temperature
Cooling	5~125°F DB (-15~52°C DB)	59~75°F WB (15~23.9°C WB)
Heating	-22~70°F WB (-30~21.1°C WB)	54~86°F DB (12.2~30°C DB)

FIELD SETTINGS

Overview

This chapter describes how the system configuration can be implemented once the installation is completed, and other relevant information.

It contains the following information:

- Implement field settings
- Energy-saving and optimized operation
- Using the Check function

NOTE: Installation personnel should read this section.

Digital display and button settings

Table 34 — Digital display output

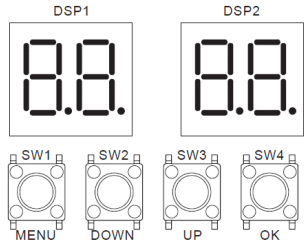
Outdoor unit state	Parameters displayed on DSP1	Parameters displayed on DSP2	Digital display output
Standby	The address of outdoor unit	The number of indoor units in communication with the outdoor units	
Normal operation	---	Running speed of the compressor in rotations per second	
Error or protection	Placeholder and error or protection cod		
In menu mode	Display menu mode code		
System check	Display system check code		

Table 35 — Function of buttons SW3 to SW6

Button	Function
SW3(UP)	In menu mode: previous and next buttons for menu modes.
SW2(DOWN)	Not in menu mode: previous and next buttons for system check information.
SW1(MENU)	Enter / exit menu mode.
SW4(OK)	Confirm to enter specified menu mode.

Menu mode

Only master unit has the full menu functions, slave units only have error codes check and cleaning functions.

1. Press and hold SW1 “MENU” button for 5 seconds to enter menu mode, and the digital display will display “n1”.
2. Press SW3 / SW2 "UP / DOWN" button to select the first level menu "n1", "n2", "n3", "n4" or "nc".
3. Press SW4 "OK" button to enter specified first level menu, for example, enter "n4" mode.
4. Press SW3 / SW2 "UP / DOWN" button to select the second level menu from "n41" to "n47".
5. Press SW4 "OK" button to enter specified second level menu, for example, enter "n43" mode.
6. Press SW3 / SW2 "UP / DOWN" button to select the specified menu.

⚠ WARNING

Operate the switches and push buttons with an insulated stick (such as a closed ball-point pen) to avoid touching the live parts.

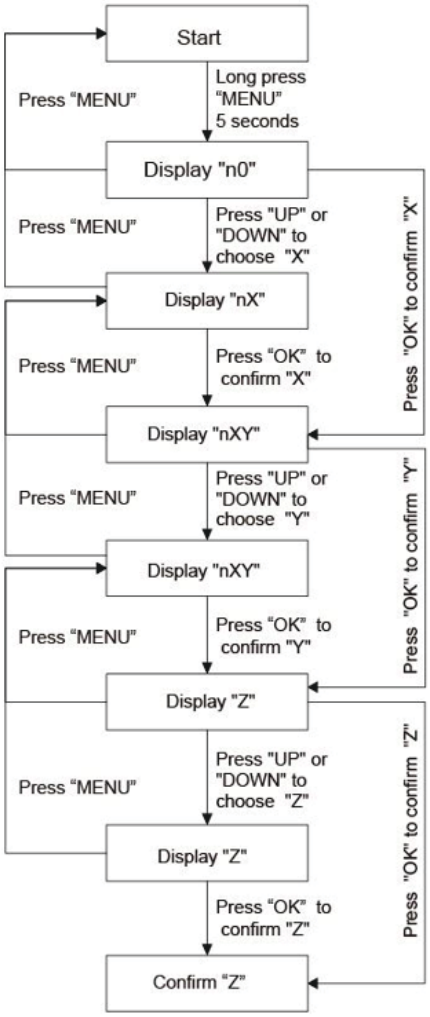


Fig. 29 —Menu Mode Selection Flowchart

Table 36 — Menu mode function:

First level menu	Second level menu	Specified menu mode	Description	Default
n0 (Information query)	0 (History error)	0	Query History error (last ten error codes)	-
		1	Cleaning history error	
	1 (address)	0	Query Indoor unit's address	
	2	1	Driver's version (compressor and fan displayed in turn)	
n1 (Installation and commissioning)	0	-	Service mode	-
	1[1] (System test)	0	Cooling Test	
		1	Heating Test	
	2 (Refrigerant recovery)	0	Recycle Refrigerant to outdoor unit	
		1	Recycle Refrigerant to indoor unit	
		2	Balance system refrigerant	
	5	-	Vacuum mode[2]	
	6	-	Setting the VIP IDU address (Default:No.63)	

Notes:

1. For details of mode, refer to *2.4 Special mode introduction*
2. This setting must be performed when vacuumizing.

Table 4-2.3 Menu mode function(continue)

Table 37 — Menu Mode Function (Cont.)

First level menu	Second level menu	Specified menu mode	Description	Default
n2 (Mode setting)	0[1] (Priority mode)	0	Automatic priority mode	√
		1	Cooling priority mode	-
		2	VIP indoor unit voting priority mode	
		3	In response to heating mode only	
		4	In response to cooling mode only	
		5	Heating priority mode	
		9	Capability requirements priority mode	
	1 (Silent mode)	0	Non silent mode	√
		1	Silent mode 1	-
		2	Silent mode 2	
		3	Silent mode 3	
		4	Silent mode 4	
		5	Silent mode 5	
	5 (°C or °F)	0	Celsius will be enable on indoor unit display	√
		1	Fahrenheit will be enable on indoor unit display	-
	9[2] (Automatic priority mode)	0	Mode Switching temperature:10°C	√
		1	Mode Switching temperature:16°C	-
		2	Mode Switching temperature:21°C	
n3 (Installation parameters)	2[3] (Level difference)	0	0m level difference between indoor unit and outdoor unit	√
		1	10m level difference between indoor unit and outdoor unit	-
		2	20m level difference between indoor unit and outdoor unit	
		3	30m level difference between indoor unit and outdoor unit	
		4	40m level difference between indoor unit and outdoor unit	
		5	50m level difference between indoor unit and outdoor unit	
	3 (Malfunction after refrigerant leakage)	0	Malfunction immediately after refrigerant leakage occur	√
		1	Malfunction after refrigerant leakage occur 12 hours	-
		2	Malfunction after refrigerant leakage occur 24 hours	-
		3	Malfunction after refrigerant leakage occur 48 hours	-
		4	Malfunction and refrigerant auto recycle immediately after refrigerant leakage occur	-
	7 (Ambient temperature)	0	External ambient temperature sensor(T10) ineffective	√
		1	External ambient temperature sensor(T10) effective	-
n4 (address)	1	-	Set Network address of Outdoor unit	-
	2	-	Set number of indoor units	1
	4	0	Auto addressing (indoor and outdoor units address)	-
		1	Clear address (indoor and outdoor units address, network address)	

Notes:

1. When the outdoor unit is in standby, the fan will turn on to clear the snow on the fan blade, and the effect of mode 2 is better than that of mode 1.
2. For details of mode, refer to *2.4 Special mode introduction*
3. If the horizontal height of the outdoor unit is higher than that of the indoor units, it needs to be set to improve the reliability of the system.

Table 38 — Menu mode function (continue)

First level menu	Second level menu	Specified menu mode	Description	Default
n6 (evaporation and condensation temperature)	0 (target evaporation temperature of the indoor unit)	0	Evaporation temperature setting (Ke0=-3)	-
		1	Evaporation temperature setting (Ke0=0)	
		2	Evaporation temperature setting (Ke0=2)	
		3	Evaporation temperature setting (Ke0=4)	√
		4	Evaporation temperature setting (Ke0=6)	-
		5	Evaporation temperature setting (Ke0=8)	
		6	Evaporation temperature setting (Ke0=9)	
		7	Evaporation temperature setting (Ke0=10)	
		8	Evaporation temperature setting (Ke0=11)	
	2 (target condensation temperature of the indoor unit)	0	Condensation temperature setting (Kc0=41)	-
		1	Condensation temperature setting (Kc0=42)	
		2	Condensation temperature setting (Kc0=43)	
		3	Condensation temperature setting (Kc0=44)	
		4	Condensation temperature setting (Kc0=45)	
		5	Condensation temperature setting (Kc0=46)	
		6	Condensation temperature setting (Kc0=48)	√
		7	Condensation temperature setting (Kc0=51)	-
n8	A	0	Refrigerant shut-off device unavailable	√
		1	Refrigerant shut-off device available	-
	b (compressor lockout)	0	No compressor lockout temperature	√
		1	-22 °F compressor lockout temperature	-
		2	-15°F compressor lockout temperature	-
		3	-8°F compressor lockout temperature	-
		4	0°F compressor lockout temperature	-
		5	7°F compressor lockout temperature	-
		6	14°F compressor lockout temperature	-
		7	21°F compressor lockout temperature	-
		8	28°F compressor lockout temperature	-
		9	36°F compressor lockout temperature	-
		10	43°F compressor lockout temperature	-
		11	50°F compressor lockout temperature	-
		12	59°F compressor lockout temperature	-
		13	68°F compressor lockout temperature	-
		14	77°F compressor lockout temperature	-
		15	86°F compressor lockout temperature	-
	E (heat-auxiliary operate)	0	Without heataux	√
		1	-22 °F heataux operate temperature	-
		2	-15°F heataux operate temperature	-
		3	-8°F heataux operate temperature	-
		4	0°F heataux operate temperature	-
		5	7°F heataux operate temperature	-
		6	14°F heataux operate temperature	-
		7	21°F heataux operate temperature	-

Table 39 — Menu Mode Function (Continue)

First level menu	Second level menu	Specified menu mode	Description	Default
n8[1]	E (heat-auxiliary operate)	8	28°F heataux operate temperature	-
		9	36°F heataux operate temperature	-
		10	43°F heataux operate temperature	-
		11	50°F heataux operate temperature	-
		12	59°F heataux operate temperature	-
		13	68°F heataux operate temperature	-
		14	77°F heataux operate temperature	-
		15	86°F heataux operate temperature	-
n9	1	0	Non-detection of over-connection ratio faults	-
		1	When operating ratio exceeds 102%, the indoor unit air flow turns to low speed	√
	4 (force mode)	0	Force defrosting	-
		1	Forced oil return	-
	5	-	Release central controller emergency stop statue	-
	7	0	Digital electricity meter	√
		1	Pulse electricity meter	-
nc[2] (Dry contact function)	0	0	Dry contact 1 function selection (Force cooling only)	-
		1	Dry contact 1 function selection (Force heating only)	
		2	Dry contact 1 function selection (Force incapacity requirements)	
		3	Dry contact 1 function selection (Force stop)	√
	1	0	Dry contact 2 function selection (Force cooling only)	-
		1	Dry contact 2 function selection (Force heating only)	
		2	Dry contact 2 function selection (Force incapacity requirements)	
		3	Dry contact 2 function selection (Force stop)	√
	2	0	Dry contact 3 function selection (Operation signal)	-
		1	Dry contact 3 function selection (Alarm signal)	√
		2	Dry contact 3 function selection (Compressor running signal)	-
		3	Dry contact 3 function selection (Defrosting signal)	
		4	Dry contact 3 function selection (Refrigerant leakage signal)	
nd (night silent mode)	0	0	Without night silent mode	√
		1	6 hours judgement time / 10 hours operation time	-
		2	6 hours judgement time / 12 hours operation time	-
		3	8 hours judgement time / 10 hours operation time	-
		4	8 hours judgement time / 12 hours operation time	-
	1	0	Night silent mode 1	-
		1	Night silent mode 2	-
		2	Night silent mode 3	-
		3	Night silent mode 4	-

NOTES:

1. Only for VRF system
2. Using with setting [n2-8-0] or [n2-8-1].

Table 40 — Function of switch ENC1

Switch	Setting	Switch positions	Description
ENC1	Model setting		Outdoor unit model setting (Valid at 0-5 ,default is 0) 0 - MDV-V18WMN10T 1 - MDV-V24WMN10T 2 - MDV-V30WMN10T 3 - MDV-V36WMN10T 4 - MDV-V48WMN10T 5 - MDV-V60WMN10T

Special Mode Introduction

Choose priority mode from menu “2-0-0” to “2-0-9”.

Table 41 — Mode Priority Control

Menu		Mode Priority
2-0-	0	Ambient temperature priority mode
	1	Cooling priority mode
	2	VIP priority mode
	3	Heating only mode
	4	Cooling only mode
	5	Heating priority mode
	9	Demand priority mode

Ambient temperature priority mode (Auto priority mode)

If ambient temperature T4 is no less than preset value of ambient temperature Ta (°F), ODU is in cooling priority mode.

If ambient temperature T4 is less than Ta-37.4 (°F), ODU is in heating priority mode.

Ta could be set by menu function settings.

Table 42 — Ambient Temperature Priority Mode

“2-9-” settings	T4 (°F)	T4 (°C)
0	50	10
1	60	16
2	70	21

Demand priority mode

Note:

1. Nt4C: Cooling demand of IDUs.
2. Nt4H: Heating demand of IDUs.

   Nt4C / Nt4H > 105%, ODU operate in cooling mode.

   Nt4C / Nt4H ≤ 105%, ODU operate in heating mode.

The minimum period between mode switch is 20 minutes.

Heating priority mode

ODU in cooling mode

If ODU receive heating demand, ODU will stop and turn to operate in heating mode. The indoor units with cooling demand are thermo-OFF and display “not priority”.

ODU in heating mode

If ODU receive cooling demand, ODU will continue to operate in heating mode. The indoor units with cooling demand are thermo-OFF and display “not priority”.

ODU without heating demand

If cooling demand exists, ODU will stop and turn to operate in cooling mode.

Cooling priority mode

ODU in heating mode

If ODU receive cooling demand, ODU will stop and turn to operate in cooling mode. The indoor units with heating demand are thermo-OFF and display “not priority”.

ODU in cooling mode

If ODU receive heating demand, ODU will continue to operate in cooling mode. The indoor units with heating demand are thermo-OFF and display “not priority”.

ODU without cooling demand

If heating demand exists, ODU will stop and turn to operate in heating mode.

VIP priority mode

Press “2-0-2” to set VIP IDU address.

If VIP IDU has demand of cooling or heating, the ODU must operate in the same mode.

If there is no VIP IDU, or VIP IDU operates in fan mode, ODU operation mode depends on the majority indoor units with same mode.

Cooling only mode

ODU can operate only in cooling mode

Heating only mode

ODU can operate only in heating mode

System test

Cooling Test Control

Cooling test control is used to check whether the system can operate cooling mode normally.

Press “**1-1-0**” on PCB to enter cooling test mode, and all indoor units downstairs operate in cooling mode set at 62.6°F with high wind. The system operates in cooling mode normally.

Exit Cooling Test Mode

1. Press “OK” for 5sec to exit cooling test mode.
2. If any error happened, exit cooling test mode automatically.
3. Operate for 240 minutes, then exit cooling test mode automatically.

Heating Test Control

Heating test control is used to check whether the system can operate heating mode normally.

Press “**1-1-1**” on PCB to enter heating test mode, and all indoor units downstairs operate in heating mode set at 86°F with high wind. The system operates in heating mode normally.

Exit heating test mode

1. Press “OK” for 5sec to exit heating test mode.
2. If any error happened, then exit heating test mode automatically.
3. Operate for 240 minutes, then exit heating test mode automatically.

Test Operation Control

Test operation is used to debug malfunction because of incorrect installation. Press “1-1-2” on PCB to enter test operation.

Before entering test operation, please debug malfunction in stop mode, such as temperature sensor error, communication error and so on.

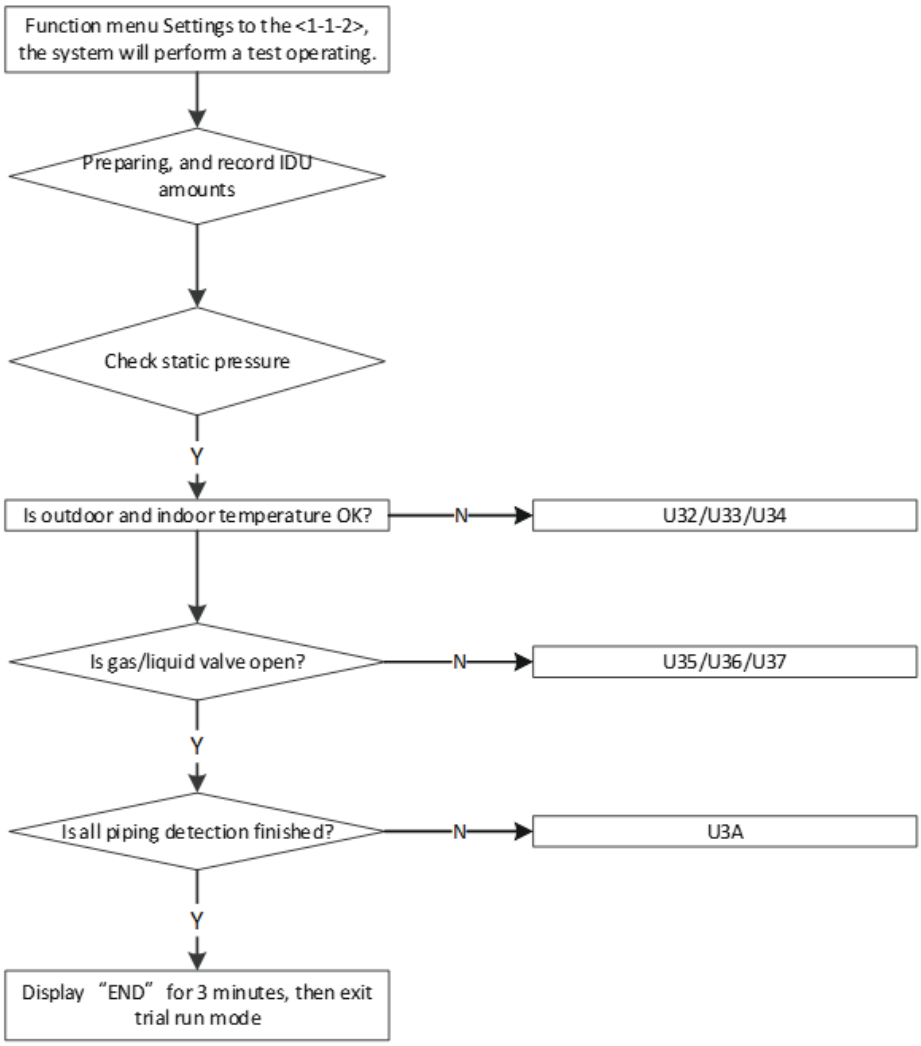


Fig. 30 —Test Operation Control

Table 43 — Error Code During Test Operation

Test item	Object	Malfunction reason	Error code
Outdoor ambient temperature	T4	and [T1 < 109.4Ń ; or [T4 < -22Ń ; T1 ≥ 53.6Ń and T4 ≥ 131Ń ; T1 < 53.6Ń and T4 ≥ 86Ń]]	U32
Indoor ambient temperature	Average T1	and [-22℉ ≤ T4 ≤ 131℉ ; or [T1 ≥ 95℉ and T4 < 23℉ ; T1 ≥ 109.4℉ and T4 ≥ 23℉]]	U33
Indoor and outdoor ambient temperature	T4 and average T1	Average T1 ≥ 109.4?, T4 ≥ 131?	U34
Gas/liquid valve is open or not	High/Low pressure	Pressure protection	U35/U36/U37
Refrigerant and electrical signal are matching		Refrigerant and electrical signal are not matching	U3A

SYSTEM PARAMETER CHECK

UP / DOWN System Check Button

Before pressing UP or DOWN button, allow the system to operate steadily for more than an hour. On pressing UP or DOWN button, the parameters listed in below table will be displayed in sequence.

Table 44 — System Check List

DISP.	CONTENT	DESCRIPTION
--	"Standby (ODU address+ IDU quantity)/frequency/special status"	
0	ODU address	0
1	ODU capacity	Unit: Ton
2	Quantity of ODU	1
3	Quantity of IDUs	1~9
4	Reserved	
5	Target frequency of ODU	Displacement frequency (1)
6	Reserved	
7	Actual frequency of compressor	Actual frequency
8	Reserved	
9	Operating mode	0: OFF 2: Cooling 3: Heating
10	Fan1 speed	Unit: RPM
11	Fan2 speed	Unit: RPM
12	T2 Average	Actual temperature=DISP. Unit: °C
13	T2B Average	Actual temperature=DISP. Unit: °C
14	T3	Actual temperature=DISP. Unit: °C
15	T4	Actual temperature=DISP. Unit: °C
16	T5	Actual temperature=DISP. Unit: °C
17	T3B/TL	Actual temperature=DISP. Unit: °C
18	T10	Actual temperature=DISP. Unit: °C
19	T7C1	Actual temperature=DISP. Unit: °C
20	Reserved	
21	Reserved	
22	Reserved	
23	Reserved	Actual temperature=DISP. Unit: °C
24	Ntc	Actual temperature=DISP. Unit: °C
25	Tg	Actual temperature=DISP. Unit: °C
26	Reserved	
27	Discharge superheat degree	Actual temperature=DISP. Unit: °C
28	Primary current	Actual current=DISP./10 Unit: A
29	Inverter compressor current	Actual current=DISP./10 Unit: A
30	Reserved	
31	EEVA position	Actual Value=DISP. *24
32	Reserved	
33	Reserved	

Table 45 — System Check List (Cont.)

DISP.	CONTENT	DESCRIPTION
34	EEVD position	Actual Value=DISP. *4
35	High pressure of unit	Actual Pressure=DISP. /100 Unit: MPa
36	Low pressure of unit	Actual Pressure=DISP. /100 Unit: MPa
37	Quantity of online IDUs	Actual quantity
38	Quantity of running IDUs	Actual quantity
39	Heat exchanger status	[0] OFF
		[1] C1: Condenser
		[2] D1: Reserved
		[3] D2: Reserved
		[4] E1: Evaporator
		[5] F1: Reserved
		[6] F2: Reserved
40	Special mode	[0] Not in special mode
		[1] Oil return
		[2] Defrost
		[3] Startup
		[4] Stop
		[5] Quick check
		[6] Reserved
41	Silent mode	1-5
42	Reserved	
43	TES	Actual temperature=DISP. Unit: °C
44	TCS	Actual temperature=DISP. Unit: °C
45	DC Voltage	Actual voltage. Unit: V
46	AC Voltage	Actual voltage. Unit: V
47	Quantity of cooling mode IDUs	
48	Quantity of heating mode IDUs	
49	Capacity of cooling mode IDUs	
50	Capacity of heating mode IDUs	
51	Reserved	
52	Reserved	
53	Fan error	
54	Software version	
55	Last error code	Service code
56	VRF/Unitary	0: VRF 1: Unitary
57	Reserved	
58	Reserved	
59	Reserved	

NOTES:

1. Need to convert to current compressor output volume, example: compressor output volume is 70, Target frequency =Actual frequency * 70 / 60.
2. Te: Low pressure equivalent saturation temperature (°C) Tes: Target Te value.
   Tc: High pressure equivalent saturation temperature (°C) Tcs: Target Tc value.

ELECTRICAL COMPONENTS AND WIRING DIAGRAMS

OUTDOOR UNIT ELECTRIC CONTROL BOX LAYOUT

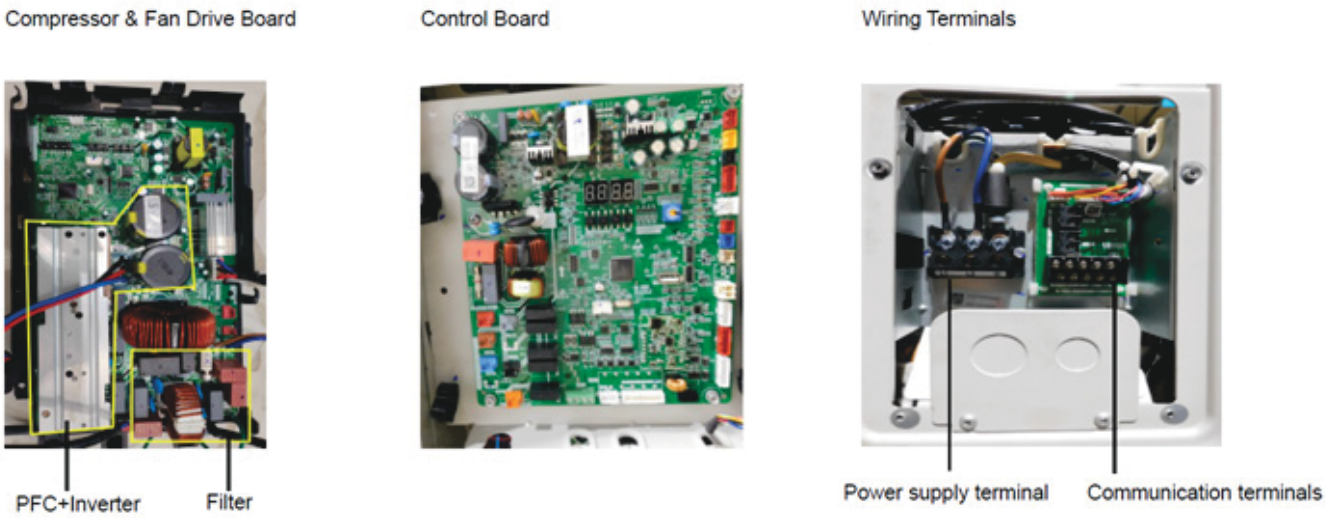


Fig. 31 —1.5/2.0 ton electric control box

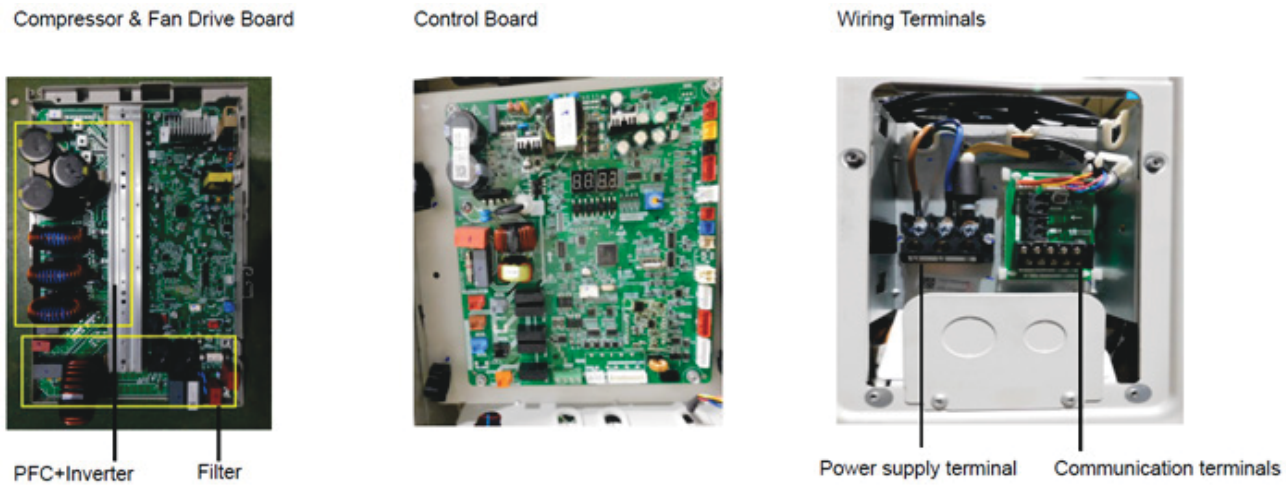


Fig. 32 —2.5/3.0 ton electric control box

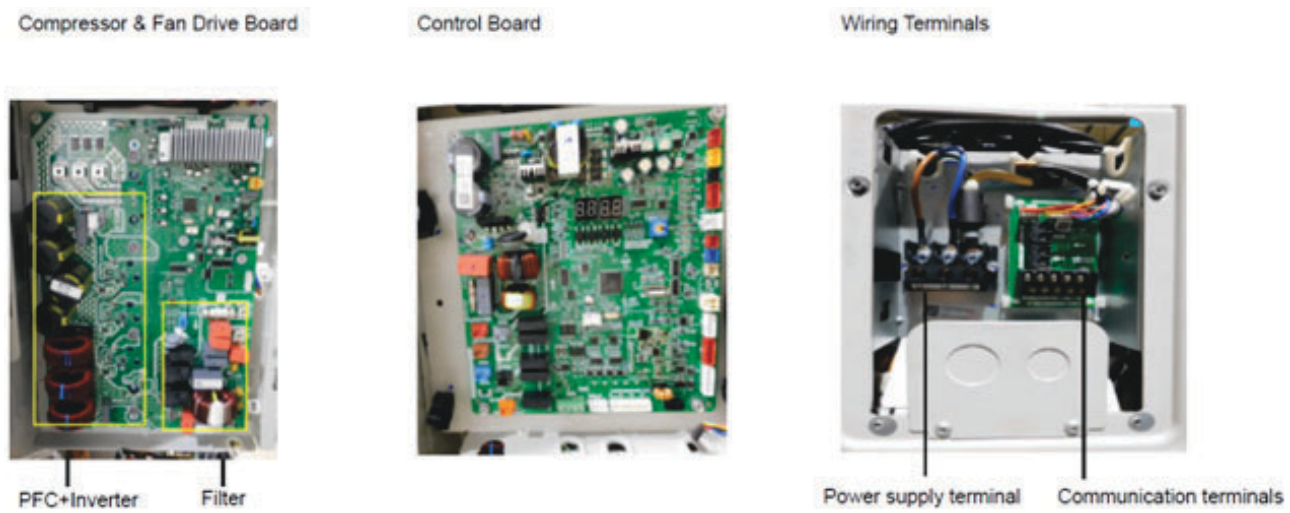


Fig. 33 —4.0/5.0 ton electric control box

OUTDOOR UNIT MAIN CONTROL BOARD PORTS

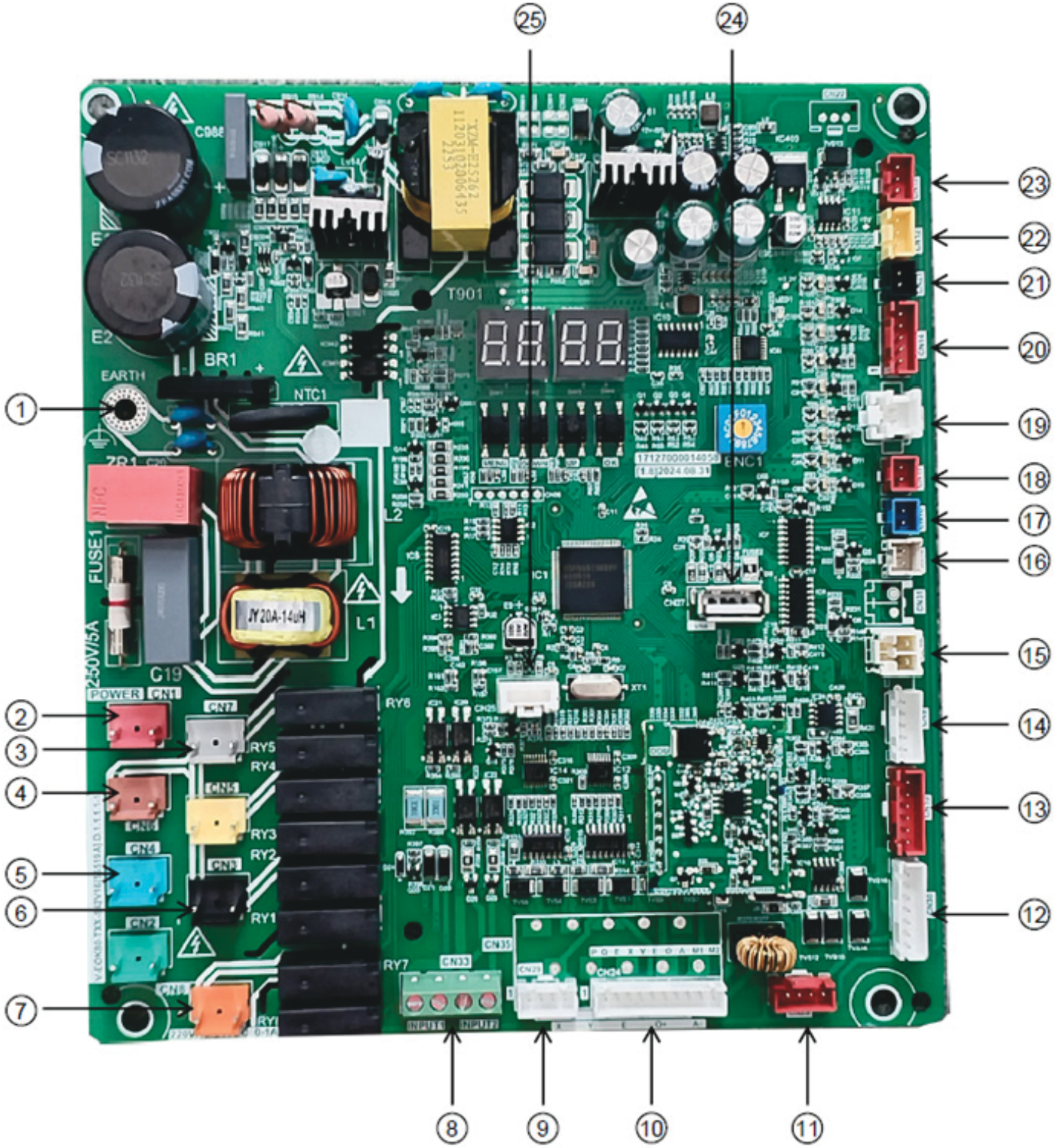


Fig. 34 —Outdoor unit main control board ports

NOTE: Label descriptions are given in Table 46.

Table 46 — Main Control Board

Label in Figure 1-1	Port code	Content	Port voltage
1	EARTH	Earth	0VDC
2	CN1	Power input	220VAC
3	CN7	HEAT: Compressor crankcase heater	220VAC
4	CN6	HEATB: Chassis electric heating belt	220VAC
5	CN4	ST1: Four-way valve	220VAC
6	CN3	SV4: Solenoid valve (Only for 2.5/3Ton and 4/5Ton)	220VAC
7	CN8	DCO: Dry contact output (Passive)	Passive
8	CN33	DCI 1&2: Dry contact input 1&2	5VDC
9	CN29	Conventional 24VAC non-communicating control signal	24VAC
10	CN24	X/Y/E/M1/M2/O/A communication port (From left to right)	5VDC+24VDC
11	CN28	Smart module communication	5VDC
12	CN30	Communication port between the Control Board and the Drive Board	5VDC+12VDC
13	CN10	EEVD: Electronic expansion valve D	12VDC
14	CN9	EEVA: Electronic expansion valve A	12VDC
15	CN32	L-PRO: Low pressure switch	3.3VDC
16	CN15	T3: Heat exchanger temperature sensor	3.3VDC
17	CN16	T4: Outdoor ambient temperature sensor	3.3VDC
18	CN34	T5: Liquid pipe temperature sensor	3.3VDC
19	CN18	T10: Additional ambient temperaturesensor (optional)	3.3VDC
20	CN14	T3B: Heat exchanger middle temperature sensor (Only for 1.5/2Ton) (Down) TL: Heat exchanger liquid temperature sensor (2.5/3Ton and 4/5Ton) (Down) Tg: Suction temperature sensor (Up)	3.3VDC
21	CN21	T7C1: Discharge temperature sensor	3.3VDC
22	CN12	Pc/Pe: Pressure sensor (Only for 1.5/2Ton) Pc: High pressure sensor (Only for 2.5/3Ton & 4/5Ton)	5VDC
23	CN13	Pe: Low pressure sensor (Only for 2.5/3Ton & 4/5Ton)	5VDC
24	CN27	USB port	5VDC
25	CN25	Debug port	3.3VDC

OOUTDOOR UNIT MAIN CONTROL BOARD COMPONENTS

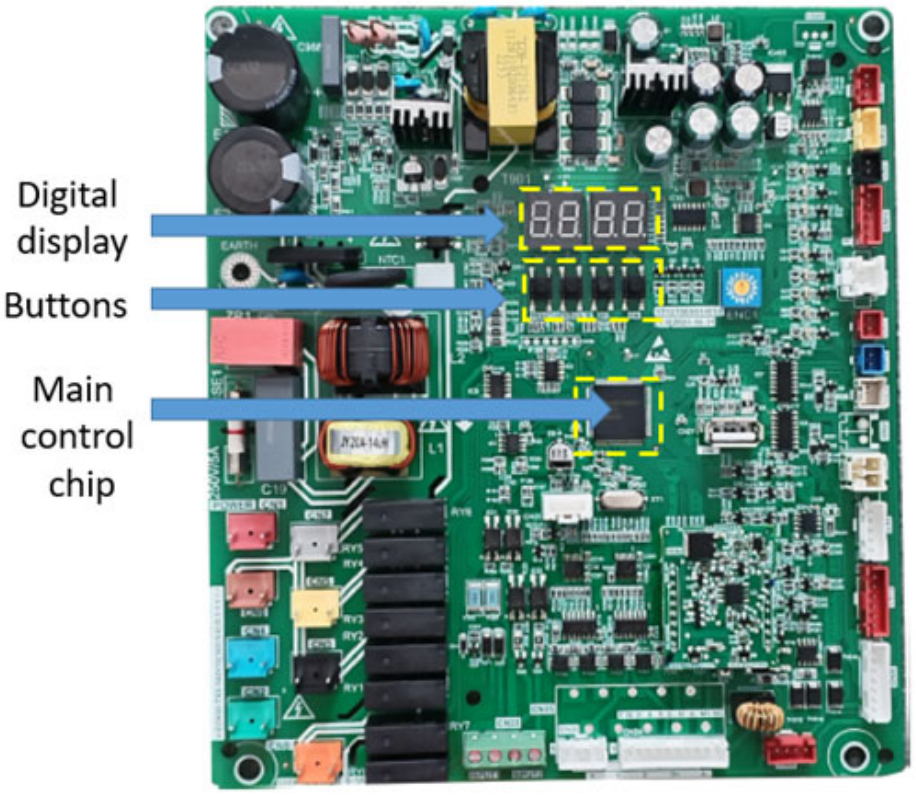


Fig. 35 —Outdoor Unit Main Control Board Components

Table 47 — Function of buttons SW3 to SW6

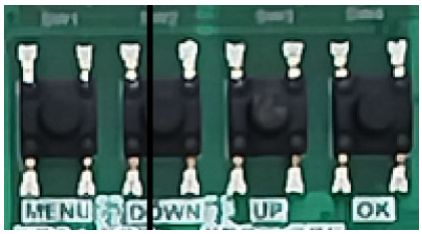
Button	Function	
SW3 (UP)	In menu mode: previous and next buttons for menu modes. Not in menu mode: previous and next buttons for system check information.	
SW2 (DOWN)		
SW1 (MENU)	Enter / exit menu mode.	
SW4 (OK)	Confirm to enter specified menu mode.	

Table 48 — Digital Display Output in Different Operating States

Outdoor unit state	Parameters displayed on DSP1	Parameters displayed on DSP2	
Standby	The address of outdoor unit	The number of indoor units in communication with the outdoor units	
Normal operation	--	Running speed of the compressor in rotations per second	
Error or protection	Placeholder and error or protection cod		
In menu mode	Display menu mode code Refer to *Table 4-2.3 Menu mode function:*		
System check	Display system check code Refer to *Table 4-3.1 system check list*		

COMPRESSOR AND FAN DRIVE BOARD

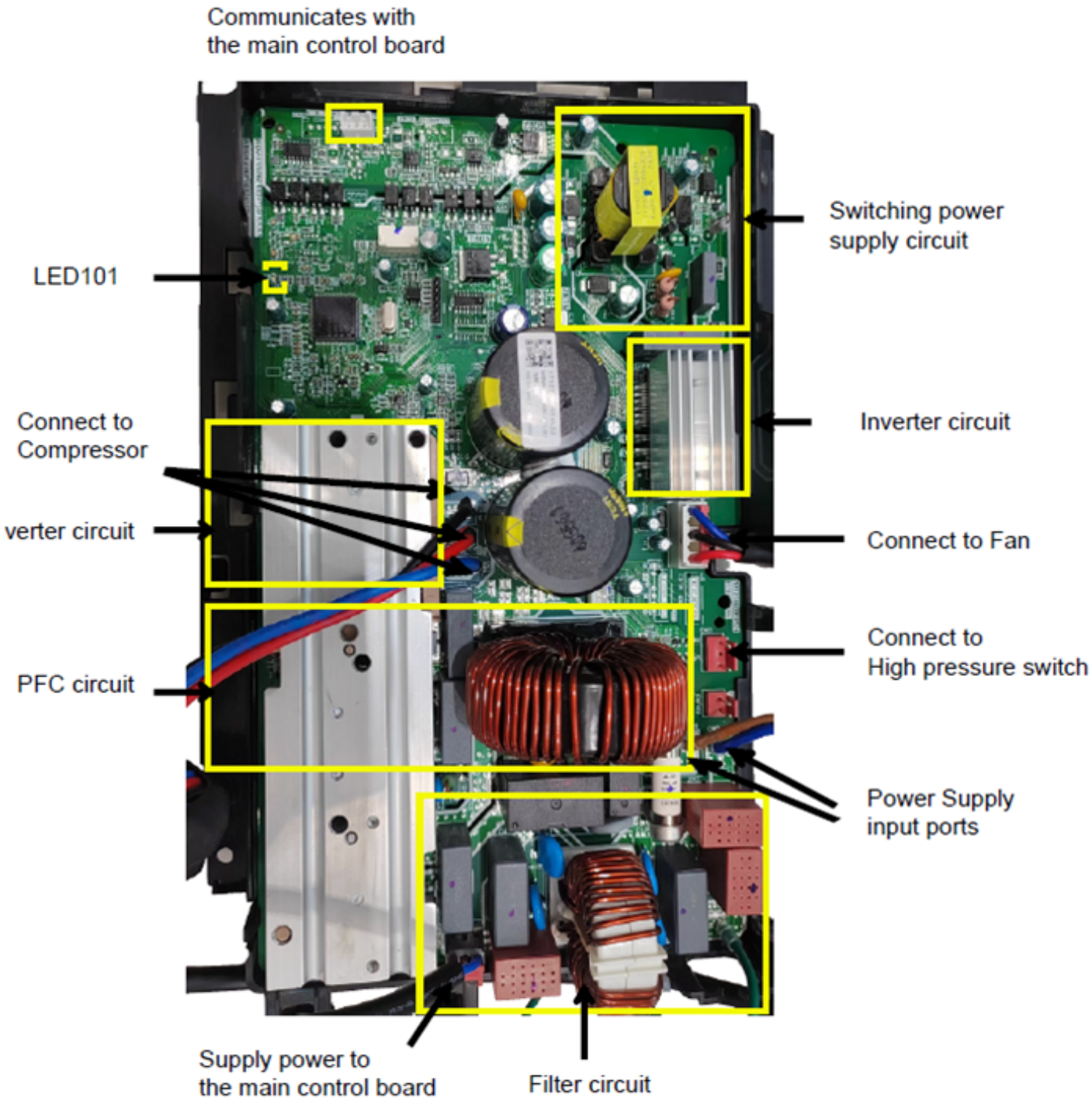


Fig. 36 —1.5/2.0 Ton Compressor and Fan Drive Board

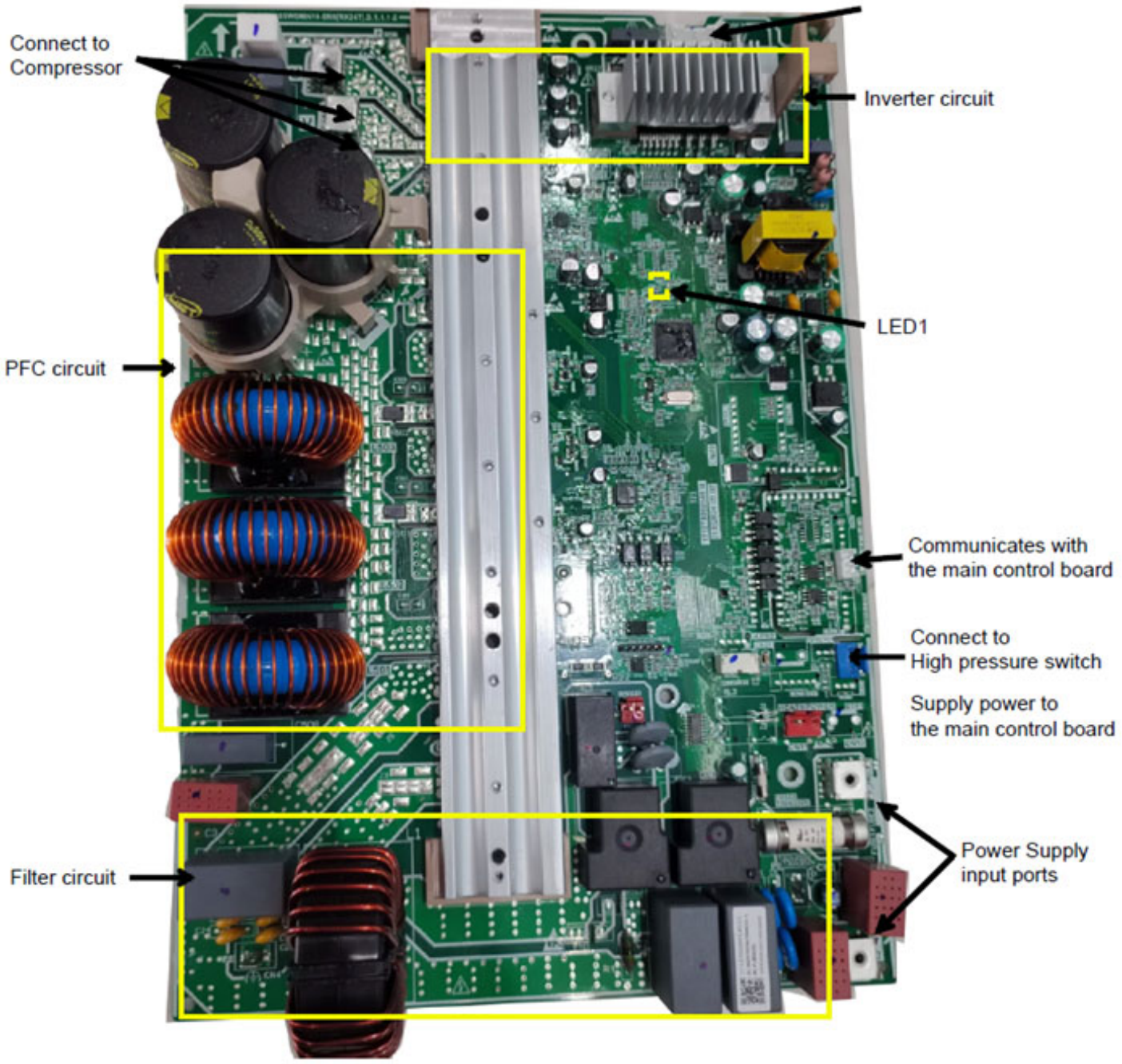


Fig. 37 —2.5 / 3.0 Ton Compressor and Fan Drive Board

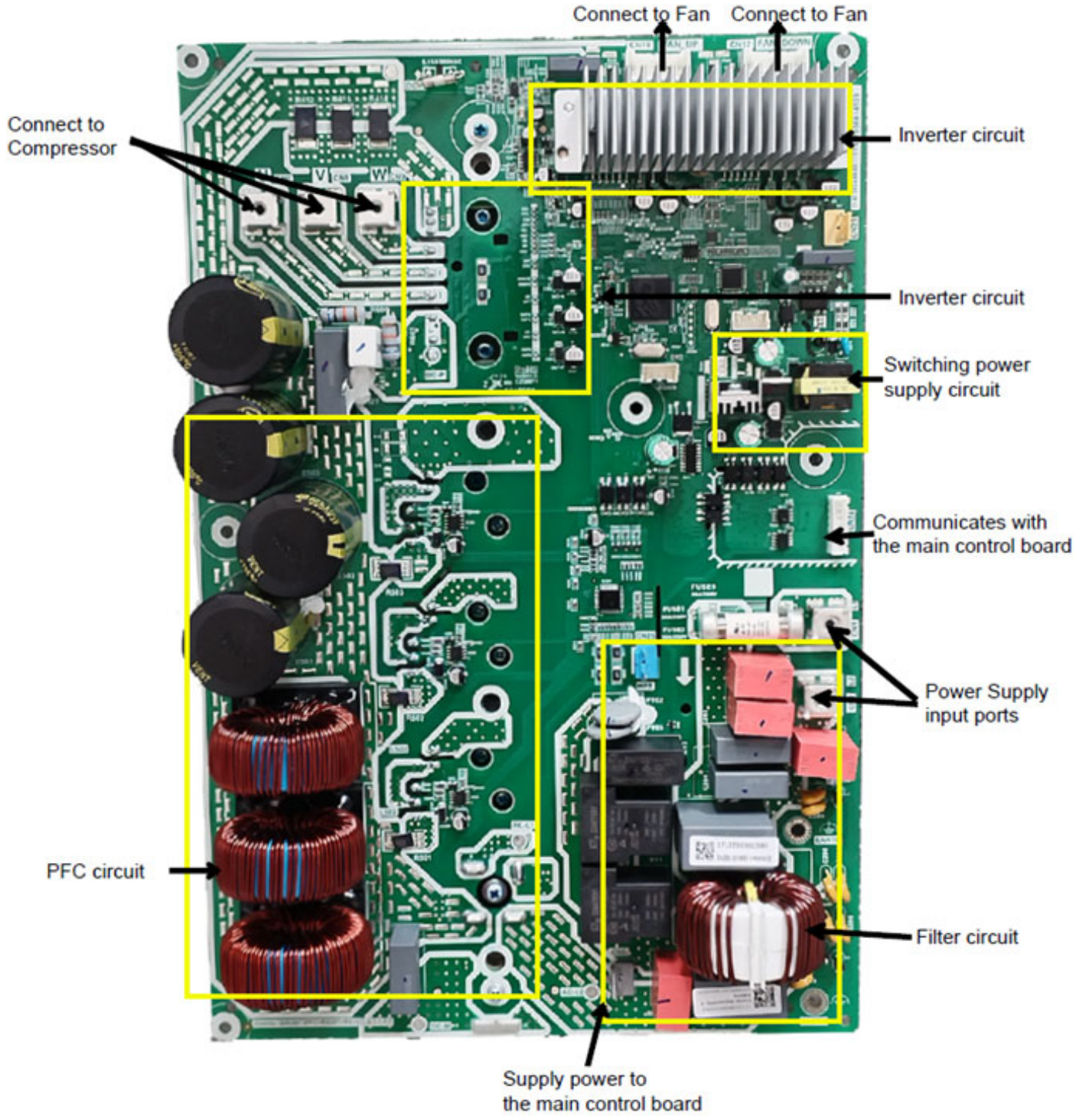


Fig. 38 —4.0 / 5.0 Ton Compressor and Fan Drive Board

WIRING DIAGRAMS

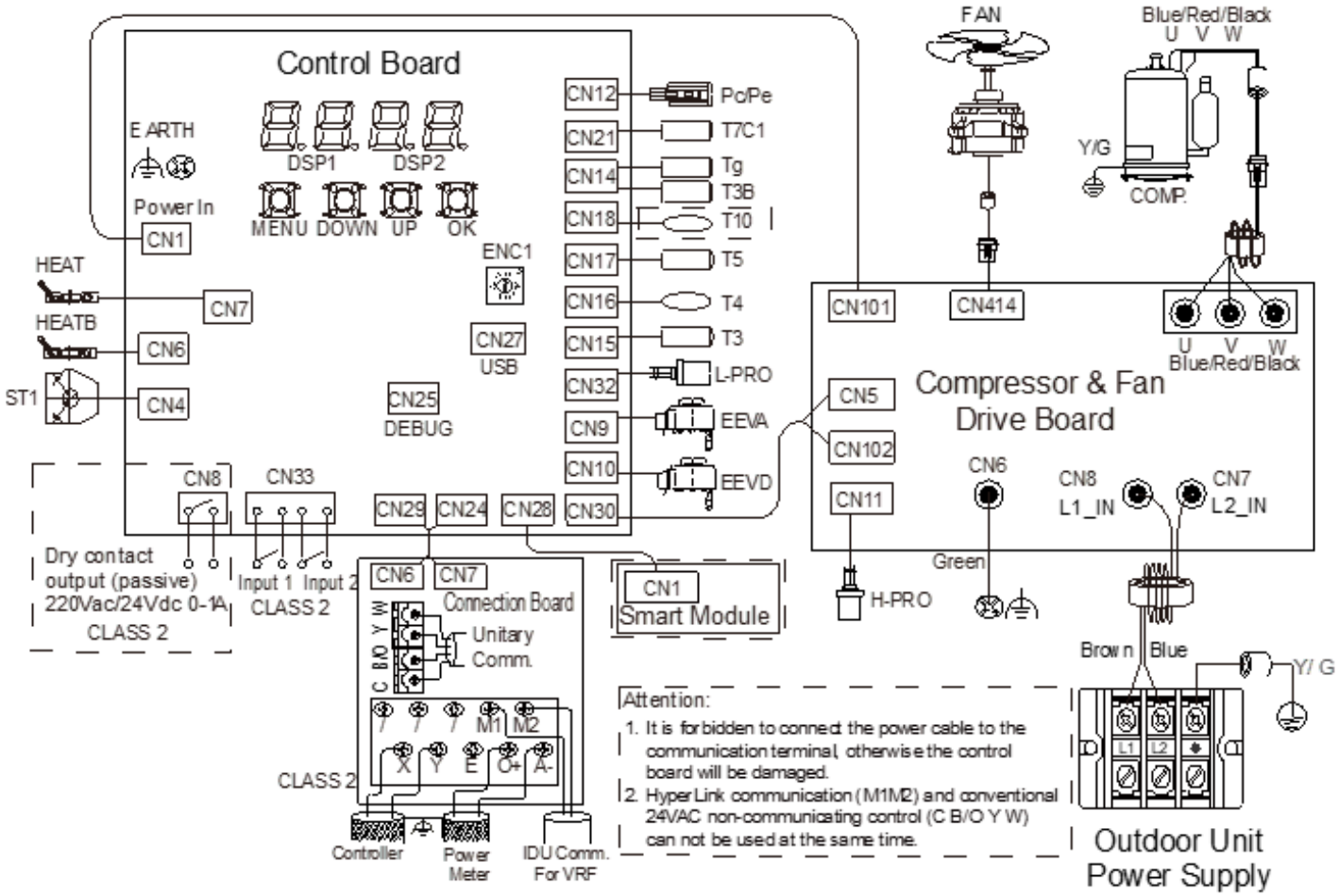


Fig. 39 —1.5 / 2.0 Ton Wiring Diagram

Table 49 — Legend

Code	Name		Code	Name
COMP	Compressor		Pc	High pressure sensor
EEVA/D	Electronic expansion valve		Pe	Low pressure sensor
FAN	DC Fan		T3B	Heat exchanger middle temperature sensor
HEAT	Crankcase heater		T4	Outdoor ambient temperature sensor
HEATB	Chassis electric heating belt		T5	Liquid pipe temperature sensor
H-PRO	High pressure switch		Tg	Suction temperature sensor
L-PRO	Low pressure switch		T10	Additional ambient temperature sensor (optional)
ST1	Four-way valve		T7C1	Compressor discharge temperature sensor
T3	Heat exchanger temperature sensor			

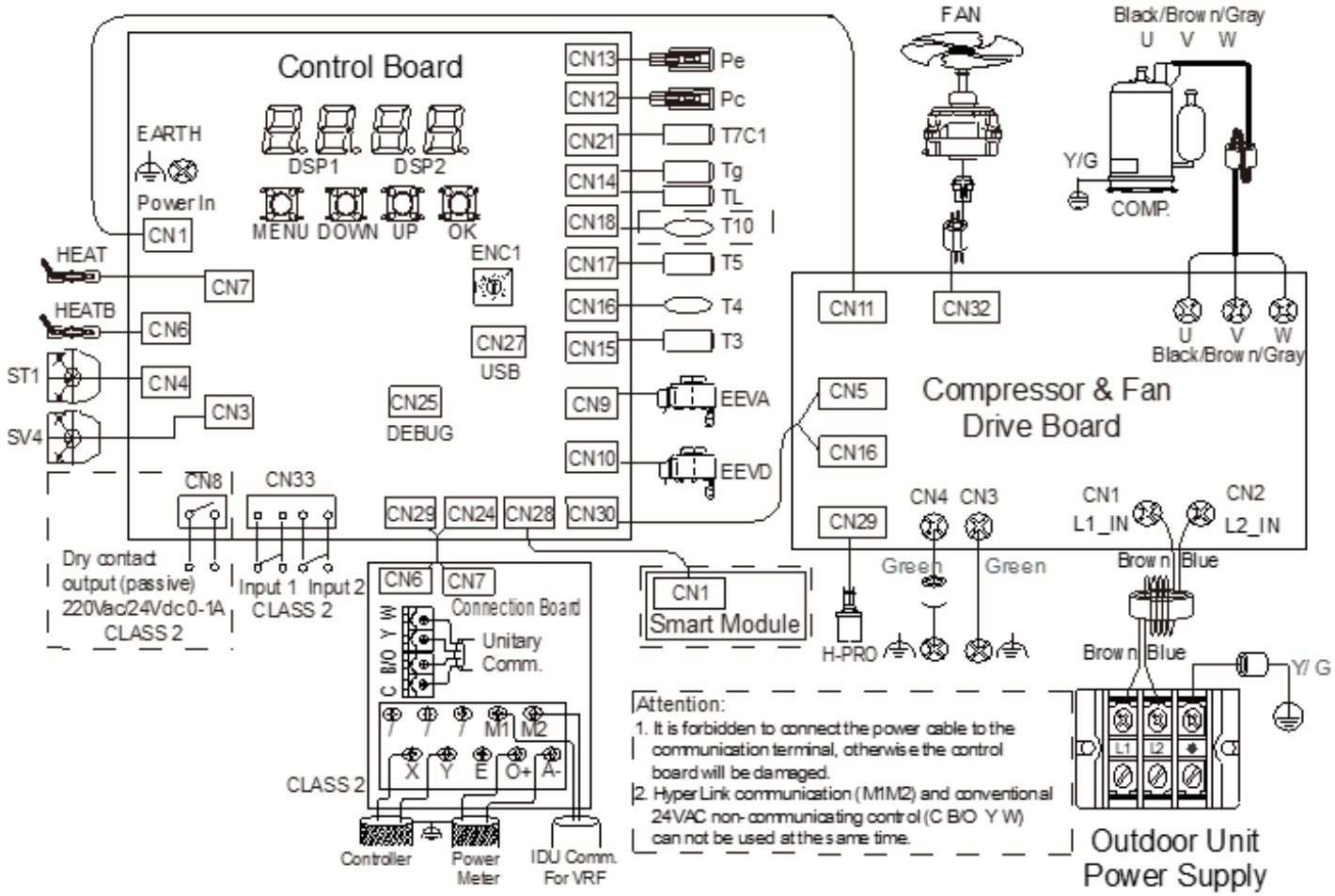


Fig. 40 —2.5 / 3.0 Ton Wiring Diagram

Table 50 — Legend

Code	Name		Code	Name
COMP	Compressor		Pe	Low pressure sensor
EEVA/D	Electronic expansion valve		T3	Heat exchanger temperature sensor
FAN	DC Fan		T4	Outdoor ambient temperature sensor
HEAT	Crankcase heater		T5	Liquid pipe temperature sensor
HEATB	Chassis electric heating belt		Tg	Suction temperature sensor
H-PRO	High pressure switch		T10	Additional ambient temperature sensor (optional)
ST1	Four-way valve		T7C1	Compressor discharge temperature sensor
SV4	Solenoid valve		TL	Heat exchanger liquid temperature sensor
Pc	High pressure sensor			

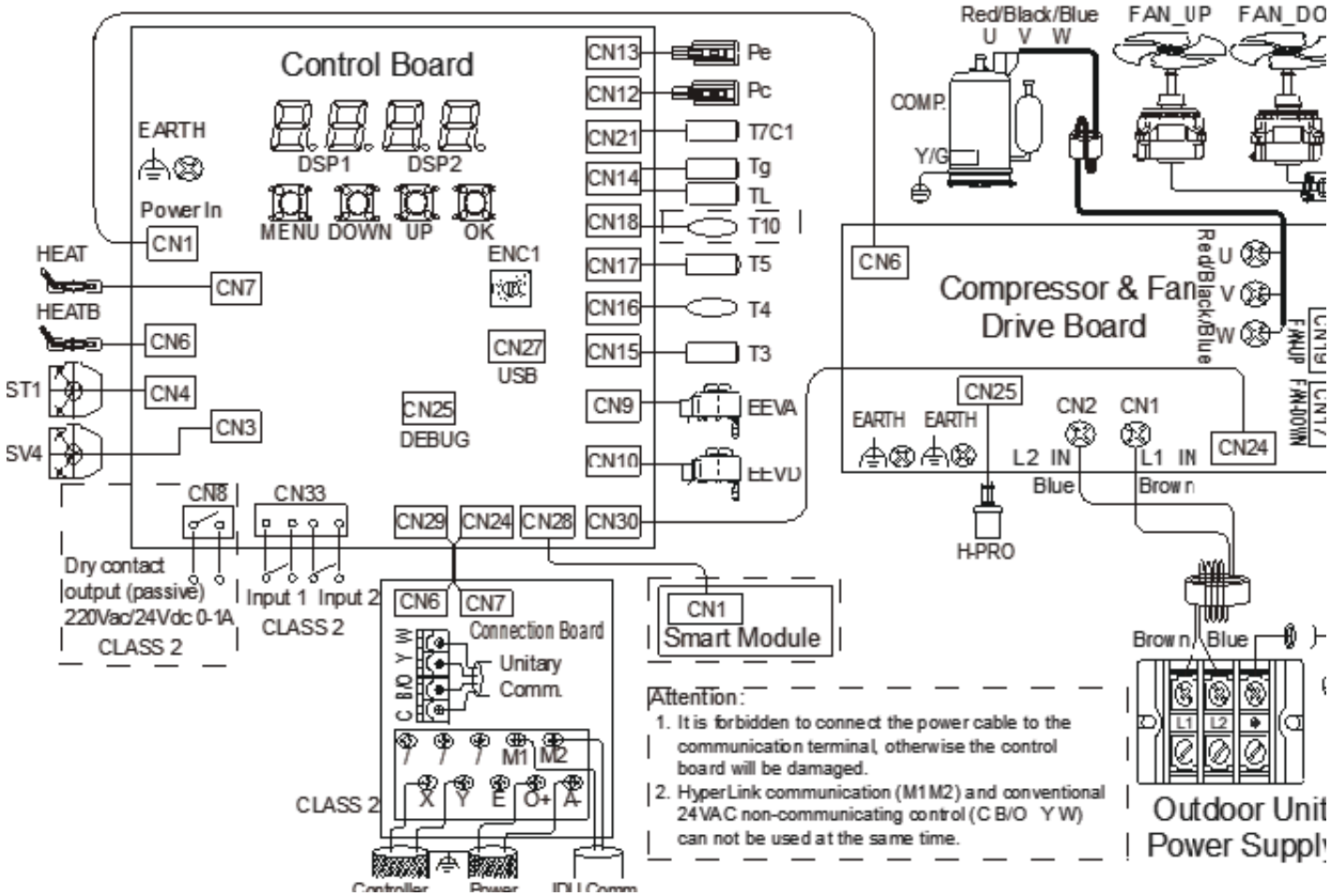


Fig. 41 —4.0 / 5.0 Ton Wiring Diagram

Table 51 — Legend

Code	Name		Code	Name
COMP	Compressor		Pe	Low pressure sensor
EEVA/D	Electronic expansion valve		T3	Heat exchanger temperature sensor
FAN_UP/ FAN_DOWN	DC Fan		T4	Outdoor ambient temperature sensor
HEAT	Crankcase heater		T5	Liquid pipe temperature sensor
HEATB	Chassis electric heating belt		Tg	Suction temperature sensor
H-PRO	High pressure switch		T10	Additional ambient temperature sensor (optional)
ST1	Four-way valve		T7C1	Compressor discharge temperature sensor
SV4	Solenoid valve		TL	Heat exchanger liquid temperature sensor
Pc	High pressure sensor			

COOLING CAPACITY <<Get tables in Excel>>

Table 52 — 3 Ton Capacity

OPERATING LIMITS

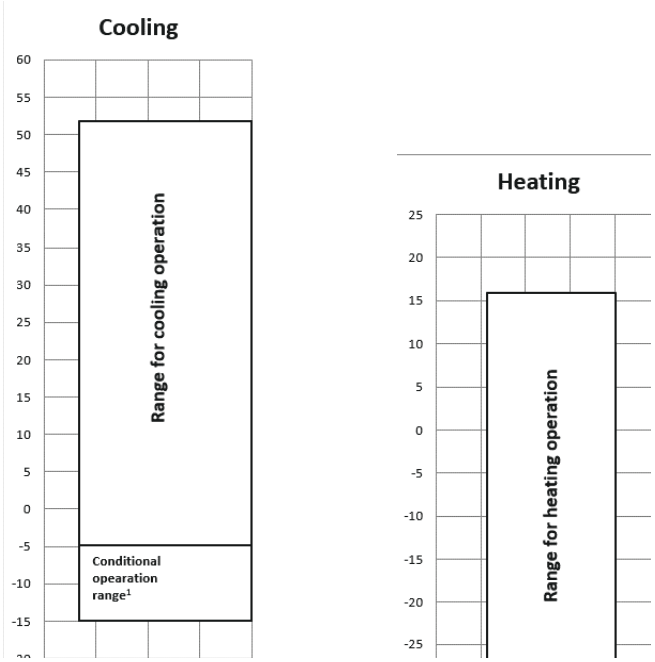


Fig. 42 —Operating Limits

Note1: Outdoor operating temperature under 23 ºF in "Cool" mode, the startup capacity of indoor units must meet at least 50% of outdoor unit capacity.

Table 53 — Operating Limits (ºF)

Mode	Outdoor Temperature	Room Temperature
Cooling operation	5 ºF to 125 ºF	62.6 ºF to 89.6 ºF
Heating operation	-22 ºF to 86 ºF	62.6 ºF to 86 ºF
Dehumidification operating	5 ºF to 125 ºF	48.2 ºF to 73.4 ºF

NOTE:

1. **If the unit is running outside the above condition, protective device will start, and even then the units take place abnormality running.**
2. **These figures base on the operation conditions between indoor units and outdoor units: Equivalent pipe length is 5m, and height difference is 0m.**

CAUTION

The indoor relative humidity should be lower than 80%. If the air conditioner works in an environment with a relative humidity higher than mentioned above, the surface of the air conditioner may condensate. In this case, it is recommended to set the air speed of the indoor unit to high.

SOUND LEVELS

Table 54 — Sound Pressure Level

Mode	Outdoor Temperature	Room Temperature
37MVH036HDS3	59	1
37MVH048HDS3	60	1
37MVH060HDS3	60	1

NOTE: Sound pressure level is measured at a position 1m in front of the unit and Hm above the floor in a semi-anechoic chamber. During in-situ operation, sound pressure levels may be higher as a result of ambient noise.

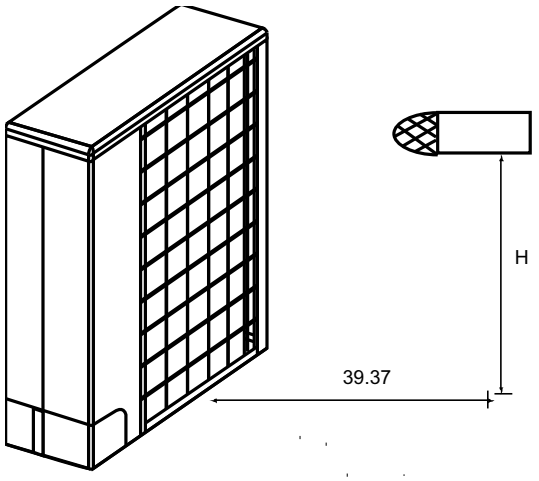


Fig. 43 —Sound Pressure Level Measurement (unit: in)

Octave Band Levels

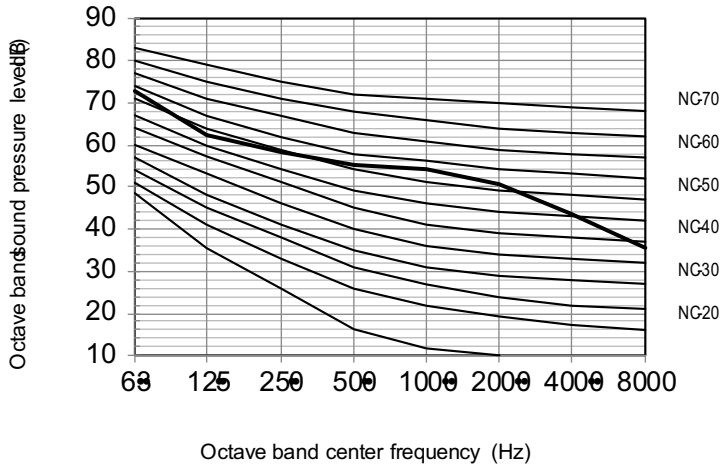


Fig. 44 —3 Ton Unit

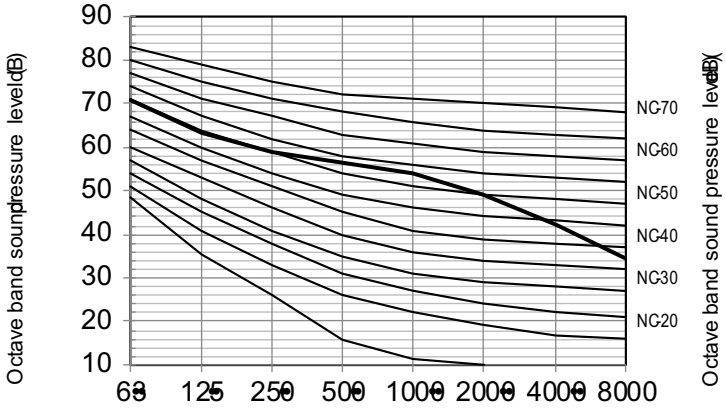


Fig. 45 —4 Ton Unit

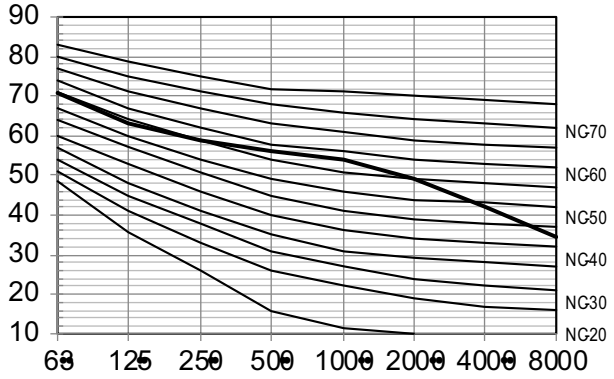


Fig. 46 —5 Ton Unit

DIAGNOSTICS AND TROUBLESHOOTING

Table 55 — Outdoor Error Codes

Error code	Error description	Manual re-start require
A01	Emergency stop	NO
A11	Indoor unit refrigerant leakage	YES
A15	Recover refrigerant after refrigerant leakage and shut down	NO
Ad1	Refrigerant shut-off device error	NO
C21	Communication error between indoor and outdoor unit	NO
C26	Number of indoor units detected by the outdoor unit has decreased	NO
C28	Number of indoor units detected by the outdoor unit has increased	NO
C2A	Communication error between outdoor unit and refrigerant shut-off device	NO
1C41	Communication error between main control chip and inverter driver chip	NO
E41	Outdoor ambient temperature sensor (T4) error (open/short)	NO
EC1	Refrigerant leakage sensor error	NO
F41	Outdoor heat exchanger temperature sensor (T3) error (open/short)	NO
F42	T3 temperature sensor overtemperature protection	NO
F43	T3B temperature sensor error (open/short)	NO
F62	Inverter module overtemperature (Tf) protection	NO
F6A	F62 protection occurs 3 times in 100 minutes	YES
F71	Discharge temperature sensor (T7C1) error (open/short)	YES
F72	Discharge temperature (T7C1) protection	NO
F75	Compressor discharge insufficient superheat protection	NO
F7A	F72 protection occurs 3 times in 100 minutes	YES
F81	Tg temperature sensor error (open/short)	NO
F91	Liquid pipe temperature sensor (T5) error (open/short)	NO
FC1	Outdoor heat exchanger outlet temperature sensor (TL) error (open/short)	NO
FL1	T10 temperature sensor error (open/short)	NO
1L--	Compressor error. Refer to Table 19.3 for indications of “--”	YES
1L01	1L1* error occurs 3 times in 60 minutes. Refer to Table 19-3 for indications of “*”	YES
1J--	Fan motor error. Refer to Table 19-4 for indications of “--”	YES
1J01	1J1* error occurs 10 times in 60 minutes. Refer to Table 19-4 for indications of “*”	YES
1b01	EEVA error	YES
4b01	EEVD error	YES
P11	High pressure sensor error	NO
P12	Discharge pipe high pressure protection	NO
P13	Discharge pipe high pressure switch protection	NO
P14	P12 protection occurs 3 times in 60 minutes	YES
P21	Low pressure sensor error	YES
P22	Suction pipe low pressure protection	NO
P23	Suction pipe low pressure switch protection	NO
P24	Suction pipe low pressure abnormal rise	NO
P25	P22 error occurs 3 times in 100 minutes	YES
1P32	Compressor high DC bus current protection (software protection)	NO
1P33	1P32 protection occurs 3 times in 100 minutes	YES
P51	High AC voltage protection	NO
P52	Low AC voltage protection	NO
P54	DC bus low voltage protection	NO
1P56	Inverter module DC bus low voltage error	YES
1P57	Inverter module DC bus high voltage error	YES
1P58	Inverter module DC bus seriously high voltage error	YES
1P59	Inverter module busbar voltage drop protection	YES
P71	EEPROM error	YES
P91	PFC feedback resistance failure protection	YES
Pb1	HyperLink overcurrent error	NO
pd1	Anti-condensation protection	NO
pd2	Pd1 protection occurs 2 times in 60 minutes	YES

Table 56 — Installation and Debugging Error Codes

Error code	Error description	Manual re-start require
U02	Technology barrier	NO
U11	Unit type is not set	YES
U12	Capacity setting error	YES
U13	Indoor unit type setting error	YES
U21	Indoor unit with old platform in the system	YES
U31	The test run is not performed or was not successful	YES
U32	The test run is not performed or was not successful	YES
U33	Indoor temperature out of operating range	YES
U34	Outdoor and indoor temperature out of operating range	YES
U35	Liquid side stop valve is not opened	YES
U37	Gas side stop valve is not opened	YES
U38	No address	YES
U3A	The communication cable is connected incorrectly	NO
U3b	The installation environment is abnormal	YES
U3C	Auto mode error	NO
U41	Common indoor unit exceeds the allowable connection range	YES

Table 57 — Compressor Drive Error Codes

Error code	Error description	Manual re-start require
1L1E	Hardware overcurrent	NO
1L11	Software overcurrent	NO
1L12	Software overcurrent protection last 30s	NO
1L2E	Inverter module high temperature protection	NO
1L3E	Low bus voltage error	NO
1L31	High bus voltage error	NO
1L32	Serious over voltage error of bus	NO
1L43	Abnormal current sampling	NO
1L45	Motor code mismatch	YES
1L46	IPM protection	NO
1L47	Module type mismatch	YES
1L5E	Startup failed	NO
1L51	Stall failure	NO
1L52	No load protection	NO
1L6E	Motor phase loss protection	NO
1LbE	High voltage switch action	NO
1Lb7	Other check exceptions/908 diagnosis error	NO

Table 58 — Fan Motor Drive Error Codes

Error code	Error description	Manual re-start require
1J1E	Hardware overcurrent	NO
1J11	Software overcurrent	NO
1J12	Software overcurrent protection in last 30s	NO
1J2E	Inverter module high temperature protection	NO
1J3E	Low bus voltage error	NO
1J31	High bus voltage error	NO
1J32	Serious over voltage error of bus	NO
1J43	Abnormal current sampling	NO
1J5E	Startup failed	NO
1J51	Stall failure	NO
1J52	No load protection	NO
1J6E	Motor phase loss protection	NO

Table 59 — Status Codes

Error code	Error description	Manual re-start require
d0x	Oil return running, x represents oil return operation steps	NO
dfx	Defrost running, x represents defrosting operation steps	NO
d31	Refrigerant judgment, no result	NO
d32	Refrigerant quantity judgment, Significantly excessive	NO
d33	Refrigerant quantity judgment, Slightly excessive	NO
d34	Refrigerant quantity judgment, normal	NO
d35	Refrigerant quantity judgment, Slightly insufficient	NO
d36	Refrigerant quantity judgment, Significantly insufficient	NO
d41	There is a no power indoor unit in the system, HyperLink is controlling the indoor unit's valve	NO

ERROR IN MAIN CONTROL

A01: Emergency Stop

Definition and inspection of faults:

The emergency stop signal is detected

Probable causess:

- Controller send emergency signal to outdoor unit
- Defective main board

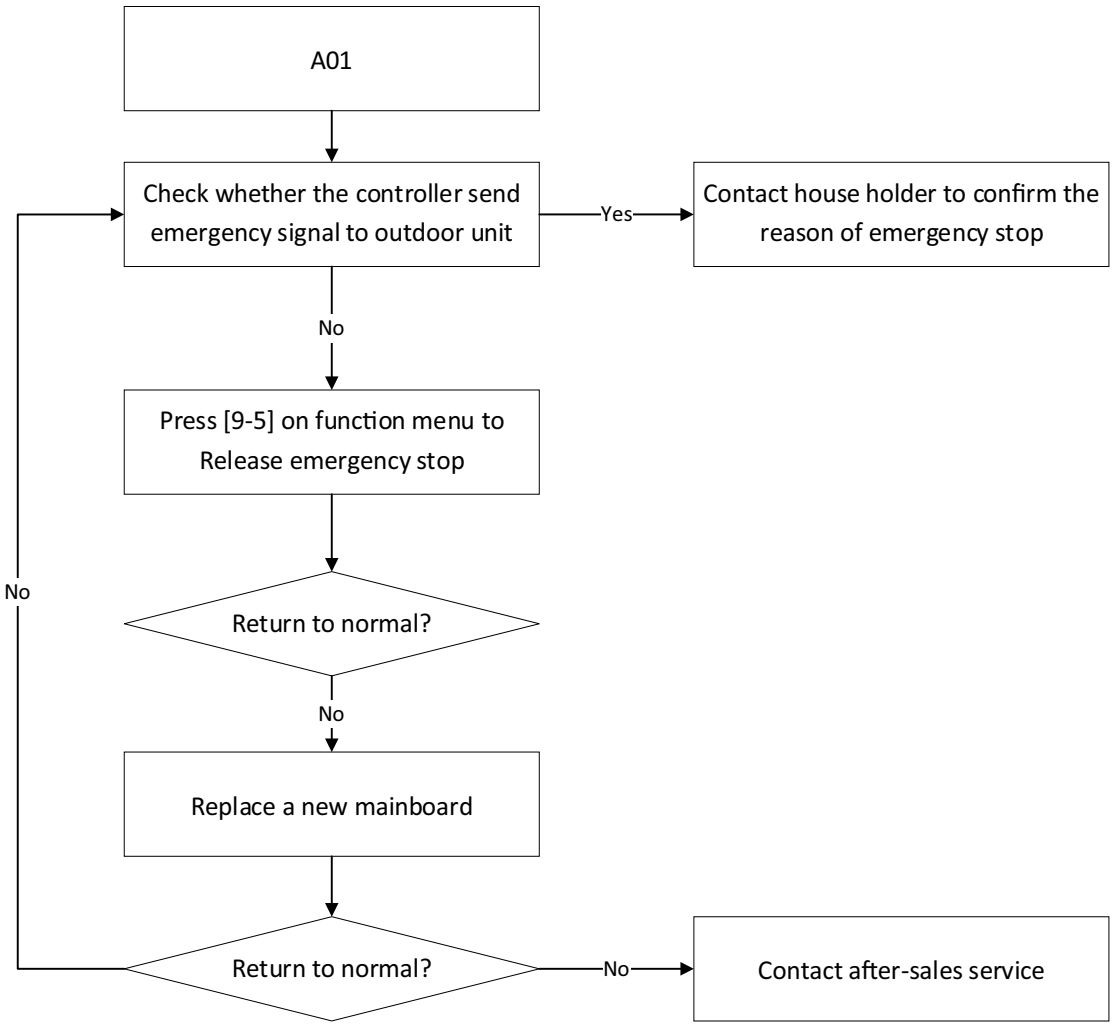


Fig. 47 —A01: Emergency Stop

A11: Refrigerant Leakage Error

Definition and inspection of faults:

Refrigerant leakage occurs

Probable causes:

- Refrigerant leakage occurs
- Malfunction of refrigerant detection sensor

1b01/4b01: Electronic Expansion Valve (EEVA/D) Error

Definition and inspection of faults:

- The electronic expansion valve signal was not detected by the mainboard for 2 minutes

Probable causes:

- The electric expansion valve (EEVA/D) winding is disconnected to mainboard
- The electric expansion valve (EEVA
- /D) winding is mismatching
- Defective electric expansion valve (EEVA
- /D) winding
- Defective mainboard

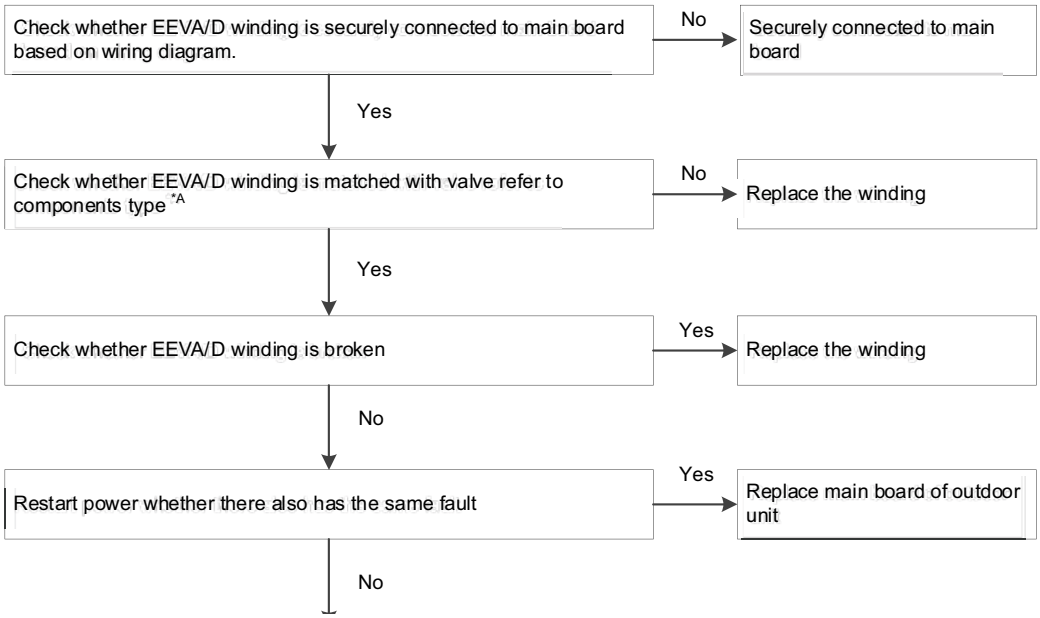


Fig. 48 —1b01/4b01: Electronic Expansion Valve (EEVA/D) Error

NOTE:

- **Refer to key components and parts type in Appendix**
- **“4b01” error only happened during refrigerant auto-charging mode**

C21: Communication error between indoor units and outdoor unit

Definition and inspection of faults

- Outdoor unit can't communicate with indoor units

Probable causes

- Communication cables between ODU and IDUs are unstably or wrongly connected, or in short circuit.
- Communication cables between communication board and main board are unstably or wrongly connected, or in short circuit.
- Abnormal power supply for all IDUs
- Damaged main board or communication board
- Too long communication wiring (Over 3937ft.)
- External cause (e.g. electromagnetic interference)

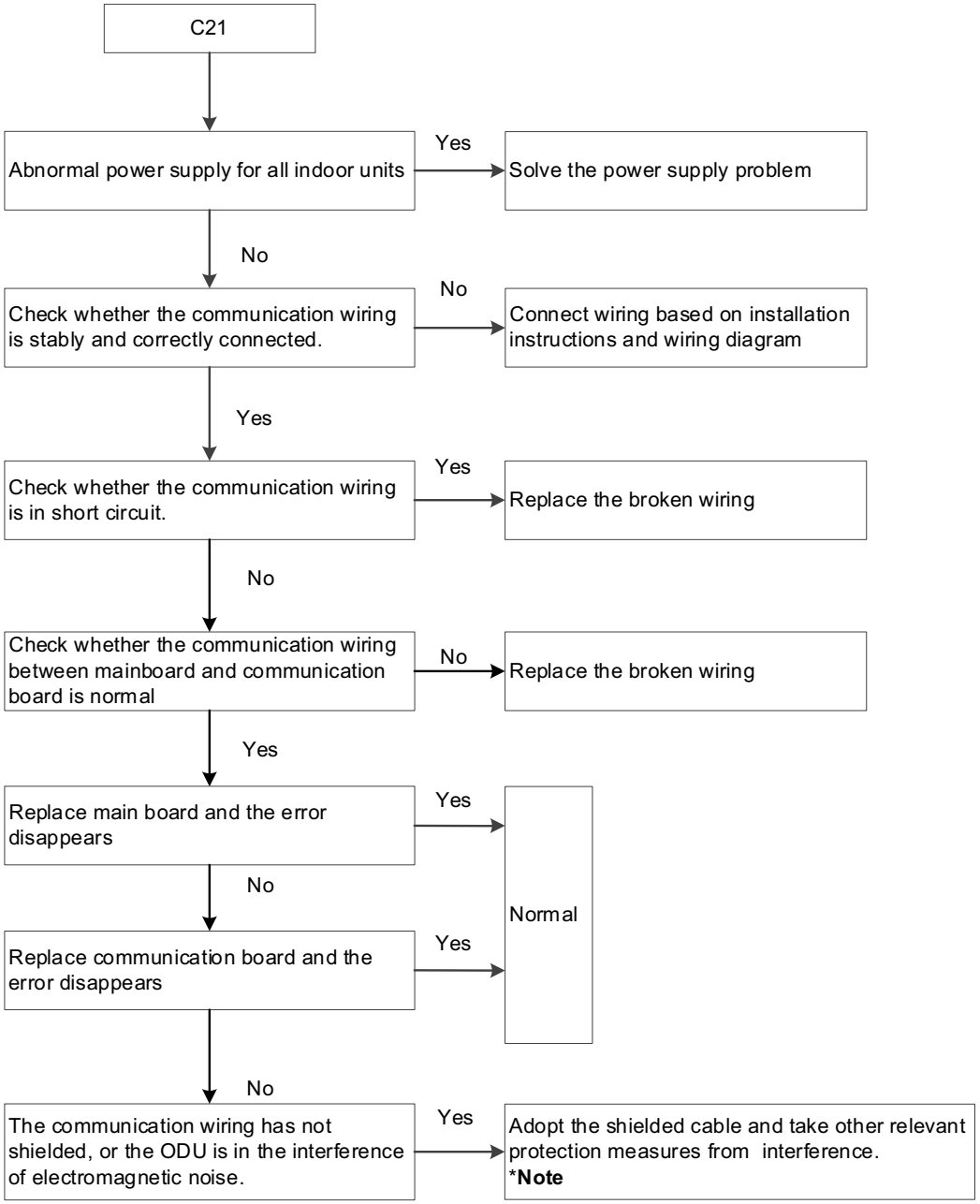


Fig. 49 —C21: Communication error between indoor units and outdoor unit

NOTE: Make sure that the matched resistance has been connected in the last indoor unit.

C26/C28: Number of indoor units detected by the outdoor unit has decreased/increased

Definition and inspection of faults

- The total number of IDUs set in commission is not the same as the actual detected total ones

Probable causes

- Repetitive addresses are exist for the IDUs in the refrigerant system
- Power supply abnormal for some IDUs
- Communication cable from some IDUs to ODU is improperly connected or in short circuit.
- Defective main board to individual IDU
- Defective ODU mainboard
- Defective ODU communication board

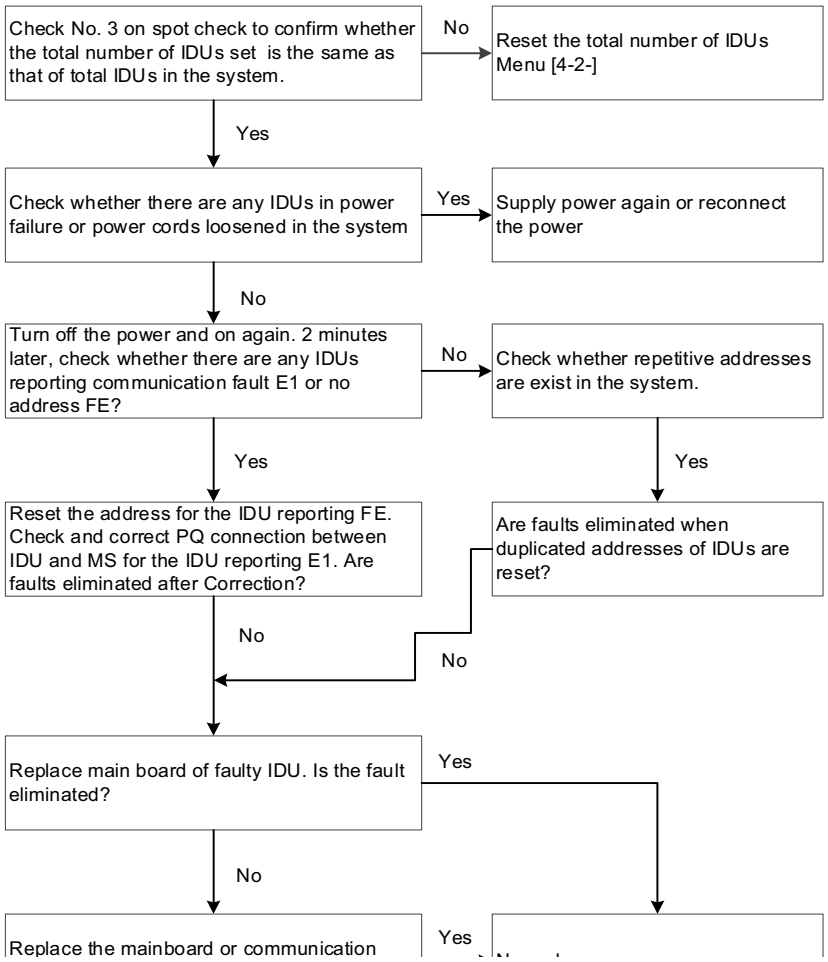


Fig. 50 —C26/C28: Number of indoor units detected by the outdoor unit has decreased/increased

1C41: Communication error between main control chip and inverter driver chip

Definition and inspection of faults

- Communication fault between main board and compressor drive board

Probable causes

- Defective ODU mainboard

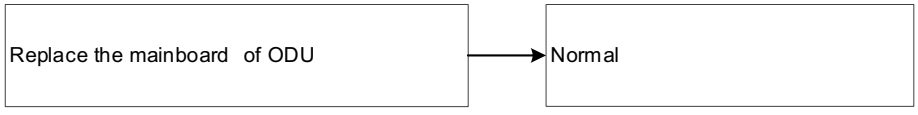


Fig. 51 —1C41: Communication error between main control chip and inverter driver chip

E41/F41/F91/FA1/FC1/Fd1: T4/T3/T3B/T5/TL/Tg error (open/short)

Definition and inspection of faults

- The temperature sensor (T4/T3/T7C/T5/T8/TL/T7) has short circuit or open circuit.
- Detective voltage > 4.95V or < 0.05V

Probable causes

- Contact failure between sensor and main board
- The temperature sensor is located at wrong place
- Temperature sensor failure
- There are other heat sources around the sensor
- Defective main board of ODU

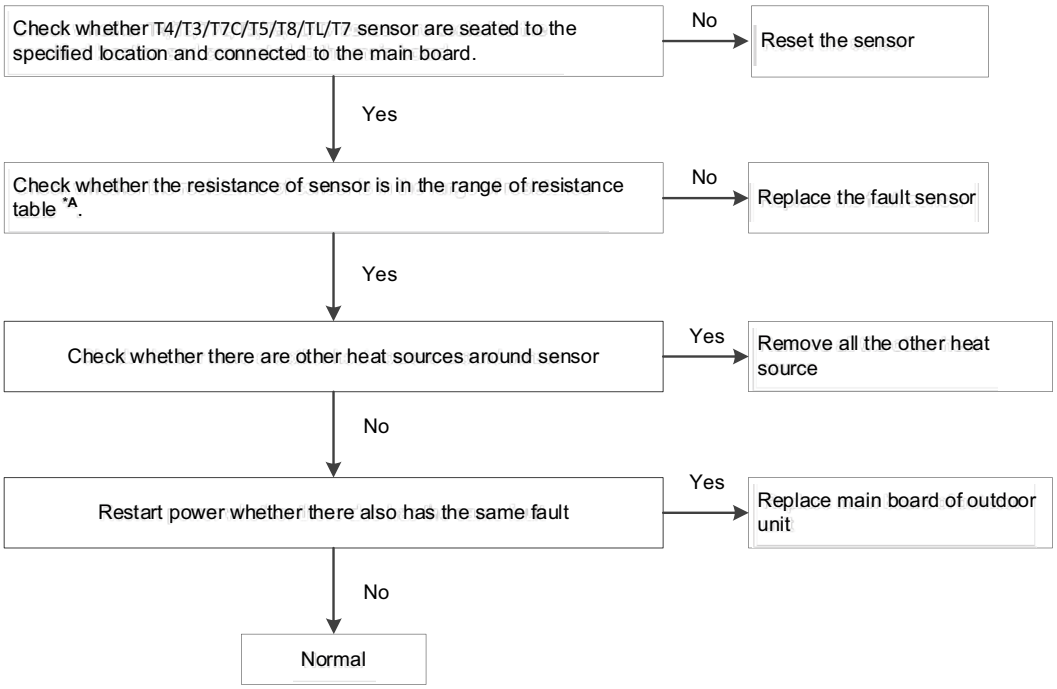


Fig. 52 —E41/F41/F91/FA1/FC1/Fd1: T4/T3/T3B/T5/TL/Tg error (open/short)

F71: Discharge temperature sensor error (open/short)

Definition and inspection of faults

- The discharge temperature sensor (T7C) has short circuit or open circuit.
- Detective voltage > 4.95V or < 0.05V

Probable causes

- Contact failure between sensor and main board
- The temperature sensor is located at wrong place
- Temperature sensor failure
- There are other heat sources around the sensor
- Defective main board of ODU

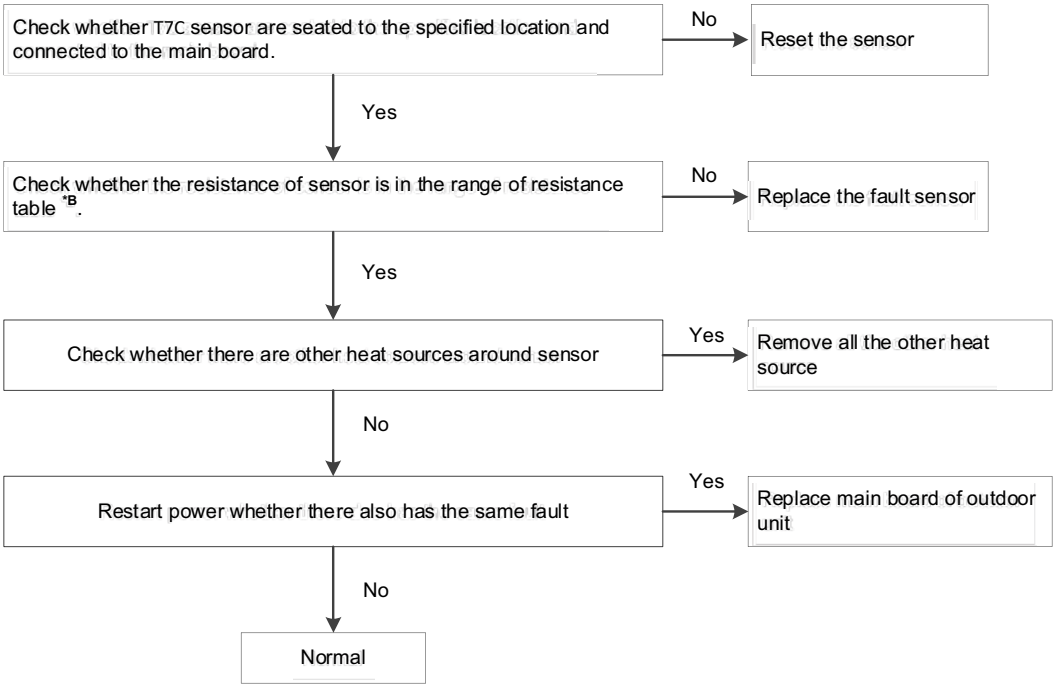


Fig. 53 —F71: Discharge temperature sensor error (open/short)

F62/F6A: Inverter module temperature (Tf) protection

Definition and inspection of faults

- NTC temperature is higher than 100°C

Probable causes

- Poor contact between driver board and cooler
- Lack of silicone thermal grease
- Defective driver board
- Gas/liquid valves closed
- Pipe and signal wiring mismatch

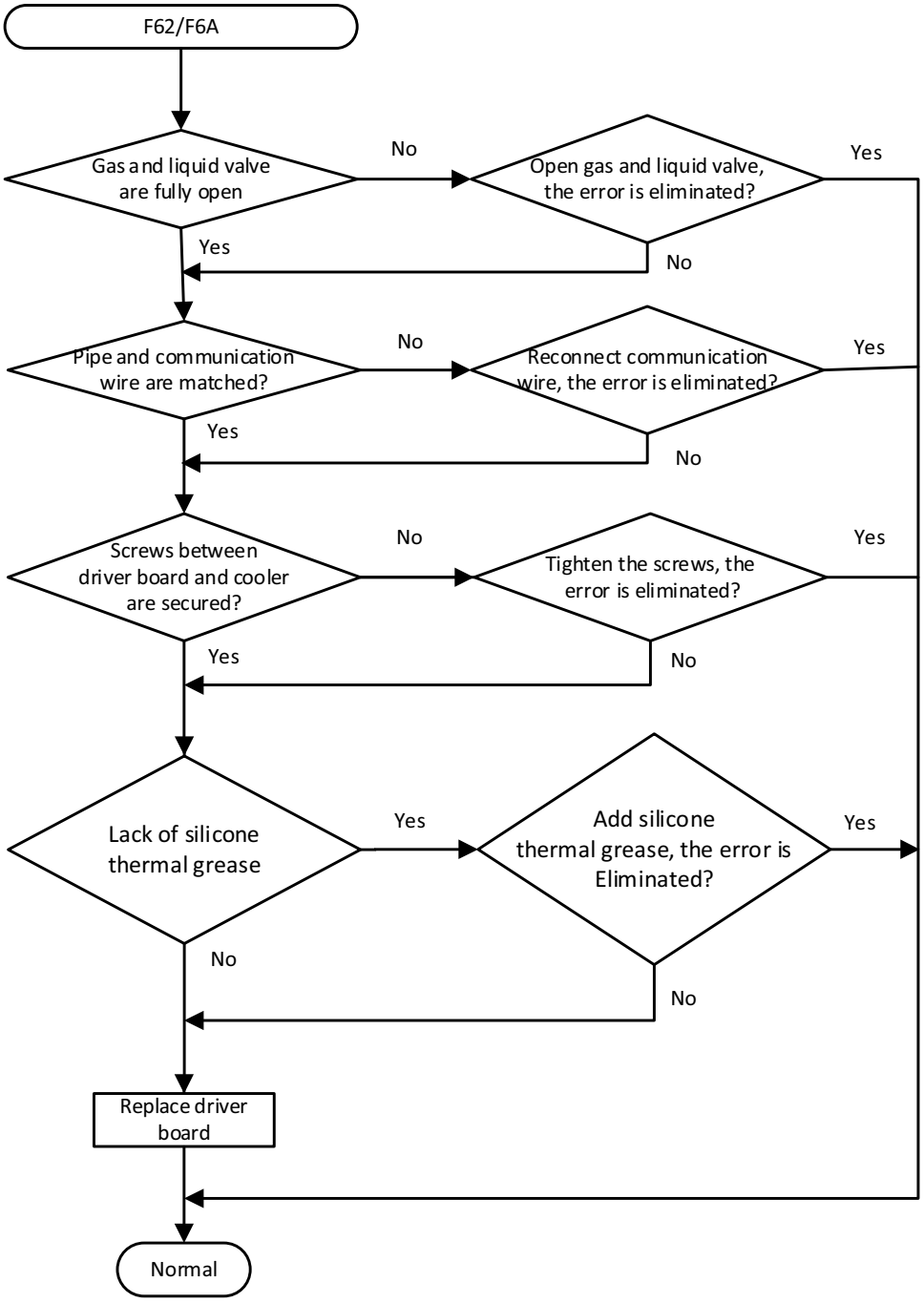


Fig. 54 —F62/F6A: Inverter module temperature (Tf) protection

F72/F7A: Discharge temperature (T7C) protection

Definition and inspection of faults

- Discharge temperature is higher than 115°C
- F7A will be reported when 3 times of F72 occurs within 100 minutes.

Probable causes

- Too high discharge temperature caused by little refrigerant remains in the system
- Misjudgment caused by faulty sensor
- Defective main board
- Lack of cooling function caused by the EEV in ODU
- The refrigerant blocked in high pressure zone owing to the faulty valve

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