

Service Manual



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GENERAL INFORMATION

Model Names of Outdoor Units/MDC/Indoor Units

OUTDOOR UNITS

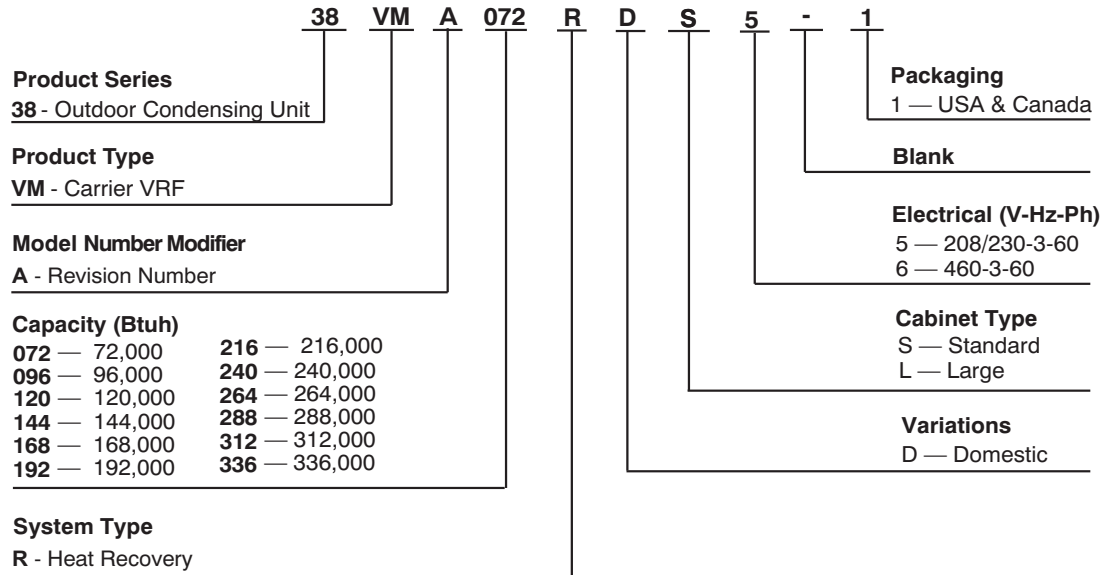


Fig. 1 —Outdoor Unit Nomenclature

Table 1 —Outdoor Unit Capacity (Small Cabinet)

CAPACITY		6 TON	8 TON	10 TON
Model Name		38VMA072RDS5-1 38VMA072RDS6-1	38VMA096RDS5-1 38VMA096RDS6-1	38VMA120RDS5-1 38VMA120RDS6-1
Capacity index		72	96	120
Indoor unit connectable	Combination ratio *1	50%-150%	50%-150%	50%-150%
MDC unit connectable	Main MDC	40VMD006, 008, 010, 016M--3, 40VMD016ML-3		
	Sub MDC *2	-		
	Maximum unit number	1	2	2

Table 2 —Outdoor Unit Capacity (Medium Cabinet)

CAPACITY		12 TON	14 TON	16 TON	18 TON	20 TON
Model Name		38VMA144RDL5-1 38VMA144RDL6-1	38VMA168RDS5-1 38VMA168RDS6-1	38VMA192RDS5-1 38VMA192RDS6-1	38VMA216RDS5-1 38VMA216RDS6-1	38VMA240RDS5-1 38VMA240RDS6-1
Capacity index		144	168	192	216	240
Indoor unit connectable	Combination ratio *1	50%-150%	50%-150%	50%-150%	50%-150%	50%-150%
MDC unit connectable	Main MDC	40VMD006, 008, 010, 016M--3, 40VMD016ML-3				
	Sub MDC *2	40VMD006, 008, 010, 016S--3				
	Maximum unit number	2	3	3	3	3

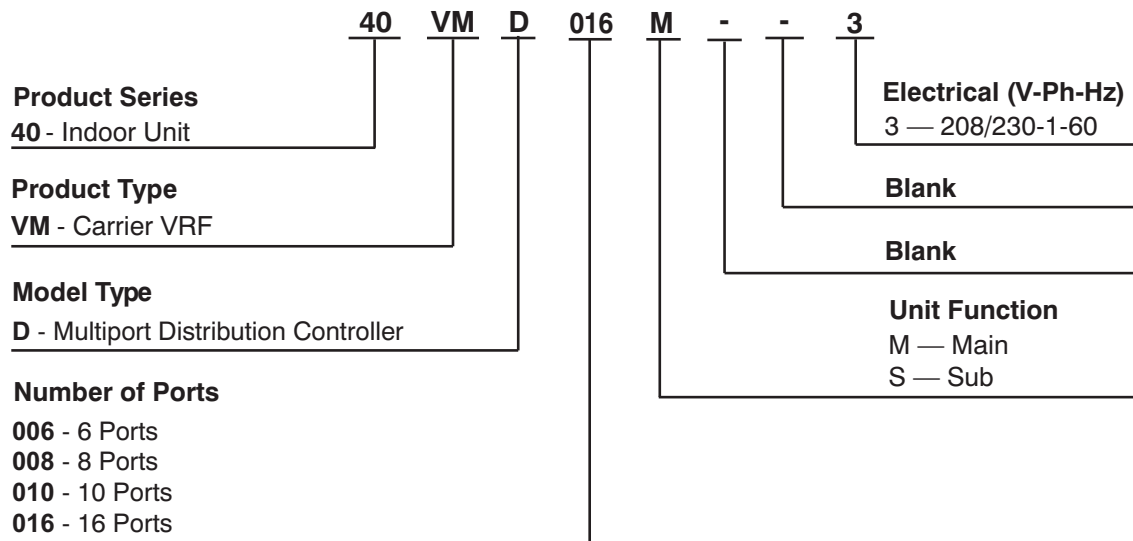
Table 3 —Outdoor Unit Capacity (Large Cabinet)

CAPACITY		20 TON	22 TON	24 TON	26 TON	28 TON
Model Name		38VMA240RDL5-1 38VMA240RDL6-1	38VMA264RDS5-1 38VMA264RDS6-1	38VMA288RDS5-1 38VMA288RDS6-1	38VMA312RDS5-1 38VMA312RDS6-1	38VMA336RDS5-1 38VMA336RDS6-1
Capacity index		240	264	288	312	336
Indoor unit connectable	Combination ratio *1	50%-150%	50%-150%	50%-150%	50%-150%	50%-150%
MDC unit connectable	Main MDC	40VMD016ML-3				
	Sub MDC *2	40VMD006, 008, 010, 016S--3				
	Maximum unit number	3	3	3	3	3

Legend

*1 Refer to capacity ratio section on page 5.

*2 Sub MDC can only connect with specified main MDC. Refer to Table 4 for additional details.

**Fig. 2 —MDC Unit Nomenclature****Table 4 —MDC Unit Capacity (Main)**

MODEL NAME		40VMD006M--3	40VMD008M--3	40VMD010M--3	40VMD016M--3	40VMD016ML-3
Indoor unit connectable	Maximum connected capacity for one branch *1	54,000B Btu/h	54,000 Btu/h	54,000 Btu/h	54,000 Btu/h	54,000 Btu/h
	Maximum connected capacity for all branches	324,000 Btu/h	360,000 Btu/h	360,000 Btu/h	360,000 Btu/h	504,000 But/h
Sub MDC unit connectable	Sub MDC model	40VMD006S--3	40VMD006S--3 40VMD008S--3	40VMD006S--3 40VMD008S--3 40VMD010S--3	40VMD006,008,010,016S--3	
	Maximum connected capacity to one sub MDC	126,000 Btu/h	126,000 Btu/h	126,000 Btu/h	126,000 Btu/h	126,000 Btu/h
	Maximum connected capacity to two sub MDC *2	168,000 Btu/h	168,000 Btu/h	168,000 Btu/h	168,000 Btu/h	168,000 Btu/h

Table 5 —MDC Unit Capacity (Sub)

MODEL NAME		40VMD006S--3	40VMD008S--3	40VMD010S--3	40VMD016S--3
Indoor unit connectable	Maximum connected capacity for one port *1	54,000 Btu/h	54,000 Btu/h	54,000 Btu/h	54,000 Btu/h
	Maximum connected capacity for all ports	126,000 Btu/h	126,000 Btu/h	126,000 Btu/h	126,000 Btu/h

Legend

The total capacity of the main MDC should always be larger than that of sub MDCs in the same refrigerant system.

*1 For indoor units with capacities greater than 54 kBtu/h, two ports of the MDC must be twinned using the Y-joint to create a single port.

*2 Maximum indoor units capacity connected to two sub MDC should be limited to 168,000Btu/h or less.

INDOOR UNITS

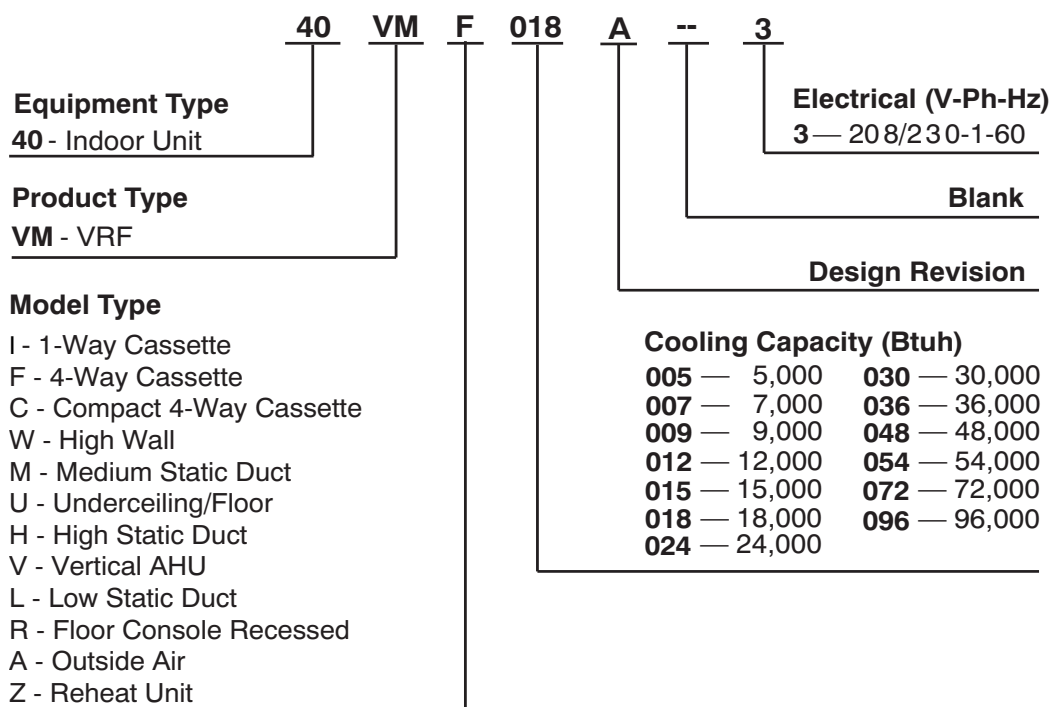


Fig. 3 —Indoor Unit Nomenclature

Table 6 —Indoor Unit Capacity Index

CAPACITY INDEX *		5	7	9	12	15	18	24	30	36	48	54	72	96
1-Way Cassette	40VMI	•	•	•	•	•	•	•						
4-Way Cassette	40VMF			•	•	•	•	•	•	•	•			
Compact 4-Way Cassette	40VMC	•	•	•	•	•								
High Wall	40VMW	•	•	•	•	•	•	•	•					
Low Static Duct	40VML		•	•	•	•	•	•						
Medium Static Duct	40VMM		•	•	•	•	•	•	•	•	•			
High Static Duct	40VMH							•	•	•	•	•	•	•
Vertical AHU	40VMV				•		•	•	•	•	•	•		
Underceiling/Floor	40VMU				•	•	•	•	•	•	•			
Floor Console Recessed	40VMR		•	•	•	•	•	•						
Outside Air	40VMA									•	•	•	•	•
Reheat Unit	40VMZ			•	•	•	•	•						

* For example: The capacity index of 40VMF009A--3 and 40VMV054---3 is 9 and 54 separately.

Capacity Ratio

$$\text{Connected capacity ratio} = \frac{\text{Total capacity index of the indoor units}}{\text{Capacity index of the outdoor unit}}$$

Keep a proper connected capacity ration for the entire system.

Minimum combination ratio	Maximum combination ratio			
	40VMH*1 only 40VMV only	40VMA only When 40VMA and indoor units connected	At least one 40VMH *1 or 40VMV connected	Other indoor unit models
50%	100%	100%*2	130%	150%

NOTES:

- When 40VMH048, 054, 072, 096---3 is installed.
- When outside air units (40VMA) and standard indoor units are connected, the total capacity index of the 40VMA must be limited to 30% or less of the capacity index of the outdoor unit. When 40VMA and 40VMZ indoor units are connected with no additional indoor units, the 30% rule does not apply.

Outdoor Units Lineup



Fig. 4 —6-10 Ton (Small Cabinet)



Fig. 5 —12-20 Ton (Medium Cabinet)



Fig. 6 —20-28 Ton (Large Cabinet)

MDC Units MAIN TYPE



Fig. 7 —40VMD006M--3



Fig. 8 —40VMD008M--3



Fig. 9 —40VMD010M--3



Fig. 10 —40VMD016M--3



Fig. 11 —40VMD016ML--3

SUB TYPE



Fig. 12 —40VMD006S--3 Fig. 13 —40VMD008S--3 Fig. 14 —40VMD010S--3 Fig. 15 —40VMD016S--3

Indoor Units Lineup



Fig. 16 —1-Way Cassette (40VMI)



Fig. 17 —4-Way Cassette (40VMF)



Fig. 18 —Compact 4-Way Cassette (40VMC)

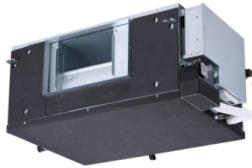


Fig. 19 —High Static Duct (40VMH)



Fig. 20 —High wall (40VMW)



Fig. 21 —Low Static Duct (40VML)



Fig. 22 —Medium Static Duct (40VMM)



Fig. 23 —Underceiling/Floor (40VMU)



Fig. 24 —Floor Console Recessed (40VMR)



Fig. 25 —Vertical AHU (40VMV)

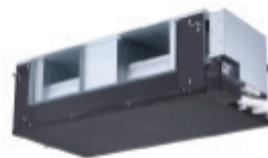


Fig. 26 —Outside Air (40VMA)

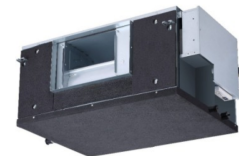


Fig. 27 —Reheat Unit (40VMZ)

Connectable Indoor Units

Table 7 —Connectable Indoor Unit Table

CAPACITY (TON)	STANDARD COMBINATION		MAXIMUM QUANTITY OF CONNECTABLE INDOOR UNITS
	MODEL (208/230V-3Ph-60Hz)	MODEL (460V-3Ph-60Hz)	
6	38VMA072RDS5-1	38VMA072HDS6-1	15
8	38VMA096RDS5-1	38VMA096HDS6-1	20
10	38VMA120RDS5-1	38VMA120HDS6-1	24
12	38VMA144RDL5-1	38VMA144HDL6-1	29
14	38VMA168RDS5-1	38VMA168HDS6-1	34
16	38VMA192RDS5-1	38VMA192HDS6-1	39
18	38VMA216RDS5-1	38VMA216HDS6-1	44
20	38VMA240RDS5-1	38VMA240HDS6-1	49
20	38VMA240RDL5-1	38VMA240HDS6-1	49
22	38VMA264RDS5-1	38VMA264HDS6-1	54
24	38VMA288RDS5-1	38VMA288HDS6-1	59
26	38VMA312RDS5-1	38VMA312HDS6-1	64
28	38VMA336RDS5-1	38VMA336HDS6-1	64

Refrigerant Charge Calculation

AMOUNT OF REFRIGERANT TO BE CHARGED

Based on the field installed refrigerant pipe and system layout, additional refrigerant charge may be required. Add additional refrigerant based on the calculation below.

R* =	Total length of high pressure pipe size 1-1/8 in. (ft) × 0.254 (lbs/ft)		+	Total length of high pressure pipe size 7/8 in. (ft) × 0.141 (lbs/ft)		+	Total length of high pressure pipe size 3/4 in. (ft) × 0.094 (lbs/ft)	
	Total length of high pressure pipe size 5/8 in. (ft) × 0.061 (lbs/ft)		+	Total length of liquid pipe size 5/8 in. (ft) × 0.114 (lbs/ft)		+	Total length of liquid pipe size 1/2 in. (ft) × 0.074 (lbs/ft)	
	Total length of liquid pipe size 3/8 in. (ft) × 0.038 (lbs/ft)		+	Total length of liquid pipe size 1/4 in. (ft) × 0.015 (lbs/ft)		+	Main MDC Model name	
							Charged amount Per unit	
							40VMD006M--3	
							40VMD008M--3	
							40VMD010M--3	
							40VMD016M--3	
							40VMD016ML-3	
							11.0 lbs	
							15.4 lbs	
+	Sub MDC Model name	Charged amount Per unit		Combination ratio	Charged amount Per unit			
	40VMD006S--3	2.2 lbs		50%~100%	0 lbs			
	40VMD008S--3	2.2 lbs	+	100%~120%	1.1 lbs			
	40VMD010S--3	4.4 lbs		120%~130%	2.2 lbs			
	40VMD016S--3	4.4 lbs		130%~150%	3.3 lbs			

R* Amount of additional refrigerant charge (lbs).

Fig. 28 —Calculating Refrigerant Charge

LIMITATION OF AMOUNT OF REFRIGERANT TO BE CHARGED IN A SYSTEM

Regardless of the total amount calculated by the formula above, pay attention to the maximum additional refrigerant charge in the following table.

OUTDOOR UNIT CAPACITY INDEX	72	96	120	144	168	192	216	240
Factory-charged amount	26.46 lbs	26.46 lbs	26.46 lbs	44.09 lbs	44.09 lbs	44.09 lbs	44.09 lbs	44.09 lbs
Maximum Additional Refrigerant charge	57.32 lbs	61.73 lbs	66.14 lbs	121.25 lbs	121.25 lbs	143.30 lbs	165.34 lbs	165.34 lbs

The following table is for large cabinets.

OUTDOOR UNIT CAPACITY INDEX	240	264	288	312	336
Factory-charged amount	77.16 lbs	77.16 lbs	77.16 lbs	77.16 lbs	77.16 lbs
Maximum Additional Refrigerant charge	165.34 lbs	165.34 lbs	165.34 lbs	165.34 lbs	165.34 lbs

REFRIGERANT CIRCUIT

38VMA Heat Recovery system consists of Outdoor Unit (ODU), Multiport Distribution Controller (MDC), and Indoor Units (IDU).

Functional Parts Layout of Outdoor Units

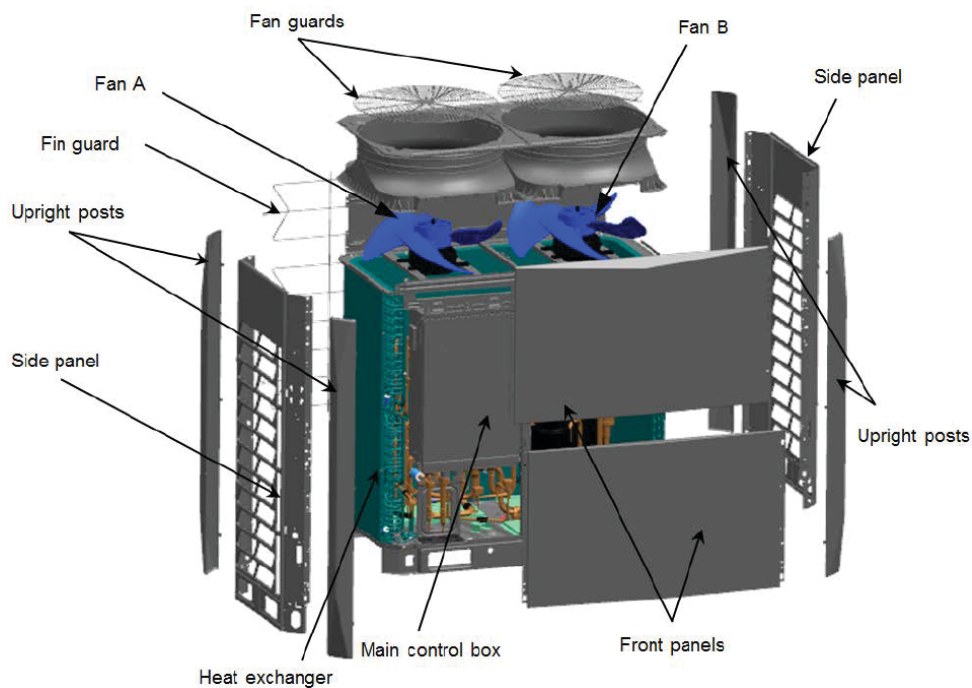


Fig. 29 —38VMA072~120RDS5-1(6-1)

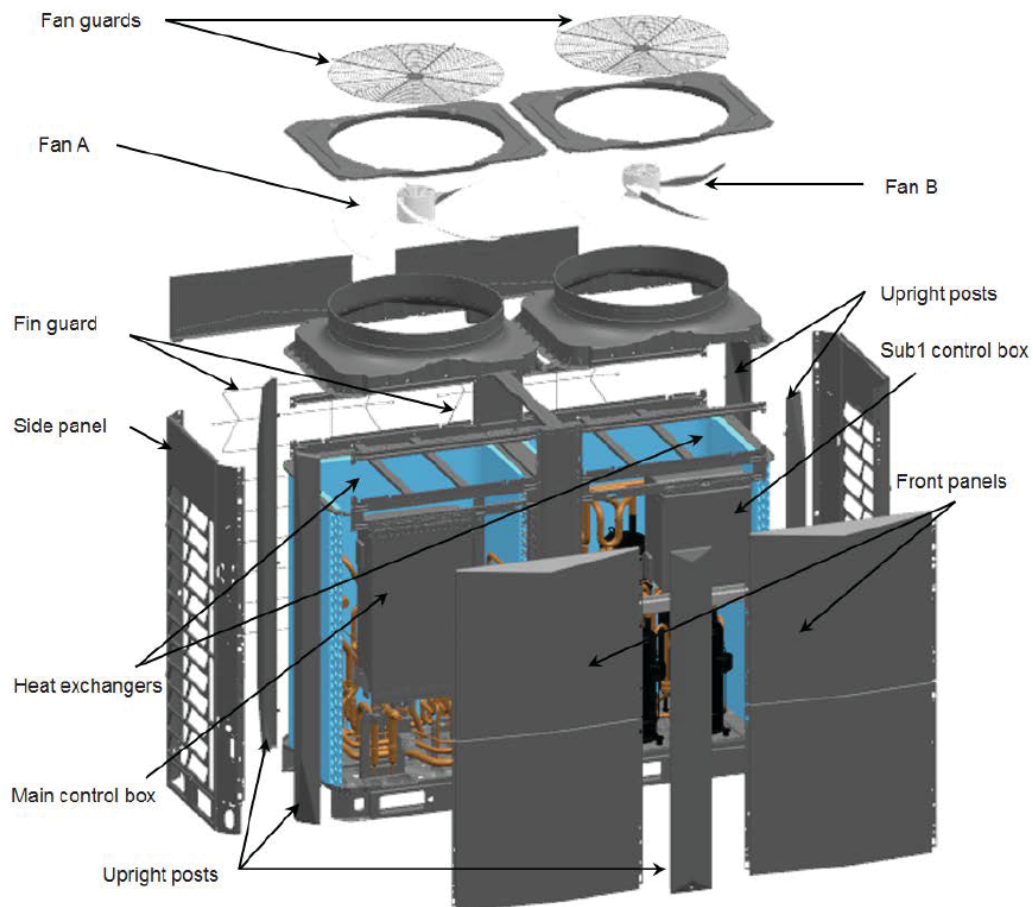


Fig. 30 —38VMA144RDL5-1(6-1), 38VMA168~240RDS5-1(6-1)

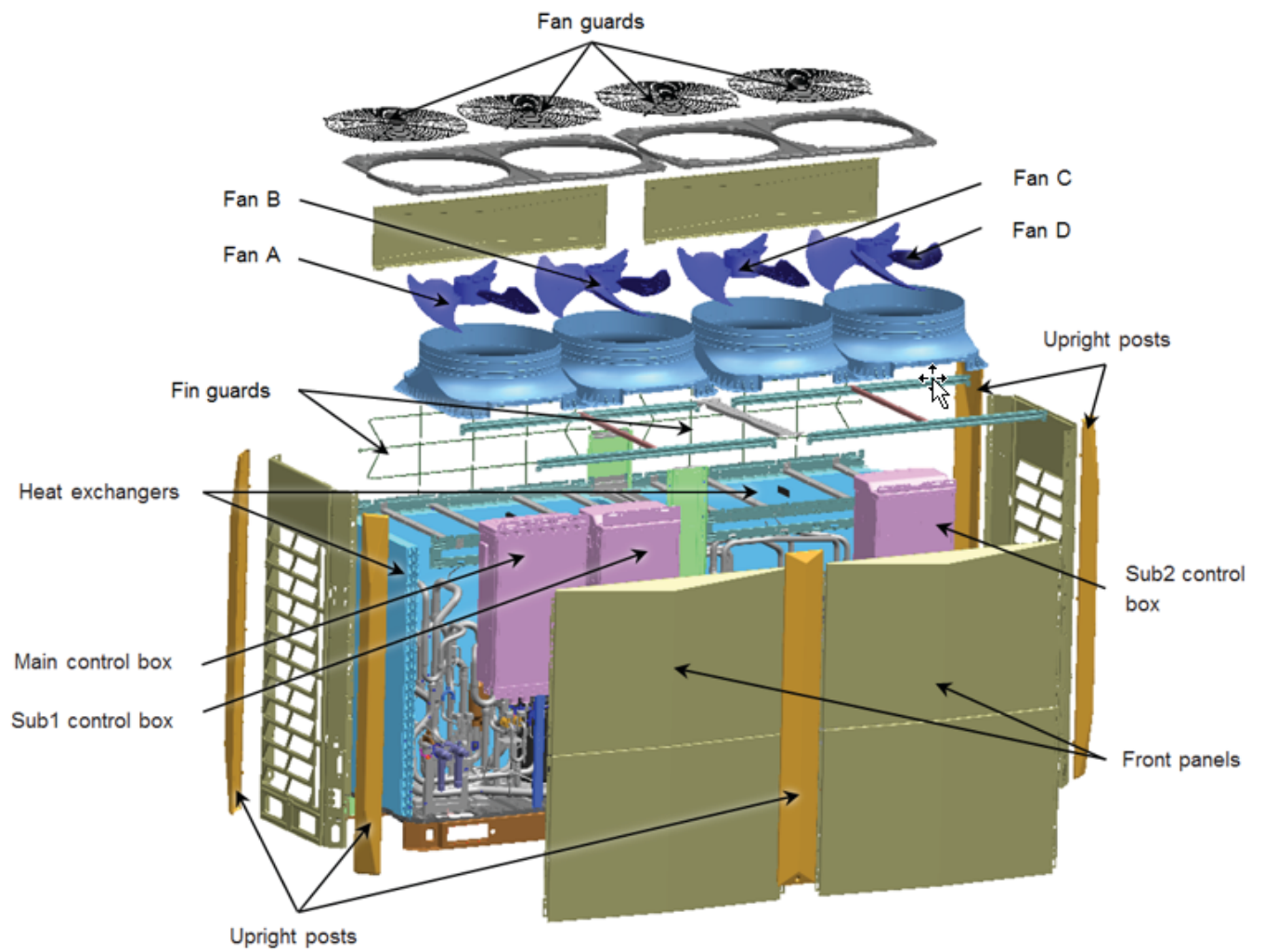


Fig. 31 —38VMA240RDL5-1(6-1), 38VMA264~336RDS5-1(6-1)

Outdoor Unit Refrigerant Circuits

38VMA072~120RDS5-1(6-1)

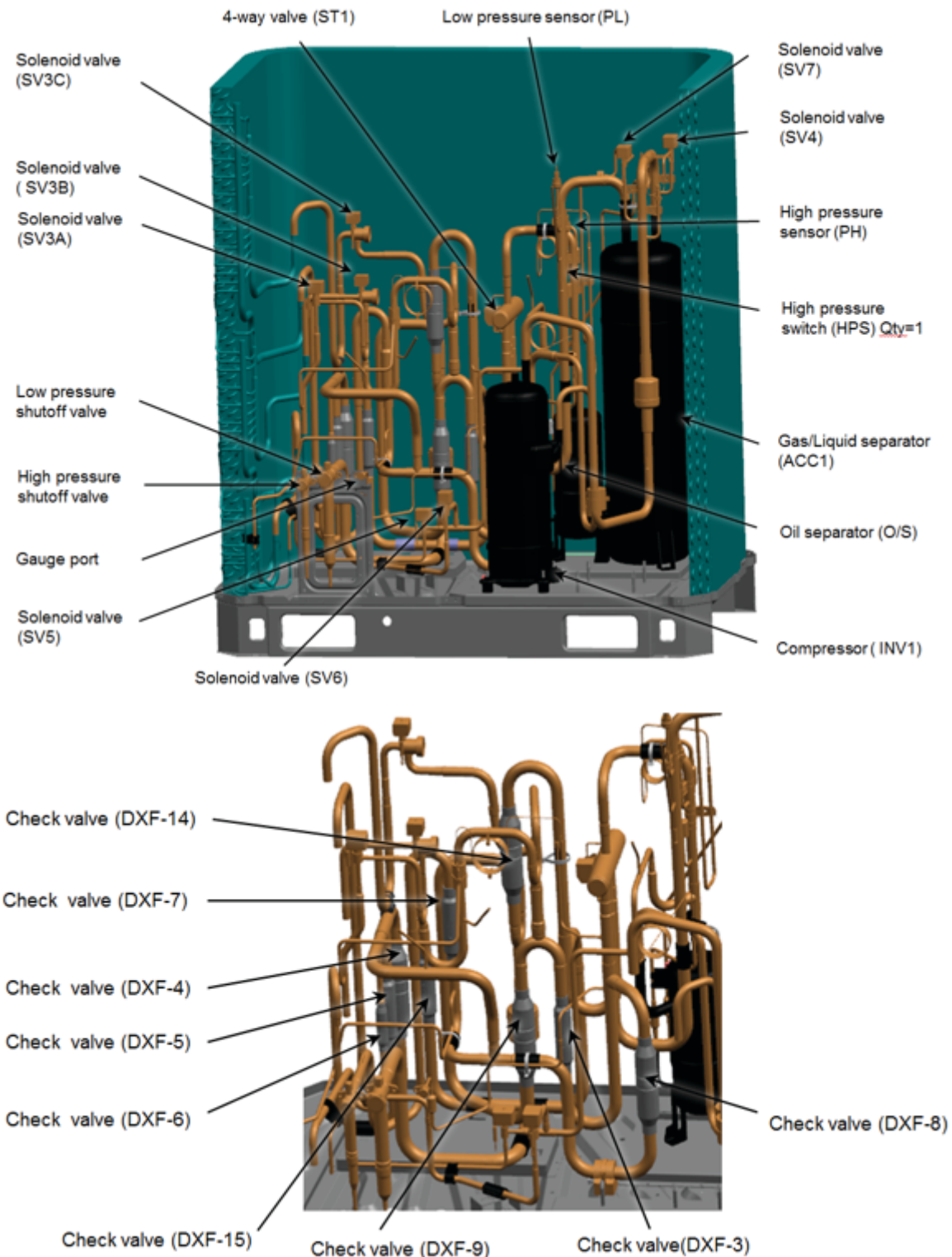


Fig. 32 —Internal Refrigerant Circuits

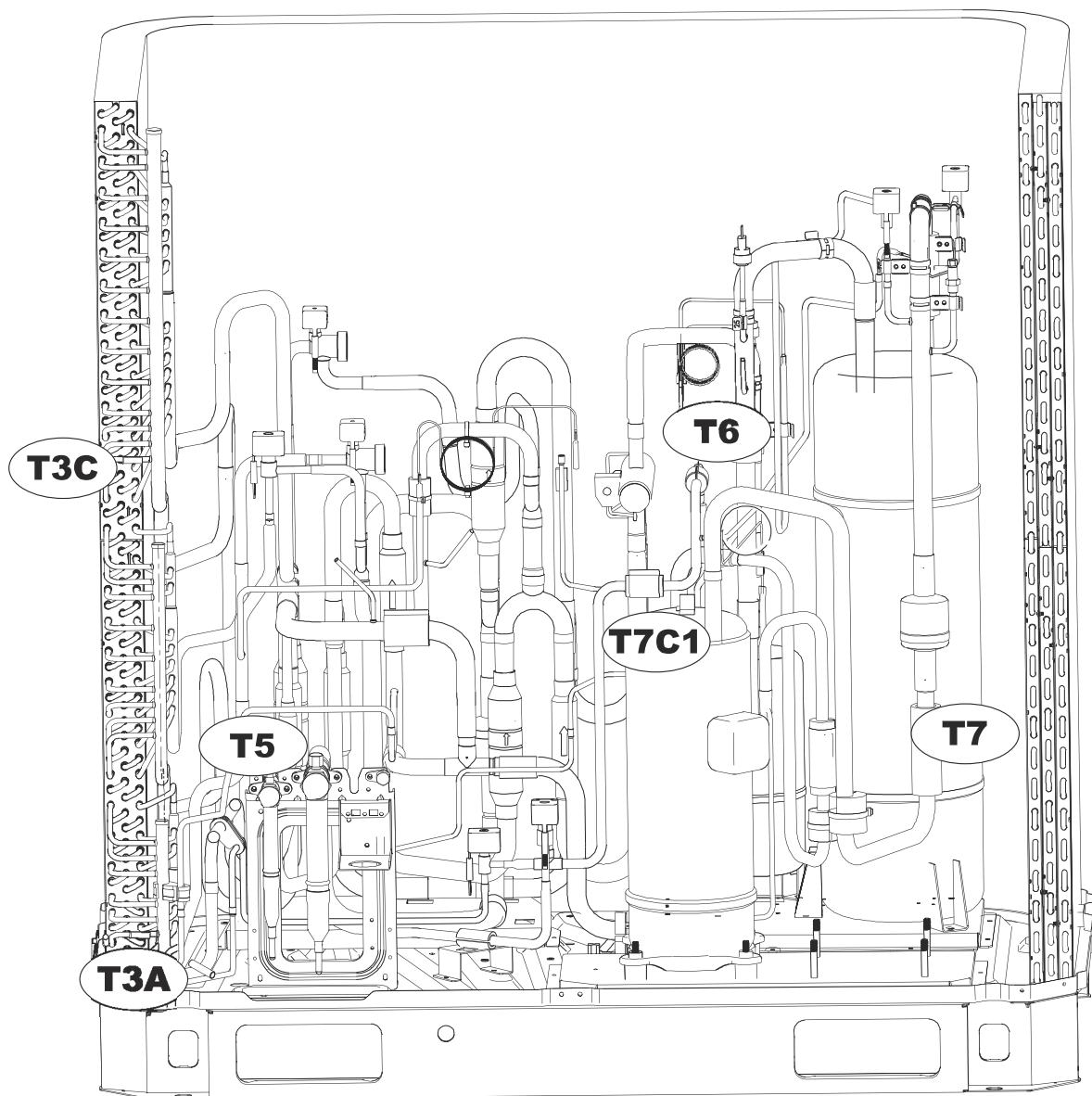
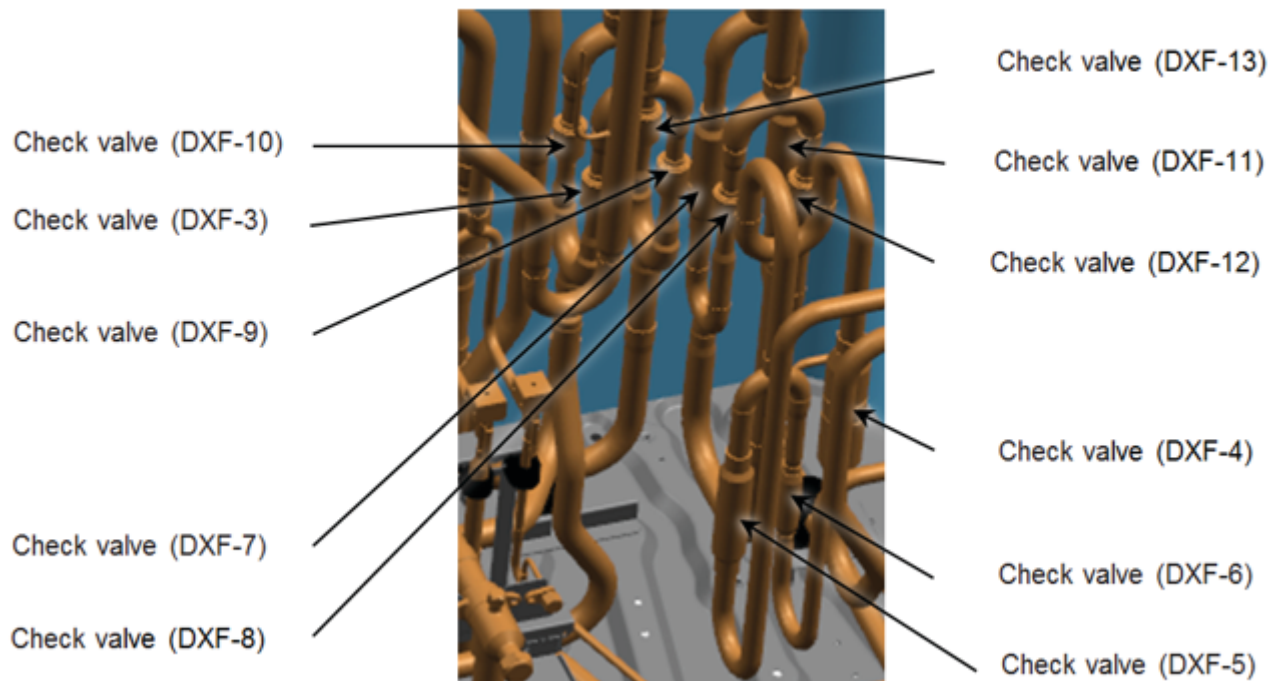
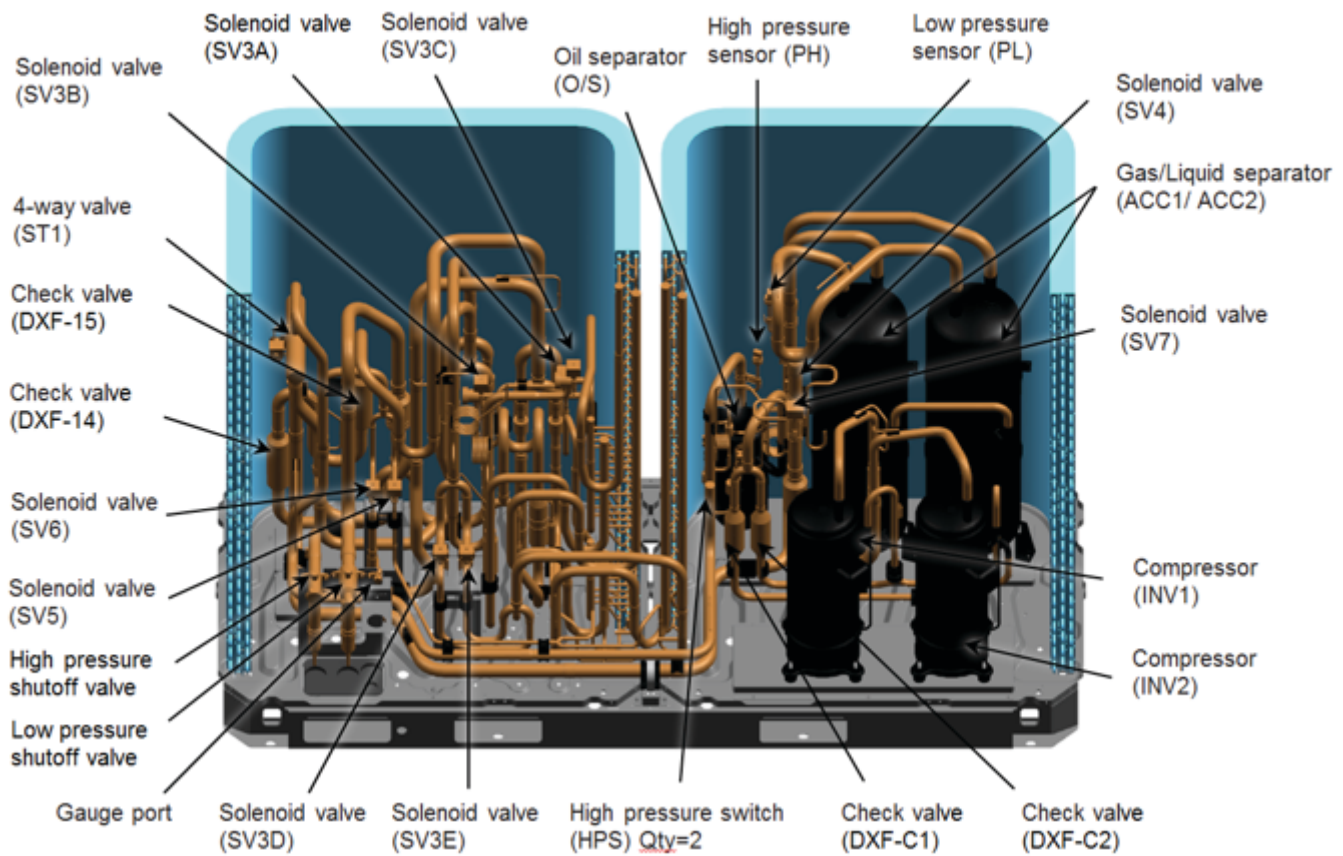


Fig. 33 —Temperature Sensor Location



Front view hiding some pipes

Fig. 34 —Internal Refrigerant Circuits

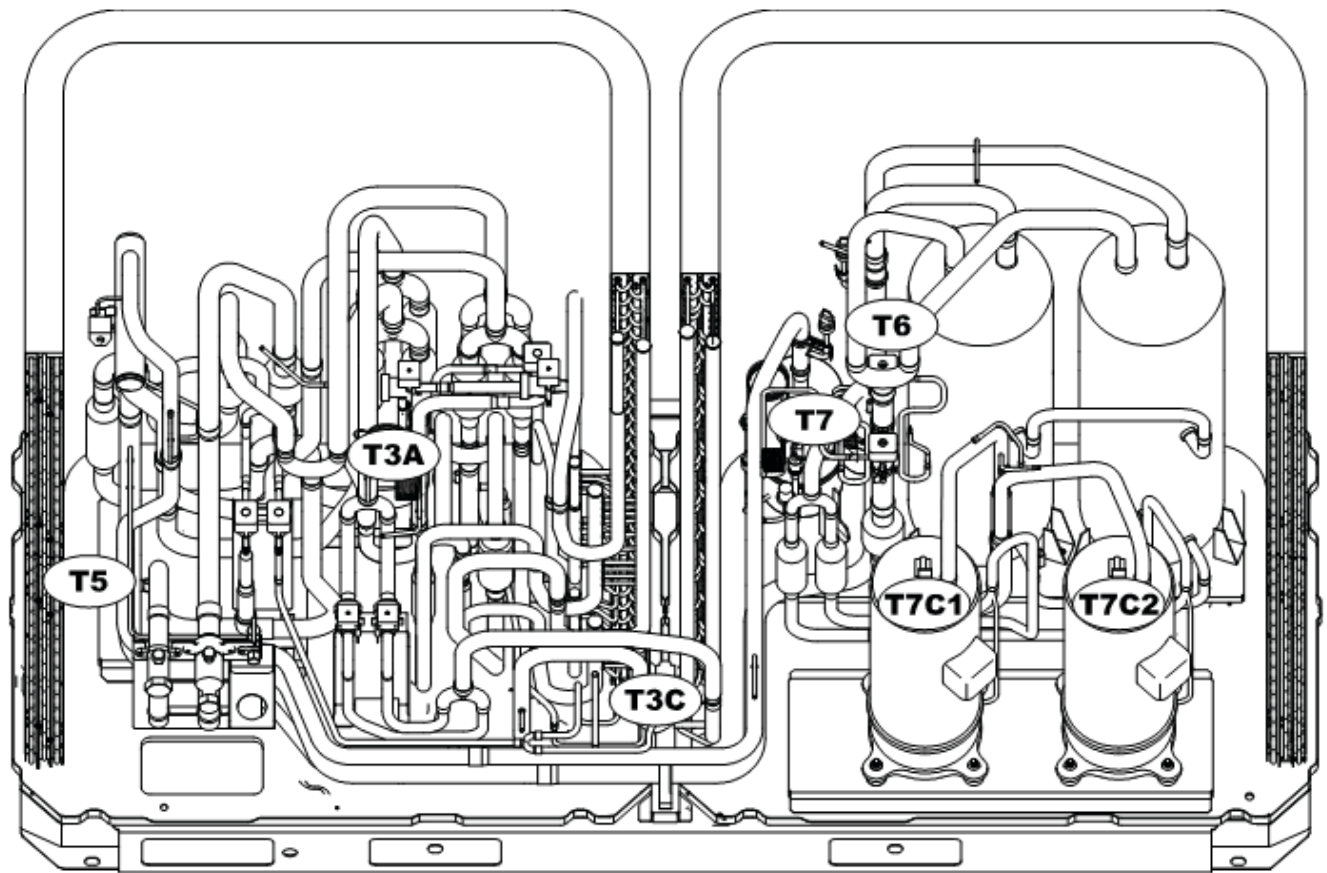


Fig. 35 —Temperature Sensor Location

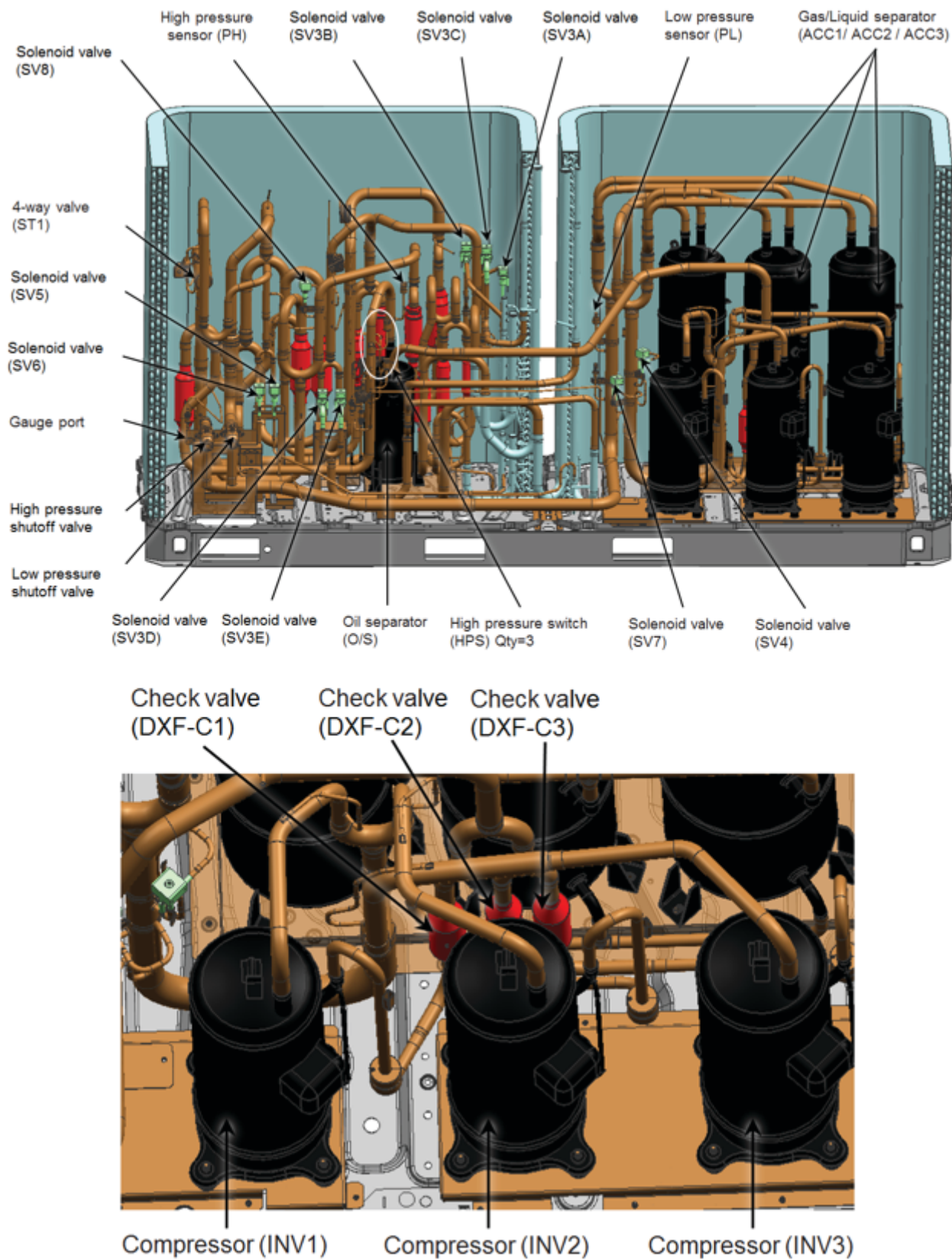


Fig. 36 —Internal Refrigerant Circuits

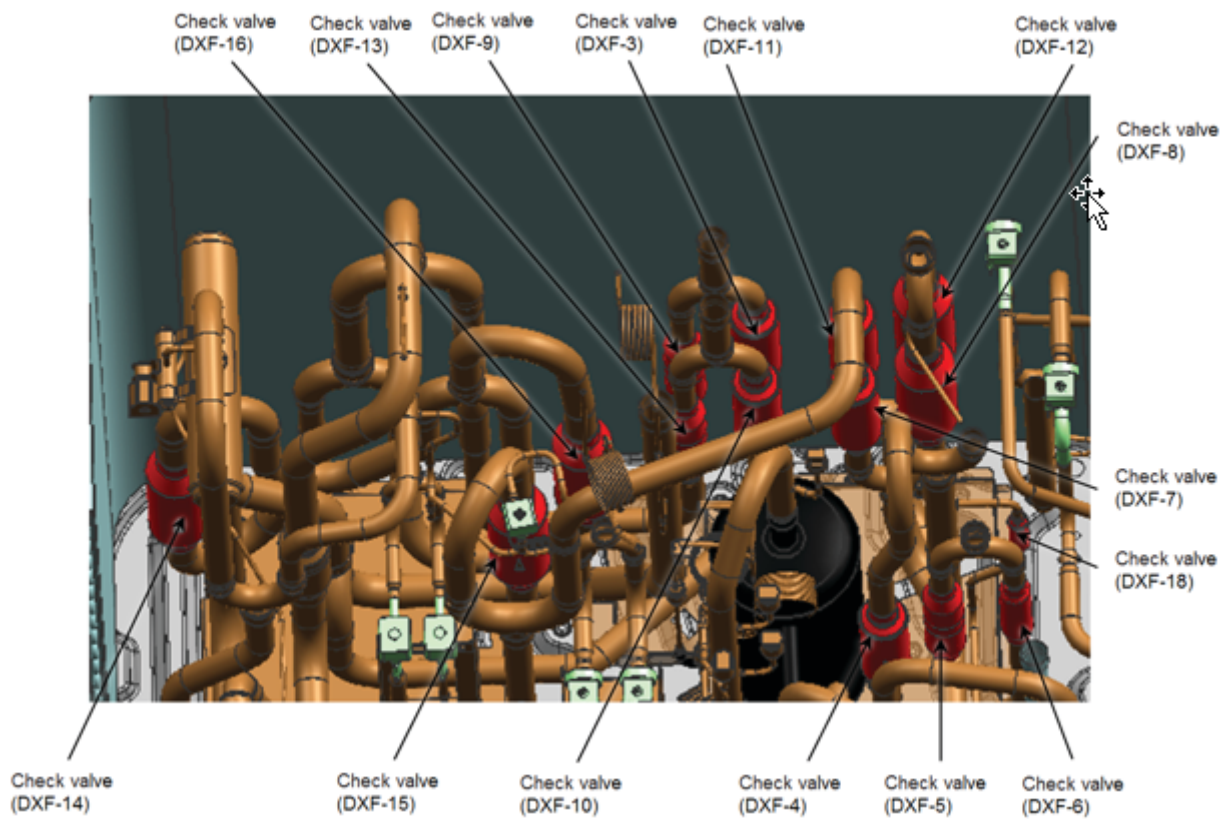


Fig. 37 —Internal Refrigerant Circuits

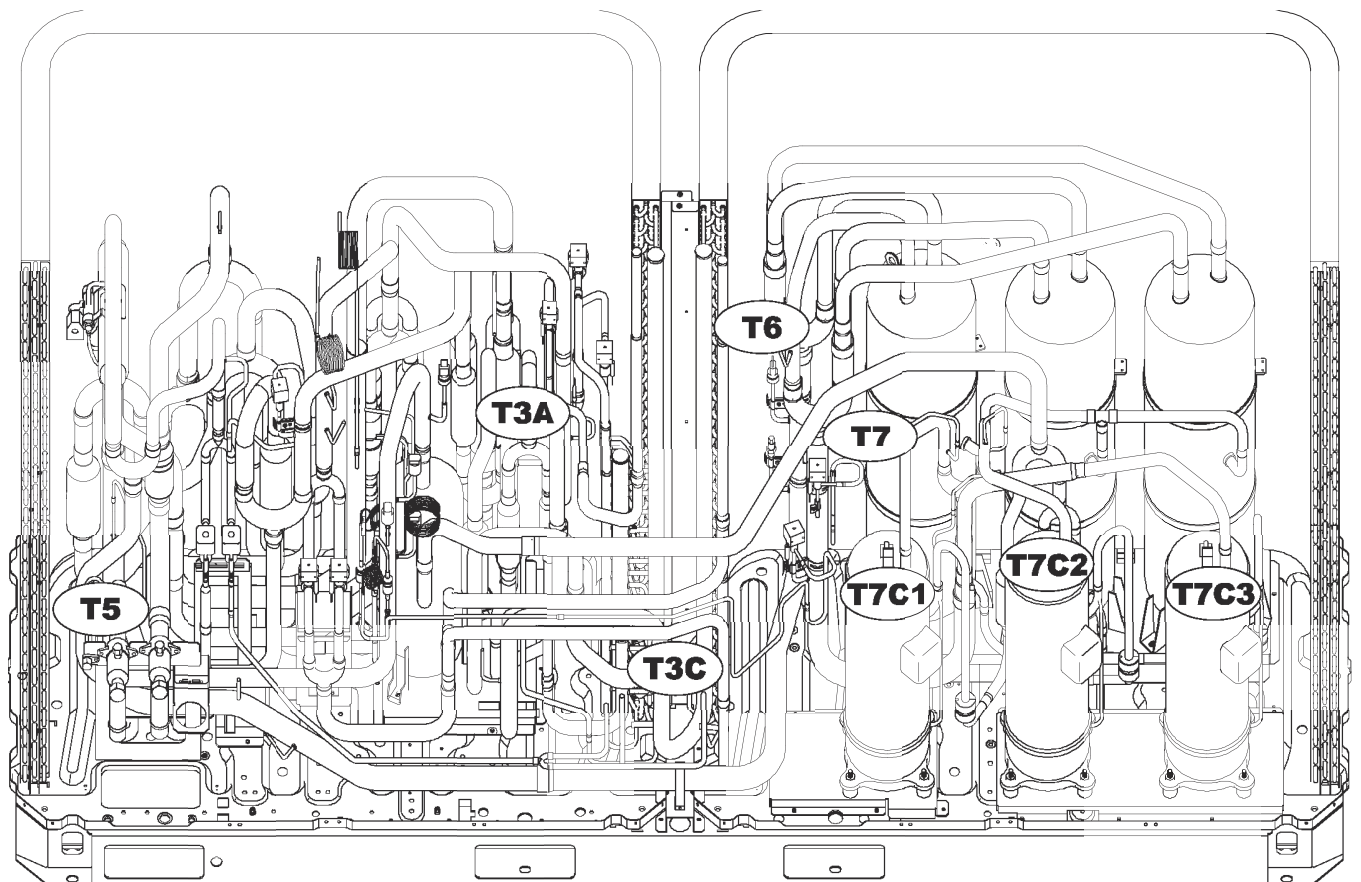


Fig. 38 —Temperature Sensor Location

Major Components Functions and Circuit Diagrams of Outdoor Units

Table 8 —38VMA072, 096, 120RDS5-1(6-1)

NAME	SYMBOL		MAJOR FUNCTION
	REFRIGERANT CIRCUIT DIAGRAM	ELECTRICAL WIRING DIAGRAM	
Inverter compressor	INV1	Compressor A	Varies the refrigerant flow rate by adjusting the frequency based on objective pressure
Oil separator	O/S	-	Used to separate oil from high pressure and high temperature refrigerant, which is pumped out during compression.
Inverter fan	FANA		The fan is operated at 13-step rotation speed by using inverter.
	FANB		
4-way valve	ST1		Used to switch the operation mode between heating and cooling
Heat exchanger	HEX	-	To transfer heat with surrounding ambient
Solenoid valve	SV3A		Used to control heat exchanger areas
	SV3B		
	SV3C		
	SV4		Used for control the amount of oil from the oil separator to the compressor
	SV5		1) High-pressure-rise prevention 2) To prevent the bottom of heat exchangers being frozen in heating mode
	SV6		1) To supply hot gas for heating indoor units in cooling main mode 2) Bypass hot gas from compressor discharge in heating operation
	SV7		1) Bypass pressure at start-up stage and control capacity at low load condition 2) High-pressure-rise prevention 3) Discharge superheat protection
Thermistor (Heat exchanger defrosting)	T3A		Used to control defrosting during heating operation
	T3C		
Thermistor (Outside air)	T4		Used to detect outdoor air temperature and control fan speed
Thermistor (High pressure pipe)	T5		Used to control SV6 based on the refrigerant status in cooling main mode
Thermistor (Accumulator inlet)	T6		Used for MDC to control EVXA and SVP
Thermistor (Compressor suction pipe)	T7		
Thermistor (INV.1 discharge pipe)	T7C1		Used to detect discharge temperature and calculate discharge superheat
Thermistor (INV.1 discharge temperature protection)	Tpr1	TP1-PRO	Provides high-temperature protection
High pressure sensor	PH	H-YL1	Used to detects high pressure
Low pressure sensor	PL	L-YL1	Used to detects low pressure
High pressure switch	HPS	H-PRO-4	This is used to prevent abnormal increase of high pressure, to which will activate at 594 psig and shut down compressors.

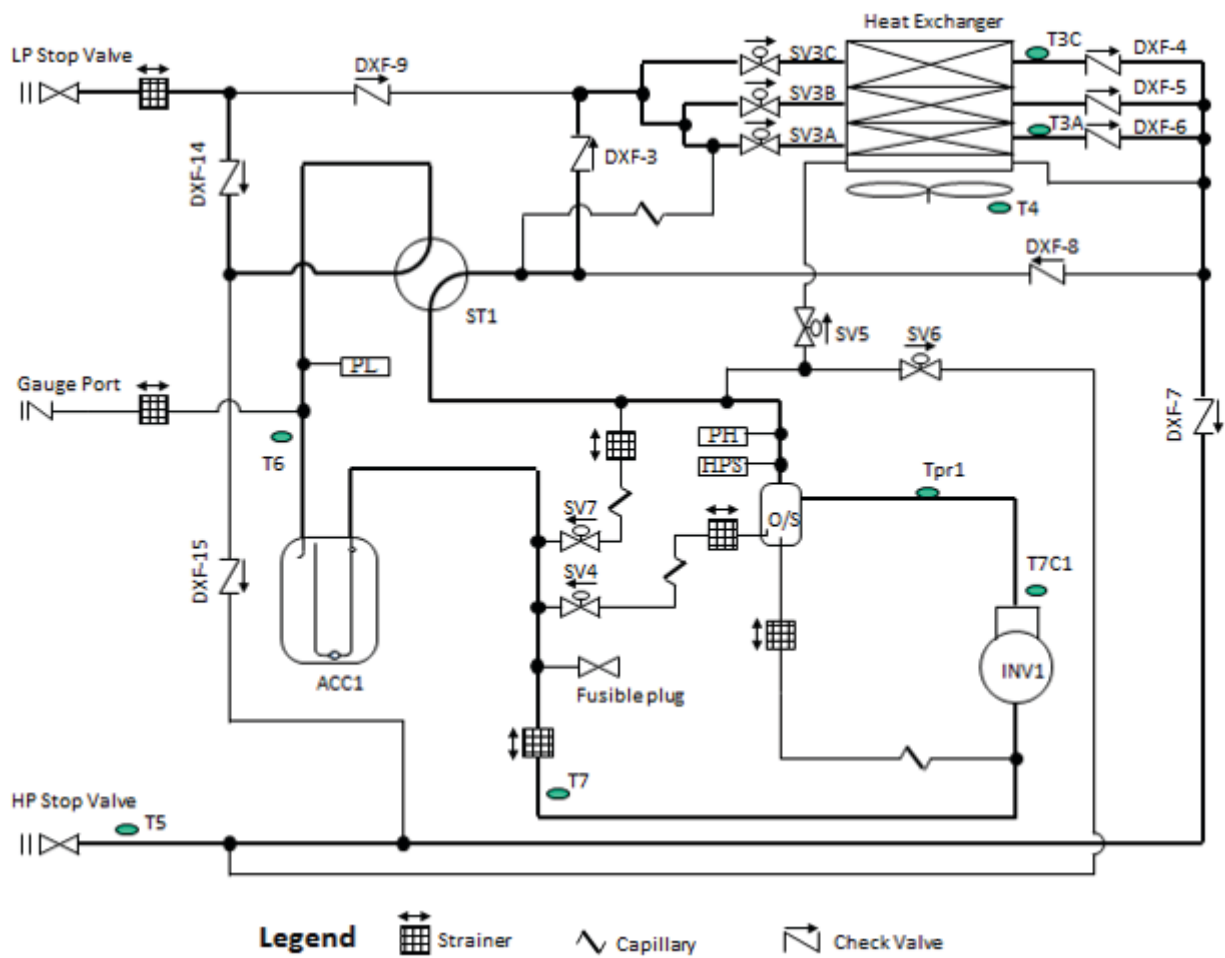


Fig. 39 —38VMA072, 096, 120RDS5-1(6-1)

Table 9 —38VMA144RDL5-1(6-1), 38VMA168, 192, 216, 240RDS5-1(6-1)

NAME	SYMBOL		MAJOR FUNCTION
	REFRIGERANT CIRCUIT DIAGRAM	ELECTRICAL WIRING DIAGRAM	
Inverter compressor	INV1	Compressor A	Varies the refrigerant flow rate by adjusting the frequency based on objective pressure
	INV2	Compressor B	
Oil separator	O/S	-	Used to separate oil from high pressure and high temperature refrigerant, which is pumped out during compression.
Inverter fan	FANA		The fan is operated at 13-step rotation speed by using inverter.
	FANB		
4-way valve	ST1		Used to switch the operation mode between heating and cooling
Heat exchanger	HEX	-	To transfer heat with surrounding ambient
Solenoid valve	SV3A		Used to control heat exchanger areas
	SV3B		
	SV3C		
	SV3D		
	SV3E		
	SV4		Used for control the amount of oil from the oil separator to the compressor
	SV5		1) High-pressure-rise prevention 2) To prevent the bottom of heat exchangers being frozen in heating mode
	SV6		1) To supply hot gas for heating indoor units in cooling main mode 2) Bypass hot gas from compressor discharge in heating operation
Thermistor (Heat exchanger defrosting)	SV7		1) Bypass pressure at start-up stage and control capacity at low load condition 2) High-pressure-rise prevention 3) Discharge superheat protection
	T3A		Used to control defrosting during heating operation
T3C			
Thermistor (Outside air)	T4		Used to detect outdoor air temperature and control fan speed
Thermistor (High pressure pipe)	T5		Used to control SV6 based on the refrigerant status in cooling main mode
Thermistor (Accumulator inlet)	T6		Used for MDC to control EVXA and SVP
Thermistor (Compressor suction pipe)	T7		
Thermistor (INV.1 discharge pipe)	T7C1		Used to detect discharge temperature and calculate discharge superheat
Thermistor (INV.2 discharge pipe)	T7C2		
Thermistor (INV.1 discharge temperature protection)	Tpr1	TP1-PRO	Provides high-temperature protection
Thermistor (INV.2 discharge temperature protection)	Tpr2	TP2-PRO	
High pressure sensor	PH	H-YL1	Used to detects high pressure
Low pressure sensor	PL	L-YL1	Used to detects low pressure
High pressure switch	HPS	H-PRO-4	These 2 switches are used to prevent abnormal increase of high pressure, to which will activate at 580 psi and shut down compressors.

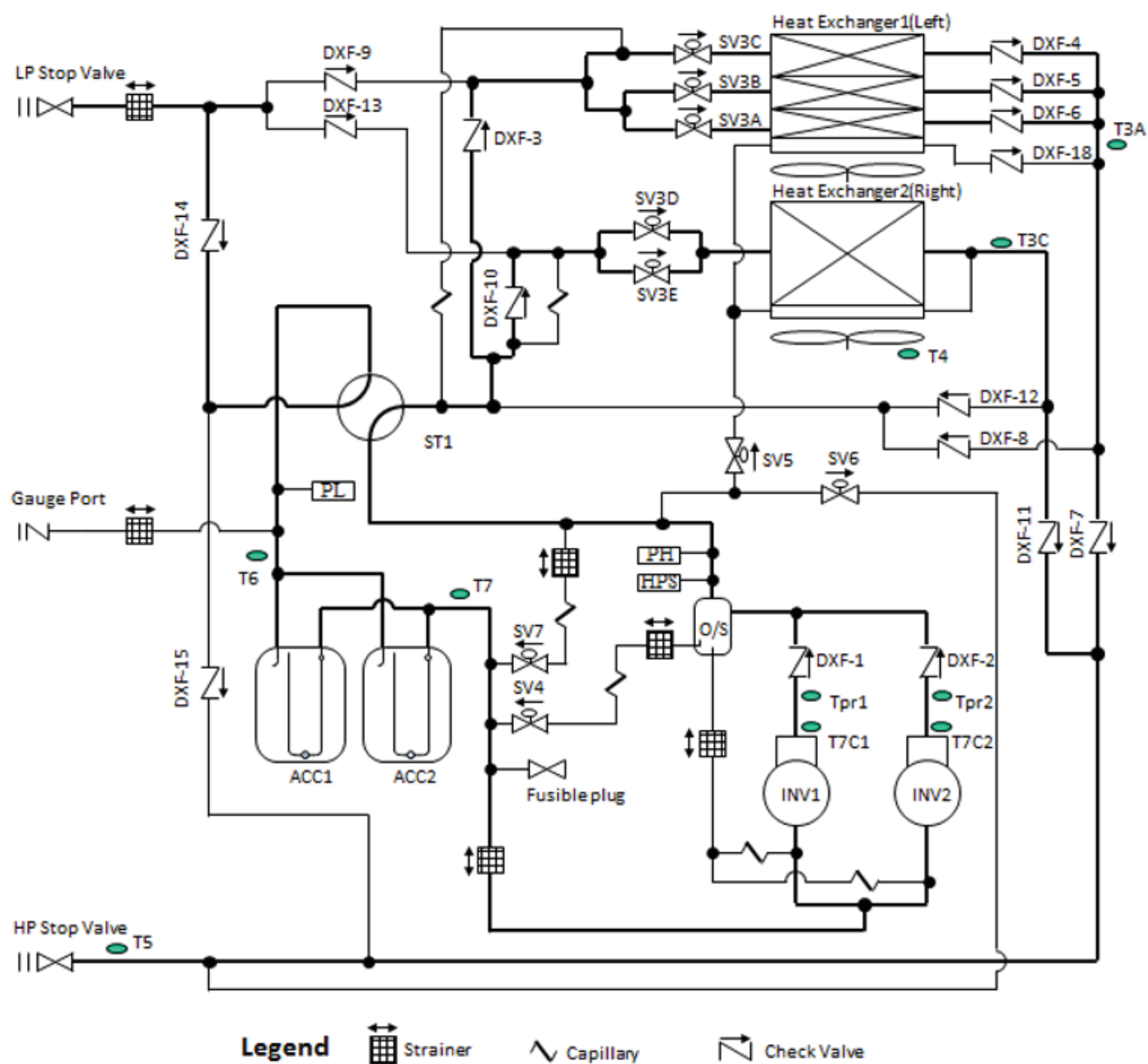
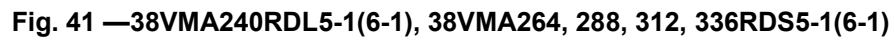


Fig. 40 —38VMA144RDL5-1(6-1), 38VMA168, 192, 216, 240RDS5-1(6-1)

Table 10 —38VMA240RDL5-1(6-1), 38VMA264, 288, 312, 336RDS5-1(6-1)

NAME	SYMBOL		MAJOR FUNCTION
	REFRIGERANT CIRCUIT DIAGRAM	ELECTRICAL WIRING DIAGRAM	
Inverter compressor	INV1	Compressor A	Varies the refrigerant flow rate by adjusting the frequency based on objective pressure
	INV2	Compressor B	
	INV3	Compressor C	
Oil separator	O/S	-	Used to separate oil from high pressure and high temperature refrigerant, which is pumped out during compression.
Inverter fan	FANA		The fan is operated at 13-step rotation speed by using inverter.
	FANB		
	FANC		
	FAND		
4-way valve	ST1		Used to switch the operation mode between heating and cooling
Heat exchanger	HEX	-	To transfer heat with surrounding ambient
Solenoid valve	SV3A		Used to control heat exchanger areas
	SV3B		
	SV3C		
	SV3D		
	SV3E		
	SV4		Used for control the amount of oil from the oil separator to the compressor
	SV5		1) High-pressure-rise prevention 2) To prevent the bottom of heat exchangers being frozen in heating mode
	SV6		1) To supply hot gas for heating indoor units in cooling main mode 2) Bypass hot gas from compressor discharge in heating operation
	SV8		
	SV7		
Thermistor (Heat exchanger defrosting)	T3A		Used to control defrosting during heating operation
	T3C		
Thermistor (Outside air)	T4		Used to detect outdoor air temperature and control fan speed
Thermistor (High pressure pipe)	T5		Used to control SV6 and SV8 based on the refrigerant status in cooling main mode
Thermistor (Accumulator inlet)	T6		Used for MDC to control EVXA and SVP
Thermistor (Compressor suction pipe)	T7		
Thermistor (INV.1 discharge pipe)	T7C1		Used to detect discharge temperature and calculate discharge superheat
Thermistor (INV.2 discharge pipe)	T7C2		
Thermistor (INV.3 discharge pipe)	T7C3		
Thermistor (INV.1 discharge temperature protection)	Tpr1	TP1-PRO	Provides high-temperature protection
Thermistor (INV.2 discharge temperature protection)	Tpr2	TP2-PRO	
Thermistor (INV.3 discharge temperature protection)	Tpr3	TP3-PRO	
High pressure sensor	PH	H-YL1	Used to detects high pressure
Low pressure sensor	PL	L-YL1	Used to detects low pressure
High pressure switch	HPS	H-PRO-4	These 3 switches are used to prevent abnormal increase of high pressure, to which will activate at 580 psi and shut down compressors.



Functional Parts Layout of MDC Unit

Use the 16 ports as an example for 40VMD series functional parts layout illustration. The difference between other models should be the port numbers to indoor units and inner space for piping arrangement.

40VMD016ML-3 (MAIN)

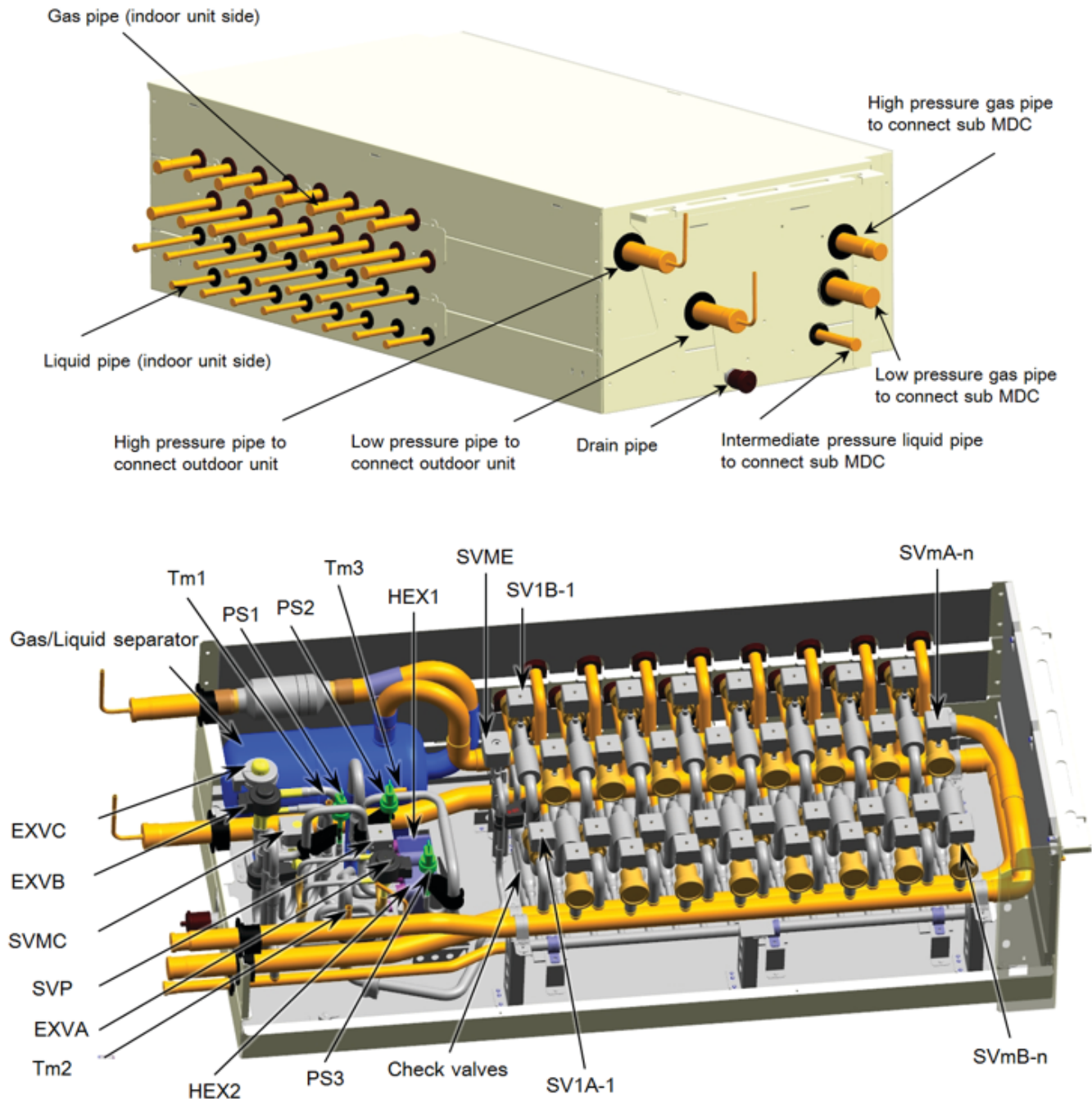


Fig. 42 —Internal View

SVmA-n: Cooling solenoid valve

SVmB-n: Heating solenoid valve

NOTES:

1. The micro-processor number of MDC board can be in the range of 1 to 8.
2. The port No. of MDC unit can be in the range of 1 to 16.

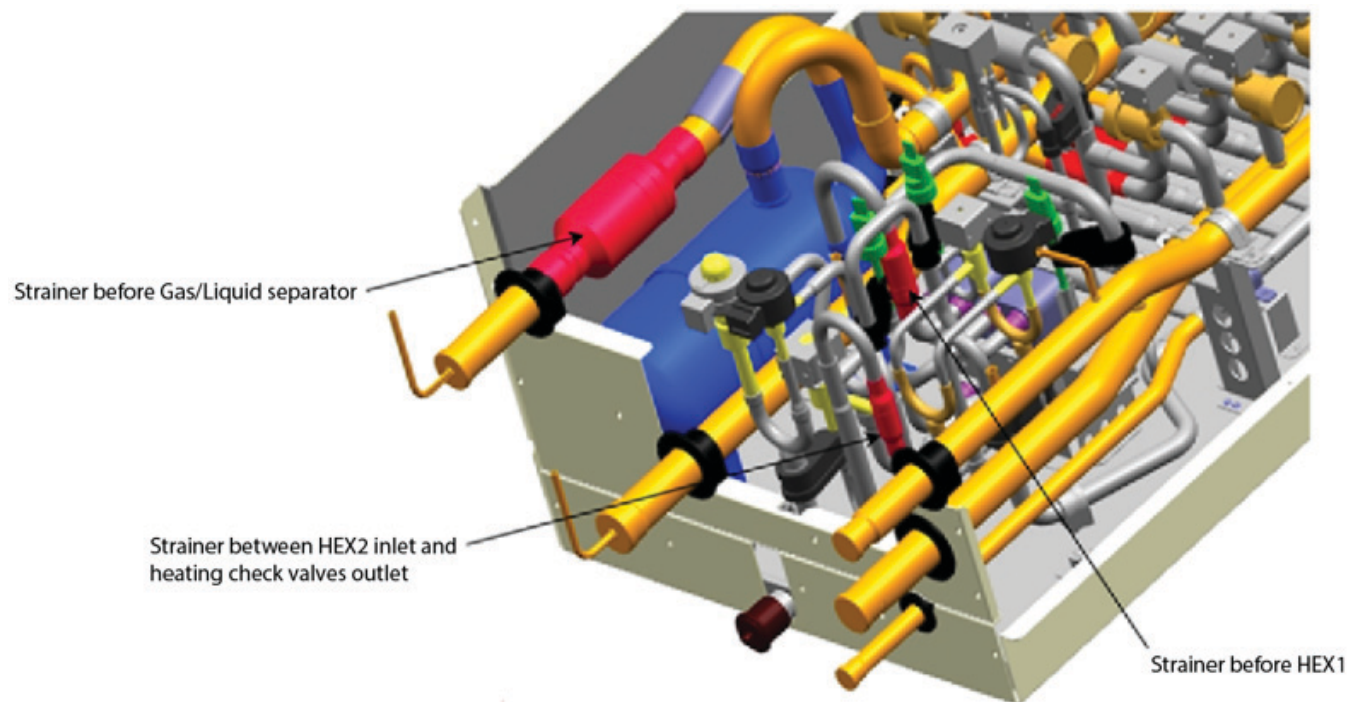


Fig. 43 —Partial View

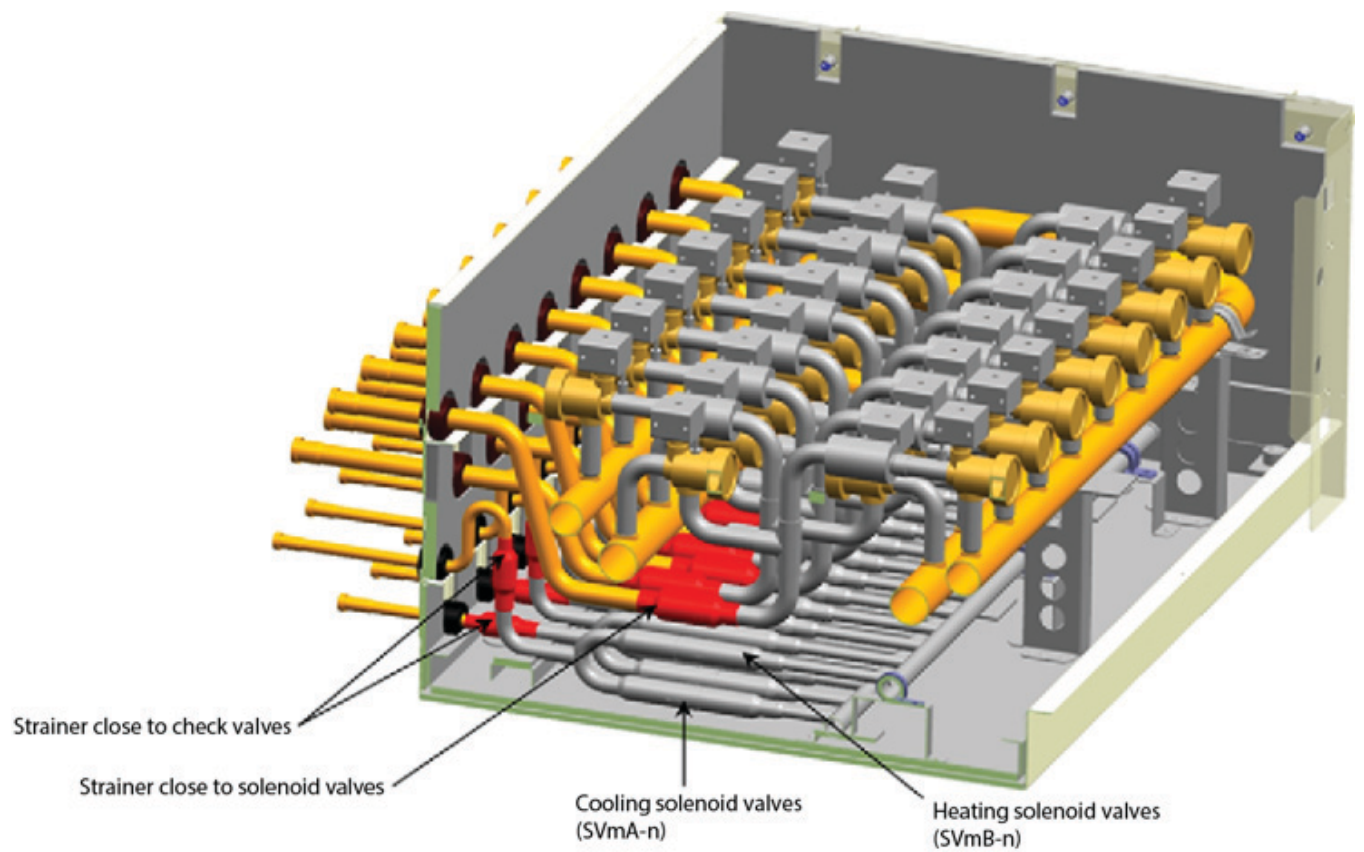


Fig. 44 —Section View

40VMD016M--3 (MAIN)

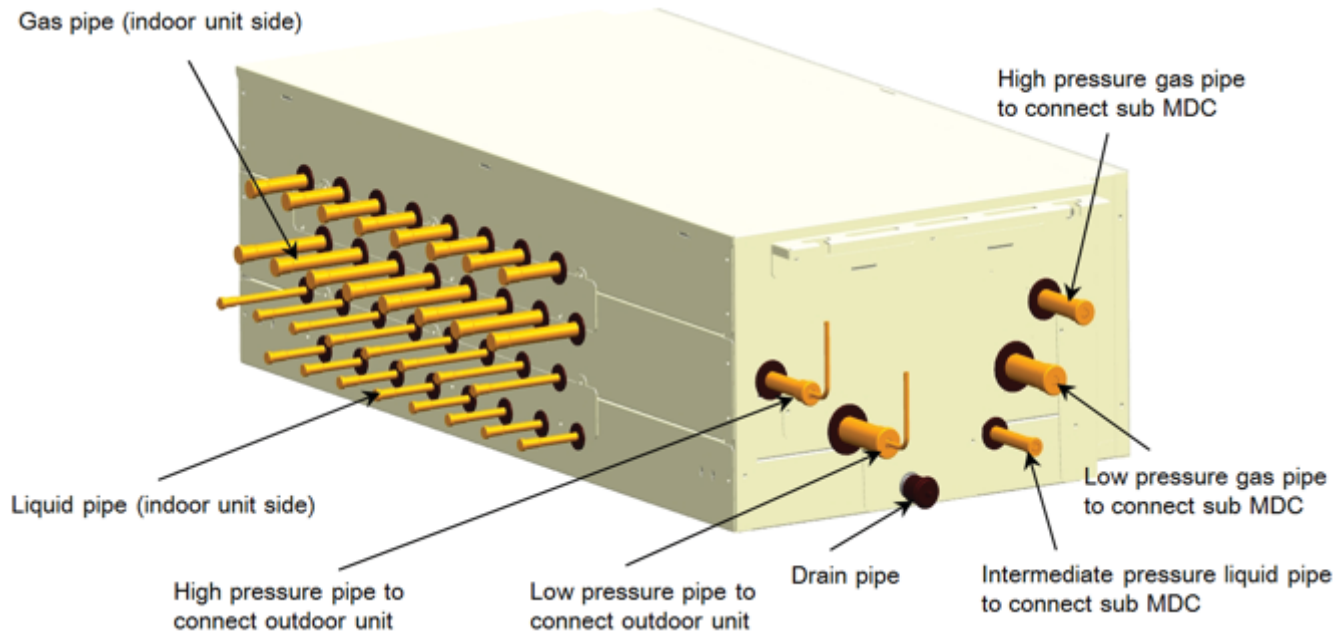


Fig. 45 —External Appearance

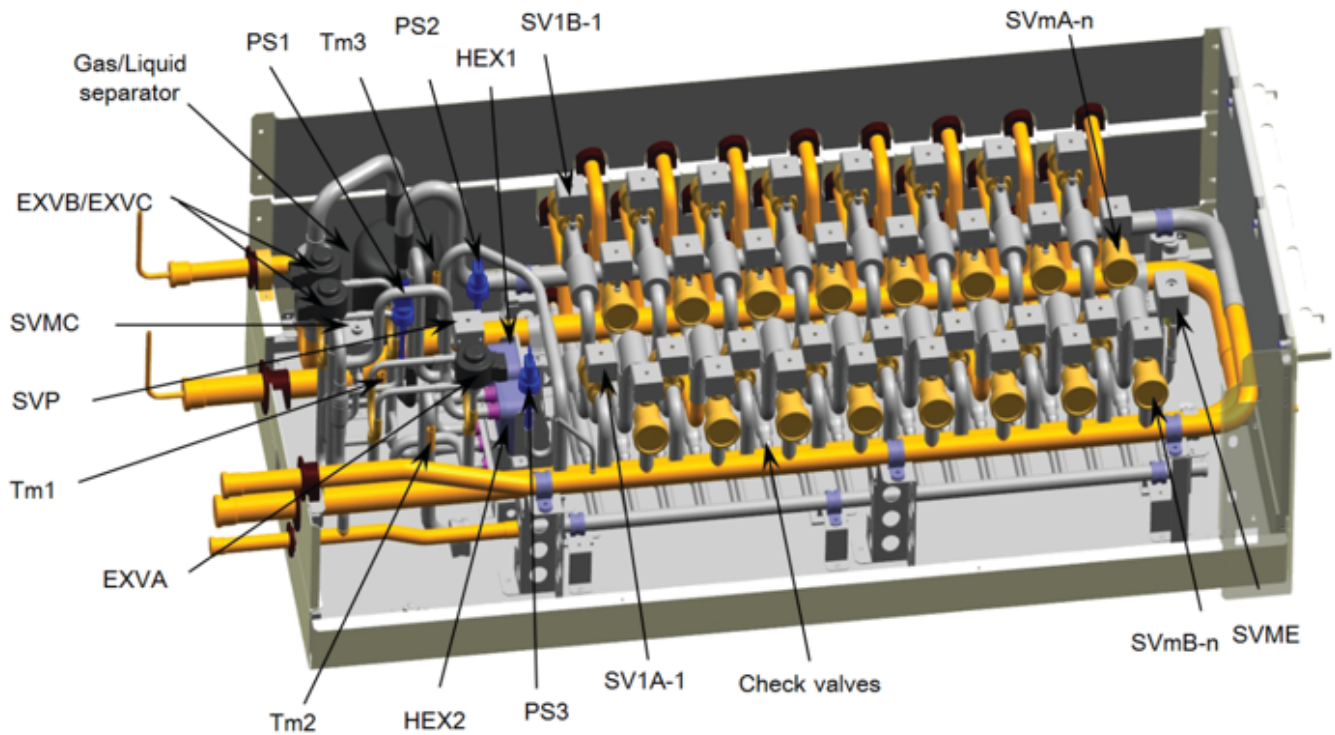


Fig. 46 —Internal View

SVmA-n: Cooling solenoid valve
SVmB-n: Heating solenoid valve

NOTES:

1. The micro-processor number of MDC board can be in the range of 1 to 8.
2. The port number of MDC unit can be in the range of 1 to 16.

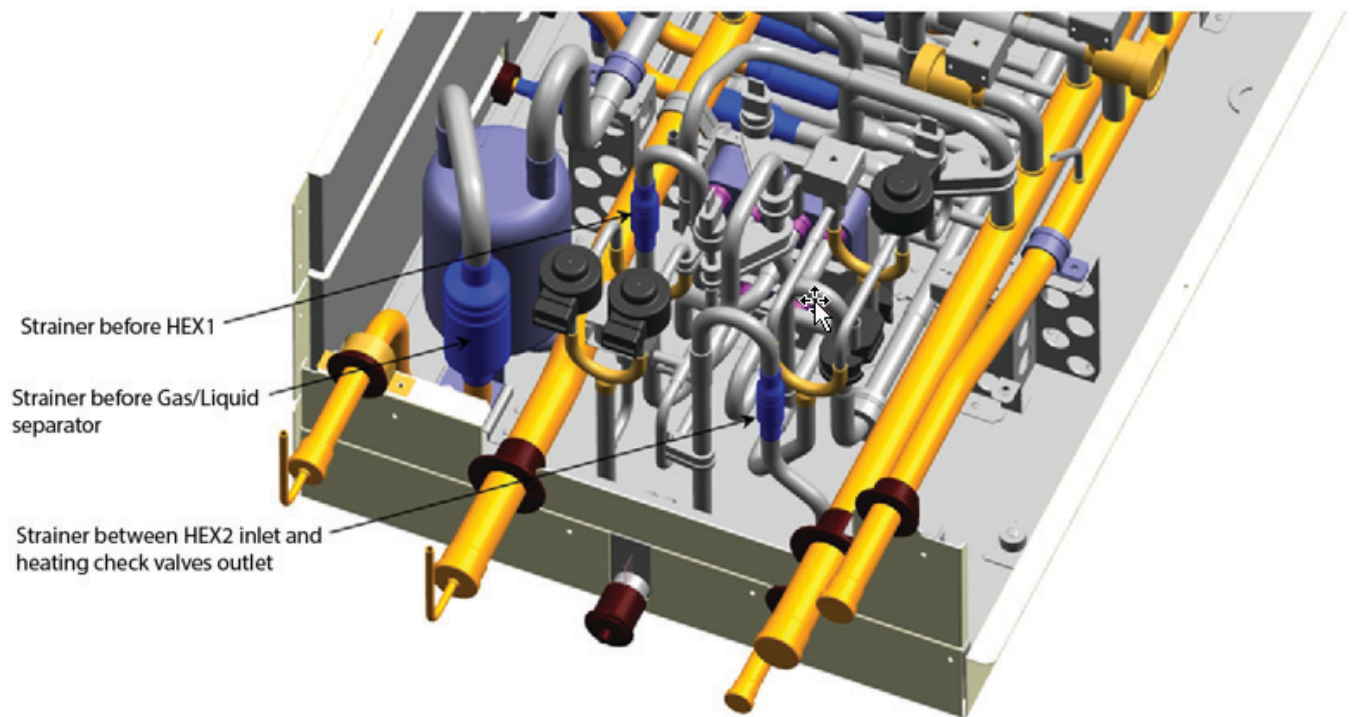


Fig. 47 —Partial View

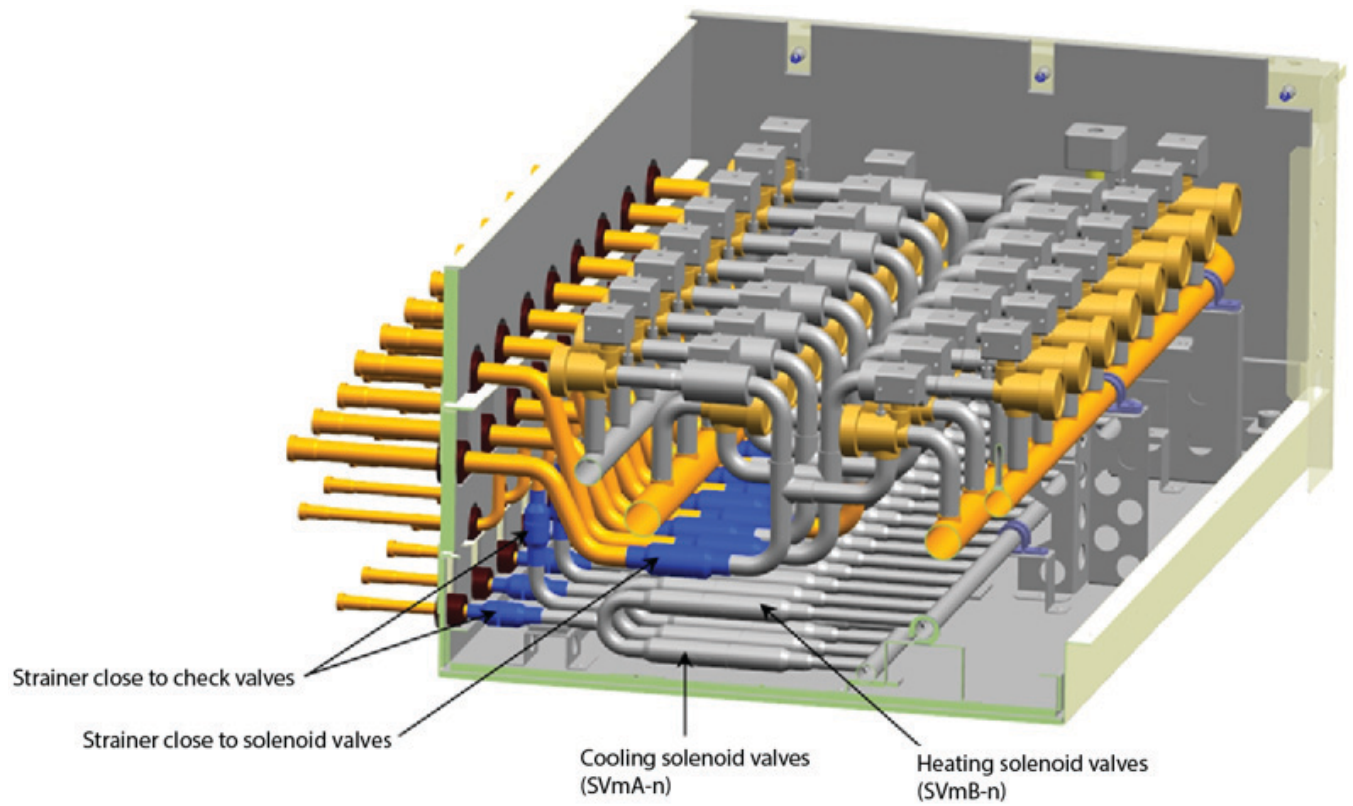


Fig. 48 —Section View

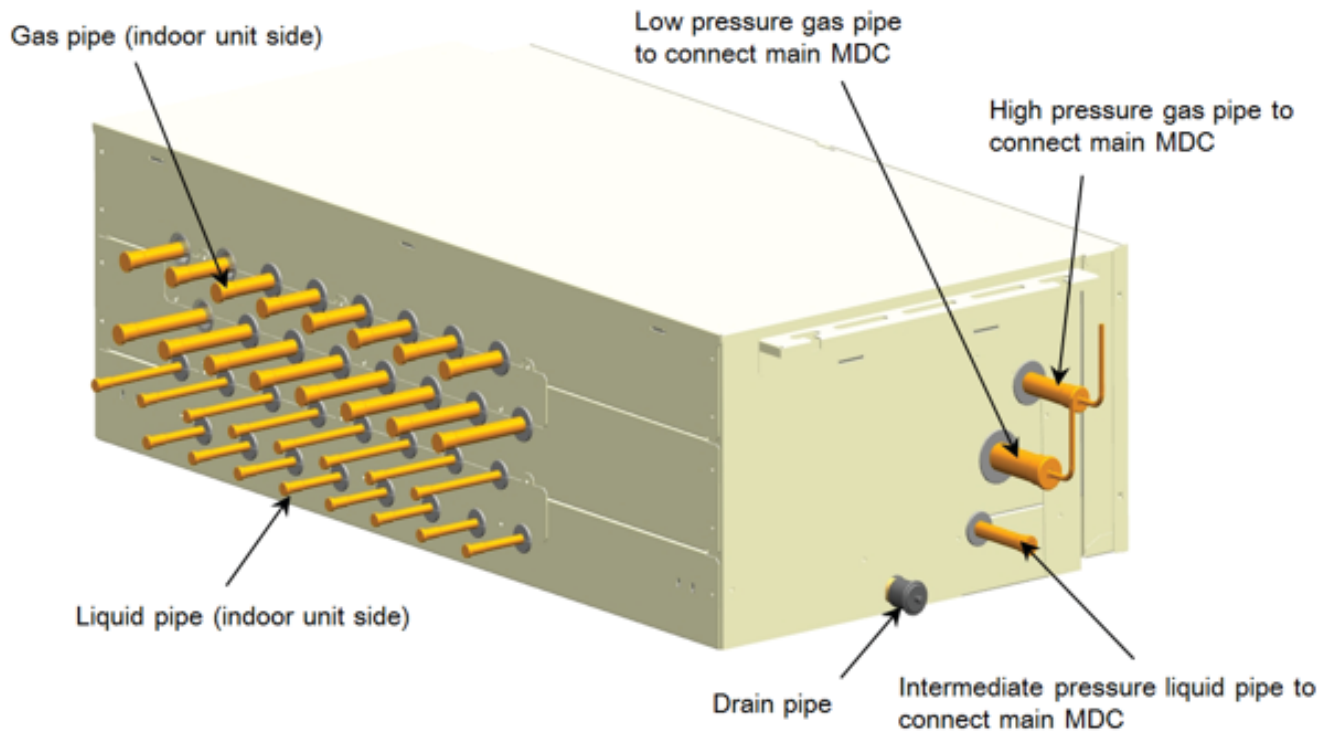


Fig. 49 —External Appearance

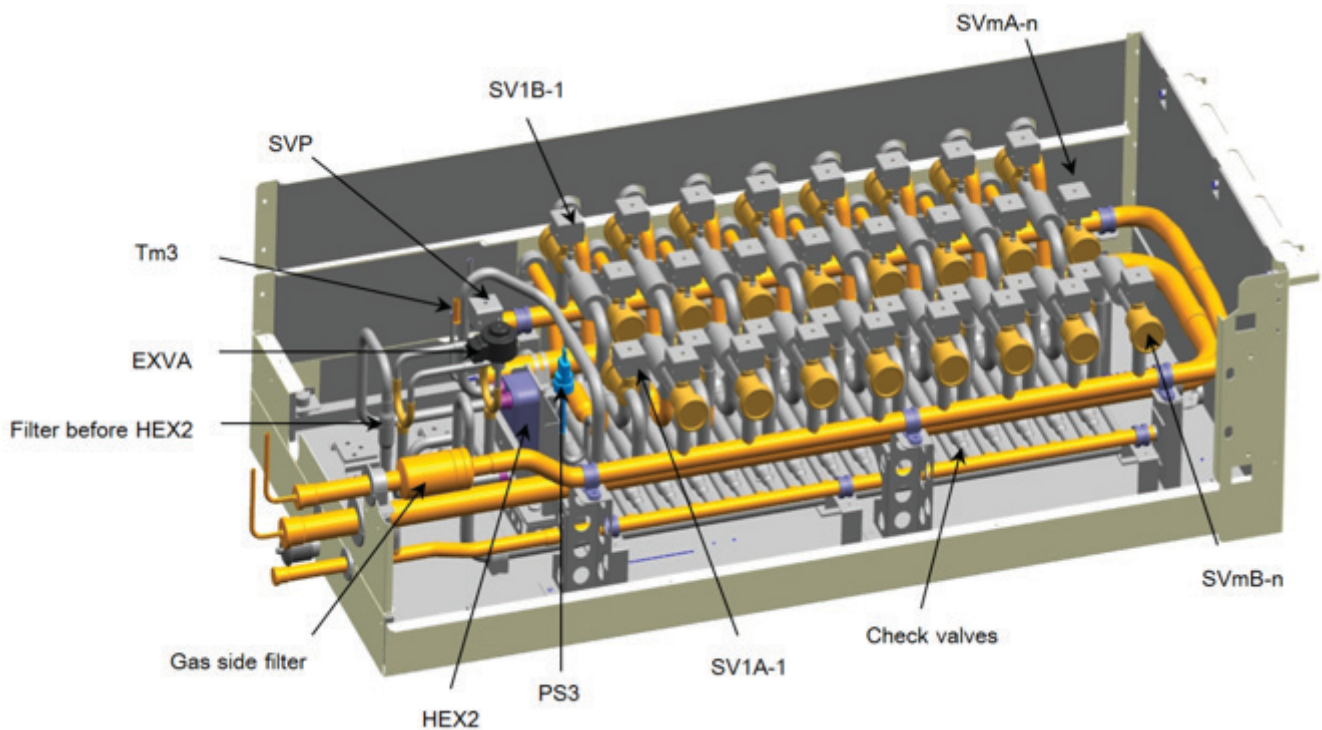


Fig. 50 —Internal View

SVmA-n: Cooling solenoid valve

SVmB-n: Heating solenoid valve

NOTES:

1. The micro-processor number of MDC board can be in the range of 1 to 8.
2. The port number of MDC unit can be in the range of 1 to 16.

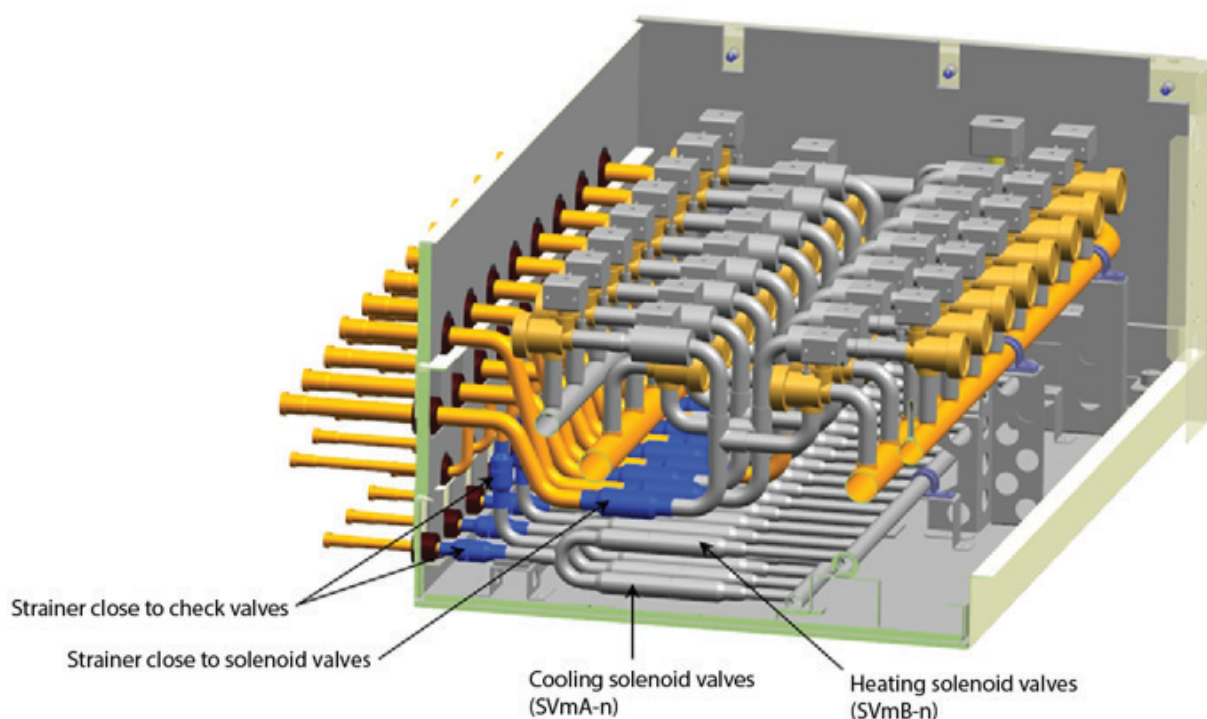


Fig. 51 —Section View

Major Components Functions and Circuit Diagrams of MDC Units

Table 11 —Component Functions of MDC

NAME	SYMBOL		MAJOR FUNCTION
	REFRIGERANT CIRCUIT DIAGRAM	ELECTRICAL WIRING DIAGRAM	
Pressure sensor	PS1	H-YL1	Used to detect high pressure and control EXVB and EXVC
	PS2	H-YL2	Used to detect intermediate pressure and control EXVB and EXVC
	PS3	L-YL1	Used to detect low pressure and control EXVA
Thermistor	Tm1	T1	Used to calculate sub-cooling (SCm1)
	Tm2	T2	Used to calculate sub-cooling (SCm2)
	Tm3	T3	Used to calculate superheat degree (SHm3)
Solenoid valve	SVMC		1) Opens during cooling and defrosting operation 2) Prevents high pressure from rising
	SVME		Used for high-pressure prevention and high-temperature protection
	SVP		1) Superheat control in cooling mode 2) Used to control discharge superheat in heating mode
	SVmA-n *Note		Provides refrigerant to indoor unit in cooling operation
	SVmB-n *Note		Provides refrigerant to indoor unit in heating operation
Electronic expansion valve	EXVA		Cooperate with SVP 1) Superheat control in cooling mode 2) Used to control discharge superheat in heating mode
	EXVB		1) Opens during cooling and defrosting operation
	EXVC		2) Pressure differential control during cooling main operation

SVmA-n: Cooling solenoid valve

SVmB-n: Heating solenoid valve

NOTES:

1. The micro-processor number of MDC board can be in the range of 1 to 8.
2. The port number of MDC unit can be in the range of 1 to 16.

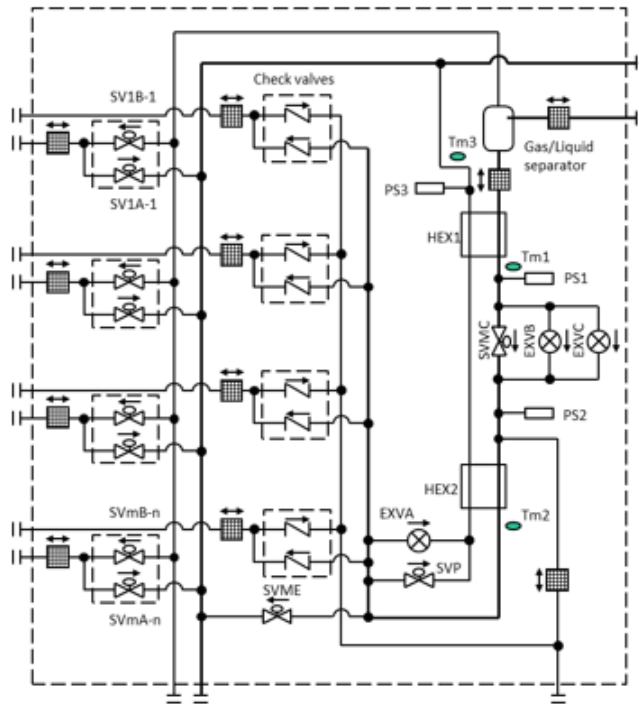


Fig. 52 —40VMD006, 008, 010, 016M—3 (Main)

SVmA-n: Cooling solenoid valve

SVmB-n: Heating solenoid valve

NOTES:

1. The micro-processor number of MDC board can be in the range of 1 to 8.
2. The port number of MDC unit can be in the range of 1 to 16.

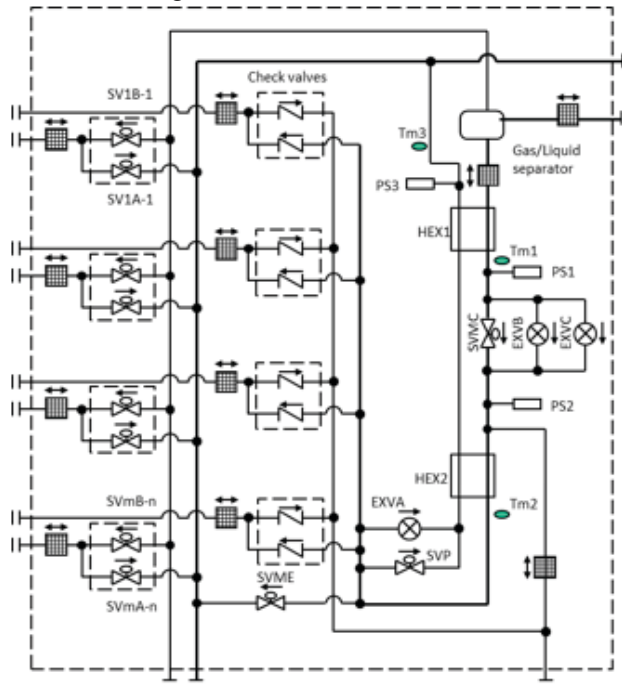


Fig. 53 —40VMD016ML-3 (Main)

SVmA-n: Cooling solenoid valve

SVmB-n: Heating solenoid valve

NOTES:

1. The micro-processor number of MDC board can be in the range of 1 to 8.
2. The port number of MDC unit can be in the range of 1 to 16.

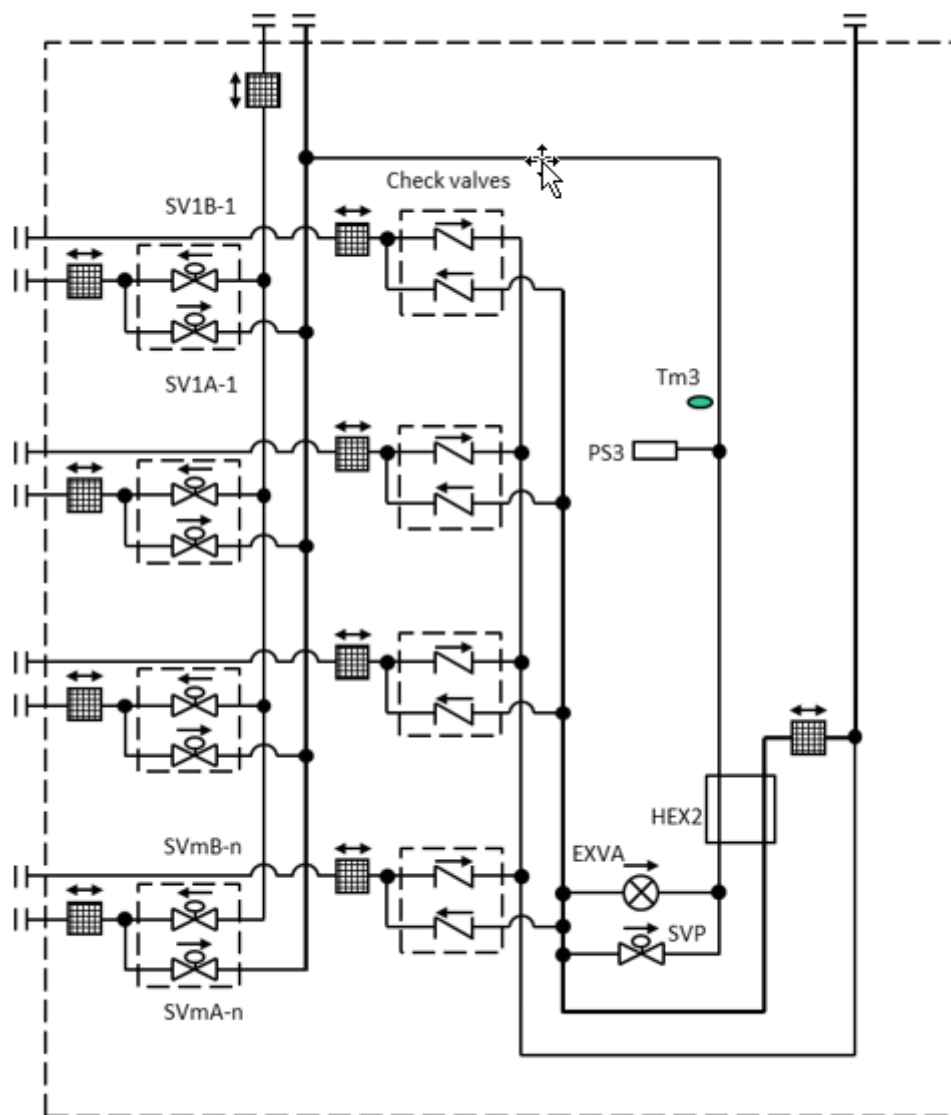


Fig. 54 —40VMD006, 008, 010, 016S—3 (Sub)

SVmA-n: Cooling solenoid valve

SVmB-n: Heating solenoid valve

NOTES:

1. The micro-processor number of MDC board can be in the range of 1 to 8.
2. The port number of MDC unit can be in the range of 1 to 16.

Refrigerant Flow for Each Operation Mode

6~10 TON SMALL CABINET SYSTEM (38VMA072, 096, 120RDS5-1(6-1))

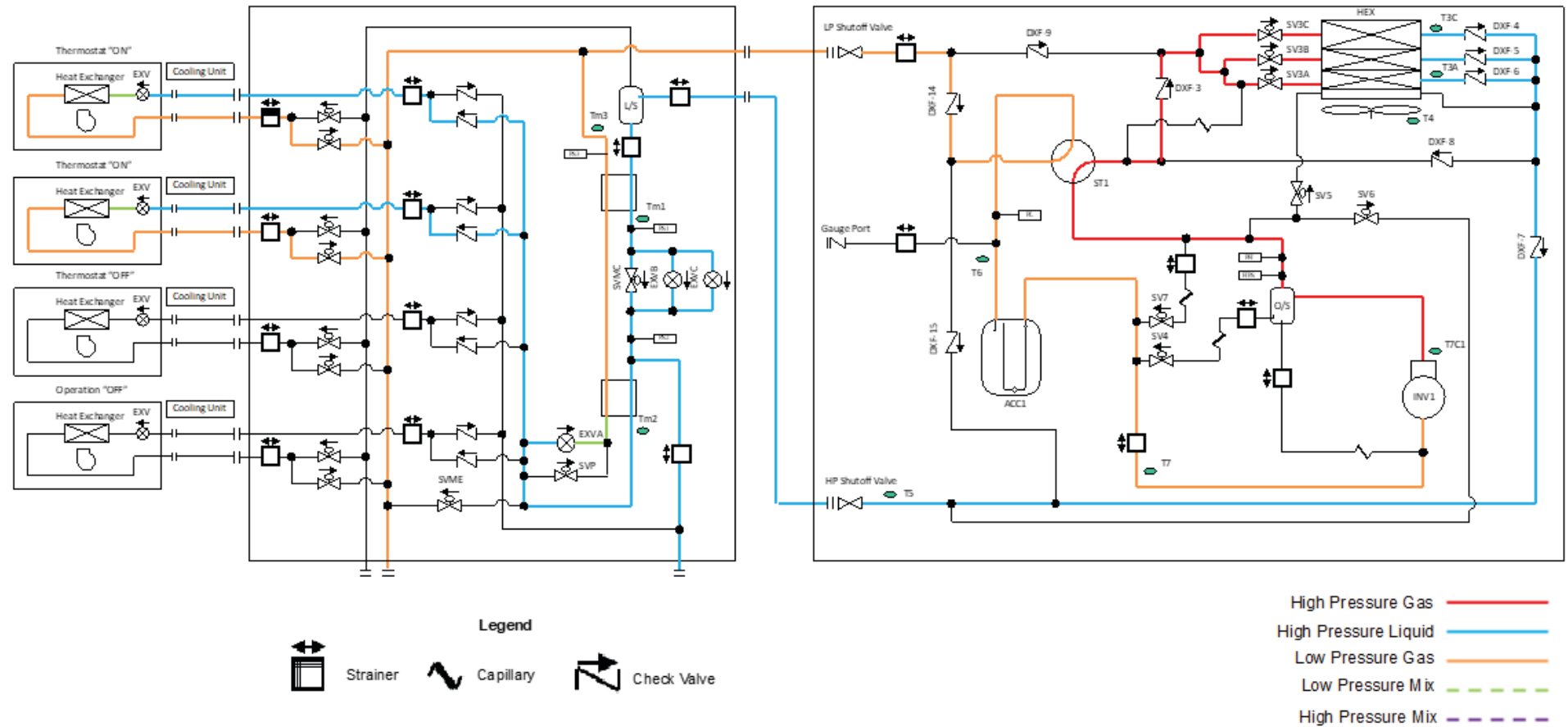


Fig. 55 —Cooling Operation

6~10 TON SMALL CABINET SYSTEM (38VMA072, 096, 120RDS5-1(6-1)) (CONT.)

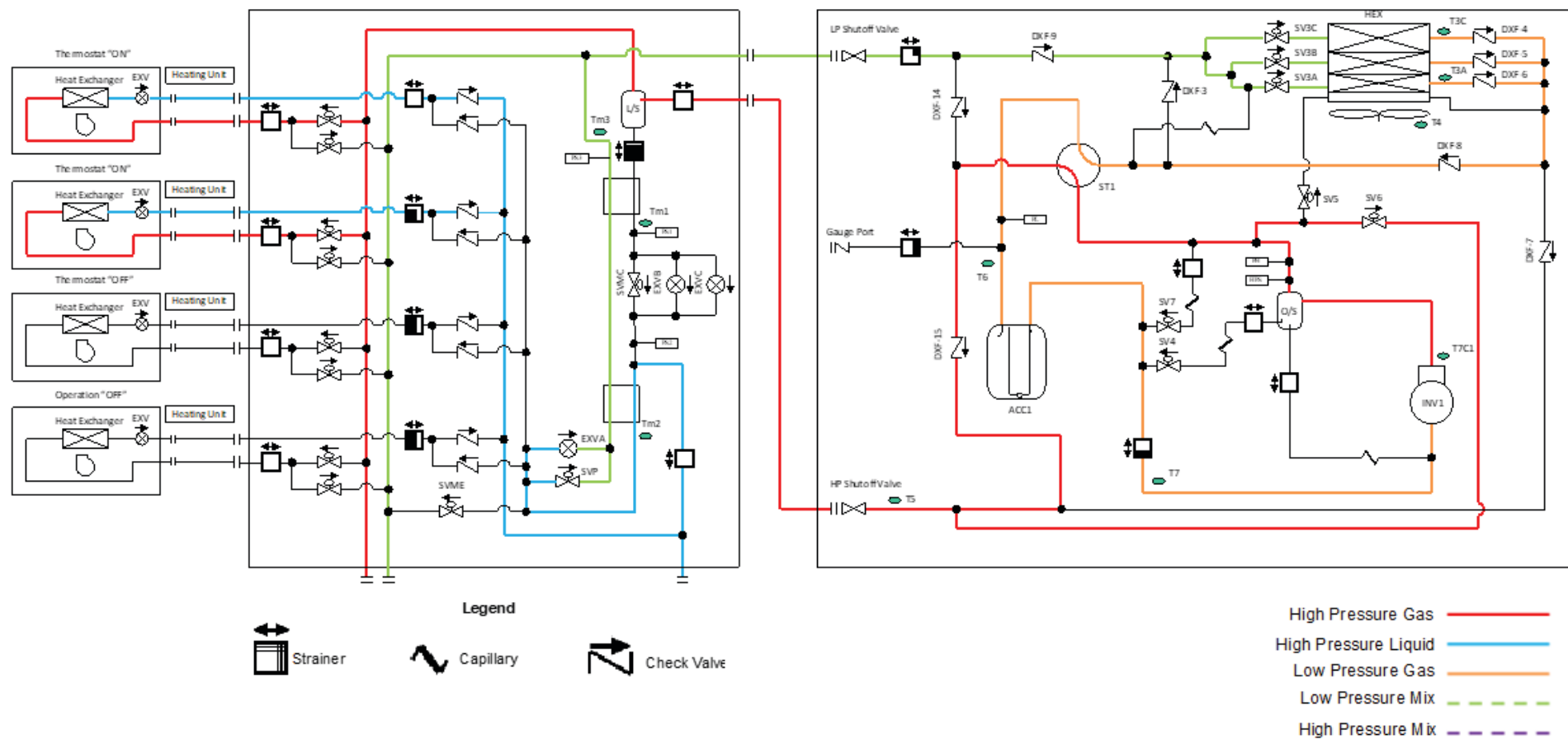


Fig. 56 —Heating Operation

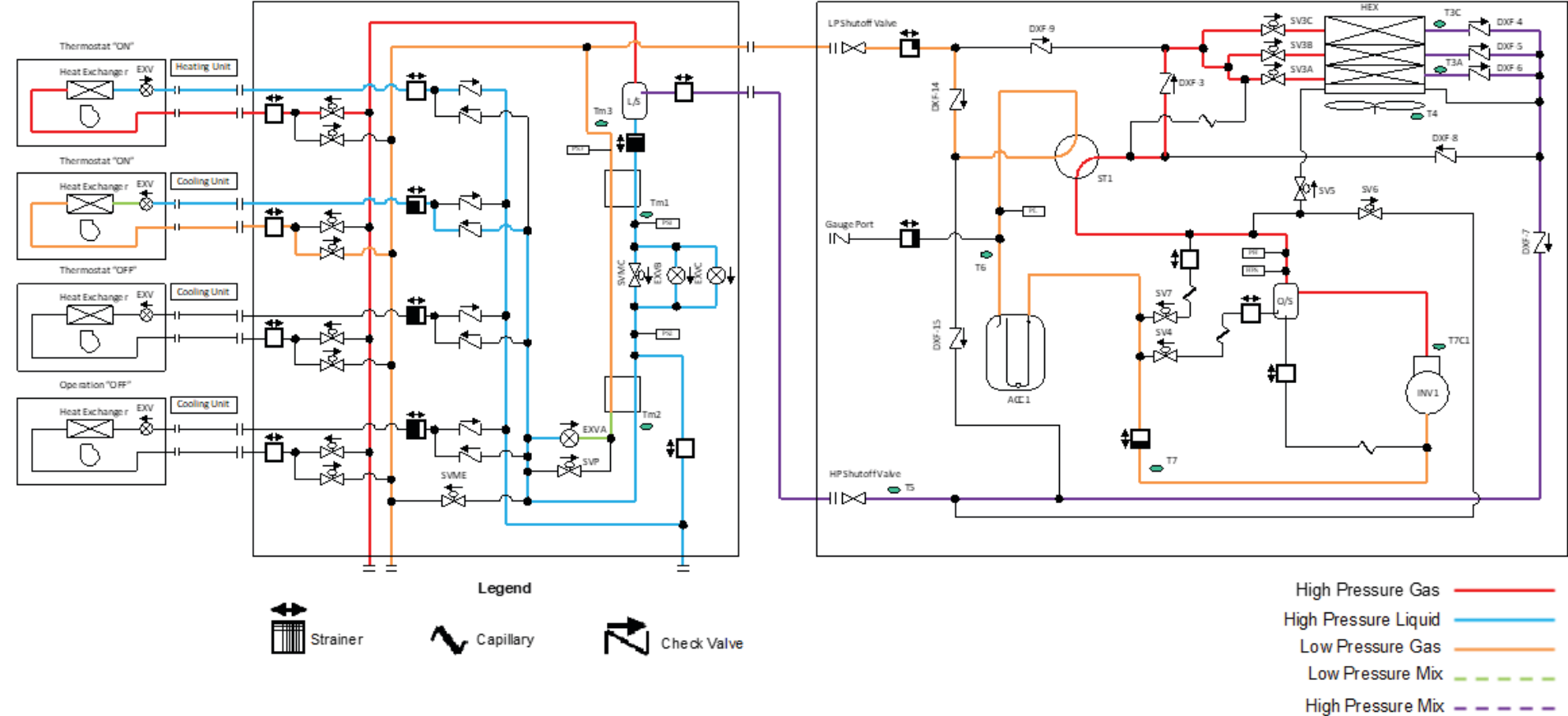


Fig. 57 —Cooling Main Operation

6~10 TON SMALL CABINET SYSTEM (38VMA072, 096, 120RDS5-1(6-1)) (CONT.)

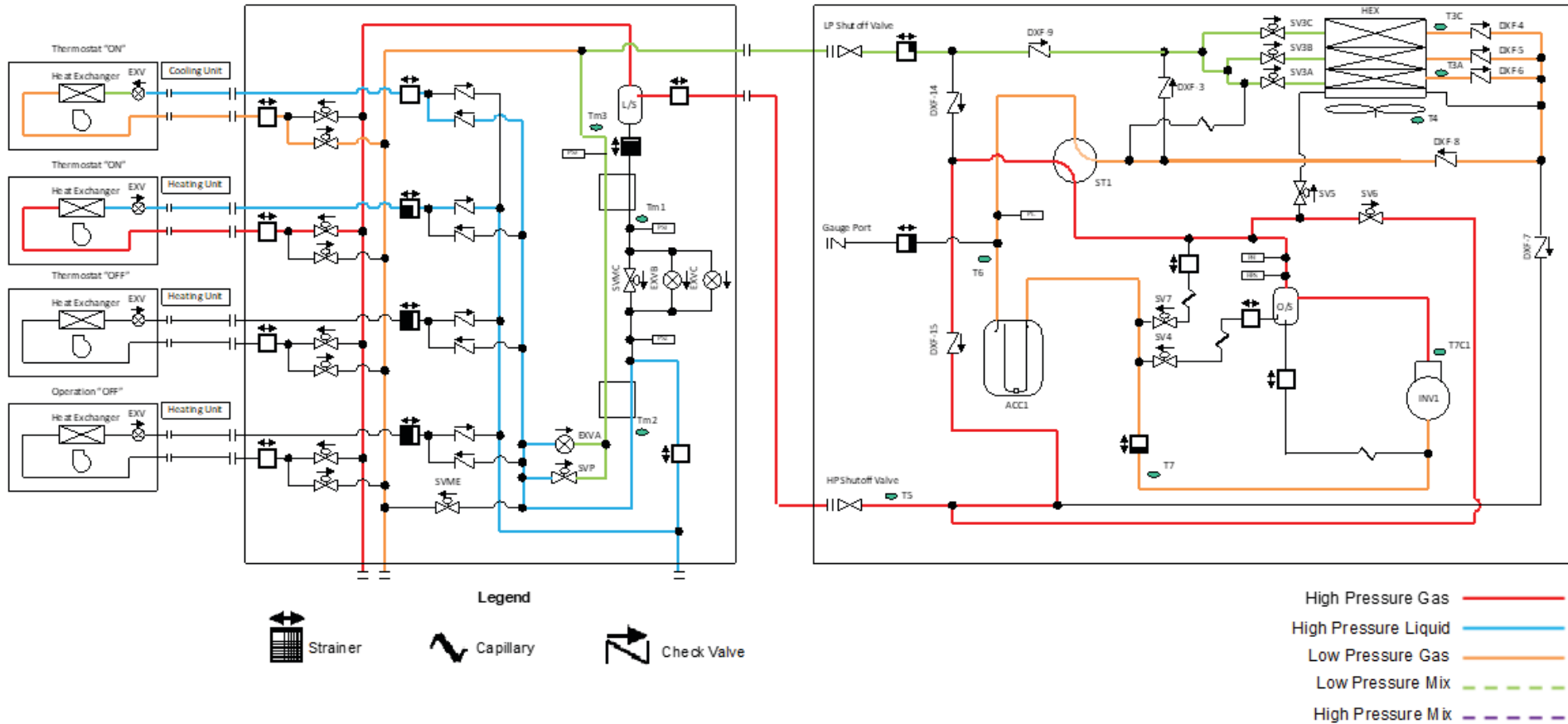


Fig. 58 —Heating Main Operation

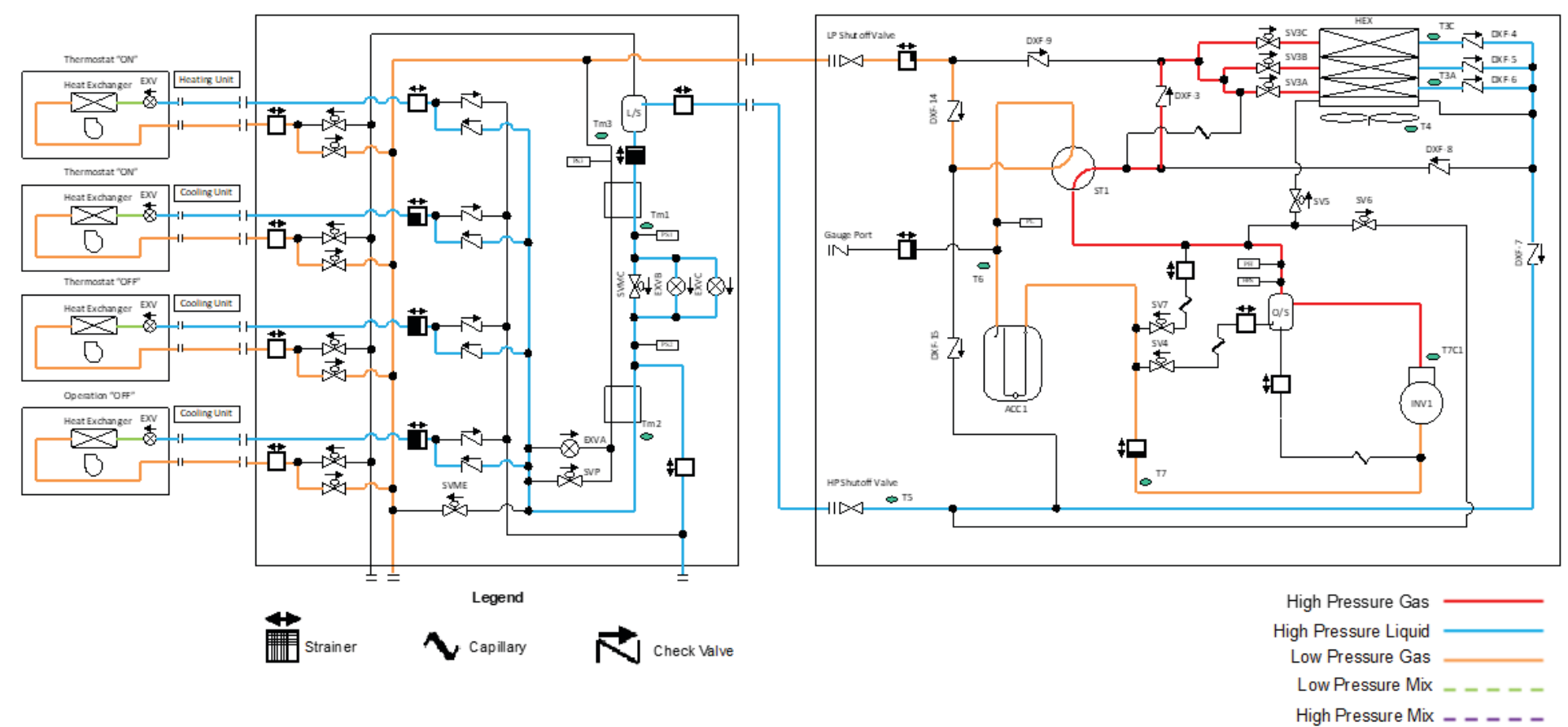


Fig. 59 —Oil Return Operation in Cooling / Cooling Main Operation

6~10 TON SMALL CABINET SYSTEM (38VMA072, 096, 120RDS5-1(6-1)) (CONT.)

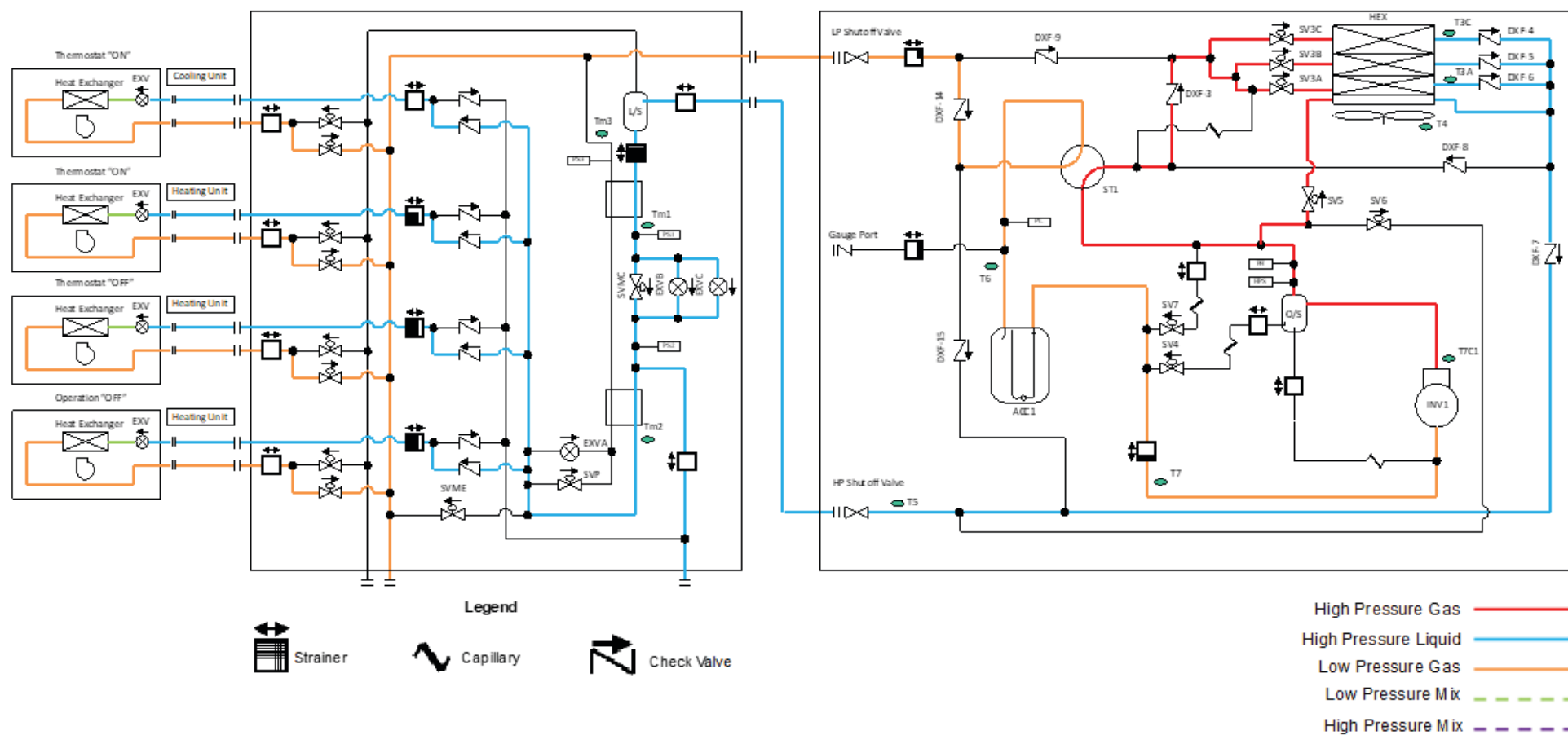


Fig. 60 —Defrosting Operation or Oil Return in Heating / Heating Main Mode

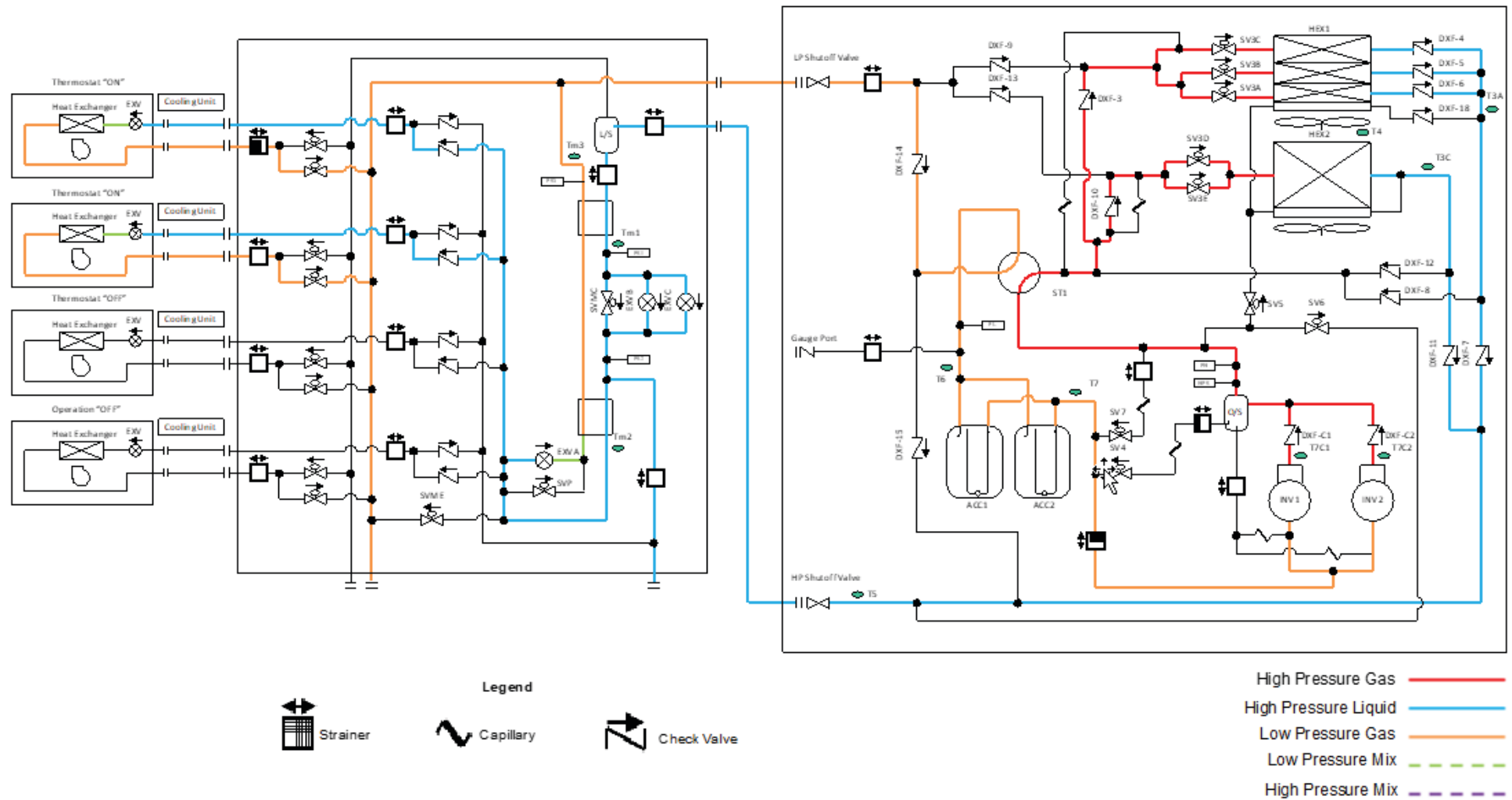


Fig. 61 —Cooling Operation

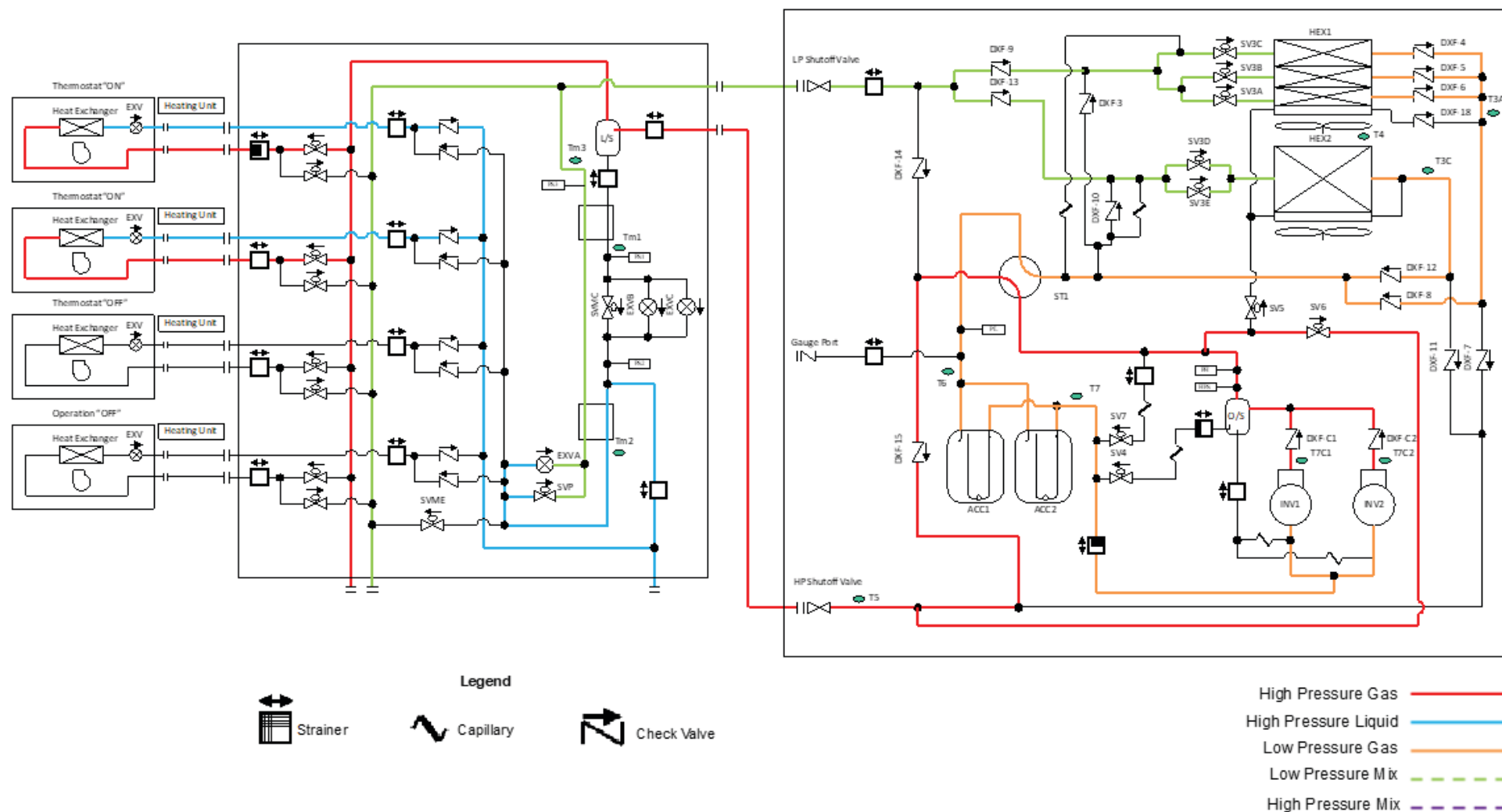


Fig. 62 —Heating Operation

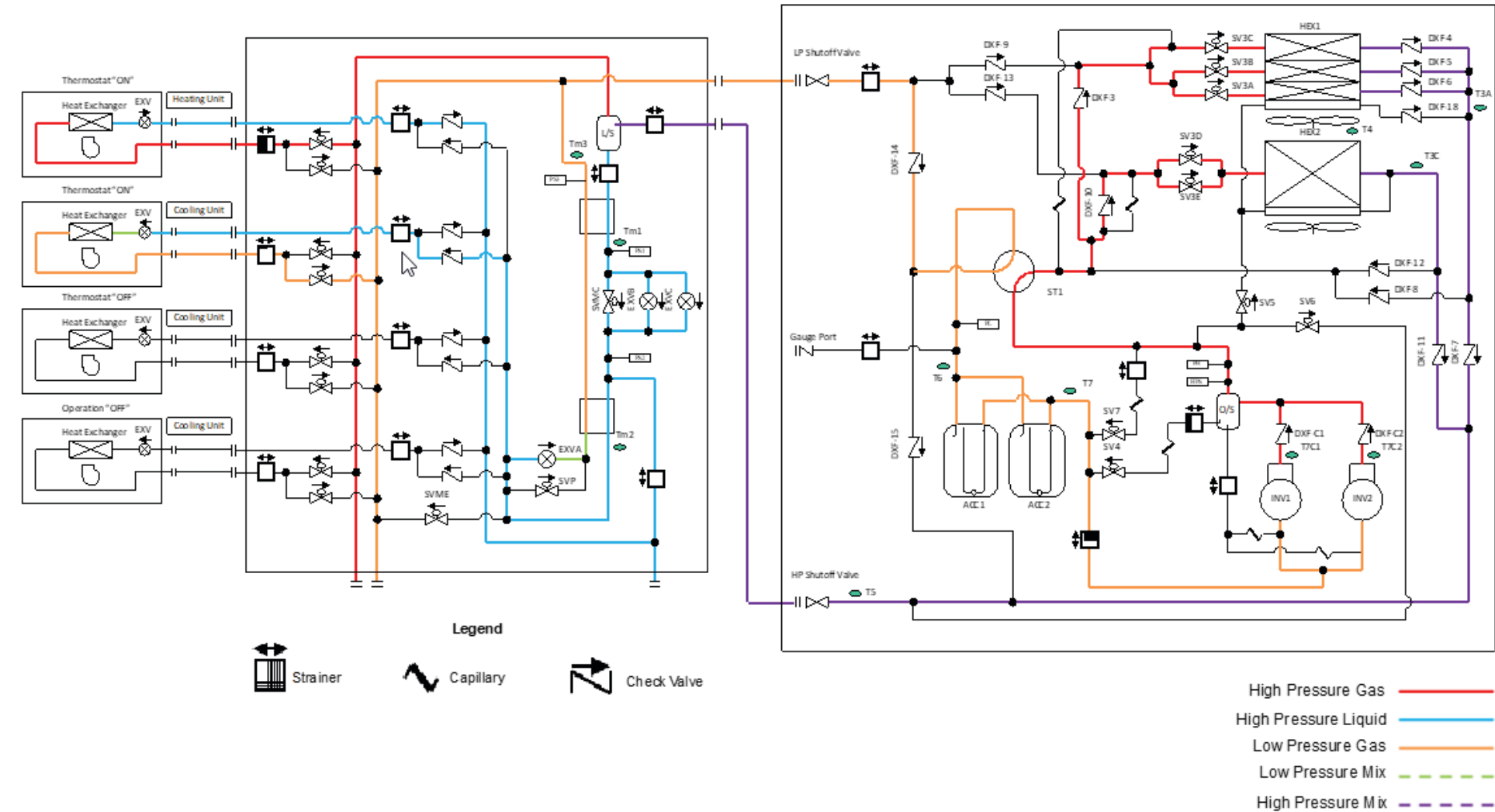


Fig. 63 —Cooling Main Operation

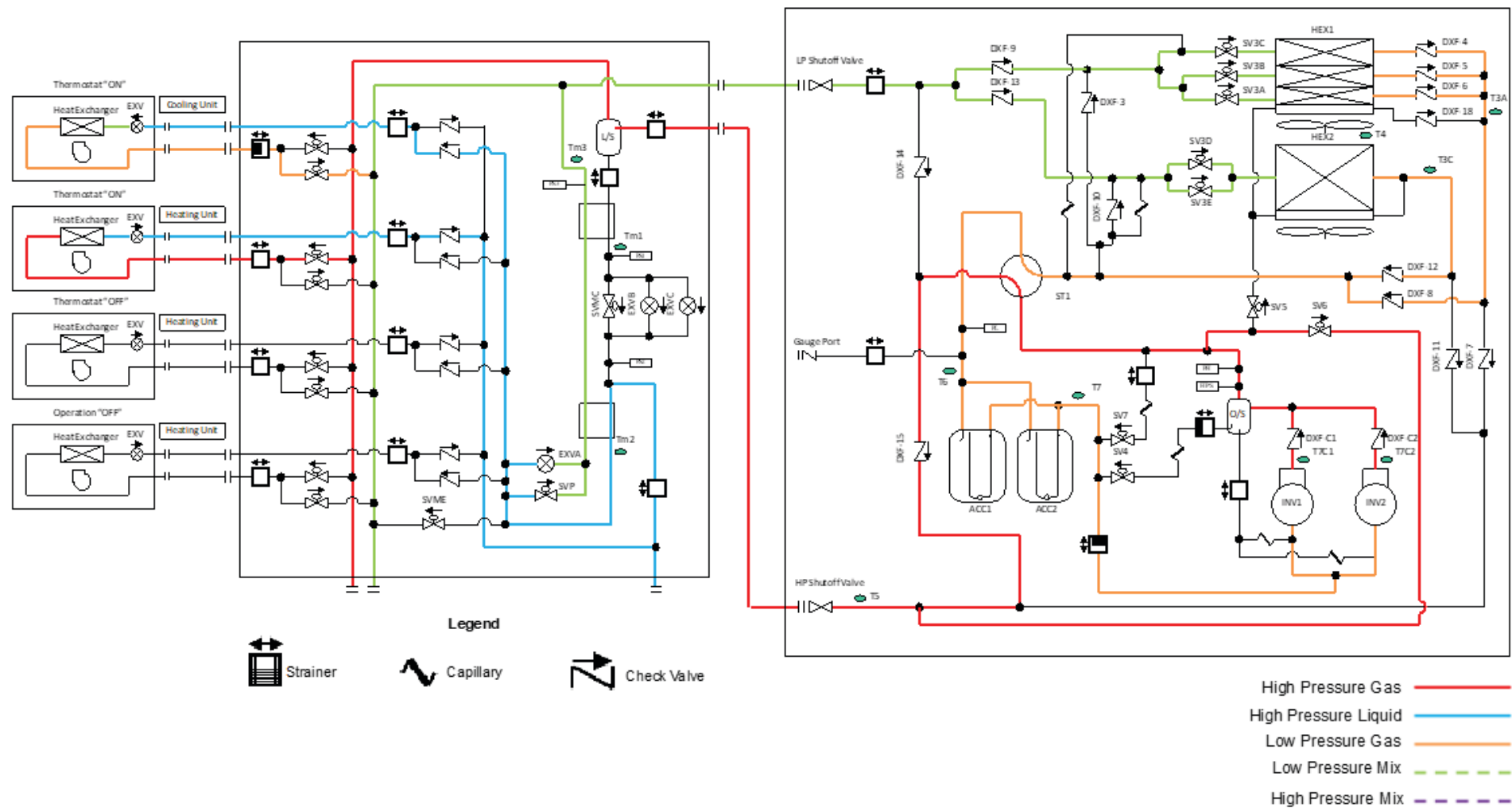


Fig. 64 —Heating Main Operation

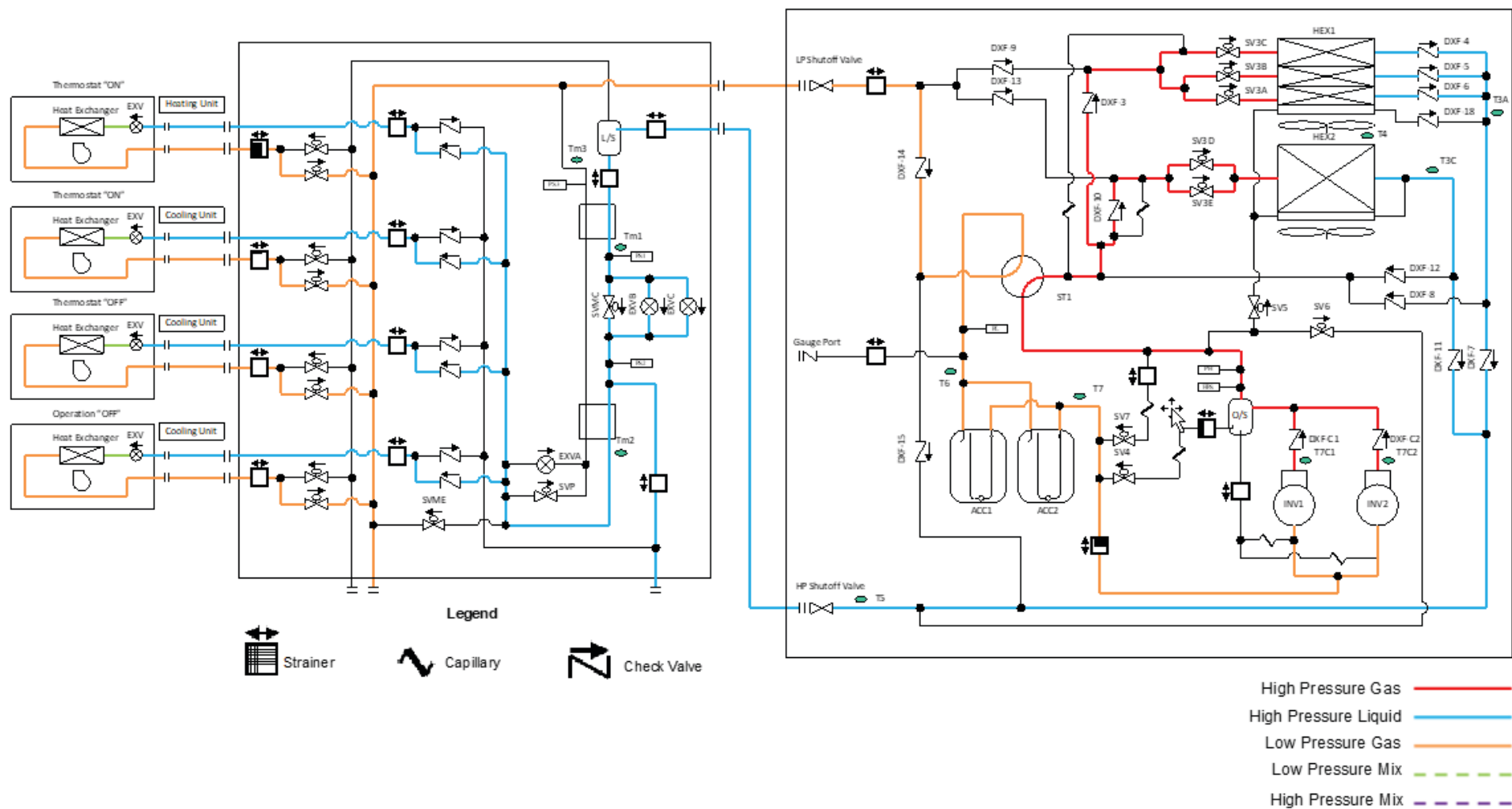


Fig. 65 —Oil Return Operation in Cooling / Cooling Main Mode

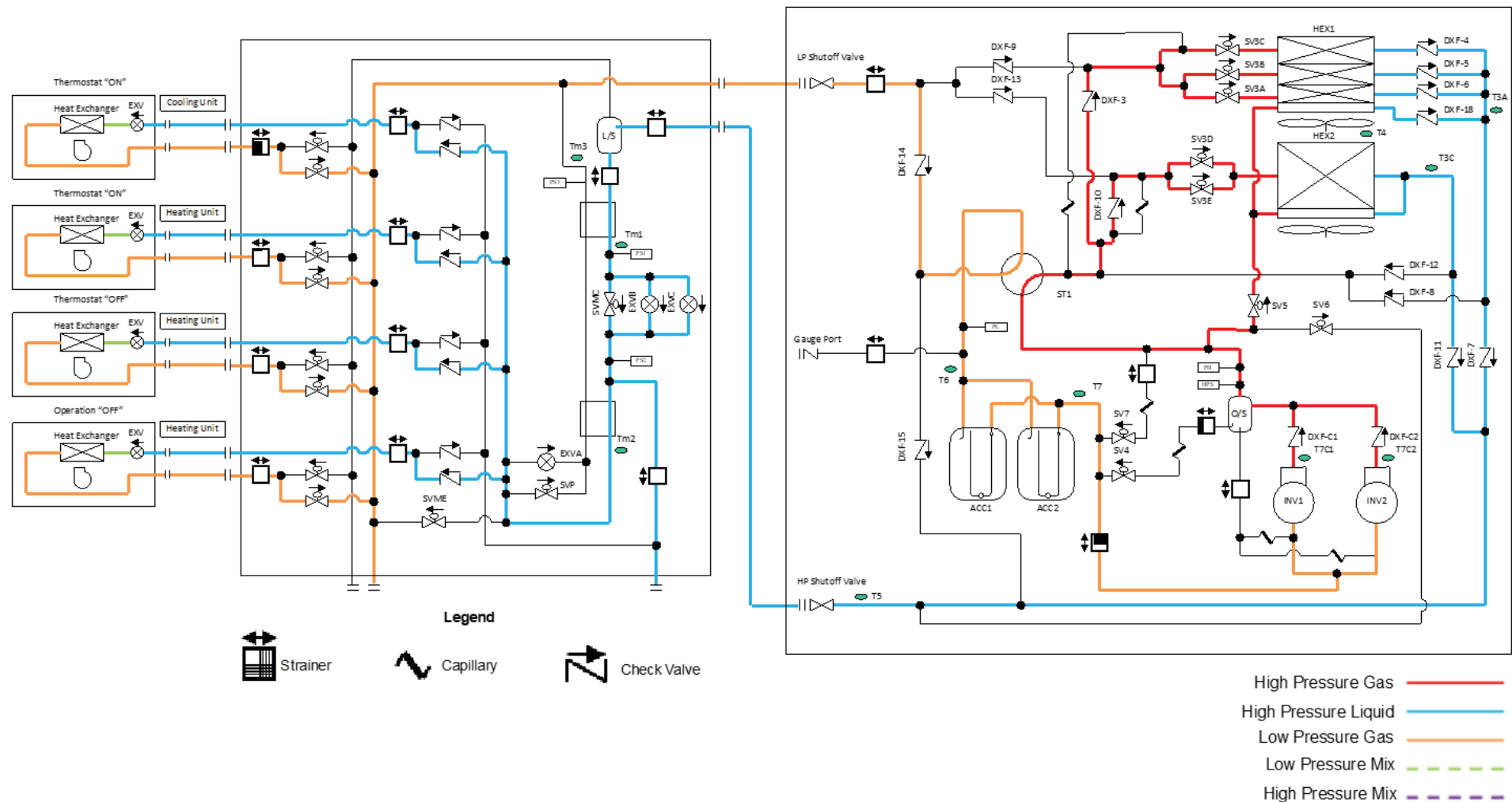


Fig. 66 —Defrosting Operation or Oil Return in Heating / Heating Main Mode

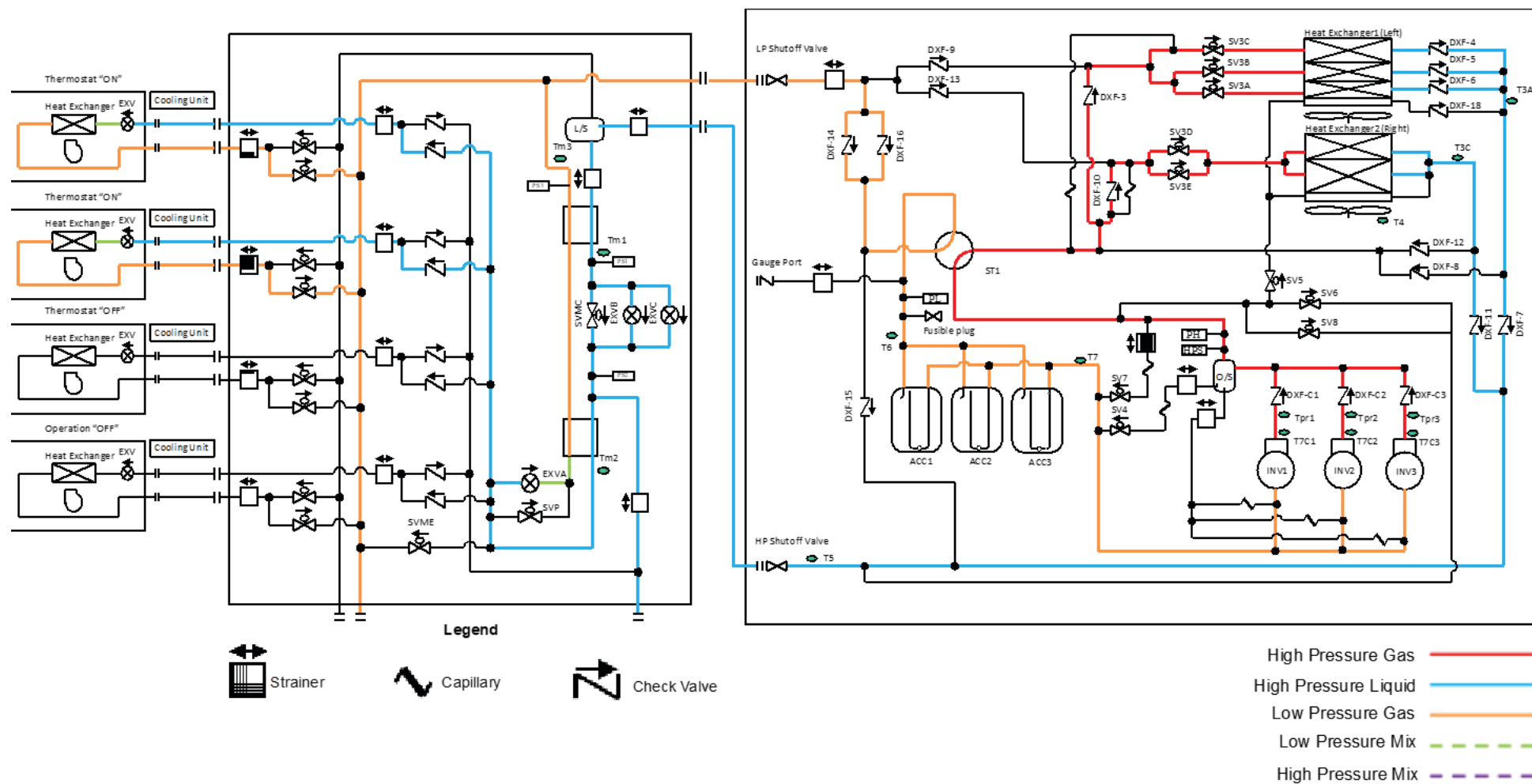


Fig. 67 —Cooling Operation

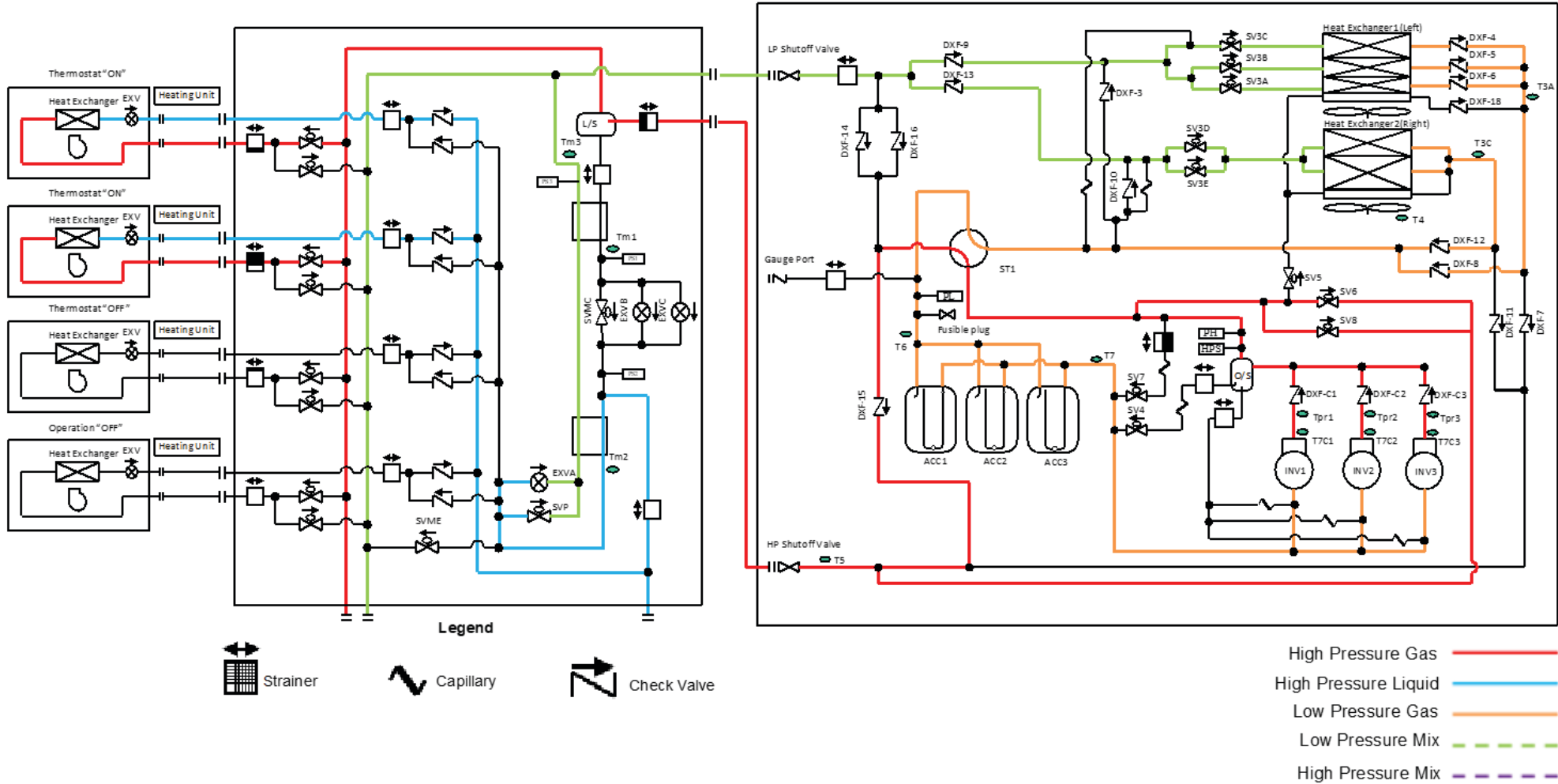


Fig. 68 —Heating Operation

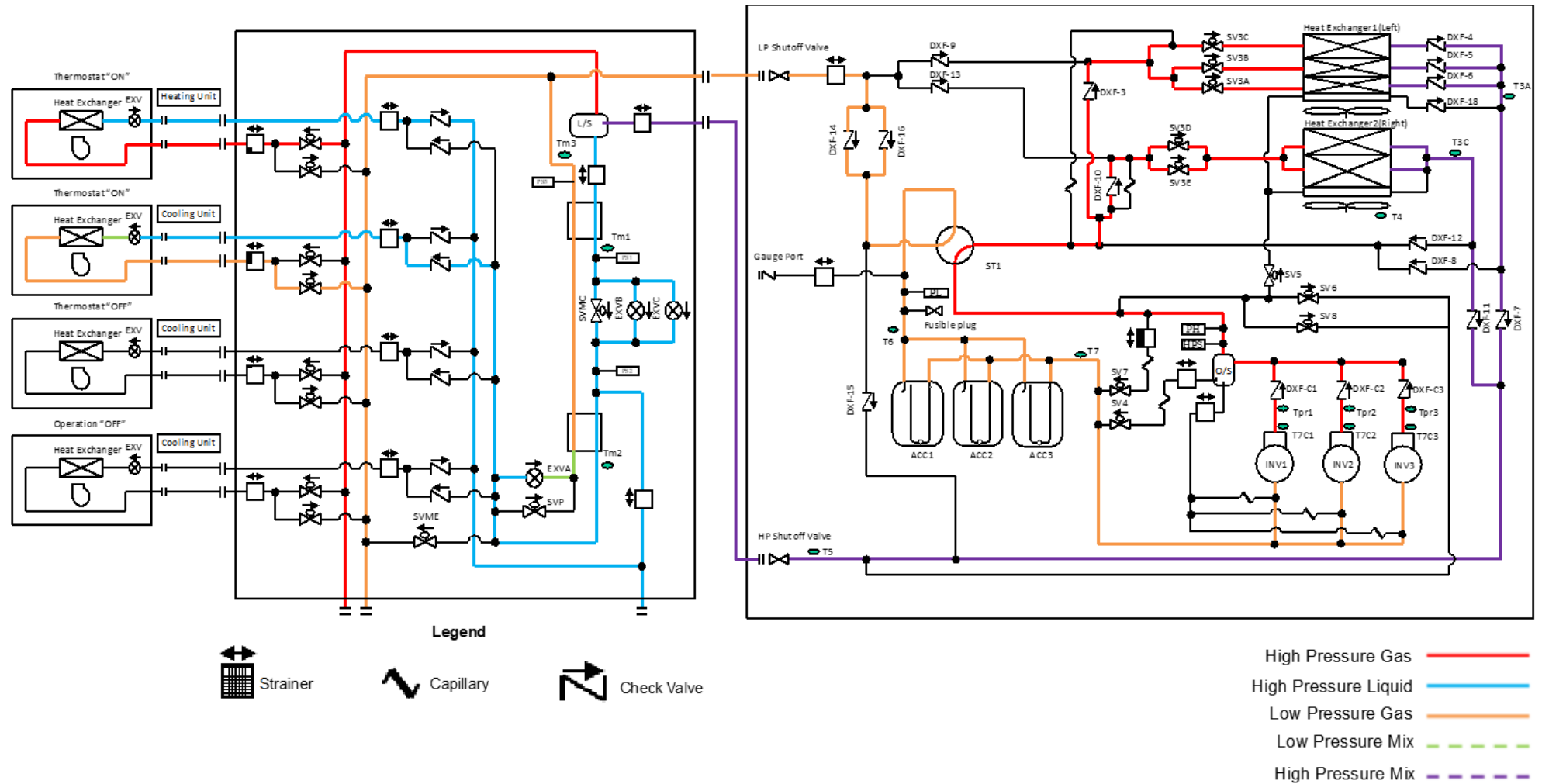


Fig. 69 —Cooling Main Operation

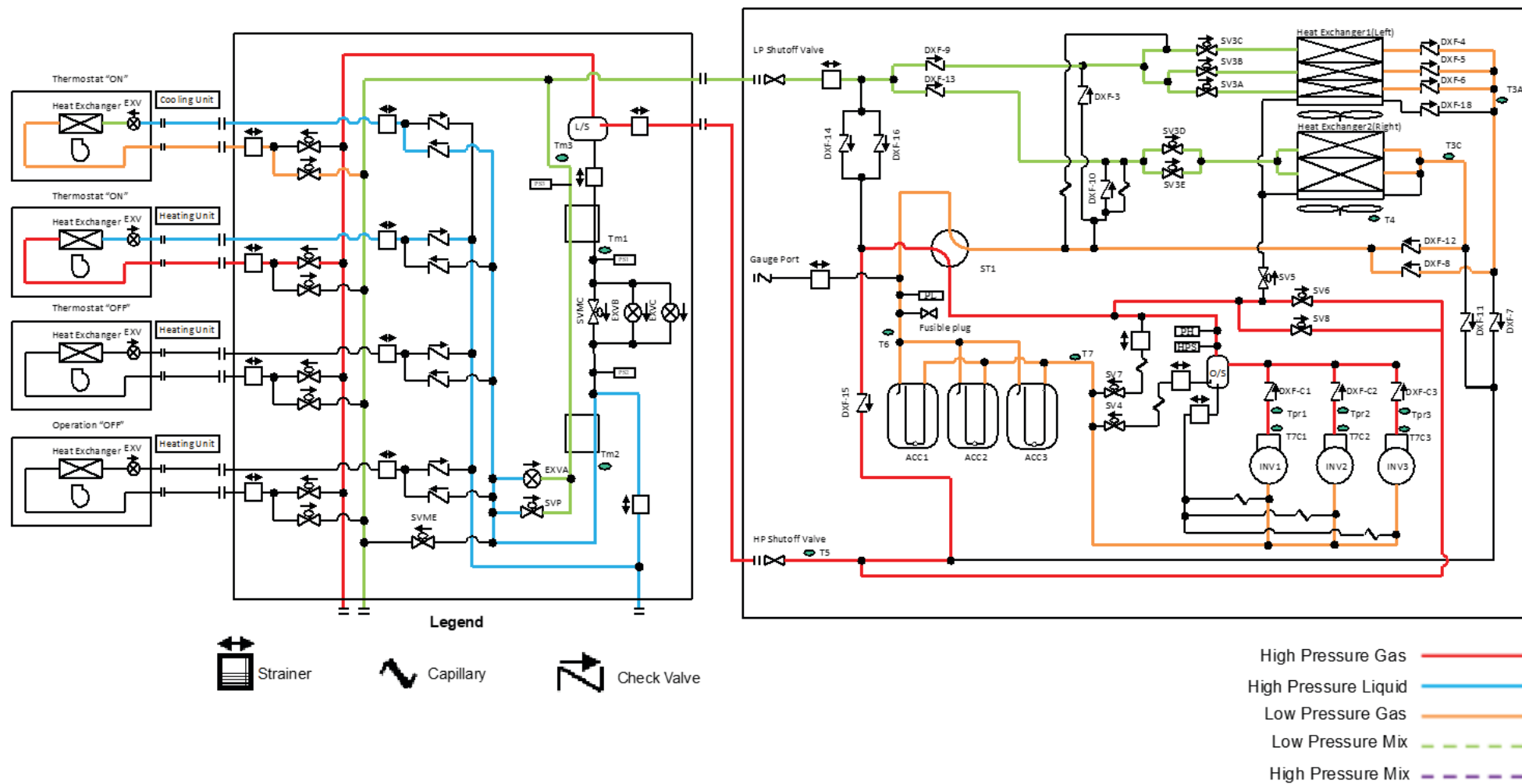


Fig. 70 —Heating Main Operation

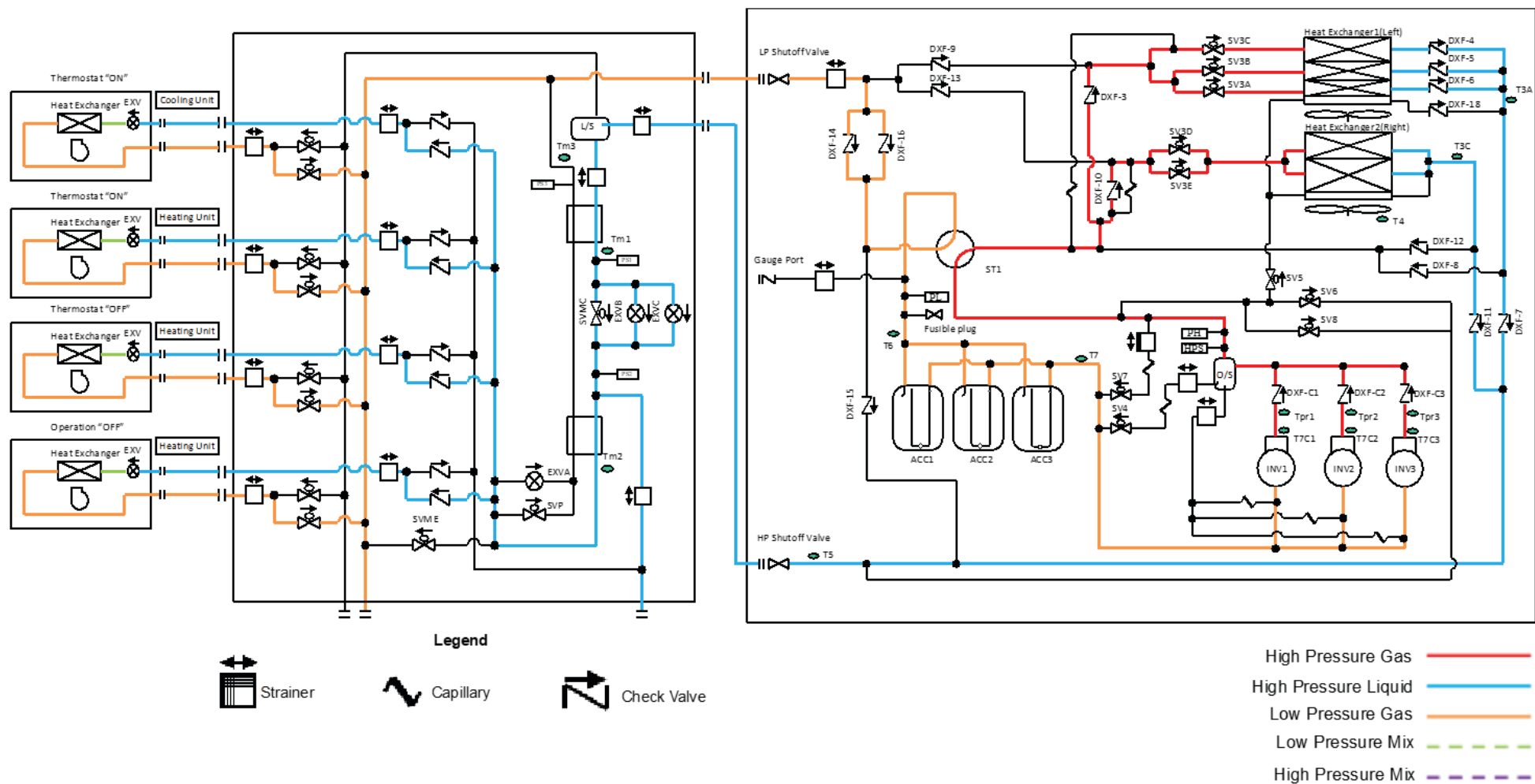


Fig. 71 —Oil Return Operation in Cooling / Cooling Main Mode

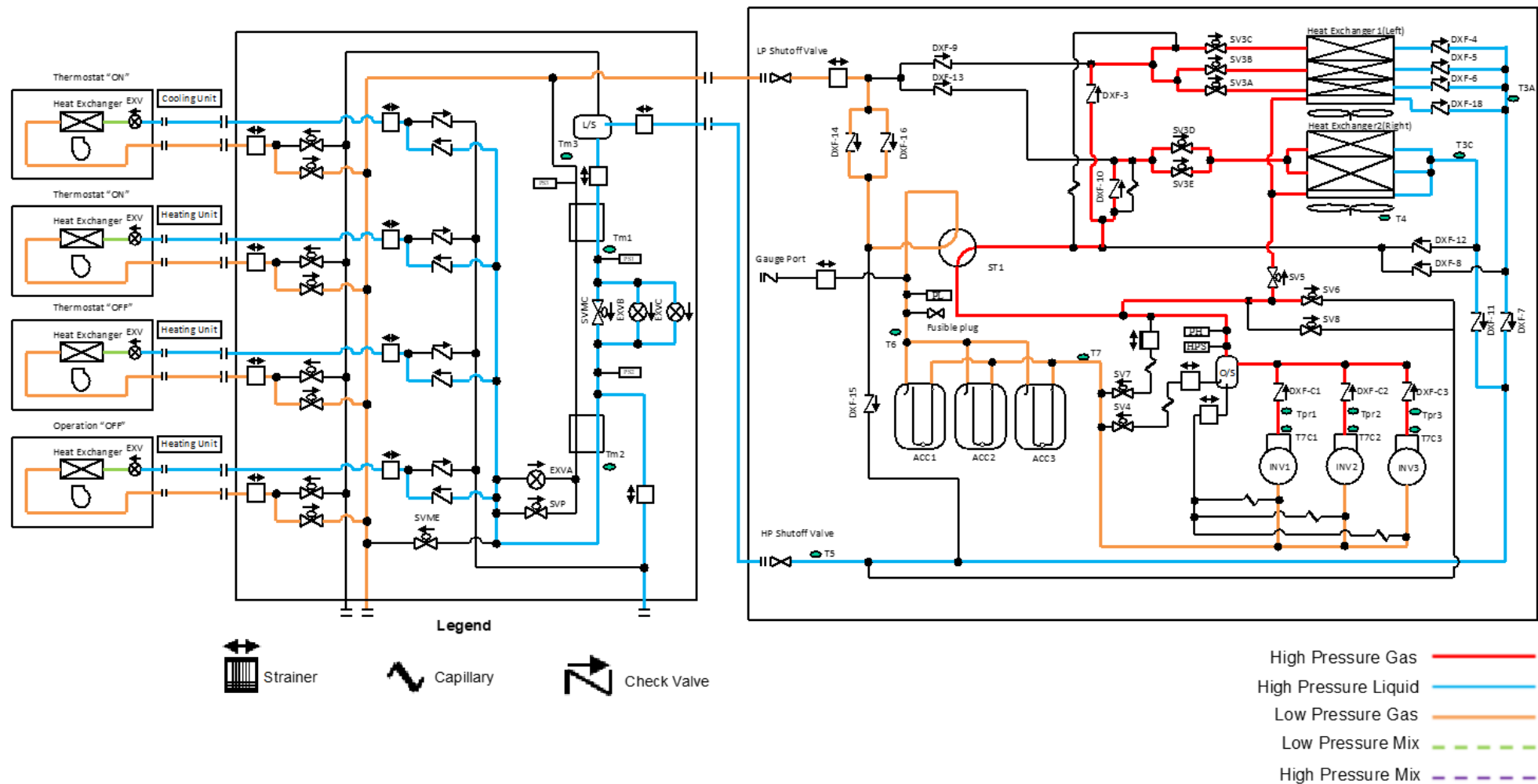


Fig. 72 —Defrost Operation or Oil Return in Heating / Heating Main Mode

ELECTRICAL COMPONENTS AND WIRING DIAGRAMS

Outdoor Unit Circuit Board Arrangement



(HIGH VOLTAGE WARNING)

Control box contains high-voltage components. Turn off power before removing control box cover during installation or maintenance. Before inspecting the inside of the control box, confirm that voltage between P and N on the compressor drive board is 20V DC or less.

CONTROL BOX ARRANGEMENT

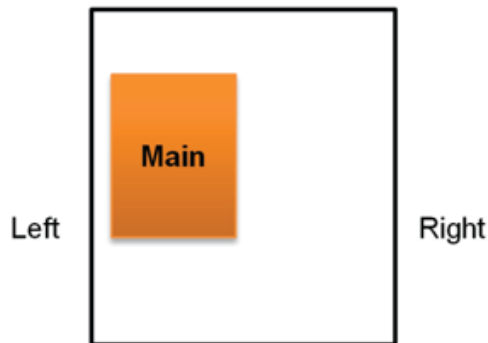


Fig. 73 —38VMA072, 096, and 120RDS

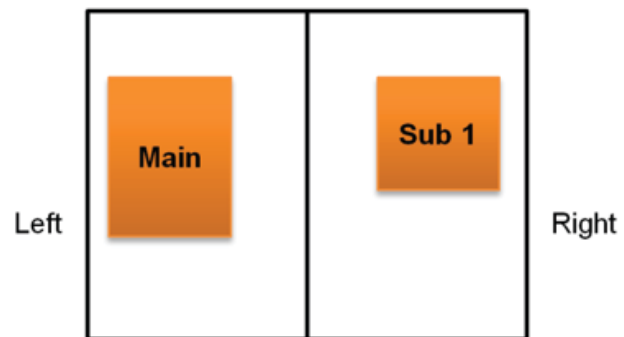


Fig. 74 —38VMA144RDL Model, 38VMA168, 192, 216, 240RDS

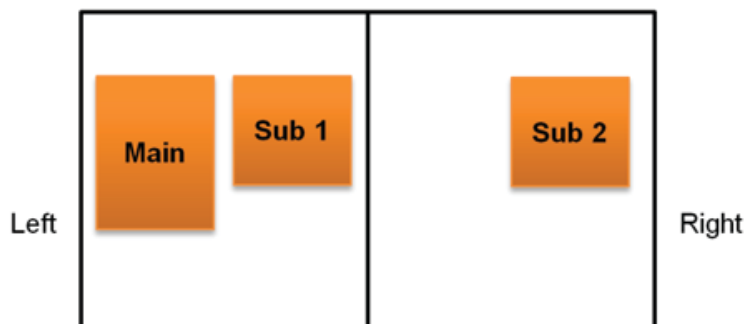


Fig. 75 —38VMA240RDL Model, 38VMA264, 288, 312, 336RDS

230V MODELS

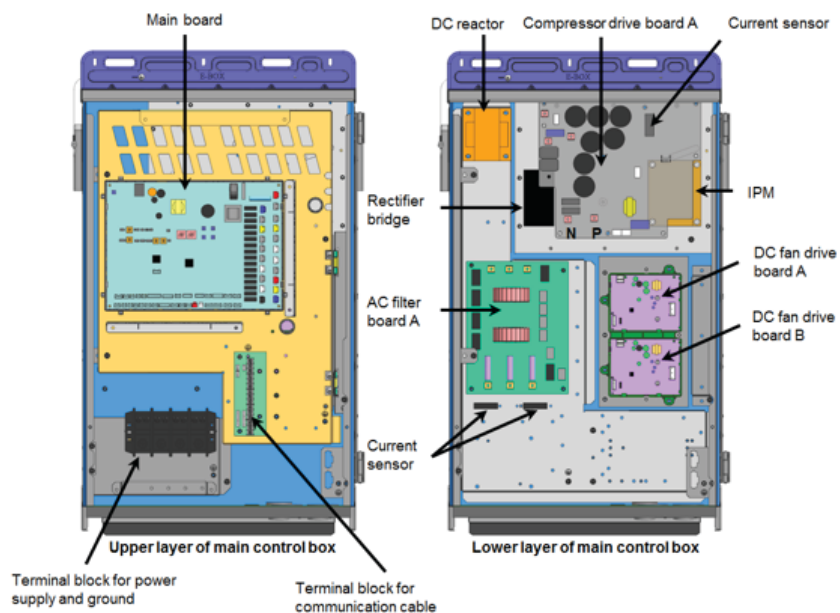


Fig. 76 —38VMA072, 096, 120RDS5-1

NOTES:

1. Disconnect all external power supplies for a minimum of ten minutes before removing the control box cover. Be sure to confirm the voltage between P and N on the compressor drive board is 20V DC or less because a charged capacitor may cause an electric shock.
2. Do not apply excessive force when lifting and swinging the hinged electric control box. Excessive force can damage the control box resulting in water leakage and dust collection.
3. The control box contains high temperature parts. Be cautious after turning off the power source.

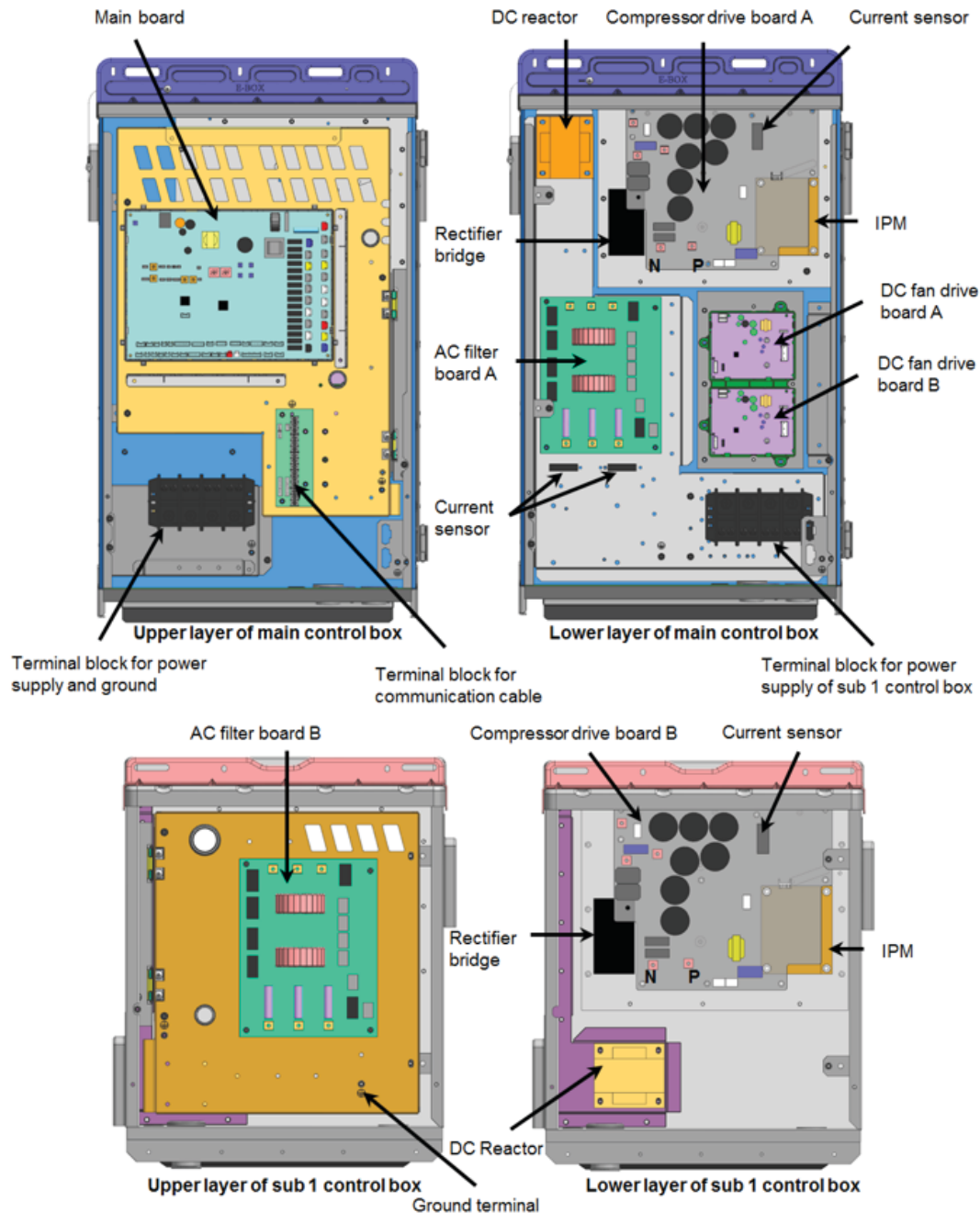


Fig. 77 —38VMA144RDL5-1, 38VMA168, 192, 216, 240RDS5-1

NOTES:

1. The sub 1 control box is used to control the second compressor for model 38VMA144, 168, 192, 216, and 240RDS5-1.
2. Disconnect all external power supplies for a minimum of ten minutes before removing control box cover. Be sure to confirm voltage between P and N on compressor drive board is 20V DC or less because a charged capacitor may cause an electric shock.
3. Do not apply excessive force when lifting and swinging the hinged electric control box. Excessive force may damage the control box resulting in water leakage and dust collection.
4. The control box contains high temperature parts. Be cautious after turning off the power source.
5. After maintenance, confirm that the communication line and power supply wire are connected between the main control box and the sub control box.

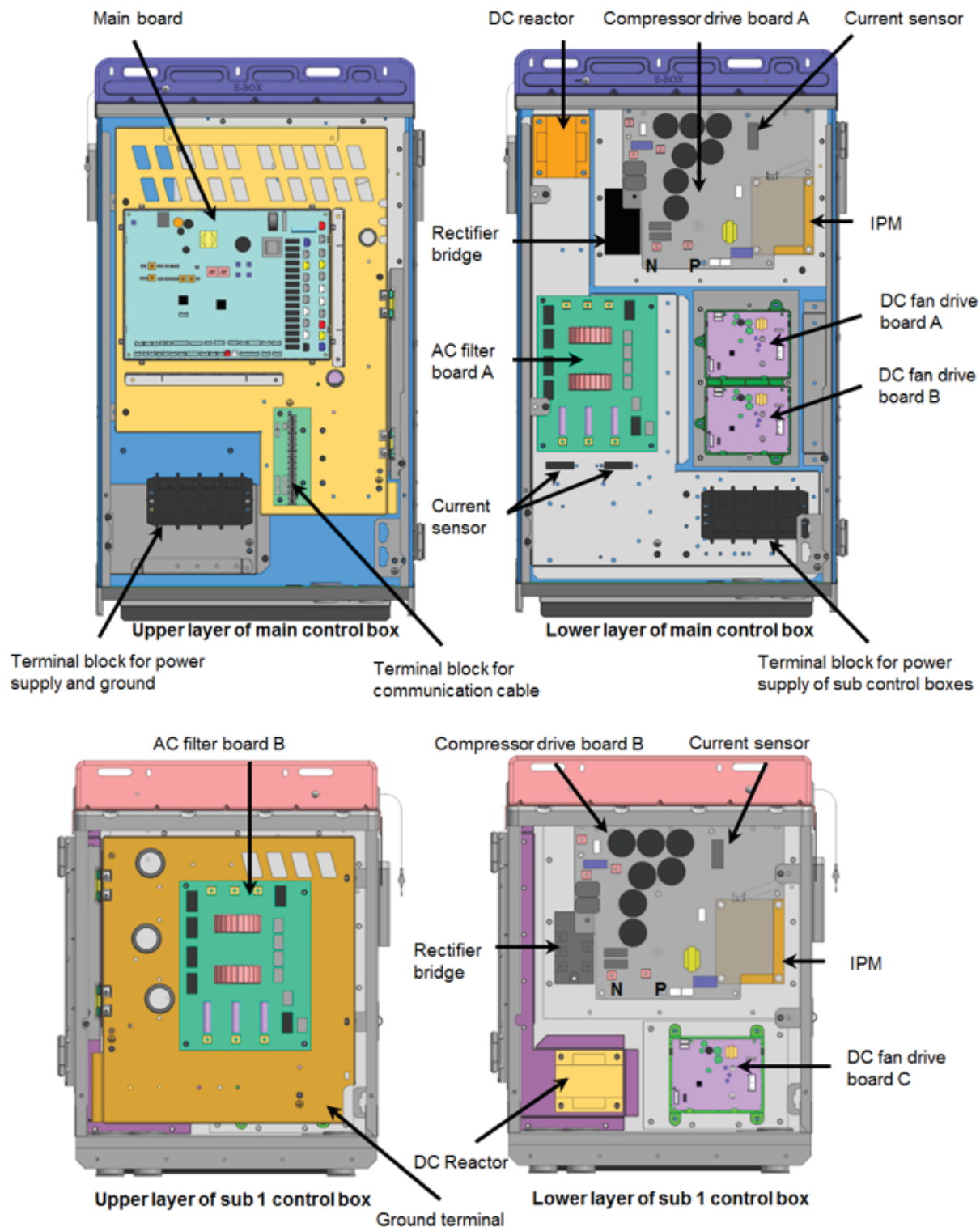


Fig. 78 —38VMA240RDL5-1, 38VMA264, 288, 312, 336RDS5-1

NOTES: The sub 1 control box is used to control the second compressor (INV2) and third DC fan motor for 38VMA240RDL, 38VMA264, 288, 312, and 336RD models.

1. Disconnect all external power supplies for a minimum of ten minutes prior to removing control box cover. Be sure to confirm voltage between P and N on compressor drive board is 20V DC or less because a charged capacitor may cause an electric shock.
2. Do not apply excessive force when lifting and swinging the hinged electric control box. Excessive force may damage the control box resulting in water leakage and dust collection.
3. The control box contains high temperature parts. Be careful after turning of the power source.
4. After maintenance, confirm that the communication line and power supply wire are connected between main control box and sub control box.

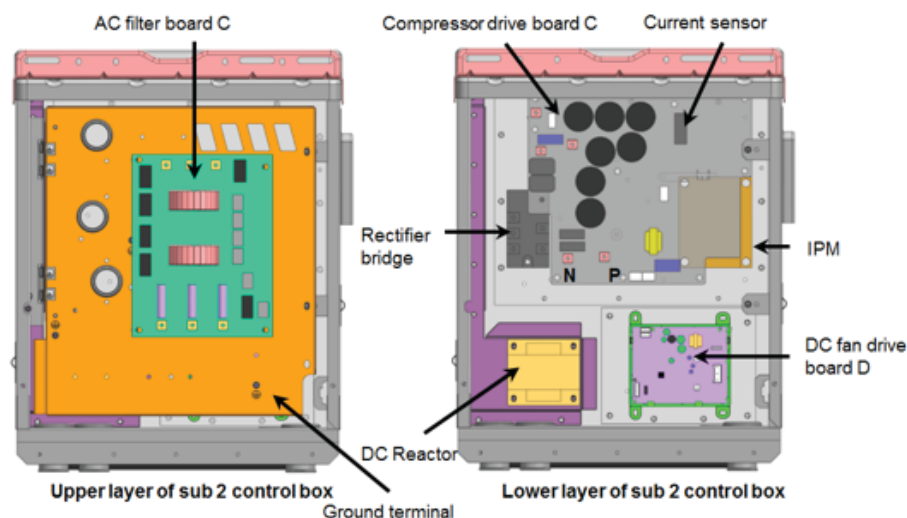


Fig. 79 —38VMA240RDL5-1, 38VMA264, 288, 312, 336RDS5-1

NOTES: The sub 2 control box is used to control the third compressor (INV3) and fourth DC fan motor for 38VMA240RDL, 38VMA264, 288, 312, and 336RD models.

1. Disconnect all external power supplies for a minimum of ten minutes before removing control box cover. Be sure to confirm voltage between P and N on compressor drive board is 20V DC or less because a charged capacitor may cause an electric shock.
2. Do not apply excessive force when lifting and swinging the hinged electric control box. Excessive force may damage the control box resulting in water leakage and dust collection.
3. The control box contains high temperature parts. Be careful after turning off the power source.
4. After maintenance, confirm that the communication line and power supply wire are connected between the main control box and the sub control box.

460V MODELS

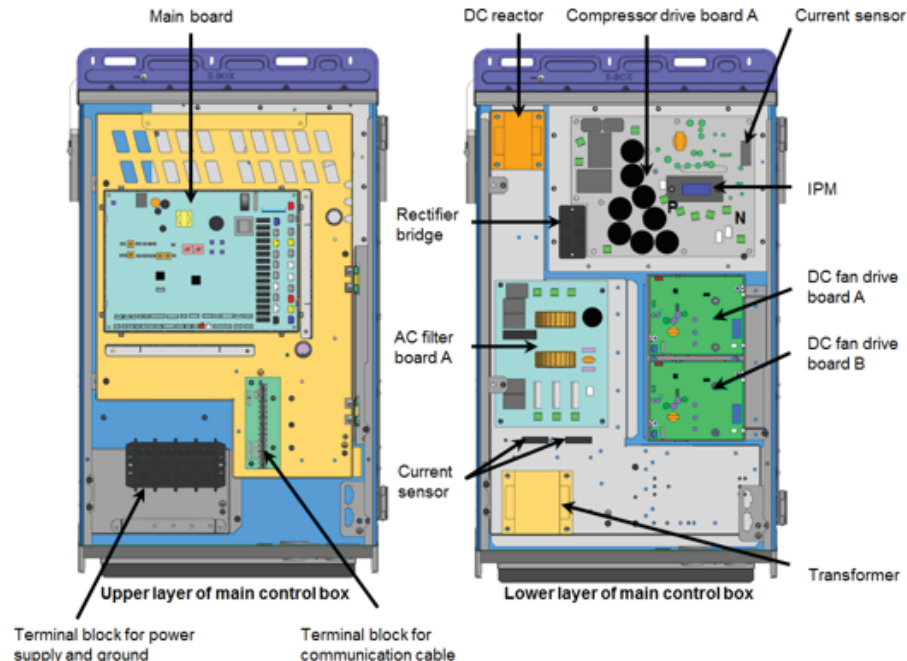


Fig. 80 —38VMA072, 096, 120RDS6-1

NOTES: Arrangement of model 38VMA***RDS6-1 has an extra transformer to change the voltage.

Although some circuit boards have the same name, they are different from the ones used in model 38VMA***RDS5-1.

1. Disconnect all external power supplies for a minimum of ten minutes before removing control box cover. Be sure to confirm voltage between P and N on compressor drive board is 20V DC or less because a charged capacitor may cause an electric shock.
2. Do not apply excessive force when lifting and swinging the hinged electric control box. Excessive force may damage the control box resulting in water leakage and dust collection.
3. The control box contains high temperature parts. Be careful after turning off the power source.

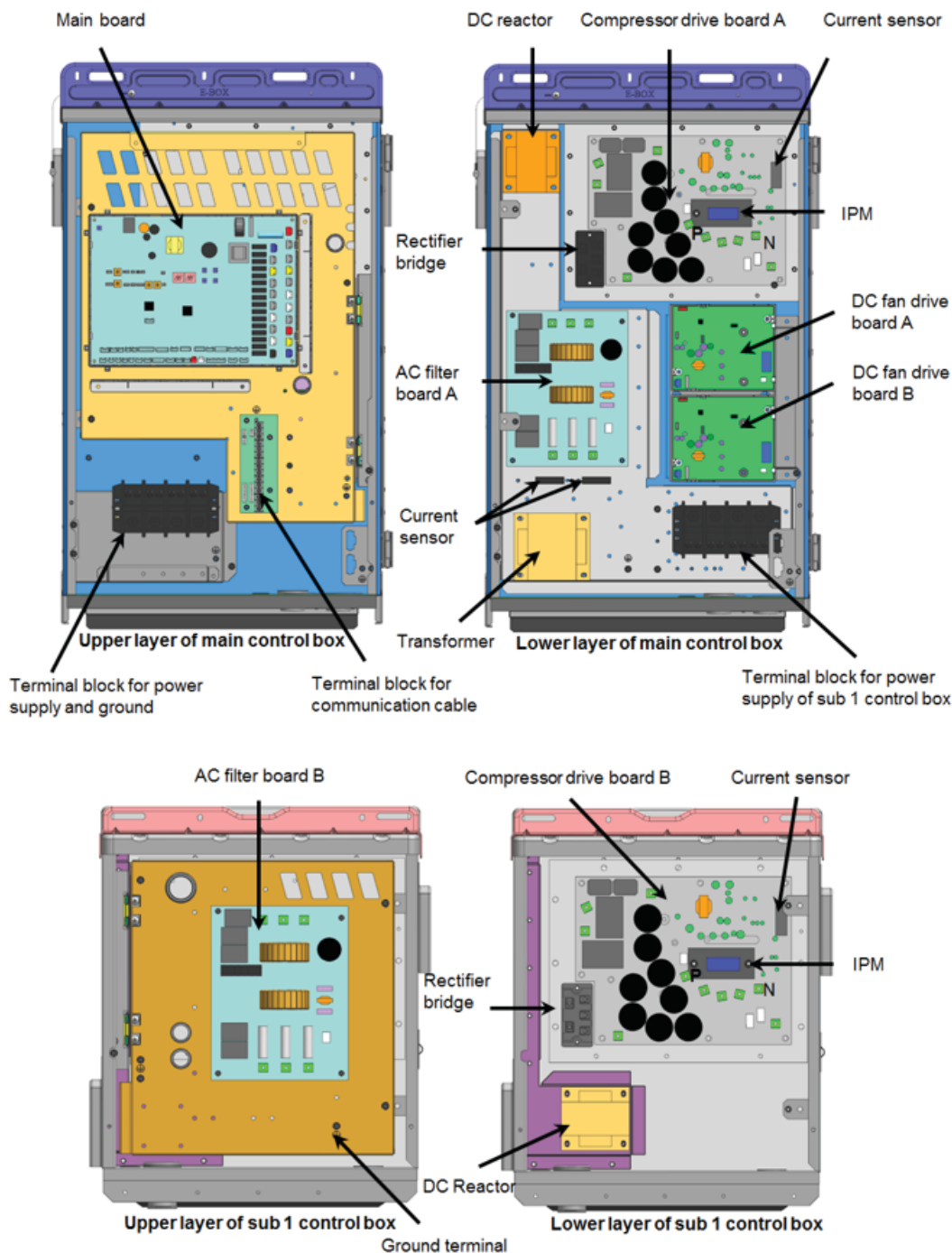


Fig. 81 —38VMA144RDL6-1, 38VMA168, 192, 216, 240RDS6-1

NOTES: The sub 1 control box is used to control the second compressor for model 38VMA144, 168, 192, 216, and 240RDS6-1.

Arrangement of model 38VMA***RDS6-1 has an extra transformer to change the voltage in main control box.

Although some circuit boards have the same name, they are different from the ones used in model 38VMA***RDS51.

1. Disconnect all external power supplies for a minimum of ten minutes before removing control box cover. Be sure to confirm voltage between P and N on compressor drive board is 20V DC or less because a charged capacitor may cause an electric shock.
2. Do not apply excessive force when lifting and swinging the hinged electric control box. Excessive force may damage the control box resulting in water leakage and dust collection.
3. The control box contains high temperature parts. Be careful after turning off the power source.
4. After maintenance, confirm that the communication line and power supply wire are connected between main control box and sub control box.

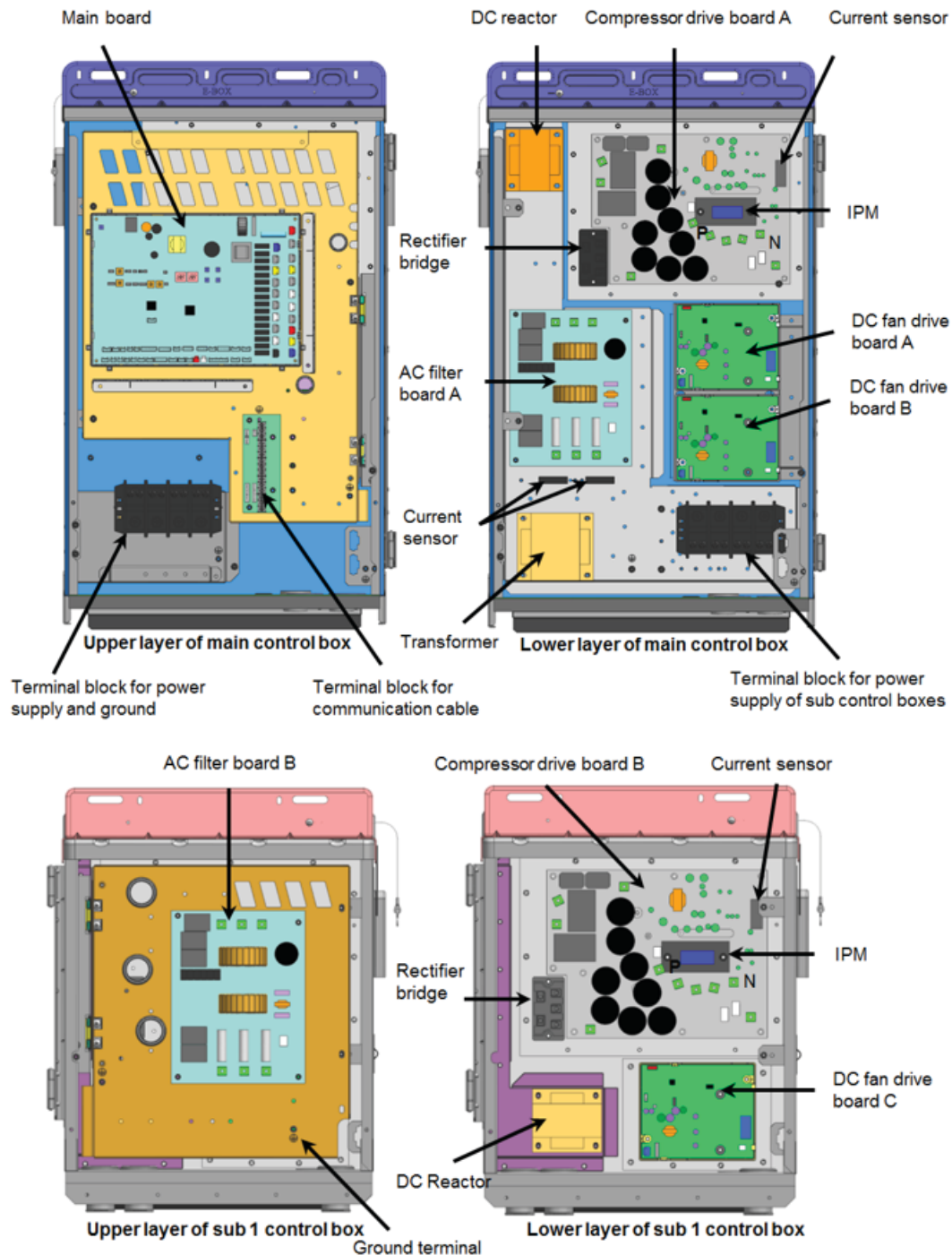


Fig. 82 —38VMA240RDL6-1, 38VMA264, 288, 312, 336RDS6-1

NOTES: The sub 1 control box is used to control the second compressor (INV2) and third DC fan motor for 38VMA240RDL, 38VMA264, 288, 312, and 336RD models.

Arrangement of model 38VMA***RDS(L)6-1 has an extra transformer to change the voltage in the main control box.

Although some circuit boards have the same name, they are different from the ones used in model 38VMA***RDS5(L)-1.

1. Disconnect all external power supplies for a minimum of ten minutes before removing control box cover. Be sure to confirm voltage between P and N on compressor drive board is 20V DC or less because a charged capacitor may cause an electric shock.
2. Do not apply excessive force when lifting and swinging the hinged electric control box. Excessive force may damage the control box resulting in water leakage and dust collection.
3. The control box contains high temperature parts. Be careful after turning off the power source.
4. After maintenance, confirm that the communication line and power supply wire are connected between the main control box and the sub control box.

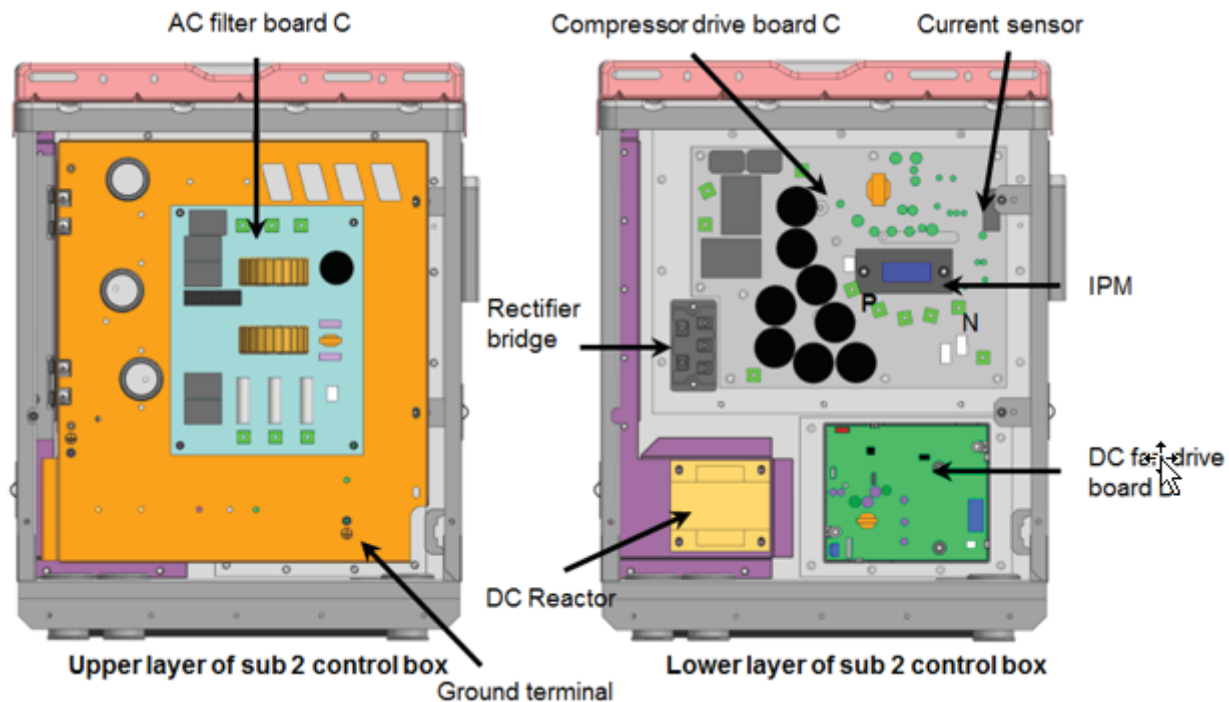


Fig. 83 —38VMA240RDL6-1, 38VMA264, 288, 312, 336RDS6-1

NOTES: The sub 2 control box is used to control the third compressor (INV3) and fourth DC fan motor for 38VMA240RDL, 38VMA264, 288, 312, and 336RD models.

Arrangement of model 38VMA***RDS(L)6-1 has an extra transformer to change the voltage in the main control box.

Although some circuit boards have the same name, they are different from the ones used in model 38VMA***RDS5(L)-1.

1. Disconnect all external power supplies for a minimum of ten minutes before removing control box cover. Be sure to confirm voltage between P and N on compressor drive board is 20V DC or less because a charged capacitor may cause an electric shock.
2. Do not apply excessive force when lifting and swinging the hinged electric control box. Excessive force may damage the control box resulting in water leakage and dust collection.
3. The control box contains high temperature parts. Be careful after turning off the power source.
4. After maintenance, confirm that the communication line and power supply wire are connected between the main control box and the sub control box.

Outdoor Unit Circuit Board Components

MAIN BOARD

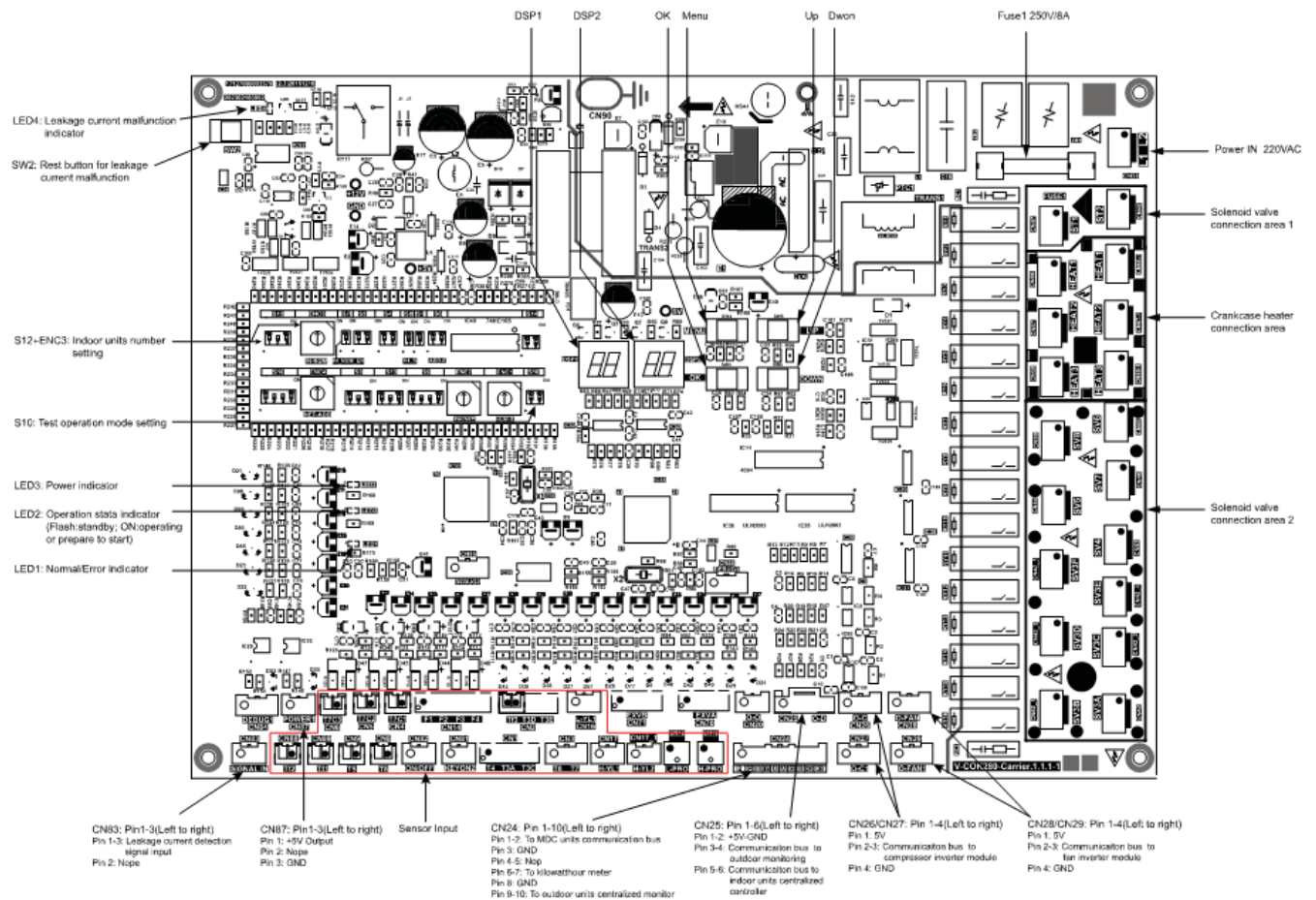


Fig. 84 —38VMA*RDS(L)5-1 (208/230V-3Ph-60Hz)**
38VMA*RDS(L)6-1 (460V-3Ph-60Hz)**

This main board contains high-voltage components. Pay attention when inspecting the unit while power is ON.

Compressor Drive Board

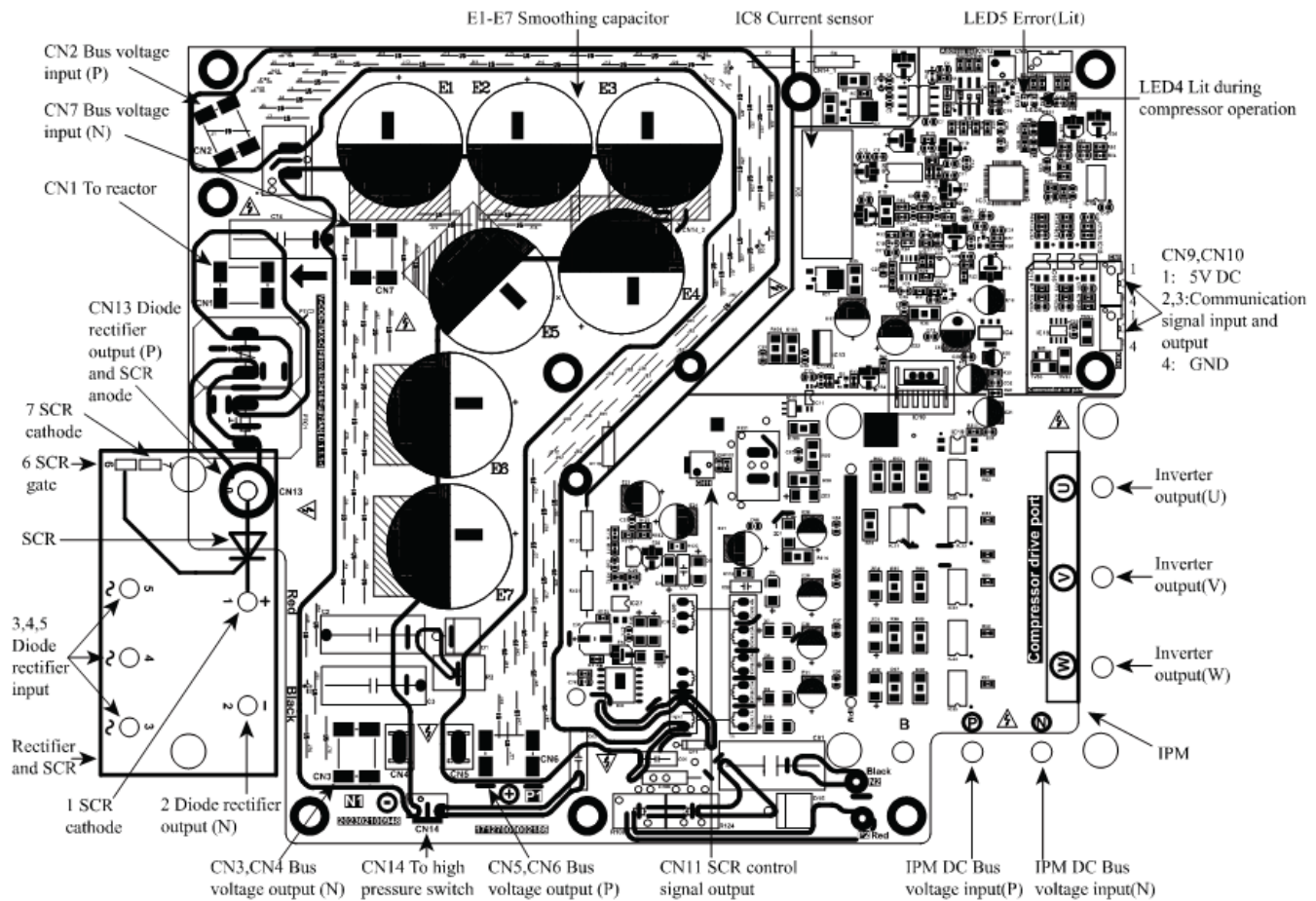


Fig. 85 —38VMA*RDS(L)5-1 (208/230V-3Ph-60Hz)**

NOTES:

1. Disconnect all external power supplies for a minimum of ten minutes before removing control box cover. Be sure to confirm voltage between P and N on compressor drive board is 20V DC or less because a charged capacitor may cause an electric shock.
2. Do not apply excessive force when lifting and swinging the hinged electric control box. Excessive force may damage the control box resulting in water leakage and dust collection.
3. The control box contains high temperature parts. Be careful after turning off the power source.
4. After maintenance, confirm that the communication line and power supply wire are connected between the main control box and the sub control box.

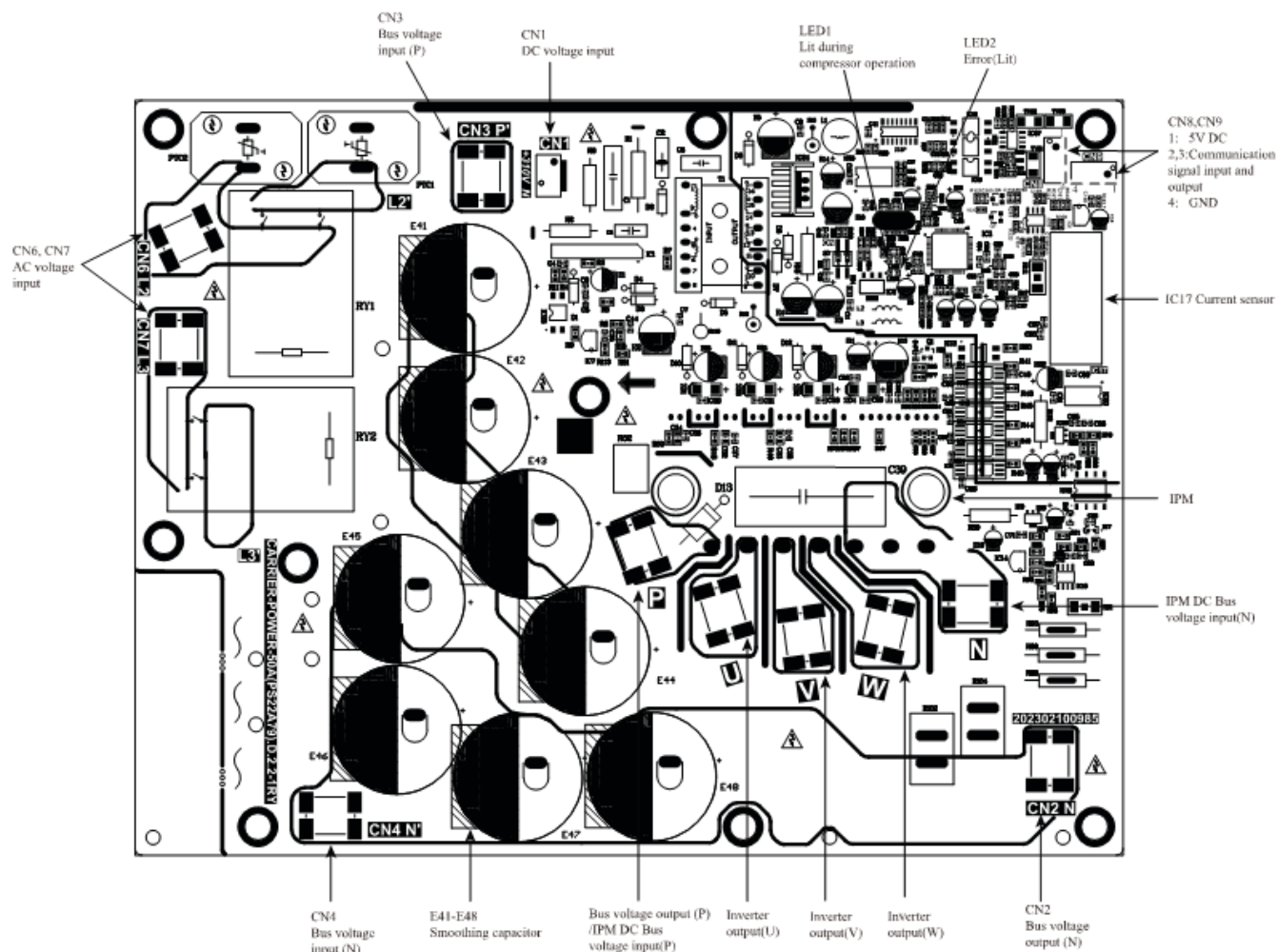


Fig. 86 —38VMA*RDS(L)6-1 (460V-3Ph-60Hz)**

NOTES:

1. Disconnect all external power supplies for a minimum of ten minutes before removing control box cover. Be sure to confirm voltage between P and N on compressor drive board is 20V DC or less because a charged capacitor may cause an electric shock.
2. Do not apply excessive force when lifting and swinging the hinged electric control box. Excessive force may damage the control box resulting in water leakage and dust collection.
3. The control box contains high temperature parts. Be careful after turning off the power source.
4. After maintenance, confirm that the communication line and power supply wire are connected between the main control box and the sub control box.

AC Filter Board

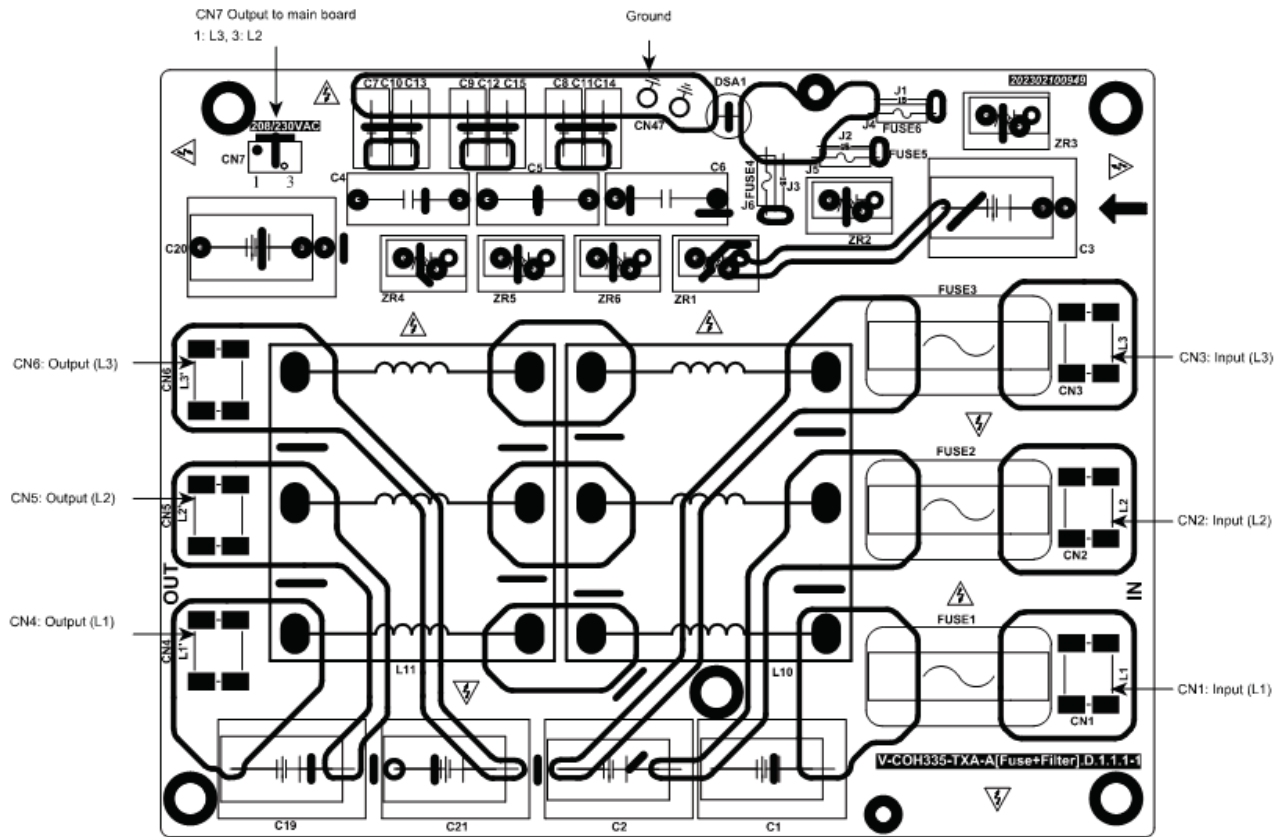


Fig. 87 —38VMA***RDS(L)5-1 (208/230V-3Ph-60Hz)

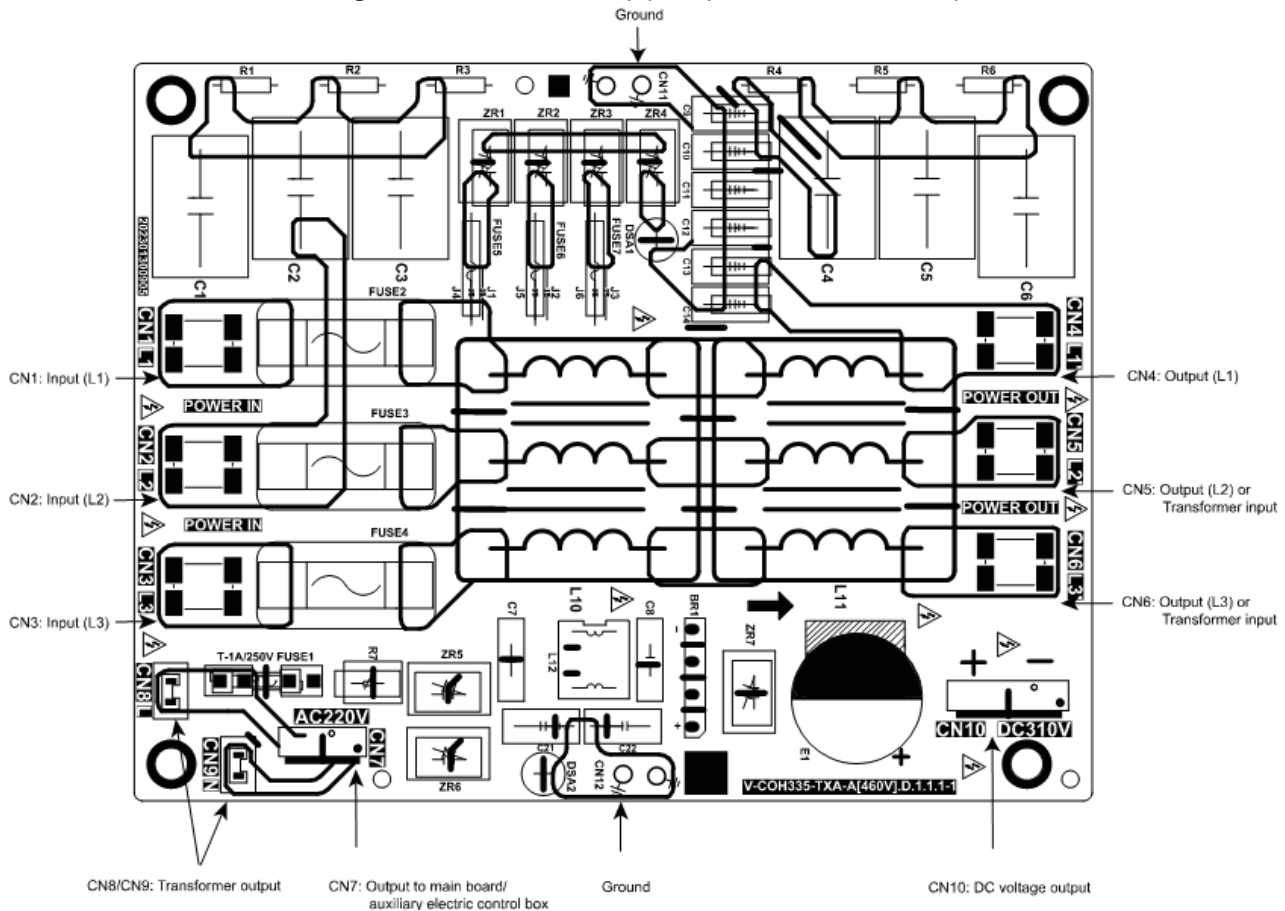


Fig. 88 —38VMA***RDS(L)6-1 (460V-3Ph-60Hz)

DC Fan Drive Board

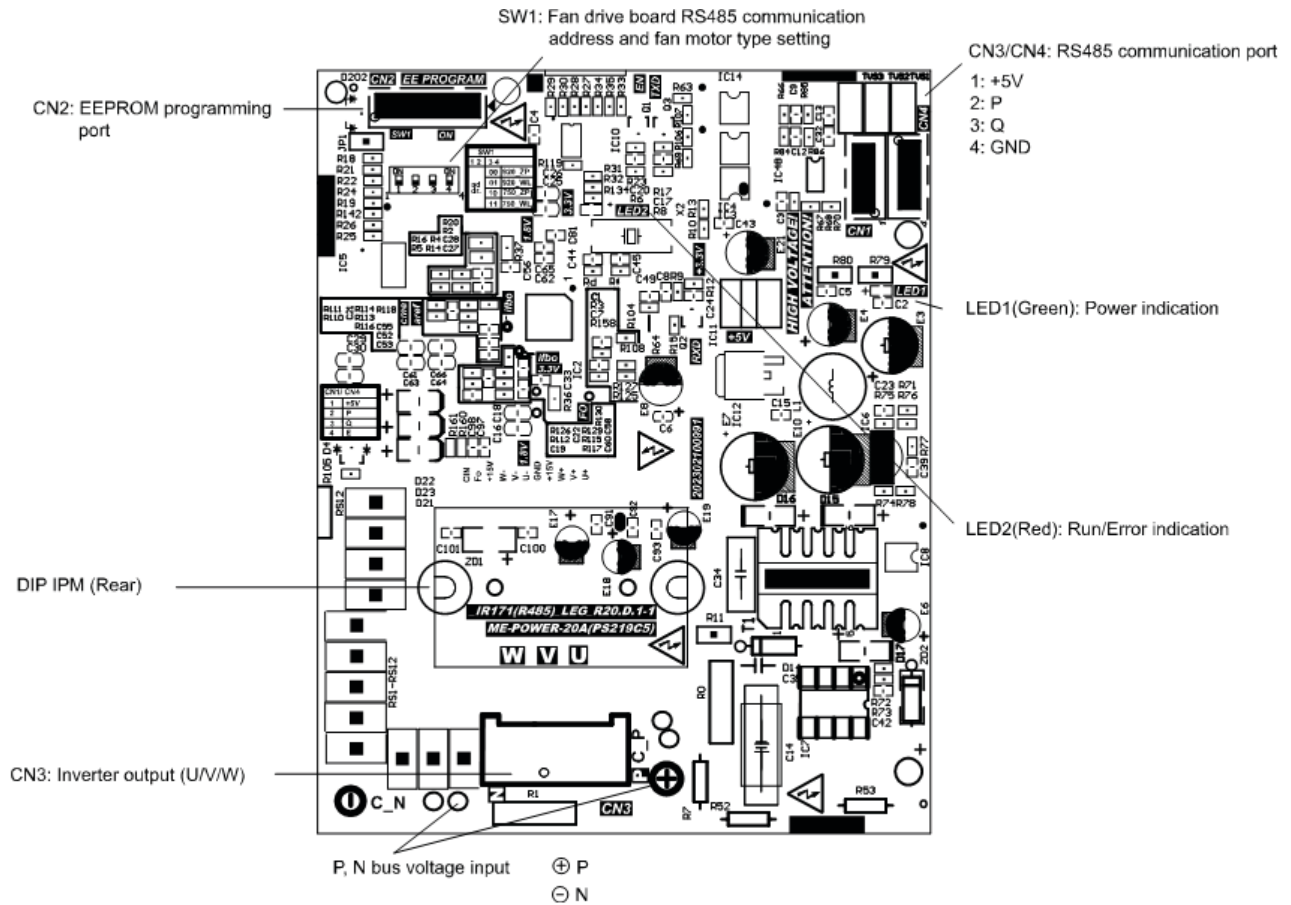


Fig. 89 —38VMA***RDS(L)5-1

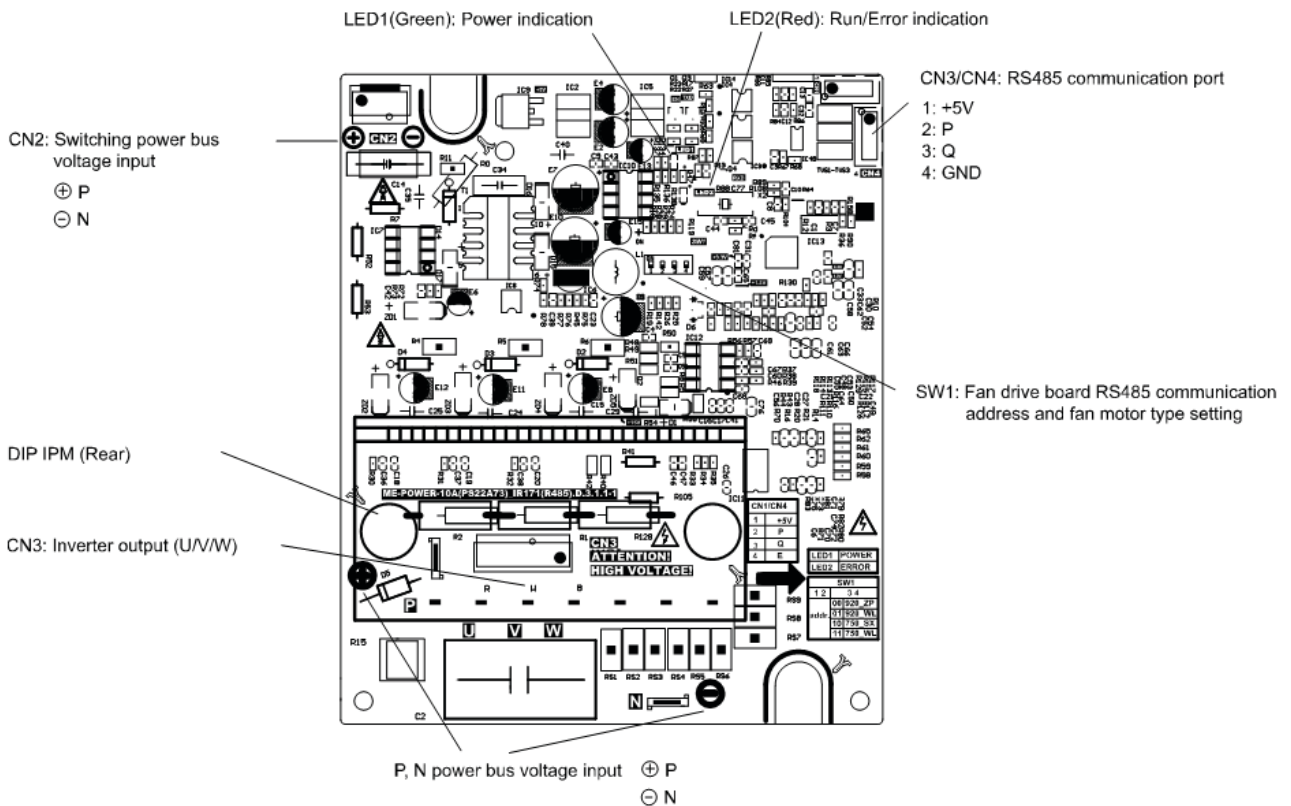


Fig. 90 —38VMA***RDS(L)6-1

SW 1  ON 1 2 3 4	Definition (Dial switch to ON is 1)	
The 1 st ~2 nd code	Address	00 - Fan A 01 - Fan B 10 - Fan C 11 - Fan D
The 3 rd code	Power of the motor	0 - 920W for 38VMA144RDL, 168~240RDS model 1 - 750W for 38VMA072~120RDS, 38VMA240RDL, 264~336RDS model
The 4 th code	Motor factory	0 - Nidec or Panasonic * 1 - Reserved

* Only 460V models like 38VMA072~120RDS6-1 and 38VMA240RDL6-1, 38VMA264~336RDS6-1 use Panasonic motors.

NOTES:

1. Disconnect all external power supplies for a minimum of ten minutes before inspecting the inside of the control box.
2. Before starting the service work, be sure to check that the motors are not operating and the voltage between P and N is 20V DC or less. Unplug P/N and U/V/W cable plugs to replace the damaged fan drive board with a new one.
3. Follow the below dip switch setting based on unit tonnage for proper operation of the unit.

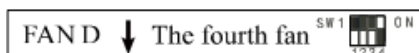
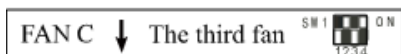
38VMA072~120RDS model



38VMA144RDL, 168~ 240RDS model



38VMA240RDL, 264~ 336RDS model



Transmission/Communication Board

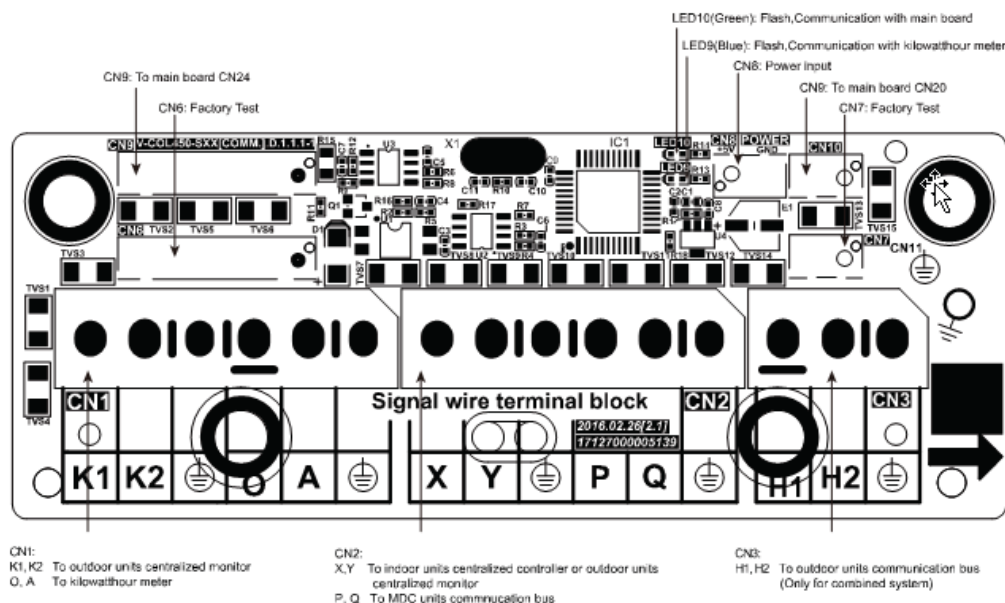


Fig. 91 —Transmission/Communication Board

Power supply: DC5V from main board, R485 communication.

If there is a communication error, the LED9 (Blue) will constantly flash at 1Hz.

Spot Check Board

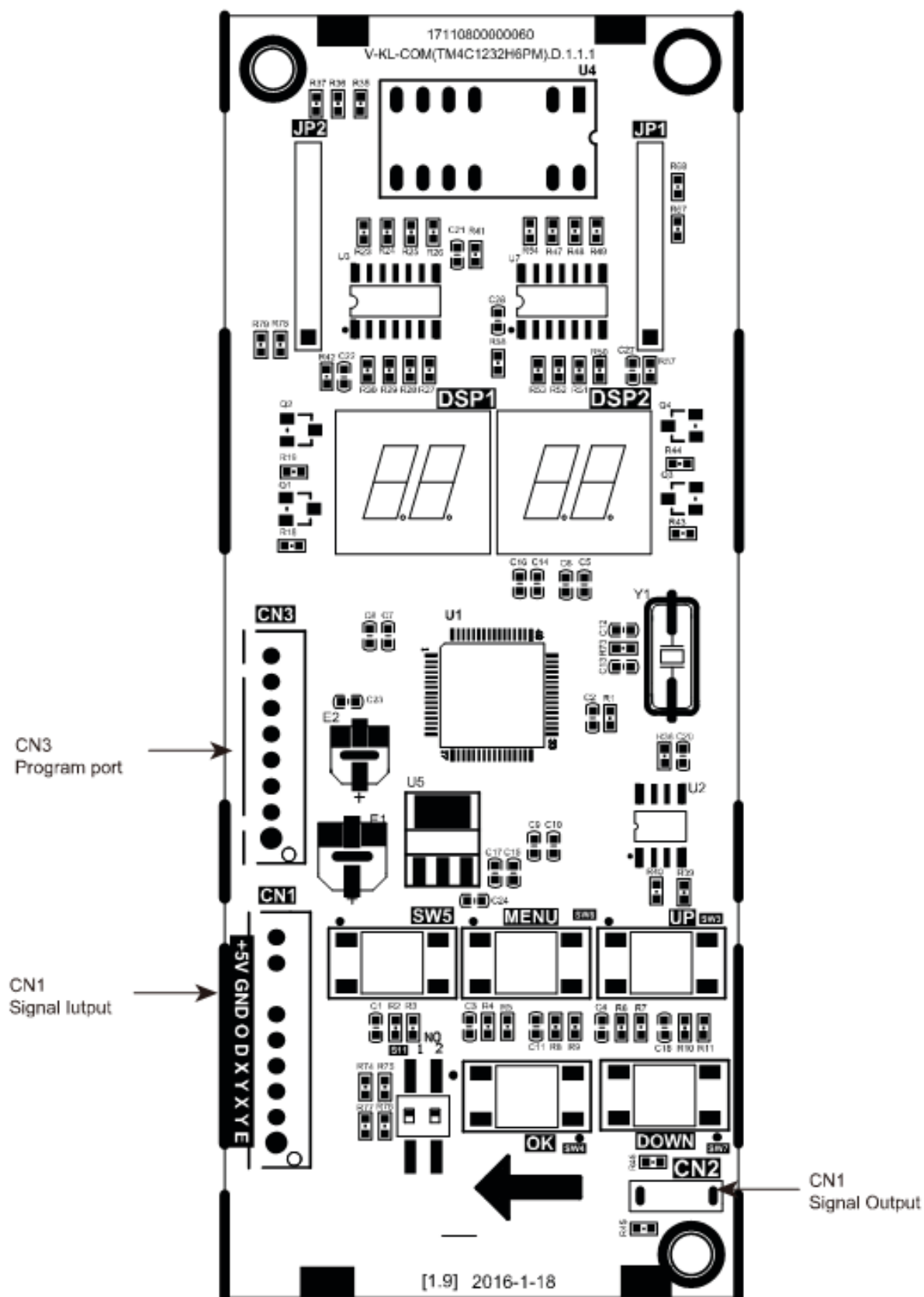
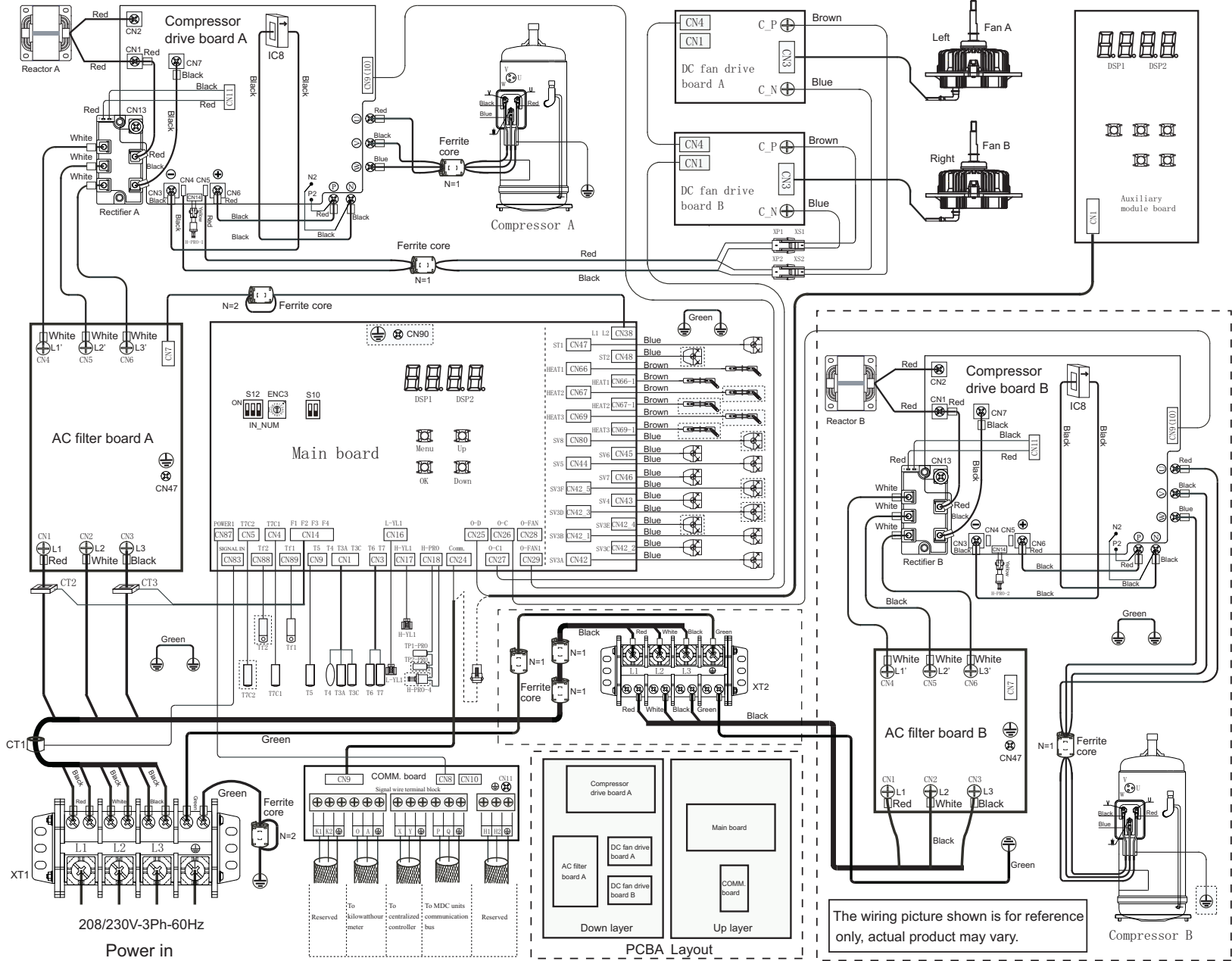


Fig. 92 —Spot Check Board

The spot check box is arranged at the upright post close to the main control box.
MENU, UP/DOWN, and OK buttons have the same function as SW4~SW6 on the main board.

Wiring Diagrams of Outdoor Units



NOTE: Sizes 072-120 only have Compressor A.

**Fig. 93 —38VMA072, 096, 120RDS5-1,
38VMA144RDL5-1, 38VMA168, 192, 216, 240RDS5-1**

Table 12 —Legend

CODE	NAME
XT1-XT2	Terminal Block
XS1-XS2	Plug
XP1-XP2	Jack
H-PRO 1-4	High Pressure ON/OFF Switch
H-YL1	High Pressure Sensor
L -YL1	Low Pressure Sensor
TP1-PRO TP2-PRO	Discharge Temperature ON/OFF Switch
T3A, T3C, T3D, T3E, T5, T6, T7, T9	Condenser or Evaporator Temperature Sensor
T4	Outdoor Ambient Temperature Sensor
T7C1-T7C2	Discharge Temperature Sensor
CT1-3, IC8	Current Sensor
ST1, ST2	4-Way Valve
SV1-SV7	Solenoid Valve
HEAT (1-3)	Crankcase Heater
Tf1, Tf2	Heat Sink Temperature

Table 13 —DSP1 and DSP2 Display Content

DISPLAY	MEANING
OE1	Phase Loss Error
OE2	Comm. Error with MDC and Indoor Unit
OE4	T3 or T4 Temperature Sensor Error
OE5	Voltage Protection
OH0/2OH0	Comm. Error Between Main Board and Compressor INV. Board
OH1	Comm. Error Between Chip IC55 and IC33 on Main Board
OLy/2OLy	Compressor Inverter module protection (0≤y≤9)
OH4/2OH4	3 times of OLy protection in 60 minutes
OP2	Low Pressure Protection
OH5	5 Times of OP2 Protection in 100 Minutes
OP4	Discharge Temperature Protection
OH6	3 Times of OP4 Protection in 60 Minutes
OH7	Quantity of Indoor Units do not Match
OH8	High Pressure Sensor Error
OP9	DC Fan Protection
OH9	10 Times of OP9 Protection in 120 Minutes
OHb	Low Pressure Sensor Error
OHc	The setting of power dial switch do not match the model of outdoor unit
OP1	High Pressure Protection or Discharge Temperature Protection or Ground Fault Problem
OP3	Compressor Current Protection
OP5	High Condenser Temperature Protection
OPL	Inverter Module Temperature Protection
OPP	Refrigerant overcharge
OF0	4 times of OPP protection in 200 minutes
OF4	T6 Temperature Sensor Error
OF5	T7 Temperature Sensor Error
OF8	MDC Error
AtL	Ambient temperature limitation (Outside ambient temperature(T4) is beyond the range that outdoor unit can run)
dF	Defrosting
dO	Oil Return

NOTE: Component in dashed line is optional.

Wiring Diagrams (Cont.)

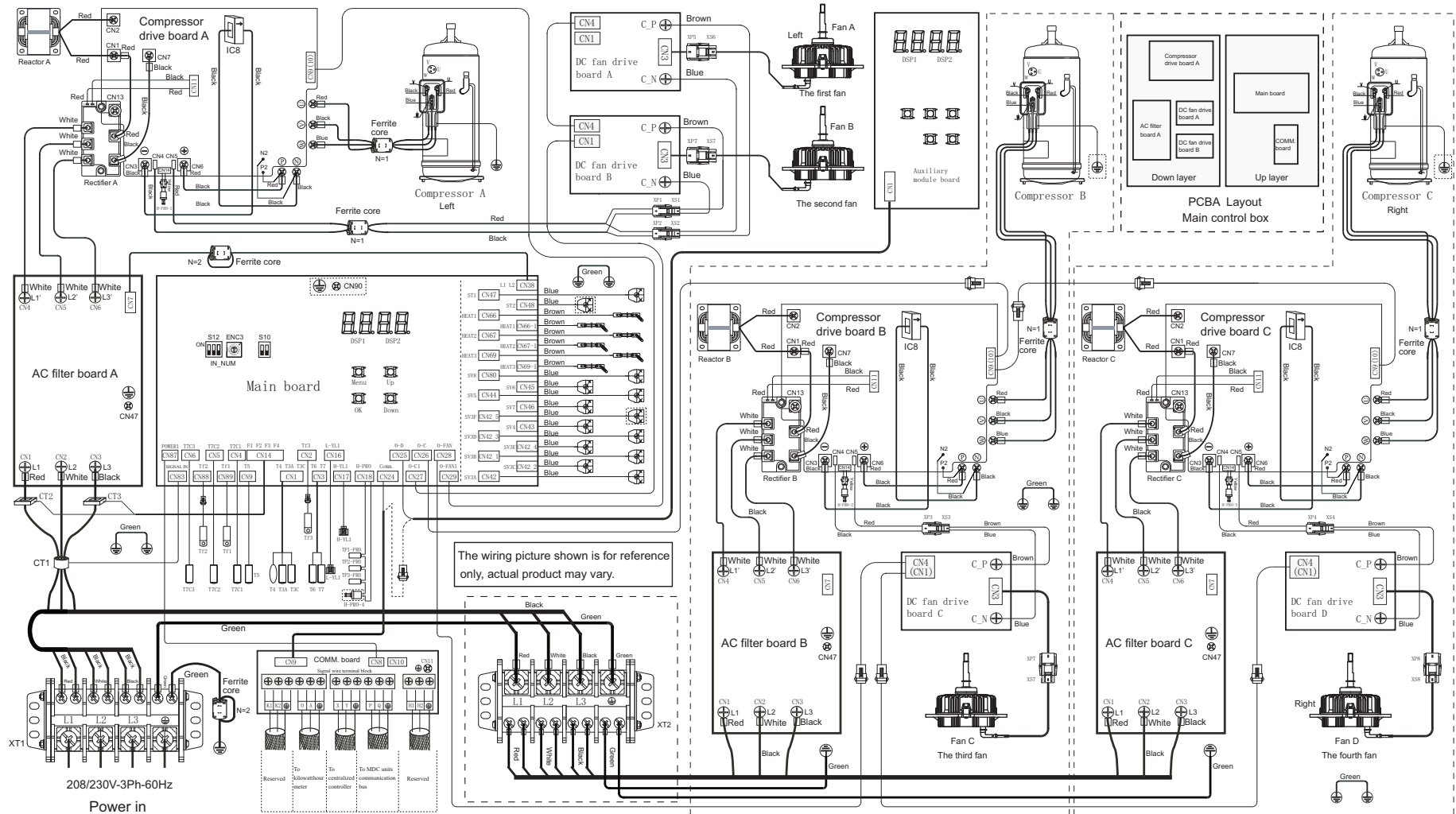


Fig. 94 —38VMA240RDL5-1, 264RDS5-1, 288RDS5-1, 312RDS5-1, 336RDS5-1

Table 14 —Legend

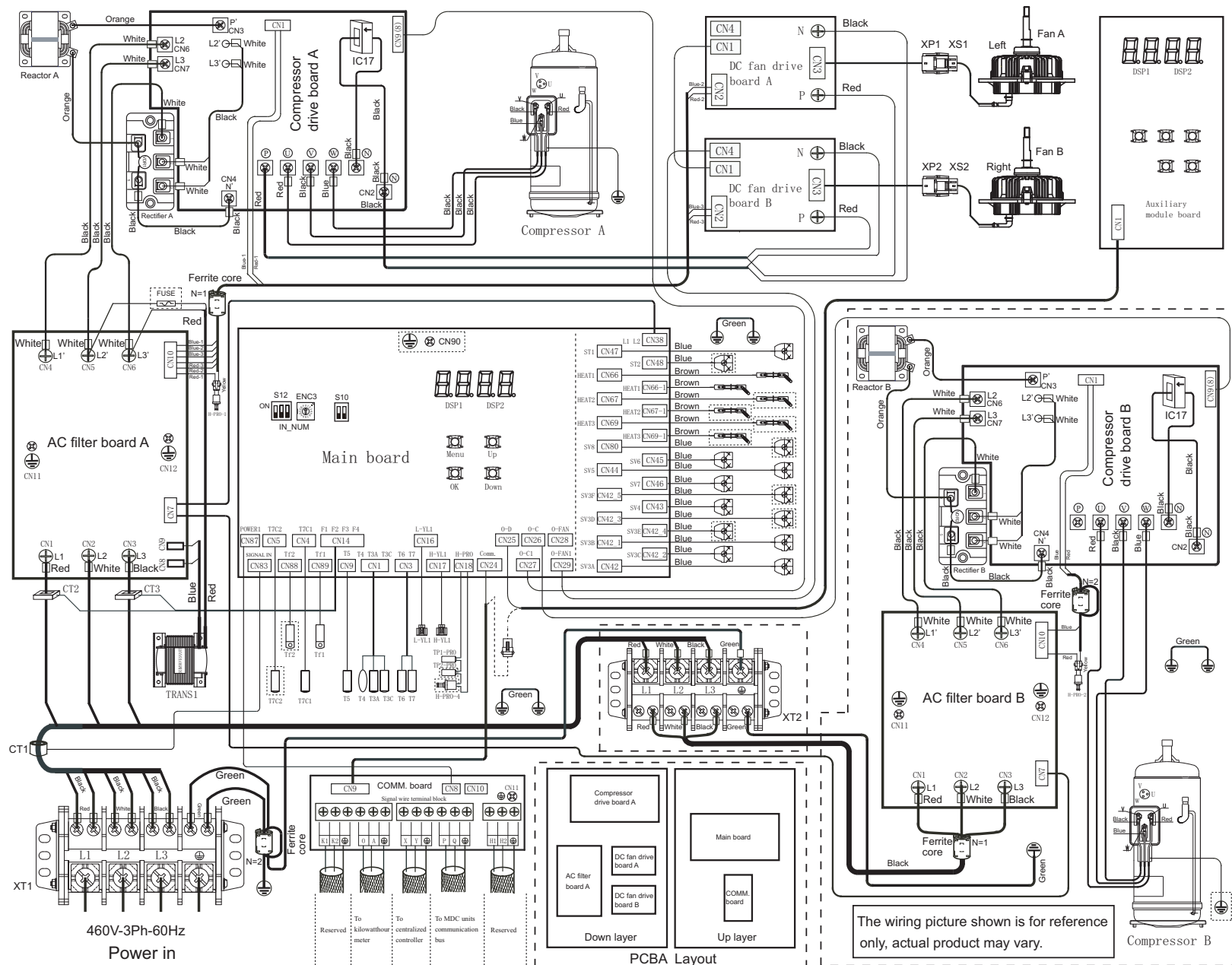
CODE	NAME
XT1-XT2	Terminal Block
XS1-XS8	Plug
XP1-XP8	Jack
H-PRO 1-4	High Pressure ON/OFF Switch
H-YL1	High Pressure Sensor
L -YL1	Low Pressure Sensor
TP1-PRO, TP2-PRO, TP3-PRO	Discharge Temperature ON/OFF Switch
T3A, T3C, T3D, T3E, T5, T6, T7	Condenser or Evaporator Temperature Sensor
T4	Outdoor Ambient Temperature Sensor
T7C1-T7C3	Discharge Temperature Sensor
CT1-3, IC8	Current Sensor
ST1, ST2	4-Way Valve
SV1-SV7	Solenoid Valve
HEAT (1-3)	Crankcase Heater
Tf1, Tf2, Tf3	Heat Sink Temperature

Table 15 —DSP1 and DSP2 Display Content

DISPLAY	MEANING
OE1	Phase Loss Error
OE2	Comm. Error with MDC and Indoor Unit
OE4	T3 or T4 Temperature Sensor Error
OE5	Voltage Protection
OH0/ 20H0/ 30H0	Comm. Error Between Main Board and Compressor INV. Board
OH1	Comm. Error Between Chip IC55 and IC33 on Main Board
OLy/2OLy/ 3OLy	Compressor Inverter module protection ($0 \leq y \leq 9$)
OH4/ 20H4/ 30H4	3 times of OLy protection in 60 minutes
OP2	Low Pressure Protection
OH5	5 Times of OP2 Protection in 100 Minutes
OP4	Discharge Temperature Protection
OH6	3 Times of OP4 Protection in 60 Minutes
OH7	Quantity of Indoor Units do not Match
OH8	High Pressure Sensor Error
OP9	DC Fan Protection
OH9	10 Times of OP9 Protection in 120 Minutes
OHb	Low Pressure Sensor Error
OHc	The setting of power dial switch do not match the model of outdoor unit
OP1	High Pressure Protection or Discharge Temperature Protection or Ground Fault Problem
OP3	Compressor Current Protection
OP5	High Condenser Temperature Protection
OPL	Inverter Module Temperature Protection
OC7	3 times of OPL protection in 100 minutes
OPP	Refrigerant overcharge
OF0	4 times of OPP protection in 200 minutes
OF4	T6 Temperature Sensor Error
OF5	T7 Temperature Sensor Error
OF8	MDC Error
AtL	Ambient temperature limitation (Outside ambient temperature(T4) is beyond the range that outdoor unit can run)
dF	Defrosting
dO	Oil Return

NOTES: Component in dashed line is optional.

Wiring Diagrams (Cont.)



NOTE: Sizes 072-120 only have Compressor A.

Fig. 95 —38VMA072RDS6-1, 096RDS6-1, 120RDS6-1, 144RDL6-1, 168RDS6-1, 192RDS6-1, 216RDS6-1, 240RDS6-1

Table 16 —Legend

CODE	NAME
XT1-XT2	Terminal Block
XS1-XS2	Plug
XP1-XP2	Jack
H-PRO 1-4	High Pressure ON/OFF Switch
H-YL1	High Pressure Sensor
L -YL1	Low Pressure Sensor
TP1-PRO, TP2-PRO	Discharge Temperature ON/OFF Switch
T3A, T3C, T3D, T3E, T5, T6, T7, T9	Condenser or Evaporator Temperature Sensor
T4	Outdoor Ambient Temperature Sensor
T7C1-T7C2	Discharge Temperature Sensor
CT1-3, IC17	Current Sensor
ST1, ST2	4-Way Valve
SV1-SV7	Solenoid Valve
HEAT (1-3)	Crankcase Heater
Tf1, Tf2	Heat Sink Temperature
TRANS1	Power Transformer

Table 17 —DSP1 and DSP2 Display Content

DISPLAY	MEANING
OE1	Phase Loss Error
OE2	Comm. Error with MDC and Indoor Unit
OE4	T3 or T4 Temperature Sensor Error
OE5	Voltage Protection
OH0/2OH0	Comm. Error Between Main Board and Compressor INV. Board
OH1	Comm. Error Between Chip IC55 and IC33 on Main Board
OLy/2OLy	Compressor Inverter module protection (0≤y≤9)
OH4/2OH4	3 times of OLy protection in 60 minutes
OP2	Low Pressure Protection
OH5	5 Times of OP2 Protection in 100 Minutes
OP4	Discharge Temperature Protection
OH6	3 Times of OP4 Protection in 60 Minutes
OH7	Quantity of Indoor Units do not Match
OH8	High Pressure Sensor Error
OP9	DC Fan Protection
OH9	10 Times of OP9 Protection in 120 Minutes
OHb	Low Pressure Sensor Error
OHc	The setting of power dial switch do not match the model of outdoor unit
OP1	High Pressure Protection or Discharge Temperature Protection or Ground Fault Problem
OP3	Compressor Current Protection
OP5	High Condenser Temperature Protection
OPL	Inverter Module Temperature Protection
OC7	3 times of OPL protection in 100 minutes
OPP	Refrigerant overcharge
OF0	4 times of OPP protection in 200 minutes
OF4	T6 Temperature Sensor Error
OF5	T7 Temperature Sensor Error
OF8	MDC Error
AtL	Ambient temperature limitation (Outside ambient temperature(T4) is beyond the range that outdoor unit can run)
dF	Defrosting
dO	Oil Return

NOTES: Component in dashed line is optional.

Wiring Diagrams (Cont.)

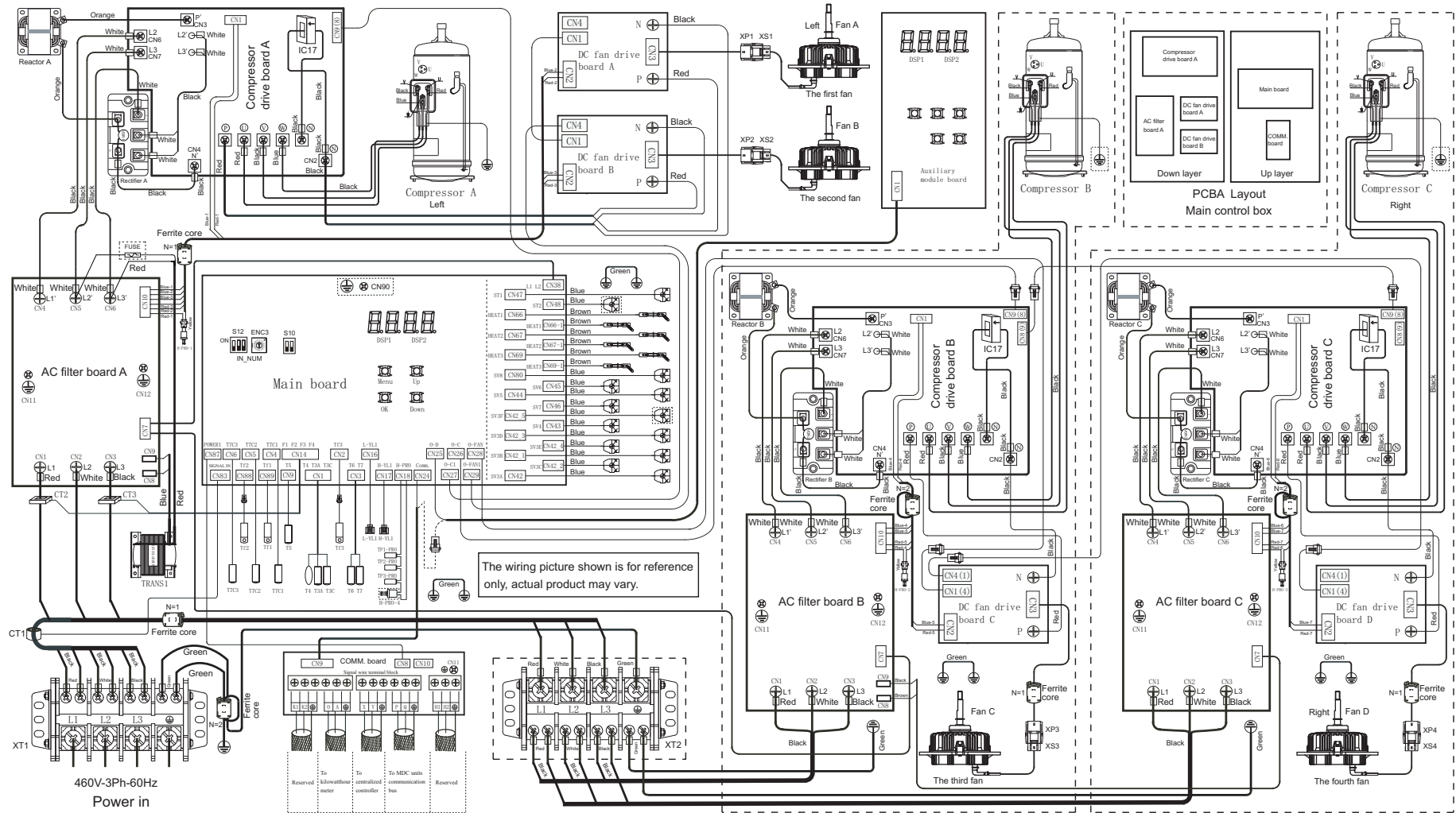


Fig. 96 —38VMA240RDL6-1, 264RDS6-1, 288RDS6-1, 312RDS6-1, 336RDS6-1

Table 18 —Legend

CODE	NAME
XT1-XT2	Terminal Block
XS1-XS4	Plug
XP1-XP4	Jack
H-PRO 1-4	High Pressure ON/OFF Switch
H-YL1	High Pressure Sensor
L-YL1	Low Pressure Sensor
TP1-PRO, TP2-PRO, TP3-PRO	Discharge Temperature ON/OFF Switch
T3A, T3C, T3D, T3E, T5, T6, T7	Condenser or Evaporator Temperature Sensor
T4	Outdoor Ambient Temperature Sensor
T7C1-T7C3	Discharge Temperature Sensor
CT1-CT3, IC17	Current Sensor
ST1, ST2	4-Way Valve
SV1-SV7	Solenoid Valve
HEAT (1-3)	Crankcase Heater
Tf1, Tf2, Tf3	Heat Sink Temperature
TRANS1	Power Transformer

Table 19 —DSP1 and DSP2 Display Content

DISPLAY	MEANING
OE1	Phase Loss Error
OE2	Comm. Error with MDC and Indoor Unit
OE4	T3 or T4 Temperature Sensor Error
OE5	Voltage Protection
OH0 / 20H0 / 30H0	Comm. Error Between Main Board and Compressor INV. Board
OH1	Comm. Error Between Chip IC55 and IC33 on Main Board
OLy / 20Ly / 30Ly	Compressor Inverter Module Protection (0≤y≤9)
OH4 / 20H4 / 30H4	3 times of OLy protection in 60 minutes
OP2	Low Pressure Protection
OH5	5 Times of OP2 Protection in 100 Minutes
OP4	Discharge Temperature Protection
OH6	3 Times of OP4 Protection in 60 Minutes
OH7	Quantity of Indoor Units do not Match
OH8	High Pressure Sensor Error
OP9	DC Fan Protection
OH9	10 Times of OP9 Protection in 120 Minutes
OHb	Low Pressure Sensor Error
OHc	The Setting of Power Dial Switch do not Match the Model of Outdoor Unit
OP1	High Pressure Protection or Discharge Temperature Protection or Ground Fault Problem
OP3	Compressor Current Protection
OP5	High Condenser Temperature Protection
OPL	Inverter Module Temperature Protection
OC7	3 Times of OPL Protection in 100 Minutes
OPP	Refrigerant Overcharge
OF0	4 times of OPP protection in 200 minutes
OF4	T6 Temperature Sensor Error
OF5	T7 Temperature Sensor Error
OF8	MDC Error
AtL	Ambient Temperature Limitation (Outside Ambient Temperature (T4) is Beyond Range that Outdoor Unit can run)
dF	Defrosting
dO	Oil Returning

NOTE: Components in dash lines are optional.

MDC Unit Circuit Board Arrangement

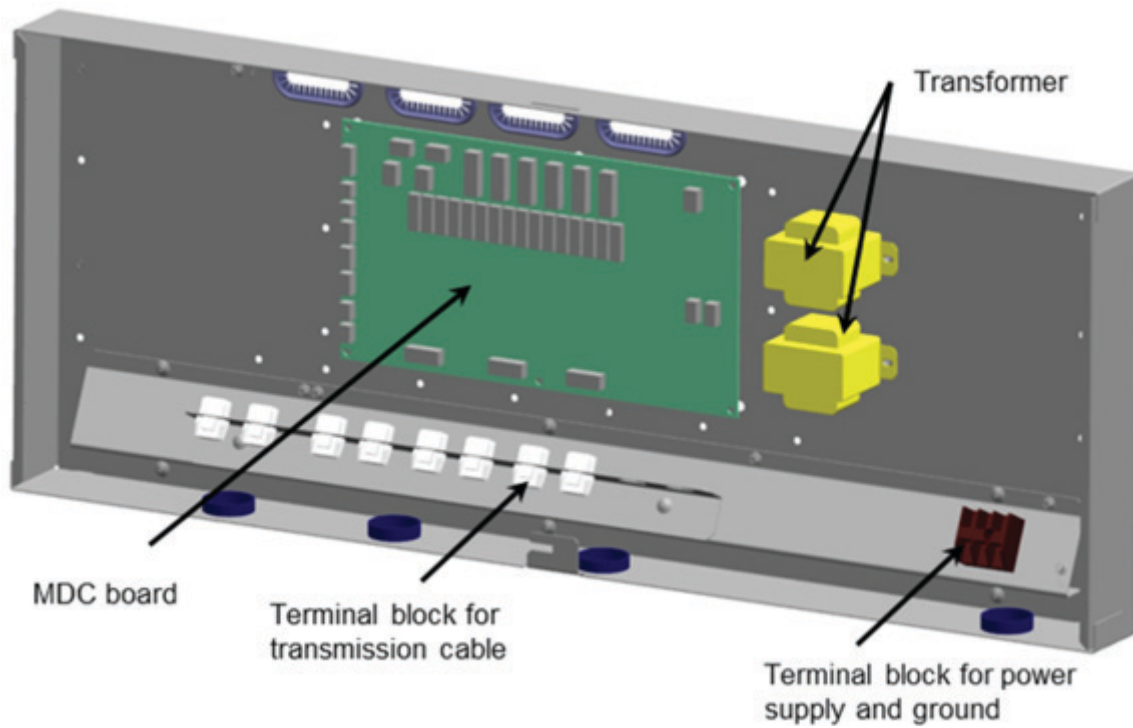


Fig. 97 —40VMD006M--3, 40VMD006S—3

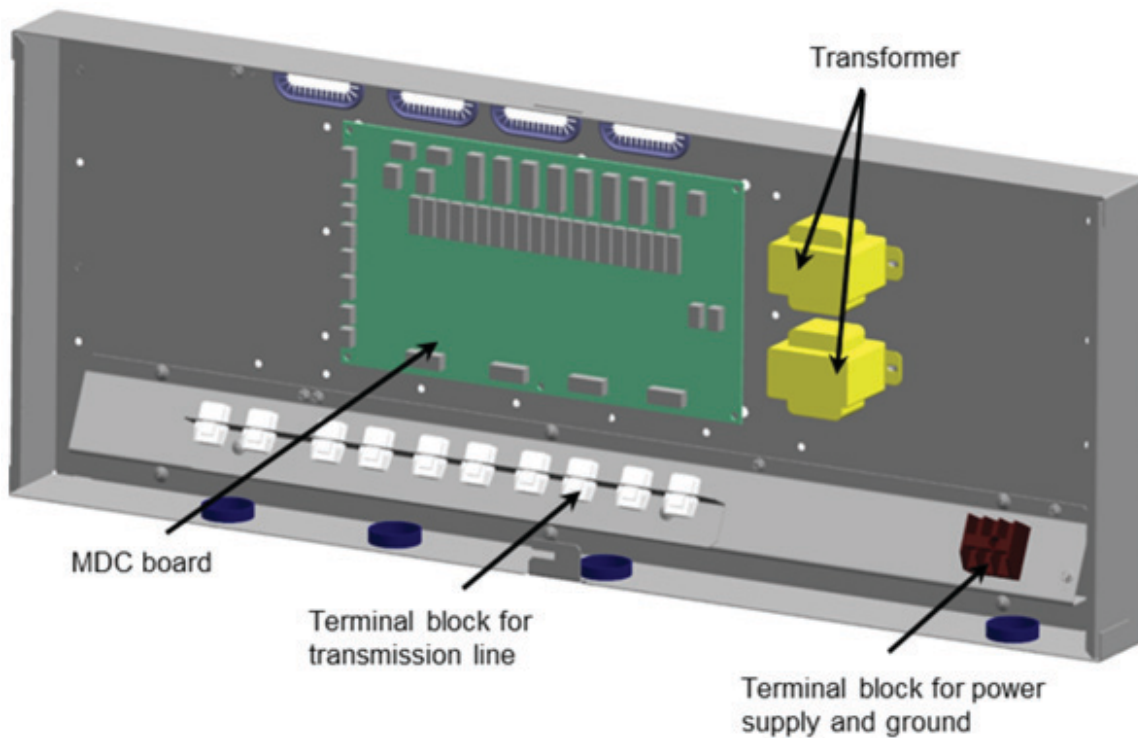


Fig. 98 —40VMD008M--3, 40VMD008S—3

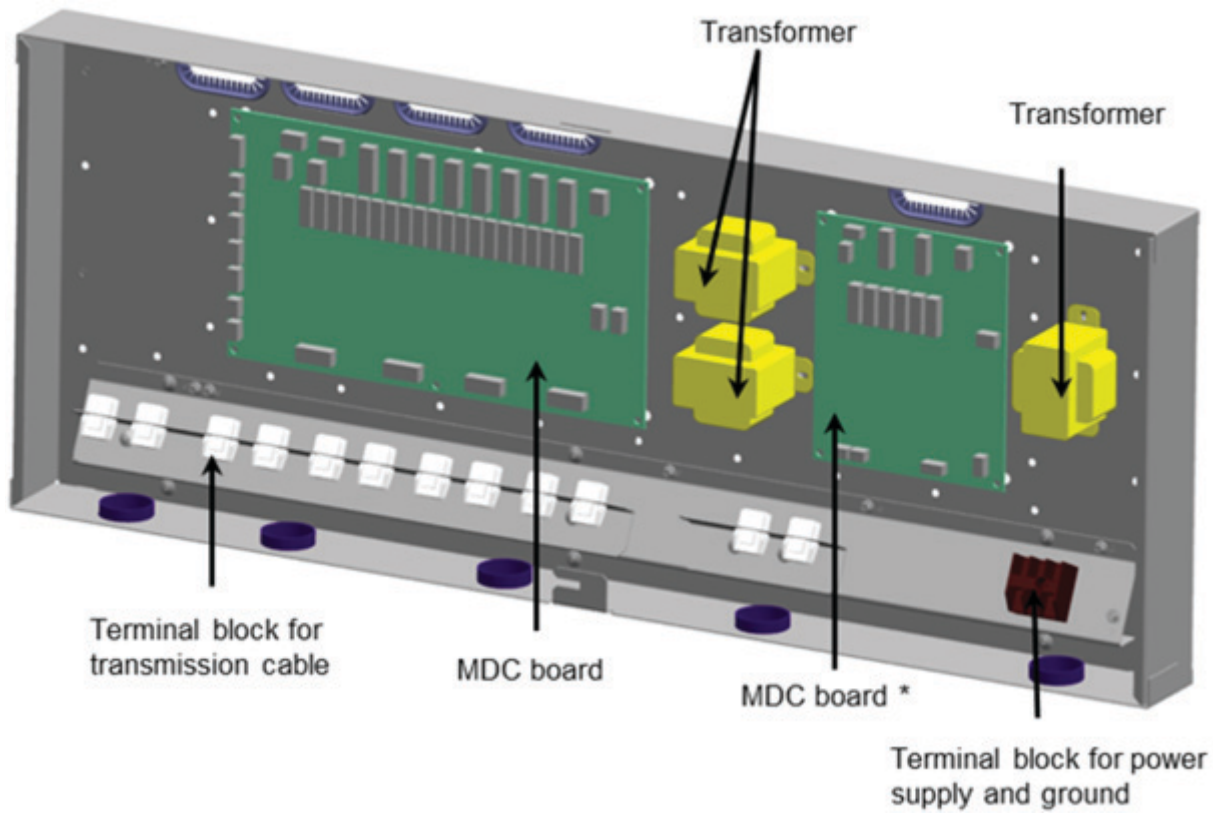


Fig. 99 —40VMD010M--3, 40VMD010S--3

*MDC board with two chips only for 40VMD010M--3 and 40VMD010S--3

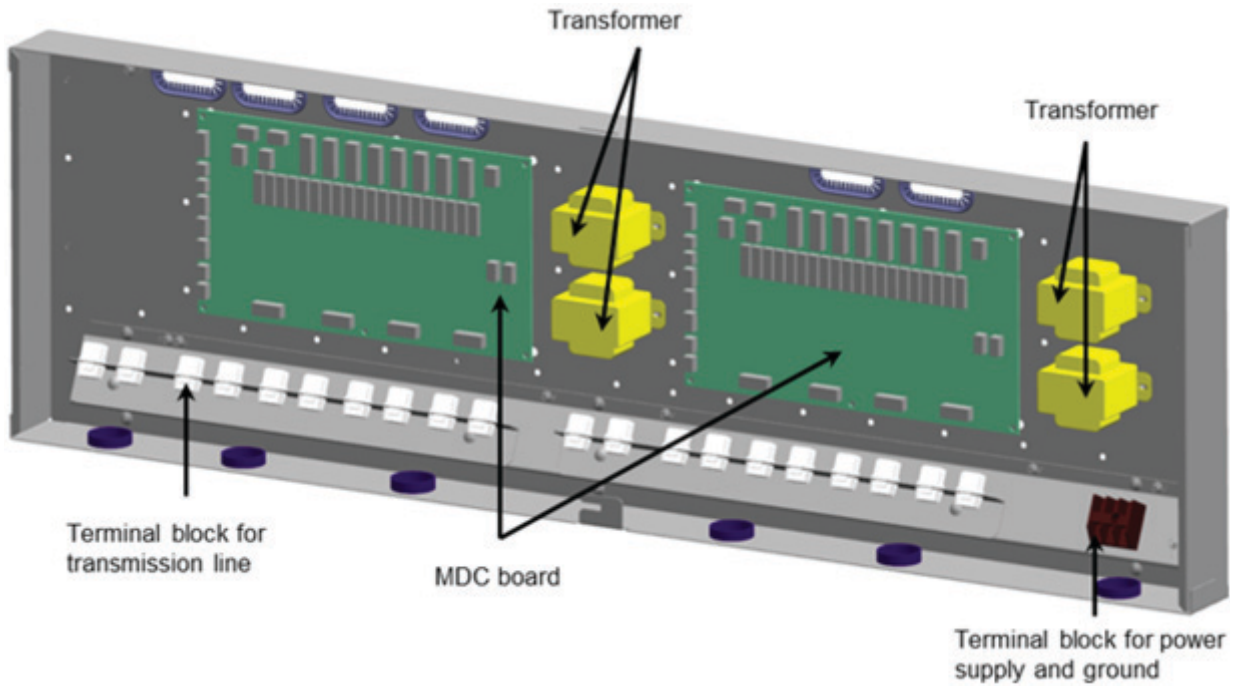


Fig. 100 —40VMD016M--3, 40VMD016ML-3, 40VMD016S--3

MDC Board Components

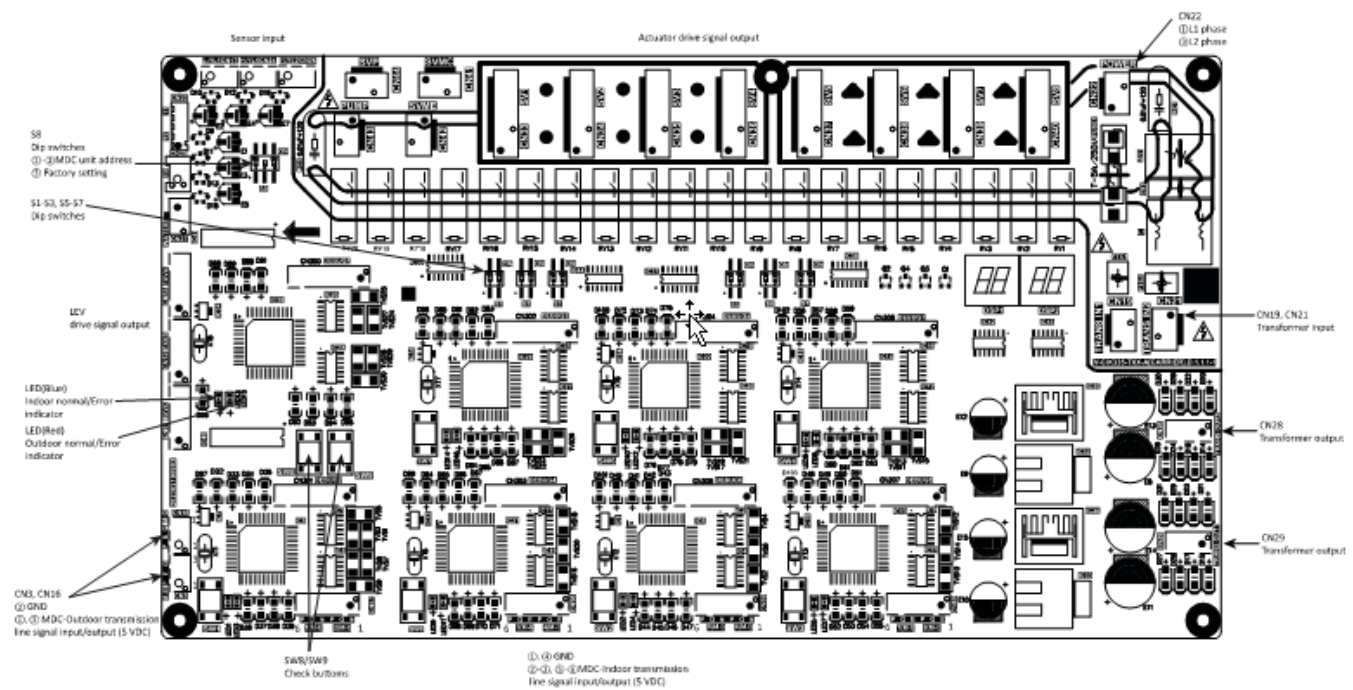


Fig. 101 —MDC board with eight chips is used for every model

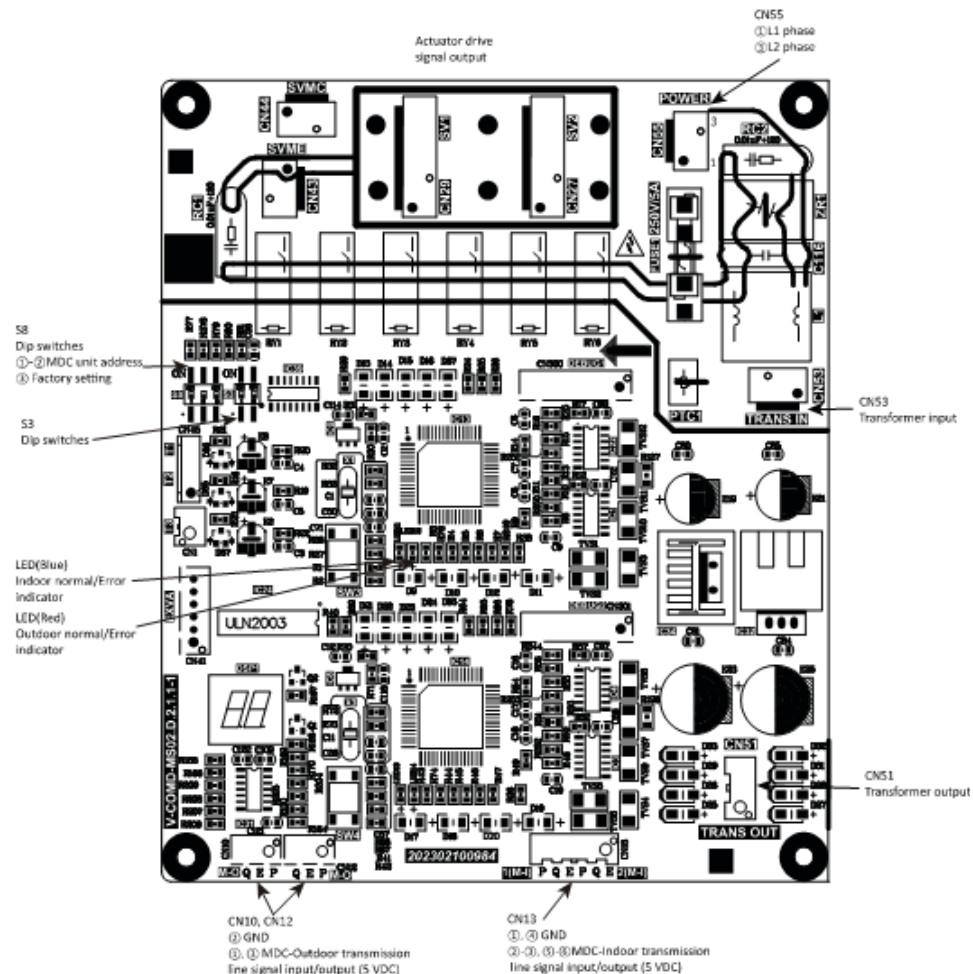


Fig. 102 —MDC board with two chips is used for 40VMD010M--3 and 40VMD010S--3

Actuator drive signal output: high-voltage to drive the solenoid valve coils

Wiring Diagrams Of MDC Unit

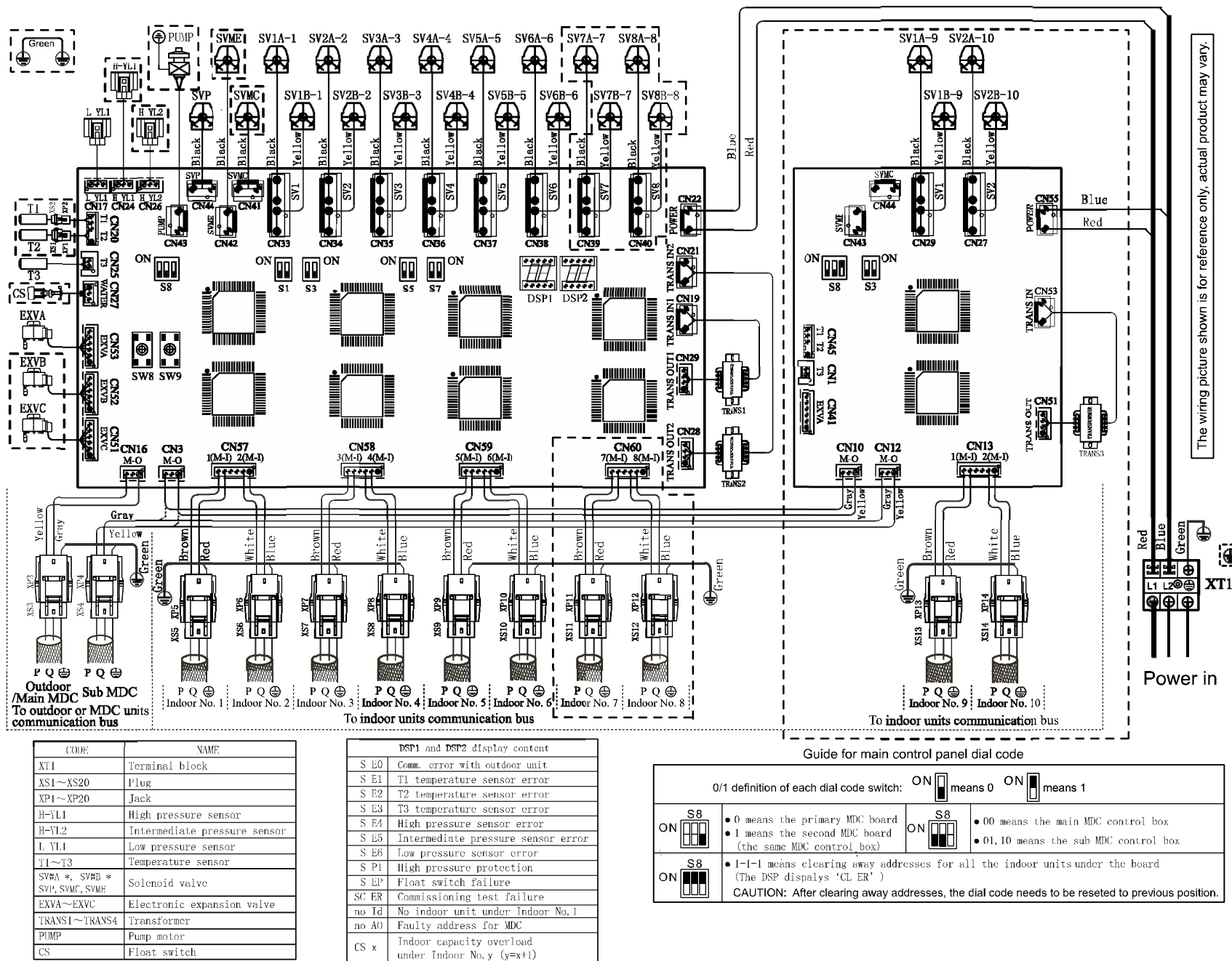


Fig. 103 —40VMD006/008/010M—3, 40VMD006/008/010S—3

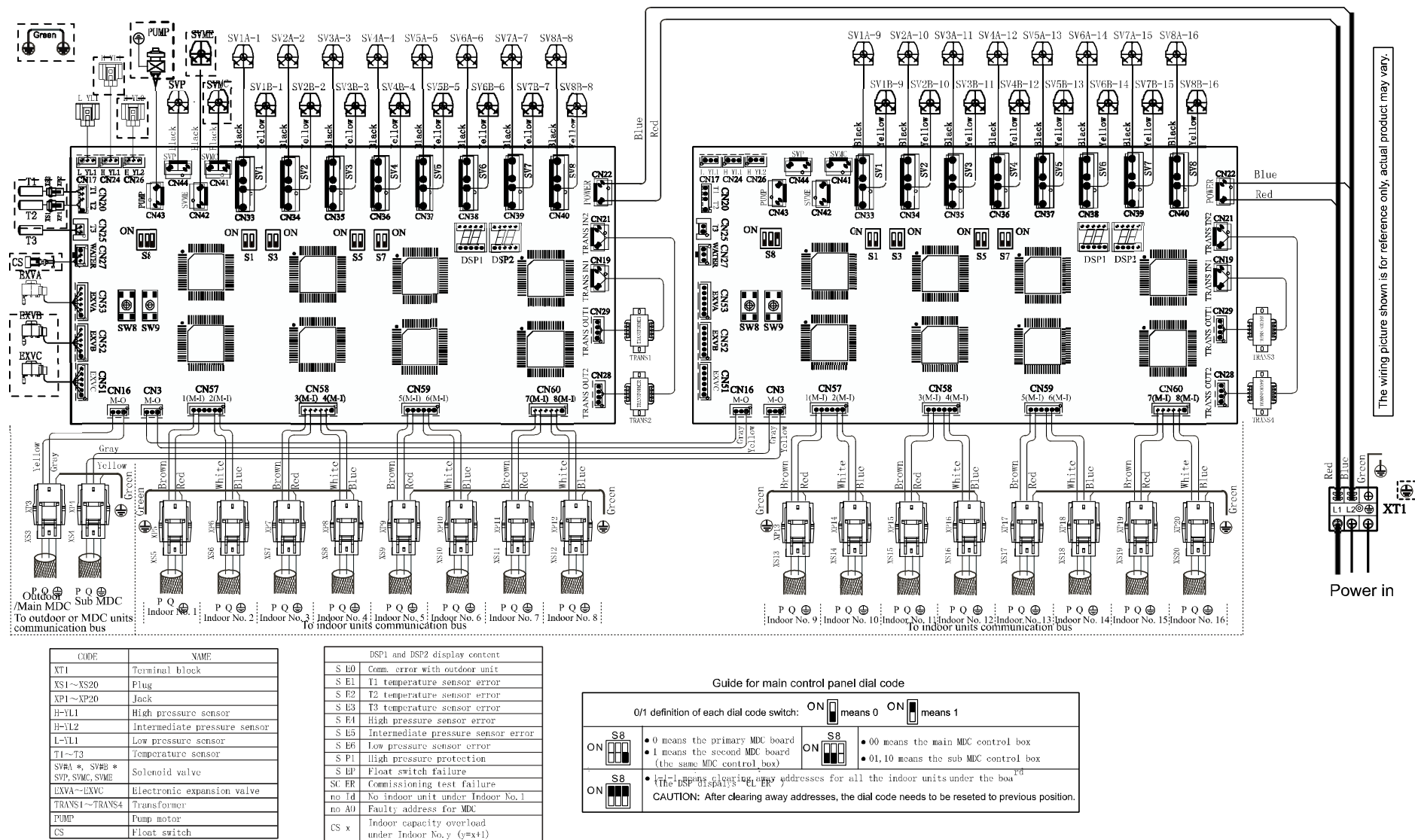


Fig. 104 —40VMD016M--3, 40VMD016ML--3, 40VMD016S--3

FUNCTION AND CONTROL

Operation Mode

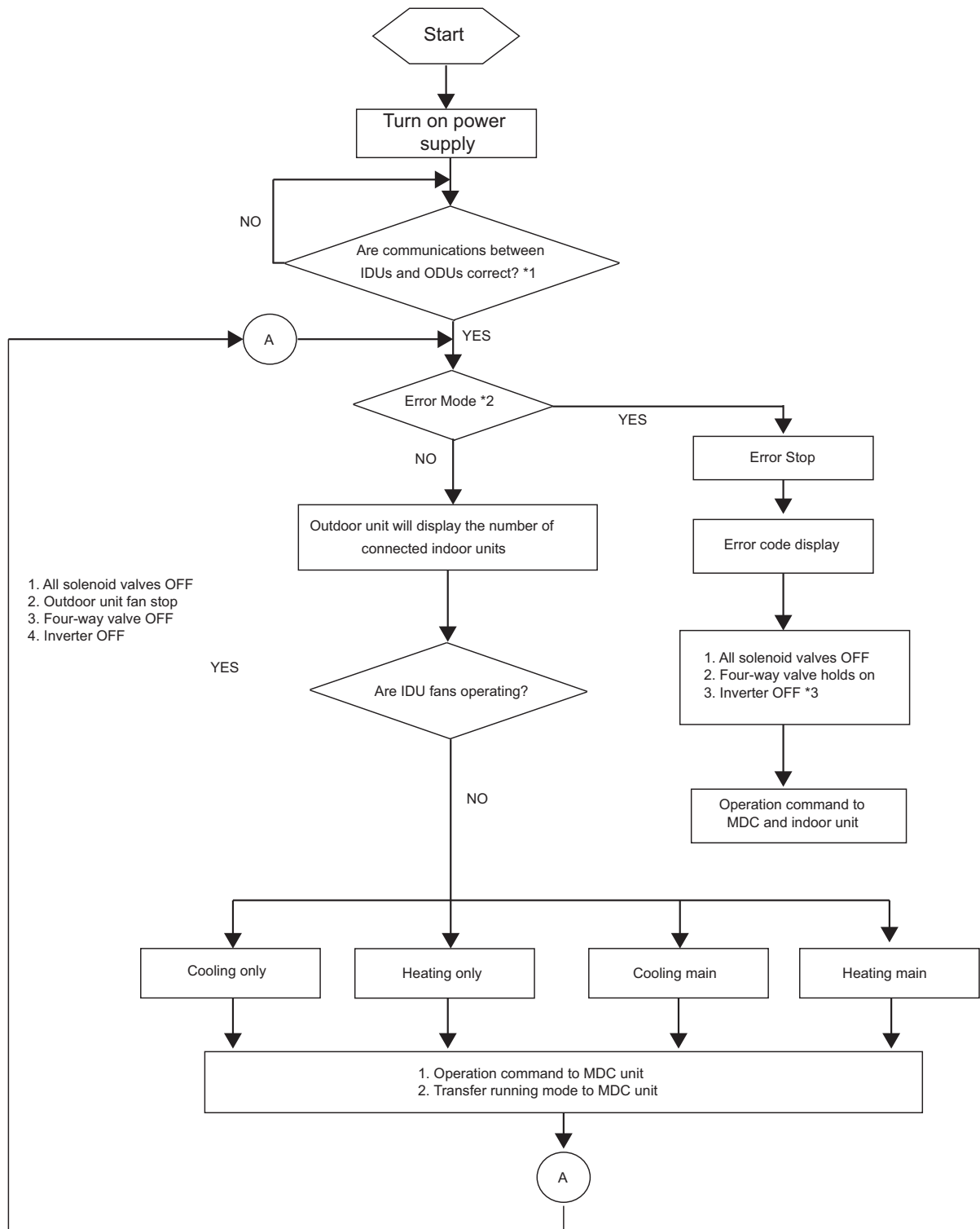


Fig. 105 —Outdoor Unit (cooling only, heating only, cooling main, and heating main modes)

NOTES:

- *1. It takes about twenty minutes after power on to count indoor unit numbers in the system.
- *2. The system may go into the error mode on either the outdoor unit, MDC, or indoor units. If some of the indoor units are experiencing problems, only those with problems will shut down. If the MDC unit or the outdoor unit is experiencing a problem, all the connected units will shut down.
- *3. In order to equal the high pressure and low pressure, there is a time delay design for solenoid valves, fans, etc. For more detailed information, refer to delay start control.

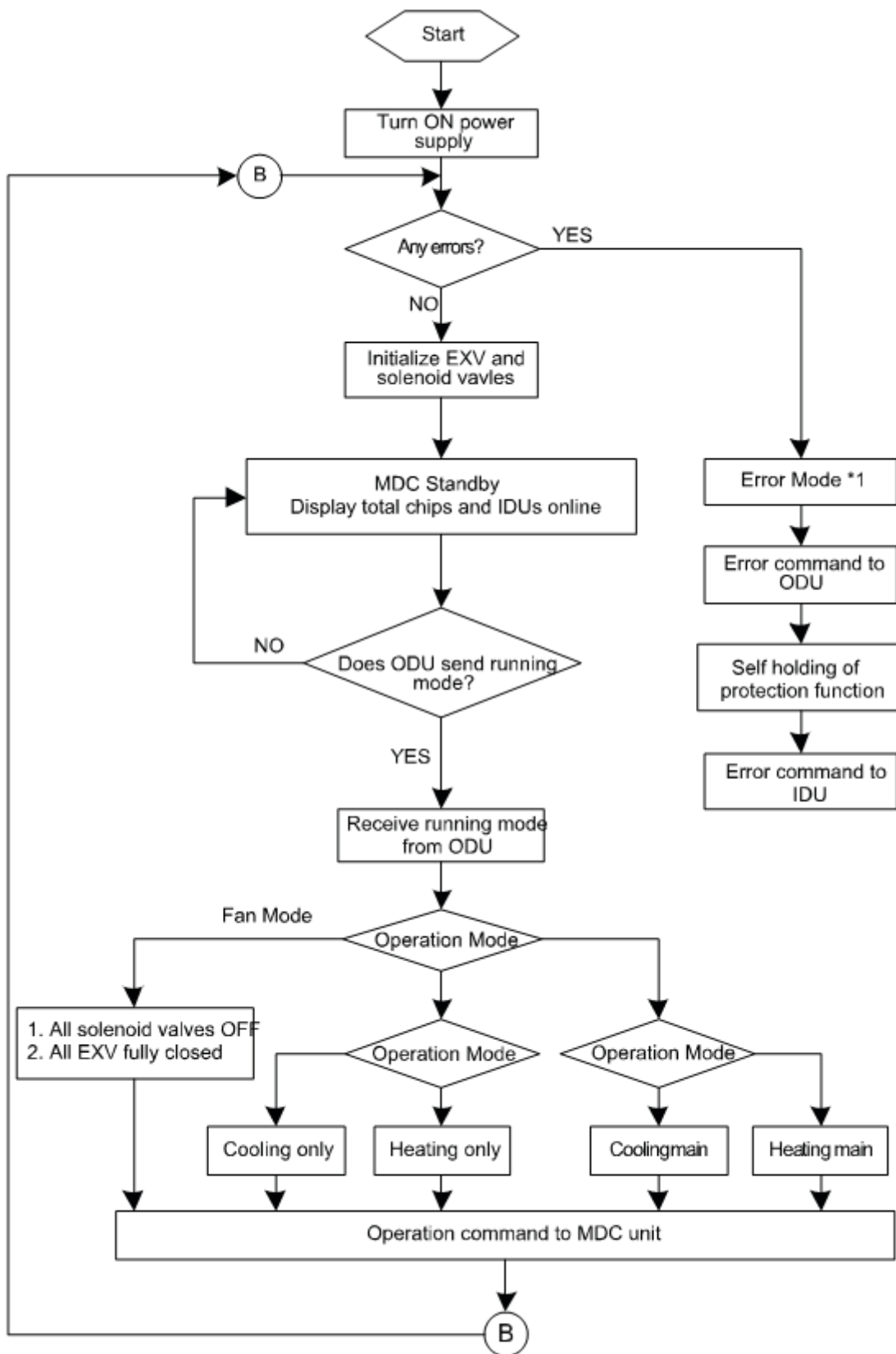


Fig. 106 —MDC Unit (cooling only, heating only, cooling main, and heating main modes)

NOTE:

- *1. The system may go into error mode on the MDC, indoor units, or outdoor unit. If some of the indoor units are experiencing problems, only those with problems will shut down. If the MDC unit or the outdoor unit is experiencing a problem, all the connected units will shut down.

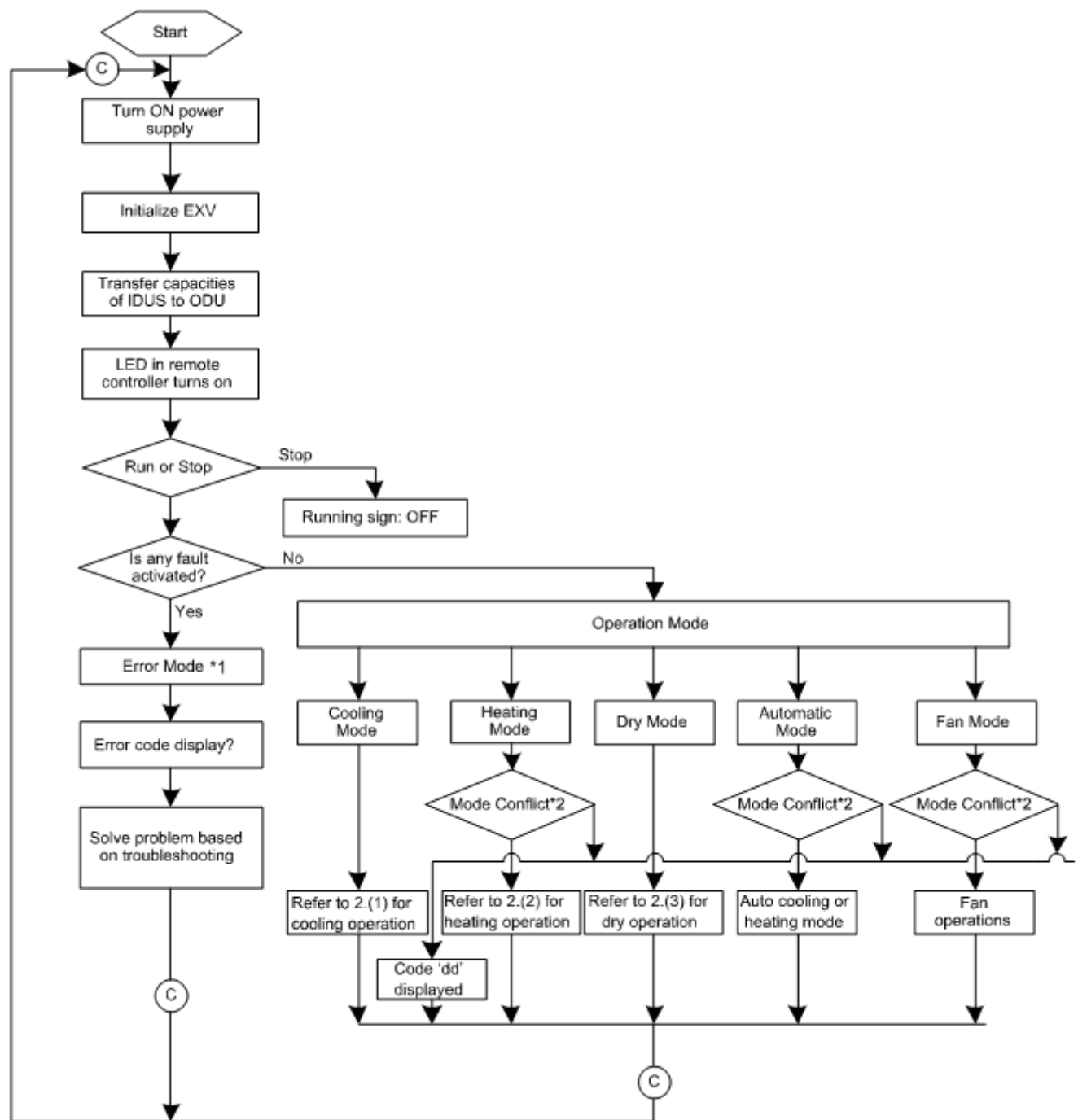


Fig. 107 —Indoor unit (Cooling, heating, dry, and fan modes)

NOTES:

- *1. The system may go into error mode on indoor units, MDC, or outdoor unit. If some of the indoor units are experiencing problems, only those with problems will shut down. If the MDC unit or the outdoor unit is experiencing a problem, all of the connected units will shut down.
- *2. If multiple indoor units share the same port of the MDC unit, all of the indoor units follow the heating priority operation. While the outdoor unit is running in heating only or mixed mode and one indoor unit is in heating mode and the other indoor unit is in cooling or fan operation, the error code 'dd' will be displayed.

Operations in Each Mode

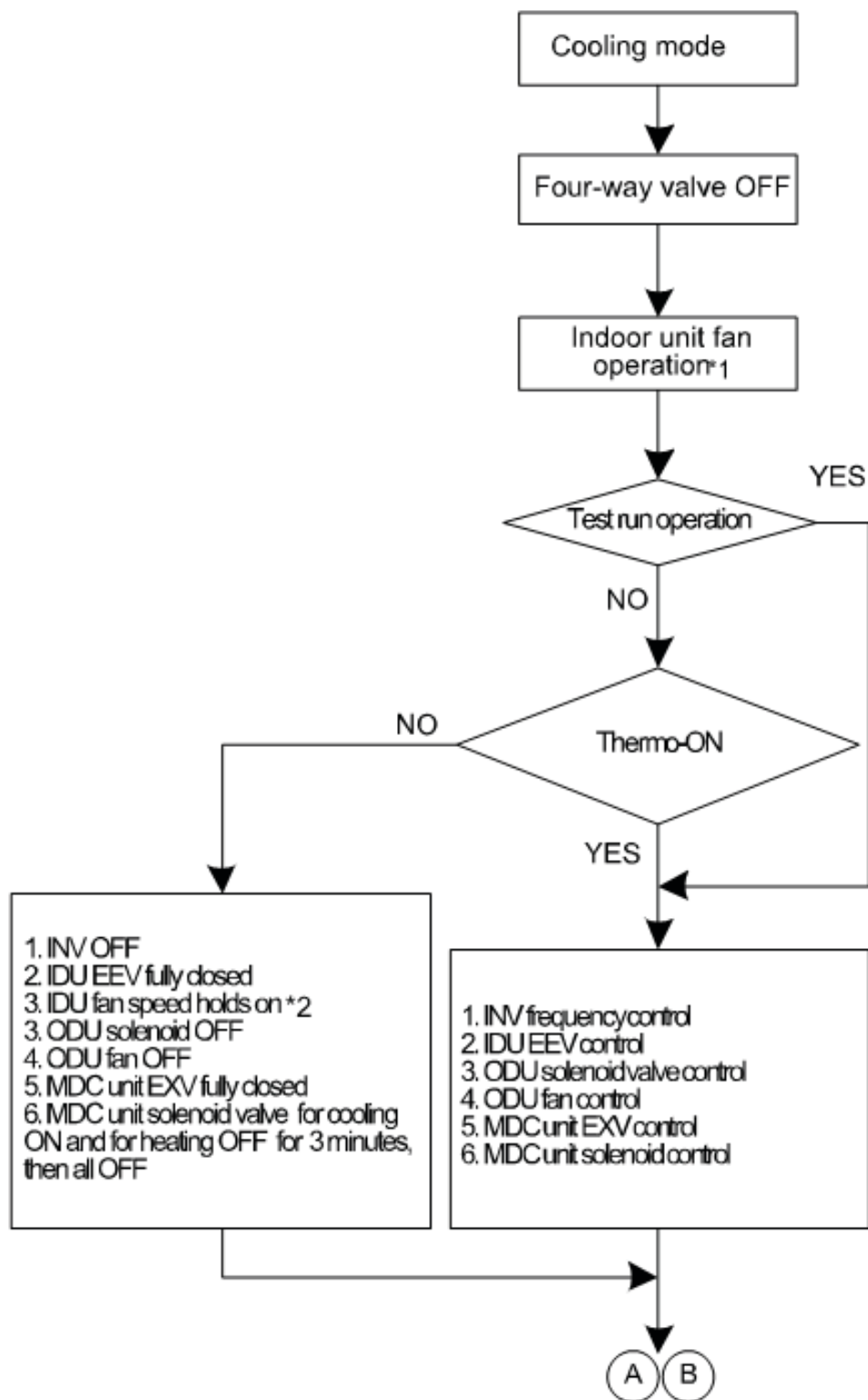


Fig. 108 —Cooling Mode

NOTES:

*1. The indoor fan may operate under cooling mode regardless of the ON/OFF state of the thermostat.

*2. The factory setting of the indoor unit fan in the thermal-OFF status is to keep the current fan speed. Users can change it through the remote controller connected to the indoor unit.

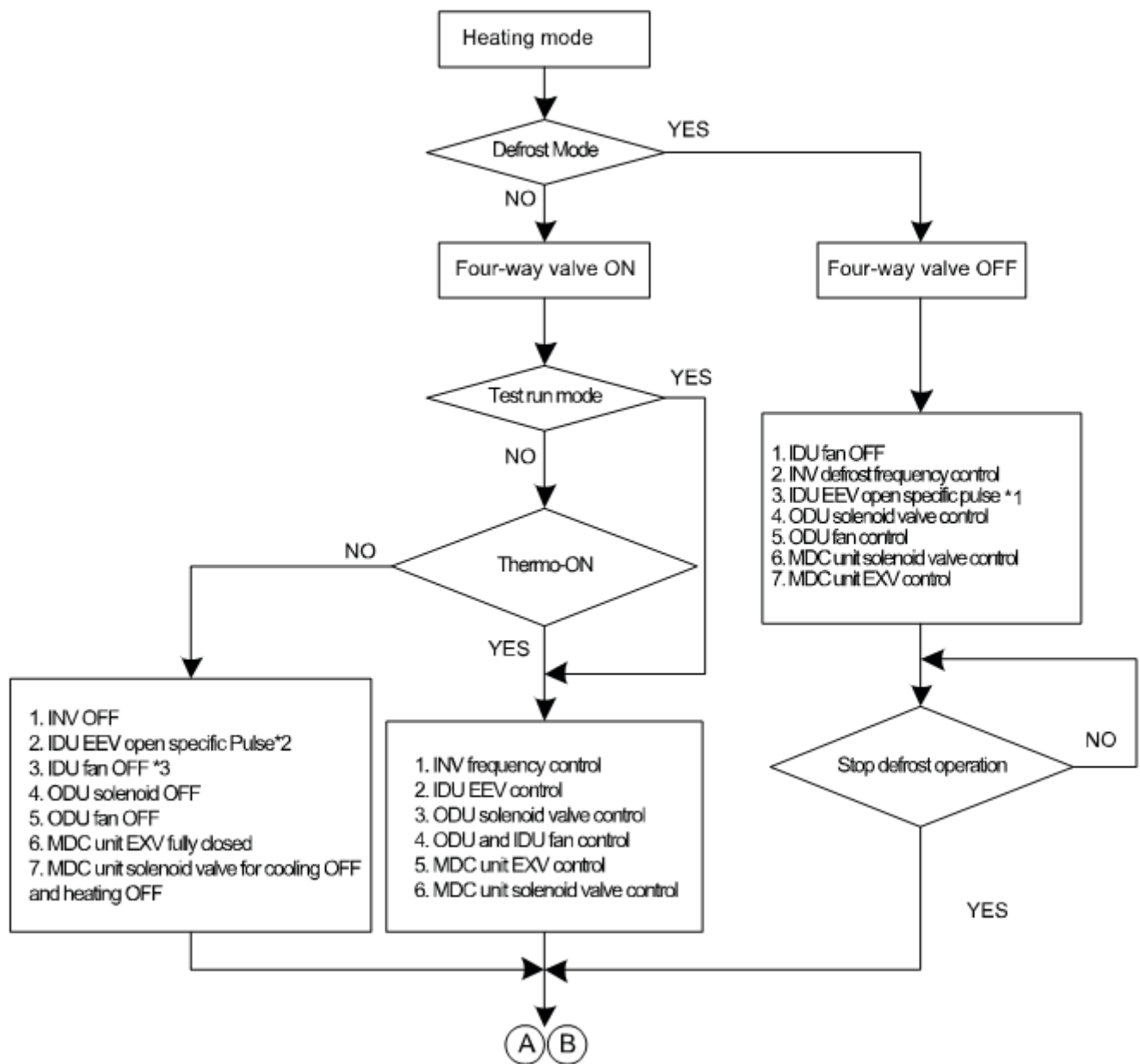


Fig. 109 —Heating Mode

NOTES:

- *1. Refer to defrost control.
- *2. The 2000P EXV are fully closed at first and then open 24P while the indoor units are in thermal OFF status. The 500P EXV are fully closed while the indoor units are in thermal-OFF status.
- *3. The factory setting of indoor unit fan is off during thermal OFF status, and users can change it through the remote controller connected to the indoor unit.

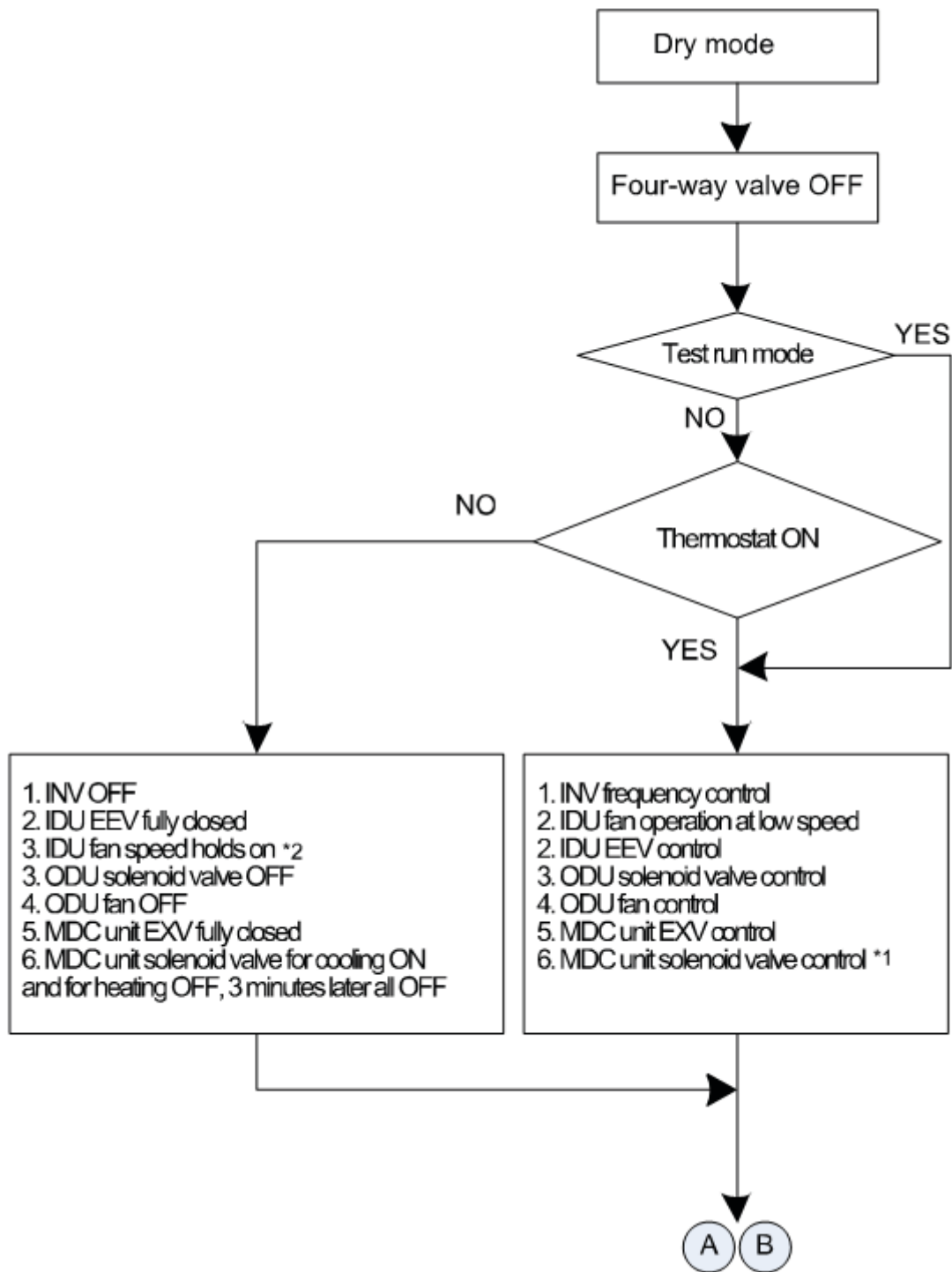


Fig. 110 —Dry Mode

NOTES:

- *1. The outdoor unit, the indoor unit, the MDC unit, and the solenoid valve operate similarly in the cooling operation when the compressor is turned on, but the indoor unit fan speed is forced to low speed.
- *2. The factory setting of the indoor unit fan in the thermal OFF status is to keep the current fan speed. Users can change it through the remote controller connected to the indoor unit.

Outdoor Unit Basic Control

NORMAL OPERATION

Table 12 —List of Outdoor Unit Functions in Normal Operation

PART NAME	SYMBOL	FUNCTION	
		COOLING	HEATING
Inverter compressor A	INV1	PI control, High pressure protection, Low pressure protection, Discharge temperature Protection, Compressor drive board protection	
Inverter compressor B *1 *2	INV2		
Inverter compressor C *1	INV3		
Inverter fan 1	FANA	PI control, Inverter module temperature protection	Low pressure control, Inverter module temperature protection
Inverter fan 2	FANB		
Inverter fan 3 *1	FANC		
Inverter fan 4 *1	FAND		
Four way valve	ST1	OFF	ON
Solenoid valve	SV3A	Outdoor unit heat exchanger capacity control (Condenser)	Outdoor unit heat exchanger capacity control (Evaporator)
	SV3B		
	SV3C		
	SV3D *2		
	SV3E *2		
	SV4	ON at oil return operation	ON at oil return and defrosting operation
	SV5	OFF	ON during defrosting cycle ON when the pressure is higher than 536 psig
	SV6 SV8 *1	Refrigerant control in cooling main mode	ON
	SV7	ON when the pressure is higher than 536 psig	ON when the pressure is higher than 536 psig

*1 For 38VMA240RDL, 264~336RDS models

*2 For 38VMA144~336RDS models

Table 20 —Normal Operation of Indoor Unit

INDOOR UNIT ACTUATOR		NORMAL COOLING	NORMAL HEATING
Fan	Thermal ON unit	Remote controller setting	Remote controller setting
	Stopping unit	OFF	OFF
	Thermal OFF unit	Remote controller setting	Remote controller setting
Electronic expansion valve (EEV)	Thermal ON unit	PI control : Evaporator outlet superheat degree (SH) constant	PI control : Condenser outlet subcooling (SC) constant
	Stopping unit	0 pls (500P EEV) or 24pls (2000P EEV)*1	54~96 pls adjust (500P EEV) or 120~288pls adjust (2000P EEV)*2 *3
	Thermal OFF unit	0 pls (500P EEV) or 24pls (2000P EEV)*1	0 pls (500P EEV) or 24pls (2000P EEV)*3

*1 Different IDUs may have 500P or 2000P EEV. Refer to the indoor unit service manual for more detailed information.

*2 The standby opening changes according to high pressure to keep reliability of the system.

*3 If the ODU stops, the standby opening should be 1200pls (2000P EEV) or 300pls (500P EEV) for pressure equalization.

The solenoid valves and electronic expansion valves are controlled as shown in the following table for normal operation.

Table 21 —Normal Operation of MDC

TYPE	PART NAME	COOLING ONLY	COOLING MAIN	HEATING ONLY OR HEATING MAIN	STOP
Main MDC	EXVB	480 pulse	Pressure differential control *1	Sub-cooling control *3	240 pulse
	EXVC	480 pulse			240 pulse
	EXVA	Superheat control *2		Discharge temperature control *4	240 pulse
	SVP				OFF
	SVME	OFF	OFF	OFF	
Sub MDC	EXVA	Superheat control *2		Discharge temperature control *4	240 pulse
	SVP				OFF

*1. Pressure differential control: Regulating the differential pressure (PS1 and PS2) within a certain range.

*2. Superheat control: The superheat is calculated by using TPS3 and Tm3 values.

*3. Open at specific pulse according to sub-cooling degree (SCM1).

*4. To keep the compressors ON in a safe operating range.

SVmA-n and SVmB-n turn ON or OFF depending on the operating mode of the port.

ODU MODE	IDU STATE	SOLENOID VALVE	
		SVmA-n	SVmB-n
All	OFF	OFF	OFF
All	Heating thermal OFF		
Cooling only	Error or Stop (Heating previously)		
All	Error or Stop (OFF before)		
All	Fan		
All	Cooling	ON	OFF
All	Cooling thermal OFF		
All	Error or Stop (Cooling previously)		
All	Heating	OFF	ON
Besides cooling only	Error or stop (Heating previously)		

REMARK: Oil return and defrosting operations are basically the same with cooling only mode.

1. The MDC unit will not respond to mode change at startup stage or to oil return and defrosting operation.
2. When multiple indoor units are connected to one port, default is heating priority. This means that if one indoor unit on this port is in heating mode, the others cannot operate in Cooling or Fan only mode.
3. SVmA-n and SVmB-n will operate during current state for three minutes after the compressor shuts down.
4. There is a delay action to avoid SVmA-n and SVmB-n to change at the same time (e.g. OFF+ON→ON+OFF).

COMPRESSOR CONTROL

The compressor capacity control is used to maintain constant evaporation temperature (Te) during cooling operation and constant condensing temperature (Tc) during heating operation. During simultaneous cooling and heating operation, it carries out PI control to maintain both Te and Tc at constant.

Cooling Operation

Compressor frequency is PI controlled to keep low pressure at target evaporator temperature (Tes).

Tes will be decided by the Tes0 setting. If the user chooses Auto, the Tes would be adjusted for saving energy (except Tes0).

Table 22 —Tes0 Setting

SETTING	1 (DEFAULT)	2	3	4	5	6	7	8
Tes0 (F)	37.4 Auto	32 Auto	42.8 Auto	48.2 Fixed	42.8 Fixed	37.4 Fixed	32 Fixed	26.6 Fixed

Heating Operation

Compressor frequency is PI controlled to keep high pressure at target condensing temperature (Tcs).

Tcs will be decided by Tcs0. If the user chooses Auto, the Tcs would be adjusted for saving energy (except Tcs0).

Table 23 —Tcs0 Setting

SETTING	1 (DEFAULT)	2	3	4	5	6	7	8
Tcs0 (F)	118.4 Auto	122 Auto	113 Auto	107.6 Fixed	111.2 Fixed	114.8 Fixed	118.4 Fixed	122 Fixed

SIMULTANEOUS COOLING AND HEATING OPERATION

It controls compressor capacity to adjust Tc to target value (Tcs) and Te to target value (Tes).

OPERATING FREQUENCY RANGE

During normal operation, the minimum frequency is always 20Hz for all outdoor units and the maximum is shown in the table below.

Table 24 —Frequency Range

MODEL	FREQUENCY RANGE IN COOLING OR COOLING MAIN		FREQUENCY RANGE IN HEATING OR HEATING MAIN	
	MINIMUM	MAXIMUM	MINIMUM	MAXIMUM
38VMA072RDS5-1(6-1)	20Hz	86Hz	20Hz	94Hz
38VMA096RDS5-1(6-1)	20Hz	90Hz	20Hz	100Hz
38VMA120RDS5-1(6-1)	20Hz	90Hz	20Hz	100Hz
38VMA144RDL5-1(6-1)	20Hz	90 + 88Hz	20Hz	100 + 98Hz
38VMA168RDS5-1(6-1)	20Hz	90 + 88Hz	20Hz	100 + 98Hz
38VMA196RDS5-1(6-1)	20Hz	90 + 88Hz	20Hz	100 + 98Hz
38VMA216RDS5-1(6-1)	20Hz	90 + 88Hz	20Hz	100 + 98Hz
38VMA240RDS5-1(6-1)	20Hz	90 + 88Hz	20Hz	100 + 98Hz
38VMA240RDL5-1(6-1)	20Hz	90 + 88 + 86Hz	20Hz	100 + 98 + 96Hz
38VMA264RDS5-1(6-1)	20Hz	90 + 88 + 86Hz	20Hz	100 + 98 + 96Hz
38VMA288RDS5-1(6-1)	20Hz	90 + 88 + 86Hz	20Hz	100 + 98 + 96Hz
38VMA312RDS5-1(6-1)	20Hz	90 + 88 + 86Hz	20Hz	100 + 98 + 96Hz
38VMA336RDS5-1(6-1)	20Hz	90 + 88 + 86Hz	20Hz	100 + 98 + 96Hz

FREQUENCY STEP FOR COMPRESSOR

Table 25 —38VMA072, 096, 120RDS5-1 (6-1)

STEP NO.	INV1	STEP NO.	INV1
1	20	22	62
2	22	23	64
3	24	24	66
4	26	25	68
5	28	26	70
6	30	27	72
7	32	28	74
8	34	29	76
9	36	30	78
10	38	31	80
11	40	32	82
12	42	33	84
13	44	34	86
14	46	35	88
15	48	36	90
16	50	37	92
17	52	38	94
18	54	39	96
19	56	40	98
20	58	41	100
21	60		

Table 26 —38VMA144RDL5-1 (6-1), 38VMA168, 192, 216, 240RDS5-1 (6-1)

STEP NO.	INV1	INV1	INV2	STEP NO.	INV1	INV2
1	20			50	52	56
2	22			51	54	56
3	24			52	54	58
4	26			53	56	58
5	28			54	56	60
6	30			55	58	60
7	32			56	58	62
8	34			57	60	62
9	36			58	60	64
10	38			59	62	64
11	40			60	62	66
12	42			61	64	66
13	44			62	64	68
14	46			63	66	68
15	48			64	66	70
16	50			65	68	70
17	52	20	22	66	68	72
18	54	20	24	67	70	72
19	56	22	24	68	70	74
20	58	22	26	69	72	74
21	60	24	26	70	70	78
22	62	24	28	71	72	78
23	64	26	28	72	74	78
24	66	26	30	73	76	78
25	68	28	30	74	76	80
26	70	28	32	75	78	80
27		30	32	76	78	82
28		30	34	77	80	82
29		32	34	78	80	84
30		32	36	79	82	84
31		34	36	80	82	86
32		34	38	81	84	86
33		36	38	82	84	88
34		36	40	83	86	88
35		38	40	84	86	90
36		38	42	85	88	90
37		40	42	86	88	92
38		40	44	87	90	92
39		42	44	88	90	94
40		42	46	89	92	94
41		44	46	90	92	96
42		44	48	91	94	96
43		46	48	92	94	98
44		46	50	93	96	98
45		48	50	94	96	100
46		48	52	95	98	100
47		50	52			
48		50	54			
49		52	54			

Table 27 —38VMA240RDL5-1 (6-1), 38VMA264, 288, 312, 336RDS5-1 (6-1)

STEP NO.	INV1	INV1	INV2	INV1	INV2	INV3
1	20	0	0	0	0	0
2	22	0	0	0	0	0
3	24	0	0	0	0	0
4	26	0	0	0	0	0
5	28	0	0	0	0	0
6	30	0	0	0	0	0
7	32	0	0	0	0	0
8	34	0	0	0	0	0
9	36	0	0	0	0	0
10	38	0	0	0	0	0
11	40	0	0	0	0	0
12	42	0	0	0	0	0
13	44	0	0	0	0	0
14	46	0	0	0	0	0
15	48	0	0	0	0	0
16	50	0	0	0	0	0
17	52	22	20	0	0	0
18	54	24	20	0	0	0
19	56	24	22	0	0	0
20	58	26	22	0	0	0
21	60	26	24	0	0	0
22	62	28	24	0	0	0
23	64	28	26	0	0	0
24	66	30	26	0	0	0
25	68	30	28	0	0	0
26	70	32	28	0	0	0
27		32	30	0	0	0
28		34	30	0	0	0
29		34	32	0	0	0
30		36	32	0	0	0
31		36	34	0	0	0
32		38	34	0	0	0
33		38	36	0	0	0
34		40	36	24	22	20
35		40	38	26	22	20
36		42	38	26	24	20
37		42	40	26	24	22
38		44	40	28	24	22
39		44	42	28	26	22
40		46	42	28	26	24
41		46	44	30	26	24
42		48	44	30	28	24
43				30	28	26
44				32	28	26
45				32	30	26
46				32	30	28
47				34	30	28
48				34	32	28
49				34	32	30

Table 28 —38VMA240RDL5-1(6-1), 38VMA264, 288, 312, 336RDS5-1(6-1) (Continued)

STEP NO.	INV1	INV2	INV3	STEP NO.	INV1	INV2	INV3
50	36	32	30	100	68	66	64
51	36	34	30	101	70	66	64
52	36	34	32	102	70	68	64
53	38	34	32	103	70	68	66
54	38	36	32	104	72	68	66
55	38	36	34	105	72	70	66
56	40	36	34	106	72	70	68
57	40	38	34	107	74	70	68
58	40	38	36	108	74	72	68
59	42	38	36	109	74	72	70
60	42	40	36	110	76	72	70
61	42	40	38	111	76	74	70
62	44	40	38	112	76	74	72
63	44	42	38	113	78	74	72
64	44	42	40	114	78	76	72
65	46	42	40	115	78	76	74
66	46	44	40	116	80	76	74
67	46	44	42	117	80	78	74
68	48	44	42	118	80	78	76
69	48	46	42	119	82	78	76
70	48	46	44	120	82	80	76
71	50	46	44	121	82	80	78
72	50	48	44	122	84	80	78
73	50	48	46	123	84	82	78
74	52	48	46	124	84	82	80
75	52	50	46	125	86	82	80
76	52	50	48	126	86	84	80
77	54	50	48	127	86	84	82
78	54	52	48	128	88	84	82
79	54	52	50	129	88	86	82
80	56	52	50	130	88	86	84
81	56	54	50	131	90	86	84
82	56	54	52	132	90	88	84
83	58	54	52	133	90	88	86
84	58	56	52	134	92	88	86
85	58	56	54	135	92	90	86
86	60	56	54	136	92	90	88
87	60	58	54	137	94	90	88
88	60	58	56	138	94	92	88
89	62	58	56	139	94	92	90
90	62	60	56	140	96	92	90
91	62	60	58	141	96	94	90
92	64	60	58	142	96	94	92
93	64	62	58	143	98	94	92
94	64	62	60	144	98	96	92
95	66	62	60	145	98	96	94
96	66	64	60	146	100	96	94
97	66	64	62	147	100	98	94
98	68	64	62	148	100	98	96
99	68	66	62	?	?	?	?

HEAT EXCHANGER CONTROL

The outdoor heat exchanger (HEX) has been divided into several sections that are controlled by solenoid valves (SV3A, SV3B, SV3C, SV3D, and SV3E).

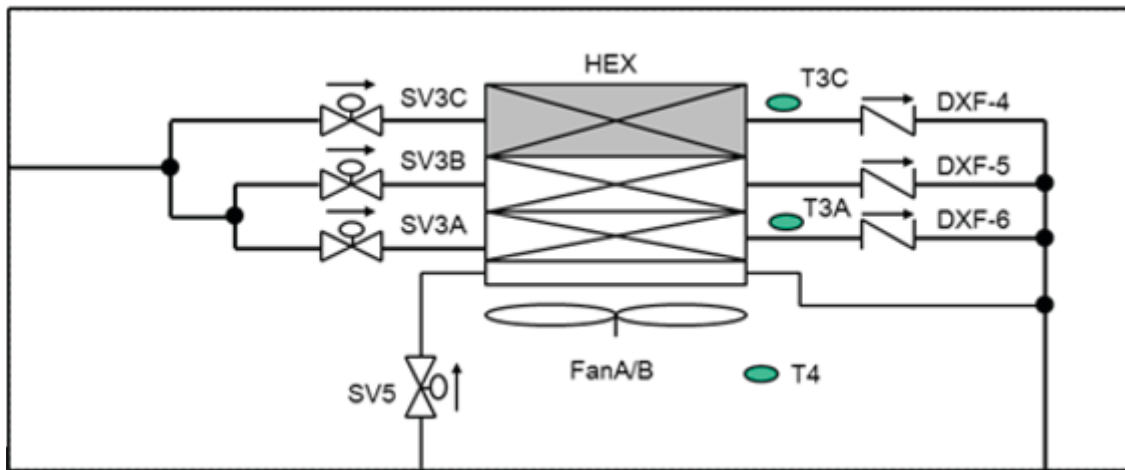


Fig. 111 —Heat Exchanger Arrangement 38VMA072, 096, 120RDS-1(6-1)

Table 29 —Heat Exchanger Arrangement

OPERATION MODE	STEP	SOLENOID VALVE		
		SV3A	SV3B	SV3C
Cooling-only	1	ON	ON	ON
	2	OFF	ON	ON
	3	OFF	OFF	ON
Cooling-main	1	ON	ON	ON
	2	OFF	ON	ON
	3	OFF	OFF	ON
	5	OFF	ON	OFF
	7	ON	OFF	OFF
Heating-only	1	ON	ON	ON
	3	OFF	OFF	ON
	5	OFF	ON	OFF
	7	ON	OFF	OFF
Heating-main	1	ON	ON	ON
	3	OFF	OFF	ON

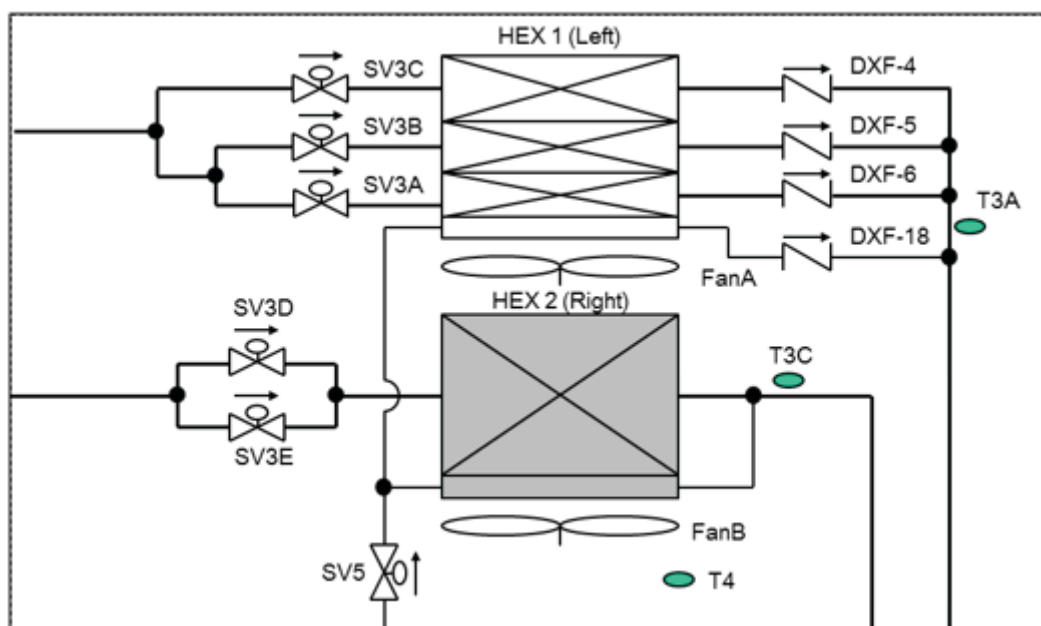


Fig. 112 —Heat Exchanger Arrangement 38VMA144RDL5-1(6-1), 38VMA168, 192, 216, 240RDS5-1(6-1)

Table 30 —Heat Exchanger Arrangement

OPERATION MODE	STEP	SOLENOID VALVE				
		SV3A	SV3B	SV3C	SV3D	SV3E
Cooling-only	1	ON	ON	ON	ON	ON
	2	ON	OFF	ON	ON	ON
	3	ON	OFF	OFF	ON	ON
	5	OFF	ON	ON	OFF	OFF
Cooling-main	1	ON	ON	ON	ON	ON
	2	ON	OFF	ON	ON	ON
	3	ON	OFF	OFF	ON	ON
	4	ON	ON	ON	OFF	OFF
	5	OFF	ON	ON	OFF	OFF
	6	OFF	OFF	ON	OFF	OFF
	7	ON	OFF	OFF	OFF	OFF
Heating-only	1	ON	ON	ON	ON	ON
	2	ON	OFF	ON	ON	ON
	3	ON	OFF	OFF	ON	ON
	4	ON	ON	ON	OFF	OFF
	7	ON	OFF	OFF	OFF	OFF
Heating-main	1	ON	ON	ON	ON	ON
	2	ON	OFF	ON	ON	ON
	3	ON	OFF	OFF	ON	ON
	4	ON	ON	ON	OFF	OFF

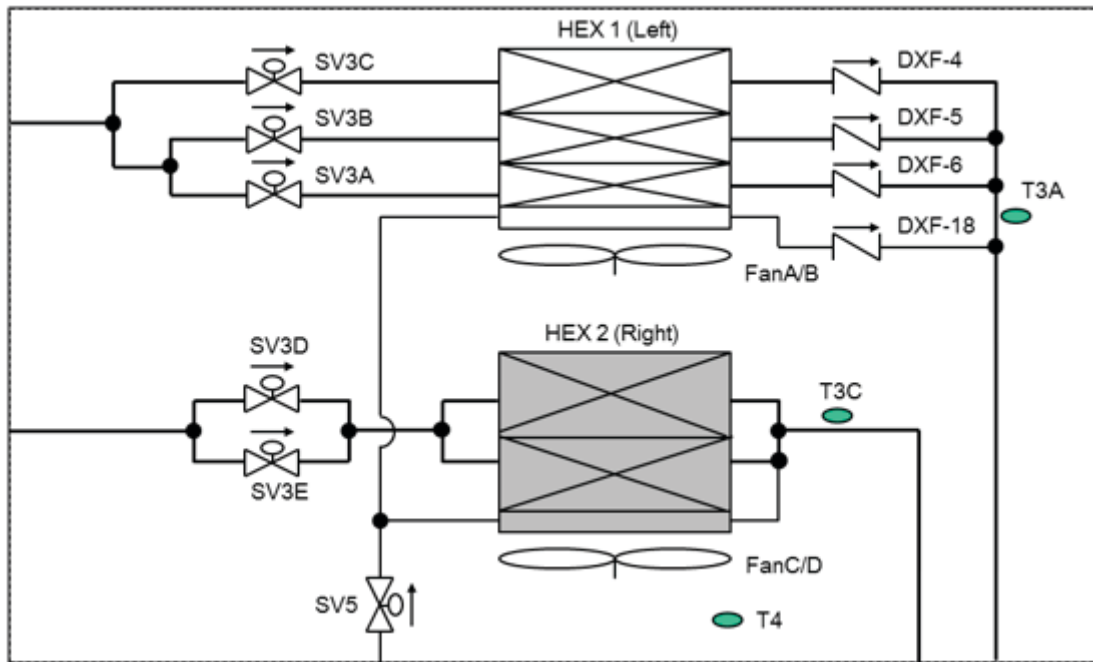


Fig. 113 —38VMA240RDL5-1(6-1), 38VMA264, 288, 312, 336RDS5-1(6-1)

Table 31 —Heat Exchanger Arrangement

OPERATION MODE	STEP	SOLENOID VALVE				
		SV3A	SV3B	SV3C	SV3D	SV3E
Cooling-only	1	ON	ON	ON	ON	ON
	2	ON	OFF	ON	ON	ON
	3	ON	OFF	OFF	ON	ON
	5	OFF	ON	ON	OFF	OFF
	6	OFF	OFF	ON	OFF	OFF
Cooling-main	1	ON	ON	ON	ON	ON
	2	ON	OFF	ON	ON	ON
	3	ON	OFF	OFF	ON	ON
	4	ON	ON	ON	OFF	OFF
	5	OFF	ON	ON	OFF	OFF
	6	OFF	OFF	ON	OFF	OFF
	7	ON	OFF	OFF	OFF	OFF
Heating-only	1	ON	ON	ON	ON	ON
	2	ON	OFF	ON	ON	ON
	3	ON	OFF	OFF	ON	ON
	4	ON	ON	ON	OFF	OFF
	7	ON	OFF	OFF	OFF	OFF
Heating-main	1	ON	ON	ON	ON	ON
	2	ON	OFF	ON	ON	ON
	3	ON	OFF	OFF	ON	ON
	4	ON	ON	ON	OFF	OFF

HEAT EXCHANGER CAPACITY CONTROL

Cooling or Cooling Main Operation

To ensure that high pressure is within the operating range, the following steps are for heat exchanger capacity control.

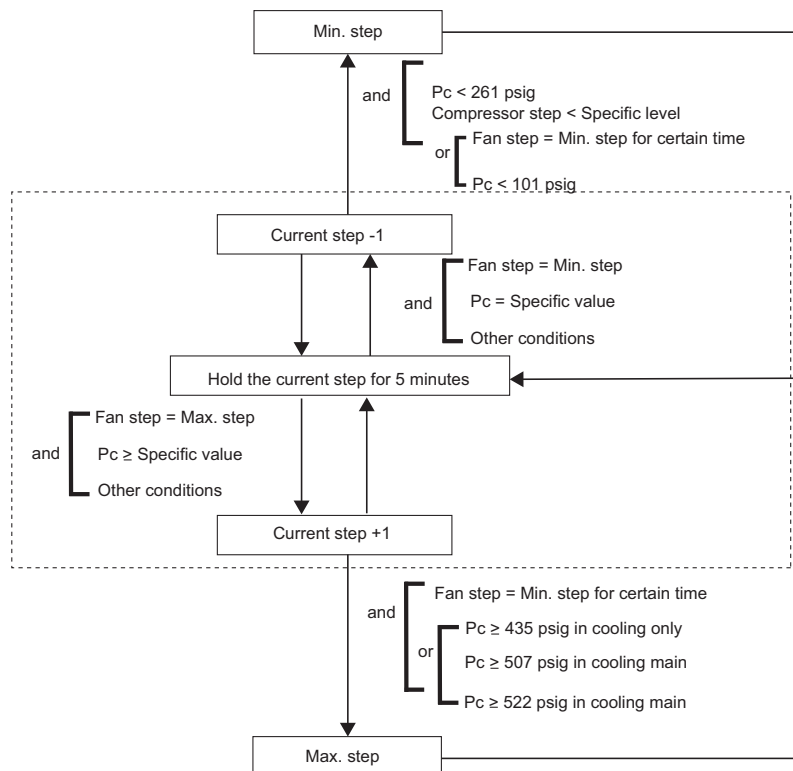


Fig. 114 —Heat Exchanger Capacity Control (Cooling or Cooling Main Operation)

Heating or Heating Main Operation

To ensure that low pressure is within the operating range, the following steps are for heat exchanger capacity control.

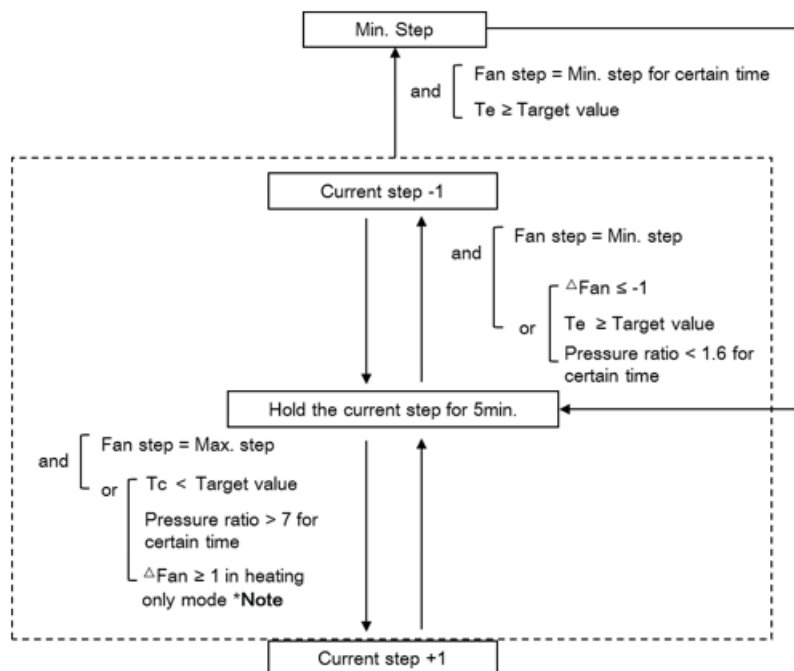


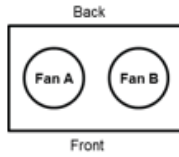
Fig. 115 —Heat Exchanger Capacity Control (Heating or Heating Main Operation)

NOTE: Only for 38VMA240RDL, 264, 288, 312, 336RDS model.

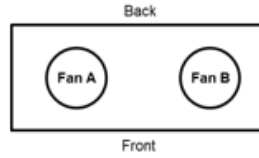
OUTDOOR FAN CONTROL

Depending on the capacity required, the rotational speed of the condenser fan is controlled to ensure target condensing temperature (Tcs) and evaporation temperature (Tes) are met during cooling operation and heating operation.

38VMA072, 096, 120RDS model



38VMA144RDL model
38VMA168, 192, 216, 240RDS model



38VMA240RDL model
38VMA264, 288, 312, 336RDS model

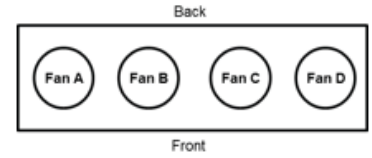


Fig. 116 —Fan Arrangement

Table 32 —Fan step control of 38VMA072, 096, 120RDS Model

STEP	FANA	FANB	REMARKS
	RPM	RPM	
0	0	0	Off Startup or defrosting control
1	150	0	
2	190	0	
3	230	0	
4	270	0	
5	310	0	
6	150	150	
7	170	170	
8	190	190	
9	210	210	
10	235	235	
11	260	260	
12	290	290	
13	320	320	
14	350	350	
15	380	380	
16	410	410	
17	450	450	
18	490	490	
19	540	540	
20	590	590	
21	650	650	
22	710	710	
23	750	750	Standard step* for 38VMA072RDS model
24	830	830	Low static pressure (0.08in.) setting for 38VMA072RDS model Standard step* for 38VMA096RDS model
25	880	880	Low static pressure (0.08in.) setting for 38VMA096RDS model Standard step* for 38VMA120RDS model
26	930	930	Low static pressure (0.08in.) setting for 38VMA120RDS model
27	980	980	
28	1010	1010	
29	1050	1010	
30	1100	1050	Debug
31	1100	1100	

* Maximum step in standard static pressure range (0 in. default).

Table 33 —Fan Step Control of 38VMA144RDL, 38VMA168, 192, 216, 240RDS Model

STEP	FANA	FANB	REMARKS
	RPM	RPM	
0	0	0	Off Startup or defrosting control
1	150	0	
2	170	0	
3	190	0	
4	210	0	
5	230	0	
6	250	0	
7	270	0	
8	150	150	
9	170	170	
10	190	190	
11	210	210	
12	230	230	
13	250	250	
14	270	270	
15	290	290	
16	310	310	
17	330	330	
18	350	350	
19	370	370	
20	400	400	
21	435	435	
22	470	470	
23	510	510	
24	555	555	
25	605	605	
26	655	655	
27	715	715	Standard step* for 38VMA144RDL, 168RDS model
28	780	780	Low static pressure setting (0.08in.) for 38VMA144RDL, 168RDS model Standard step* for 38VMA192RDS model
29	850	850	Low static pressure setting (0.08in.) for 38VMA192RDS model Standard step* for 38VMA216, 240RDS model
30	925	925	
31	1010	1010	Low static pressure setting (0.08in.) for 38VMA216, 240RDS model
32	1050	1010	
33	1100	1050	
34	1100	1100	Debug

* Maximum step in standard static pressure range (0 in. default).

Table 34 —Fan step control of 38VMA240RDL, 38VMA264, 288, 312, 336RDS Model

STEP	FANA	FANB	FANC	FAND	REMARKS
	RPM	RPM	RPM	RPM	
0	0	0	0	0	Off Startup or defrosting control
1	150	0	0	0	
2	190	0	0	0	
3	230	0	0	0	
4	270	0	0	0	
5	310	0	0	0	
6	150	150	0	0	Minimum Fan step when the second compressor is operating
7	170	170	0	0	
8	190	190	0	0	
9	210	210	0	0	
10	235	235	0	0	
11	260	260	0	0	
12	150	150	150	150	Minimum Fan step when the third compressor is operating
13	170	170	170	170	
14	190	190	190	190	
15	210	210	210	210	
16	235	235	235	235	
17	260	260	260	260	
18	290	290	290	290	
19	320	320	320	320	
20	350	350	350	350	
21	380	380	380	380	
22	410	410	410	410	
23	450	450	450	450	
24	490	490	490	490	
25	540	540	540	540	
26	590	590	590	590	
27	650	650	650	650	
28	710	710	710	710	
29	750	750	750	750	
30	830	830	830	830	Standard step* for 38VMA240RDL model
31	880	880	880	880	Low static pressure setting (0.08in.) for 38VMA240RDL model Standard step* for 38VMA264, 288RDS model
32	930	930	930	930	Low static pressure setting (0.08in.) for 38VMA264, 288RDS model Standard step* for 38VMA312, 336RDS model
33	980	980	980	980	Low static pressure setting (0.08in.) for 38VMA312, 336RDS model
34	1010	1010	1010	1010	
35	1010	1050	1010	1050	
36	1050	1100	1050	1100	Debug
37	1100	1100	1100	1100	

* Maximum step in standard static pressure range (0 in. default). It can go up to step 34 if T4 is larger than 106°F.

FAN STEP CONTROL

In cooling or cooling main operation, outdoor fan speed is PI controlled to keep high and low pressure at target pressure.

PI control in cooling/cooling main operation

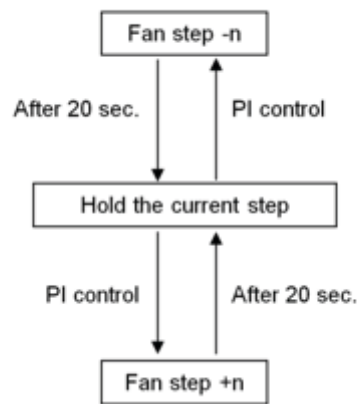


Fig. 117 —Cooling and Cooling Main Operation

n =1 or 2 according to the system states

In heating or heating main operation, outdoor fan speed is controlled by low pressure.

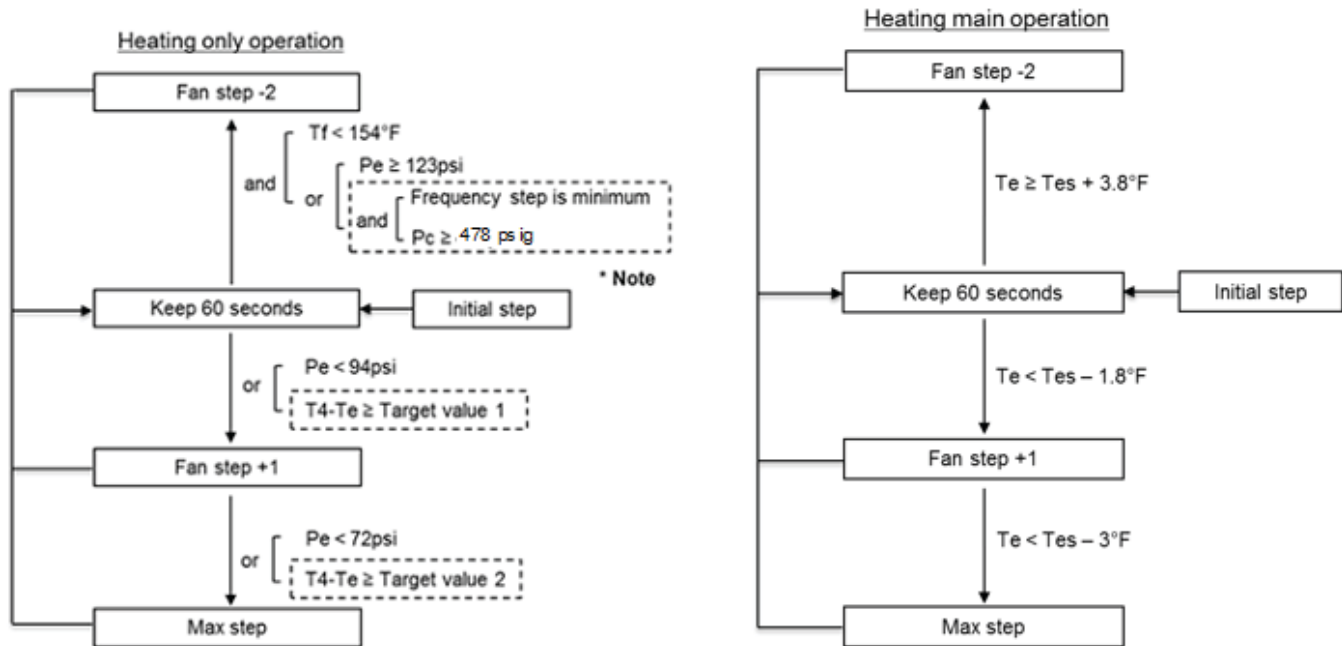


Fig. 118 —Heating and Heating Main Operation

NOTE: Data in the dotted rectangle is just for 38VMA240RDL, 264, 288, 312, and 336RDS models.

OTHER ILLUSTRATIONS

Fans have a two minutes delay operation after the compressors shut down.

Fans often stop at defrosting operation, but it will go to specific step if $P_c \geq 333$ psig.

Special Control

STARTUP CONTROL

Table 35 —Startup Control in Cooling Operation

PART NAME		SYMBOL	BEFORE STARTUP ^{*1}	STARTUP CONTROL		
ODU	Inverter compressor A	INV1	0 Hz	20 Hz for 1 minute	→40Hz if Pc < 376 psig and Pe ≥ 108 psig ←20 Hz if Pc ≥ 359 psig or Pe < 86 psig	→56 Hz if Pc – Pe < 72 psig for 1 minute
	Inverter compressor B	INV2	0 Hz	0 Hz		
	Inverter compressor C	INV3	0 Hz	0 Hz		
	Inverter fan 1	FANA	0 Step	Start: 0 step if T4 < 68°F, 18 step if T4 ≥ 68°F, then adjust by Pc until PI. Adjust: +1 step if Pc > 333 psig and -1 step if Pc < 275 psig		
	Inverter fan 2	FANB				
	Inverter fan 3	FANC				
	Inverter fan 4	FAND				
	Four way valve	ST1	Maintains previous position	OFF		
	Solenoid valve	SV3A	ON	Startup step based on T4 and initial capacity that indoor unit runs		
		SV3B				
		SV3C				
		SV3D				
		SV3E				
		SV4	ON	ON		
		SV5	OFF	OFF		
		SV6/SV8	OFF	OFF		
		SV7	ON	ON if Pc ≥ 493 psig or Pe ≥ 40 psig, else OFF		
MDC	Solenoid valve	SVMC	OFF	Cooling only: ON Cooling main: OFF (Bypass control is effective)		
		SVME	OFF	OFF (Bypass control is effective)		
		SVP	OFF	OFF		
		SVmA-n	OFF	Control based on IDUs' mode (No response for IDU mode change at startup stage)		
		SVmB-n	OFF			
	Electronic expansion valve	EXVA	240 pulse	48 pulse→ +8 pulse per 20 seconds based on high pressure, low pressure or discharge temperature		
		EXVB	240 pulse	240 pulse		
		EXVC	240 pulse	240 pulse		
IDU	Fan	Fan	0 step	Setting speed by owners		
	Electronic expansion valve	EEV	300 pulse (500P EEV) 1200 pulse (2000P EEV)	500P EEV IDU: Maintain 120 pulse for 5 minutes 2000P EEV IDU : Initial pulse (Specific opening between 200 and 400) for 5 minutes, but it will open to specific opening until PI once Pe ≤ 28.5 psig		
Ending conditions*2			60 seconds	End if startup time arrives 10 minutes or the superheat of discharge temp. ≥ 18°F or Tc > 122°F		

LEGEND

1. The period for restarting after stopping is seven minutes when it is necessary to equalize the pressure in the entire system.
2. The startup stage is no less than four minutes because it requires time to heat the oil on the bottom of compressor.

Table 36 —Startup Control in Heating Operation

PART NAME		SYMBOL	BEFORE STARTUP*1	STARTUP CONTROL		
ODU	Inverter compressor A	INV1	0 Hz	20 Hz for 1 minute	→40 Hz if Pc < 376 psig ←20 Hz if Pc ≥ 359 psig	→56Hz if Pc – Pe < 72 psig lasts one minute, or cold startup control*2
	Inverter compressor B	INV2	0 Hz	Generally 0 Hz But at freezing startup control *2, it adjusts frequency by Pe and Pc until PI.		
	Inverter compressor C	INV3	0 Hz			
	Inverter fan 1	FANA	0 Step	Start: 0 step if T4 < 32°F, 18 step if T4 ≥ 32°F, then adjust by Pe and Pc until PI.		
	Inverter fan 2	FANB				
	Inverter fan 3	FANC				
	Inverter fan 4	FAND				
	Four way valve	ST1	Maintains previous position	ON		
	Solenoid valve	SV3A	ON	Startup step based on T4 and initial capacity that indoor unit runs		
		SV3B				
		SV3C				
		SV3D				
		SV3E	ON	ON if Pc ≥ 493 psig or Pe < 40 psig, else OFF		
		SV4				
		SV5				
		SV6/SV8				
MDC	Solenoid valve	SVMC	OFF	OFF (Bypass control is effective)		
		SVME	OFF	OFF (Bypass control is effective)		
		SVP	OFF	Cooperates with EXVA		
		SVmA-n	OFF	Control based on IDUs' mode (No response for IDU mode change at startup stage)		
		SVmB-n	OFF			
	Electronic expansion valve	EXVA	240 pulse	48 pulse→ +8 pulse per twenty seconds based on high pressure or low pressure		
		EXVB	240 pulse	240 pulse		
		EXVC	240 pulse	240 pulse		
IDU	Fan	Fan	OFF	Setting speed by owners		
	Electronic expansion valve	EEV	300 pulse (500P EEV) 1200 pulse (2000P EEV)	500P EEV IDU: 120 pulse for one minute, then 330 pulse for four minutes 2000P EEV IDU : 500 pulse for one minute, then initial opening (Specific opening between 600 and 1400 Pulse) for four minutes		
Ending conditions *3			Sixty seconds	End if the startup stage is ten minutes*2, else Tc > 86°F or DSH ≥ 27°F		

LEGEND

1. The period for restarting after stopping is seven minutes when it is necessary to equalize the pressure in the entire system.
2. Initial start up of ODU in heating mode or stop of ODU after 4 hours of ideal time with ambient temperature below freezing (T4 < 32°F), the ODU will initiate the cold control startup, which requires a minimum of 20 minutes. The compressor frequency step can only vary + or - 1 step per 20 seconds.
3. The startup stage requires six minutes to heat the oil in the compressor.

OIL RETURN CONTROL

Oil Return Operation in Cooling Mode

Below are the conditions when the oil return operation is activated during cooling mode.

1. First oil return operation will occur after 120 minutes from turning the power on to the system.
2. Next oil return operation will occur after 8 hours of cumulative compressor operation time.
3. Based on internal logic, if refrigerant is not returned back to compressor for more than 5 minutes in cooling / cooling main mode.

Table 37 —Oil Return Operation in Cooling Mode

PART NAME		SYMBOL	STEP1	STEP2
ODU	Inverter compressor A	INV1	Fix Tes = min (24.8, T4-5.4)°F	+1 Step if 108 psig ≤ Pe < 333 psig and Pc < 493 psig -1 Step if Pe < 94 psig or > 522 psig
	Inverter compressor B	INV2		
	Inverter compressor C	INV3		
	Inverter fan 1	FANA	Cooling fan control	
	Inverter fan 2	FANB		
	Inverter fan 3	FANC		
	Inverter fan 4	FAND		
	Four way valve	ST1	OFF	
	Solenoid valve	SV3A	ON	
		SV3B		
		SV3C		
		SV3D	ON if outdoor unit model is 38VMA144~336RDS(L)	
		SV3E		
		SV4	ON	
		SV5	OFF	
		SV6/SV8	OFF	
		SV7	OFF	
MDC	Solenoid valve	SVMC	ON	
		SVME	OFF	
		SVP	OFF	
		SVMa-n	ON (Only for Ports that are connected to indoor unit)	
		SVMb-n	OFF	
	Electronic expansion valve	EXVA	0 pulse	Initial 48 pulse → +8 pulse per twenty seconds based on high pressure, low pressure, and discharge temperature.
		EXVB	480 pulse	
		EXVC	480 pulse	
End conditions			Maximum 180 seconds	The compressor discharge volume ≥ Target value for four minutes

COOLING INDOOR UNIT		2000P EEV	500P EEV
FAN	Thermal ON unit	Keep the previous fan speed	
	Thermal OFF unit		
	Stop* or Fan		
Electronic expansion valve (EEV)	Thermal ON unit	Superheat PI control	
	Thermal OFF unit	1200P	300P
	Stop* or Fan	1200P	300P
HEATING INDOOR UNIT (ODU OPERATES COOLING MAIN OPERATIONS)		2000P EEV	2000P EEV
FAN	Thermal ON unit	OFF	
	Thermal OFF unit		
	Stop*		
Electronic expansion valve (EEV)	Thermal ON unit	1504P	480P
	Thermal OFF unit	1504P	480P
	Stop*	1504P	480P

* Includes indoor units that are in error.

Oil Return Operation in Heating Mode

Basically the same as the defrost operation showed below.

DEFROST OPERATION

During low ambient temperature heating operation, the outdoor heat exchanger may be covered by frost, which will reduce heating capacity. The system carries out defrost operation automatically based on the following conditions:

1. $T_e < 28.4^\circ\text{F}$, $T_4 < 68^\circ\text{F}$, and one of the following conditions is met:
 - When there is a drop in the temperature of the outdoor unit heat exchanger outlet to minimum (T_{3A}, T_{3C})
 - When the cumulative operating time after the latest defrost control arrives at a specific time (one hour minimum)
 - When T_c stays in a range for certain amounts of time (twenty minutes minimum)
2. Defrosting or oil return must be set manually after PI control for five minutes (Set n16 by SW4 on the main board or spot check board).

The user can set the difficulties that the ODU activates in the defrosting operation by SW4. If the parameter has been selected as n63, the time to start the defrosting operation may need to be multiplied by 1.1.

This is easy for high humidity areas and difficult for low humidity areas.

Table 38 —SW4 Defrost Operation

SETTINGS	DIFFICULTIES	FACTOR
n61	Easy to activate defrosting operation	0.9
n62	Standard mode (Default)	1.0
n63	Hard to activate defrosting operation	1.1

Table 39 —Defrost Operation Control

PART NAME		SYMBOL	DEFROST OPERATION CONTROL							
			CONTROL BEFORE DEFROST	DEFROST CONTROL	CONTROL AFTER DEFROST					
ODU	Inverter compressor A	INV1	Reduce frequency step	072 ~ 120RDS: 74Hz, upper limit 88Hz 144RDL,168 ~ 240RDS: 74 + 72Hz, upper limit 88 + 86Hz 240RDL, 264~336RDS: 74 + 72 + 70Hz, upper limit 88 + 86 + 84Hz	072 ~ 120RDS: 28Hz 144RDL,168 ~ 240RDS: 28 + 26Hz 240RDL,264 ~ 336RDS: 28 + 26 + 24	072 ~ 120RDS: 48Hz 144RDL,168 ~ 240RDS: 48 + 46Hz 240RDL,264 ~ 336RDS: 28 + 26 + 24Hz then PI adjust				
	Inverter compressor B	INV2								
	Inverter compressor C	INV3								
	Inverter fan 1	FANA	Low pressure control	Initial OFF but 4 Step (10 Step for 144~336RD) or higher if the high pressure is larger than 333 psig.	Low pressure control					
	Inverter fan 2	FANB								
	Inverter fan 3	FANC								
	Inverter fan 4	FAND								
	Four wayvalve	ST1	ON	OFF	OFF	ON				
	Solenoid valves	SV3A SV3B SV3C SV3D SV3E	Heat exchanger capacity control	Defrosting by turn*1	ON	Protect compressor from liquid slugging				
					ON if 144 ~ 336RDS(L)					
					SV4		Follow SV4 logic	ON	ON	ON
					SV5		ON after 120 seconds	ON	ON	Follow SV5 logic
					SV6 SV8		Follow SV6 and SV8 logic	OFF	OFF	Follow SV6 and SV8 logic
		SV7	Holds for 120 seconds. Then ON if Pc-Pe ≥ 72 psig, else OFF	ON if Pc ≥ 493 psig or Pe < 40 psig, else: OFF	ON if Pc – Pe ≥ 72 psig, else OFF	ON				
		MDC	Solenoid valves	SVMC	Follow SVMC logic	ON	ON	OFF		
				SVME	OFF	OFF	OFF	OFF		
	SVP			Action *2 cooperated with EXVA				OFF		
SVmA-n	Ports connected to cooling IDU: ON, Others: OFF			ON	Protect compressor from liquid slugging	Control refer to IDU mode				
SVmB-n	Ports connected to heating IDU: ON, Others: OFF			OFF						
Electronic expansion valve	EXVA		Action *2				240 pulse then PI			
	EXVC		Holds	480 pulse	480 pulse	Specific opening				
	EXVB		Holds	480 pulse	480 pulse	Specific opening				
End conditions			End if Pc – Pe < 72 psig, Maximum 240 seconds	Refer to *3	90 seconds or Pc – Pe < 72 psig for 20 seconds	30 seconds				

*1 Model 072~120RD:

- Defrost the upper heat exchanger section first (SV3C: ON, SV3A/SV3B: OFF)
- Defrost the bottom heat exchanger section second (SV3C: OFF, SV3A/SV3B: ON)

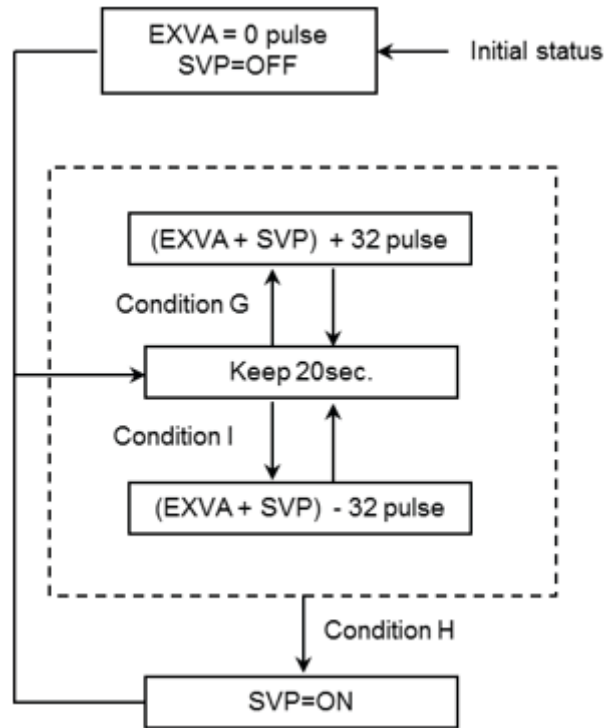
Model 144~336RD:

- Defrost the right heat exchanger first (SV3D/SV3E: ON, SV3A/SV3B/SV3C: OFF)
 - Defrost the left heat exchanger second (SV3D/SV3E: OFF, SV3A/SV3B/SV3C: ON)
- Defrost time for each part has a minimum limitation of one minute.

*2 Refer to the flow chart below.

*3 Defrost control time is no less than 145 seconds and fulfill either of the conditions below.

- $P_c\text{-max} \geq 435 \text{ psi}$
- The total defrost control time has reached ten minutes or T3 (T3A and T3C) > Target value for a certain time.



Condition G/H/I: Related to high pressure, low pressure, pressure ratio, and discharge temperature.

Fig. 119 —Defrost Control Operation

Table 40 —Defrosting Control for Indoor Units (Cooling)

COOLING INDOOR UNIT (ONLY IN HEATING MAIN OPERATION)		2000P EEV			500P EEV		
		< 1 MINUTE	1 to 3 MINUTES	≥ 3 MINUTES	< 1 MINUTE	1 to 3 MINUTES	≥ 3 MINUTES
FAN	Thermal ON unit	Holds			Holds		
	Thermal OFF unit						
	Stop* or Fan						
Electronic expansion valve	Thermal ON unit	800P	800P	1504P	120P	120P	300P
	Thermal OFF unit	800P	800P	1504P	120P	120P	300P
	Stop* or Fan	800P	800P	800P	120P	120P	120P

Table 41 —Defrosting Control for Indoor Units (Heating)

HEATING INDOOR UNIT		2000P EEV			500P EEV		
		< 1 MINUTE	1 to 3 MINUTES	≥ 3 MINUTES	< 1 MINUTE	1 to 3 MINUTES	≥ 3 MINUTES
FAN	Thermal ON unit	OFF			OFF		
	Thermal OFF unit						
	Stop*						
Electronic expansion valve	Thermal ON unit	504P	800P	1504P	72P	120P	300P
	Thermal OFF unit	504P	800P	1504P	72P	120P	300P
	Stop*	800P	800P	800P	120P	120P	120P

* Including indoor units that are in error.

DELAY START CONTROL

In order to prevent frequent ON/OFF of the compressor and to equalize pressure within the system, a delay start of seven minutes is built in at compressor restart. The following table illustrates operations of different parts when the system has delay start.

Table 42 —Delay Start Control

PART NAME		SYMBOL	DELAY START CONTROL
ODU	Inverter compressor A	INV1	OFF
	Inverter compressor B	INV2	
	Inverter compressor C	INV3	
	Inverter fan 1	FANA	OFF after 2 minutes
	Inverter fan 2	FANB	
	Inverter fan 3	FANC	
	Inverter fan 4	FAND	
	Four way valve	ST1	Holds
	Solenoid valves	SV3A	OFF after 2 minutes
		SV3B	
		SV3C	
		SV3D	
		SV3E	ON for four minutes, then OFF
		SV4	
		SV5	
	Electronic expansion valves	SV6/SV8	ON (Maximum fifteen minutes if thermal OFF), then OFF
		SV7	OFF for one minute → ON for three minutes → OFF
MDC	Solenoid valves	SVMC	OFF
		SVME	OFF
		SVP	OFF
		SVmA-n	OFF after 3 minutes
		SVmB-n	
	Electronic expansion valves	EXVA	240 pulse
		EXVB	240 pulse
		EXVC	240 pulse
IDU	Fan	Fan	Low speed for 40 seconds, then OFF
	Electronic expansion valve	EEV	Open to 1200 pulse (2000P EEV) or 300 pulse (500P EEV) after 3 minutes

CRANKCASE HEATER CONTROL

During ideal or defrost operation, to prevent the refrigerant from condensing in the compressor crankcase, this control is used to heat the refrigerant.

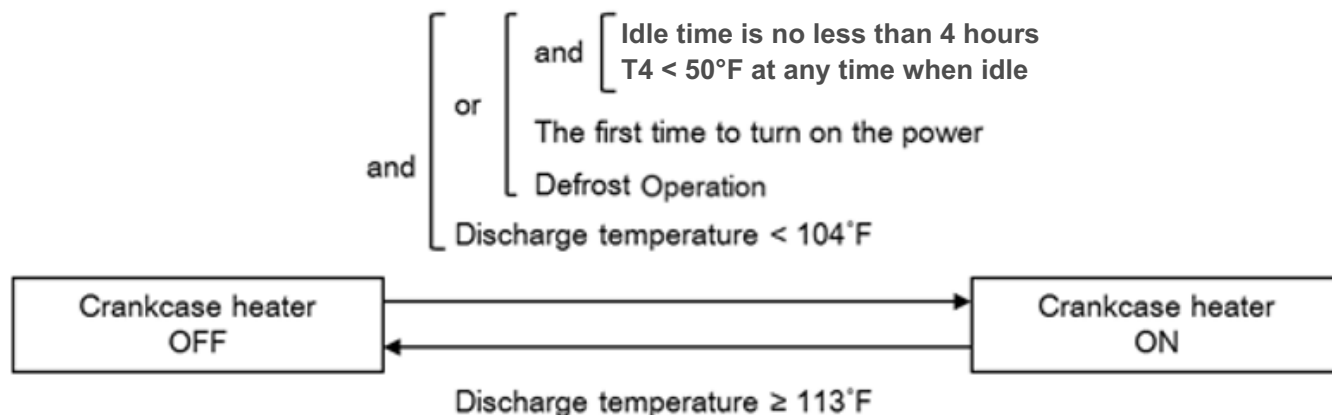


Fig. 120 —Crankcase Heater Control

OVERLOAD CONTROL

When the operational capacity of indoor units is greater than 120%, low airflow operation is enforced for all running indoor units. The system will go back to normal control once operational capacity of indoor units is less than 105%.

BYPASS CONTROL

Operating sequence of solenoid valves used to equalize pressure between high and low side of the refrigerant system is as follows:

Table 43 —SV7 in ODU

OPERATION	SV7 in ODU (ON = Open, OFF = Closed)	
	ON	OFF
High pressure (Pc) protection	When Pc is > 536 psig	When Pc is < 493 psig and SV7 has opened for 5 minutes
Low pressure (Pe) and liquid slugging protection	SV7 has closed for 5 minutes and the T7C1(2)(3) <194°F. - Pe < 34psig or DSH < 18°F for 15 minutes - Tc > 133°F with INV = 20Hz in heating operation	Pe ≥ 29ps and meet any of the following conditions: - T7C1(2)(3) ≥ 194°F for 2 minutes - DSH ≥ 27°F and Tc < 127°F

Table 44 —SV5 in ODU

OPERATION	SV5 in ODU (ON = Open, OFF = Closed)	
	ON	OFF
High pressure (Pc) protection in heating operation	When Pc is > 536 psig	Pe ≥ 33 psig and meet any of the following conditions: - Pc < 478 psig lasts 10 minutes - Pc < 435 psig lasts 3 minutes

Table 45 —SVMC in MDC

OPERATION	SVMC in MDC (ON=Open, OFF=Closed)	
	ON	OFF
High pressure protection in cooling main operation	When Pc or PS1 is > 536 psig	There is at least one thermal ON heating IDU in the entire system. All others are below 478 psig, including Pc and PS1.
High pressure protection in heating main operation	When Pc or PS1 is > 565 psig	

Table 46 —Bypass Solenoid Valve (SVME in MDC)

Operation	SVME in MDC (ON = Open, OFF = Closed)	
	ON	OFF*2
Protection in cooling main operation	Either of the following conditions: • Pc or PS1 is > 551 psig. • Pe < 30 psig • T7C1(2)(3) ≥ 221°F*1	Both Pc and PS1 are below 478 psig respectively. Extra points for 40VMD016ML-3 Pe ≥ 40 psig and T7C1(2)(3) < 185°F*1
Protection in heating operation	Meet any of the following conditions: • Pc or PS1 is > 551 psig. • Pe • < 30 psig • Other conditions showing below 40VMD016ML-3 T4 - Te ≥ 57.6°F or T7C1(2)(3) ≥ 212°F Other condition T7C1(2)(3) ≥ 203°F or PI control with DSH ≥ 81°F, but EXVA and SVP have the maximum opening.	40VMD016ML-3 PI control with SVP and EXVA Other condition Fulfill all conditions below in heating main or heating only operation to close SVME. • Pc and PS1 is below 478 psig • Pe ≥ 40 psig • T7C1(2)(3) < 185°F • EXVA < 125 pulse and SVP is open.

1. Only applicable to 40VMD016ML-3.
2. OFF when cooling only operation.

PUMP-DOWN CONTROL

Recover Refrigerant to Outdoor Unit

In order to recover the refrigerant from the indoor units and MDC before performing any service, the pump down operation is as follows:

1. Ensure that the high pressure shutoff valve has been fully closed and the low pressure shutoff valve is open.
2. Press MENU for five seconds to enter the parameter setting screen.
3. Press “Up/Down” to select “n 21” and press OK to confirm.
The LED displays r001 to activate this control.

Table 47 —Recover Refrigerant to Outdoor Unit

PART NAME		SYMBOL	STARTUP CONTROL	NORMAL CONTROL	PUMP DOWN
ODU	Inverter compressor A	INV1	Refer to startup control in cooling operation	Tes = 5°F Upper limit: 10 Step	6 Step
	Inverter compressor B	INV2			
	Inverter compressor C	INV3		Cooling normal control	Follow fan operation logic
	Inverter fan 1	FANA			
	Inverter fan 2	FANB			
	Inverter fan 3	FANC			
	Inverter fan 4	FAND		OFF	OFF
	Four way valve	ST1			
	Solenoid valves	SV3A		Cooling only normal control	ON
		SV3B			
		SV3C			ON if outdoor unit model is 38VMA144 ~ 336RDS(L)
		SV3D			
		SV3E			OFF
		SV4			
		SV5			Keep
		SV6/SV8			OFF
		SV7			OFF
MDC	Solenoid valves	SVMC		Control based on cooling only mode	Control based on cooling only mode
		SVME			
		SVP			
		SVmA-n			
		SVmB-n			
	Electronic expansion valves	EXVA			
		EXVB			
		EXVC			
IDU	Fan	Fan		High speed	High speed
	Electronic expansion valves	EEV		Forced cooling opening	Forced cooling opening
End conditions				30 minutes or Pe < 43 psig	Meet any of the following conditions: • This operation has passed 5 minutes • Pe < 28.5 psig • T7C_Max ≥ 221°F • Pc ≥ 478 psig

Recover Refrigerant to Indoor Units and MDC Units

In order to recover the refrigerant from the outdoor unit to indoor units, MDC units, and connection pipes, the pump-down operation is as follows:

1. Ensure that the low pressure shutoff valve has been fully closed and the high pressure shutoff valve is open.
2. Press MENU for five seconds to enter the parameter setting screen.
3. Press “Up/Down” to select “n 22” and OK to confirm.

The LED displays r002 to activate this control.

Table 48 —Recover Refrigerant to Indoor Units and MDC Units

PART NAME		SYMBOL	STARTUP CONTROL	NORMAL CONTROL	PUMP DOWN
ODU	Inverter compressor A	INV1	Refer to startup control in heating operation	Tcs = 109.4°F Upper limit: 10 Step	6 Step
	Inverter compressor B	INV2			
	Inverter compressor C	INV3			
	Inverter fan 1	FANA		Heating normal control	Follow fan operation logic
	Inverter fan 2	FANB			
	Inverter fan 3	FANC			
	Inverter fan 4	FAND			
	Four way valve	ST1		ON	ON
	Solenoid valve	SV3A		Heating only normal control	ON if outdoor unit model is 38VMA144 ~ 336RDS(L) OFF Keep ON OFF
		SV3B			
		SV3C			
		SV3D			
		SV3E			
		SV4			
		SV5			
		SV6/SV8			
		SV7			
MDC	Solenoid valve	SVMC	Control based on heating only mode	Control based on heating only mode	
		SVME			
		SVP			
		SVmA-n			
		SVmB-n			
	Electronic expansion valve	EXVA			
		EXVB			
		EXVC			
IDU	Fan	Fan	High speed	High speed	
	Electronic expansion valve	EEV	Forced heating opening	Forced heating opening	
End conditions			30 minutes or Pe < 16 psig	Meet any of the following conditions: • This operation has passed five minutes • Pe < 28.5 psig • T7C_Max ≥ 221°F • Pc ≥ 478 psig	

Recover Refrigerant to External Storage Tank (During Pump Down)

This control is used to open solenoid valves and electronic expansion valves in the entire system.

1. Make sure that the high pressure shutoff valve and low pressure shutoff valve are all fully open.
2. Press MENU for five seconds to enter the parameter setting screen.
3. Press “Up/Down” to select “n 23” and OK to confirm.

The LED displays r003 to activate this control.

Remarks

- During external storage tank refrigerant recovery, the high/low pressure sensor and low pressure protection should be shorted.
- The 4-way valve is OFF, and compressors or fans should not be running.

Protection Control

HIGH PRESSURE PROTECTION CONTROL

High pressure protection control is used to prevent high pressures in the system and protect the compressor.

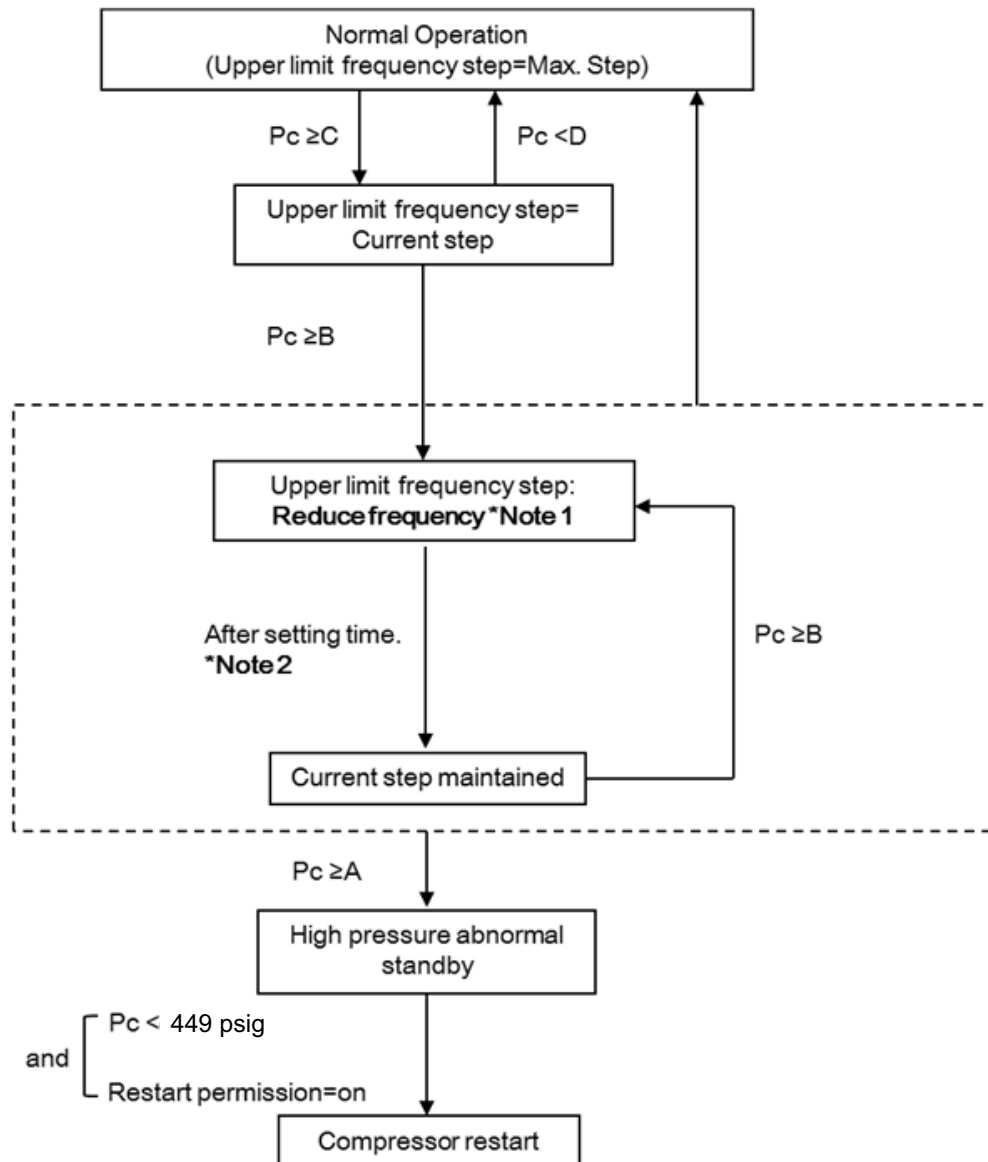


Fig. 121 —High Pressure Protection Control (Cooling Operation)

NOTE: Pc is the pressure value detected by the high pressure sensor.

VALUE SETTING	NORMAL PROTECTION	WITH LARGE HEIGHT DIFFERENCE SIGNAL *NOTE 3
A	579.6 psig	579.6 psig
B	521.63 psig	463.6 psig
C	507.1 psig	449.1 psig
D	492.6 psig	434.6 psig

***NOTE 1:**

2 Step: For 38VMA072~120RDS, 144RDL, 164~240RDS models

3 Step: For 38VMA240RDL, 264~336RDS models

***NOTE 2:**

15 Seconds: For 38VMA072~120RDS, 144RDL, 164~240RDS models

10 Seconds: For 38VMA240RDL, 264~336RDS models

***NOTE 3:**

Signal from MDC on the condition that outdoor unit is above indoor units

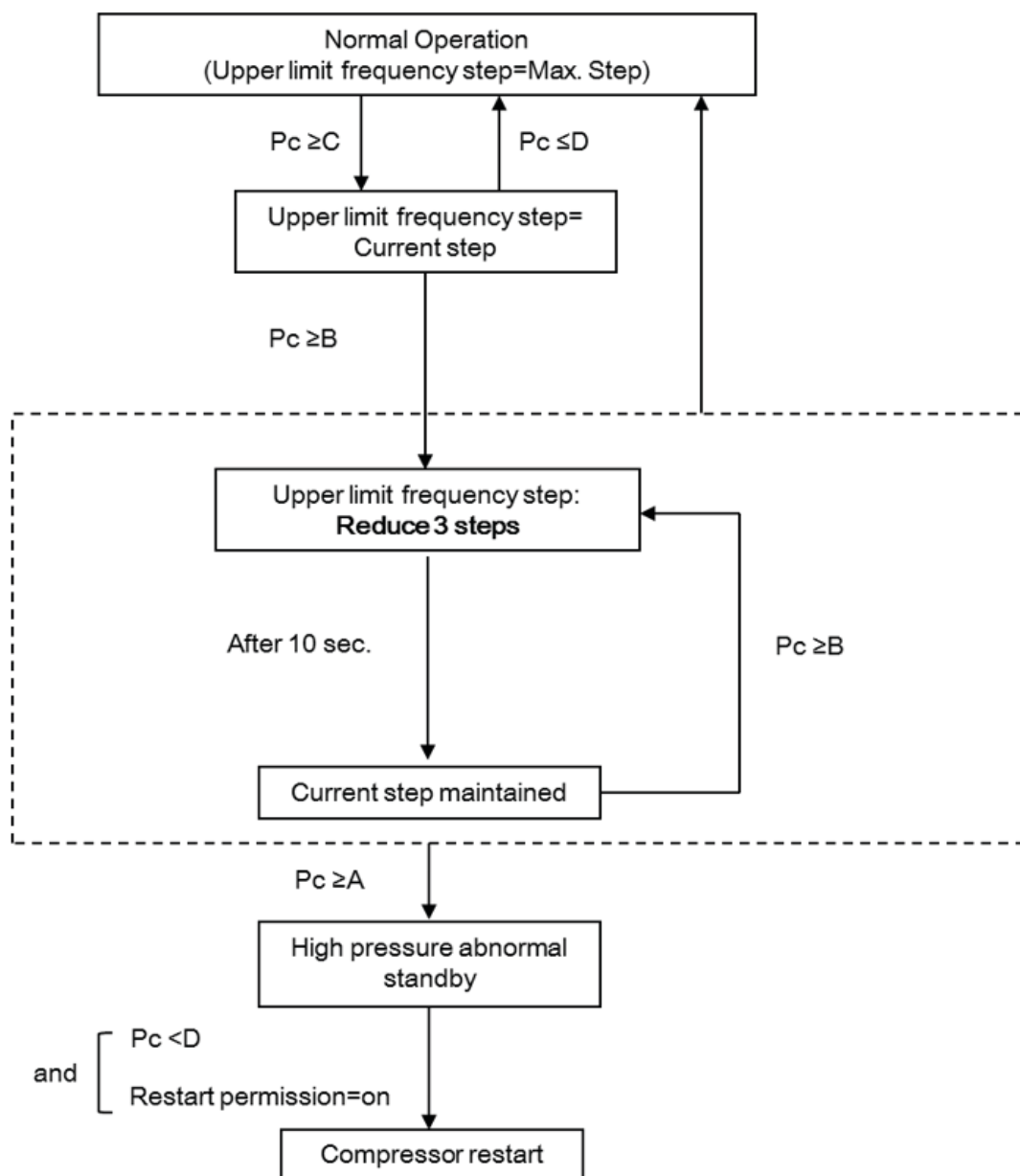


Fig. 122 —High Pressure Protection Control (Heating Operation)

NOTE: Pc is the pressure value detected by the high pressure sensor.

VALUE SETTING	NORMAL PROTECTION
A	579.6 psig
B	492.6 psig
C	478.1 psig
D	463.6 psig

LOW PRESSURE PROTECTION CONTROL

Low pressure protection control is used to detect low pressures in the system and protect the compressor.

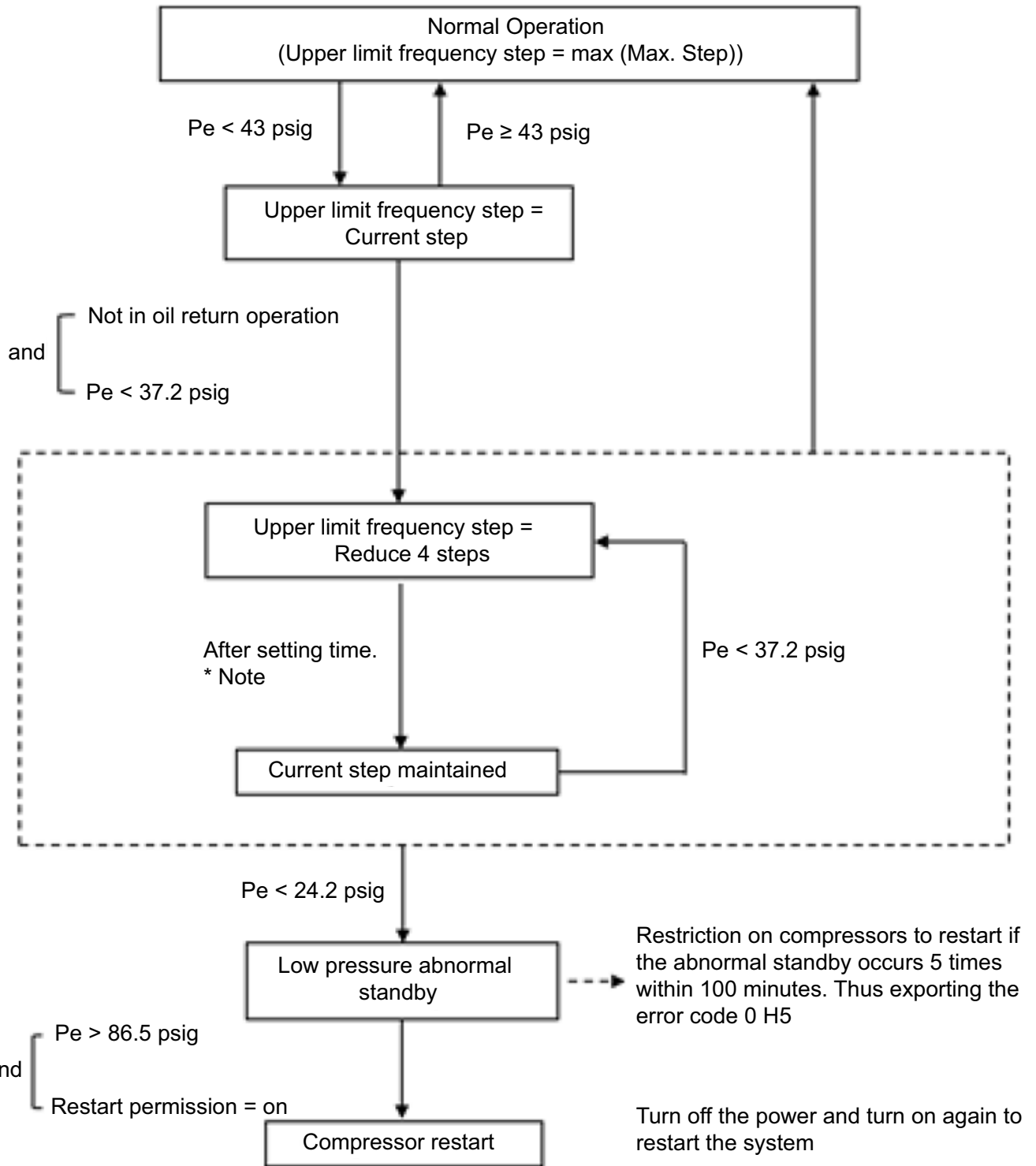


Fig. 123 —Low Pressure Protection Control (Cooling Operation)

NOTES:

P_e is the pressure value detected by the low pressure sensor.

15 Seconds: For 38VMA072~120RDS, 144RDL, 164~240RDS models

10 Seconds: For 38VMA240RDL, 264~336RDS models

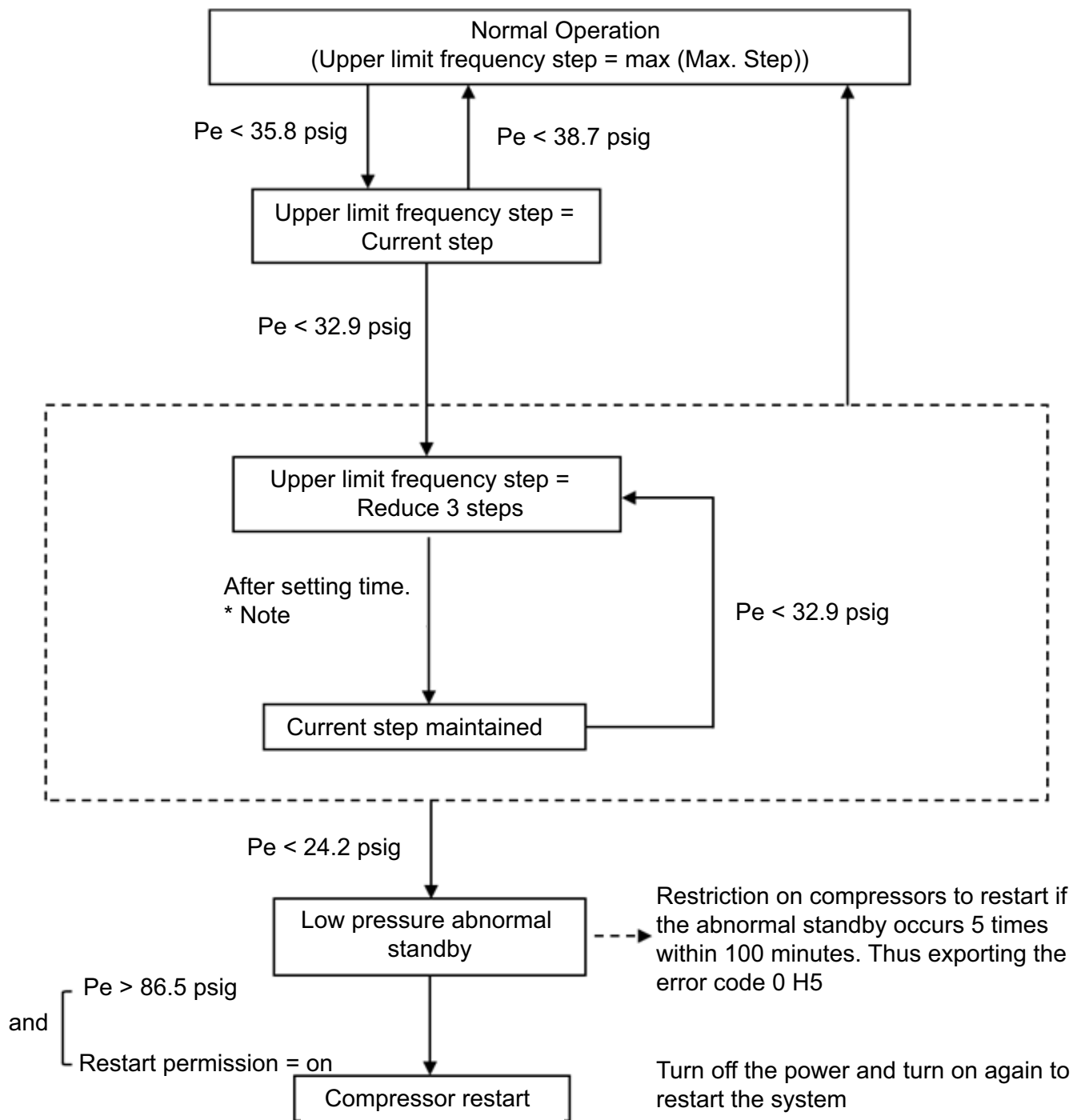


Fig. 124 —Low Pressure Protection Control (Heating Operation)

NOTES:

Pe is the pressure value detected by the low pressure sensor.

15 Seconds: For 38VMA072~120RDS, 144RDL, 164~240RDS models

10 Seconds: For 38VMA240RDL, 264~336RDS models

DISCHARGE TEMPERATURE PROTECTION CONTROL

The discharge temperature protection control is used to protect the compressor internal temperature against any abnormal increase of discharge pipe temperature.

The following control is performed for each compressor. T7C_max indicates the maximum value within T7C1, T7C2, and T7C3.

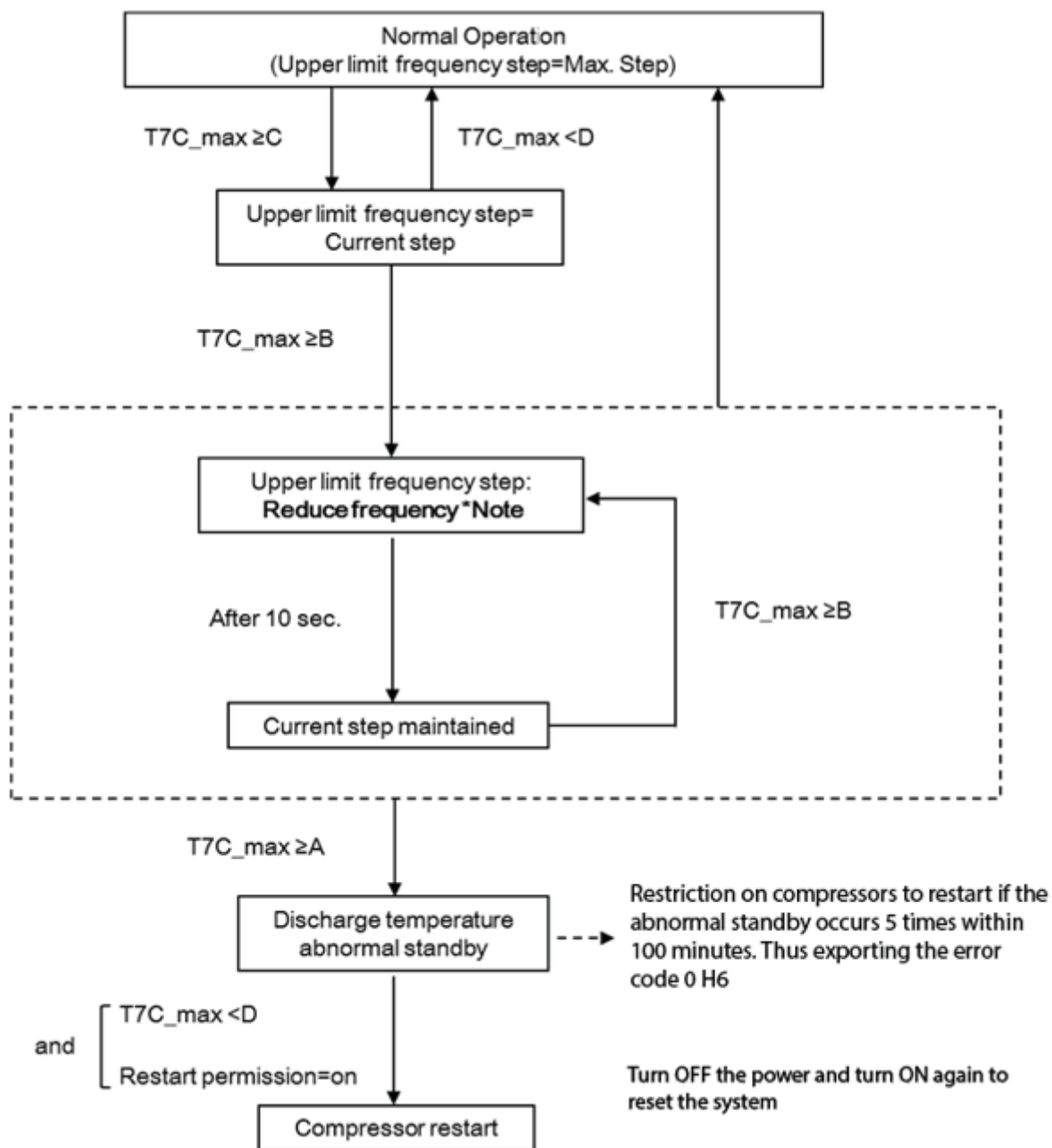


Fig. 125 —Discharge Temperature Protection Control

VALUE SETTING	COOLING	HEATING
A	239°F	239°F
B	212°F	212°F
C	203°F	203°F
D	194°F	194°F

NOTES:

2 Step: For 38VMA072~120RDS, 144RDL, 164~240RDS models

3 Step: For 38VMA240RDL, 264~336RDS models

INVERTER OVER-CURRENT PROTECTION CONTROL

Inverter current protection control is to prevent tripping due to over-current. In a multi-compressor-unit system, each INV compressor performs this control in the following sequence.

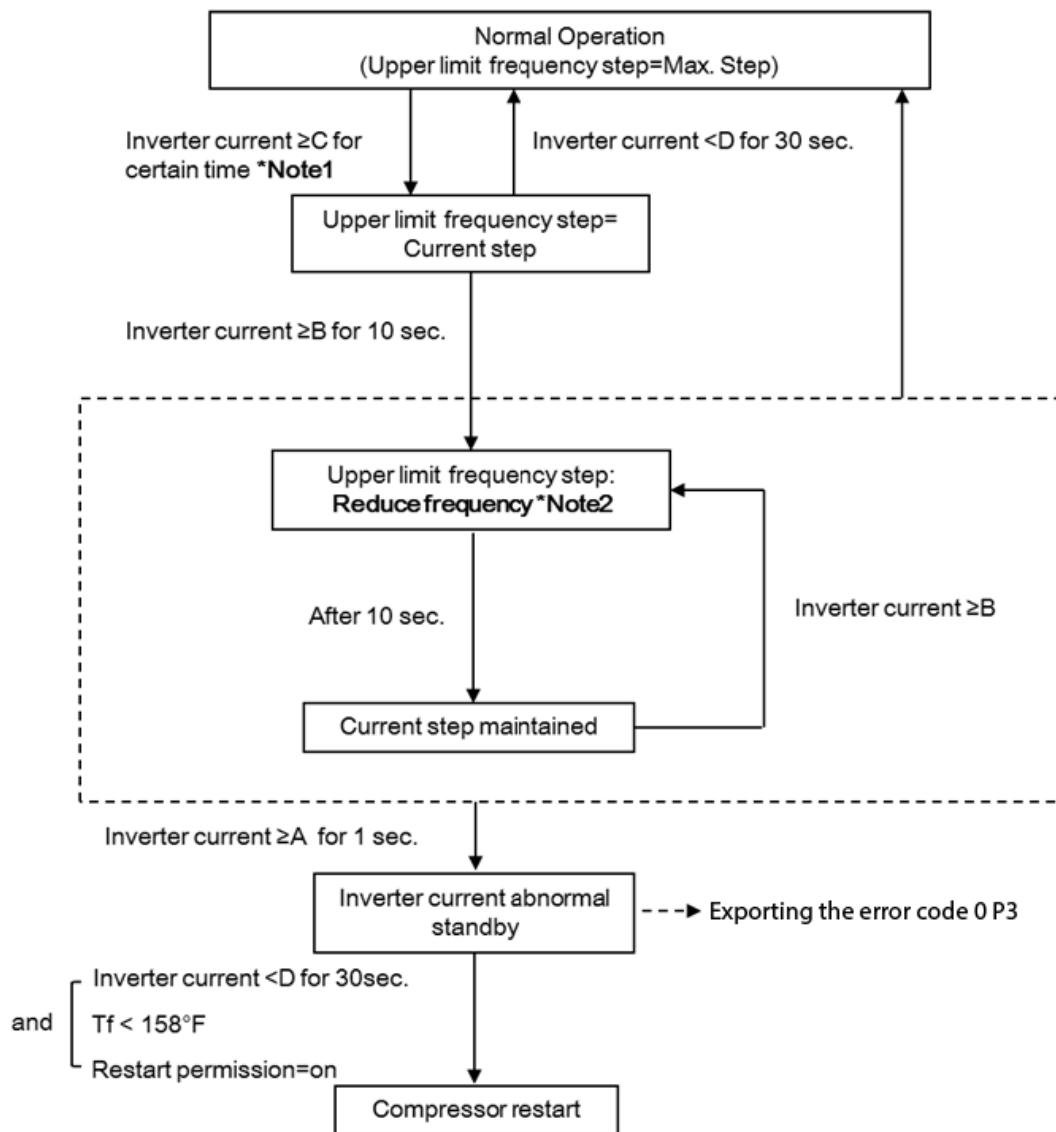


Fig. 126 —Inverter Over-Current Protection Control

VALUE SETTINGS	38VMA072~336RDS(L)5-1	38VMA072~336RDS(L)6-1
A	38A	22A
B	35A	19A
C	34A	18A
D	32.5A	17A

NOTE 1:

10 Seconds: For 38VMA072~120RDS, 144RDL, 164~240RDS models

0 Seconds: For 38VMA240RDL, 264~336RDS models

NOTE 2:

2 Step: For 38VMA072~120RDS, 144RDL, 164~240RDS models

3 Step: For 38VMA240RDL, 264~336RDS models

INVERTER MODULE TEMPERATURE PROTECTION CONTROL

Inverter module temperature T_f (T_{f1} , T_{f2} and T_{f3}) protection control is performed to prevent tripping due to an abnormal increase in temperature. If there is a multi-compressor-unit system, each INV compressor performs this control in the following sequence.

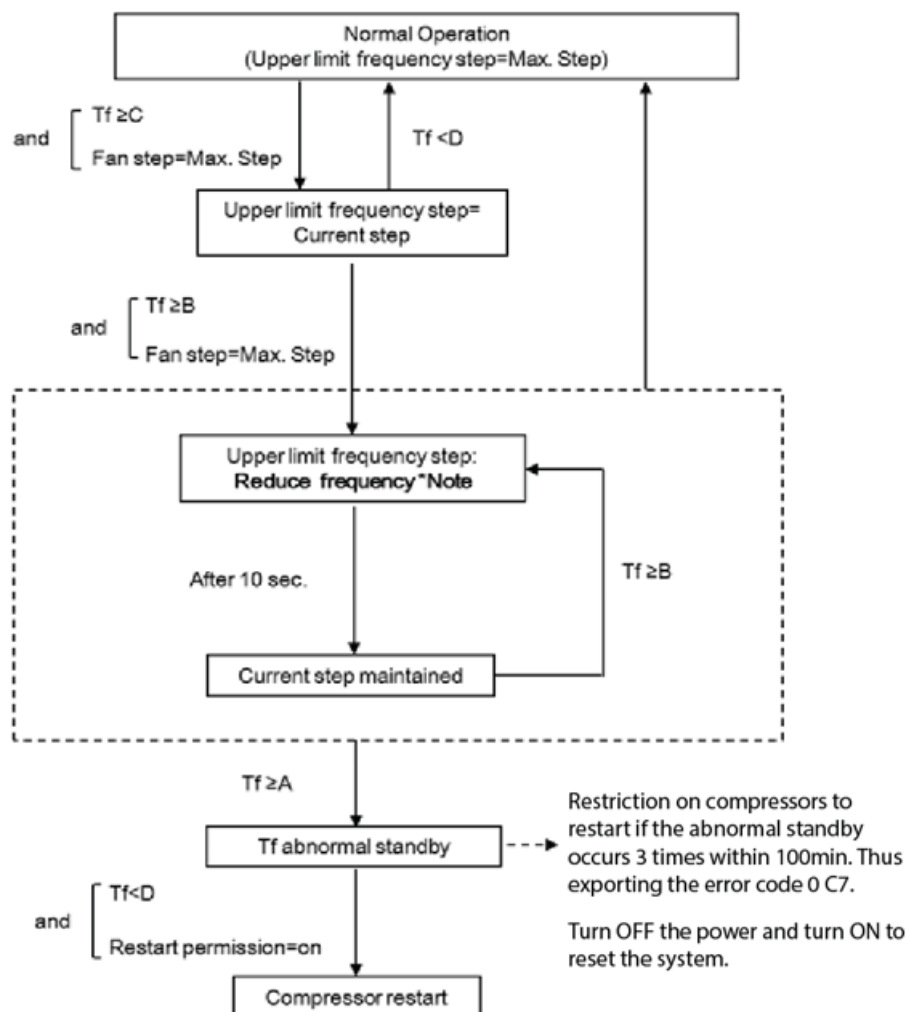


Fig. 127 —Inverter Module Protection Control

VALUE SETTING	38VMA072~336RDS(L)
A	172°F
B	167°F
C	163°F
D	158°F

NOTES:

2 Step: For 38VMA072~120RDS, 144RDL, 164~240RDS models

3 Step: For 38VMA240RDL, 264~336RDS models

LIQUID SLUGGING PROTECTION CONTROL

This protection is used to prevent the damage to compressor due to excessive liquid slugging. When $T_7 - T_e < 7.2^\circ\text{F}$ and $\text{DSH} < 10.8^\circ\text{F}$ for 30 minutes, the liquid slugging protection timer will be on. If the situation continues for 60 minutes, the system will display 0PP error code. The main board restricts compressors to restart if the 0PP error code occurs twice within 200 minutes, the system will display 0F0 error code. Switching OFF the power and turning it on again will reset the system. The liquid slugging timing will be cleared immediately if $\text{DSH} \geq 18^\circ\text{F}$ or $T_7 - T_e > 9^\circ\text{F}$.

LEGEND

DSH: Superheat of discharge temperature

HIGH PRESSURE RATIO PROTECTION CONTROL

High pressure ratio protection control is used to detect high pressures ratio in the system and protect the compressor.

$$\text{Pressure Ratio} = (P_c + 14.5) / (P_e + 14.5)$$

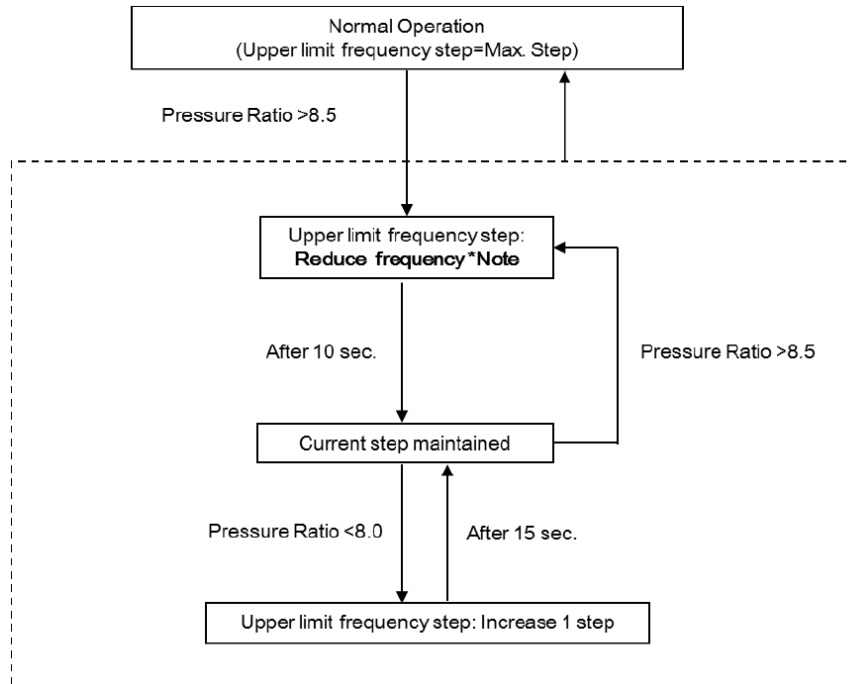


Fig. 128 —High Pressure Ratio Protection Control

NOTES:

2 Step: For 38VMA072~120RDS, 144RDL, 164~240RDS models

3 Step: For 38VMA240RDL, 264~336RDS model

VOLTAGE PROTECTION CONTROL

38VMA072~336RDS(L)5-1 voltage protection control is to prevent tripping due to abnormal voltage.

38VMA072~336RDS(L)6-1 does not have any frequency limits caused by abnormal voltage.

The outdoor unit will shut down with error “E5” if the voltage is beyond $\pm (12\sim17)\%$ of the nominal value.

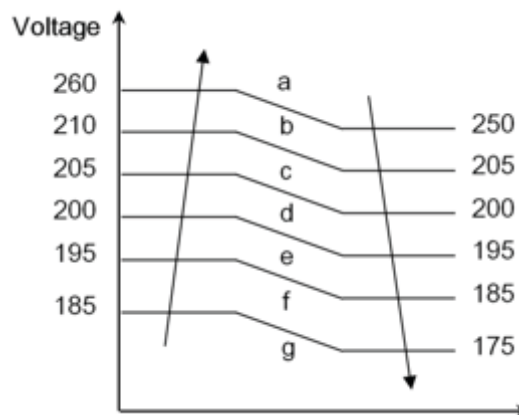


Table 49 —Voltage Protection Control

Level	38VMA072~120RDS5-1	38VMA144RDL5-1 38VMA168~240RDS5-1	38VMA240RDL5-1 38VMA264~336RDS5-1
a	E5		
b	Normal control		
c			
d	31 step	75 step	116 step
e	26 step	65 step	101 step
f	21 step	54 step	86 step
g	E5		

Other Controls

SNOW BLOWING CONTROL

Purpose: To prevent ice from building up on condenser fan of the ODU.

Activation Condition:

Press the SW5 button on the spot check box of the outdoor unit to enter the snow-blowing function.

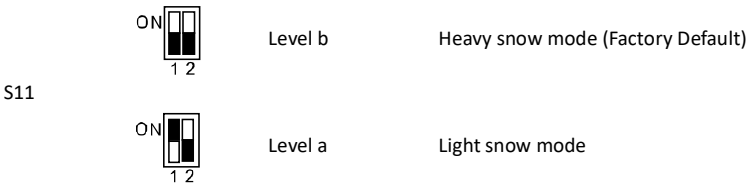
It will display Sn0 for 15 seconds.

Once the snow-blowing function is activated, the outdoor unit fan will rotate at 15th step for 2 minutes before stopping. The unit will initiate the timer (TA) based on the interval selected. Once the interval time is satisfied and $T4 < 37^{\circ}\text{F}$, the condenser fan will run for 2 minutes to clear any snow build up. If the interval time is satisfied and $T4 > 37^{\circ}\text{F}$, the condenser fan will run using normal operating logic.

NOTE: If the unit receives a startup signal, it will exit the snow blowing function.

ODU MODEL	FAN STEP	FAN RPM	TA: LEVEL A	TA: LEVEL B
38VMA072~120RDS	15	380 + 380	30 minutes	15 minutes
38VMA144RDL, 38VMA168~240RDS		290 + 290		
38VMA240RDL, 38VMA264~336RDS		210 + 210 + 210 + 210		

NOTE: Select TA from Dip Switch “S11” of spot check board.



Deactivate Condition:

Press the SW5 button for fifteen seconds again to exit the snow-blowing function.

It will display Sn1 for fifteen seconds.

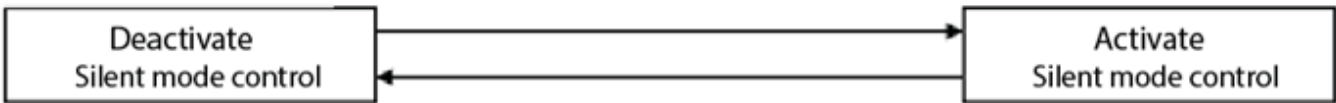
SILENT MODE

The silent mode has three different setting:

1. Night silent mode
2. Silent mode
3. Super silent mode

When silent mode is activated, the top condenser fan step and top compressor frequency step are limited.

- and
- One of the silent modes has been activated on outdoor unit.
 - The compressor frequency is greater than or equal to 6th step.
 - It has passed 30min since the latest silent mode control.



- or
- The outdoor unit shuts down.
 - The frequency step of compressor is minimum.

Fig. 129 —Silent Mode

Table 50 —Silent Modes (Cooling)

COOLING	NIGHT SILENT MODE *		SILENT MODE		SUPER SILENT MODE	
	MAXIMUM FAN STEP	MAXIMUM FREQUENCY STEP	MAXIMUM FAN STEP	MAXIMUM FREQUENCY STEP	MAXIMUM FAN STEP	MAXIMUM FREQUENCY STEP
072RDS	Standard step -3	28 step	Standard step -3	28 step	Standard step -5	25 step
096RDS	Standard step -3	31 step	Standard step -3	31 step	Standard step -5	26 step
120RDS	Standard step -3	31 step	Standard step -3	31 step	Standard step -5	26 step
144 ~ 168RDS(L)	Standard step -3	75 step	Standard step -3	75 step	Standard step -7	66 step
192RDS	Standard step -3	78 step	Standard step -3	78 step	Standard step -7	70 step
216 ~ 240RDS	Standard step -3	78 step	Standard step -3	78 step	Standard step -7	74 step
240RDL	Standard step -2	110 step	Standard step -2	110 step	Standard step -5	98 step
264 ~ 288RDS	Standard step -3	113 step	Standard step -3	113 step	Standard step -6	98 step
312 ~ 336RDS	Standard step -3	116 step	Standard step -3	116 step	Standard step -6	101 step

Table 51 —Silent Modes (Heating)

HEATING	NIGHT SILENT MODE *		SILENT MODE		SUPER SILENT MODE	
	MAXIMUM FAN STEP	MAXIMUM FREQUENCY STEP	MAXIMUM FAN STEP	MAXIMUM FREQUENCY STEP	MAXIMUM FAN STEP	MAXIMUM FREQUENCY STEP
072RDS	Standard step -3	32 step	Standard step -3	32 step	Standard step -5	27 step
096RDS	Standard step -3	34 step	Standard step -3	34 step	Standard step -5	29 step
120RDS	Standard step -3	35 step	Standard step -3	35 step	Standard step -5	31 step
144 ~ 168RDS(L)	Standard step -3	76 step	Standard step -3	76 step	Standard step -7	68 step
192RDS	Standard step -3	80 step	Standard step -3	80 step	Standard step -7	72 step
216 ~ 240RDS	Standard step -3	84 step	Standard step -3	84 step	Standard step -7	80 step
240RDL	Standard step -2	119 step	Standard step -2	119 step	Standard step -5	104 step
264 ~ 288RDS	Standard step -3	122 step	Standard step -3	122 step	Standard step -6	107 step
312 ~ 336RDS	Standard step -3	125 step	Standard step -3	125 step	Standard step -6	110 step

NOTE:

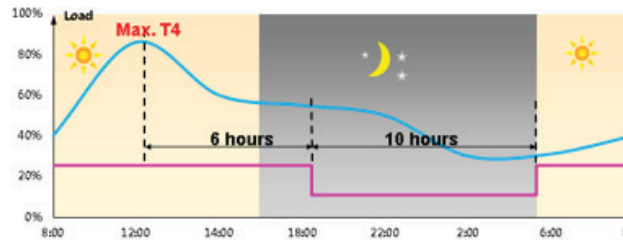
Press SW4 button on spot check box of the outdoor unit to enter setting parameter screen.

Scroll UP or Down button to go to night time setting "n4_".

Select one of the options from the below table and press OK to confirm.

Table 52 —Menu Button n4_

NIGHTTIME SETTING	AFTER THE HIGHEST T4 AT DAYTIME/NIGHT SILENT TIME
n41	6/10h (Default)
n42	6/12h
n43	8/10h
n44	8/12h



DEMAND CONTROL

Demand control saves the power consumption in heating operation resulting in a decrease of heating capacity. To enter this control, set "n7_" by the menu button on main board or spot check board.

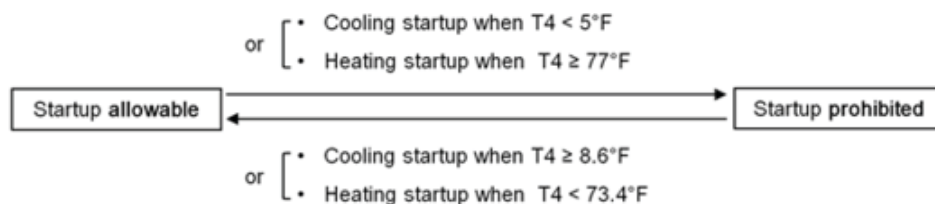
Table 53 —Demand Control Levels

OUTDOOR AIR TEMPERATURE	LEVEL 1 (DEFAULT)	LEVEL 2	LEVEL 3	LEVEL 4	LEVEL 5	LEVEL 6
to 5°F	100%	100%	100%	100%	100%	100%
6°F to 15°F	100%	100%	100%	100%	100%	90%
16°F to 25°F	100%	100%	100%	100%	90%	80%
26°F to 35°F	100%	100%	100%	90%	80%	70%
36°F to 45°F	100%	100%	90%	80%	70%	70%
46°F to 55°F	100%	90%	80%	70%	70%	70%
56°F to 65°F	100%	80%	70%	70%	70%	70%
66°F to 75°F	100%	70%	70%	70%	70%	70%
Larger than 75°F	100%	70%	70%	70%	70%	70%

DEMAND CONTROL SETTING	DEMAND LEVEL
n71	Level 1 (Default)
n72	Level 2
n73	Level 3
n74	Level 4
n75	Level 5
n76	Level 6

OPERATION LIMITS CONTROL

Ambient temperature (T4) will determine the startup operation of the compressor in a given mode.



To maintain the system reliability:

- The ODU will shut down if $T4 > 131^{\circ}\text{F}$ when cooling or cooling main is the main operation.
- The ODU can operate in heating mode only when the ambient temperature is less than 5°F .
- For 38VMA240RDL and 264~336RDS models, there is a minimum operating capacity of 30% for cooling start when $5^{\circ}\text{F} \leq T4 \leq 14^{\circ}\text{F}$.

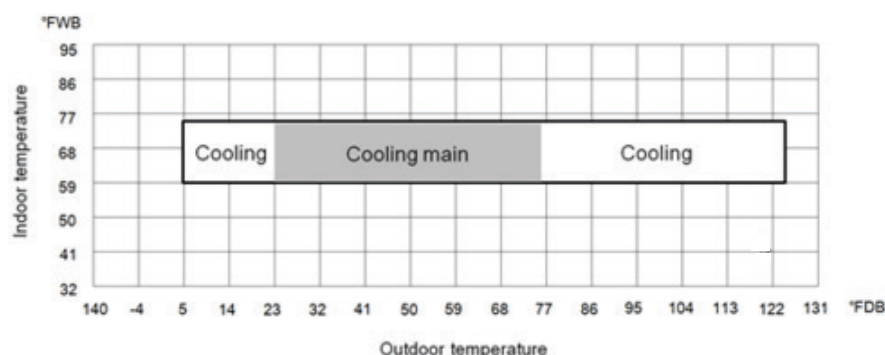


Fig. 130 —Operation Limits Control (Cooling)

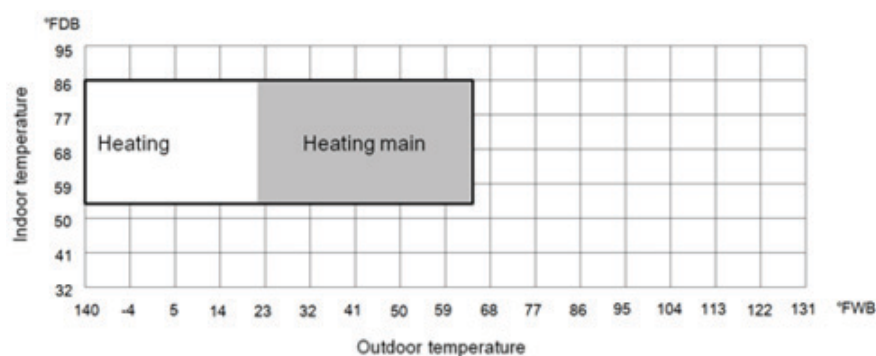


Fig. 131 —Operation Limits Control (Heating)

Table 54 —Operating Temperature Range

MODE	OUTDOOR TEMPERATURE	INDOOR TEMPERATURE
Cooling Only	5~125°F°DB	59~75°F°WB
Heating Only	-13~64°F°WB	54~86°F°DB
Cooling Only	23~75°F°DB	C: 59~75°F°WB H: 54~86°F°DB
Heating Only	21~64°F°WB	

FIELD SETTINGS

Field Setting For Outdoor Unit

The main power wiring should be separated from the communication cable to maintain reliable communications between the main MDC and the outdoor unit as shown in the following illustration.

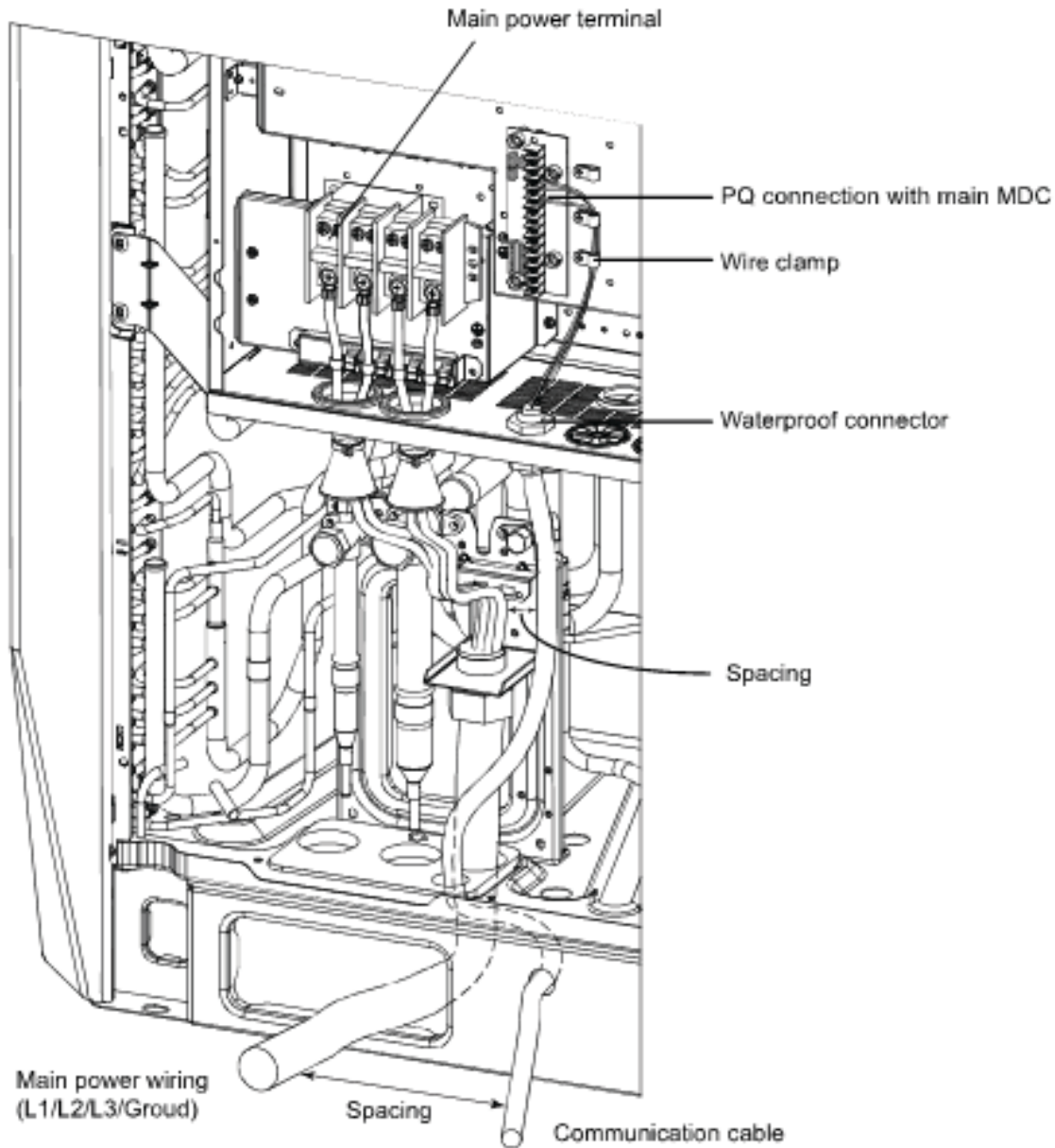


Fig. 132 —Outdoor Unit Field Setting

The connected number of indoor units needs to be set in the main board before applying power.

Table 55 —Dip Switch Settings

SYMBOL	SWITCH	STATUS	FUNCTION	Remarks
S10		00	Skip test operation (Factory default)	
		10	Test operation (The system can run normally on a successful auto-commissioning operation)	
ENC3+S12		0~F	Setting the number of indoor units 0~15	
		000		
		0~F	Setting the number of indoor units 16~31.	
		001		
		0~F	Setting the number of indoor units 32~47	
		010		
		0~F	Setting the number of indoor units 48~63	
		011		
		0~F	Setting the number of indoor units to 64	
		100		
ENC4 + ENC1	 + 	0~7	The quantity of outdoor unit 0-7 on ENC4 and 0 on ENC1	

NOTE: Night Time/Silent/Defrost/Energy Saving/Static Pressure settings can also be set.

“SW4” SETTING PARAMETER

1. Press the MENU button for five seconds to enter the parameter setting function.
 2. Press UP/DOWN to select the items.
 3. Press OK to confirm or MENU to return back.
- More details as follows:

Table 56 —“SW4” Setting Parameter

SYMBOL	FUNCTION	ITEM	DESCRIPTION
n1_	Special function for debugging	n11	Test operating mode
		n16	Forced defrosting
n2_	Refrigerant recycle function	n21	Refrigerant recycled to outdoor unit
		n22	Refrigerant recycled to indoor units
		n23	Refrigerant recycled to piping (Field vacuum to open valves)
n3_	Error and version query	n31	Historical error query
		n32	Clear the historical error
		n33	Version of fan inverter module
n4_	Night time setting	n41	6/10h (Default)
		n42	6/12h
		n43	8/10h
		n44	8/12h
n5_	Silent mode setting	n51	Night silent mode
		n52	Silent mode
		n53	Super silent mode
		n54	Silent mode off (No limitation) (Default)
n6_	Defrosting mode setting	n61	Easy to defrost
		n62	Standard mode (Default)
		n63	Hard to defrost
n7_	Demand control setting	n71	Level demand 1 (Default)
		n72	Level demand 2
		n73	Level demand 3
		n74	Level demand 4
		n75	Level demand 5
		n76	Level demand 6
n8_	Static pressure mode setting	n81	Standard static pressure mode (Default)
		n82	Low static pressure mode
		n83	Medium static pressure mode
		n84	High static pressure mode
n9_	Tes setting	n91	Tes0 = 37°F, Tes automatically adjust (Default)
		n92	Tes0 = 32°F, Tes automatically adjust
		n93	Tes0 = 43°F, Tes automatically adjust
		n94	Low level 1 (Tes = 48°F), locked
		n95	Low level 2 (Tes = 43°F), locked
		n96	Medium level 1 (Tes = 37°F), locked
		n97	Medium level 2 (Tes = 32°F), locked
		n98	High level (Tes = 27°F), locked
nA_	Tcs setting	nA1	Tcs0 = 118°F, Tcs automatically adjust (Default)
		nA2	Tcs0 = 122°F, Tcs automatically adjust
		nA3	Tcs0 = 113°F, Tcs automatically adjust
		nA4	Low level 1 (Tcs = 108°F), locked
		nA5	Low level 2 (Tcs = 111°F), locked
		nA6	Medium level 1 (Tcs = 115°F), locked
		nA7	Medium level 1 (Tcs = 118°F), locked
		nA8	High level (Tcs = 124°F), locked
nb_	Temperature unit selection	nb1	Temperature unit: °F
		nb2	Temperature unit: °F (Default)
nC_	T4 sensor (outdoor temperature) threshold to enable Auxiliary Heat. Aux heat will enable when outdoor temperature falls 1.8°F below this temperature.	nC1	Auxiliary heat disabled
		nC2	5°F
		nC3	15°F
		nC4	25°F
		nC5	35°F
		nC6	45°F
		nC7	55°F
		nC8	65°F

“SW5/SW6” SPOT CHECK CONTENT INSTRUCTIONS

Table 57 —“SW5/SW6” Spot Check Content Instructions

NORMAL DISPLAY	DESCRIPTION	NOTE
0--	Outdoor unit address	0
1--	Outdoor unit capacity	6,8,10,.....28Ton
2--	Modular outdoor unit quantity	1
3--	Quantity setting of indoor units	Setting by ENC3 + S12
4--	Operation mode *1	0,2,3,5,6
5--	Cooling capacity of indoor units	Horse power
6--	Heating capacity of indoor units	Horse power
7--	Total capacity demand of outdoor units	Compressor frequency step
8--	Speed of Fan A	Actual fan step
9--	Speed of Fan B	Actual fan step
10--	Status of the outdoor heat exchanger	
11--	Condenser temperature (T3)	Actual value °C (The lowest of T3A and T3C)
12--	Ambient temperature (T4)	Actual value °C
13--	Inlet temperature of accumulator (T6)	Actual value °C
14--	Suction temperature (T7)	Actual value °C
15--	High pressure shutoff valve pipe temperature (T5)	Actual value °C
16--	Discharge temperature of compressor A (INV1)	Actual value °C
17--	Discharge temperature of compressor B (INV2)	Actual value °C
18--	Discharge temperature of compressor C (INV3)	Actual value °C
19--	Inverter module temperature of compressor inverter (Tf)	Actual value °C
20--	Saturated temperature of the discharge pressure	Actual value °C
21--	Saturated temperature of the suction pressure	Actual value °C
22--	Current of compressor A (INV1)	Actual value
23--	Current of compressor B (INV2)	Actual value
24--	Current of compressor C (INV3)	Actual value
25--	High pressure	Actual value = Display value x 0.1 MPa
26--	Low pressure	Actual value = Display value x 0.1 MPa
27--	Targeted evaporating temperature (TES)	Actual value °C
28--	Targeted condensing temperature (TCS)	Actual value °C
29--	Qty. of indoor units that are communicating with outdoor unit	
30--	Silent control mode + silent noise control mode *2	?
31--	Static pressure mode + defrost mode *3	?
32--	Energy saving mode *4	?
33--	TCS + TES mode *5	?
34--	Temperature unit setting for indoor unit + Unit setting mode in centralized controller *6	?
35--	T4 value setting point for auxiliary heating resource starting	?
36--	Ver. Of software	?
37--	Clear error number of times	?
38--	Last alarm code	Display --- if no alarm code
39--	?	Check end (Only displayed on main board)

NOTES:

1. Normal display: In standby, the LED displays the address of the outdoor unit and the quantities of indoor units connected. Otherwise, it displays the rotational frequency and speed level of the compressor. During defrost and oil return, it displays dF dF and d0 d0 respectively. Operation mode: 0-OFF; 2-Cooling; 3-Heating; 5-Cooling main mode; 6-Heating main mode
2. The 1st number of DSP2 represents silent control mode: 1-Night silent mode, 2-Silent mode, 3-Super silent mode, 4-None
3. The 2nd number of DSP2 represents Night time: 1-6/10h, 2-6/12h, 3-8/10h, 4-8/12h
4. The 1st number of DSP2 represents static pressure mode: 1-Standard (Factory default), 2-Low, 3-Medium, 4-High
5. The 2nd number of DSP2 represents defrost mode: 1-Easy to defrost, 2- Standard (Factory default), 3-Hard to defrost
6. Energy saving mode: 1-no limitation, 2-100%, 3-90%; 4-80%, 5-70%, 6-60%
7. The 1st and 2nd number of DSP2 represents TCS mode and TES mode respectively
8. The 1st number of DSP2 represents temperature unit setting for indoor unit: 1°C; 2°F
9. The 2nd number of DSP2 represents temperature unit setting for centralized controller: 1-Allowable, 2- Prohibit

Field Setting for MDC

Always confirm that port No.1 on the main MDC has been connected to an indoor unit. Otherwise, the entire system cannot operate.

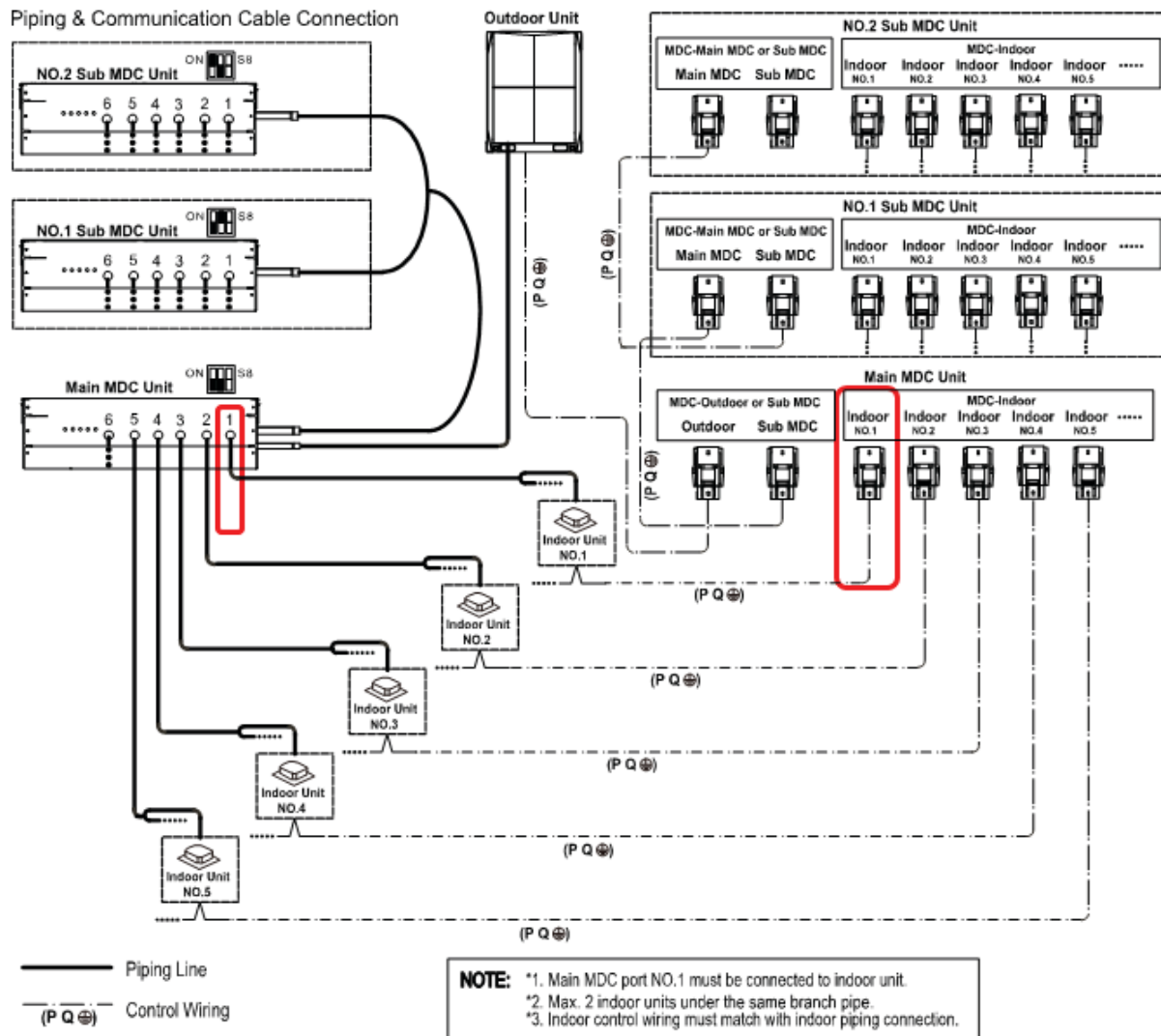


Fig. 133 —Field Setting from MDC

Use 2-core stranded shielded communication wire to connect indoor unit to MDC and sub MDC to main MDC. Follow the controls wiring diagram for correct and accurate wiring. To connect MDC to ODU, PQE connectors are recommended for quick, easy and faster installation.

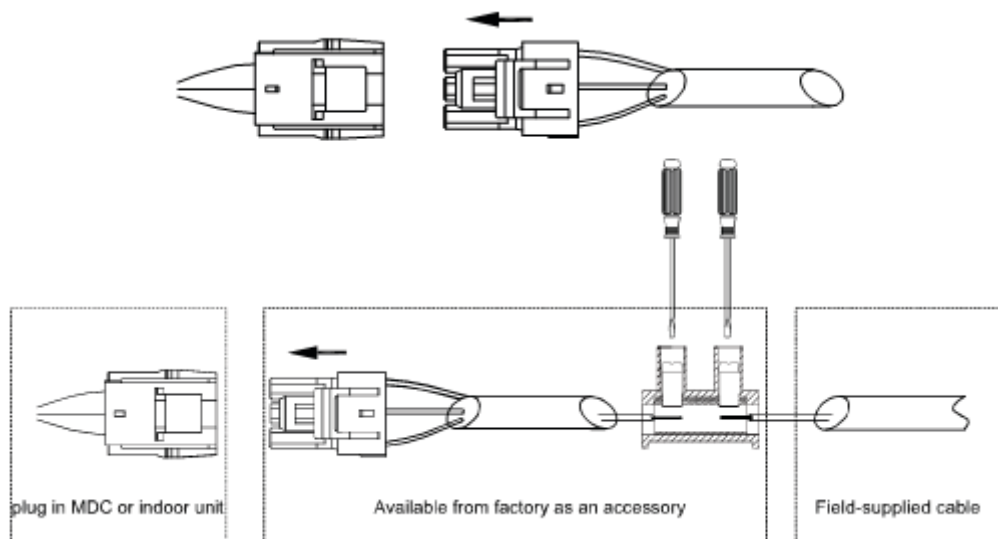


Fig. 134 —MDC Connections

NO.1 PORT BACKUP

If the solenoid valve of port # 1 has failed, reassign any backup port (empty port with no IDU connected) to act as port # 1 on the main MDC. (In the following example, port # 2 will be assigned as backup port with no IDU connected to begin with).

1. Switch the piping from port # 1 to port # 2.
2. Disconnect SV1A-1 and SV1B-1 from SV1 (chip # 1).
3. Switch the coil wiring of SV2A-2 and SV2B-2 from SV2 to SV1 as shown below.

You can use diagnostic software to identify which one is corresponding to the specified port.

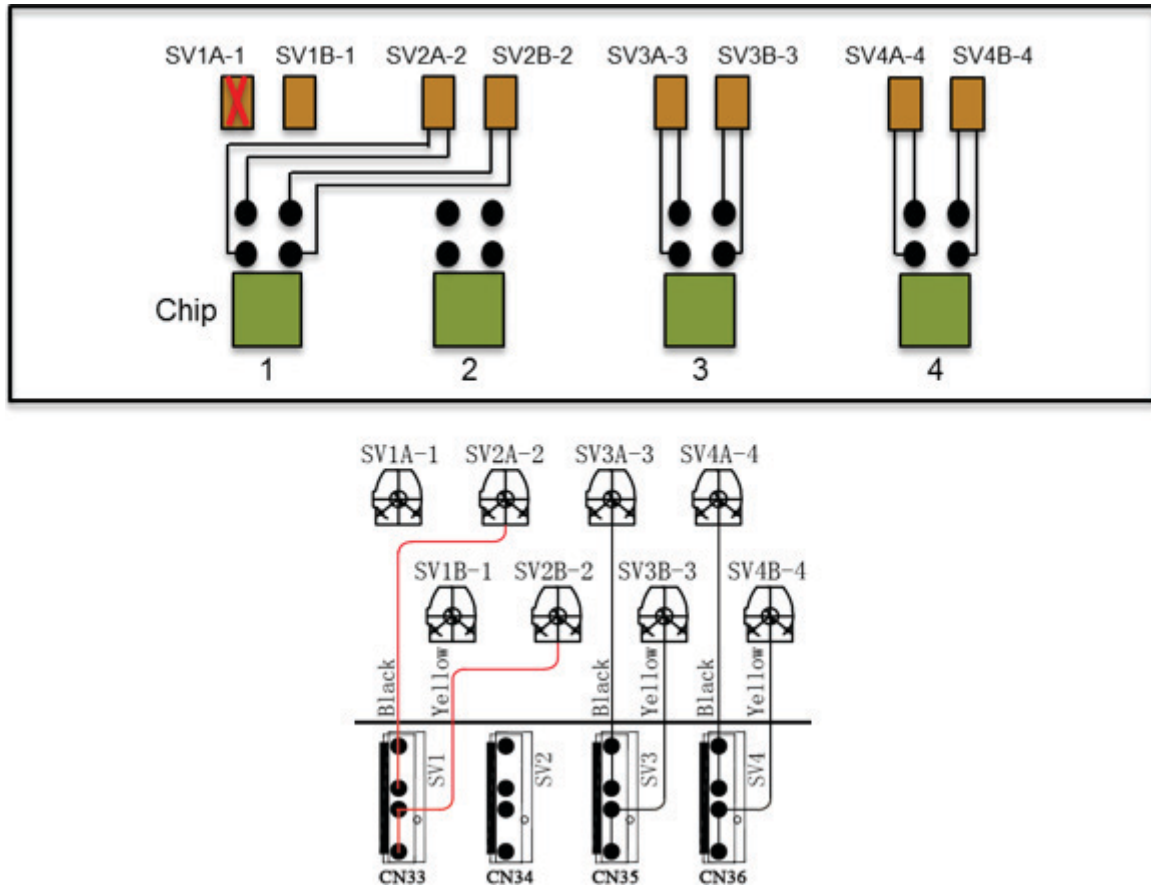


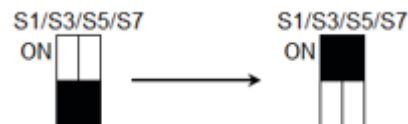
Fig. 135 —No. 1 Port Backup

PORTS COMBINATION

When connecting 72K or 96K indoor units, it is necessary to merge two ports as one (twinning) to offer sufficient refrigerant flow. The first port should have an odd number and second port should be the next sequential even number. For example: No.1 and No.2, No.3 and No.4, No.5 and No.6 and so on.

In order to keep normal communication, note that No.2 and No.3, No.4 and No.5 and so on are prohibited for port combination.

Dip switch "S1/S3/S5/S7" must be set as follows:



Factory default

Fig. 136 —Dip Switch Settings

- S1: 11 means No.1, 2 group pipes merging control
- S3: 11 means No.3, 4 group pipes merging control
- S5: 11 means No.5, 6 group pipes merging control
- S7: 11 means No.7, 8 group pipes merging control

MDC ADDRESS

When the main and sub MDCs – (40VMD**M--3 and 40VMD**S--3) are used in a system, the address must be set according to the following table. The address must be set before powering on the MDCs.

The address number is set from dip switch “S8” as shown below.

Table 58 —Setting MDC Address (First Two Codes of S8)

FIRST TWO CODE SWITCHES OF S8		ADDRESS
ON 	00*	Main MDC control box
ON 	01*	No.1 Sub MDC
ON 	10*	No.2 Sub MDC

Table 59 —Setting MDC Address (Third Code of S8)

THIRD CODE SWITCH OF S8		MDC BOARD
ON 	**0	Primary board in this MDC
ON 	**1	Second board in this MDC

NOTE: The third switch has been set by the factory and is shown for reference only.

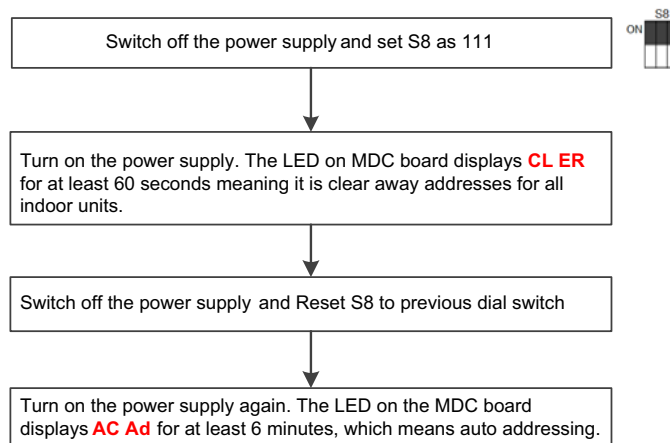
AUTO ADDRESSING FOR INDOOR UNITS

Every time the MDC is powered on, the LED will display “AC Ad” for about six minutes, which means it is automatically addressing for indoor units. It only distributes addresses for indoor units without an address. Since one MDC port can connect a maximum of two IDUs, each chip will be assigned two addresses.

For example:

- Main MDC: Main chip gets 0 or 1, next 2 or 3, next 4 or 5 until $2 \times \text{No. of Ports} - 1$ (Maximum $2 \times 16 - 1 = 31$).
- Sub 1 MDC: Start from 32# no matter what type of main MDC is connected.
- Sub 2 MDC: Start from 64# no matter what type of main MDC and sub 1 MDC are connected.

In this case, indoor units connected to No.2 sub MDC will get 64~95# addresses, which cannot be controlled by any remote controllers (E9 will be shown on the LED of the remote controllers). Reset the addresses to 0~63# for these IDUs manually if you want to use the controllers to command the units. Be sure that no duplicate addresses exist for the entire refrigerant system or the 0 H7 error will be shown at the ODU.



CONDENSATE PUMP CONNECTION

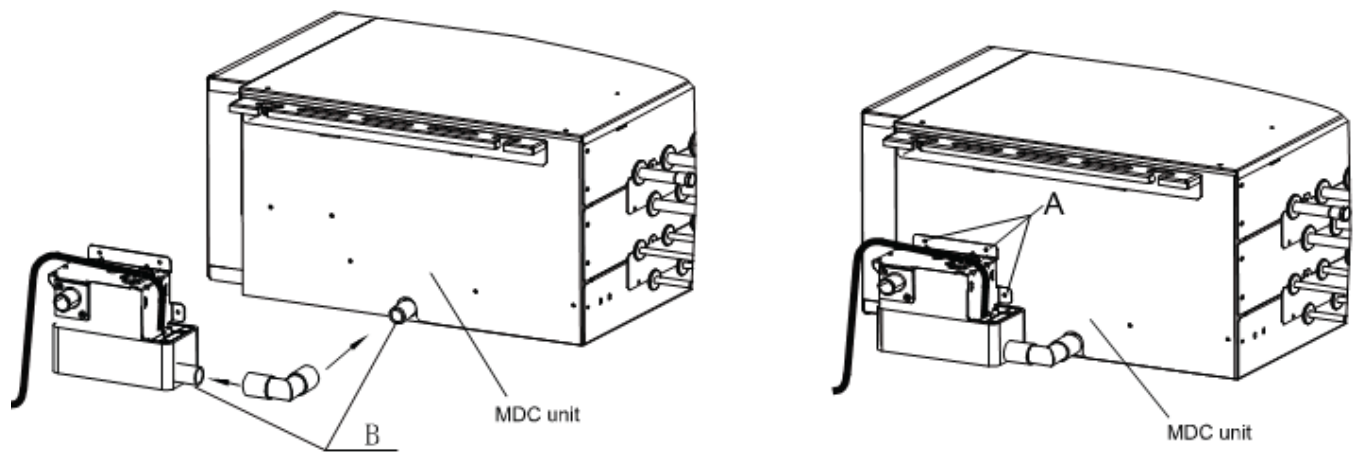


Fig. 137 —Connecting Water Pump

Installation Steps:

1. Wrap sealing materials on the surface B to avoid water leakage.
2. Connect a 90° elbow.
3. Fasten the water pump box to the MDC unit by attaching three screws to hole A.

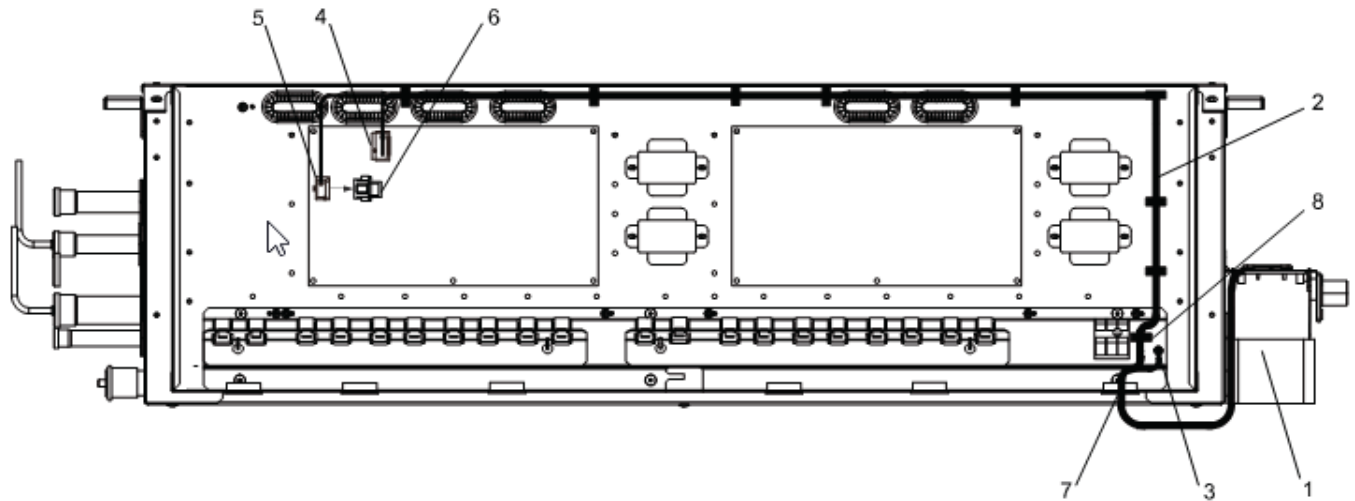


Fig. 138 —Condensate Pump Wiring Details

Table 60 —Water Pump Callouts

NUMBER	COMPONENT NAME
1	Condensate pump
2	Wires for condensate pump and float switch
3	Ground wire
4	PUMP (CN43) on primary MDC board for connecting drain pump
5	WATER (CN27) on the primary MDC board for connecting float switch *NOTE
6	Short connector
7	Hole for wires to pass through
8	Snaps to fasten the cables (Accessory)

NOTE: Unplug the short connector before connecting float switch wires.

Communication Wire Length Limitations

Use 2-core stranded shielded wire as communication wires. Long communication wires will cause a voltage decrease, so the length should follow the limitation for proper communication.

Maximum length to outdoor	L1 + L2, L5	≤ 3937 ft	AWG 18
Maximum total length to Indoor units	L3, L3 + L4	≤ 3937 ft	AWG 18
Maximum length from controller to indoor units	L6 + L7 + L8 + L9, L10 + L11	≤ 820 ft	AWG 18

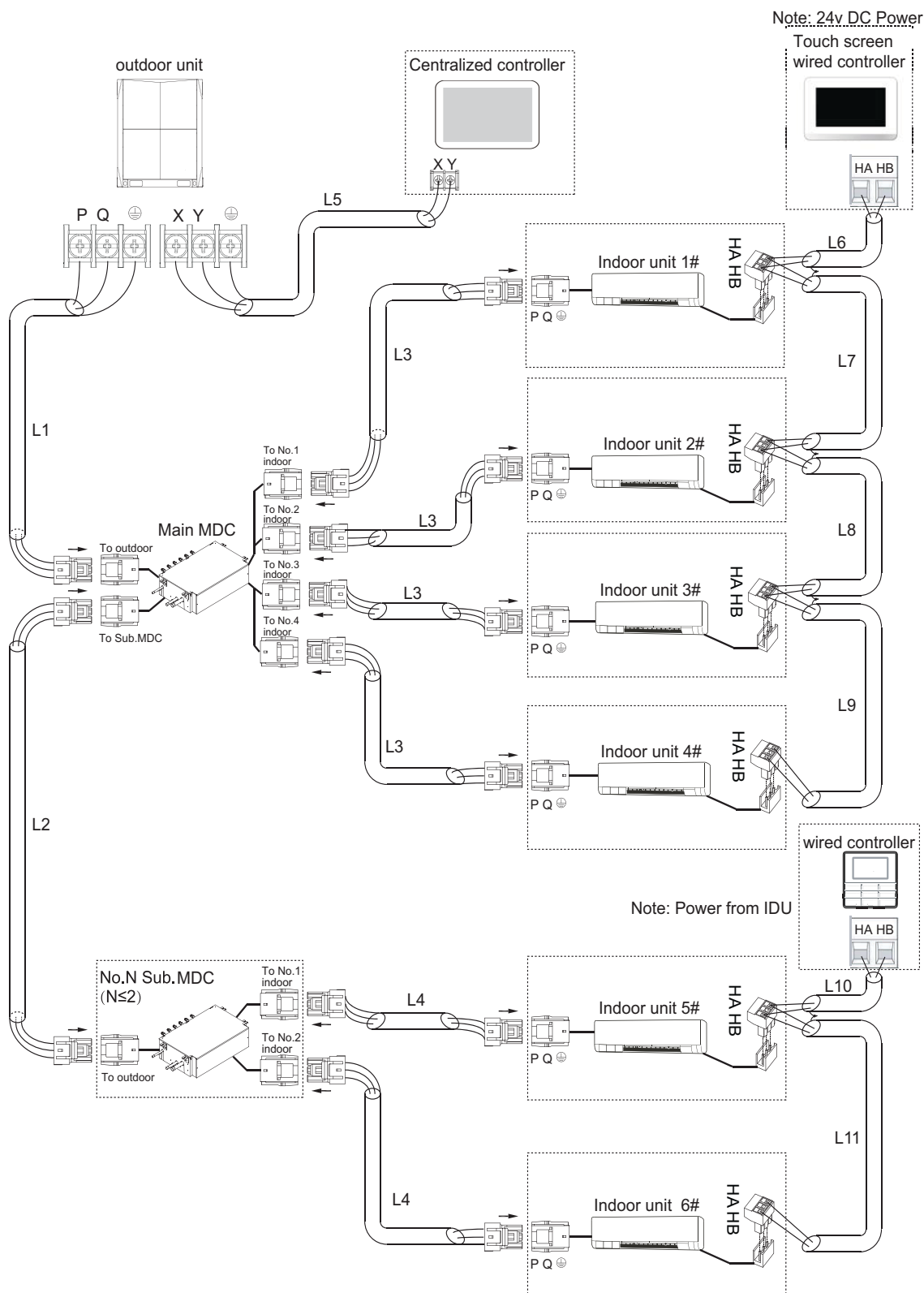


Fig. 139 —Communication Wiring Diagram

COMMISSIONING TEST

Installation Process

The following figure shows the recommended installation process.

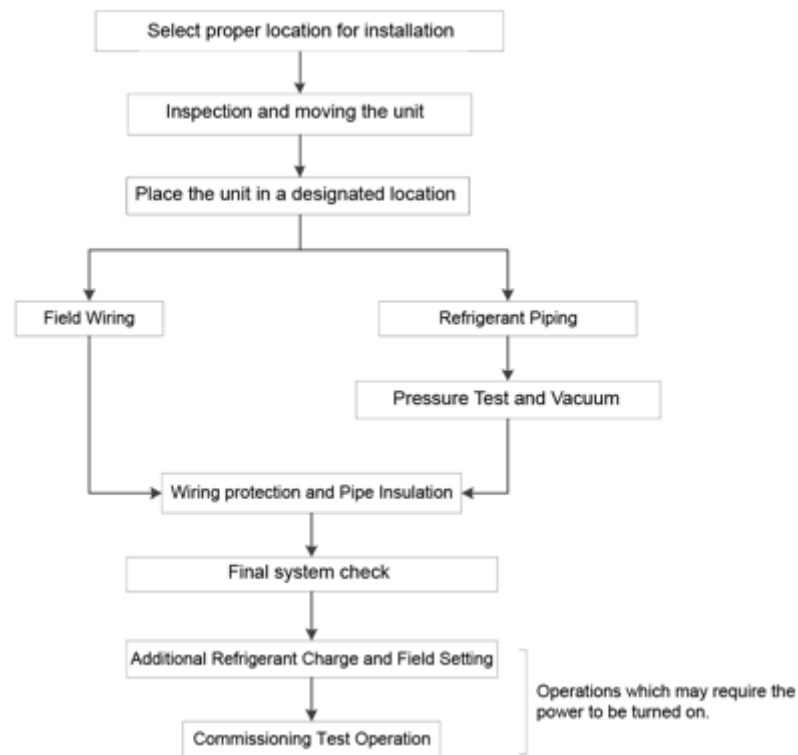


Fig. 140 —Recommended Installation Process

Procedure and Outline

Check work prior to turning on power supply. Use the following procedure to conduct the initial test operation after installation.

1. Check the power wiring and communication cable connection.
 - Are the designated wires used based on MCA?
 - Does the electrical work follow the related rules and regulations?
 - Is the grounding completed?
2. Check refrigerant piping/insulation materials.
 - Are the piping sizes correct?
 - Is the refrigerant piping design pressure no less than 580 psi?
 - Field piping should be insulated properly. Otherwise, water condensate will be produced.
3. Check airtight test and vacuum drying.
 - Have the airtight test and the vacuum drying been conducted according to the procedure in the Installation Manual?
4. Check on the amount of refrigerant charge (See NOTE below).
 - Have the charged refrigerant amounts been recorded?
 - Are the correct refrigerant amounts charged?
5. Check the dial switch of outdoor unit.
 - Is the indoor unit number set in the main board equal to the numbers connected in this system?
6. Check the dial switch of MDC.
 - Are the addresses for main/sub MDC correct?
 - Are the dial switches for merged port correct?
7. Check communication cable connections.
 - Are the PQ communication cables all connected for outdoor unit, MDC, and indoor units?
 - Are there any communication cables in short circuit?
8. Check the status of shutoff valves.
 - Are the HP shutoff valve and LP shutoff valve fully opened?

NOTE: After vacuum work (will keep at least 24 hours), charge refrigerant to the refrigerant system through HP (liquid) shutoff valve, LP (gas) shutoff valve. If adequate refrigerant cannot be charged for any reason, charge liquid refrigerant through the gas shutoff valve port when the outdoor unit is operating.

AIR TIGHT TEST AND VACUUM WORK

Carry out air tight test and vacuum after piping work. Be sure to always use nitrogen gas for the air-tightness test.

Table 61 —Required Tools

Gauge manifold charge hose valve	- To prevent any impurities from entering the refrigerant system and to ensure sufficient pressure resistance, always use the special tools dedicated for R410A. - Use a charge hose that can connect to gauge port and shutoff valves.
Vacuum pump	- The vacuum pump should be able to lower the pressure to 100 micron. - Make sure the pump oil never flows backward into the refrigerant pipe during the pump stops.

Refer to the figure below: connect a nitrogen tank, refrigerant tank, and a vacuum pump to the outdoor unit.

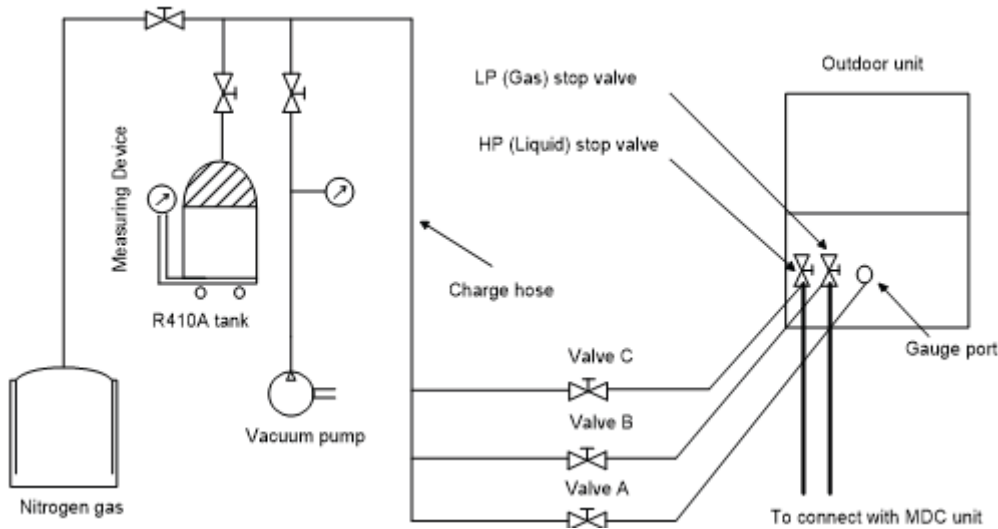
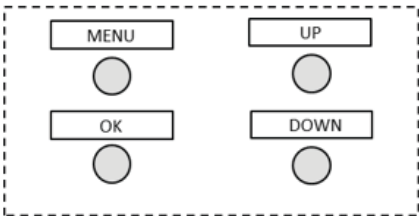


Fig. 141 —System for Air Tight Test and Vacuum Work

NOTES:

The outdoor unit contains factory-charged refrigerant, so be careful when attaching the charge hose.
The gauge port, which is connected with accumulators of the outdoor unit, is used for service work to check pressure and for charging the excess refrigerant that cannot be charge from the shutoff valves.

- Air tight test**
The air-tight test and vacuum work should be done using the service ports of gas and liquid shutoff valve. Pressurize the liquid pipe and gas pipe from the service ports of each shutoff valve to 478 psi. Do not pressurize more than 478 psi. If the pressure does not drop within 24 hours, the system passes the test. If there is a pressure drop, check for leaks, make repairs, and perform the airtight test again.
 - Vacuum work**
Evacuate the system from the liquid pipe and gas pipe shutoff valve service ports by using a vacuum pump for at least two hours and bring the pressure to 500 micron or less. Keep the system in this condition for at least one hour to check whether the vacuum gauge rises or not. If it rises, the system may either contain moisture inside or have minor leaks.
- If working during rain, condensation may form on inside of pipes. If any moisture enters pipe, use the following precautions:
- Evacuate the system for two hours.
 - Pressurize the system with nitrogen gas and evacuate the system again using the vacuum pump for one hour to 500 micron or less (vacuum drying).
 - If the system cannot be evacuated to 500 micron within two hours, repeat operation of vacuum break and vacuum drying.



Check Device and Installation Conditions

Be sure to check the following:

ELECTRICAL WORK

- Make sure there are no incorrect communication cables.
- Make sure there is no improper power wiring or loose nuts.
- Has the insulation of the main power circuit deteriorated?

PIPE WORK

- Make sure piping size is correct.
- Make sure insulation work is done. Check to ensure that the insulation follows the regular value in accordance with relevant local and national regulations.
- Make sure no refrigerant pipes from the MDC to different indoor units have been cross connected.

Adding Refrigerant Charge and Checking Operation

1. Adjust Refrigerant Charge

Calculate amount of refrigerant (R-410A) to add using “Refrigerant Charge Calculation in Chapter 1.7” and figures below:

* 1 maximum refrigerant charge: the amount of refrigerant to be added on site.

All service valves on the outdoor units should remain fully closed.

R-410A refrigerant should be added (in liquid state) at the liquid line service port on the unit.

If the total calculated amount of refrigerant can be added to the system, the charging process is finished.

If the total calculated amount of refrigerant cannot be added to the system; close the valve on the refrigerant bottle, and move the charging hose from the liquid line service port to the suction line service port.

Open the suction and liquid service valves on the unit and start the system in cooling mode.

Slowly open the valve on the refrigerant bottle, and carefully release the liquid refrigerant into the suction service port.

The charging process is finished when the total calculated charge amount is added completely to the system.

2. Charge Refrigerant Tank

Check whether the tank has a siphon pipe before charging, and place the tank so the refrigerant is charged in liquid form.

Table 62 — Charging Refrigerant Tank

WITH SIPHON PIPE	INSTRUCTIONS
	Stand the tank upright and charge. (The siphon pipe goes all the way inside, so the tank does not need to be put upside-down to charge in liquid form.)
	Stand the tank upside-down and charge

NOTE: Always use R-410A refrigerant or damage to the equipment may occur.

R-410A is a mixed refrigerant, so charging it as a gas will cause the refrigerant composition to change, which may prevent normal operation.

Auto-Commissioning Operation

CHECK BEFORE AUTO-COMMISSIONING OPERATION

Make sure the following are completed in accordance with the installation manual.

- Piping
- Wiring
- Air tight test
- Vacuum
- Additional refrigerant charge
- Check operation
- Make sure that the above tasks for the MDCs and indoor units are complete and that there is no danger to operating the equipment.

If the above tasks are complete, check the following contents sequentially:

Table 63 —Checks for Auto-Commissioning

NUMBER	CHECKING CONTENTS BEFORE TEST RUN	CHECKING PURPOSE	CONFIRMATION
BEFORE POWER SUPPLY ON			
1	Check whether the refrigerant system leaks	Prevent leakage of the system	☐
2	Check whether transmission cables are proper connected or loose	Prevent communication abnormally	☐
3	Check whether power wiring are firm, grounded, and the phase sequence is correct	Prevent fire and electric shock	☐
4	Check whether power supply is consistent with the nameplate	Prevent damage to the unit	☐
5	Check whether the dip switches of ODU are correct (focus on numbers of IDU)	Prevent abnormal communication among ODU, MDC, and IDUs	☐
6	Check whether dip switches of MDC are correct	Prevent the solenoid valves from working abnormally	☐
7	Check whether transmission cables are correctly connected between two or three MDC units	Prevent abnormal communication among ODU, MDC, and IDU	☐
8	Check whether high/low pressure shutoff valves are open	Prevent system protection caused by refrigerant blockage	☐
TURN POWER ON			
9	Check the errors of ODU, MDC, IDU	Debug the error. (The error codes are detailed in Troubleshooting)	☐
10	Check whether the display of ODU and MDC show correct numbers of IDUs *This function is valid while the address of IDUs had been set.	Avoid IDU address conflict and disconnection among ODU, MDC, and IDUs.	☐
11	Check whether the compressors have been preheated for 12 hours.	Prevent poor starting of compressor.	☐
12	Check whether the fans of IDUs work correctly.	Avoid fan trouble of IDUs.	☐

When first powered on, about 20 minutes are communication between the outdoor unit, MDC, and IDUs. The error code will be sent from MDC to the outdoor unit.

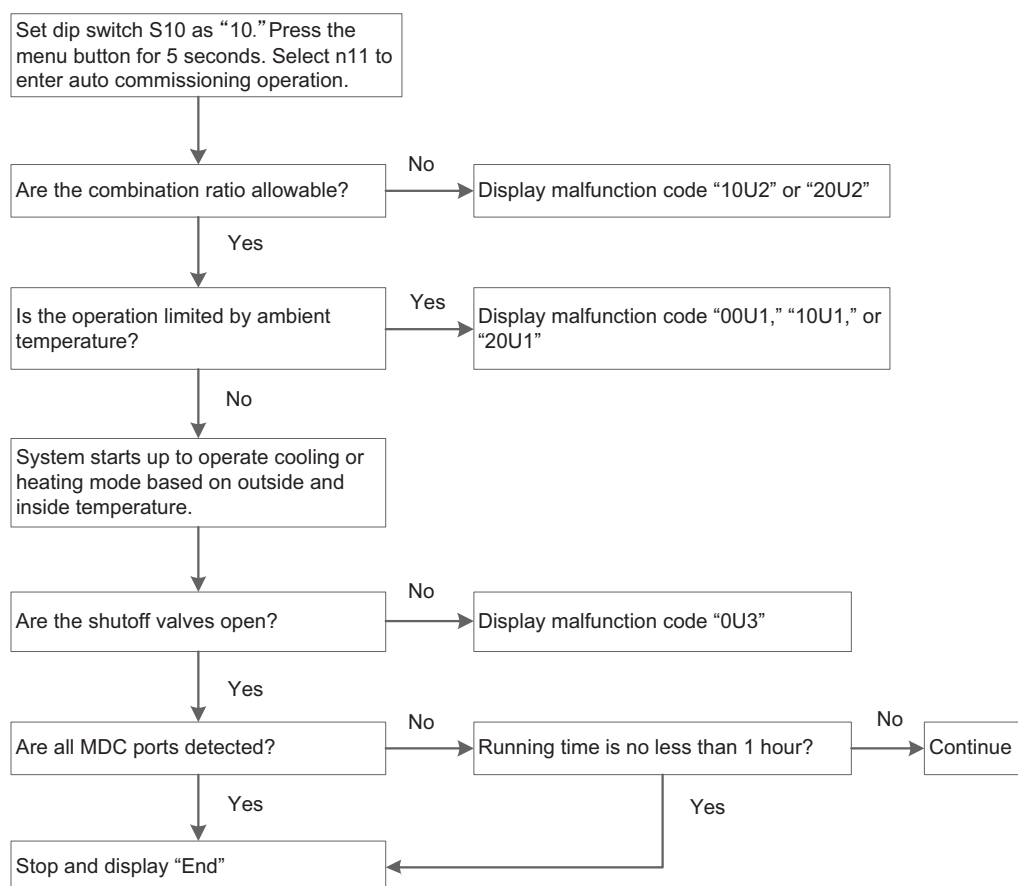
After the communication completes, the address of the outdoor unit and numbers of indoor units can be shown on the LED display by spot check. Press UP/Down in the main board or spot check board of ODU to obtain the quantity setting of IDUs.

NORMAL DISPLAY	DESCRIPTION
0--	Outdoor unit address
1--	Outdoor unit capacity
2--	Modular outdoor unit quantity
3--	Quantity setting of indoor units
---	---

OVERVIEW OF AUTO-COMMISSIONING OPERATION

To protect the compressor, be sure to turn on the power supply twelve hours before the starting operation. The following flowchart describes the auto-commissioning operation, which is used to correct certain mistakes when installing the heat recovery system.

- Judge whether the combination ratio of outdoor units and indoor units is correct
- Check the shutoff valves opening status
- Check for incorrect wiring (uniformity of piping connection and communication signal)

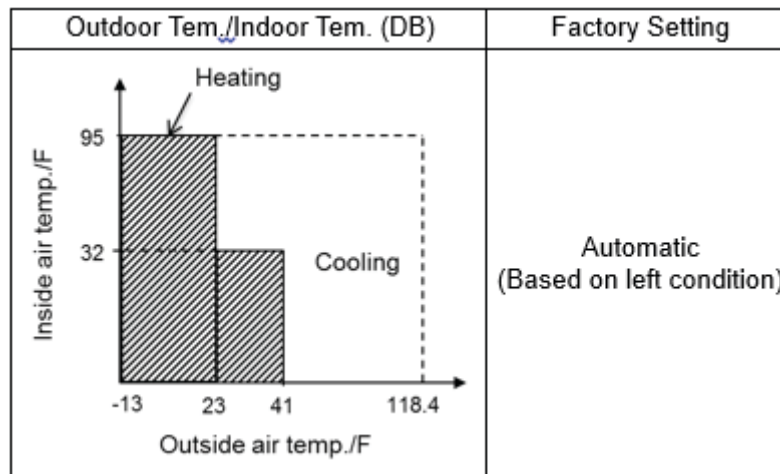


NOTES:

- Error code “0U0” will be shown if the auto-commissioning operation is not working within thirty minutes after the dial switch is set to 10.
- There are two conditions that cause the unit to cease the auto-commissioning operation:
 1. End after the latest step (all MDC ports are detected) has finished for three minutes. The signal of successful auto-commissioning operation will be recorded in the EEPROM and ODU standby. When the system is powered on again, the auto-commissioning operation is invalid and the system will go directly to standby. If the communication between ODU, MDC, and IDUs has changed, the auto-commissioning operation must be done again.
 2. The running time of the auto commissioning operation is no less than one hour. The ODU displays “0U4” and the signal of failed auto-commissioning operation is recorded in the EEPROM so that normal operation cannot be carried out. The failure signal will be overwritten until it passes successfully. Check refrigerant leakage and test it again after self-checking.
- If the ODU displays error code “0 F8” because of non-uniform piping connections and communication wiring, check whether there is a mismatch of any refrigerant pipes and transmission cables between the MDC and IDUs. Test again after correcting it.

EXPLANATION FOR THE FLOWCHART OF AUTO-COMMISSIONING OPERATION

- The operation will count the combination ratio (A) of all indoor units and outdoor unit. If $45\% \leq A < 165\%$, the operation will go to the next step.
If $A \geq 165\%$, error code “10U2” will be displayed on the outdoor unit.
If $A < 45\%$, error code “20U2” will be displayed on the outdoor unit.
These error codes will be displayed until the power supply is turned off.
- The auto-commissioning operation will check the temperature of inside and outside, and then run cooling or heating mode by the temperature condition as follows:



IMPROPER CONTENTS	JUDGING CRITERIA	ERROR CODE
Inside temperature	Average temperature of all indoor units' return air: Greater than 95°F	10U1
Outside temperature	Outdoor unit temperature sensor (T4): Less than -13°F or greater than 52°F	00U1
Inside/Outside temperature	IDU: Greater than 32°F Temperature difference between IDU and ODU: Greater than 54°F	20U1

- Operating mode legend
 - a. Cooling only mode, $T_{es} = 5^{\circ}\text{F}$ (Fix). Solenoid valve “SV7” is forced to close.
 - b. Heating only mode, $T_{es} = 122^{\circ}\text{F}$ (Fix). Solenoid valve “SV7” is forced to close.
- Check whether the shutoff valves of the high or low pressure side are open. If high pressure or low pressure protection is detected, the ODU stops and shows error code “0U3.” Otherwise, it goes to next step.
- It mainly checks whether the wiring and piping between MDC and indoor units are entirely matched. If one of these is connected incorrectly, the signal will be recorded in the main MDC and the error code “SC ER” will be displayed. The system will go to standby if all the wiring and piping are properly connected.

Check Work after Auto Commissioning Operation

Perform the following checks after the test run is complete:

- Record the contents of the field setting.
- Record the installation date.
- Make sure the electrical control box cover and the front panels are all attached.

CAUTION FOR REFRIGERANT LEAKAGE

The installer and system specialist shall secure safety against leakage according to local regulations or standards. The following standards may be applicable if local regulations are unavailable.

This VRF system uses R-410A, which is a safe, non-toxic, non-combustible refrigerant. Nevertheless, care must be taken to ensure that air-conditioning facilities are installed in a room large enough to comply with local applicable regulations and standards. This precaution ensures that the maximum concentration level of refrigerant is not exceeded.

Maximum Concentration Level

- The maximum charge of refrigerant and the calculation of the maximum concentration of refrigerant are directly related to the human-occupied space into which it could leak.
- Compliance to the local applicable regulations and standards for the maximum allowable concentration level is required.
- Pay attention to places, such as basements, where refrigerant can accumulate since refrigerant is heavier than air.

Procedure for Checking Maximum Concentration

Check the maximum concentration level in accordance with points below and take whatever action is necessary to comply. The unit of measurement of the concentration is lb/ft^3 (the weight of refrigerant gas in 1 ft^3 volume of the occupied space).

- a. Calculate the amount of refrigerant (lb) charged to each system separately.
- b. Calculate the smallest room volume (ft^3).

For the following cases, calculate the volume of (A), (B) as a single room or as the smallest room.

Case A: Where there are no smaller room divisions

Case B: Where there is a room division, but there is an opening between rooms so large that it permits free flow of air back and forth

Follow local code requirements for other cases.

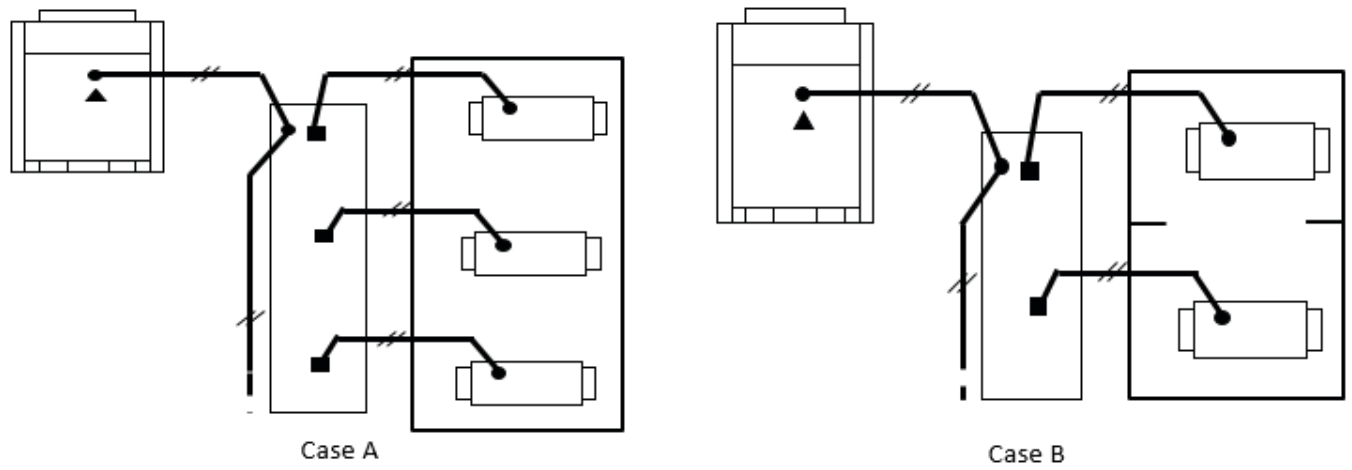


Fig. 142 —Determining Maximum Concentration

TROUBLESHOOTING

Troubleshooting Outdoor Unit



Caution

Make sure the power is disconnected from the unit before connecting or disconnecting any port/connector on the PC board to avoid any potential damage.

If the unit is in standby mode, the LED will display the address of the outdoor unit and the quantities of indoor units connected. Otherwise, it displays the INV1's rotation frequency and frequency step.

NOTE: In defrosting and oil return operation, it displays dF dF and d0 d0 respectively.

NOTE: If the number is larger than 100, it only displays the first digit.

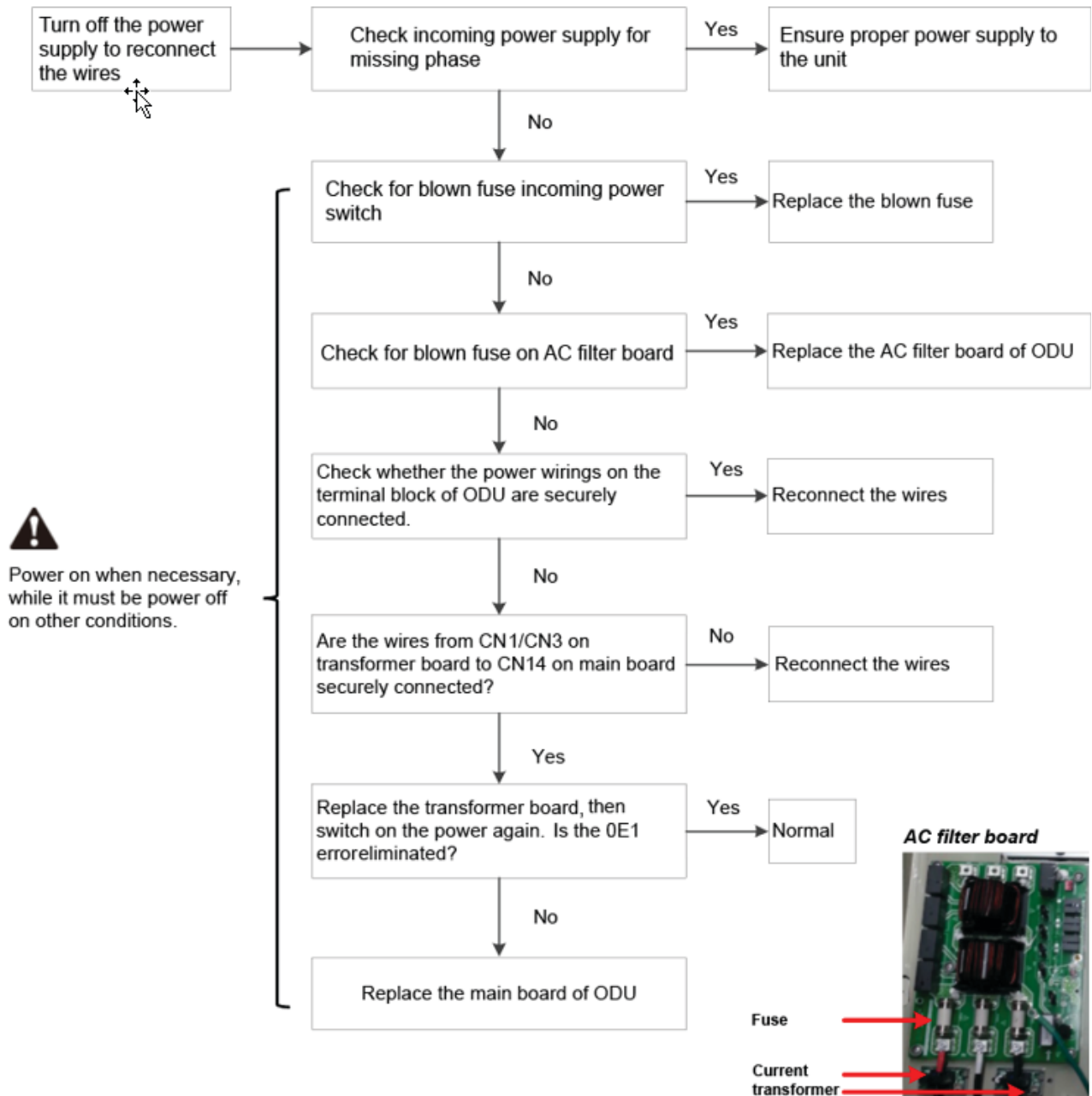
The LED, located at the main board or spot check board, displays the code error if the outdoor unit has errors.

Table 64 —Troubleshooting Codes

CODE	DEFINITION	LEGEND
0 E1	Missing one of the voltage phase	
0 E2	Communication error between outdoor unit and MDC	
0 E4	T3A, T3C, or T4 Temperature sensor error	
0 E5	Voltage protection	
0 H0/20 H0/30 H0	Communication error between main board and compressor drive board	
0 H1	Communication error between main chip and communication chip	
0 H7	Incorrect number of IDUs	ODU cannot restart with 0 H7
0 H8	High pressure sensor error	
0 Hb	Low pressure sensor error	
0 HC	The main board does not match the model of outdoor unit	
0 F4	Temperature sensor (T6) error	
0 F5	Temperature sensor (T7) error	
0 F8	MDC error	
0 P1	1. Current leakage protection 2. Discharge temperature switch or high pressure protection	
0 P2/0 H5	Low pressure protection	ODU cannot restart with 0 H5
0 P3	Over-current protection for compressor	
0 P4/0 H6	Discharge temperature protection	ODU cannot restart with 0 H6
0 P5	High temperature protection for pipe temperature	
0 P9/0 H9	DC fan protection	ODU cannot restart with 0 H9
0 PL/0 C7	High module temperature protection	ODU cannot restart with 0 C7
0 PP/0 F0	Liquid slugging protection	ODU cannot restart with 0 F0
L0~L9 0 H4/20 H4/30 H4	Compressor INV module protection	ODU cannot restart with *0 H4
A tL	Ambient temperature limit operation	

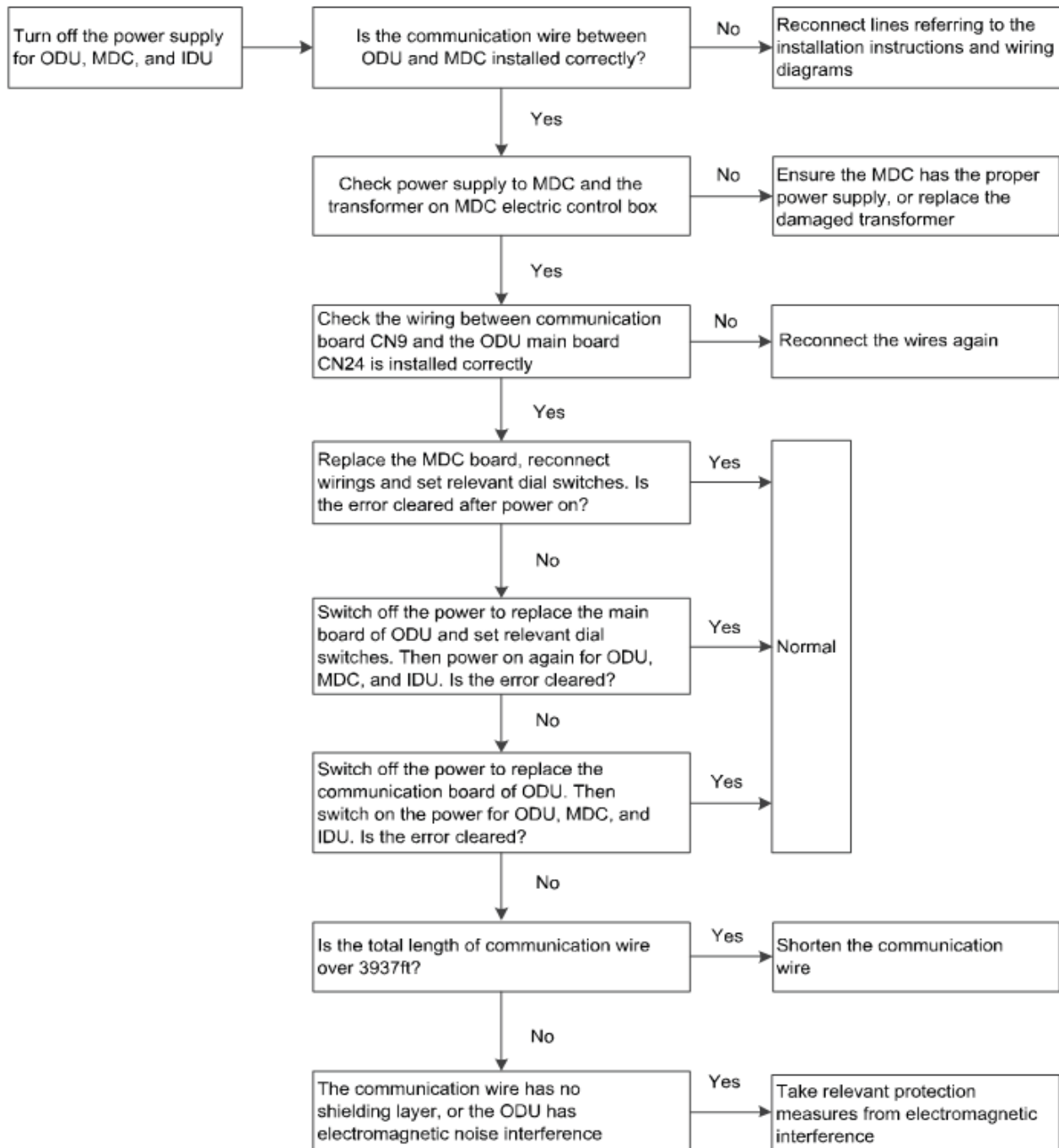
0E1: MISSING ONE OF THE VOLTAGE PHASE

1. Error display:
ODU display:  0E1
2. Applicable models:
38VMA***RDS(L)5-1, 38VMA***RDS(L)6-1
3. Error definition:
An open phase of power supply was detected.
4. Possible causes:
 - Incorrect power supply
 - Blown fuse on incoming power switch or AC filter board
 - Loose power wire connection (L1/L2/L3)
 - Communication wires from transformer to main board is disconnected
 - Incorrect transformer board
 - Damaged main board



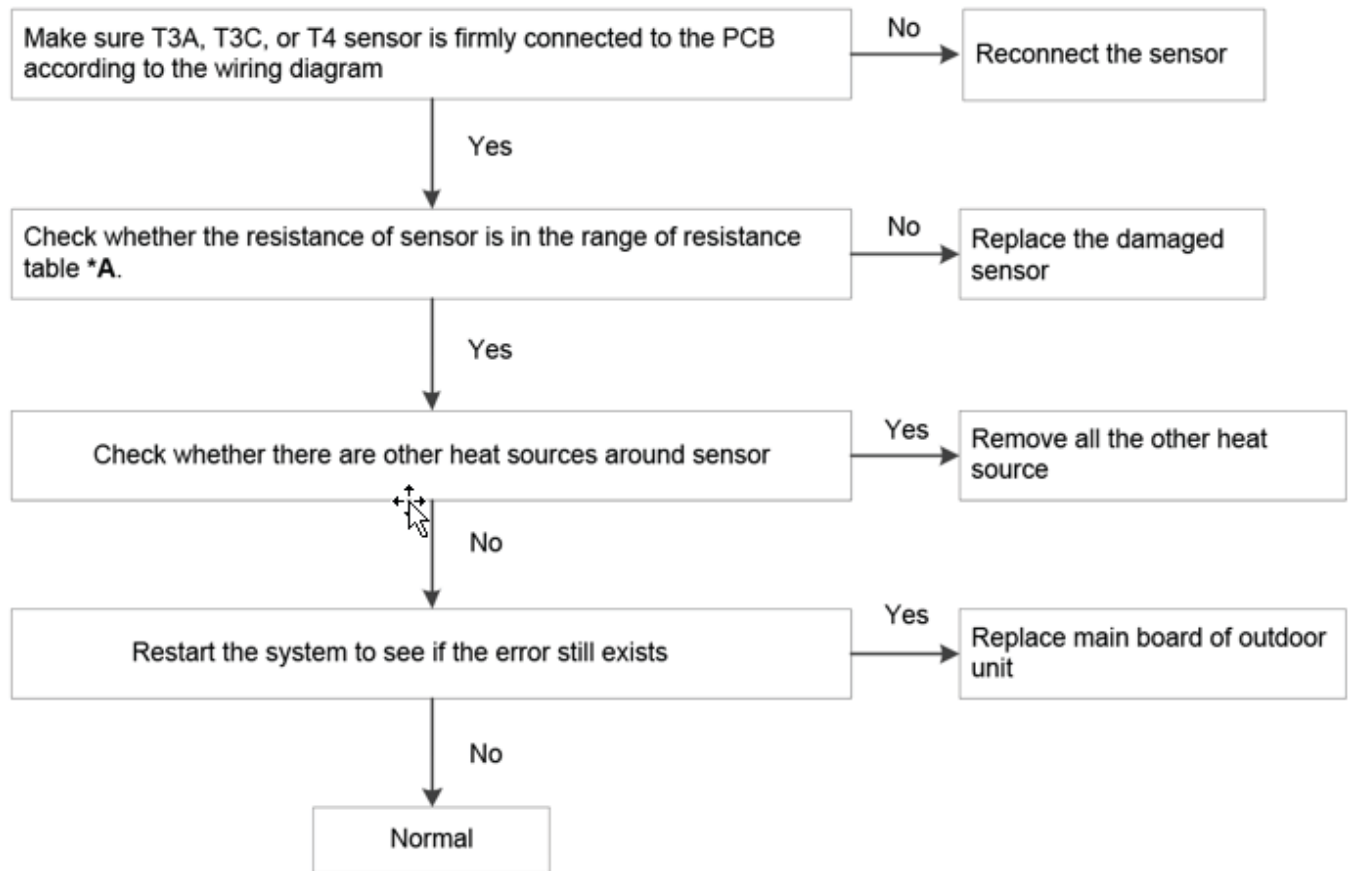
0E2: COMMUNICATION ERROR BETWEEN OUTDOOR UNIT AND MDC

1. Error display:
ODU display: $\square$ E2
2. Applicable models:
38VMA***RDS(L)5-1, 38VMA***RDS(L)6-1
3. Error Definition:
Communication error between ODU and MDC
4. Possible causes:
 - Communication wire between ODU and MDC is installed incorrectly or disconnected.
 - Incorrect MDC power supply
 - Damaged ODU communication board or main board
 - Damaged MDC main board
 - Communication line over 3937 feet
 - External interface (e.g. electromagnetic)



0E4: T3A, T3C, AND T4 TEMPERATURE SENSOR ERROR

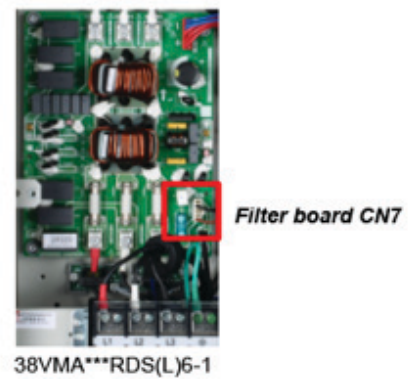
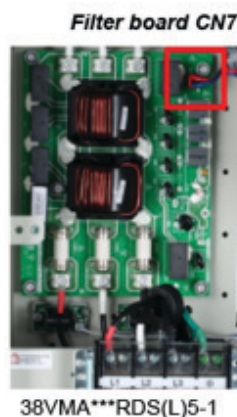
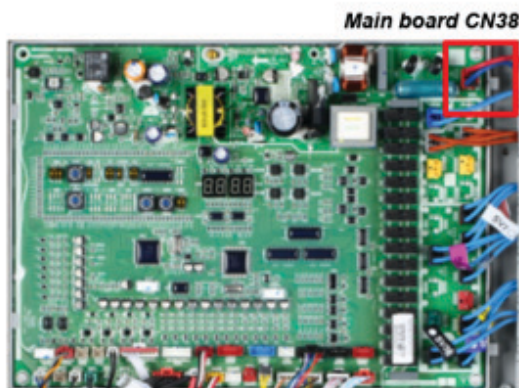
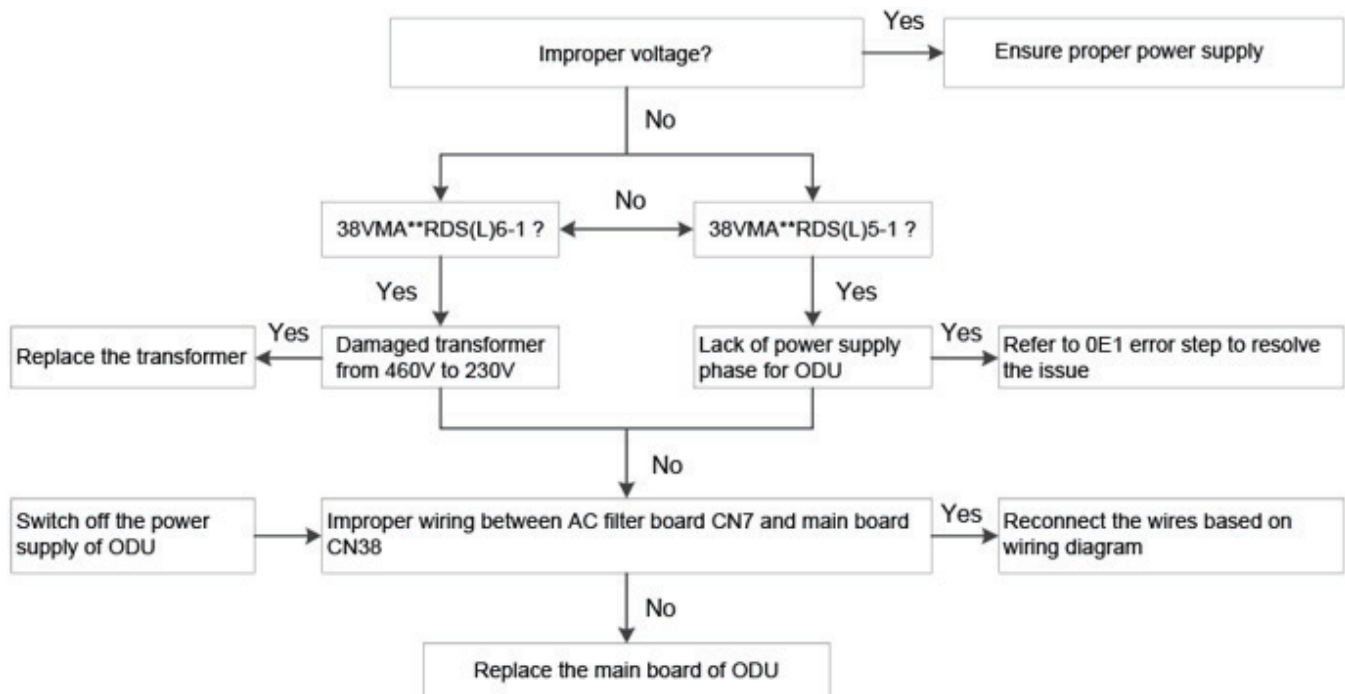
1. Error display:
ODU display: □ E4
2. Applicable models:
38VMA***RDS(L)5-1, 38VMA***RDS(L)6-1
3. Error Definition:
The temperature sensor (T3A or T3C or T4) on main board is short or damaged.
The test voltage should be $> 4.95V$ or $< 0.05V$
4. Possible causes:
 - Loose connection at port on main control board
 - Damaged sensor
 - Other heat sources around the sensor
 - Damaged main board



*A Refer to “Resistance Table of Ambient Temperature Sensor” in Appendix.

0E5: VOLTAGE PROTECTION

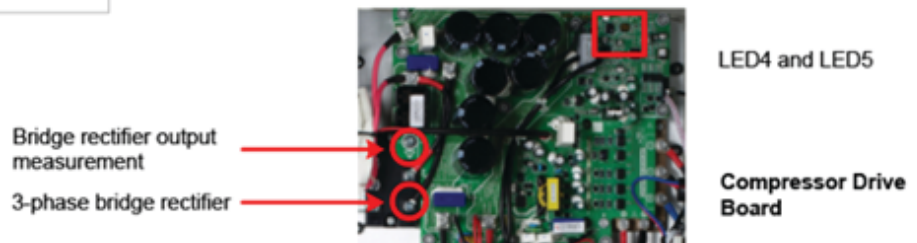
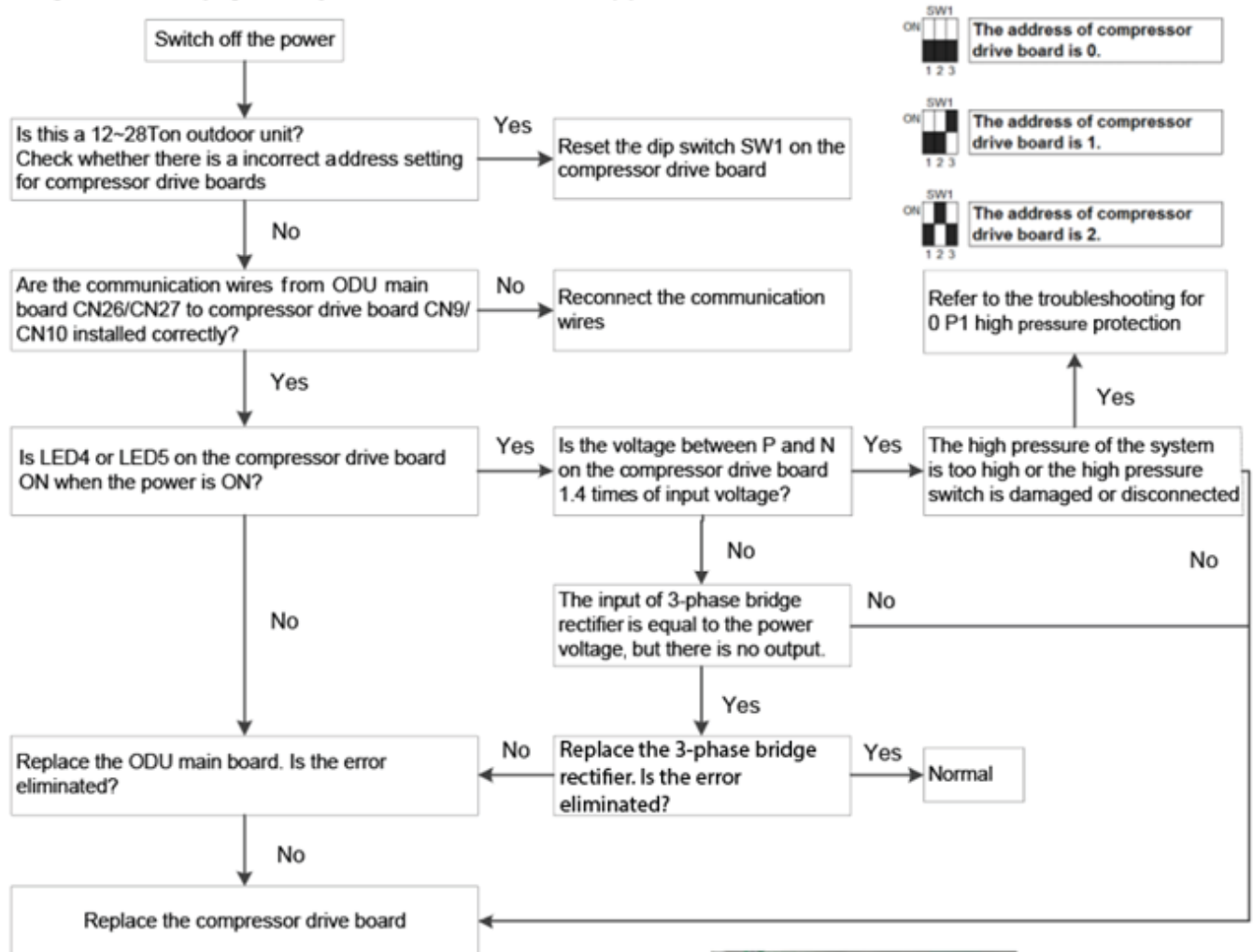
1. Error display:
ODU display:  E5
2. Applicable models:
38VMA***RDS(L)5-1, 38VMA***RDS(L)6-1
3. Error Definition:
Voltage of the ODU is not within the acceptable range
4. Possible causes:
 - Improper voltage
 - Lack of power supply phase for the ODU
 - Damaged transformer for 460V ODU
 - Improper wiring between AC filter board and main board
 - Damaged ODU main board



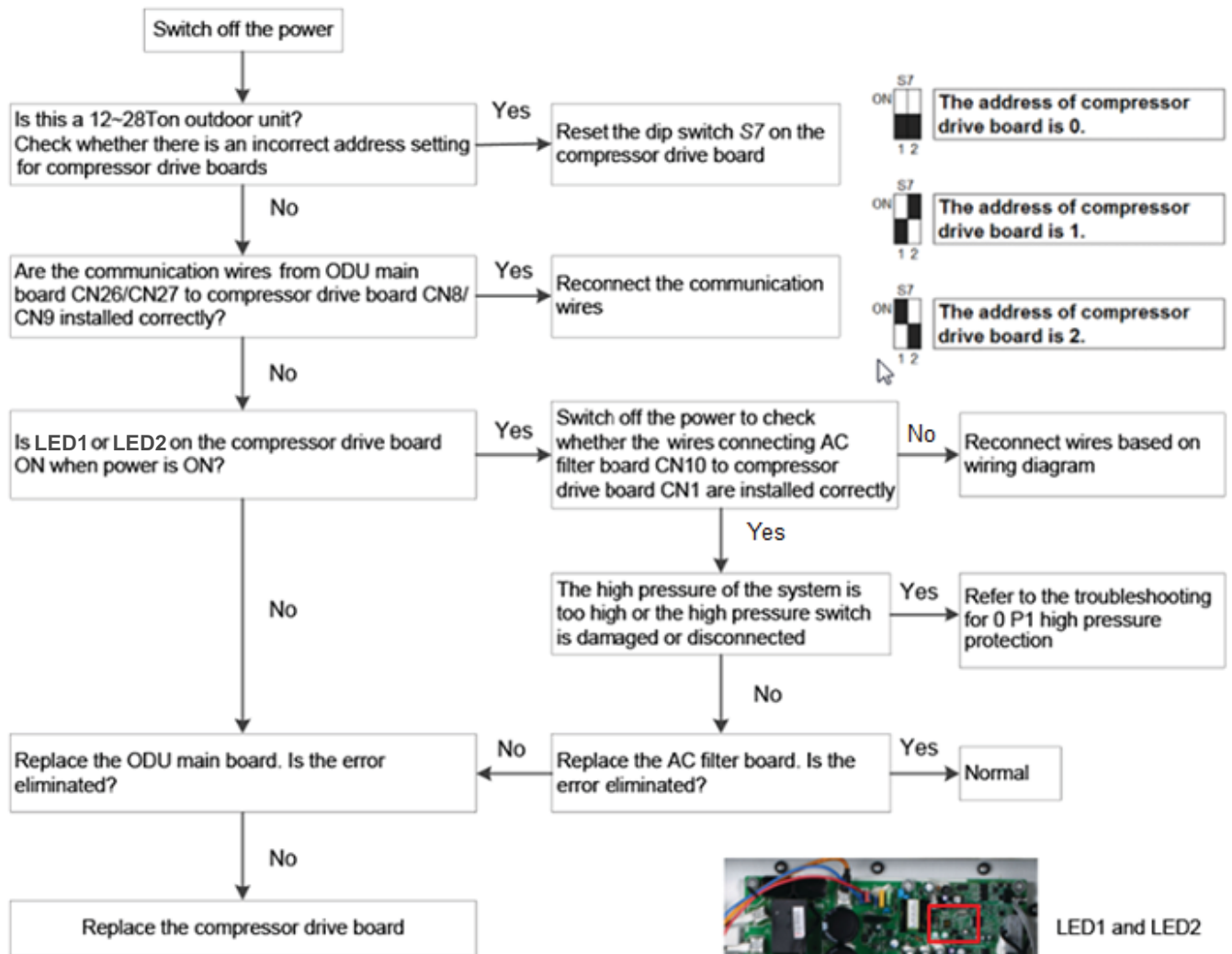
0H0~30 H0: COMMUNICATION ERROR BETWEEN MAIN BOARD AND COMPRESSOR DRIVE BOARD

1. Error display:
ODU display: 0 H0 / 20 H0 / 30 H0
2. Applicable models:
38VMA***RDS(L)5-1, 38VMA***RDS(L)6-1
3. Error Definition:
0 H0: Communication error between main board and compressor drive board on the main electric control box
20 H0: Communication error between main board and compressor drive board on the sub 1 electric control box
30 H0: Communication error between main board and compressor drive board on the sub 2 electric control box
4. Possible causes:
 - Duplicated or incorrect addresses for compressor drive board
 - Improper communication wiring between the main board and the compressor drive board
 - Damaged bridge rectifier
 - Damaged main board
 - Damaged compressor drive board

Judgment on this page is only suitable for 38VMA*RDS(L)5-1 i.e 208/230V-3Ph-60Hz ODU.**



Troubleshooting on this page is only suitable for 38VMA***RDS(L)6-1 i.e. 460V-3Ph-60Hz ODU.

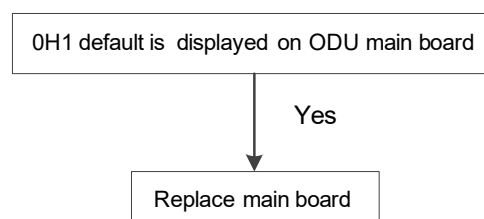


LED1 and LED2

Compressor Drive Board

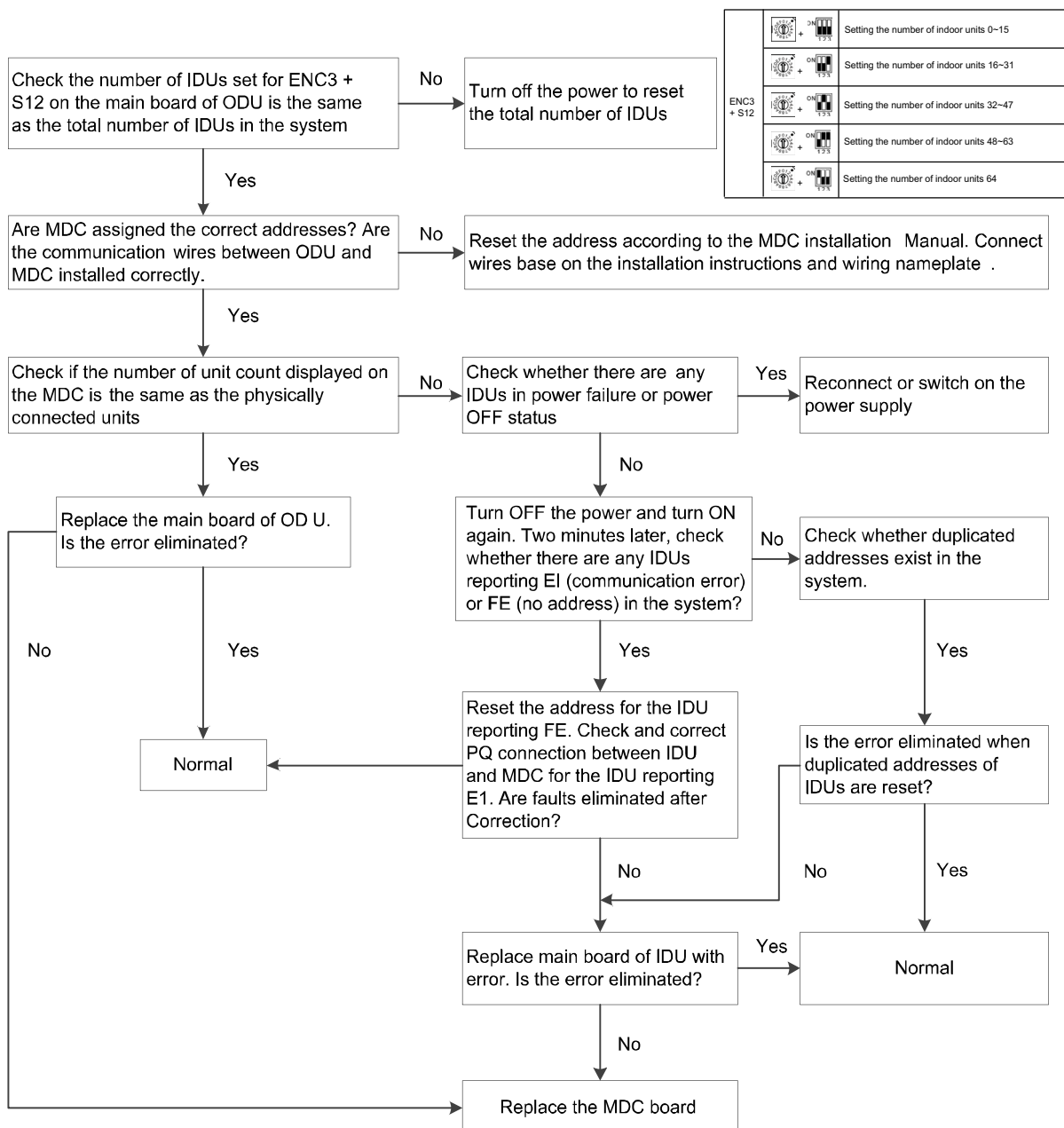
0 H1: COMMUNICATION ERROR BETWEEN MAIN CONTROL CHIP AND COMMUNICATION CHIP

1. Error display:
ODU display: H1
2. Applicable models:
38VMA***RDS(L)5-1, 38VMA***RDS(L)6-1
3. Error Definition:
Communication error between the main control chip IC55 and communication chip IC33 on main board
4. Possible causes:
Damaged main board of ODU



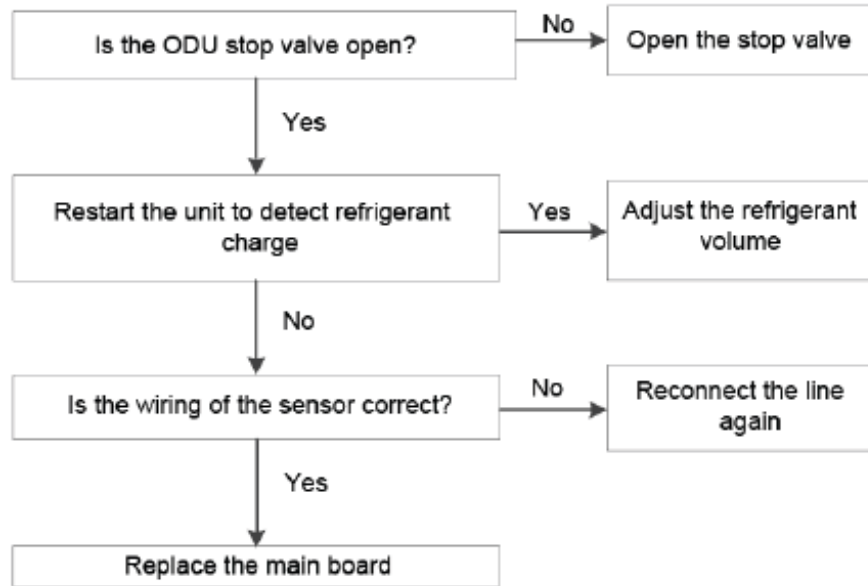
0 H7: INCORRECT NUMBER OF IDUS

1. Error display:
ODU display:  H7
2. Applicable models:
38VMA***RDS(L)5-1, 38VMA***RDS(L)6-1
3. Error Definition:
The number of physically connected indoor units to and outdoor unit does not match the ENC3 + S12.
4. Possible causes:
 - Incorrect number of IDUs set on the main board of the ODU
 - Duplicate addresses exist for the IDUs in the refrigerant system
 - Improper or incorrect power supplies for some IDUs
 - The communication wire from some IDUs to the MDC are installed incorrectly
 - Damaged individual transformer in the electric control box of MDC
 - Damaged main board to individual IDU
 - Damaged MDC board
 - Damaged ODU main board



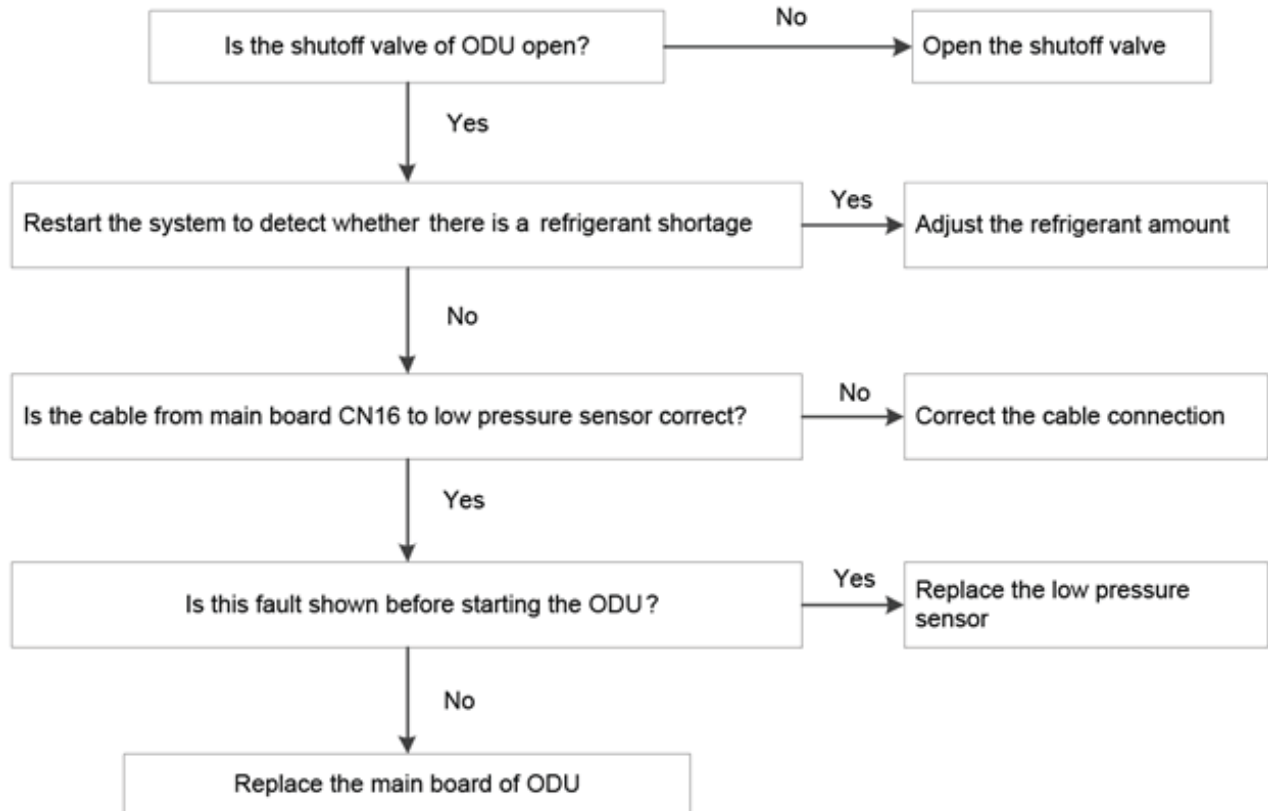
0 H7: HIGH PRESSURE SENSOR ERROR

1. Error display:
ODU display:
2. Applicable models:
38VMA***RDS(L)5-1, 38VMA***RDS(L)6-1
3. Error Definition:
In the condition that outdoor unit is operating or $T_4 \geq 14^{\circ}\text{F}$.
If the high pressure < 57.5 psig and lasts for 20 seconds, the high pressure sensor error is reported.
4. Possible causes:
 - The high pressure and low pressure error is caused by lack of refrigerant in the system
 - Damaged sensor
 - Damaged main board of outdoor unit



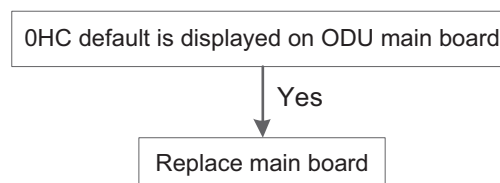
0 HB: LOW PRESSURE SENSOR ERROR

1. Error display:
ODU DISPLAY:
2. Applicable models:
38VMA***RDS(L)5-1, 38VMA***RDS(L)6-1
3. Error Definition:
 - The detected output voltage is beyond the low pressure sensor voltage characteristics in the Appendix.
 - The low pressure sensor is open or shorted.
4. Possible causes:
 - Low pressure is too low because of insufficient amount of refrigerant in the system
 - Damaged low pressure sensor
 - Damaged main board of ODU



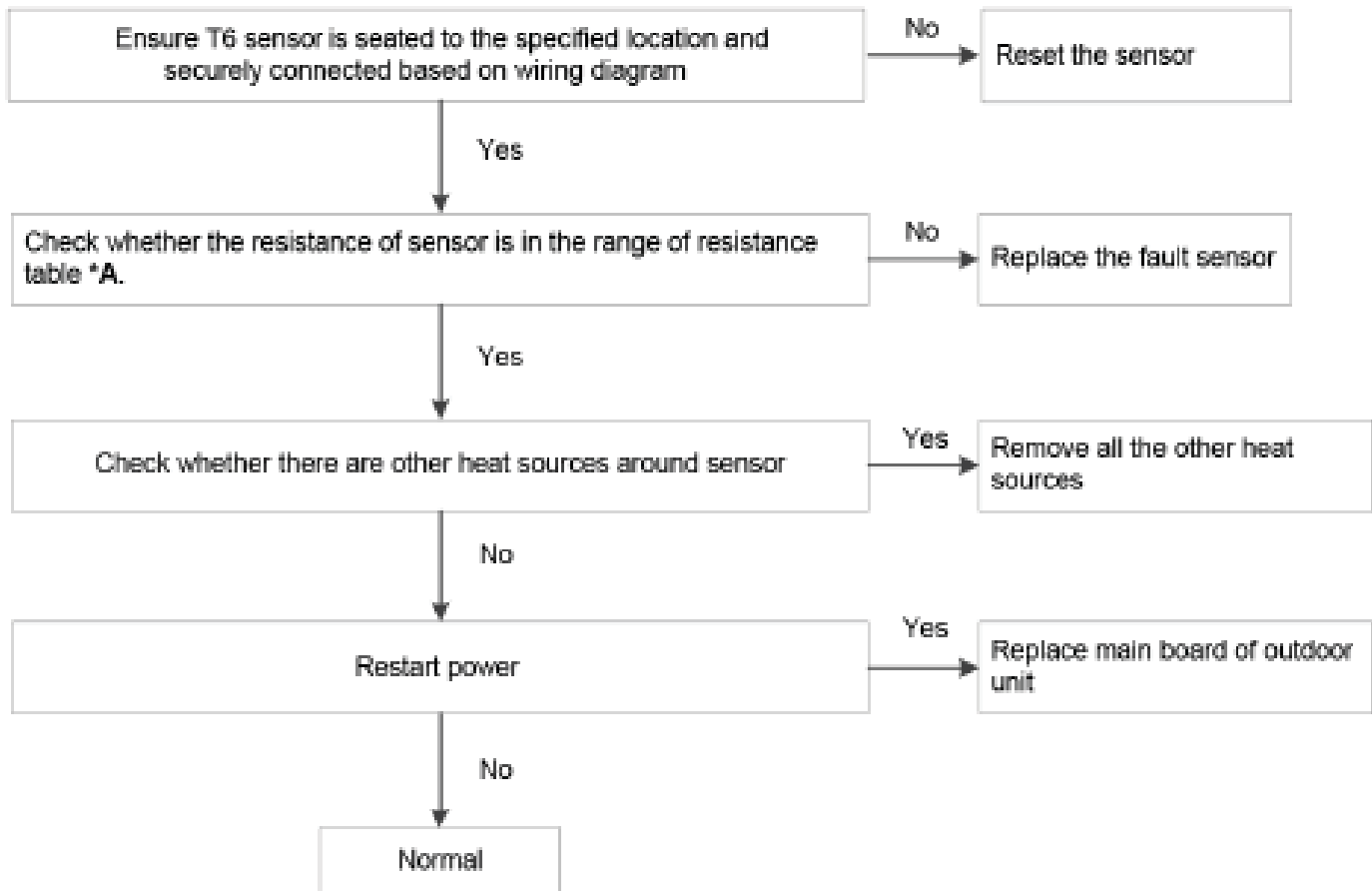
0 HC: UNMATCHED CAPACITY SETTING OF ODU

1. Error display:
ODU display: 0 HC (Only display on ODU)
2. Applicable models:
38VMA***RDS(L)5-1, 38VMA***RDS(L)6-1
3. Error Definition:
Unmatched ODU model setting
4. Possible causes:
 - Incorrect model setting for ODU
 - Damaged main board of ODU



0 F4: TEMPERATURE SENSOR (T6) ERROR

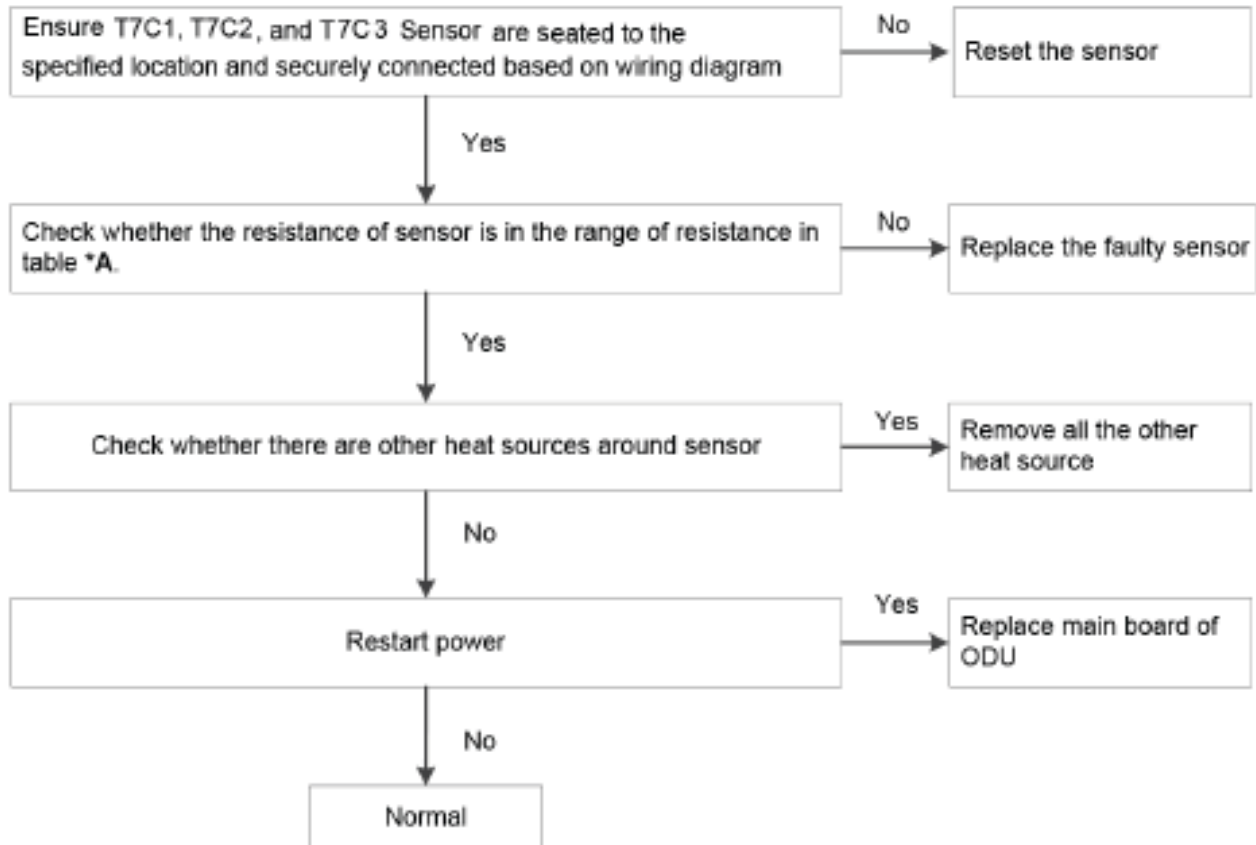
1. Error display:
ODU display: F4
2. Applicable models:
38VMA***RDS(L)5-1, 38VMA***RDS(L)6-1
3. Error Definition:
The temperature sensor (T6) is open or shorted.
The detected voltage $> 4.95\text{V}$ or $< 0.05\text{V}$.
4. Possible causes:
 - Loose connection between sensor and main board
 - Temperature sensor failure
 - Heat sources around the sensor
 - Damaged main board of ODU



*A Refer to “Resistance Table of Ambient Temperature Sensor” in Appendix.

0 F5: Temperature Sensor (T7) Error

1. Error display:
ODU display:
2. Applicable models:
38VMA***RDS(L)5-1, 38VMA***RDS(L)6-1
3. Error Definition:
T7C1, T7C2, and T7C3 temperature sensor is open or shorted. Detected voltage > 4.95V or < 0.05V.
4. Possible causes:
 - Loose connection between sensor and main board
 - Temperature sensor failure
 - There are heat sources around the sensor
 - Damaged main board of ODU



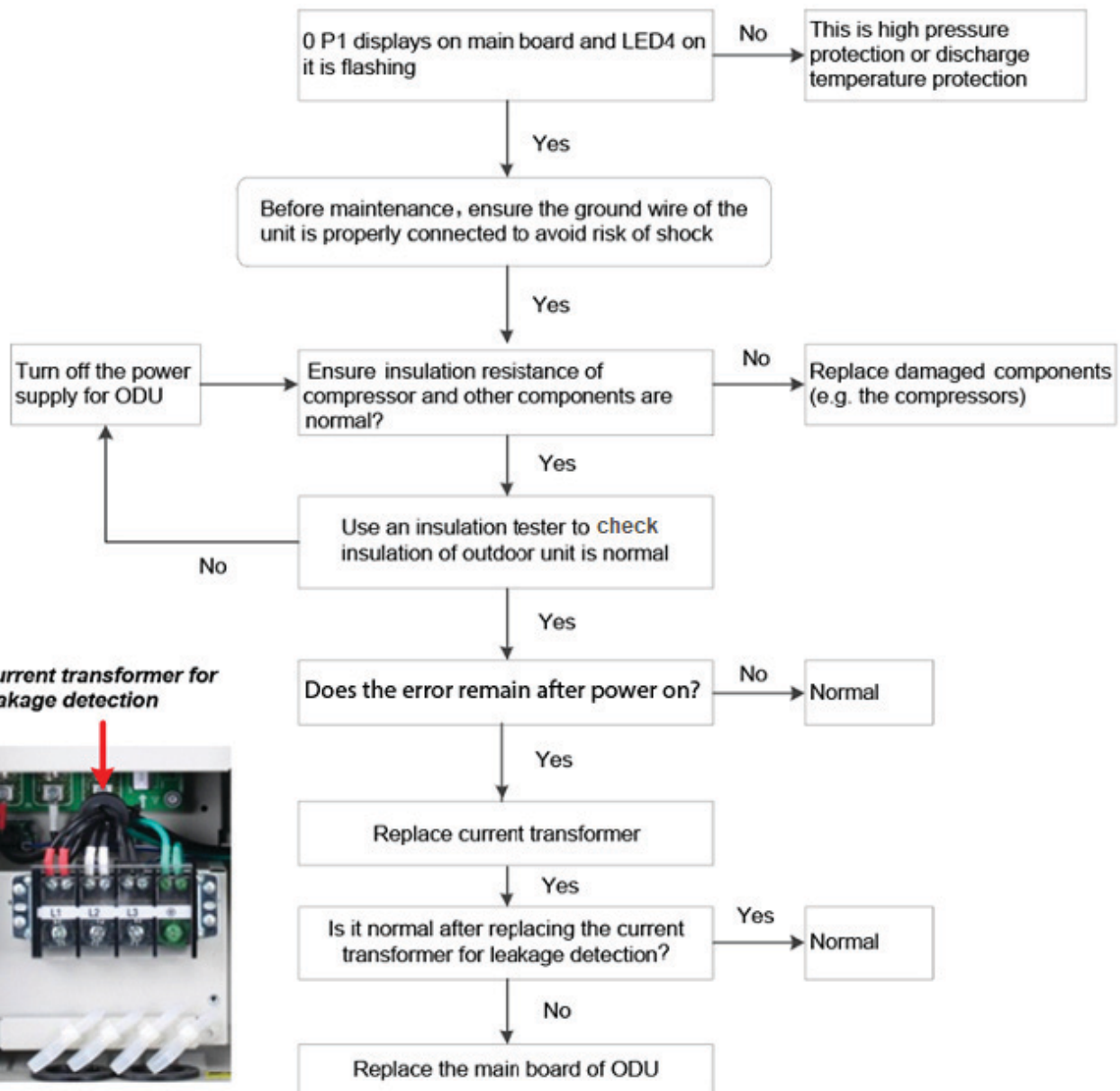
*A Refer to “Resistance Table of Ambient Temperature Sensor” in Appendix.

0 F8: MDC Error

1. Error display:
ODU display:
2. Applicable models:
38VMA***RDS(L)5-1, 38VMA***RDS(L)6-1
3. Error Definition:
MDC error in the system
4. Possible causes:
 - MDC in error status

0 P1: CURRENT LEAKAGE PROTECTION

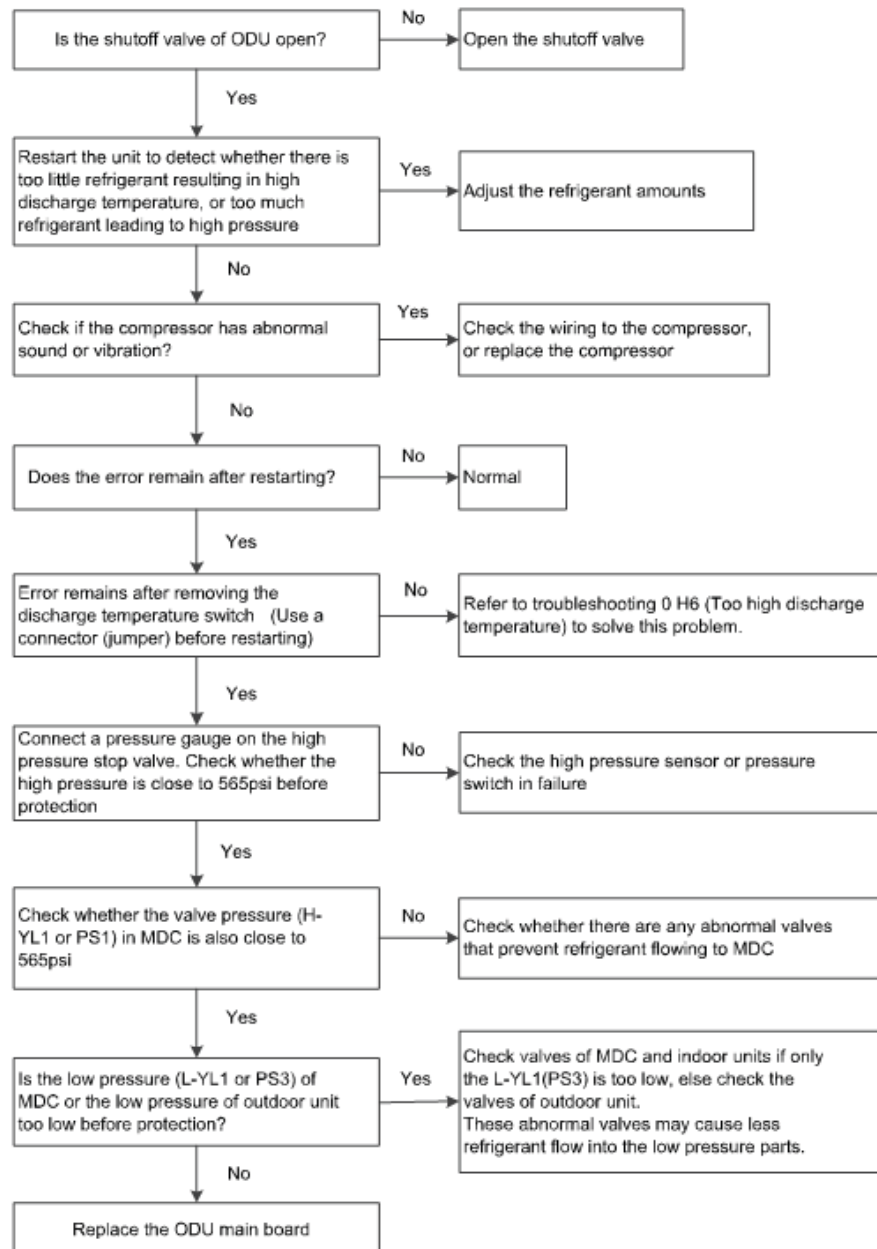
1. Error display:
ODU display:  P1
2. Applicable models:
38VMA***RDS(L)5-1, 38VMA***RDS(L)6-1
3. Error Definition:
The detected value of current leakage exceeds the predefined value
4. Possible causes:
 - Abnormal insulation resistance and leakage for unit parts
 - Damaged current transformer
 - Damaged main board of ODU



NOTE: If leakage protection occurs three times in one hour, press the “SW2” button for three seconds to reset.

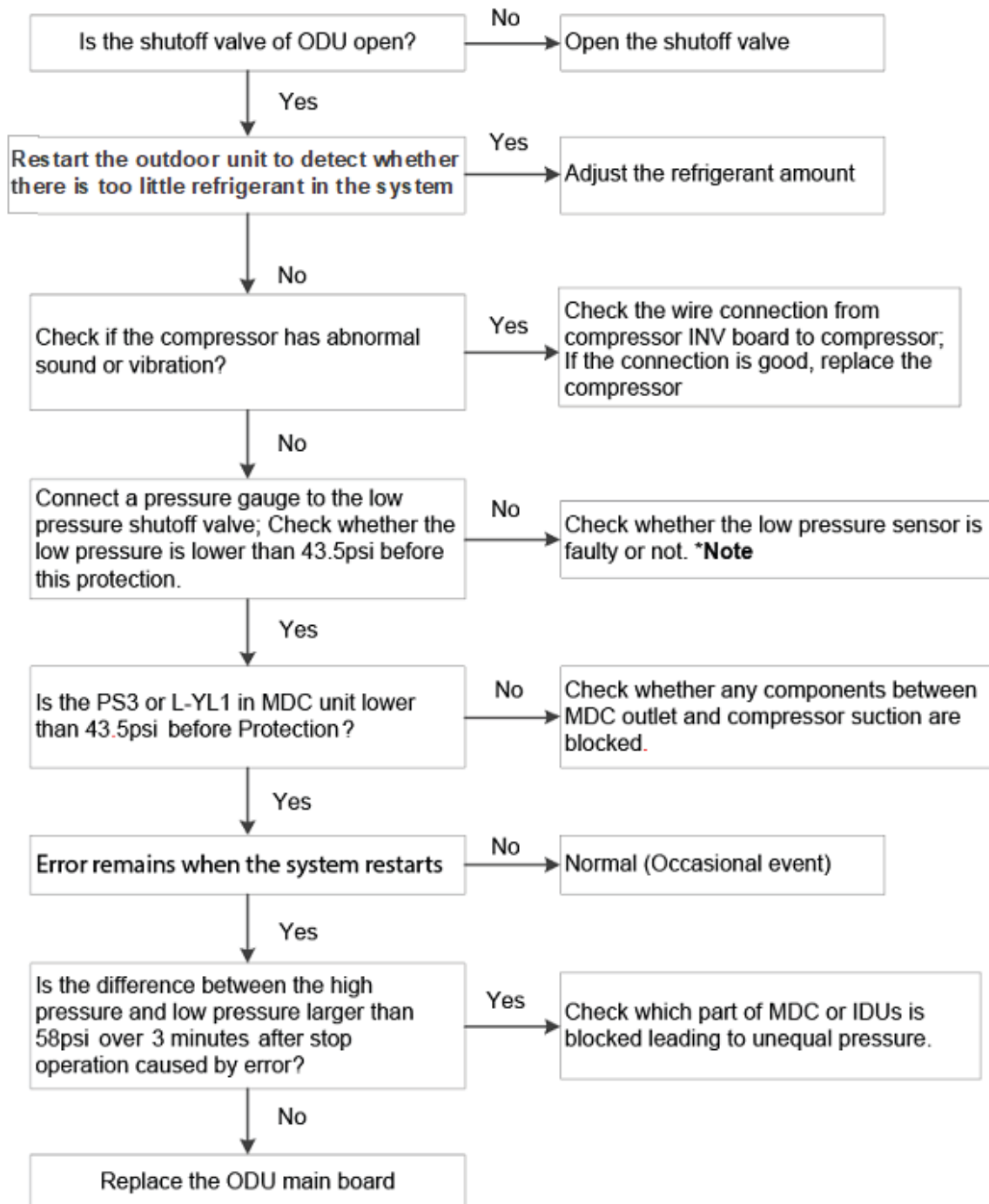
0 P1: DISCHARGE TEMPERATURE SWITCH OR HIGH PRESSURE PROTECTION

1. Error display:
ODU display:  P1
2. Applicable models:
38VMA***RDS(L)5-1, 38VMA***RDS(L)6-1
3. Error Definition:
The detected discharge temperature is no less than 239°F or the detected high pressure is no less than 565 psi.
4. Possible causes:
 - Extremely high pressure for too much refrigerant
 - Extremely high discharge temperature caused by less refrigerant
 - Liquid spraying function error caused by valve error (i.e. SVME) in MDC
 - The refrigerant has been blocked in high pressure zone
 - because of a damaged valve
 - Bypass control sensors SV5, SV7, SVMC, or SVME to equalize pressure are damaged
 - Compressor
 - is operating in reverse due to incorrect wiring sequence
 - Defective ODU main board



0 P2 or 0 H5: LOW PRESSURE PROTECTION

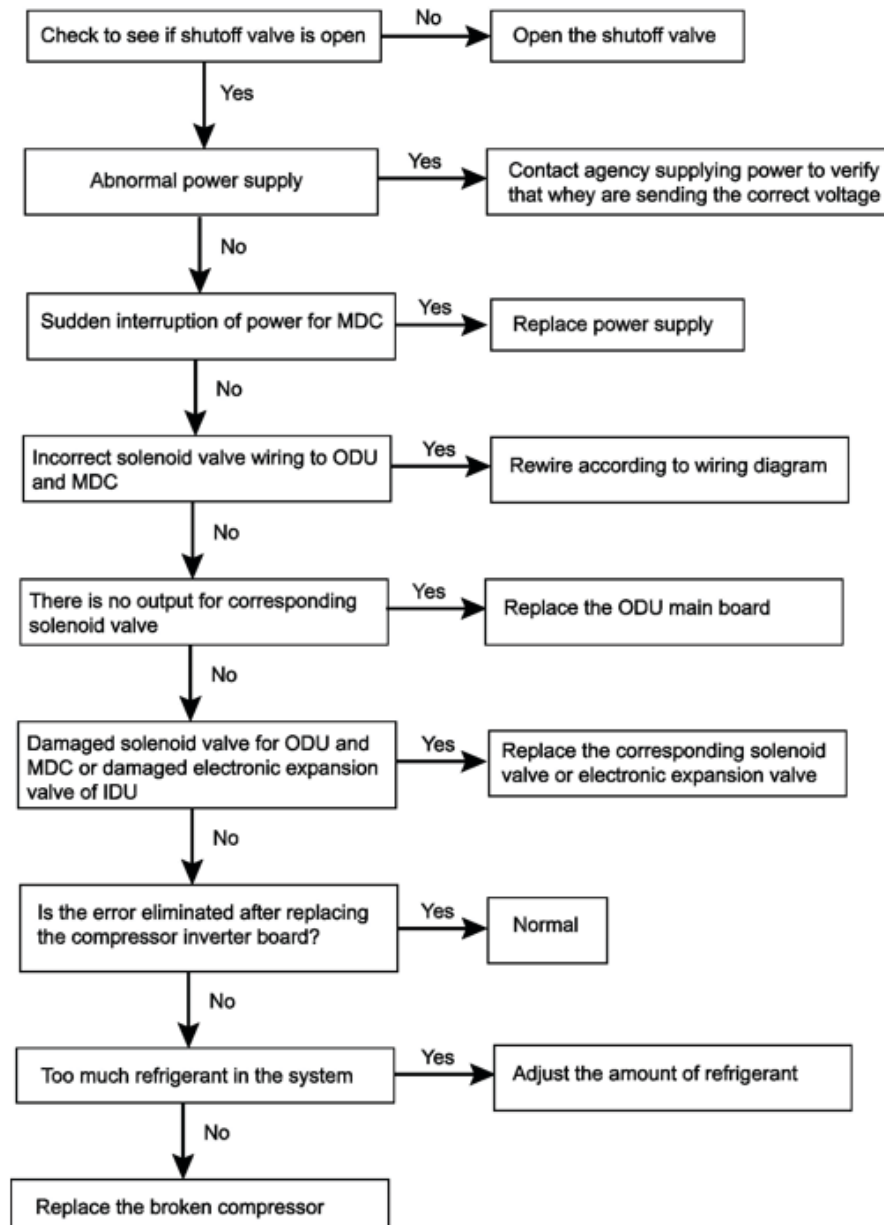
1. Error display:
ODU display: 0 P2 or 0 H5
2. Applicable models:
38VMA***RDS(L)5-1, 38VMA***RDS(L)6-1
3. Error Definition:
0 P2 error will be shown when the detected value of low pressure is less than 28.5 psig.
0 H5 error will be shown when 0 P2 has occurred five times in 100 minutes.
4. Possible causes:
 - Not enough refrigerant in the system
 - Error caused by damaged sensor
 - Defective main board of outdoor unit
 - Refrigerant has been blocked in high pressure zone because of damaged valve



*A Refer to “Resistance Table of Ambient Temperature Sensor” in Appendix.

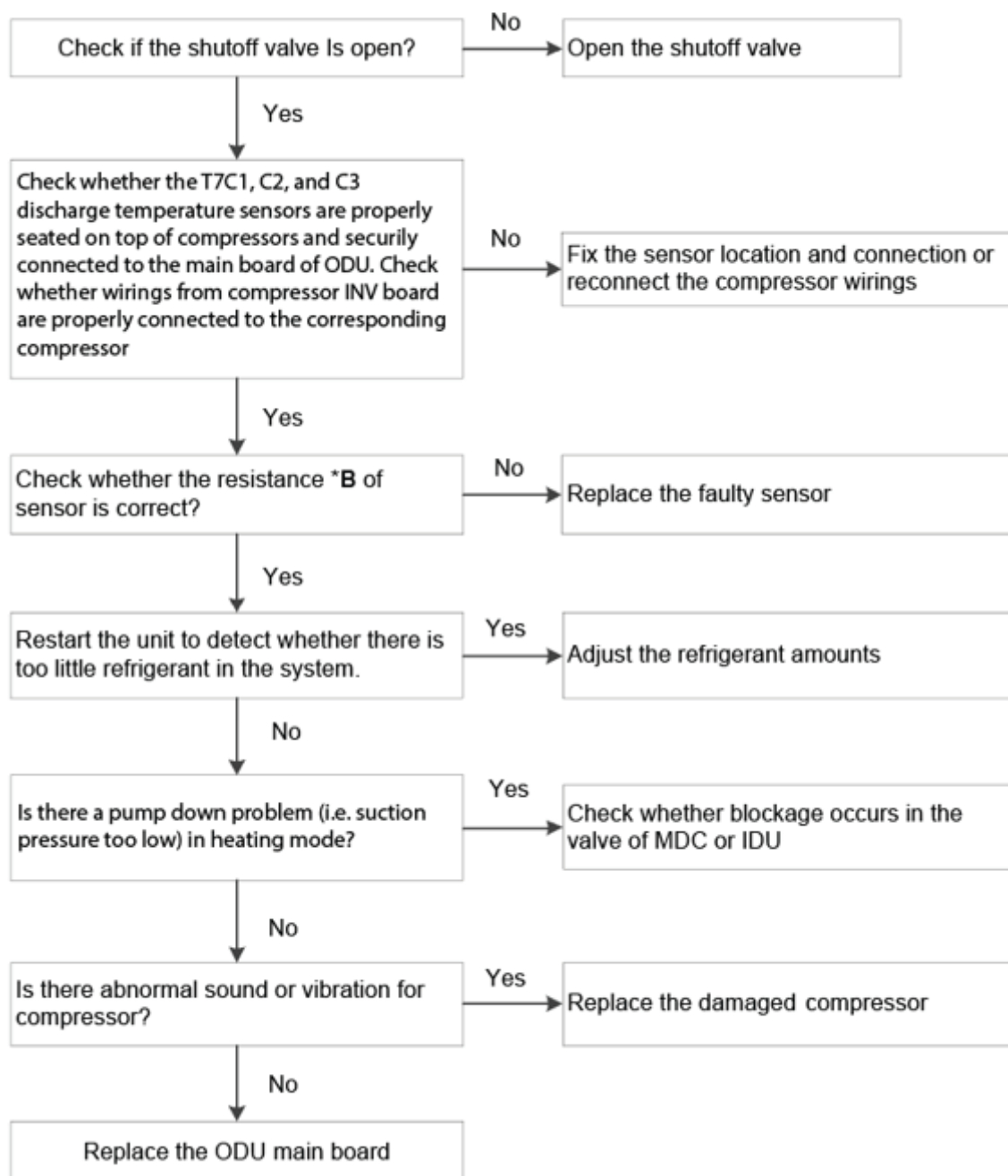
0 P3: OVERCURRENT PROTECTION OF COMPRESSOR

1. Error display:
ODU display: (For ODU only)
2. Applicable models:
38VMA***RDS(L)5-1, 38VMA***RDS(L)6-1
3. Error Definition:
The detected compressor current is not within the range of set value
Note:** 38A for 38VMARDS(L)5-1 and 22A for 38VMA***RDS(L)6-1
4. Possible causes:
 - Shutoff valve is closed
 - Abnormal power supply voltage
 - Wiring error for solenoid valve or damaged solenoid valves
 - Damaged main board or compressor inverter board
 - Too much refrigerant in the system resulting in liquid slugging at compressor
 - MDC is suddenly powered off
 - Damaged electronic expansion valve in IDU
 - Damaged Compressor



0 P4 or 0 H6: DISCHARGE TEMPERATURE PROTECTION

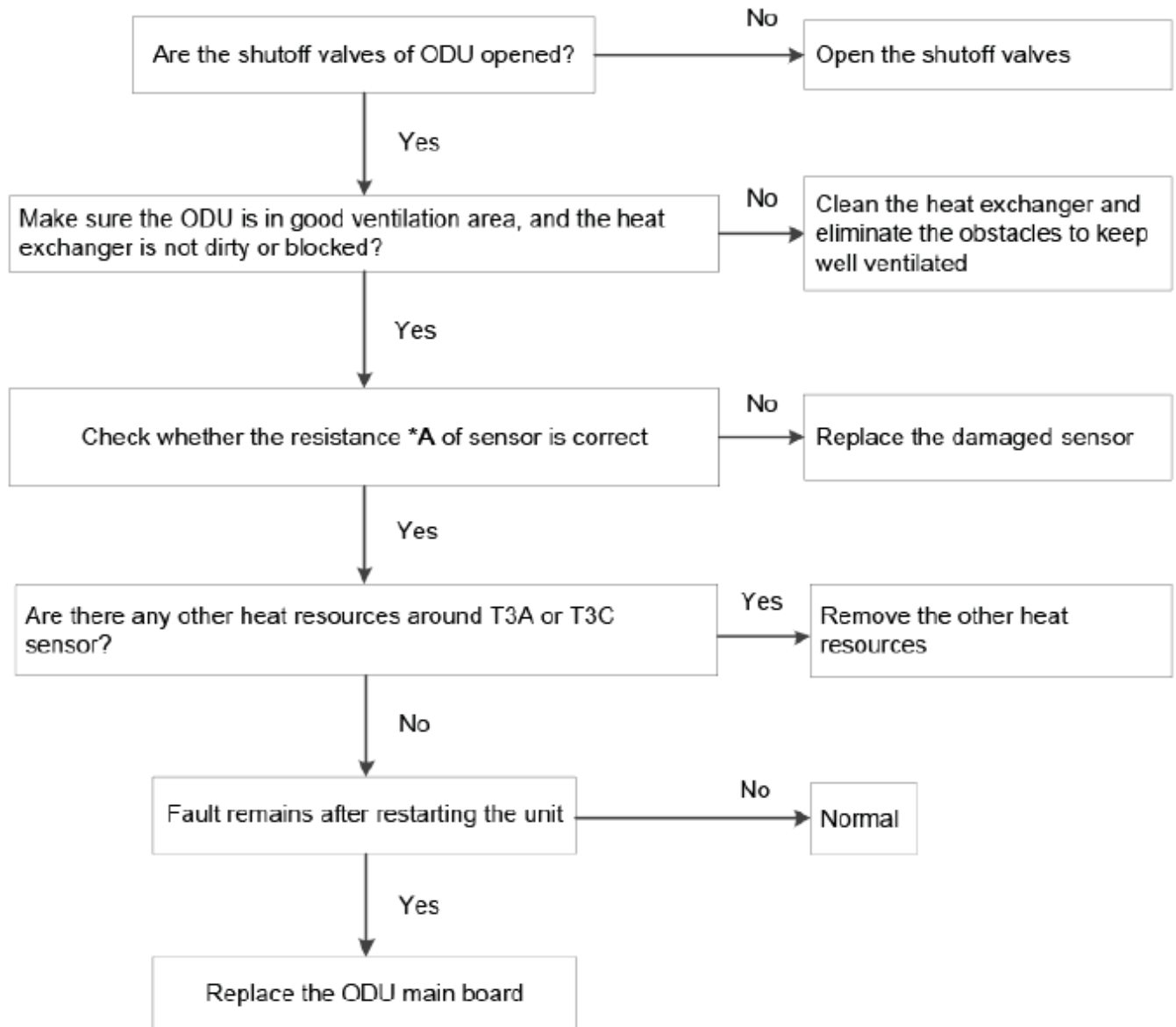
1. Error display:
ODU display: **P4** or **H6**
2. Applicable models:
38VMA***RDS(L)5-1, 38VMA***RDS(L)6-1
3. Error Definition:
0 P4 will be reported when the maximum detected value is larger than 239°F.
0 H6 will be reported when 0 P4 occurs 3 times within 100 minutes.
4. Possible causes:
 - Too high discharge temperature caused by little refrigerant remains in the system
 - Damaged sensor
 - Damaged main board
 - Lack of cooling function caused by the damaged valve of MDC (i.e. SVME)
 - The refrigerant blocked in high pressure side due to improper operation of the valve



*A Refer to “Resistance Table of Discharge Temperature Sensor” in Appendix.

0 P5: CONDENSER TEMPERATURE PROTECTION

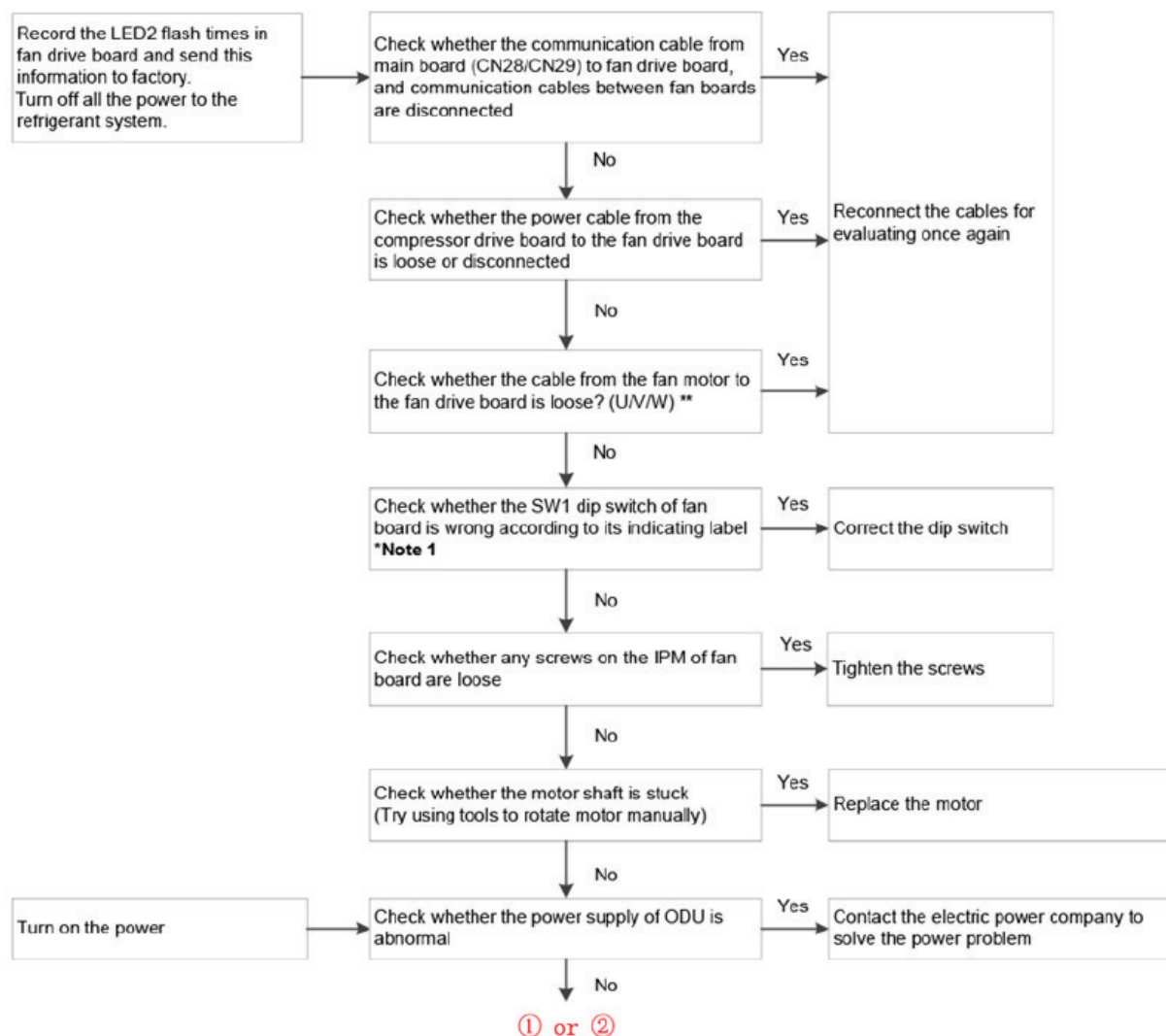
1. Error display:
ODU display:  P5
2. Applicable models:
38VMA***RDS(L)5-1, 38VMA***RDS(L)6-1
3. Error Definition:
The maximum T3A or T3C condenser temperature is $> 149^{\circ}\text{F}$.
The unit will restart once the maximum T3A or T3C $< 131^{\circ}\text{F}$.
4. Possible causes:
 - Shutoff valve is closed
 - Heat exchanger is in worse ventilation
 - Temperature sensor failure
 - There are other heat sources around the
 - T3A or T3C sensor
 - Damaged main board of ODU



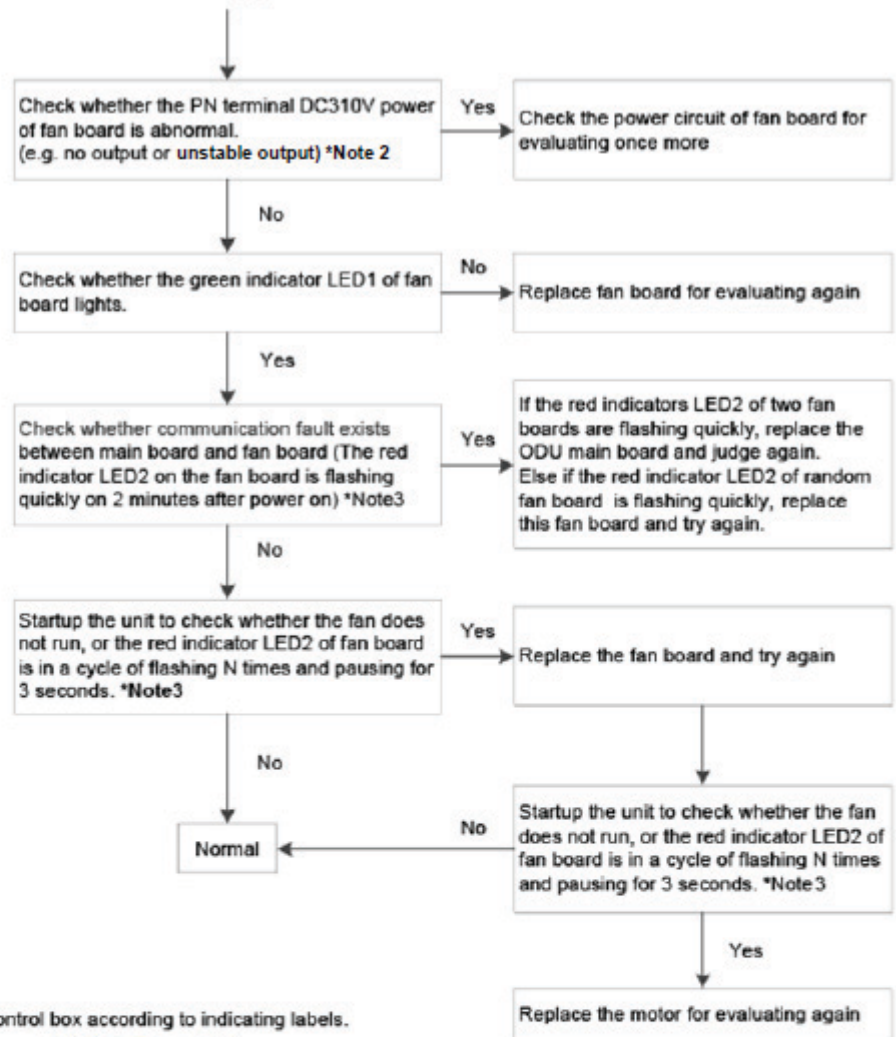
*A Refer to “Resistance Table of Ambient Temperature Sensor” in Appendix.

0 P9 or 0 H9: DC FAN PROTECTION

1. Error display:
ODU display: or
2. Applicable models:
38VMA***RDS(L)5-1, 38VMA***RDS(L)6-1
3. Error definition:
Multiple errors related to ODU fan motor and fan motor drive.
0 H9 will be reported in the LED display if 0 P9 occurs for 12 times within 100 minutes.
Check whether the following are normal:
 - Fan motor of ODU
 - Fan board and its dip switch setting
 - Power supply of fan board
 - Communication wiring between fan board and main board of ODU
4. Possible causes:
 - Improper wiring between the main board to the fan board, power lines from the power supply circuit to the fan board, or from the fan motor to the fan board
 - Incorrect installation of DIP-IPM screws on the fan board
 - Damaged power circuit of fan board
 - Incorrect setting of dip switch of fan board
 - Damaged fan board
 - Damaged fan motor
 - Damaged main board of ODU



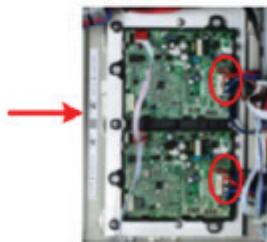
① Use this page for the models 38VMA***RDS(L)5-1 i.e 230V-3Ph-60Hz ODU



Note1

Check the dip switches in the electronic control box according to indicating labels.

The indicating labels of dip switches.
Please refer to 3.2.2.4 DC Fan Drive Board for more information.



** Cables from the motor to fan board

Note2

It is recommended to make measurement of PN voltage for the positions as follows.



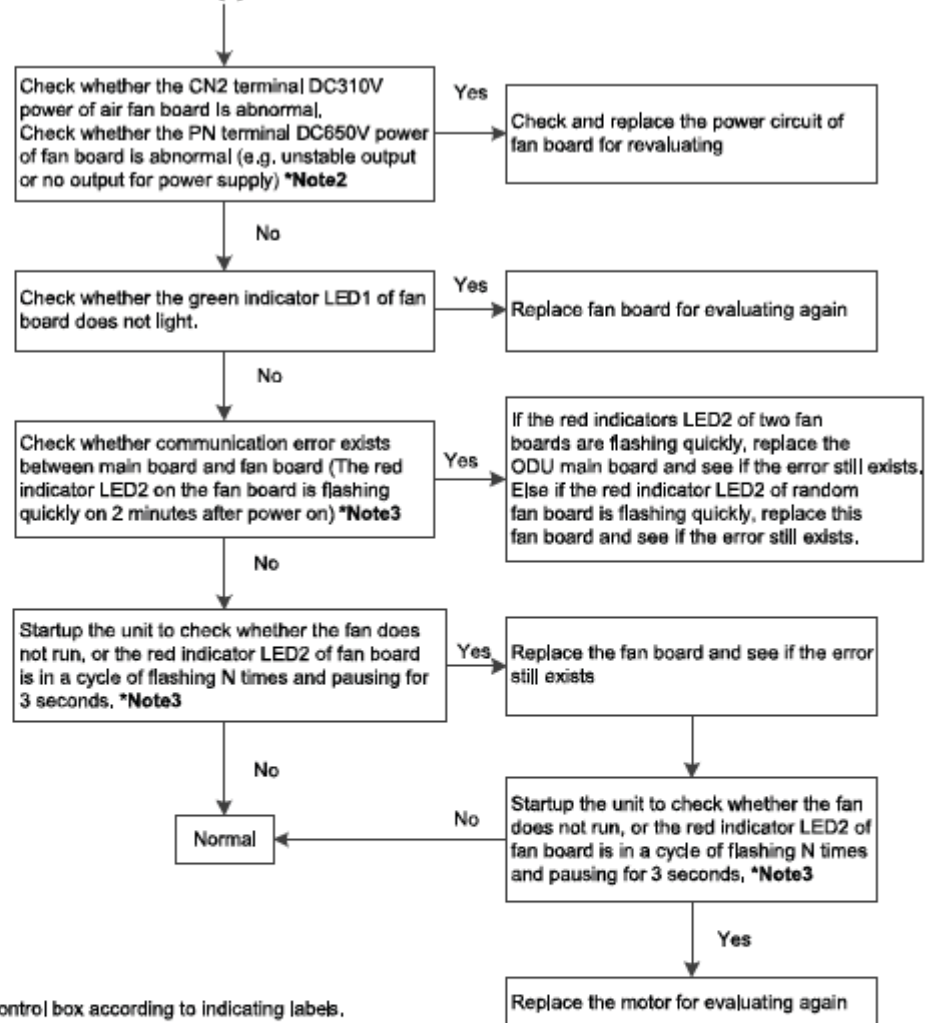
P end: the pin close R0 and R7

N end: Negative polarity next to the screen printing

Note3

For communication fault, LED2 is flashing in the frequency of 3.3Hz;
For other fault, LED2 is flashing in the frequency of 1.25Hz

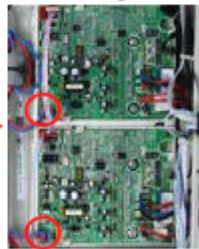
② Use this page for the model 38VMA***RDS(L)6-1 i.e 460V-3Ph-60Hz ODU



Note1

Check the dip switches in the electronic control box according to indicating labels.

The indicating labels of dip switches. Please refer to 3.2.2.4 DC Fan Drive Board for more information.



Note2

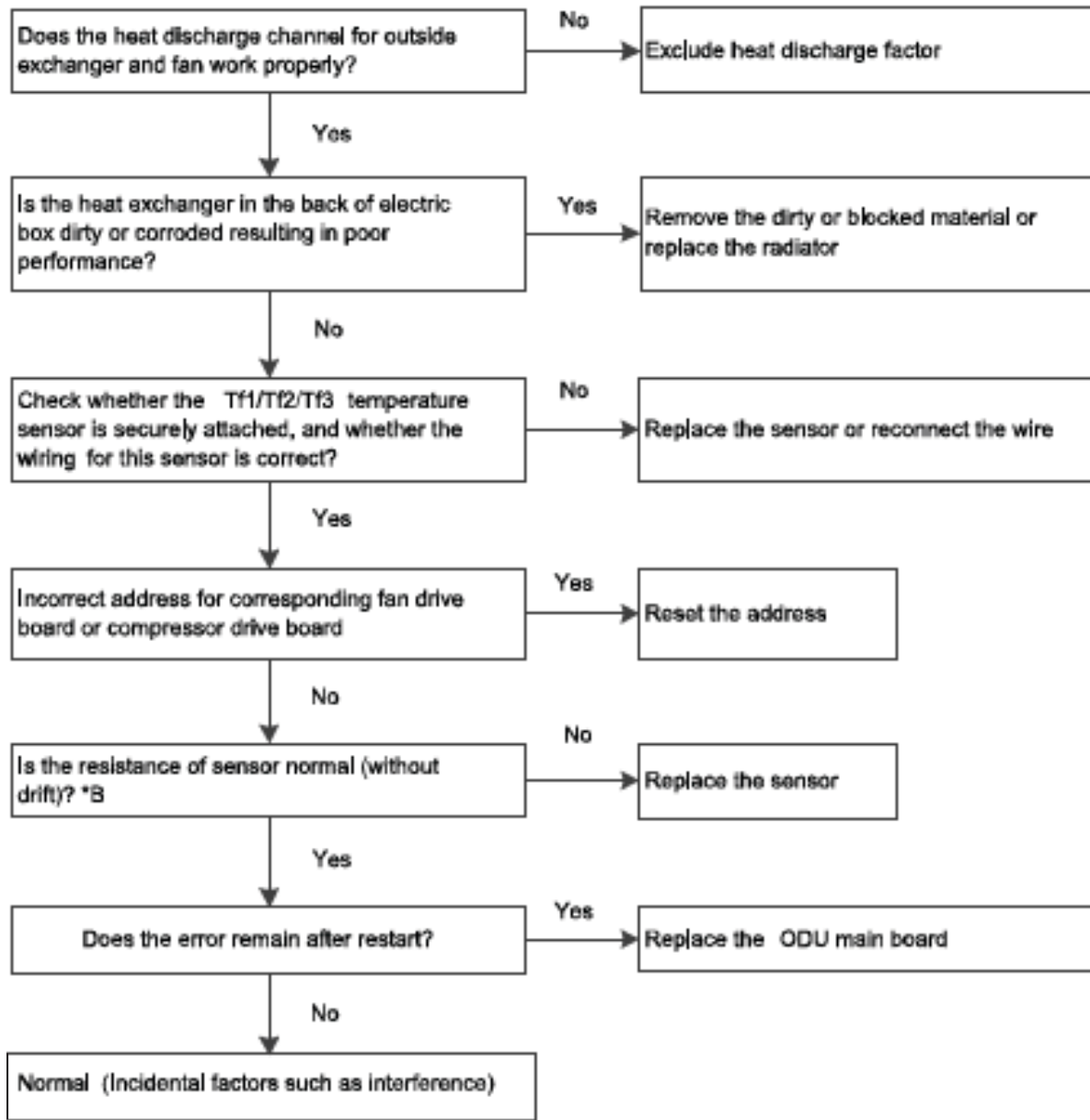
Make a measurement of PN voltage for the positions circled above.

Note3

For communication error, LED2 is flashing in the frequency of 3.3Hz;
For other errors, LED2 is flashing in the frequency of 1.25Hz

0 PL or 0 C7: INVERTER MODULE TEMPERATURE PROTECTION

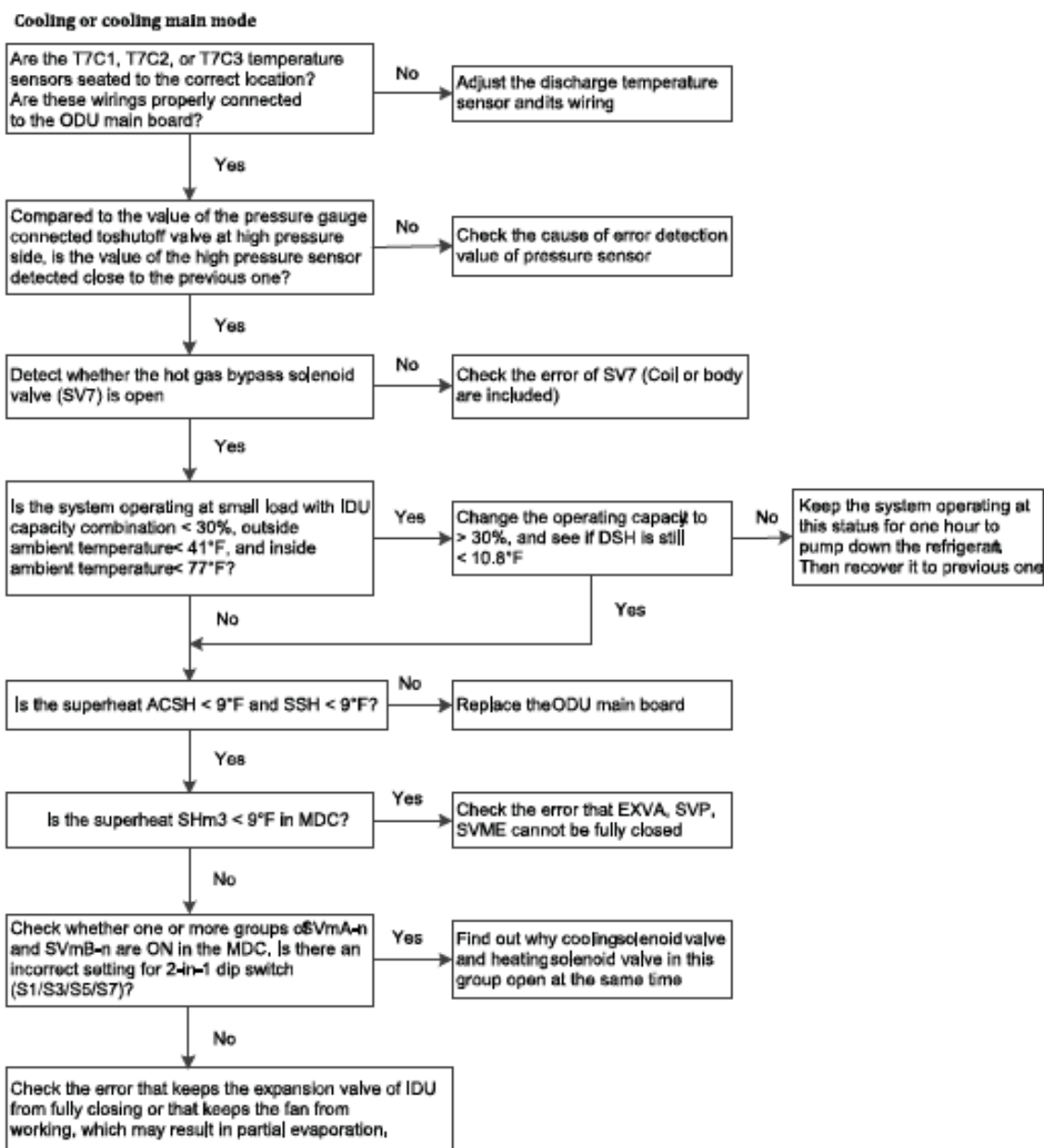
1. Error display:
ODU display: or
2. Applicable models:
38VMA***RDS(L)5-1, 38VMA***RDS(L)6-1
3. Error definition:
0 PL error is reported when the temperature of the inverter module is registered on the main board $Tf1/Tf2/Tf3 > 172^{\circ}\text{F}$, and 0 C7 is reported when 0 PL occurs three times within 100 minutes.
4. Possible causes:
 - Improper heat rejection channel
 - Damaged Tf1, Tf2, Tf3 sensor
 - Damaged ODU main board
 - Clogged fin of radiator resulting in poor heat transfer
 - Incorrect address for fan drive board during maintenance
 - Incorrect address for compressor drive board during maintenance



*B Refer to “Resistance Table of Discharge Temperature Sensor” in Appendix.

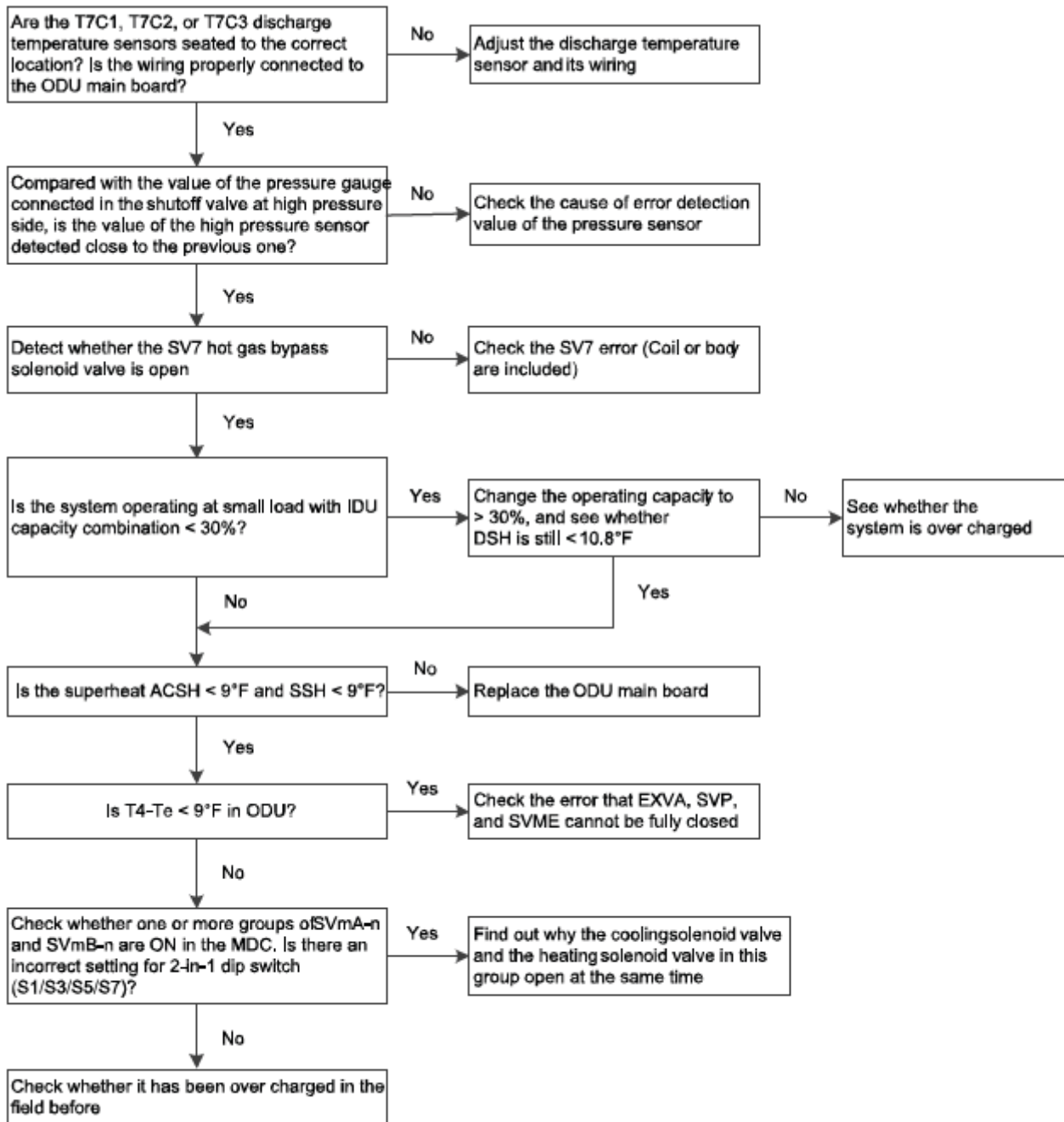
0 PP or 0 F0: LIQUID SLUGGING PROTECTION

1. Error display:
ODU display: or
2. Applicable models:
38VMA***RDS(L)5-1, 38VMA***RDS(L)6-1
3. Error definition:
The discharge superheat of compressor is less than 10.8°F for an extended period of time.
If 0 PP protection occurs four times within a 200 minute period, 0 F0 error will be reported on the digital display of the main board.
4. Possible causes:
 - Improper operation (closing) of valves on IDU or MDC
 - Damaged discharge temperature sensor
 - Damaged ODU main board
 - Excess refrigerant charge
 - Improper operation of hot gas bypass valve (SV7)



DSH: The superheat degree of discharge temperature
 ACSH: The superheat degree of ACC outlet [ACSH = $T_6 - T_{e(sat)}$]
 SSH: The superheat degree of suction temperature [SSH = $T_7 - T_{e(sat)} + 1.8^{\circ}\text{F}$]

Heating or heating main mode



DSH: The superheat degree of discharge temperature

ACSH: The superheat degree of ACC outlet $[ACSH = T6 - Te(sat)]$

SSH: The superheat degree of suction temperature $[SSH = T7 - Te(sat) + 1.8°F]$

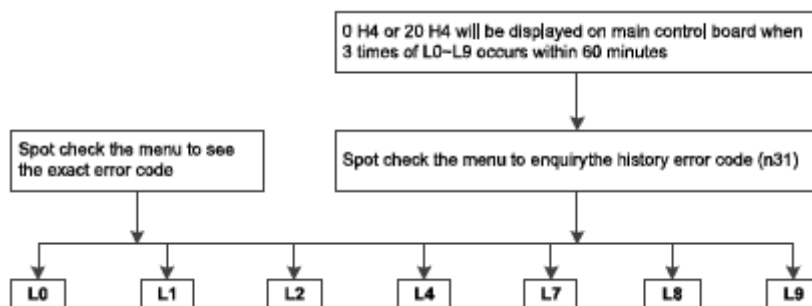
L0~L9 or (0H4~30H4): COMPRESSOR INV MODULE PROTECTION

1. Error display:

For the L0~L9 error, the display on the main board is identical to that in standby status. Check to see each error code. See the following table for more information.

If L0~L9 protection occurs three times within a 60 minute period,

will be reported on the digital display



2. Applicable models:

38VMA***RDS(L)5-1, 38VMA***RDS(L)6-1

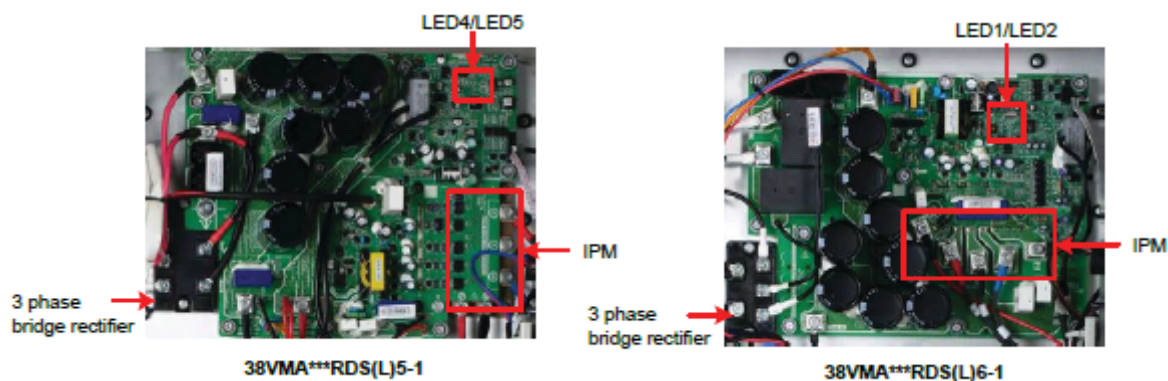
3. Error definition:

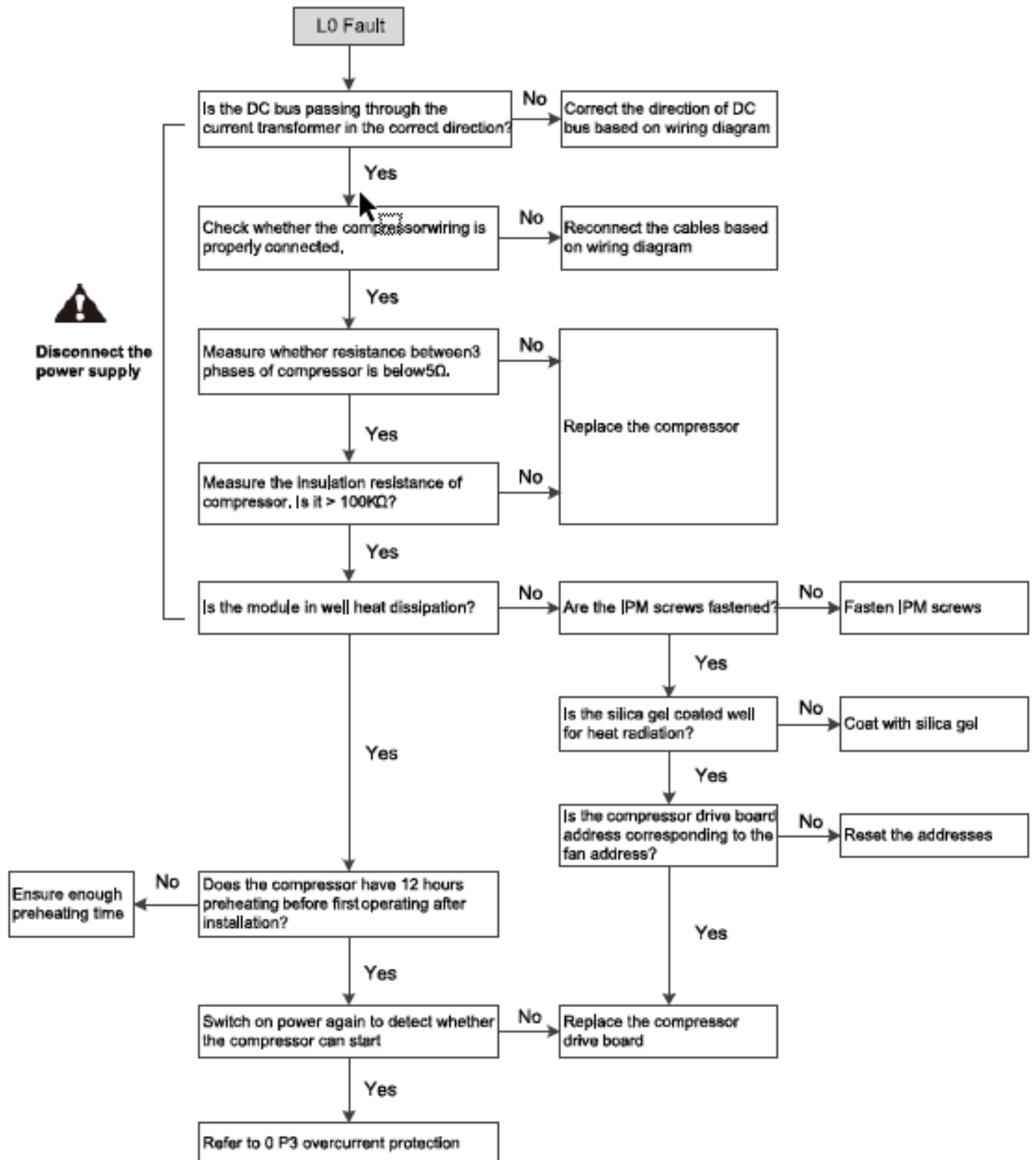
Compressor module protection

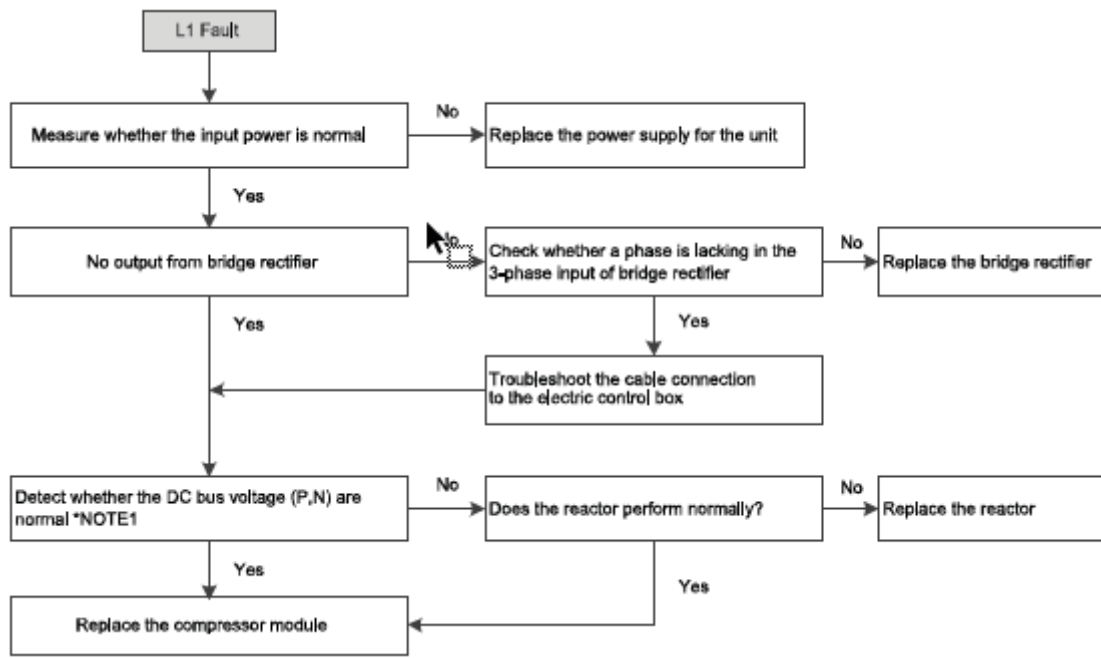
Error	Detailed Definition	Green LED (number of flashes)	Red LED
Compressor Module Protection	L0: Error in compressor module	8	Light on for first time
	L1: DC bus under-voltage protection	9	
	L2: DC bus over-voltage protection	10	
	L4: MCE error / synchronization / closed loop	12	
	L7: Phase lack protection for 3-phase line U/V/W in compressor	15	
	L8: Protection for transient variation $\geq 15\text{Hz}$ between the former moment (2sec) and the next moment	16	
	L9: Protection for speed difference between transient variation and actual operation $> 15\text{Hz}$	17	

4. Possible causes:

- Improper heat transfer by ODU system
- Improper heat transfer by IPM, IPM thermal protection
- Improper input voltage for power supply
- Improper connection for 3-phase U/V/W lines to compressor
- Damaged compressor module
- Damaged compressor
- Improper refrigerant charge in the system

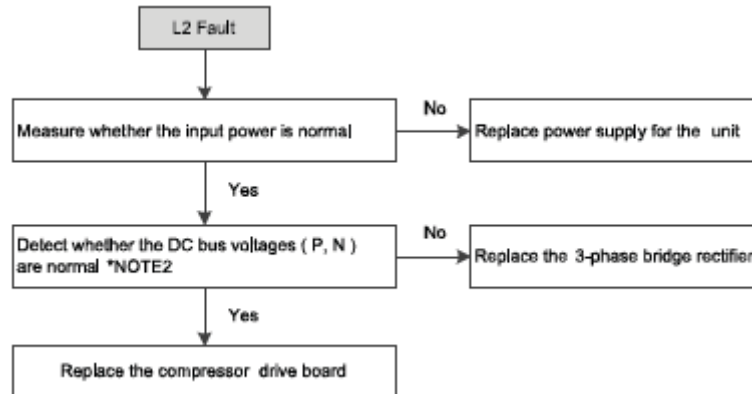






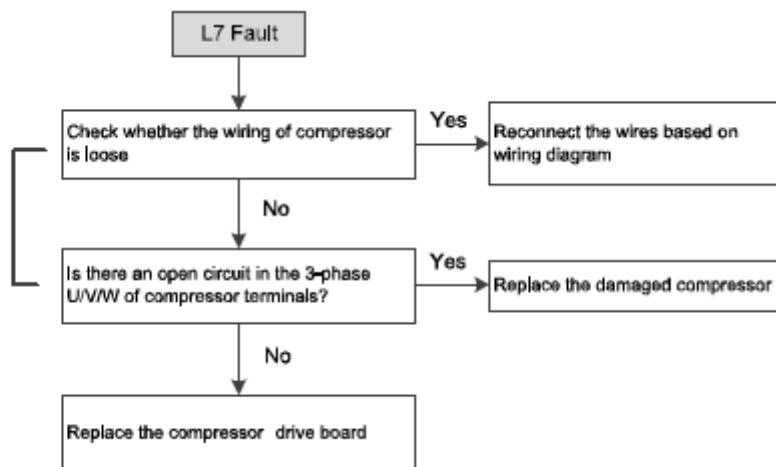
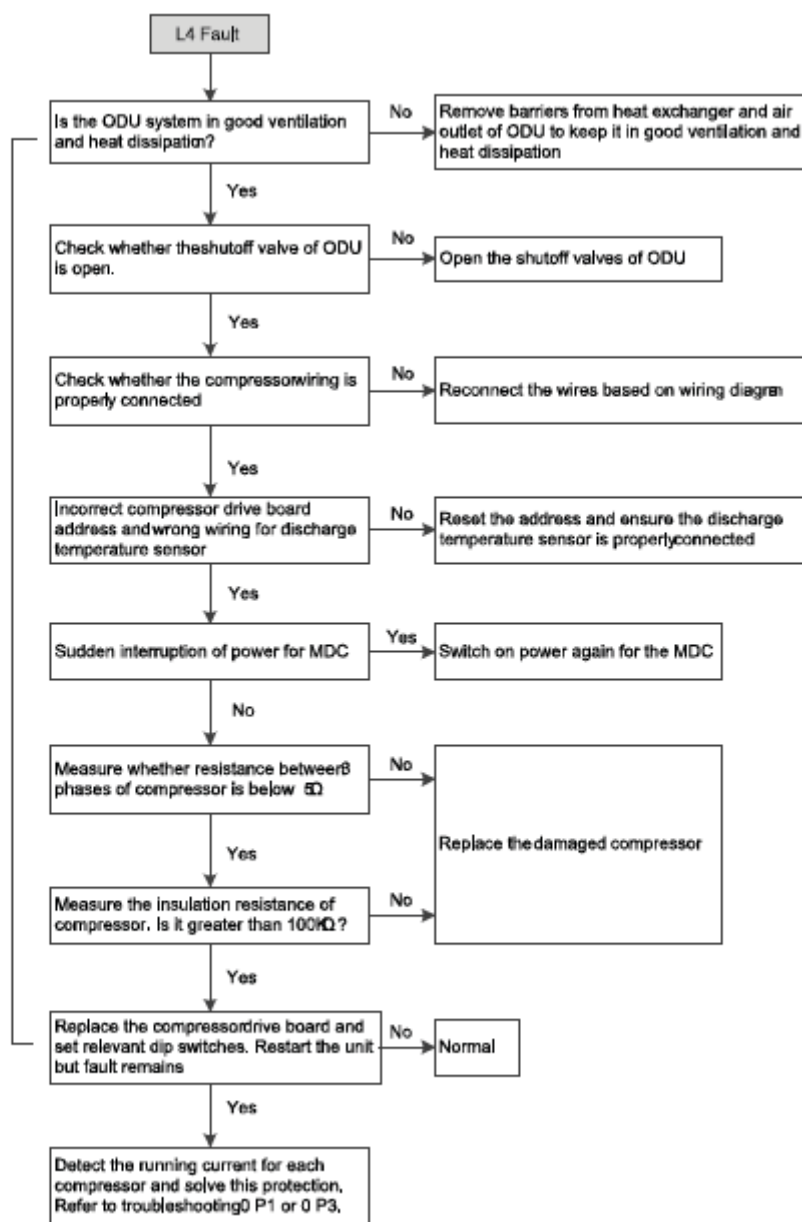
NOTE1:

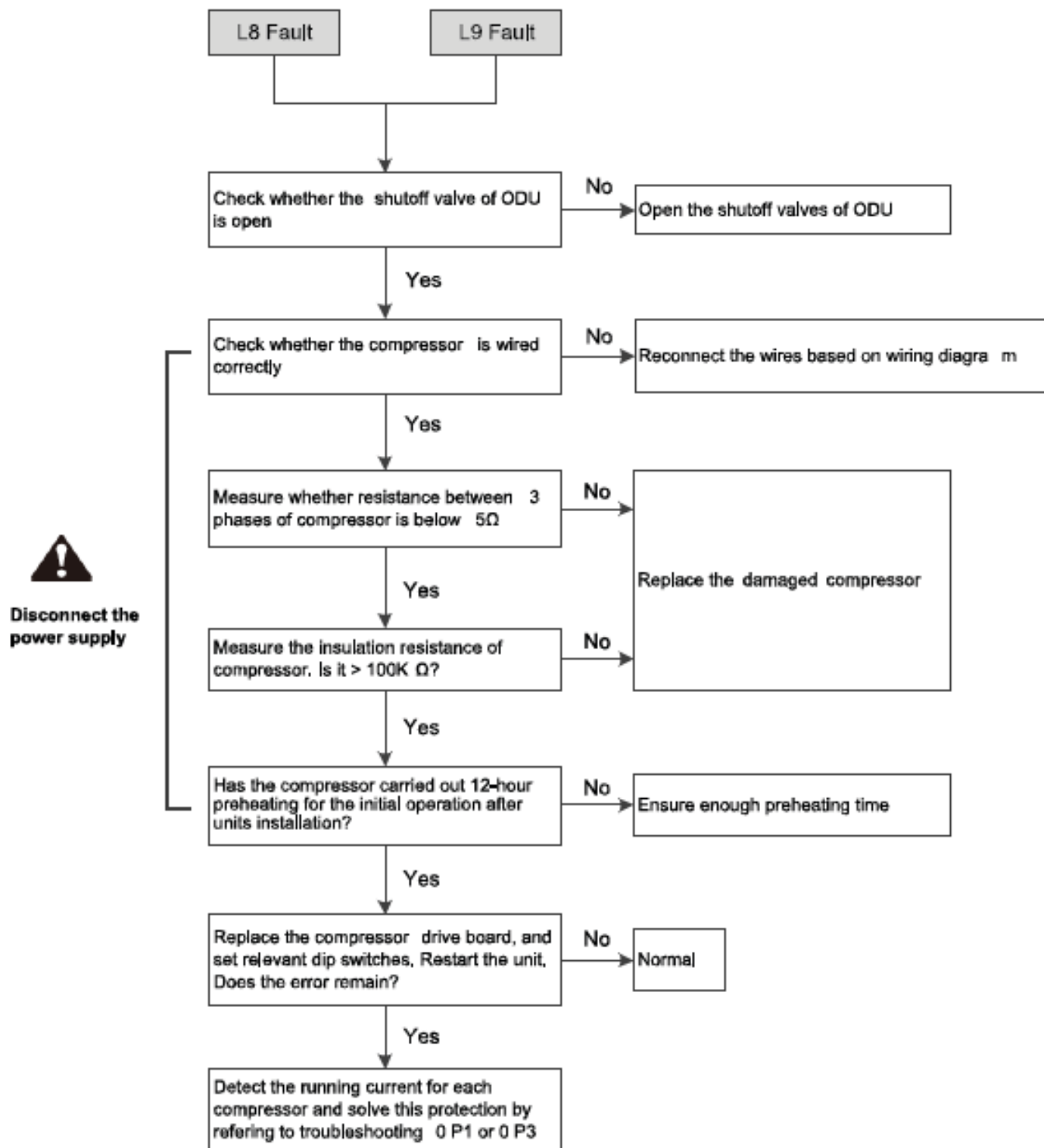
- 38VMA***RDS(L)5-1 230V-3Ph-60Hz:
L1 error will be reported when it is < 150VDC.
- 38VMA***RDS(L)6-1 460V-3Ph-60Hz:
L1 error will be reported when it is < 400VDC.



NOTE2:

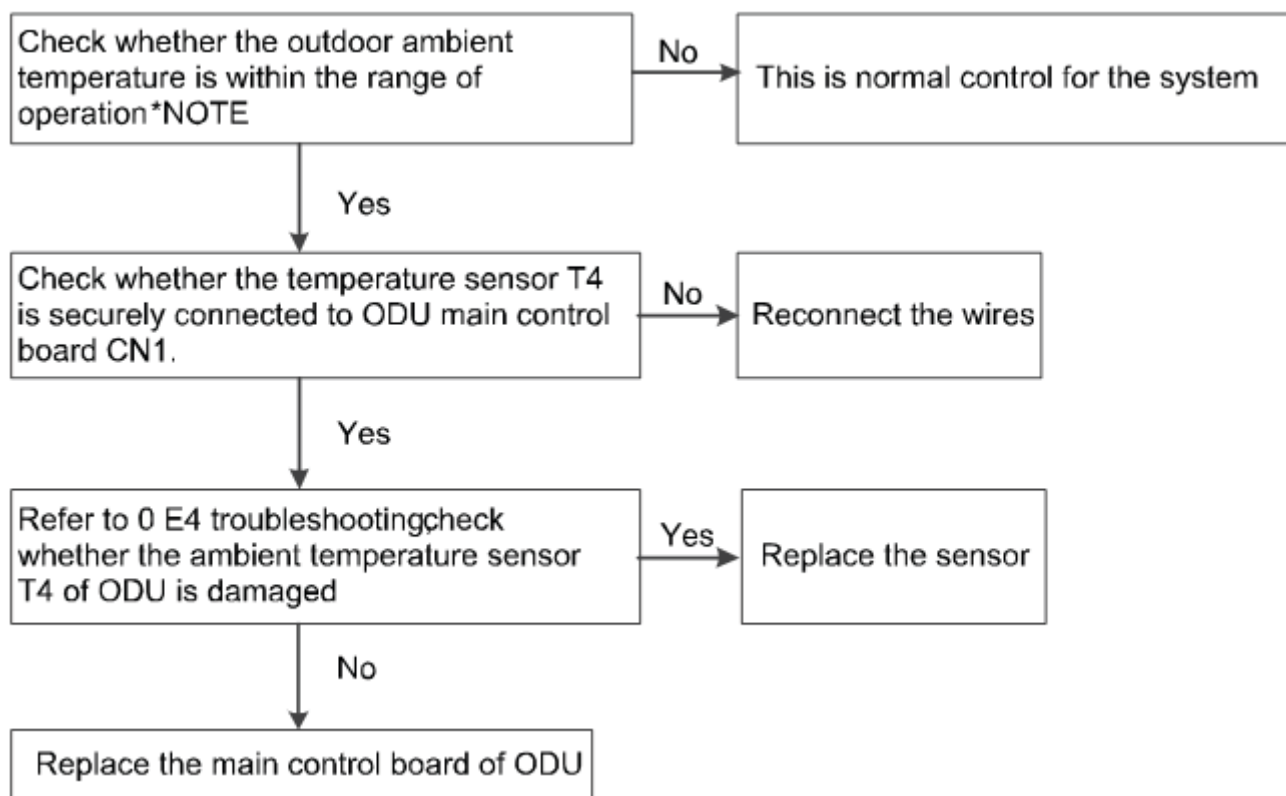
- 38VMA***RDS(L)5-1 230V-3Ph-60Hz:
L2 error will be reported when it is higher than 500VDC.
- 38VMA***RDS(L)6-1 460V-3Ph-60Hz:
L2 error will be reported when it is higher than 800VDC.





A TL: AMBIENT TEMPERATURE OPERATING LIMIT

1. Error display:
ODU display: **F 5L** (For ODU only)
2. Applicable models:
38VMA***RDS(L)5-1, 38VMA***RDS(L)6-1
3. Error definition:
ODU operating outside the allowable limits (allowable limits: cooling 5~125°F DB, heating -13~75°F DB)
4. Possible causes:
 - The ODU ambient temperature exceeds the allowable operational limit
 - Damaged ambient temperature sensor
 - Damaged main board



NOTE: Refer to Operational Limits in this manual.

Troubleshooting MDC



Caution

Make sure power is disconnected from the unit before connecting or disconnection any port/connector on the PC board.
When the LED indication lamp is intermittently flashing, there is a communication error.

LED	NORMALLY ON	SLOW FLASH *1	FLASH *2
LED1 Lamp (Red)	Outdoor unit is ON	Outdoor unit in standby mode	Communication error with outdoor unit
LED2 Lamp (Blue)	Indoor unit is ON for that micro processor	Indoor unit is OFF for that micro processor	Communication error with indoor unit

*1 Slow Flash: 1Hz

*2 Flash: 2Hz

Table 65 —MDC error codes displayed on the units display (DSP1 and DSP2)

DISPLAY	ERROR CODE DEFINITION
S E0	Communication error with outdoor unit
S E1	T1 temperature sensor error
S E2	T2 temperature sensor error
S E3	T3 temperature sensor error
S E4	High pressure sensor error
S E5	Intermediate pressure sensor error
S E6	Low pressure sensor error
S EP	Condensate switch error
S P1	High pressure protection
SC ER	Mismatched refrigerant piping and communication wiring for a given indoor unit
no 1d	No indoor unit connected to port 1 of main MDC
no A0	Incorrect address for MDC
CS x	More than two IDUs connected to single port on MDC

If the LED of the main MDC displays **SC ER**, a commissioning test has been accomplished successfully.
The power of MDC should be switched off and on again so that the LED can display the actual status.

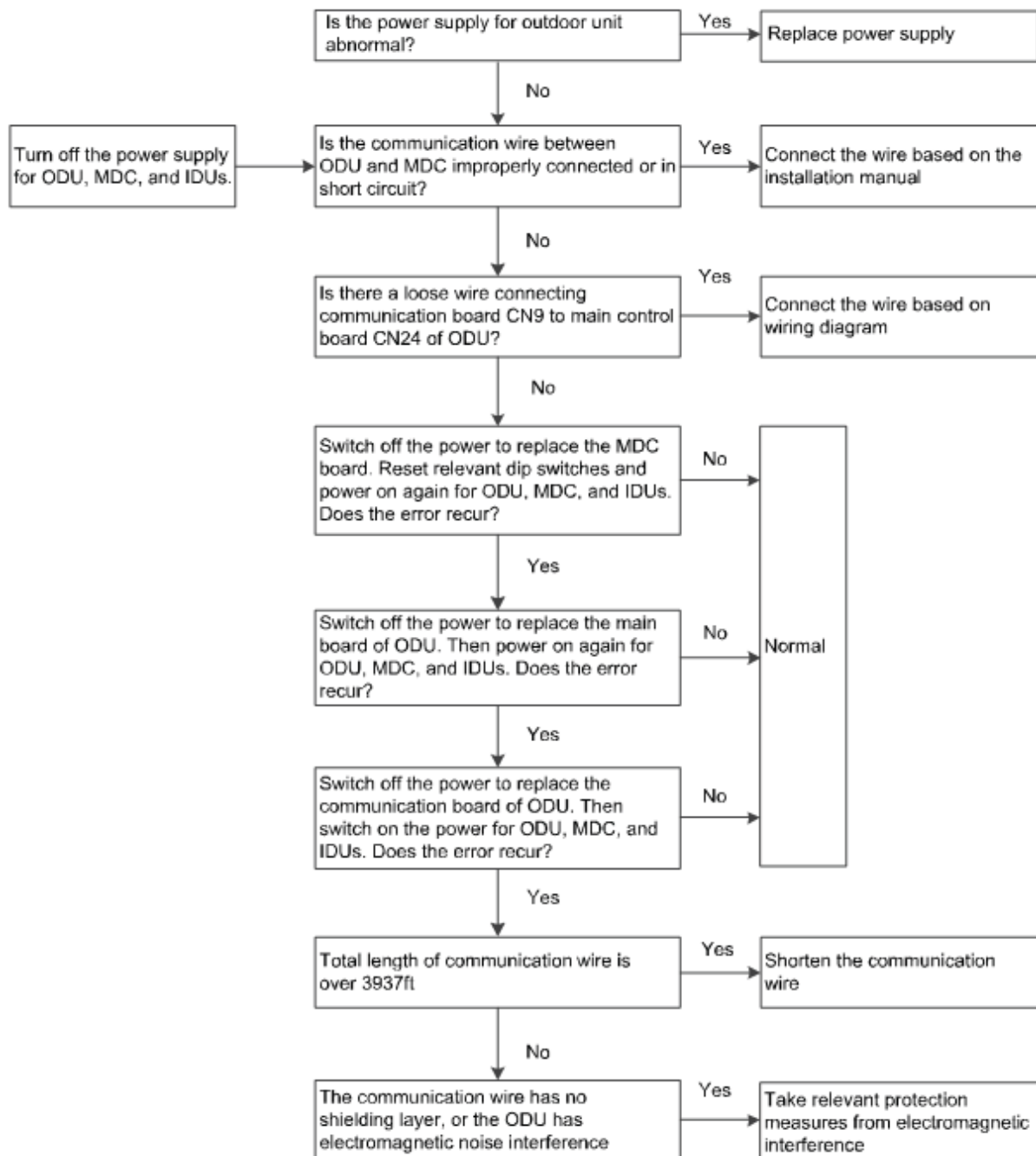
“SW8/SW9” QUERY INSTRUCTIONS

1. Press either SW8 or SW9 on MDC control board, the MDC’s LED display will show a query code.
2. Press SW8 to move up (SW9 to move down) to scroll through the different display number as shown below:

DISPLAY	DESCRIPTION		COMMENT
	FIRST AND SECOND DIGIT	THIRD AND FORTH DIGIT	
--00	Number of online micro-processors	Number of online indoor units	Actual value
--01	Number of open micro-processors	Number of open indoor units	Actual value
--02	Number of cooling micro-processors	Number of online heating units	Actual value
--03	Outdoor unit operation mode		--
--04	Opening of EXVA		Actual value
--05	Opening of EXVB		Actual value
--06	Opening of EXVC		Actual value
--07	Liquid inlet temperature (T1 or Tm1)		Actual value °C
--08	Liquid refrigerant temperature (T2 or Tm2)		Actual value °C
--09	Bypass outlet temperature (T3 or Tm3)		Actual value °C
--10	High pressure (H-YL1 or PS1)		Actual value = Display value x 0.1 MPa
--11	Intermediate pressure (H-YL2 or PS2)		Actual value = Display value x 0.1 MPa
--12	Low pressure (L-YL1 or PS3)		Actual value = Display value x 0.01 MPa
--13	Version of software		--
--14	----		Check end

S E0: COMMUNICATION ERROR WITH OUTDOOR UNIT

1. Error display:
MDC display: **S E0**
2. Applicable models:
40VMD006, 008, 010, 016M(S)--3
40VMD016ML-3
3. Error definition:
Communication error between MDC and outdoor unit (i.e. The ODU could not be detected by MDC.)
4. Possible causes:
 - Incorrect ODU power supply
 - Incorrect communication wiring between MDC and ODU
 - Damaged MDC board
 - Damaged ODU main board or communication board
 - Communication wiring exceeds allowable limits
 - External Interference (e.g. electromagnetic interference)

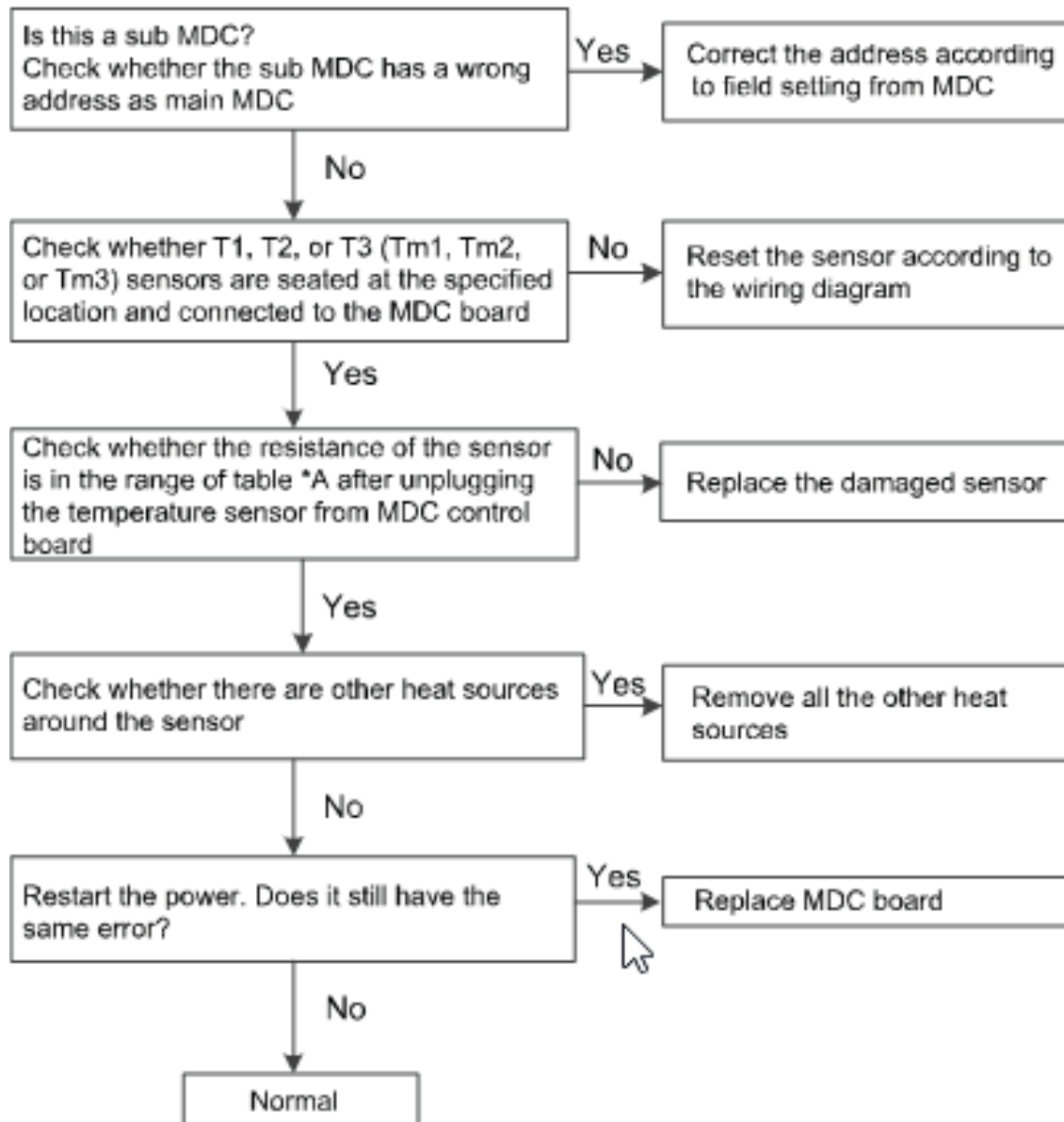


S E1~S E3: T1, T2, AND T3 TEMPERATURE SENSOR ERROR

1. Error display:
MDC display: S E1 S E2 S E3
2. Applicable models:
40VMD006, 008, 010, 016M(S)--3
40VMD016ML-3
3. Error definition:
The T1, T2, or T3 temperature sensors on MDC control board (CN20 and CN25) are incorrectly wired or damaged.
The voltage range is < 4.68V or > 0.10V.

Temperature Sensor Name in Refrigerant Circuit Diagrams	Tm1	Tm2	Tm3
Temperature Sensor Name in Wiring Diagrams	T1	T2	T3

4. Possible causes:
 - Improper wiring between the temperature sensor and MDC control board
 - Damaged temperature sensor
 - Damaged MDC board
 - Incorrect addressing of sub MDC
 - External interference from other heat source



*A Refer to “Resistance Table of Ambient Temperature Sensor” in Appendix.

S E4: HIGH PRESSURE SENSOR ERROR

1. Error display:

MDC display: 5 E4

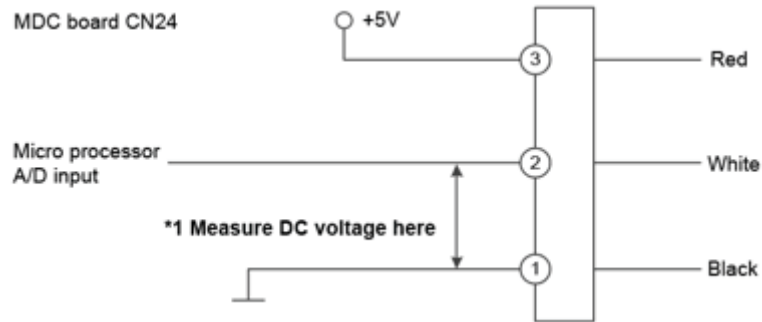
2. Applicable models:

40VMD006, 008, 010, 016M(S)--3

40VMD016ML-3

3. Error definition:

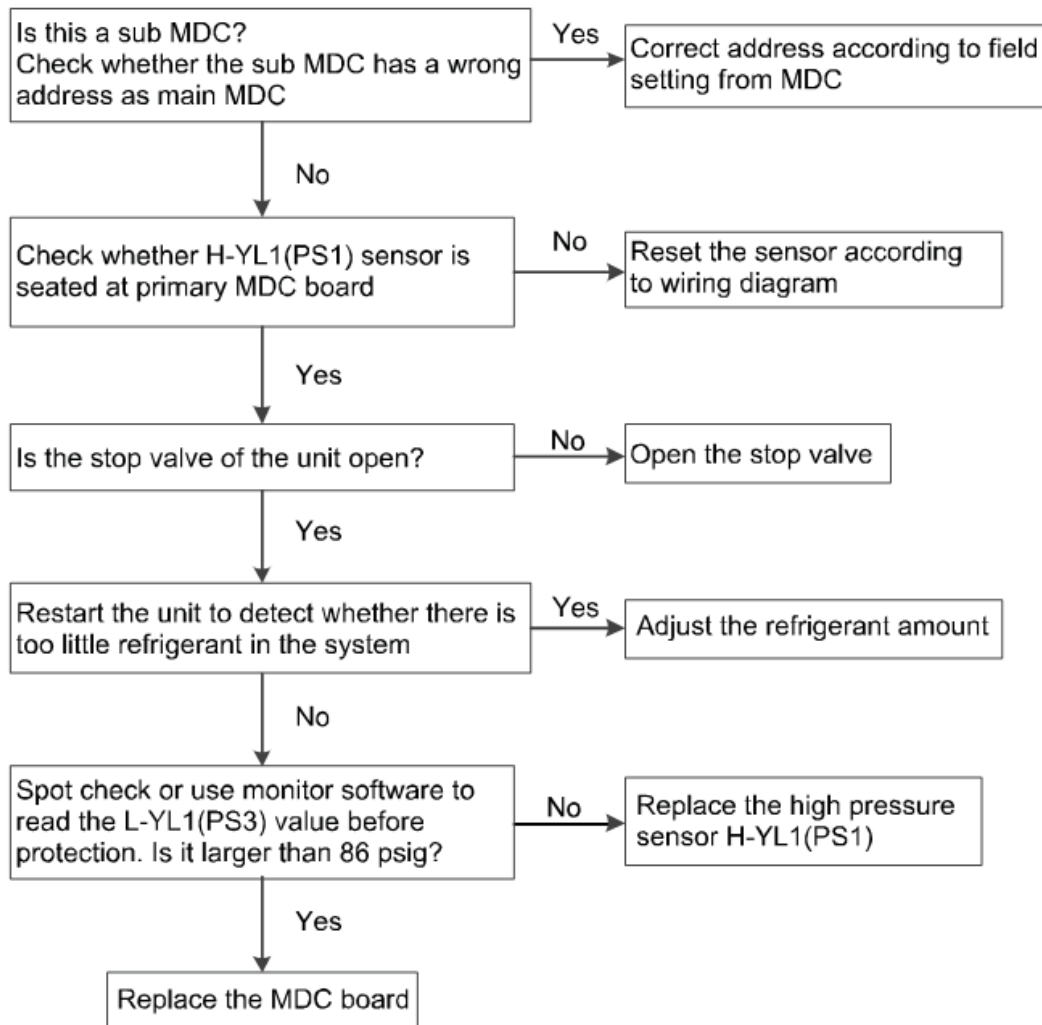
The pressure sensor H-YL1 (CN24, PS1) on the MDC main control board is incorrectly wired or damaged. The voltage range between CN24 pin ? and ? should be $< 4.76V$ or $> 0.58V$.



*1: Refer to “High Pressure Sensor Voltage Characteristics” table in Appendix.

4. Possible causes:

- The high pressure error is caused by lack of refrigerant in the system
- Damaged sensor
- Damaged MDC board



S E5: INTERMEDIATE PRESSURE SENSOR ERROR

1. Error display:

MDC display: **S E5**

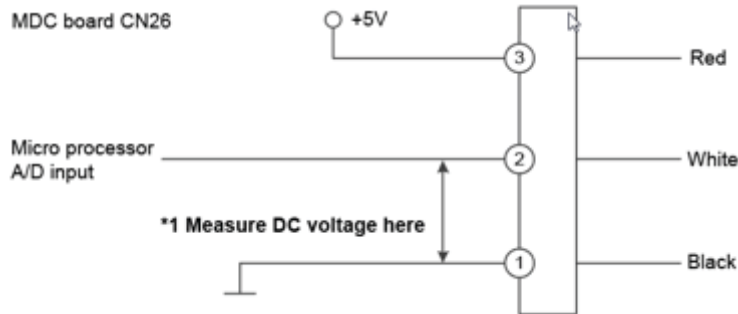
2. Applicable models:

40VMD006, 008, 010, 016M(S)--3

40VMD016ML-3

3. Error definition:

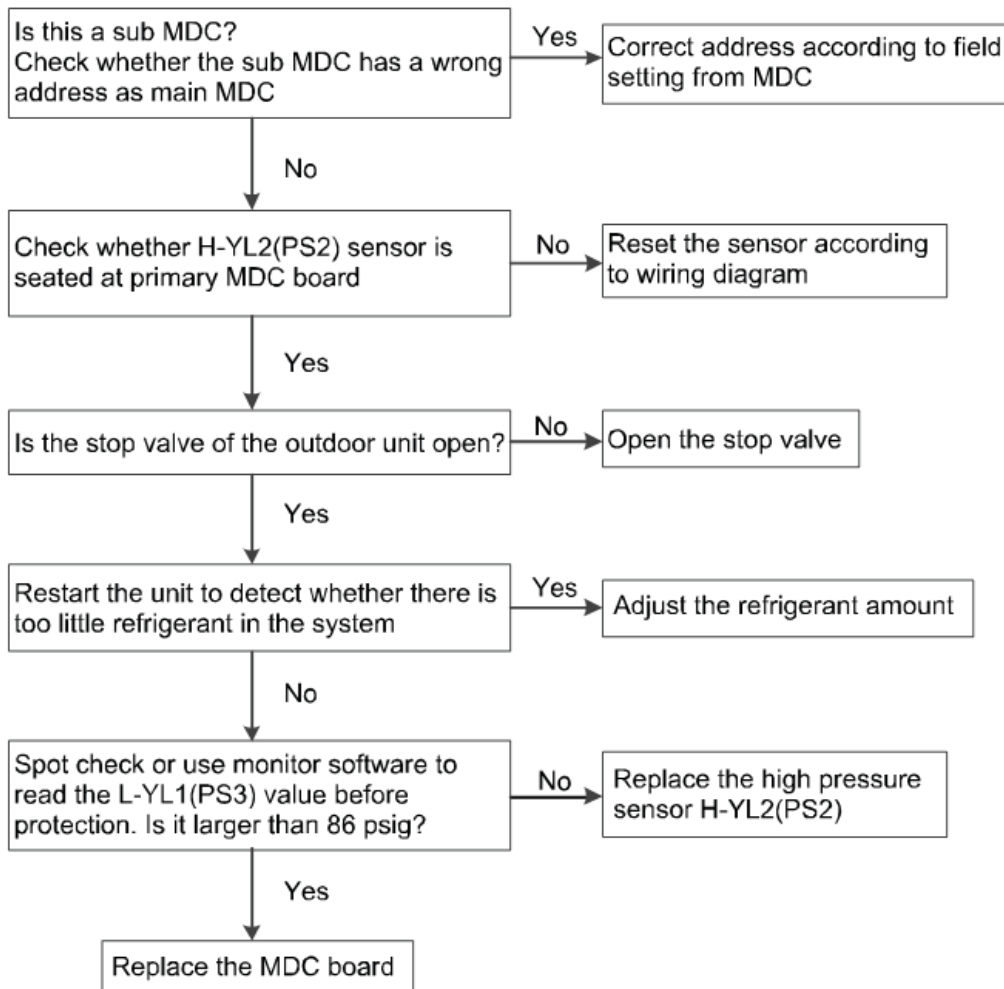
The pressure sensor H-YL2 (CN26, PS2) on the MDC main control board is incorrectly wired or damaged. The voltage range between CN26 pin ? and ? should be $< 4.76\text{V}$ or $> 0.58\text{V}$.



*1 Refer to “High Pressure Sensor Voltage Characteristics” table in Appendix.

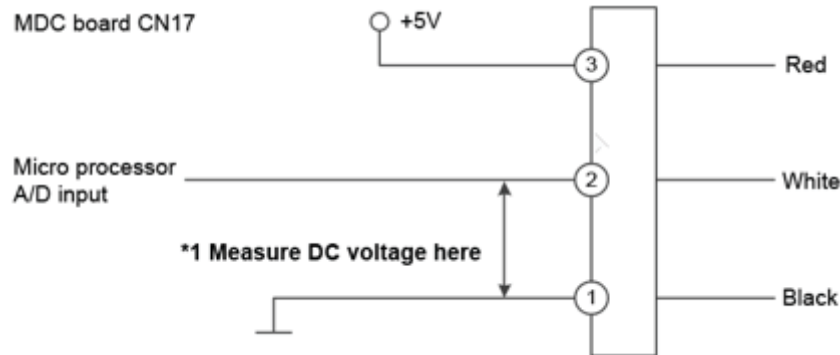
4. Possible causes:

- The high pressure and low pressure error are caused by lack of refrigerant in the system
- Damaged sensor
- Damaged MDC board



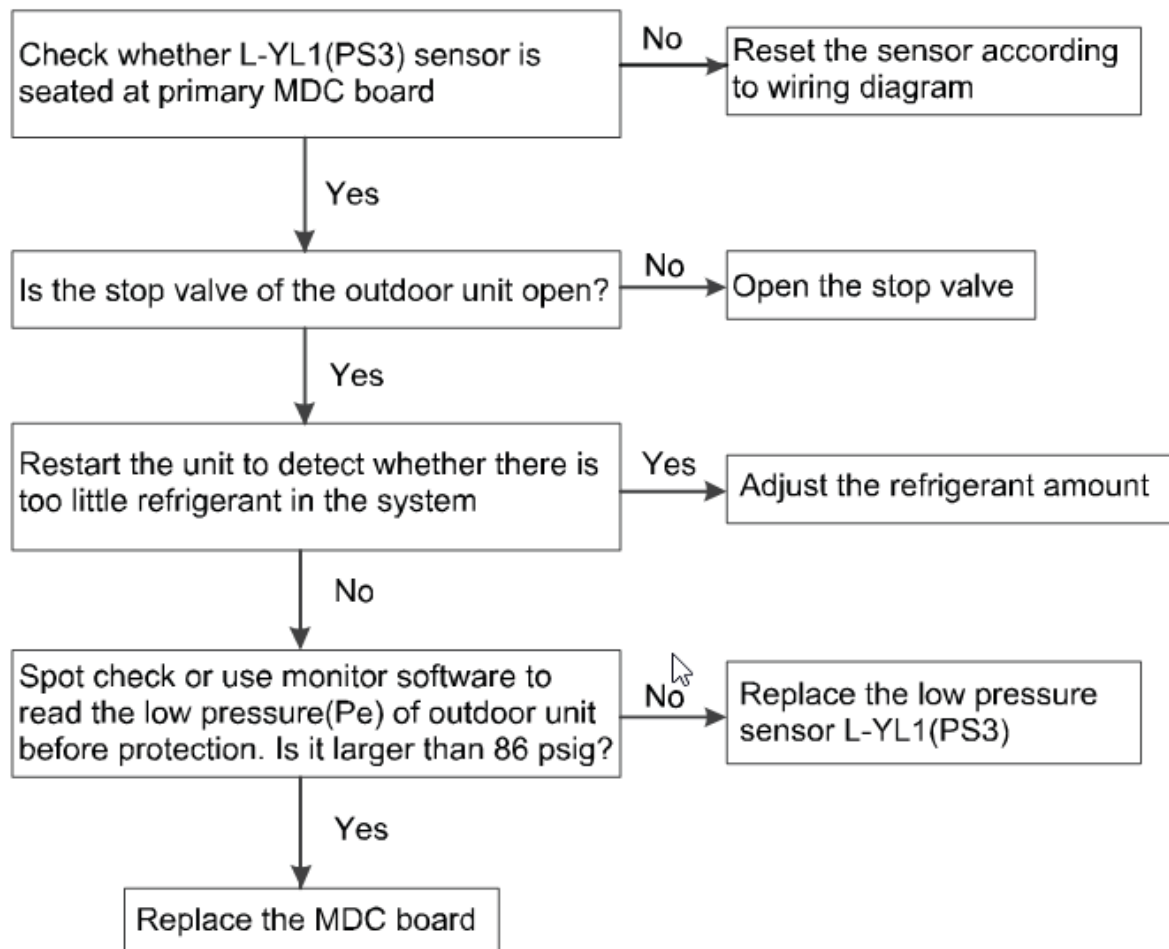
S E6: LOW PRESSURE SENSOR ERROR

1. Error display:
MDC display: 5 E5
2. Applicable models:
40VMD006, 008, 010, 016M(S)--3
40VMD016ML-3
3. Error definition:
The pressure sensor L-YL1 (CN17, PS3) on the MDC main control board is incorrectly wired or damaged.
The voltage range between CN17 pin ? and ? should be $< 4.5V$ or $> 0.7V$.



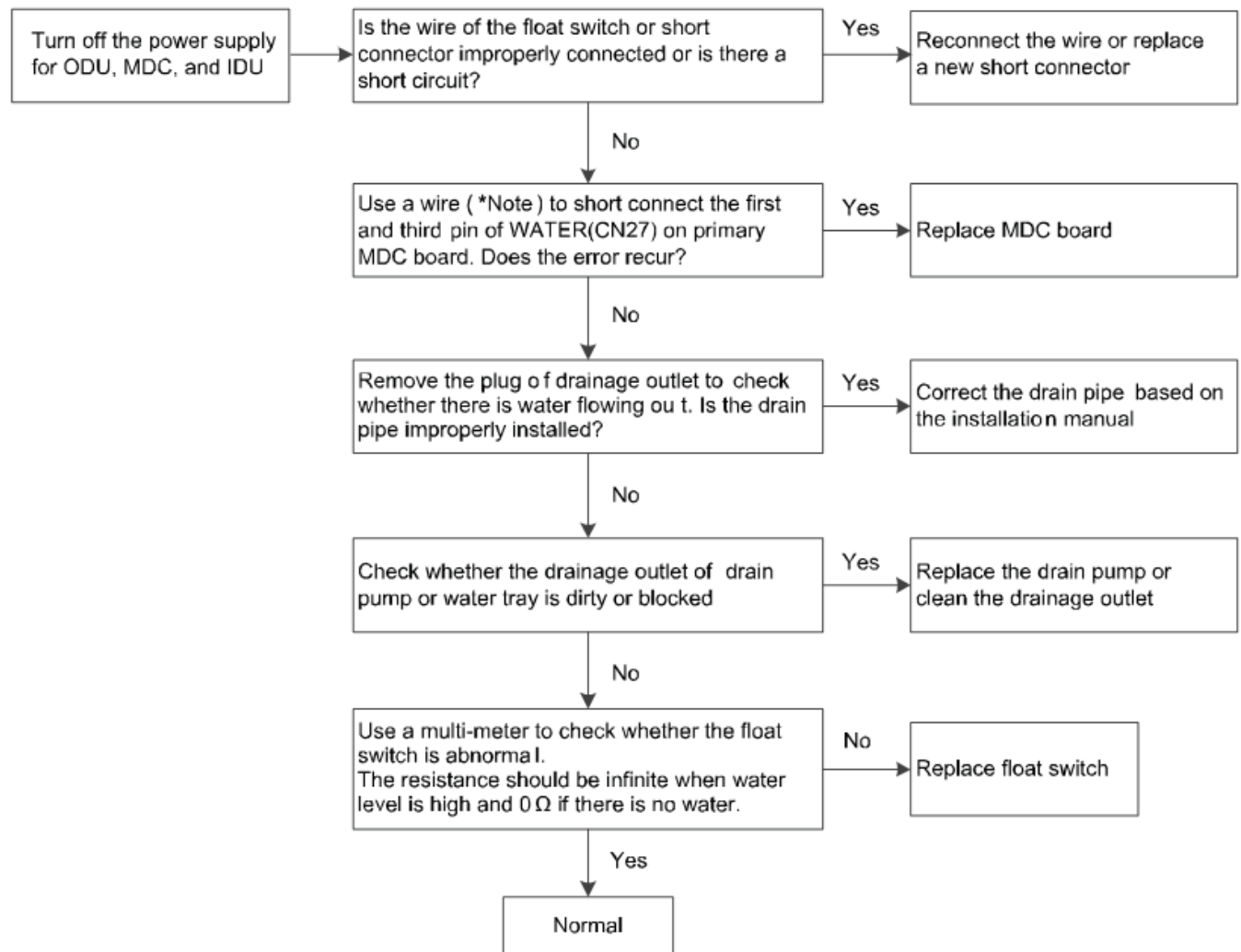
*1 Refer to "Low Pressure Sensor Voltage Characteristics" table in Appendix.

4. Error causes:
 - The low pressure error is caused by lack of refrigerant in the system
 - Damaged sensor
 - Damaged MDC board



S EP CONDENSATE SWITCH ERROR

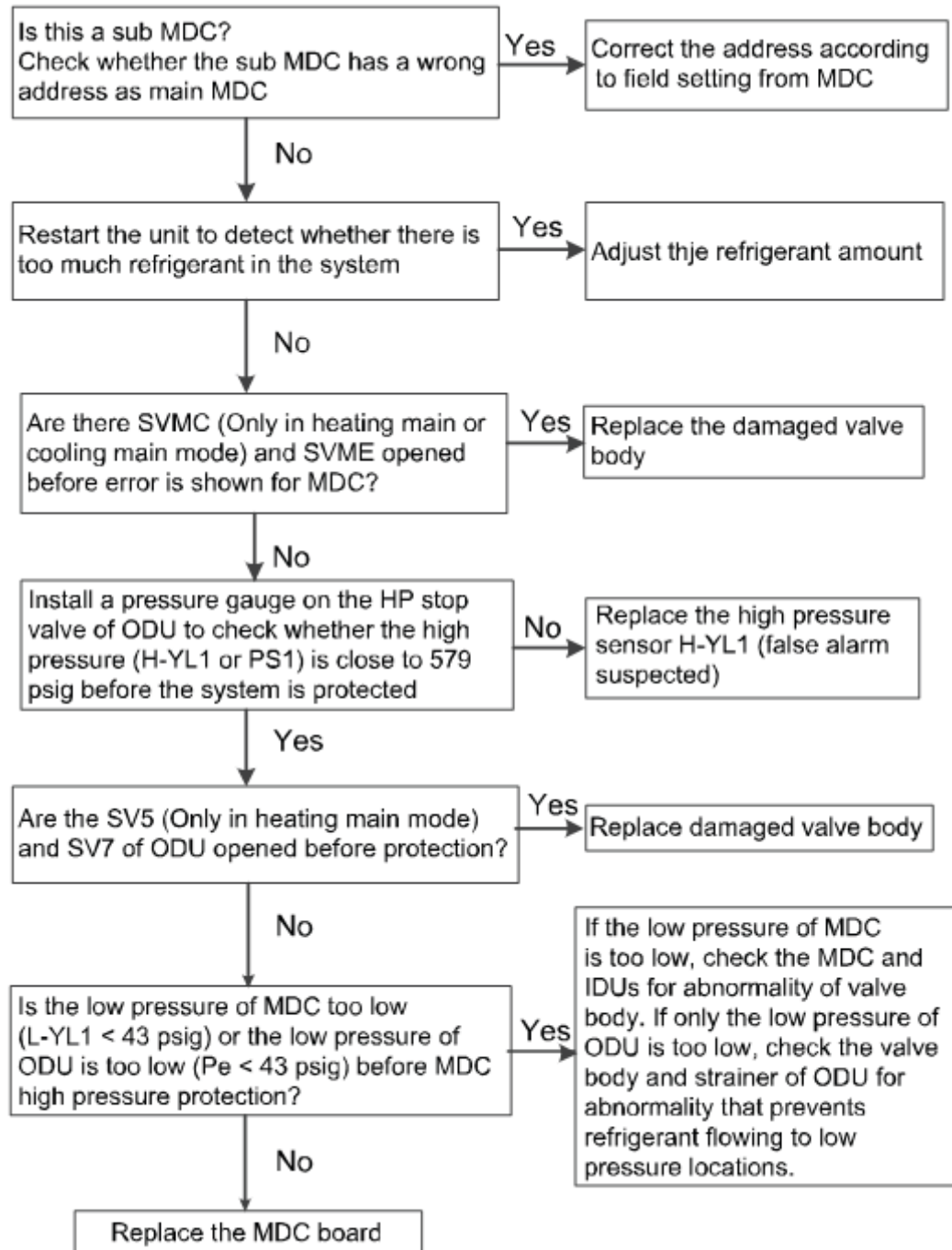
1. Error display:
MDC display: **S EP**
2. Applicable models:
40VMD006, 008, 010, 016M(S)--3
40VMD016ML-3
3. Error definition:
Condensate switch error is seen when there is high water level or blocked condensate drain line.
4. Possible causes:
 - Improper wiring between condensate float switch and MDC main control board CN27
 - Float of condensate switch is blocked
 - Blocked condensate line due to improper operation of condensate pump or incorrect installation of condensate drain line
 - Damaged MDC board



***NOTE:** Use a new short connector instead if available

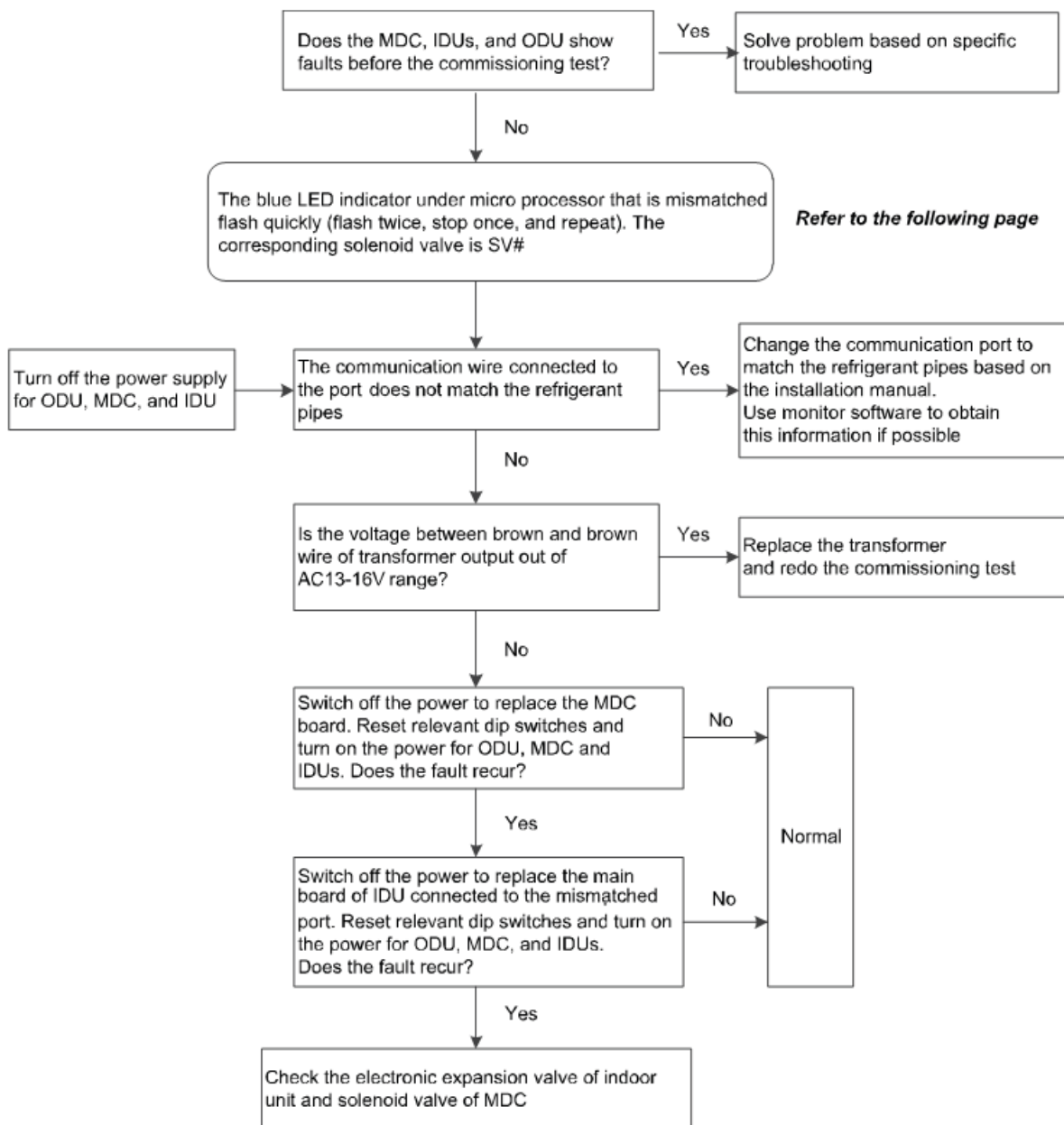
S P1: HIGH PRESSURE PROTECTION

1. Error display:
MDC display: 5 P1
2. Applicable models:
40VMD006, 008, 010, 016M(S)--3
40VMD016ML-3
3. Error definition:
The high pressure sensed by the sensor H-YL1 (CN24, PS1) is above 579 psig
4. Possible causes:
 - High pressure due to excess refrigerant in the system
 - Damaged MDC board
 - Improper operation of pressure relief valve on the refrigerant system due to solenoid valve error (IDUs, MDC, ODU)
 - Damaged pressure sensor
 - The high pressure is too high and the low pressure is too low caused by blockage in the system



SC ER: MISMATCHED REFRIGERANT PIPING AND COMMUNICATION WIRING FOR A GIVEN INDOOR UNIT

1. Error display:
MDC display: **SC ER**
2. Applicable models:
40VMD006, 008, 010, 016M(S)--3
40VMD016ML-3
3. Error definition:
For a given indoor unit, the refrigerant piping would be connected to one port and the communication wiring would be connected to another port.
4. Possible causes:
 - Refrigerant pipe of one indoor unit is mismatched with communication wiring of other indoor unit
 - Damaged transformer
 - Damaged MDC board
 - Damaged main board of IDU
 - Damaged electronic expansion valve on IDU and corresponding solenoid valve of MDC



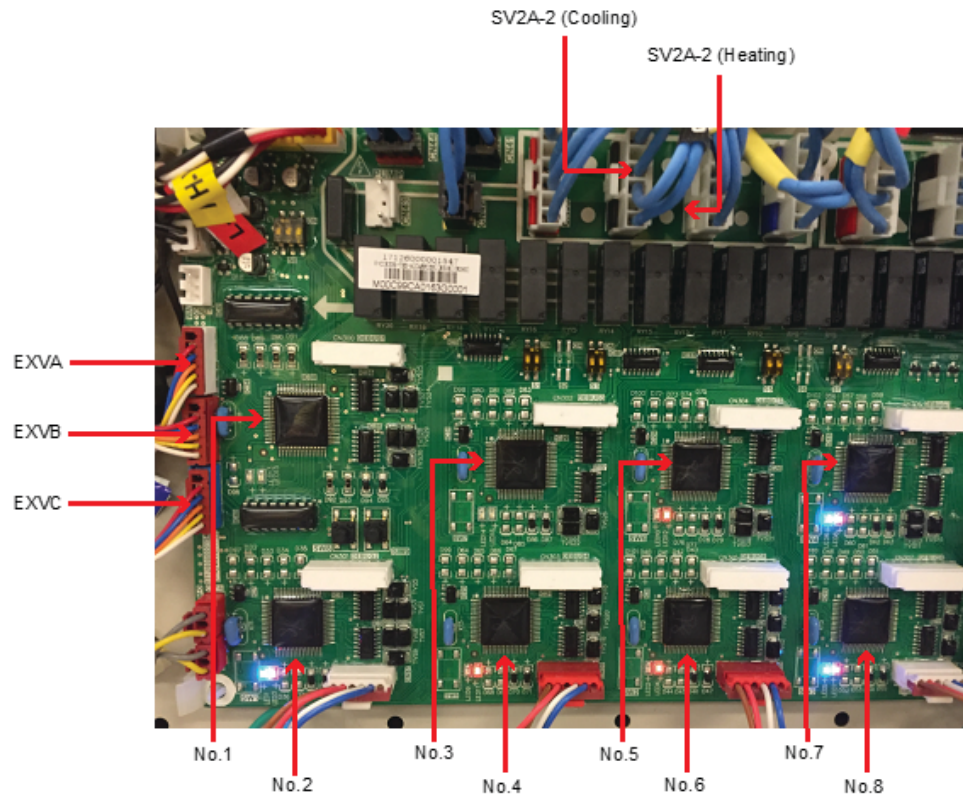


Fig. 143 —Blue Indicator

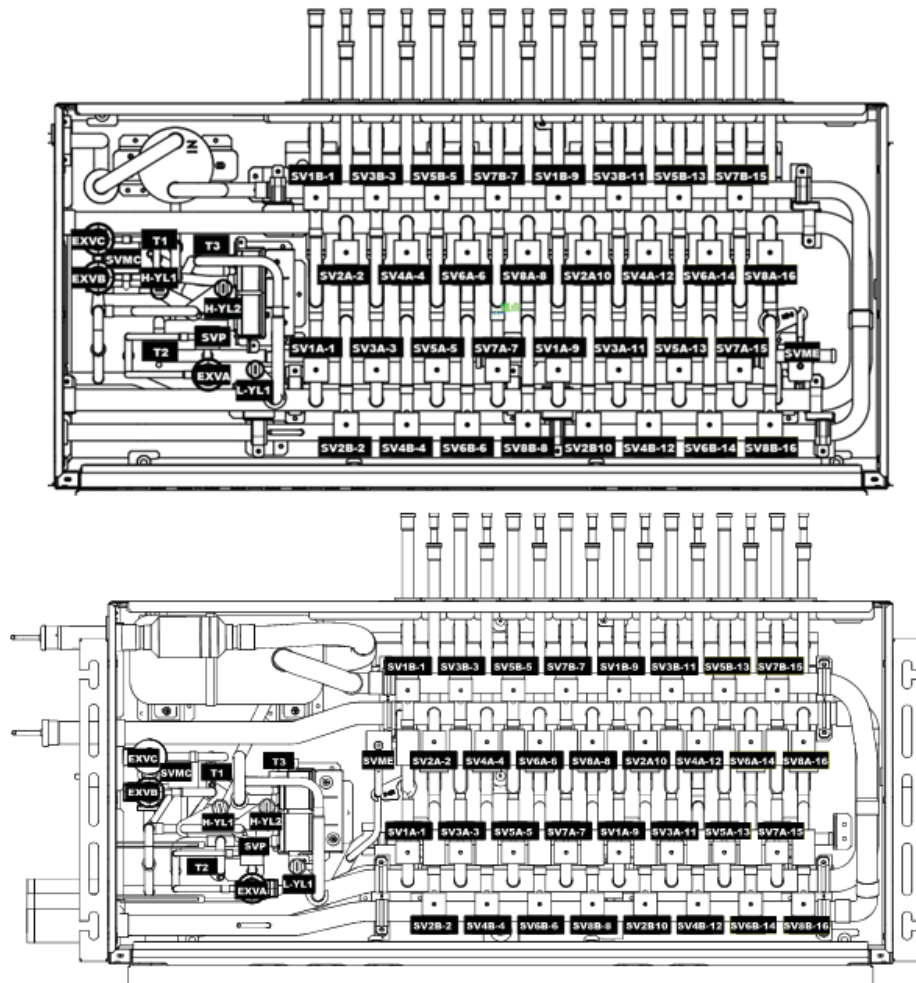


Fig. 144 —Corresponding Solenoid Valve

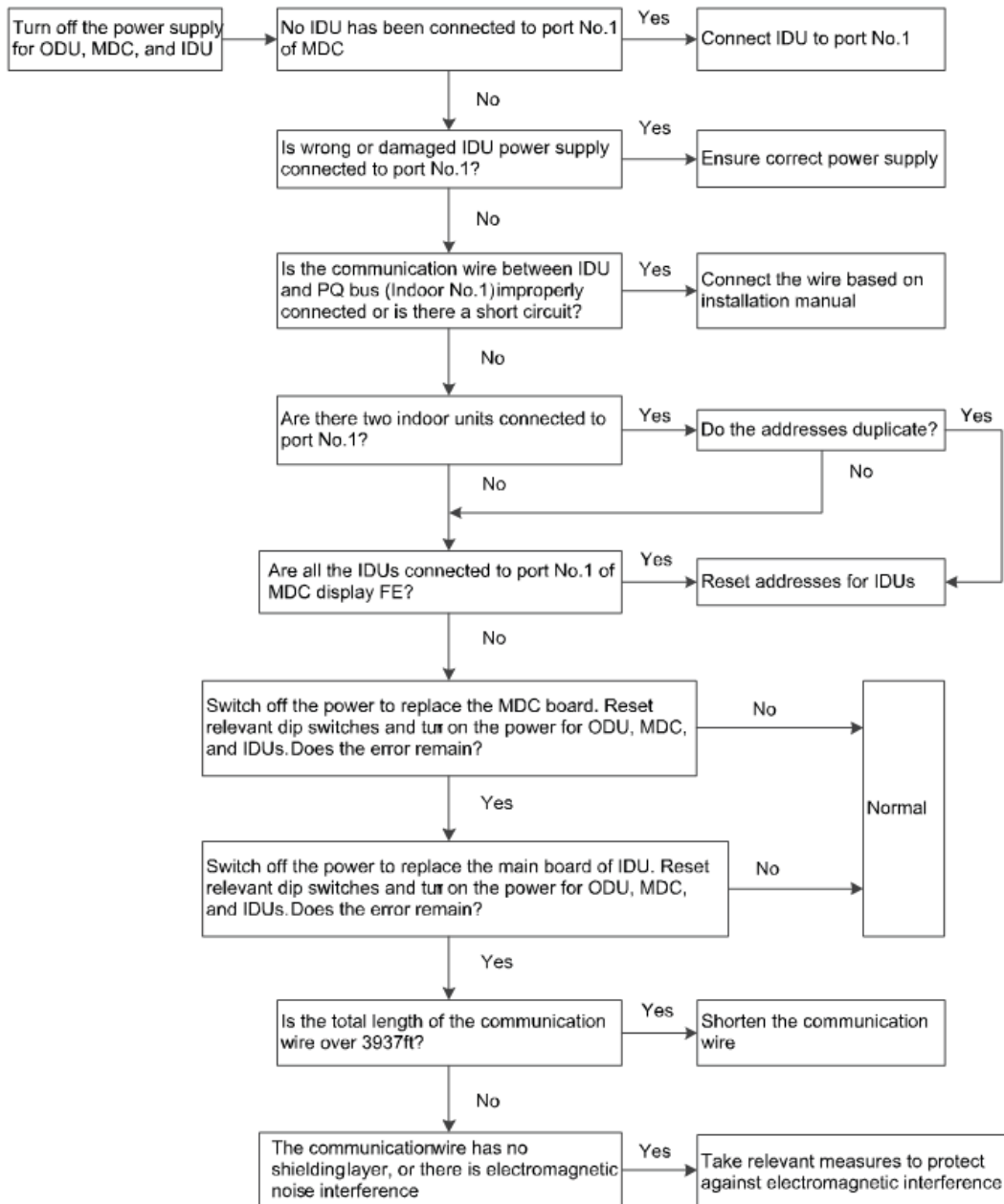
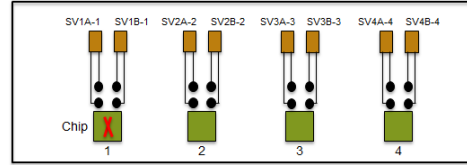
NO 1D: NO INDOOR UNIT CONNECTED TO PORT 1 OF MAIN MDC

1. Error display:
MDC display: **no 1d**

2. Applicable models:
40VMD006, 008, 010, 016M--3
40VMD016ML-3

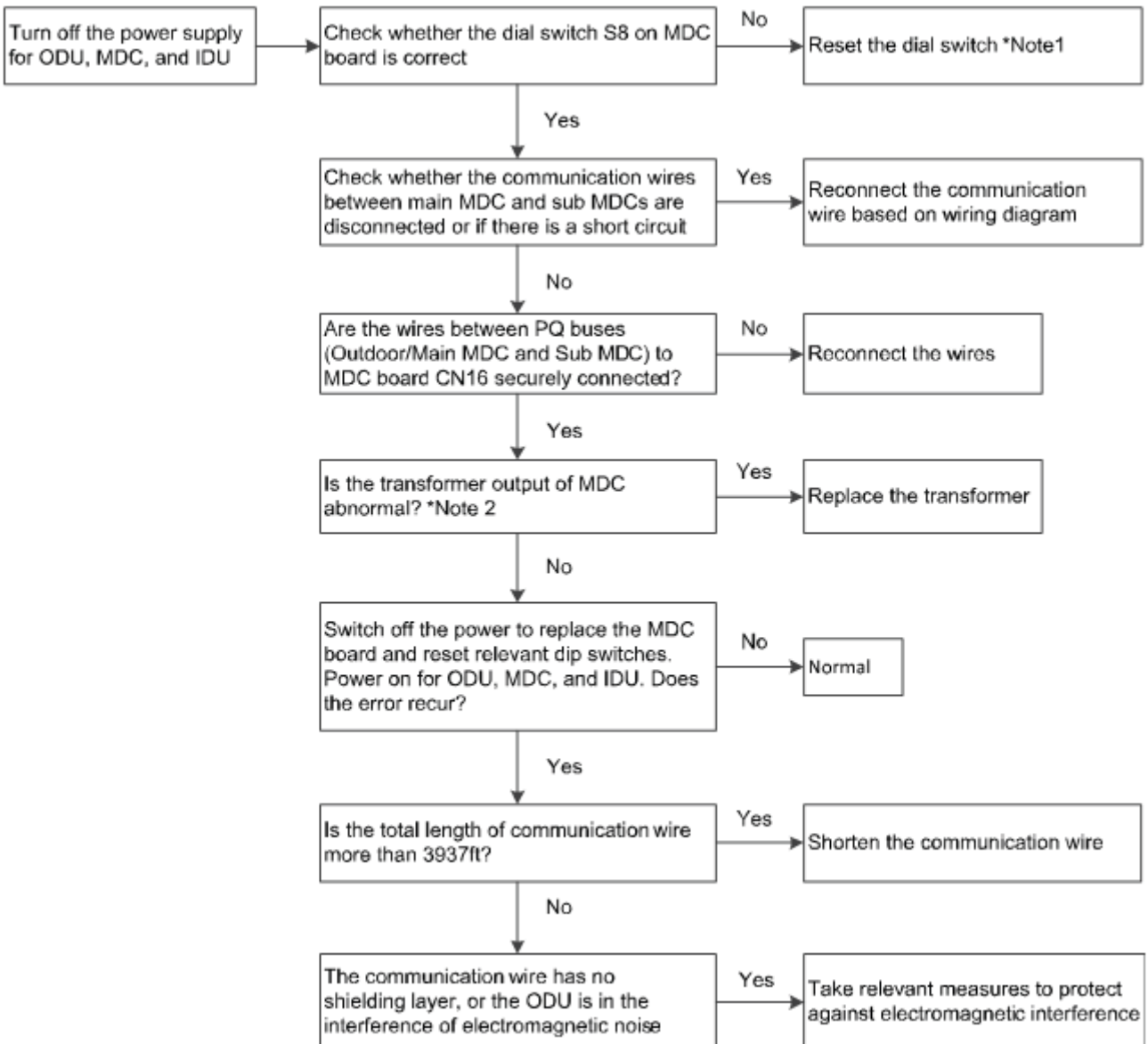
3. Error definition:
No IDU is connected to port No.1 of the main MDC

4. Possible causes:
- Port No.1 of main MDC has not connected to any indoor unit
 - Improper power supply for indoor unit connected to port No.1 of main MDC
 - Improper communication wiring between MDC and IDU
 - No address or duplicate address for IDUs connected to port No.1
 - Damaged main board of indoor unit connected to port No.1
 - Communication cable exceeds allowable length
 - External causes (e.g. electromagnetic interference)
 - Damaged MDC board containing chip for port 1



NO A0 INCORRECT ADDRESS FOR MDC

1. Error display:
MDC display: **no A0**
2. Applicable models:
40VMD006, 008, 010, 016M(S)--3
40VMD016ML-3
3. Error definition:
Wrong address has been set for MDC
4. Possible causes:
 - S8 dial switch on MDC control board is set incorrectly
 - Communication wires between main MDC and sub MDCs are installed incorrectly
 - Damaged transformer
 - Damaged MDC board
 - Communication wire exceeds allowable length
 - External causes (e.g. electromagnetic interference)



NOTES:

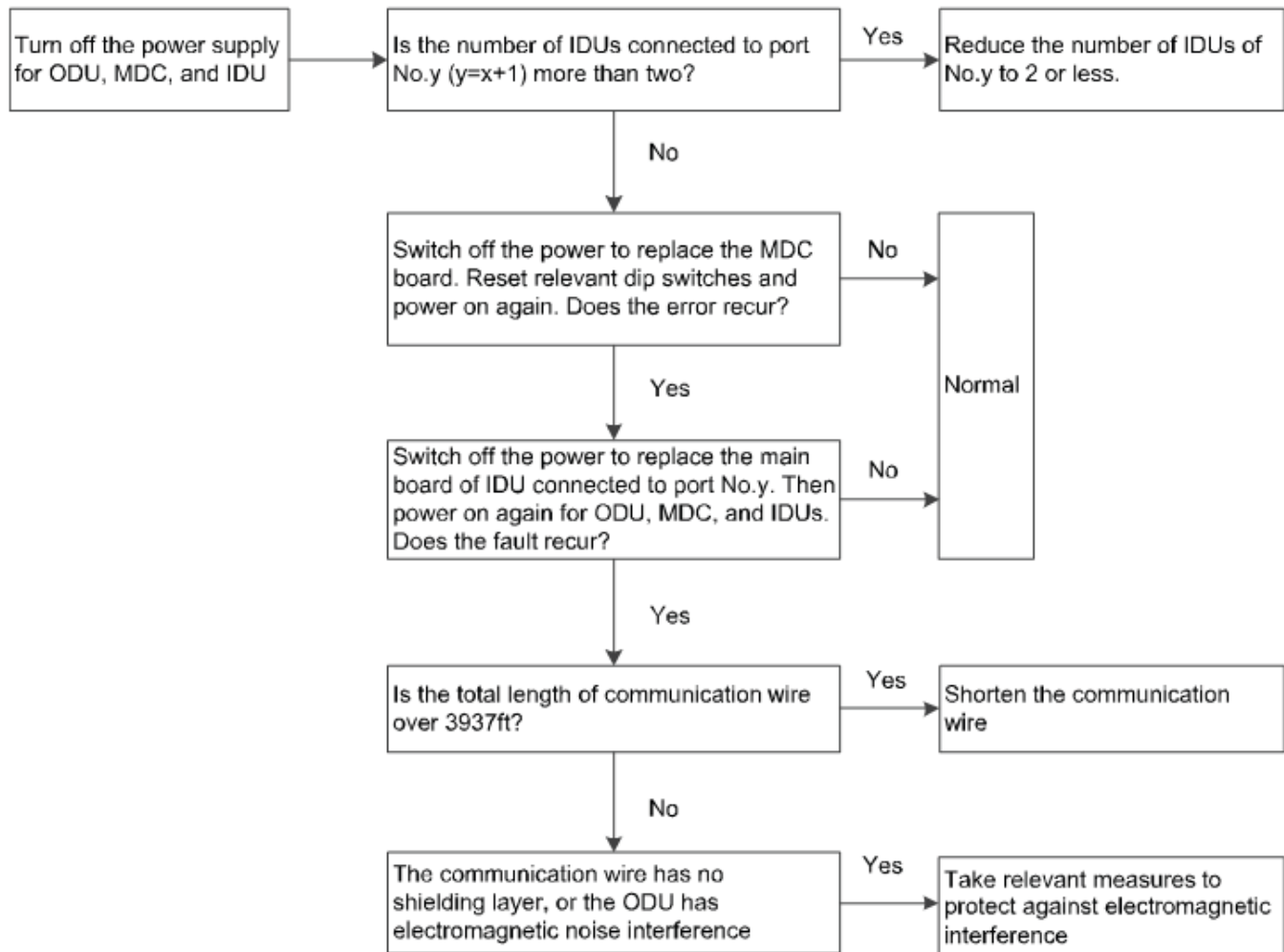
Refer to field setting from MDC of this service manual.

There are four wires on the transformer output plug.

The output voltage should be 13~16VAC for brown-to-brown and 8~11VAC for yellow-to-yellow.

CS X: MORE THAN TWO IDUS CONNECTED TO A SINGLE PORT ON MDC

1. Error display:
MDC display: 5 X
2. Applicable models:
40VMD006, 008, 010, 016M(S)--3
40VMD016ML-3
3. Error definition:
There are more than two IDUs connected to a single port on MDC.
4. Possible causes:
 - The number of IDUs connected to a single port is over allowance limit (two)
 - Damaged MDC board
 - Damaged IDU board
 - Communication wire exceeds allowable length
 - External causes (e.g. electromagnetic interference)



APPENDIX

Resistance of Temperature Sensors

Table 66 —Resistance of Temperature Sensor A

TEMP. (°F)	RESISTANCE (KΩ)	VOLTAGE (V)	TEMP. (°F)	RESISTANCE (KΩ)	VOLTAGE (V)	TEMP. (°F)	RESISTANCE (KΩ)	VOLTAGE (V)
-38.2	387.13	0.10	51.8	19.61	1.45	141.8	2.27	3.90
-36.4	360.98	0.10	53.6	18.65	1.50	143.6	2.19	3.93
-34.6	336.73	0.11	55.4	17.74	1.56	145.4	2.11	3.96
-32.8	314.24	0.12	57.2	16.89	1.61	147.2	2.03	3.99
-31.0	293.38	0.13	59.0	16.08	1.66	149.0	1.96	4.01
-29.2	274.01	0.14	60.8	15.31	1.72	150.8	1.89	4.04
-27.4	256.05	0.15	62.6	14.58	1.77	152.6	1.83	4.07
-25.6	239.36	0.16	64.4	13.89	1.83	154.4	1.76	4.10
-23.8	223.87	0.17	66.2	13.24	1.89	156.2	1.70	4.12
-22.0	209.48	0.18	68.0	12.63	1.94	158.0	1.64	4.15
-20.2	196.11	0.19	69.8	12.04	2.00	159.8	1.59	4.17
-18.4	183.68	0.21	71.6	11.49	2.06	161.6	1.53	4.19
-16.6	172.12	0.22	73.4	10.97	2.11	163.4	1.48	4.22
-14.8	161.36	0.23	75.2	10.47	2.17	165.2	1.43	4.24
-13.0	151.34	0.25	77.0	10.00	2.23	167.0	1.38	4.26
-11.2	142.02	0.26	78.8	9.55	2.28	168.8	1.34	4.28
-9.4	133.32	0.28	80.6	9.12	2.34	170.6	1.29	4.30
-7.6	125.22	0.30	82.4	8.72	2.40	172.4	1.25	4.32
-5.8	117.66	0.32	84.2	8.33	2.45	174.2	1.21	4.34
-4.0	110.60	0.33	86.0	7.97	2.51	176.0	1.17	4.36
-2.2	104.02	0.35	87.8	7.62	2.56	177.8	1.13	4.38
-0.4	97.86	0.38	89.6	7.29	2.62	179.6	1.10	4.39
1.4	92.10	0.40	91.4	6.98	2.67	181.4	1.06	4.41
3.2	86.72	0.42	93.2	6.68	2.73	183.2	1.03	4.43
5.0	81.69	0.44	95.0	6.40	2.78	185.0	1.00	4.44
6.8	76.98	0.47	96.8	6.13	2.83	186.8	0.97	4.46
8.6	72.57	0.49	98.6	5.87	2.89	188.6	0.94	4.47
10.4	68.43	0.52	100.4	5.63	2.94	190.4	0.91	4.49
12.2	64.56	0.55	102.2	5.39	2.99	192.2	0.88	4.50
14.0	60.93	0.58	104.0	5.17	3.04	194.0	0.85	4.51
15.8	57.52	0.61	105.8	4.96	3.09	195.8	0.83	4.53
17.6	54.33	0.64	107.6	4.76	3.14	197.6	0.80	4.54
19.4	51.33	0.67	109.4	4.57	3.19	199.4	0.78	4.55
21.2	48.51	0.71	111.2	4.38	3.23	201.2	0.75	4.57
23.0	45.86	0.74	113.0	4.21	3.28	203.0	0.73	4.58
24.8	43.38	0.78	114.8	4.04	3.32	204.8	0.71	4.59
26.6	41.04	0.82	116.6	3.88	3.37	206.6	0.69	4.60
28.4	38.85	0.85	118.4	3.73	3.41	208.4	0.67	4.61
30.2	36.78	0.89	120.2	3.59	3.45	210.2	0.65	4.62
32.0	34.84	0.93	122.0	3.45	3.50	212.0	0.63	4.63
33.8	33.01	0.98	123.8	3.31	3.54	213.8	0.61	4.64
35.6	31.28	1.02	125.6	3.19	3.58	215.6	0.59	4.65
37.4	29.66	1.06	127.4	3.07	3.62	217.4	0.58	4.66
39.2	28.13	1.11	129.2	2.95	3.65	219.2	0.56	4.67
41.0	26.69	1.15	131.0	2.84	3.69	221.0	0.54	4.68
42.8	25.33	1.20	132.8	2.73	3.73			
44.6	24.05	1.25	134.6	2.63	3.76			
46.4	22.85	1.30	136.4	2.53	3.80			
48.2	21.71	1.35	138.2	2.44	3.83			
50.0	20.63	1.40	140.0	2.35	3.86			

* Outdoor unit: T3A, T3C, T4, T6, T7

MDC: Tm1, Tm2, Tm3

Indoor unit: T1, TA, T2A, T2B

The resistance of 77°F is 10 KΩ±1%. The relation between voltage and resistance is: $V = \frac{8.06}{8.06+R} * 5$

Table 67 —Resistance of Temperature Sensor B

TEMP. (°F)	RESISTANCE (KΩ)	VOLTAGE (V)
-4.0	542.70	0.07
-2.2	511.90	0.07
-0.4	483.00	0.08
1.4	455.90	0.08
3.2	430.50	0.09
5.0	406.70	0.09
6.8	384.30	0.10
8.6	363.30	0.10
10.4	343.60	0.11
12.2	325.10	0.12
14.0	307.70	0.12
15.8	291.30	0.13
17.6	275.90	0.14
19.4	261.40	0.14
21.2	247.80	0.15
23.0	234.90	0.16
24.8	222.80	0.17
26.6	211.40	0.18
28.4	200.70	0.19
30.2	190.50	0.20
32.0	180.90	0.21
33.8	171.90	0.22
35.6	163.30	0.23
37.4	155.20	0.24
39.2	147.60	0.25
41.0	140.40	0.27
42.8	133.50	0.28
44.6	127.10	0.29
46.4	121.00	0.31
48.2	115.20	0.32
50.0	109.80	0.34
51.8	104.60	0.35
53.6	99.69	0.37
55.4	95.05	0.39
57.2	90.66	0.40
59.0	86.49	0.42
60.8	82.54	0.44
62.6	78.79	0.46
64.4	75.24	0.48
66.2	71.86	0.50
68.0	68.66	0.52
69.8	65.62	0.54
71.6	62.73	0.56
73.4	59.98	0.59
75.2	57.37	0.61
77.0	54.89	0.64
78.8	52.53	0.66
80.6	50.28	0.69
82.4	48.14	0.71
84.2	46.11	0.74
86.0	44.17	0.77
87.8	42.33	0.79

TEMP. (°F)	RESISTANCE (KΩ)	VOLTAGE (V)
89.6	40.57	0.82
91.4	38.89	0.85
93.2	37.3	0.88
95.0	35.78	0.91
96.8	34.32	0.95
98.6	32.94	0.98
100.4	31.62	1.01
102.2	30.36	1.04
104.0	29.15	1.08
105.8	28.00	1.11
107.6	26.90	1.15
109.4	25.86	1.18
111.2	24.85	1.22
113.0	23.89	1.26
114.8	22.89	1.30
116.6	22.10	1.33
118.4	21.26	1.37
120.2	20.46	1.41
122.0	19.69	1.45
123.8	18.96	1.49
125.6	18.26	1.53
127.4	17.58	1.57
129.2	16.94	1.61
131.0	16.32	1.65
132.8	15.73	1.69
134.6	15.16	1.73
136.4	14.62	1.77
138.2	14.09	1.81
140.0	13.59	1.86
141.8	13.11	1.90
143.6	12.65	1.94
145.4	12.21	1.98
147.2	11.79	2.03
149.0	11.38	2.07
150.8	10.99	2.11
152.6	10.61	2.15
154.4	10.25	2.20
156.2	9.90	2.24
158.0	9.56	2.28
159.8	9.24	2.32
161.6	8.94	2.37
163.4	8.64	2.41
165.2	8.35	2.45
167.0	8.08	2.49
168.8	7.82	2.53
170.6	7.56	2.57
172.4	7.32	2.62
174.2	7.08	2.66
176.0	6.85	2.70
177.8	6.64	2.74
179.6	6.43	2.78
181.4	6.22	2.82

TEMP. (°F)	RESISTANCE (KΩ)	VOLTAGE (V)
183.2	6.03	2.85
185.0	5.84	2.89
186.8	5.66	2.93
188.6	5.48	2.97
190.4	5.32	3.01
192.2	5.15	3.04
194.0	5.00	3.08
195.8	4.84	3.12
197.6	4.70	3.15
199.4	4.56	3.19
201.2	4.42	3.22
203.0	4.29	3.26
204.8	4.16	3.29
206.6	4.04	3.32
208.4	3.92	3.36
210.2	3.81	3.39
212.0	3.70	3.42
213.8	3.59	3.45
215.6	3.49	3.48
217.4	3.39	3.51
219.2	3.29	3.54
221.0	3.20	3.57
222.8	3.11	3.60
224.6	3.02	3.63
226.4	2.94	3.66
228.2	2.86	3.69
230.0	2.78	3.71
231.8	2.70	3.74
233.6	2.63	3.76
235.4	2.55	3.79
237.2	2.48	3.82
239.0	2.42	3.84
240.8	2.35	3.86
242.6	2.29	3.89
244.4	2.23	3.91
246.2	2.17	3.93
248.0	2.11	3.95
249.8	2.06	3.98
251.6	2.00	4.00
253.4	1.95	4.02
255.2	1.90	4.04
257.0	1.85	4.06
258.8	1.80	4.08
260.6	1.76	4.10
262.4	1.71	4.12
264.2	1.67	4.14
266.0	1.63	4.15

**Outdoor unit: T5, T7C1 (2) (3)

The resistance of 194°F is $5K\Omega \pm 3\%$. The relation between voltage and resistance is: $V = \frac{8.06}{8.06 + R} * 5$

Voltage Characteristics

Table 68 —Low Pressure Sensor Voltage Characteristics

LOW PRESSURE (psi)	RESISTANCE (KΩ)	OUTPUT VOLTAGE (V)	LOW PRESSURE (psi)	RESISTANCE (KΩ)	OUTPUT VOLTAGE (V)
14.5	49.51	0.70	98.6	13.60	1.86
16.0	47.91	0.72	102	13.15	1.90
17.4	46.39	0.74	106	12.50	1.96
18.9	44.96	0.76	110	11.89	2.02
20.3	43.60	0.78	113	11.50	2.06
21.8	42.31	0.80	117	10.94	2.12
23.2	41.08	0.82	122	10.42	2.18
24.7	39.91	0.84	126	9.93	2.24
26.1	38.80	0.86	131	9.46	2.30
27.6	37.73	0.88	135	9.02	2.36
30.5	35.74	0.92	139	8.59	2.42
31.9	34.81	0.94	144	8.19	2.48
33.4	33.92	0.96	148	7.80	2.54
34.8	33.06	0.98	154	7.32	2.62
37.7	31.44	1.02	158	6.97	2.68
39.2	30.69	1.04	164	6.54	2.76
42.1	29.25	1.08	168	6.23	2.82
43.5	28.57	1.10	174	5.83	2.90
46.4	27.29	1.14	180	5.46	2.98
47.9	26.68	1.16	184	5.19	3.04
50.8	25.52	1.20	190	4.85	3.12
53.7	24.44	1.24	196	4.53	3.20
55.1	23.92	1.26	202	4.22	3.28
58.0	22.94	1.30	207	3.93	3.36
60.9	22.01	1.34	215	3.58	3.46
63.8	21.14	1.38	220	3.32	3.54
66.7	20.32	1.42	226	3.07	3.62
69.6	19.54	1.46	233	2.77	3.72
72.5	18.80	1.50	239	2.54	3.80
75.4	18.10	1.54	247	2.27	3.90
78.3	17.44	1.58	254	2.01	4.00
81.2	16.81	1.62	261	1.76	4.10
84.1	16.21	1.66	268	1.53	4.20
88.5	15.37	1.72	276	1.31	4.30
91.4	14.83	1.76	283	1.09	4.40
94.3	14.33	1.80	290	0.89	4.50

* Outdoor unit: Low pressure sensor (L-YL1 of ODU)

MDC: Low pressure sensor (PS3 or L-YL1)

Table 69 —High Pressure Sensor Voltage Characteristics

HIGH PRESSURE (psi)	RESISTANCE (KΩ)	OUTPUT VOLTAGE (V)
14.5	60.59	0.58
29.0	51.73	0.67
43.5	44.90	0.76
58.0	39.47	0.84
72.5	35.05	0.93
87.0	31.38	1.02
101.5	28.28	1.10
116.0	25.64	1.19
130.5	23.35	1.28
145.0	21.36	1.36
159.5	19.60	1.45
174.0	18.04	1.54
188.5	16.65	1.63
203.0	15.40	1.71
217.5	14.27	1.80
232.0	13.24	1.89
246.5	12.31	1.97
261.0	11.45	2.06
275.5	10.66	2.15
290.0	9.93	2.23
304.5	9.26	2.32
319.0	8.64	2.41
333.5	8.05	2.50
348.0	7.51	2.58
362.5	7.01	2.67
377.0	6.53	2.76
391.5	6.09	2.84
406.0	5.67	2.93
420.5	5.27	3.02
435.0	4.90	3.10
449.5	4.55	3.19
464.0	4.21	3.28
478.5	3.89	3.36
493.0	3.59	3.45
507.5	3.31	3.54
522.0	3.04	3.63
536.5	2.78	3.71
551.0	2.53	3.80
565.5	2.29	3.89
580.0	2.06	3.97
594.5	1.85	4.06
609.0	1.64	4.15
623.5	1.44	4.23
638.0	1.25	4.32
652.5	1.07	4.41
667.0	0.89	4.50
681.5	0.72	4.58
696.0	0.56	4.67
710.5	0.40	4.76

**Outdoor unit: high pressure sensor (H-YL1 of ODU)

MDC: High pressure sensor (PS1 or H-YL1), Medium pressure sensor (PS2 or H-YL2)

BILL OF MATERIAL (BOM)

38VMA072RDS5-1, 38VMA096RDS5-1, 38VMA120RDS5-1

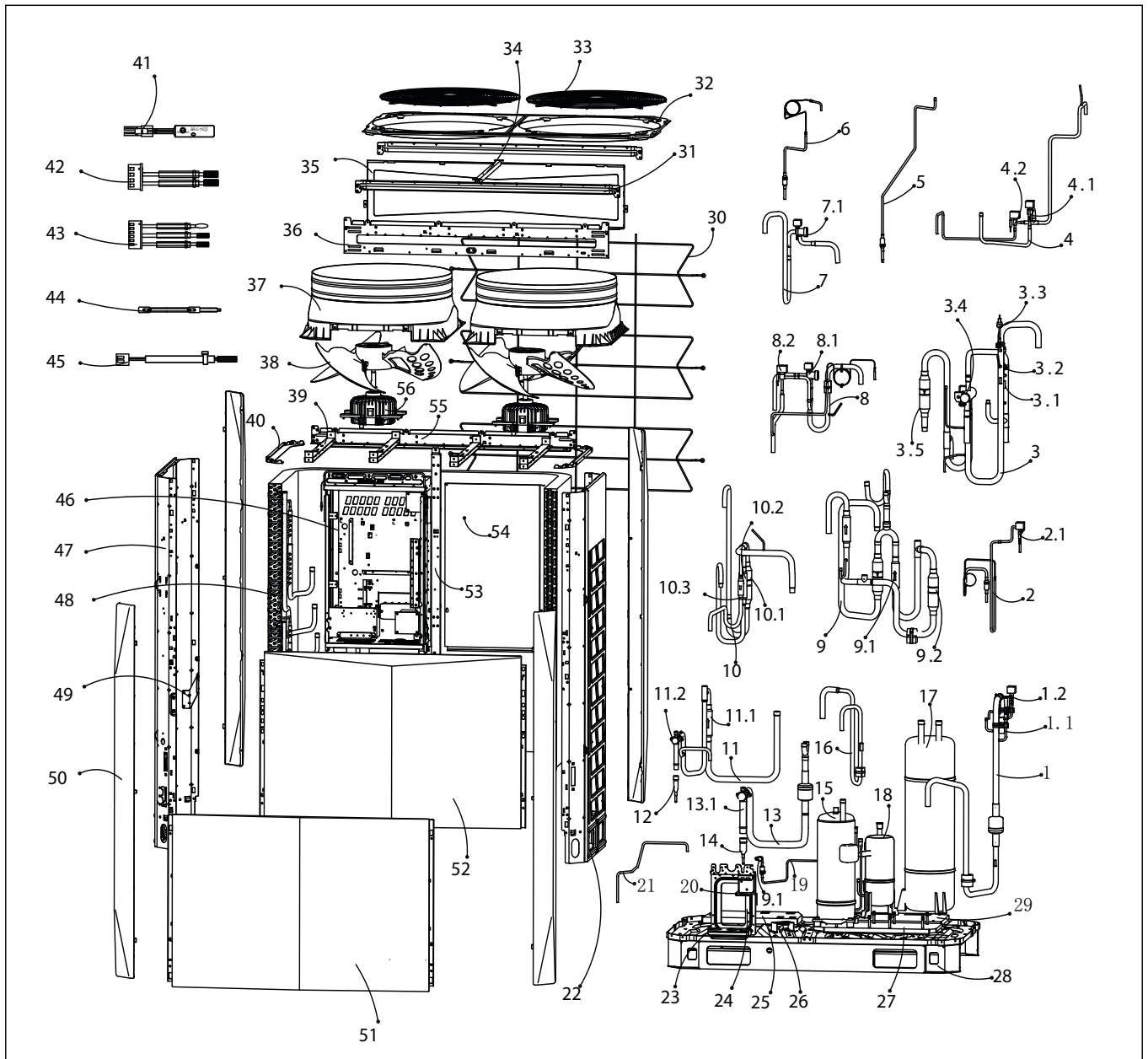


Fig. 145 —Heat Recovery Exploded View

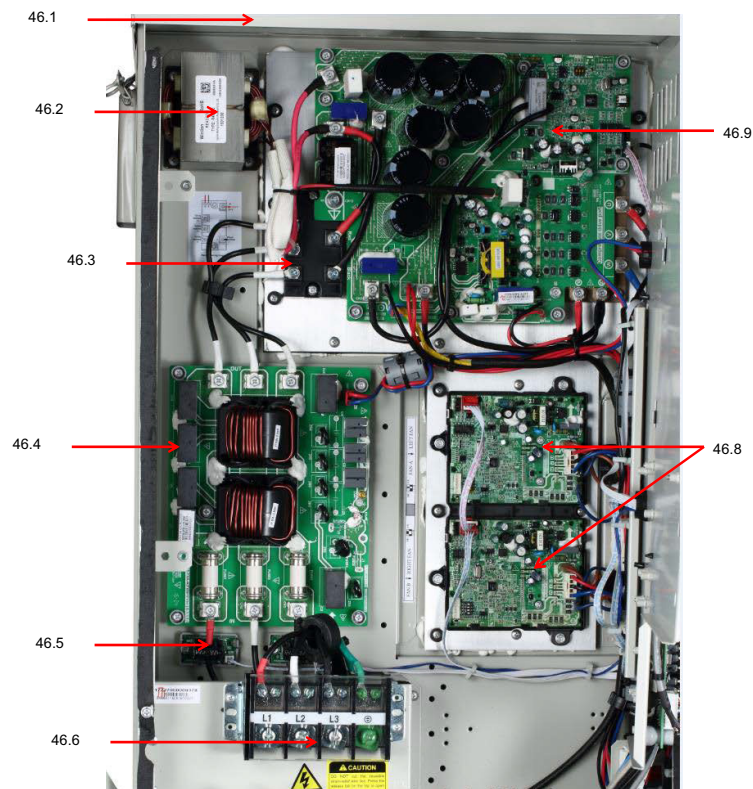
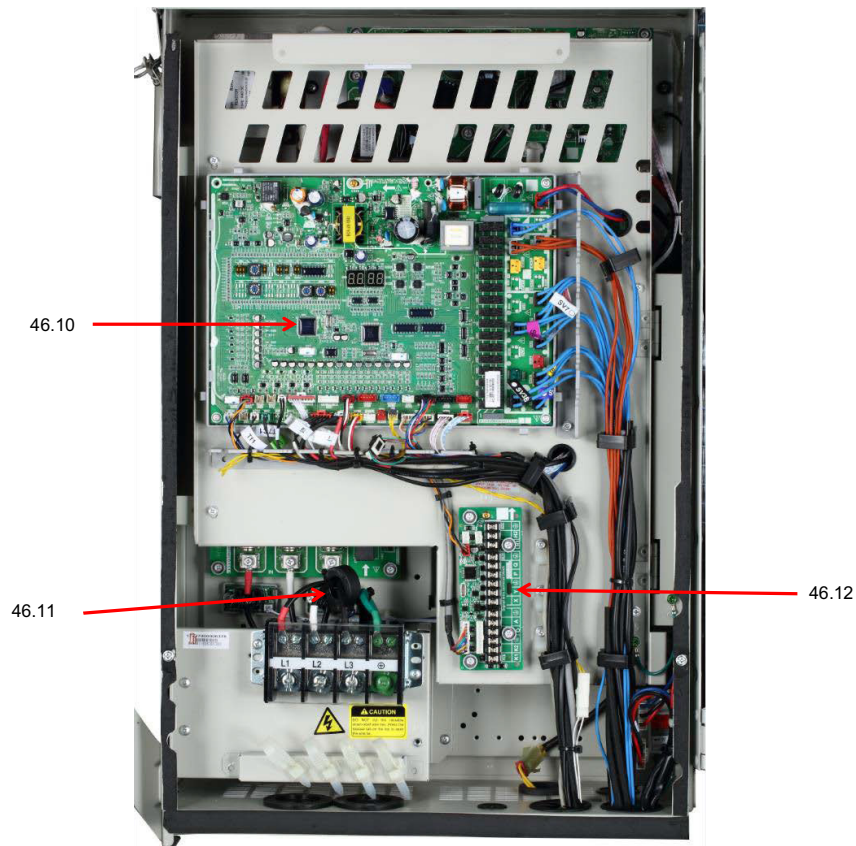


Fig. 146 —Control Board Views

Table 70 —Heat Recovery Parts Breakdown

NUMBER	PART NAME	QUANTITY	BOM CODE
1	Suction Pipe Assembly of Compressor	1	15427000001422
1.1	Fusible Plug Assembly	1	15427000001439
1.2	Single Pass Solenoid Valve Package (L2300, VHR, SH)	1	15500205000240
2	Bypass Valve Assembly	1	15427000001420
2.1	Single Pass Solenoid Valve Package (L1800, VHR, SH)	1	15500205000539
3	4-Way Valve Assembly	1	15427000001423
3.1	Pressure Switch	1	17400516000108
3.2	Pressure Switch	1	11201008000035
3.3	Pressure Switch	1	11201008000032
3.4	4-Way Valve Kit	1	15500216000123
3.5	Check Valve (Diaphragm Type)	1	15500203000110
4	Solenoid Valve Assembly 3	1	15427000001399
4.1	Single Pass Solenoid Valve Package (L1800, VHR, SH)	1	15500205000219
4.2	Single Pass Solenoid Valve Package (L1800, VHR, SH)	1	15500205000220
5	Connecting Pipe Assembly	1	15127000003919
6	Oil Return Capillary Assembly	1	15127000003946
7	Solenoid Valve Assembly 2	1	15427000001400
7.1	Single Pass Solenoid Valve Package (L1800, VHR, SH)	1	15500205000721
8	Solenoid Valve Assembly 1	1	15427000001401
8.1	Single Pass Solenoid Valve Package (L1800, VHR, SH)	1	15500205000219
8.2	Single Pass Solenoid Valve Package (L1800, VHR, SH)	1	15500205000739
9	One-Way Valve Assembly	1	15427000001419
9.1	Check Valve (Diaphragm Type)	2	15500203000109
9.2	Check Valve (Diaphragm Type)	2	15500203000110
10	One-Way Valve Assembly 2	1	15427000001402
10.1	Check Valve (Diaphragm Type)	1	15500203000108
10.2	Check Valve (Diaphragm Type)	1	15500203000109
10.3	Check Valve (Diaphragm Type)	1	15500203000110
11	High Pressure Valve Assembly	1	15427000001421
11.1	One-Way Valve	1	15500203000109
11.2	Low Pressure Valve	1	15500204000120
12	Connecting Pipe Assembly	1	15127000005158
13	Suction Valve Assembly	1	15427000001424
13.1	Suction Valve	1	15500204000088
14	Connecting Pipe Assembly	1	15127000005159
15	DC Inverter Compressor	1	11102020000021
16	Discharge Pipe Assembly of Compressor	1	15126000001606
17	Separator	1	15500501000036
18	Oil Separator	1	15500501000005
19	Oil Balance Valve Assembly	1	15127000003950
19.1	Oil Balance Valve	1	15500301000011
20	Supporter	1	12227000005982
21	Connecting Pipe	1	15127000003918
22	Right Panel Assembly	1	12227000003813
23	Seal Pad	1	12627000000207
24	Fixing Panel of Valve	1	12227000001085
25	Supporter	1	12227000003348
26	Pipe Supporter	1	12227000003350
27	Compressor Support Plate Assembly	1	12227000003345
28	Bottom	1	12227000003336
29	Supporter Assembly	1	12227000003341
30	Rear Grille	1	12927000000041
31	Top Cover Support Plate	2	12227000001212
32	Cover	1	12227000000419
33	Fan Guard	2	12927000000020
34	Cover Supporter, Middle	1	12227000001263
35	Rear Upper Panel	1	12227000000855

NUMBER	PART NAME	QUANTITY	BOM CODE
36	Front Beam	1	12227000001065
37	Air Outlet Guide Assembly	2	12127000000061
38	Axial Fan	1	12100105000384
39	Motor Supporter Assembly	4	12227000001279
40	Condenser Side Sealing Plate Assembly	2	12227000001377
41	Exhaust Temperature Sensor	1	11201007000308
42	Temperature Sensor	1	11201007000979
43	Temperature Sensor	1	11201007000980
44	Room Temperature Sensor	1	11201007001640
45	Compressor Electric Heater	2	17402001000049
46	E-Part Box Assembly	1	17227000000378
46.1	E-Part Box Assembly	1	12227000004381
46.2	Reactor	1	17400306000223
46.3	Three-Phase Bridge	1	11201418000069
46.4	Filter Board Assembly	1	17127000002996
46.5	Current Detection Board Assembly	2	17127000004756
46.6	Wire Joint	1	17400401000616
46.8	Fan Motor Module Assembly	2	17127000005818
46.9	Inverter Module Assembly	1	17127000002997
46.10	Board, Main Control	1	17127000005555
46.10	Board, Main Control	1	17127000005557
46.10	Board, Main Control	1	17127000005590
46.11	Current Transformer	1	17427000000025
46.12	Wiring Board Brush Glue Assembly	1	17127000005136
47	Left Panel Assembly	1	12227000006792
48	Condenser Assembly	1	15827000000366
49	Electric Control Box Left Hanging Board	1	12227000003669
50	Corner Supporter	4	12227000001036
51	Front Lower Panel	1	12227000000779
52	Top Front Cover	1	12227000000850
53	Front Middle Column Component	1	12227000005952
54	E-Part Box Cover Assembly	1	12227000002513
55	Rear Beam Assembly	1	12227000001590
56	Brushless DC Motor	2	11002015001281

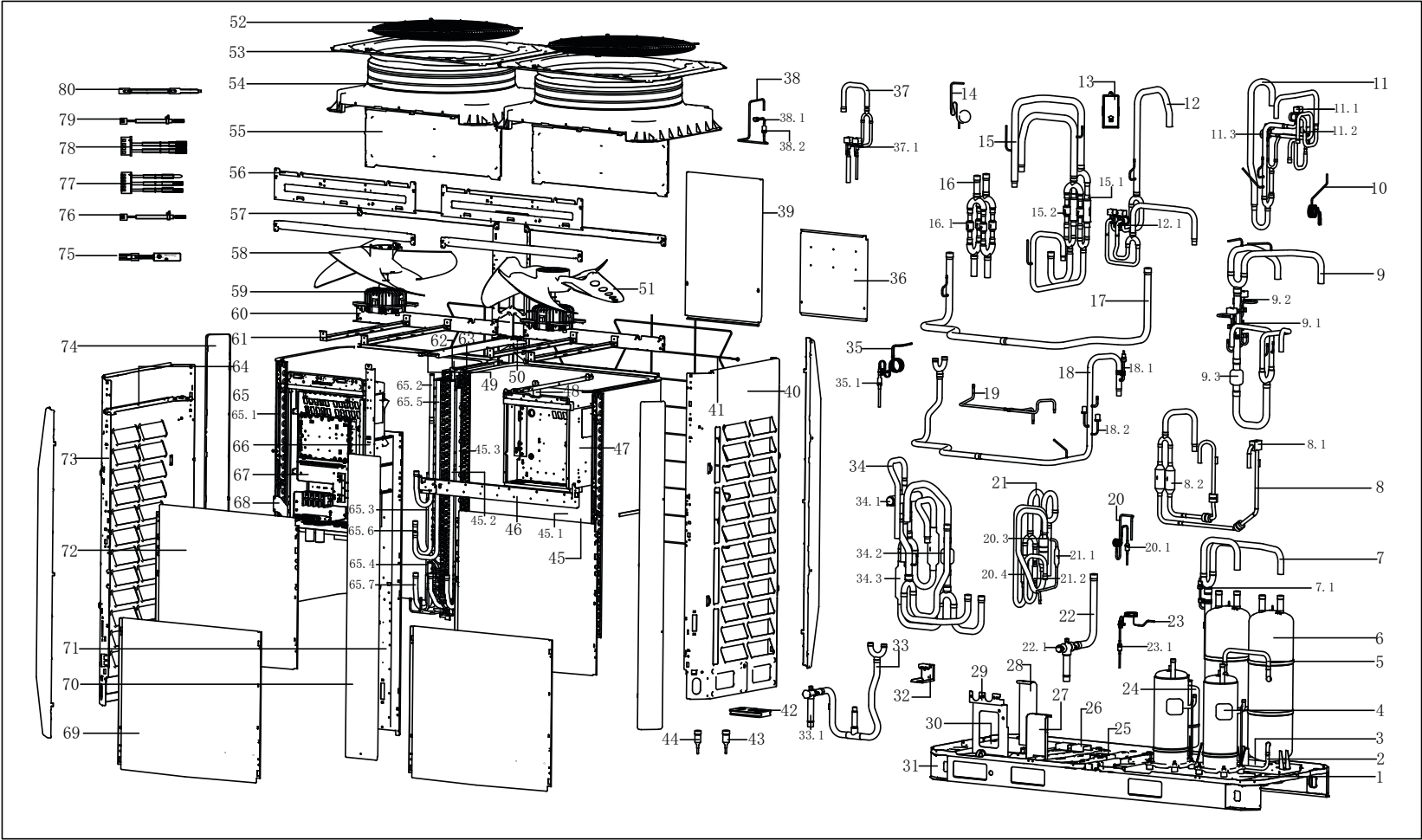
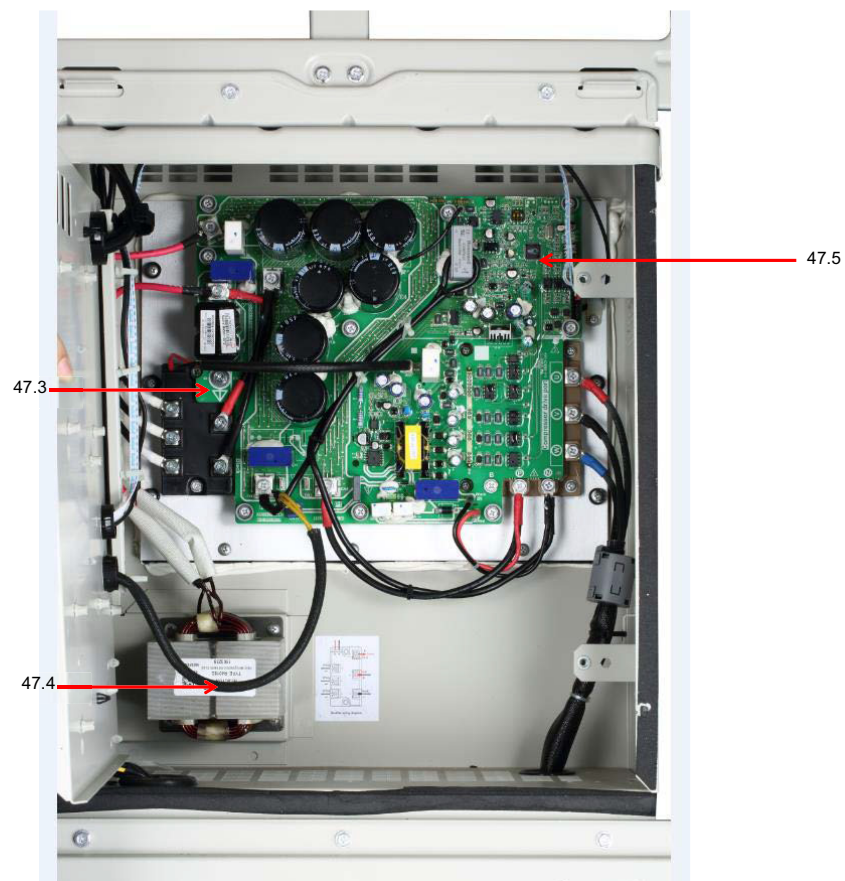
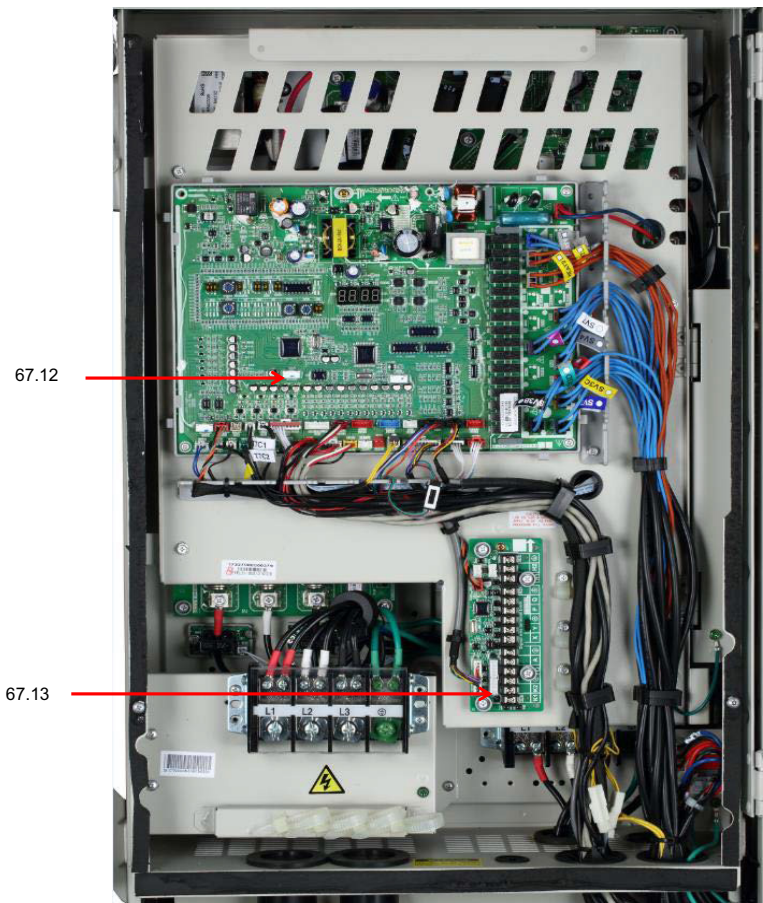


Fig. 147 —Heat Recovery Exploded View



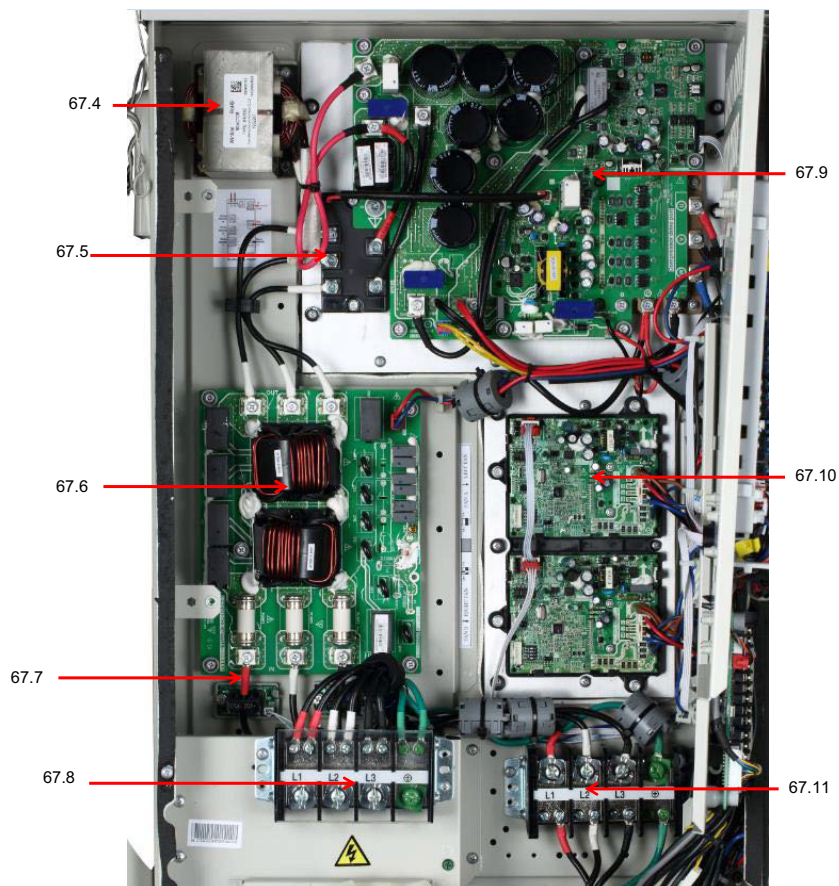
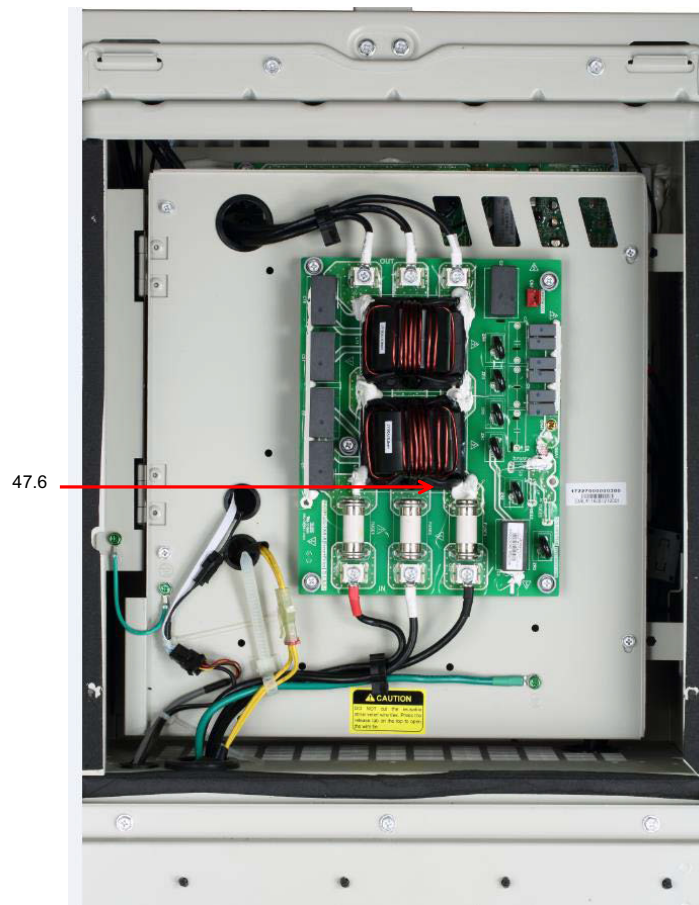


Fig. 148 —Control Board Views

Table 71 —Heat Recovery Parts Breakdown

NUMBER	PART NAME	QUANTITY	BOM CODE
1	Support, Compressor	1	12227000005940
2	Oil Balance Connecting Pipe	1	15127000000426
3	Plate, Compressor Support	1	15127000000426
4	Compressor	2	11102020000021
5	U Tube	1	15100112000155
6	Separator, Gas-Liquid	2	15500501000079
7	Connecting Pipe Assembly	1	15427000002164
7.1	Sensor, Pressure	1	11201008000032
8	Compressor Discharge Pipe Assembly	1	15427000002160
8.1	Counter Weight	4	12600102000043
8.2	Valve, Check	2	15500203000032
9	Compressor Suction Pipe Assembly	1	15427000002159
9.1	Plug, Fusible	1	15427000001439
9.2	Valve, One-Way Solenoid	1	15500205000539
9.3	Filter, Liquid	1	15500504000641
10	Connecting Pipe Assembly	1	15127000005859
11	Solenoid Valve Assembly	1	15427000002169
11.1	Valve, One-Way Solenoid	1	15500205000721
11.2	Valve, One-Way Solenoid	1	15500205000219
11.3	Valve, One-Way Solenoid	1	15500205000739
12	Solenoid Valve Assembly	1	15427000002167
12.1	Valve, One-Way Solenoid	2	15500205000721
13	Controller, Network	1	17211200000381
14	Connecting Pipe Assembly	1	15127000005858
15	Valve, Check	1	15427000002168
15.1	Valve, Check	2	15500203000109
15.2	Valve, Check	2	15500203000288
16	Valve, Check	1	15427000002165
16.1	Valve, Check	4	15500203000288
17	Connecting Pipe Assembly	1	15127000005849
18	Connecting Pipe Assembly	1	15427000002172
18.1	Sensor, Pressure	1	11201008000035
18.2	Switch, Pressure	2	17400516000428
19	Connecting Pipe Assembly	1	15127000005851
20	Connecting Pipe Assembly	1	15427000002171
20.1	Filter, Liquid	1	15500504000109
21	Valve, Check	1	15427000002170
21.1	Valve, Check	1	15500203000035
21.2	Valve, Check	1	15500203000108
21.3	Valve, Check	1	15500203000109
21.4	Valve, Check	1	15500203000110
22	Low Pressure Valve Assembly	1	15427000002163
22.1	Valve, Low Pressure	1	15500204000242
23	Capillary, Oil Balance	1	15127000005845
23.1	Filter, Liquid	1	15500504000109
24	Separator, Oil	1	15500501000005
25	Support, Tube	1	12227000005937
26	Support, Tube	1	12227000005939
27	Support, Tube	1	12227000005935
28	Support, Tube	1	12227000005936
29	Plate, Valve Mounting	1	12227000005942
30	Piping Support Plate	1	12227000005938
31	Chassis Assembly	1	12227000003012
32	Plate, Support	1	12227000005982
33	High Pressure Valve Assembly	1	15427000002162
33.1	Valve, Low Pressure	1	15500204000088
34	Four-Way Valve Assembly	1	15427000002161

NUMBER	PART NAME	QUANTITY	BOM CODE
34.1	Valve, Four-Way	1	15500216000741
34.2	Filter, Liquid	1	15500504000641
34.3	Valve, Check	1	15500203000050
35	Capillary, Oil Return	1	15127000005846
35.1	Filter, Liquid	1	15500504000125
36	Cover, Control Box	1	12227000005978
37	Solenoid Valve Assembly	1	15427000002166
37.1	Valve, One-Way Solenoid	2	15500205000010
38	Gauge Port Assembly	1	15127000005816
38.1	Connection, Meter	1	15500301000011
38.2	Filter, Liquid	1	15500504000109
39	Cover, Control Box	1	12227000002513
40	Panel, Right	1	12227000003813
41	Grille	2	12927000000029
42	Seal, Rubber	1	12627000000207
43	Connecting Pipe Assembly	1	15427000001267
44	Connecting Pipe Assembly	1	15127000005158
45	Coil, Right Condenser	1	15827000000808
45.1	Filter, Liquid	1	15827000000809
45.2	Condenser Output Pipe Assembly	1	15127000005789
45.3	Condenser Input Pipe Assembly	1	15127000005788
46	Beam Assembly	1	12227000005984
47	Board, Main Control	1	17227000000380
47.1	Control Box Body Assembly	1	12227000005972
47.2	Mount, Main Board	1	12227000005975
47.3	Rectifier, Bridge	1	11201418000069
47.4	Reactor	1	17400306000243
47.5	Module, Compressor	1	17127000002997
47.6	Board, Filter	1	17127000002996
48	Bracket, Control Box	1	12227000005980
49	Support, Panel	1	12227000000927
50	Plate, Condenser Seal	1	12227000001363
51	Fan	1	12100105000382
52	Guard, Fan	2	12927000000027
53	Support Panel, Fan Guard	2	12227000000421
54	Panel, Air Outlet	2	12127000000059
55	Panel, Top, Rear	2	12227000000783
56	Beam, Front	2	12227000001058
57	Support, Panel	4	12227000001198
58	Fan	1	12100105000381
59	Motor	2	11002015000561
60	Beam, Back	2	12227000001596
61	Mount, Motor	4	12227000001279
62	Plate, Condenser	1	12227000005934
63	Plate, Condenser Connection	1	12227000005933
64	Plate, Condenser Side Seal	2	12227000001377
65	Coil, Left Condenser	1	15827000000806
65.1	Coil, Condenser	1	15827000000807
65.2	Condenser Input Pipe Assembly	1	15127000005786
65.3	Condenser Input Pipe Assembly	1	15127000005785
65.4	Condenser Input Pipe Assembly	1	15127000005784
65.5	Condenser Output Pipe Assembly	1	15127000005783
65.6	Condenser Output Pipe Assembly	1	15127000005782
65.7	Condenser Output Pipe Assembly	1	15127000005781
66	Support, Control Box	1	12227000005986
67	Board, Main Control	1	17227000000379
67.1	Box, Control	1	12227000004381
67.2	Mount, Main Board	1	12227000004373
67.3	Support, Main Board	1	12127000000320

NUMBER	PART NAME	QUANTITY	BOM CODE
67.4	Reactor	1	17400306000223
67.5	Rectifier, Bridge	1	11201418000069
67.6	Board, Filter	1	17127000002996
67.7	Board, Current Detector	2	17127000004756
67.8	Block, 3P Terminal	1	17400401000616
67.9	Module, Compressor	1	17127000002997
67.10	Module, Fan Motor	2	17127000005818
67.11	Block, 3P Terminal	1	17400401000636
67.12	Board, Main Control	1	17127000005592
67.12	Board, Main Control	1	17127000005578
67.12	Board, Main Control	1	17127000005549
67.12	Board, Main Control	1	17127000005543
67.12	Board, Main Control	1	17127000005582
67.13	Board, Intermediate Adapter	1	17127000005136
68	Mount, Control Box	1	12227000003669
69	Panel, Bottom, Front	2	12227000000830
70	Panel, Middle	1	12227000001037
71	Panel Support, Middle	1	12227000001023
72	Panel, Top, Front	2	12227000005522
73	Panel, Left	1	12227000006792
74	Panel, Corner	4	12227000001036
75	Controller, Discharge Temperature	2	17400513000066
76	Sensor, Pipe Temperature	1	11201007001640
77	Sensor, Temperature	1	11201007000980
78	Sensor, Temperature	1	11201007000979
79	Sensor, Discharge Temperature	2	11201007000308
80	Heater, Crankcase	4	17402001000049

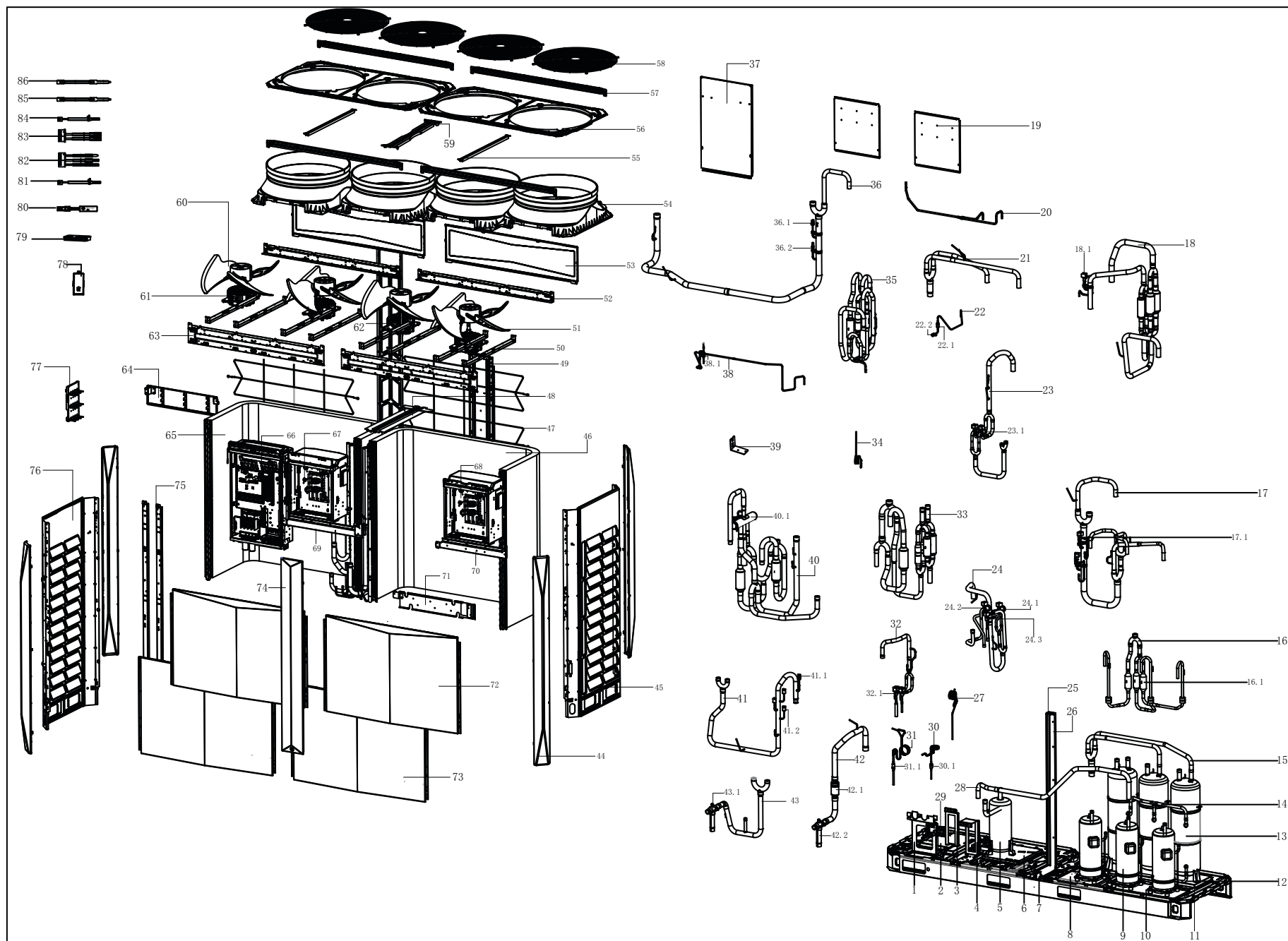
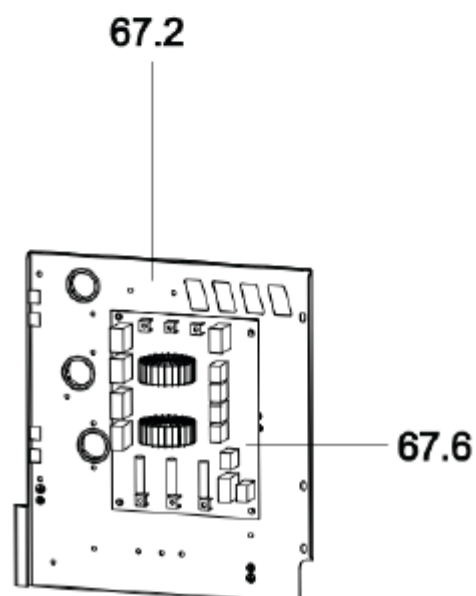
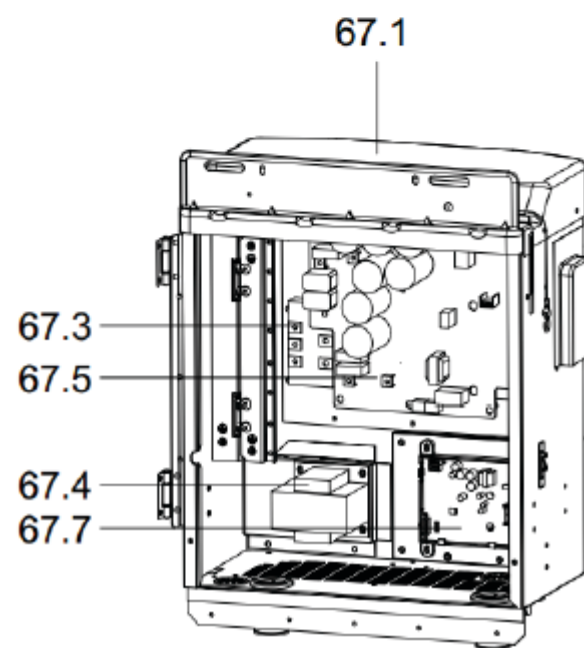
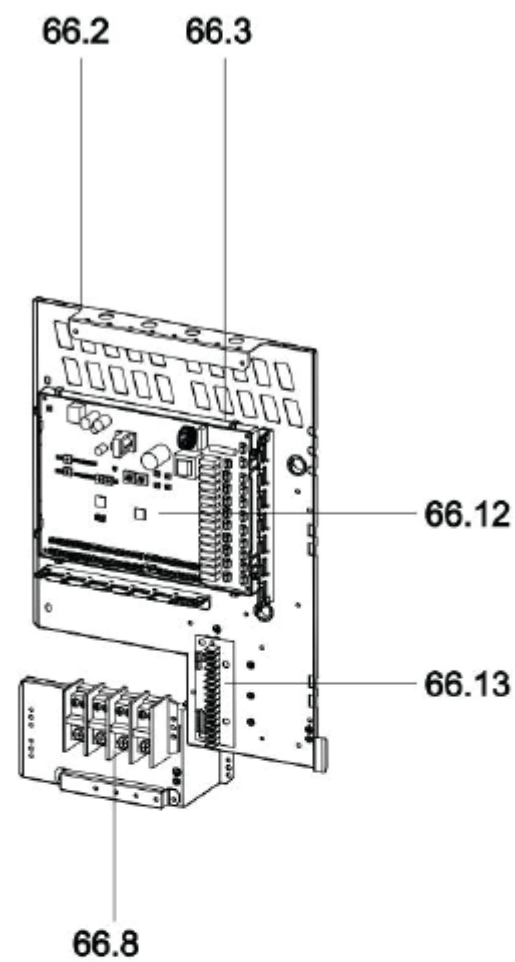
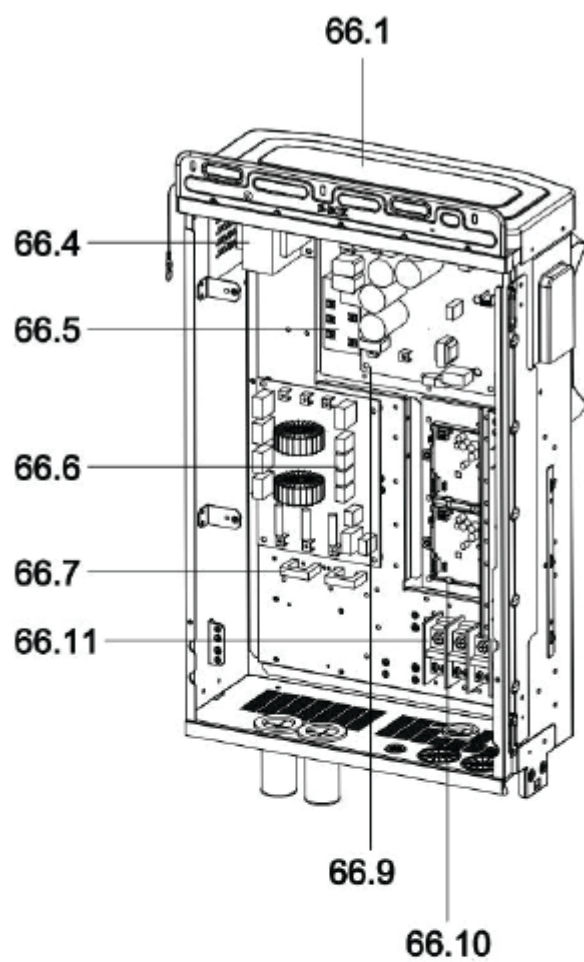


Fig. 149 —Heat Recovery Exploded View



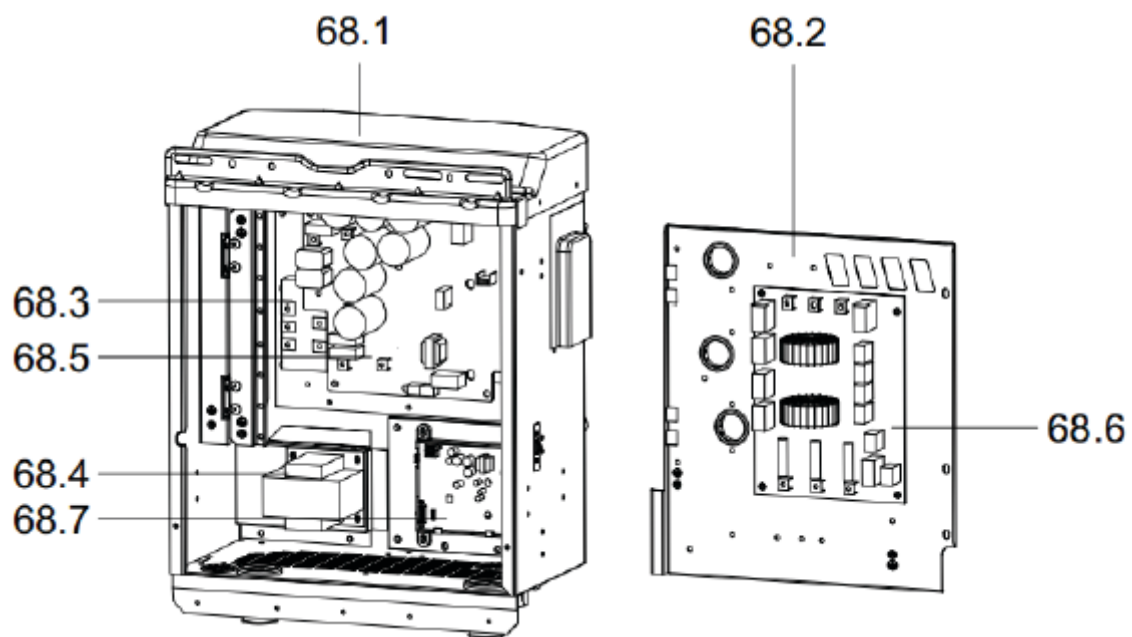


Fig. 150 —Control Board Views

Table 72 —Parts Table

NUMBER	PART NAME	QUANTITY	BOM CODE
1	Valve Panel	1	12227000007634
2	Supporter	1	12227700005081
3	Pipe Supporter	1	12227000007638
4	Pipe Supporter	1	12227000007645
5	Oil Separator	1	15500501000006
6	support Plate Assembly	1	12227000007650
7	Pipe Supporter	1	12227000007647
8	Compressor Support Plate Assembly	1	12227000007643
9	Compressor	3	11102020000021
10	Compressor Support Plate Assembly	1	12227000007640
11	Support Plate Assembly	1	12227000007636
12	Connecting Pipe Assembly	1	15427000002439
13	Gas-Liquid Separator	3	15500501000079
14	Connecting Pipe Assembly	1	15427000002460
15	Connecting Pipe Assembly	1	15427000002453
16	Compressor Discharge Pipe Assembly	1	15427000002463
16.1	Check Valve	3	15500203000032
17	Compressor Suction Pipe Assembly	1	15427000002469
17.1	Solenoid Valve Assembly	2	15500205000639
18	Check Valve Assembly	1	15427000002468
18.1	Solenoid Valve Assembly	1	15500205000010
19	Control Box Cover	2	12227000005978
20	Connecting Pipe Assembly	1	15427000002443
21	Connecting Pipe Assembly	1	15427000002451
22	Connecting Pipe Assembly	1	15427000002465
22.1	Filter	1	15500504000109
22.2	Gauge Port	1	15500301000011
23	Solenoid Valve Assembly	1	15427000002461
23.1	Solenoid Valve Assembly	2	15500205000721
24	Solenoid Valve Assembly	1	15427000002462
24.1	Solenoid Valve Assembly	1	15500205000720
24.2	Solenoid Valve Assembly	1	15500205000722
24.3	Solenoid Valve Assembly	1	15500205000719
25	Condenser Connection Plate Assembly	1	12227000007612
26	Condenser Connection Plate Assembly	1	12227000007613
27	Connecting Pipe Assembly	1	15427000002452
28	Connecting Pipe Assembly	1	15427000002455
29	Support Plate	1	12227000007632
30	Oil Balance Pipe Assembly	1	15427000002464
30.1	Filter	1	15500504000109
31	Oil Balance Pipe Assembly	1	15427000002454
31.1	Filter	1	15500504000125
32	Solenoid Valve Assembly	1	15427000002466
32.1	Solenoid Valve Assembly	2	15500205000219
33	Check Valve Assembly	1	15427000002441
34	Connecting Pipe Assembly	1	15427000002449
35	Check Valve Assembly	1	15427000002459
36	Connecting Pipe Assembly	1	15427000002679
36.1	Pressure Censor	1	11201008000032
36.2	Fusible Plug Assembly	1	15427000001439
37	Control Box Cover	1	12227000002513
38	Connecting Pipe Assembly	1	15427000002457
38.1	Filter	1	15500504000109
39	support plate	1	12227000007972
40	Four-Way Valve Assembly	1	15427000002445
40.1	Four-Way Valve Assembly	1	15500216000921
41	Connecting Pipe Assembly	1	15427000002440

NUMBER	PART NAME	QUANTITY	BOM CODE
41.1	Pressure Sensor	1	11201008000035
41.2	Pressure Sensor	3	17400516000428
42	Low Pressure Valve Assembly	1	15427000002450
42.1	Filter	1	15500504000878
42.2	Low Pressure Valve	1	15500204000106
43	High Pressure Valve Assembly	1	15427000002448
43.1	High Pressure Valve	1	15500204000242
44	Upright Post	4	12227000001036
45	Right Side Panel Assembly	1	12227000003813
46	Right Condenser Assembly	1	15827000000967
47	Rear Grille	2	12927000000041
48	Condenser Seal Plate Assembly	1	12227000002727
49	Front Side Middle Pillar Assembly	1	12227000001023
50	Motor Bracket Assembly	8	12227000001279
51	Propeller Fan	2	12100105000383
52	Back Beam Assembly	2	12227000001064
53	Rear Upper Panel	2	12227000002372
54	Air Outlet Guide Assembly	4	12127000000061
55	Cover Supporter	2	12227000001263
56	Cover	2	12227000000419
57	Cover Supporter	4	12227000001212
58	Fan Guard	4	12927000000020
59	Cover Supporter	1	12227000000927
60	Propeller Fan	2	12100105000384
61	Brushless DC Motor	3	11002015001281
62	Brushless DC Motor	1	11002015005621
63	Front Beam	2	12227000001065
64	Beam Assembly	1	12227000008016
65	Left Condenser Assembly	1	15827000000966
66	Control Box (Main)	1	17227000001959
66.1	Control Box Body Assembly	1	12227000004381
66.2	Mainboard Mounting Plate	1	12227000004373
66.3	Mainboard Bracket	1	12127000000320
66.4	Reactance	1	17400306000223
66.5	Bridge Rectifier	1	11201418000069
66.6	AC Filter Plate Assembly	1	17127000002996
66.7	Current Detection Board Assembly	2	17127000004756
66.8	Wire Holder	1	17400401000616
66.9	Inverter Module Assembly (Compressor)	1	17127000002997
66.10	Inverter Module Assembly (Brushless DC Motor)	2	17127000005818
66.11	Wire Holder	1	17400401000636
66.12	Main Control Board Assembly	1	17127000006142
66.12	Main Control Board Assembly	1	17127000006141
66.12	Main Control Board Assembly	1	17127000006140
66.12	Main Control Board Assembly	1	17127000006136
66.12	Main Control Board Assembly	1	17127000006138
66.13	Terminal Block Board Assembly	1	17127000005136
67	Control Box (Main)	1	17227000001957
67.1	Control Box Body Assembly	1	12227000007695
67.2	Mainboard Mounting Plate	1	12227000005975
67.3	Bridge Rectifier	1	11201418000069
67.4	Reactance	1	17400306000243
67.5	Inverter Module Assembly (Compressor)	1	17127000002997
67.6	AC Filter Plate Assembly	1	17127000002996
67.7	Inverter Module Assembly (Brushless DC Motor)	1	17127000005818
68	control Box (Main)	1	17227000001958
68.1	Control Box Body Assembly	1	12227000007692
68.2	Mainboard Mounting Plate	1	12227000005975
68.3	Bridge Rectifier	1	11201418000069

NUMBER	PART NAME	QUANTITY	BOM CODE
68.4	Reactance	1	17400306000243
68.5	Inverter Module Assembly (Compressor)	1	17127000002997
68.6	AC Filter Plate Assembly	1	17127000002996
68.7	Inverter Module Assembly (Brushless DC Motor)	1	17127000005818
69	Beam Assembly	1	12227000007676
70	Beam Assembly	1	12227000007672
71	Beam Assembly	1	12227000008015
72	Top Front Panel Assembly	2	12227000000850
73	Low Front Panel	2	12227000000779
74	Upright Post	1	12227000001037
75	Support Plate Assembly	2	12227000007682
76	Left Side Panel Assembly	1	12227000006792
77	Bracket Assembly	1	12227000008012
78	Network Controller	1	17211200000381
79	Sealing Gasket	1	12627000000306
80	Exhaust Temperature Controller	3	17400513000043
81	Temperature Sensor	1	11201007001640
82	Temperature Sensor	1	11201007000980
83	Temperature Sensor	1	11201007000979
84	Exhaust Temperature Sensor	3	11201007000759
85	Compressor Electric Heating Zone	2	17402001000049
86	Compressor Electric Heating Zone	4	17402001000379

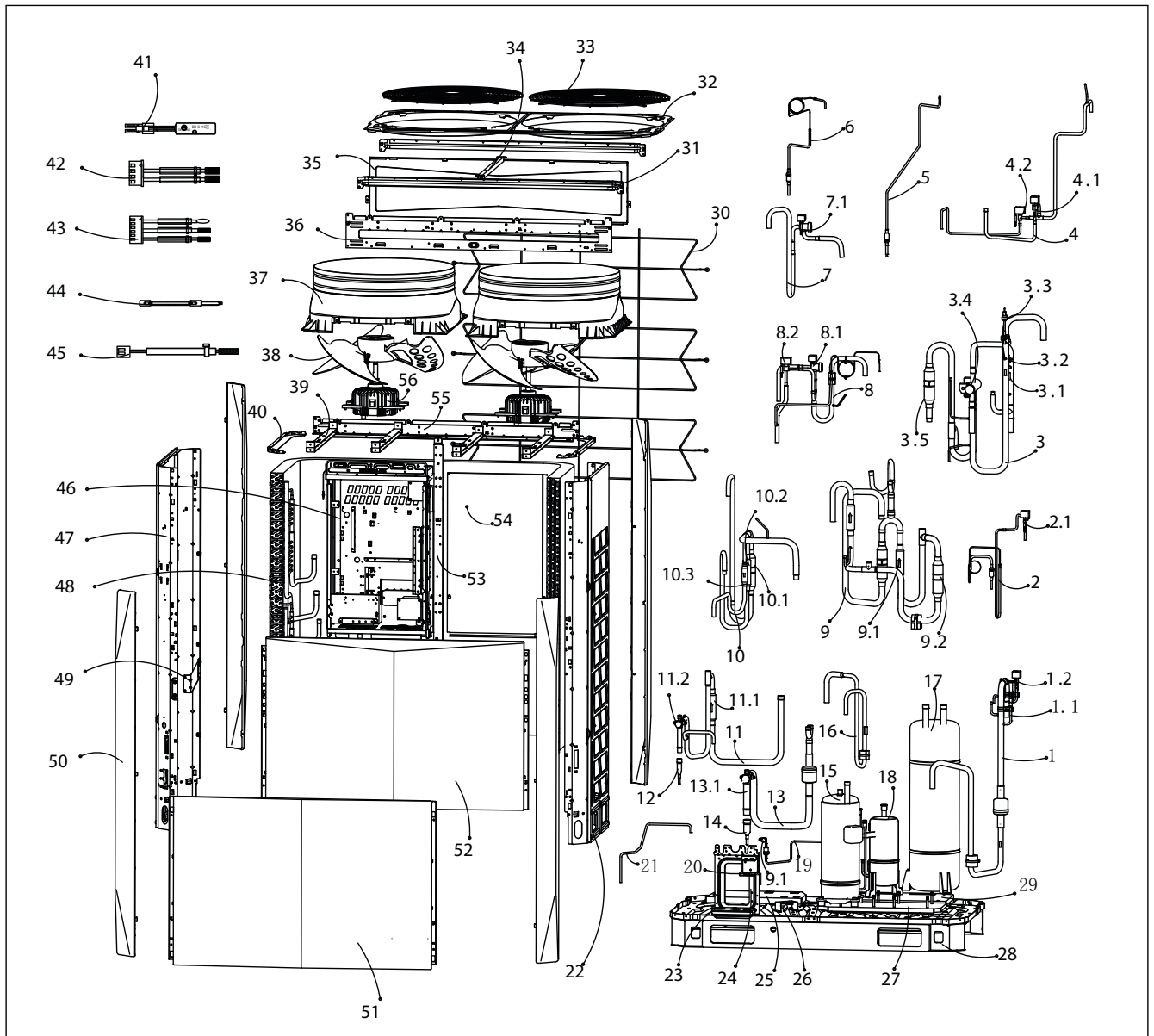


Fig. 151 —Heat Recovery Exploded View

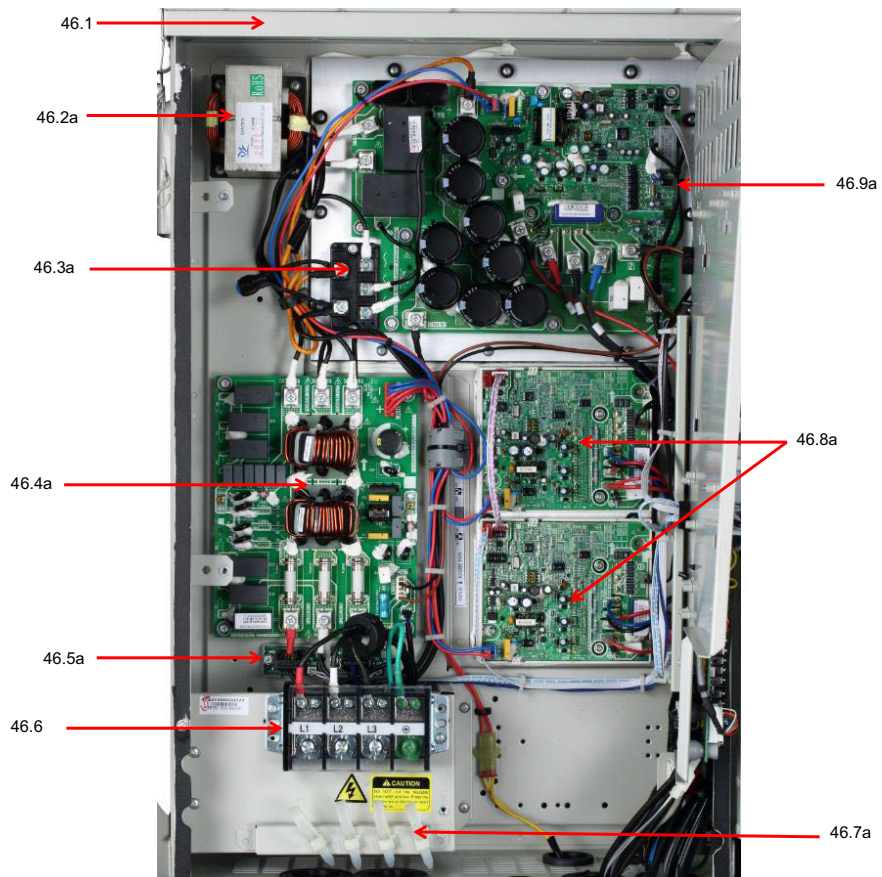
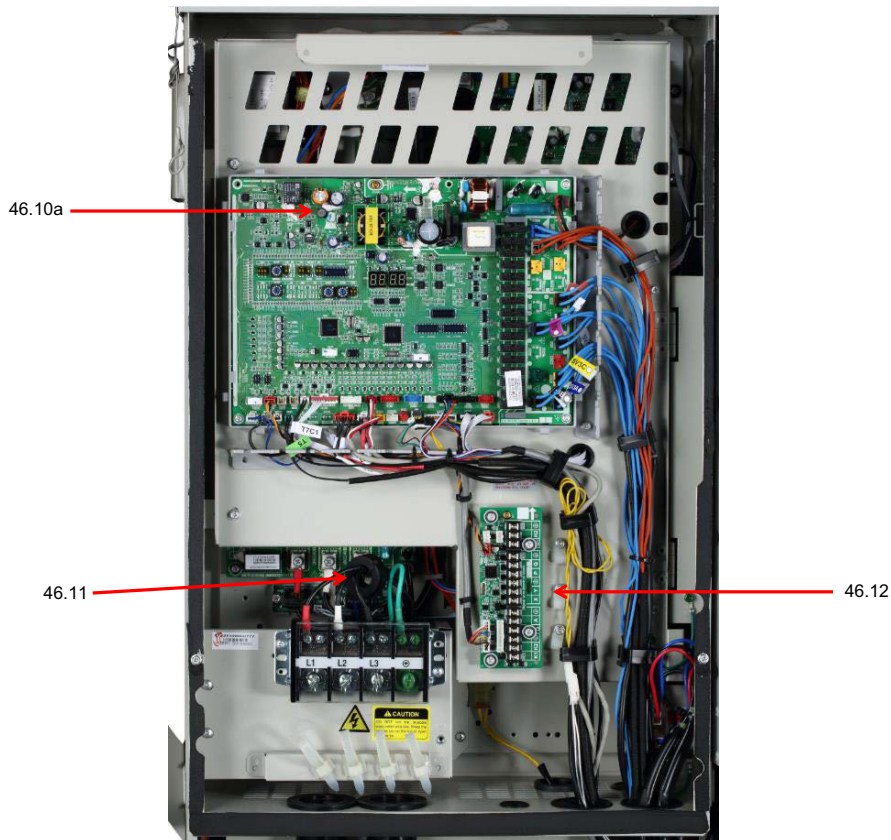


Fig. 152 —Control Board Views

Table 73 —Heat Recovery Parts Breakdown

NUMBER	PART NAME	QUANTITY	BOM CODE
1	Suction Pipe Assembly of Compressor	1	15427000001422
1.1	Plug, Fusible	1	15427000001439
1.2	Valve, One-Way Solenoid	1	15500205000240
2	Valve, Bypass	1	15427000001420
2.1	Valve, One-Way Solenoid	1	15500205000539
3	4-Way Valve Assembly	1	15427000001423
3.1	Switch, Pressure	1	17400516000108
3.2	Sensor, Pressure	1	11201008000035
3.3	Sensor, Pressure	1	11201008000032
3.4	Valve, 4-Way	1	15500216000123
3.5	Valve, Check	1	15500203000110
4	Valve, Solenoid	1	15427000001399
4.1	Valve, One-Way Solenoid	1	15500205000219
4.2	Valve, One-Way Solenoid	1	15500205000220
5	Connecting Pipe Assembly	1	15127000003919
6	Capillary, Oil Return	1	15127000003946
7	Valve, Solenoid	1	15427000001400
7.1	Valve, One-Way Solenoid	1	15500205000721
8	Valve, Solenoid	1	15427000001401
8.1	Valve, One-Way Solenoid	1	15500205000219
8.2	Valve, One-Way Solenoid	1	15500205000739
9	Valve, One-Way	1	15427000001419
9.1	Valve, Check	2	15500203000109
9.2	Valve, Check	2	15500203000110
10	Valve, One-Way	1	15427000001402
10.1	Valve, Check	1	15500203000108
10.2	Valve, Check	1	15500203000109
10.3	Valve, Check	1	15500203000110
11	High Pressure Valve Assembly	1	15427000001421
11.1	Valve, Low Pressure	1	15500204000120
12	Connecting Pipe Assembly	1	15127000005158
13	Low Pressure Valve Assembly	1	15427000001424
13.1	Valve, Low Pressure	1	15500204000088
14	Connecting Pipe Assembly	1	15127000005159
15a	Compressor	1	11102020000012
16	Discharge Pipe Assembly of Compressor	1	15126000001606
17	Separator	1	15500501000036
18	Separator, Oil	1	15500501000005
19	Connector Assembly	1	15127000003950
19.1	Connection, Meter	1	15500301000011
20	Plate, Support	1	12227000005982
21	Connecting Pipe	1	15127000003918
22	Panel, Right	1	12227000003813
23	Seal, Rubber	1	12627000000207
24	Mount, Valve	1	12227000001085
25	Plate, Support	1	12227000003348
26	Supporter, Pipe	1	12227000003350
27	Support, Compressor	1	12227000003345
28	Bottom	1	12227000003336
29	Support, Front Panel	1	12227000003341
30	Grille	1	12927000000041
31	Support, Top Panel	2	12227000001212
32	Support Panel, Fan Guard	1	12227000000419
33	Guard, Fan	2	12927000000020
34	Support, Panel	1	12227000001263
35	Panel, Top, Rear	1	12227000000855
36	Beam, Front	1	12227000001065
37	Panel, Air Outlet	2	12127000000061
38	Fan	1	12100105000384
39	Mount, Motor	4	12227000001279
40	Plate, Condenser Side Seal	2	12227000001377
41	Sensor, Discharge Temperature	1	11201007000308
42	Sensor, Temperature	1	11201007000979
43	Sensor, Temperature	1	11201007000980
44	Sensor, Discharge Temperature	1	11201007001640
45	Heater, Crankcase	2	17402001000049
46a	E-Part Box Assembly	1	17227000000777
46.1	E-Part Box Assembly	1	12227000004381
46.2a	Reactor	1	17400306000306
46.3a	Bridge, Three Phase	1	11201418000002
46.4a	Board, Filter	1	17127000003296
46.5a	Board, Current Detector	2	17127000004257
46.6	Block, 3P Terminal	1	17400401000616

NUMBER	PART NAME	QUANTITY	BOM CODE
46.7a	Transformer	1	11203103000813
46.8a	Module, Fan Motor	2	17127000005816
46.9a	Module, Compressor	1	17127000003299
46.10a	Board, Main Control	1	17127000005537
46.10a	Board, Main Control	1	17127000005584
46.10a	Board, Main Control	1	17127000005594
46.11	Transformer	1	17427000000025
46.12	Board, Communication	1	17127000005136
47	Panel, Left	1	12227000006792
48	Coil, Condenser	1	15827000000366
49	Mount, Control Box	1	12227000003669
50	Panel, Corner	4	12227000001036
51	Panel, Bottom, Front	1	12227000000779
52	Panel, Top, Front	1	12227000000850
53	Support, Middle Beam	1	12227000005952
54	Cover, Control Box	1	12227000002513
55	Beam, Rear	1	12227000001590
56a	Motor, Fan	2	11002015000316

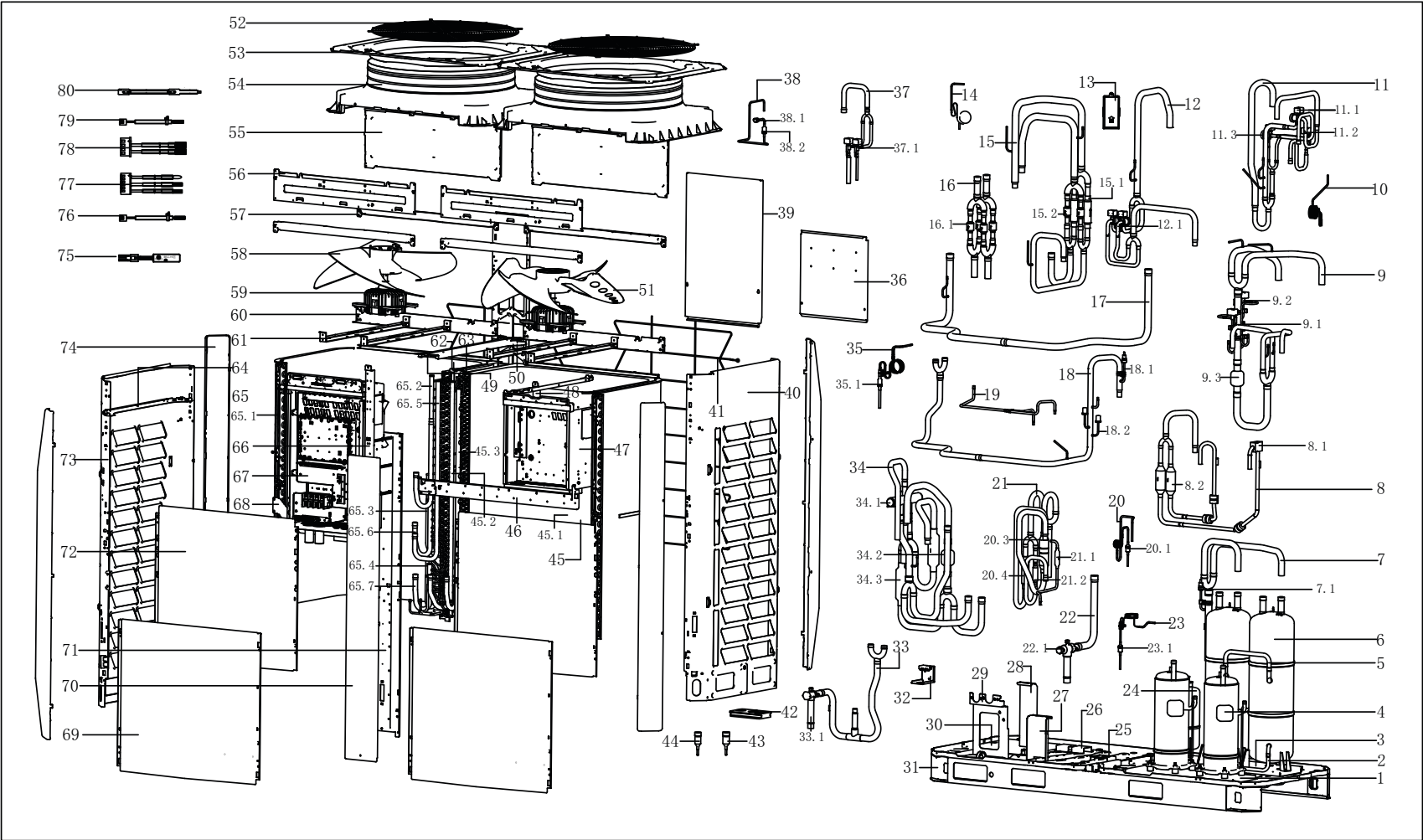
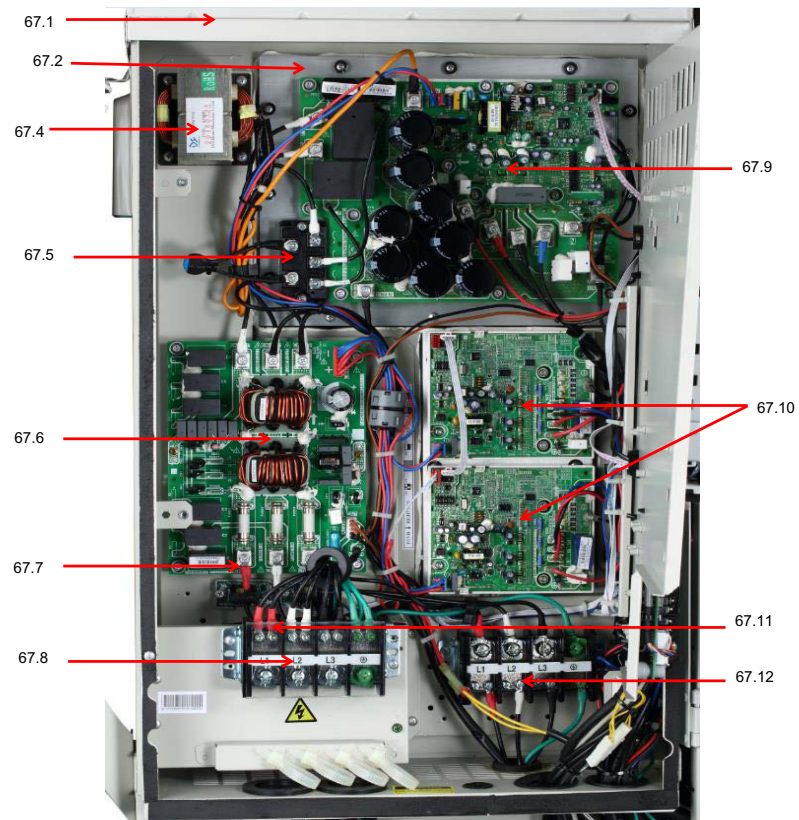
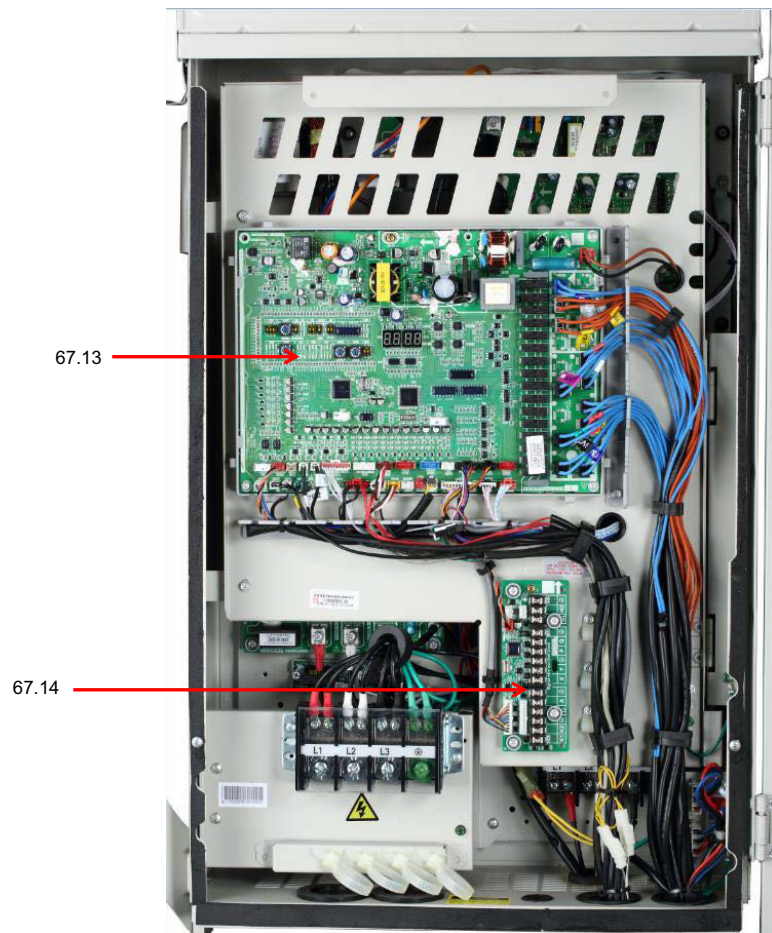


Fig. 153 —Heat Recovery Exploded View



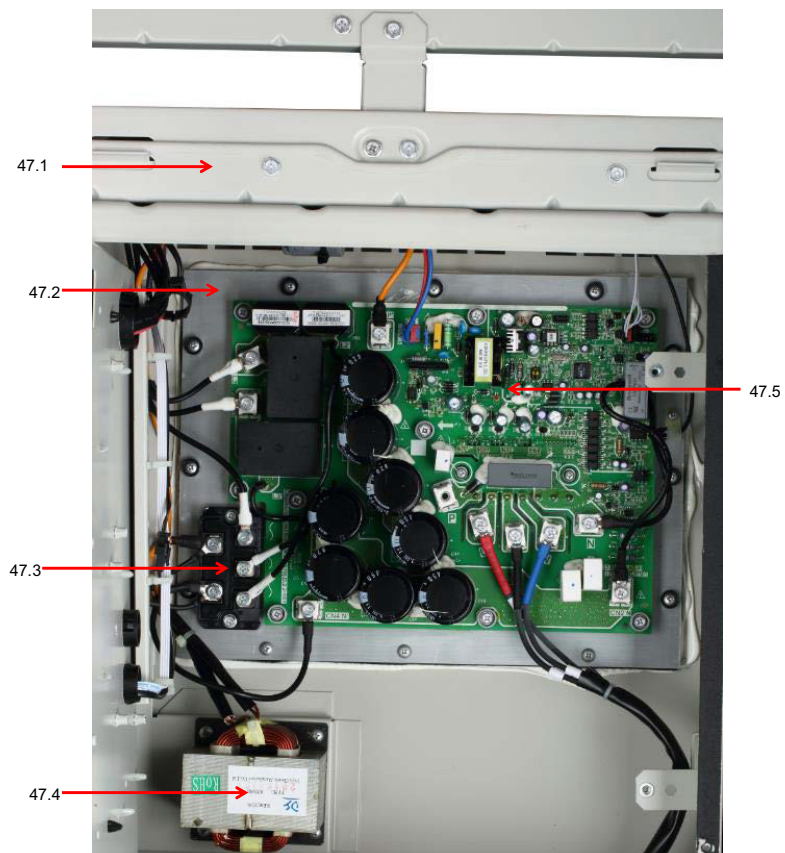
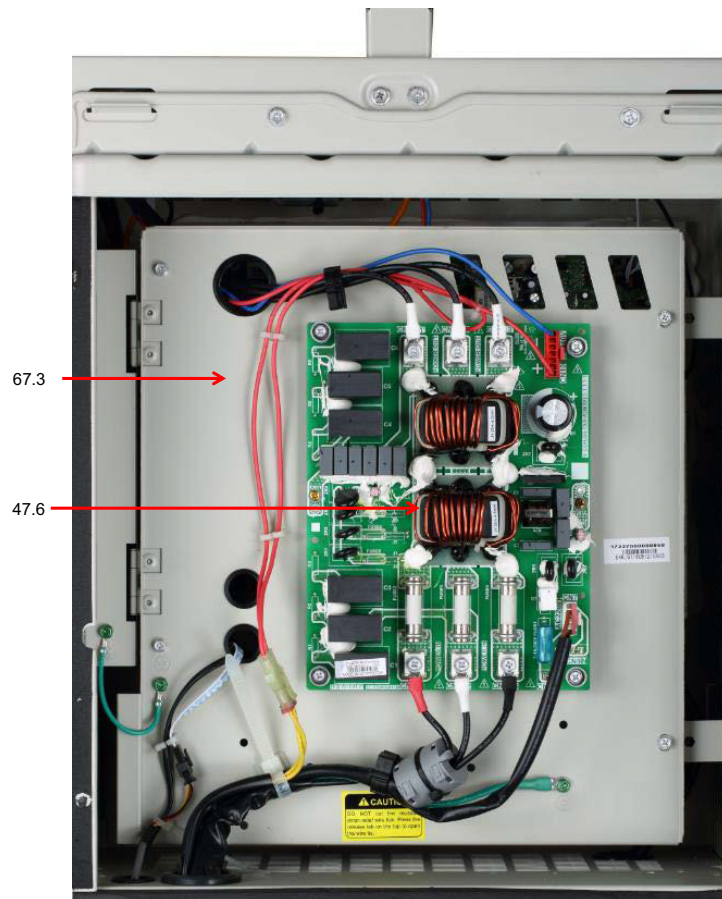


Fig. 154 —Control Board Views

Table 74 —Heat Recovery Parts Breakdown

NUMBER	PART NAME	QUANTITY	BOM CODE
1	Compressor Support Plate Assembly	1	12227000005940
2	Oil Balance Connecting Pipe	1	15127000000426
3	Support Plate Assembly	1	12227000005941
4	Compressor	2	11102020000012
5	U Tube	1	15100112000155
6	Gas-Liquid Separator	2	15500501000079
7	Connecting Pipe Assembly	1	15427000002164
7.1	Pressure Sensor	1	11201008000032
8	Compressor Discharge Pipe Assembly	1	15427000002160
8.1	Counter Weight	4	12600102000043
8.2	Check Valve	2	15500203000032
9	Compressor Suction Pipe Assembly	1	15427000002159
9.1	Fusible Plug Assembly	1	15427000001439
9.2	Solenoid Valve Assembly	1	155002050000539
9.3	Filter	1	155005040000641
10	Connecting Pipe Assembly	1	15127000005859
11	Solenoid Valve Assembly	1	15427000002169
11.1	Solenoid Valve Assembly	1	155002050000721
11.2	Solenoid Valve Assembly	1	155002050000219
11.3	Solenoid Valve Assembly	1	155002050000739
12	Solenoid Valve Assembly	1	15427000002167
12.1	Solenoid Valve Assembly	2	155002050000721
13	Network Controller	1	17211200000381
14	Connecting Pipe Assembly	1	15127000005858
15	Check Valve Assembly	1	15427000002168
15.1	Check Valve	2	155002030000109
15.2	Check Valve	2	155002030000288
16	Check Valve Assembly	1	15427000002165
16.1	Check Valve	4	155002030000288
17	Connecting Pipe Assembly	1	15127000005849
18	Connecting Pipe Assembly	1	15427000002172
18.1	Pressure Sensor	1	112010080000035
18.2	Pressure Sensor	2	17400516000428
19	Connecting Pipe Assembly	1	15127000005851
20	Connecting Pipe Assembly	1	15427000002171
20.1	Filter	1	155005040000109
21	Check Valve Assembly	1	15427000002170
21.1	Check Valve	1	155002030000035
21.2	Check Valve	1	155002030000108
21.3	Check Valve	1	155002030000109
21.4	Check Valve	1	155002030000110
22	Low Pressure Valve Assembly	1	15427000002163
22.1	Low Pressure Valve	1	155002040000242
23	Oil Balance Pipe Assembly	1	15127000005845
23.1	Filter	1	155005040000109
24	Oil Separator	1	155005010000005
25	Piping Support Plate	1	12227000005937
26	Piping Support Plate	1	12227000005939
27	Piping Support Plate	1	12227000005935
28	Piping Support Plate	1	12227000005936
29	Valve Mounting Board Assembly	1	12227000005942
30	Piping Support Plate	1	12227000005938
31	Chassis Assembly	1	12227000003012
32	Support Plate	1	12227000005982
33	High Pressure Valve Assembly	1	15427000002162
33.1	Low Pressure Valve	1	155002040000088
34	Four-Way Valve Assembly	1	15427000002161
34.1	Four-Way Valve Assembly	1	155002160000741
34.2	Filter	1	155005040000641
34.3	Check Valve	1	155002030000050
35	Oil Return Capillary Assembly	1	15127000005846
35.1	Filter	1	155005040000125
36	Control Box Cover	1	12227000005978
37	Solenoid Valve Assembly	1	15427000002166
37.1	Solenoid Valve Assembly	2	155002050000010
38	Gauge Port Assembly	1	15127000005816
38.1	Gauge Port	1	155003010000011
38.2	Filter	1	155005040000109
39	Control Box Cover	1	12227000002513
40	Right Side Panel Assembly	1	12227000003813
41	Rear Grille	2	12927000000029
42	Sealing Gasket	1	126270000000207
43	Connecting Pipe Assembly	1	15427000001267

NUMBER	PART NAME	QUANTITY	BOM CODE
44	Connecting Pipe Assembly	1	15127000005158
45	Right Condenser Assembly	1	15827000000808
45.1	Filter	1	15827000000809
45.2	Condenser Output Pipe Assembly	1	15127000005789
45.3	Condenser Input Pipe Assembly	1	15127000005788
46	Beam Assembly	1	12227000005984
47	Control Box (Auxiliary)	1	17227000000858
47.1	Control Box Body Assembly	1	12227000005972
47.2	Mainboard Mounting Plate	1	12227000005975
47.3	Bridge Rectifier	1	11201418000002
47.4	Reactance	1	17400306000543
47.5	Inverter Module Assembly (Compressor)	1	17127000003299
47.6	AC Filter Plate Assembly	1	17127000003296
48	Strengthen Board	1	12227000005980
49	Cover Supporter	1	12227000000927
50	Condenser Seal Plate Assembly	1	12227000001363
51	Propeller Fan	1	12100105000382
52	Fan Guard	2	12927000000027
53	Cover	2	12227000000421
54	Air Outlet Guide Assembly	2	12127000000059
55	Rear Upper Panel	2	12227000000783
56	Front Beam	2	12227000001058
57	Cover Supporter	4	12227000001198
58	Propeller Fan	1	12100105000381
59	Brushless DC Motor	2	11002015000562
60	Back Beam Assembly	2	12227000001596
61	Motor Bracket Assembly	4	12227000001279
62	Condenser Connection Plate Assembly	1	12227000005934
63	Condenser Connection Plate Assembly	1	12227000005933
64	Condenser Seal Plate Assembly	2	12227000001377
65	Left Condenser Assembly	1	15827000000806
65.1	Condenser	1	15827000000807
65.2	Condenser Input Pipe Assembly	1	15127000005786
65.3	Condenser Input Pipe Assembly	1	15127000005785
65.4	Condenser Input Pipe Assembly	1	15127000005784
65.5	Condenser Output Pipe Assembly	1	15127000005783
65.6	Condenser Output Pipe Assembly	1	15127000005782
65.7	Condenser Output Pipe Assembly	1	15127000005781
66	Support Plate Assembly	1	12227000005986
67	Control Box (Main)	1	17227000000857
67.1	Control Box Body Assembly	1	12227000004381
67.2	Mainboard Mounting Plate	1	12227000004373
67.3	Mainboard Bracket	1	12127000000320
67.4	Reactance	1	17400306000306
67.5	Bridge Rectifier	1	11201418000002
67.6	AC Filter Plate Assembly	1	17127000003296
67.7	Current Detection Board Assembly	2	17127000004257
67.8	Wire Holder	1	17400401000616
67.9	Inverter Module Assembly (Compressor)	1	17127000003299
67.10	Inverter Module Assembly (Brushless DC Motor)	2	17127000005816
67.11	Linear Transformer	1	11203103000813
67.12	Wire Holder	1	17400401000636
67.13	Main Control Board Assembly	1	17127000005576
67.13	Main Control Board Assembly	1	17127000005545
67.13	Main Control Board Assembly	1	17127000005551
67.13	Main Control Board Assembly	1	17127000005539
67.13	Main Control Board Assembly	1	17127000005598
67.14	Terminal Block Board Assembly	1	17127000005136
68	Left Hanging Plate of Control Box	1	12227000003669
69	Low Front Panel	2	12227000000830
70	Upright Post	1	12227000001037
71	Front Side Middle Pillar Assembly	1	12227000001023
72	Top Front panel Assembly	2	12227000005522
73	Left Side Panel Assembly	1	12227000006792
74	Corner Supporter	4	12227000001036
75	Exhaust Temperature Controller	2	17400513000066
76	Tube Temperature Sensor	1	11201007001640
77	Temperature Sensor	1	11201007000980
78	Temperature Sensor	1	11201007000979
79	Exhaust Temperature Sensor	2	11201007000308
80	Compressor Electric Heating Zone	4	17402001000049

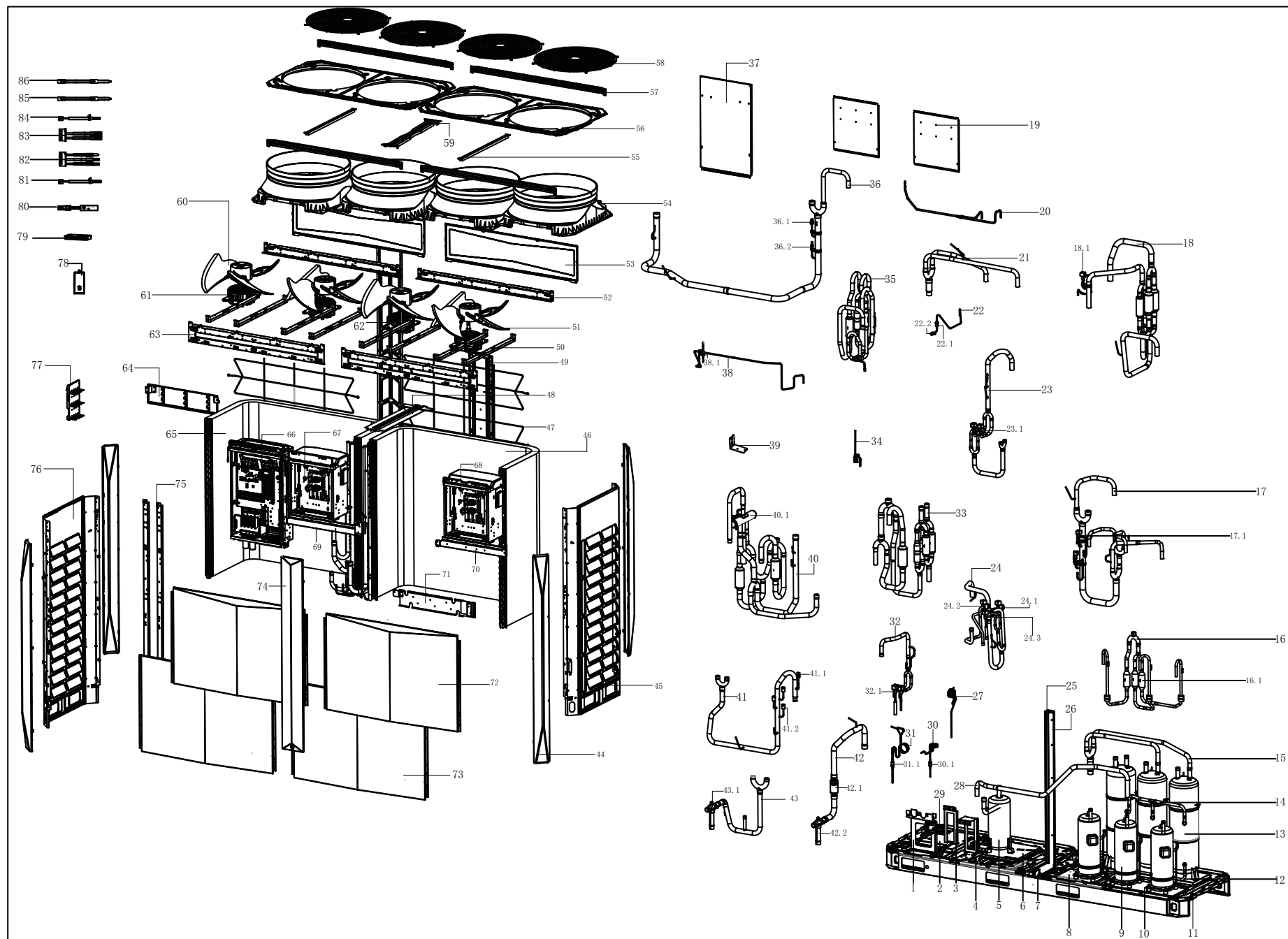
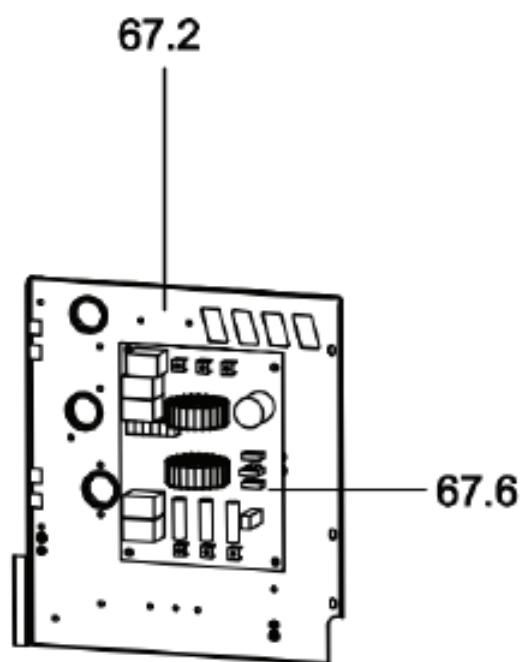
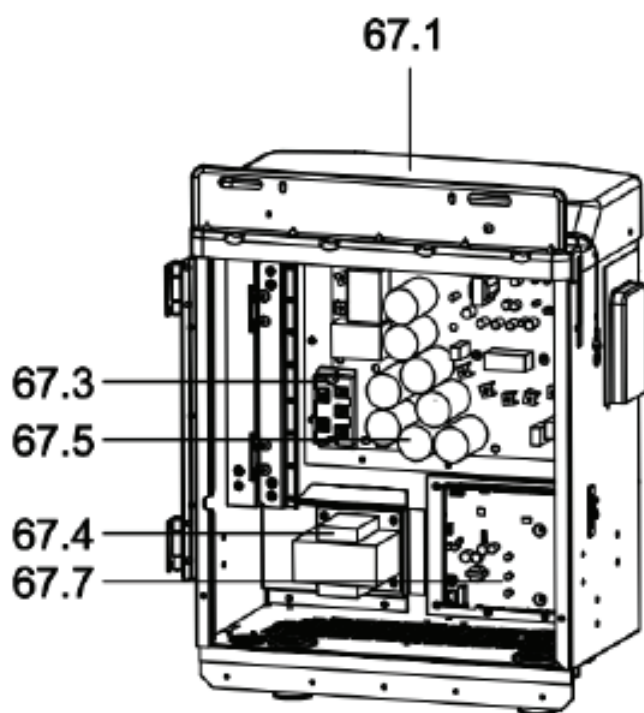
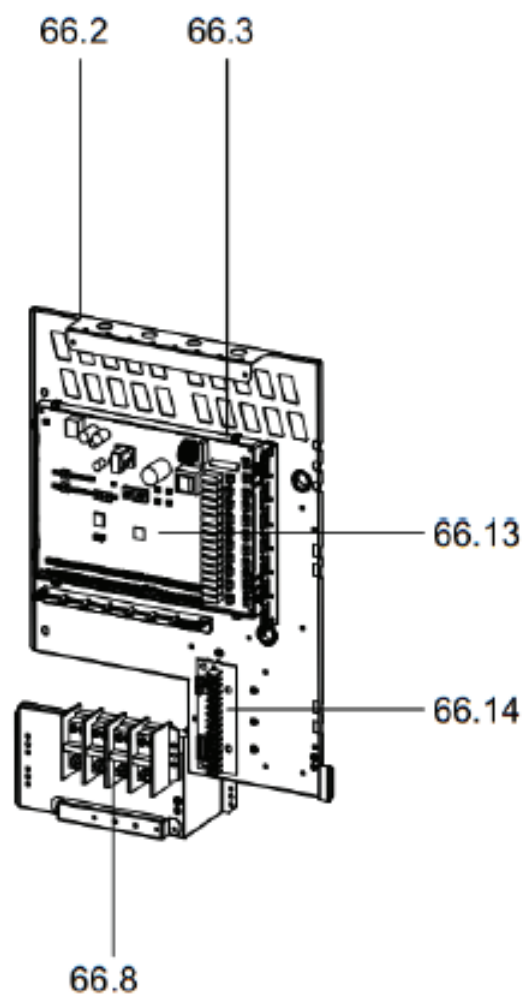
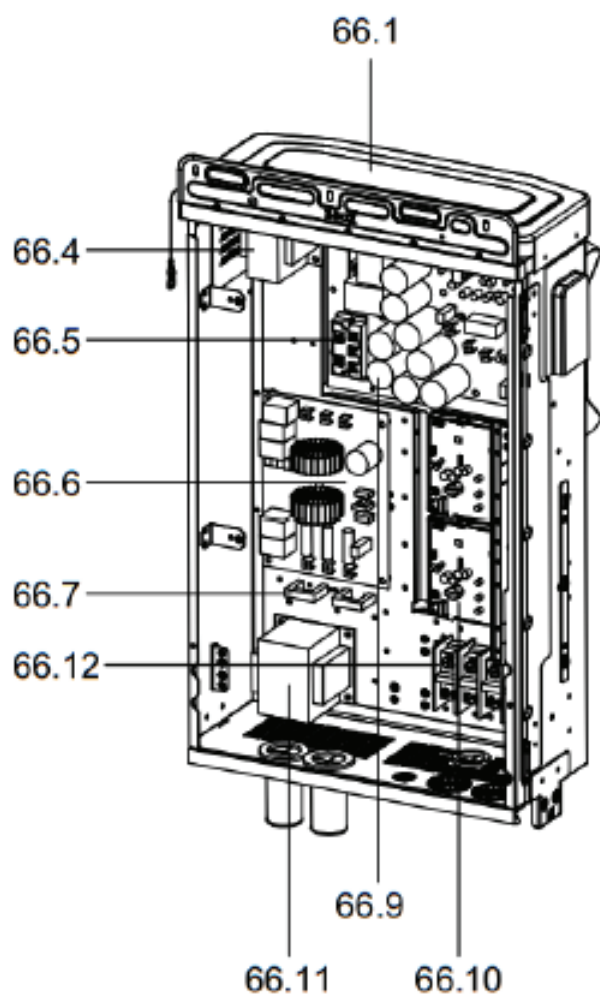


Fig. 155 —Heat Recovery Exploded View



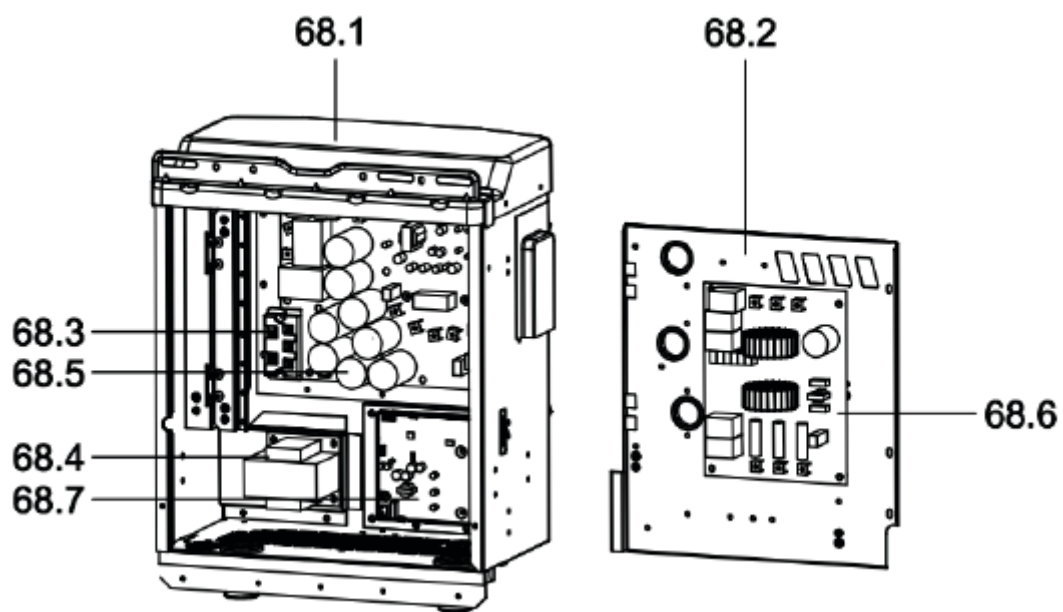


Fig. 156 —Control Board Views

Table 75 —Parts Table

NUMBER	PART NAME	QUANTITY	BOM CODE
1	Valve Panel	1	12227000007634
2	Supporter	1	12227700005081
3	Pipe Supporter	1	12227000007638
4	Pipe Supporter	1	12227000007645
5	Oil Separator	1	15500501000006
6	Support Plate Assembly	1	12227000007650
7	Pipe Supporter	1	12227000007647
8	Compressor Support Plate Assembly	1	12227000007643
9	Compressor	3	11102020000012
10	Compressor Support Plate Assembly	1	12227000007640
11	Support Plate Assembly	1	12227000007636
12	Connecting Pipe Assembly	1	15427000002439
13	Gas-Liquid Separator	3	15500501000079
14	Connecting Pipe Assembly	1	15427000002460
15	Connecting Pipe Assembly	1	15427000002453
16	Compressor Discharge Pipe Assembly	1	15427000002463
16.1	Check Valve	3	15500203000032
17	Compressor Suction Pipe Assembly	1	15427000002469
17.1	Solenoid Valve Assembly	2	15500205000639
18	Check Valve Assembly	1	15427000002468
18.1	Solenoid Valve Assembly	1	15500205000010
19	Control Box Cover	2	12227000005978
20	Connecting Pipe Assembly	1	15427000002443
21	Connecting Pipe	1	15427000002451
22	Connecting Pipe Assembly	1	15427000002465
22.1	Filter	1	15500504000109
22.2	Gauge Port	1	15500301000011
23	Solenoid Valve Assembly	1	15427000002461
23.1	Solenoid Valve Assembly	2	15500205000721
24	Solenoid Valve Assembly	1	15427000002462
24.1	Solenoid Valve Assembly	1	15500205000720
24.2	Solenoid Valve Assembly	1	15500205000722
24.3	Solenoid Valve Assembly	1	15500205000719
25	Condenser Connection Plate Assembly	1	12227000007612
26	Condenser Connection Plate Assembly	1	12227000007613
27	Connecting Pipe Assembly	1	15427000002452
28	Connecting Pipe Assembly	1	15427000002455
29	Support Plate	1	12227000007632
30	Oil Balance Pipe Assembly	1	15427000002464
30.1	Filter	1	15500504000109
31	Oil Balance Pipe Assembly	1	15427000002454
31.1	Filter	1	15500504000125
32	Solenoid Valve Assembly	1	15427000002466
32.1	Solenoid Valve Assembly	2	15500205000219
33	Check Valve Assembly	1	15427000002441
34	Connecting Pipe Assembly	1	15427000002449
35	Check Valve Assembly	1	15427000002459
36	Connecting Pipe Assembly	1	15427000002679
36.1	Pressure Sensor	1	11201008000032
36.2	Fusible Plug Assembly	1	15427000001439
37	Control Box Cover	1	12227000002513
38	Connecting Pipe Assembly	1	15427000002457
38.1	Filter	1	15500504000109
39	Support Plate	1	12227000007972
40	Four-Way Valve Assembly	1	15427000002445
40.1	Four-Way Valve Assembly	1	15500216000921
41	Connecting Pipe Assembly	1	15427000002440

NUMBER	PART NAME	QUANTITY	BOM CODE
41.1	Pressure Sensor	1	11201008000035
41.2	Pressure Sensor	3	17400516000428
42	Low Pressure Valve Assembly	1	15427000002450
42.1	Filter	1	15500504000878
42.2	Low Pressure Valve	1	15500204000106
43	High Pressure Valve Assembly	1	15427000002448
43.1	High Pressure Valve	1	15500204000242
44	Upright Post	4	12227000001036
45	Right Side Panel Assembly	1	12227000003813
46	Right Condenser Assembly	1	15827000000967
47	Rear Grille	2	12927000000041
48	Condenser Seal Plate Assembly	1	12227000002727
49	Front Side Middle Pillar Assembly	1	12227000001023
50	Motor Bracket Assembly	8	12227000001279
51	Propeller Fan	2	12100105000383
52	Back Beam Assembly	2	12227000001064
53	Rear Upper Panel	2	12227000002372
54	Air Outlet Guide Assembly	4	12127000000061
55	Cover Supporter	2	12227000001263
56	Cover	2	12227000000419
57	Cover Supporter	4	12227000001212
58	Fan Guard	4	12927000000020
59	Cover Supporter	1	12227000000927
60	Propeller Fan	2	12100105000384
61	Brushless DC Motor	3	11002015000316
62	Brushless DC Motor	1	11002015005623
63	Front Beam	2	12227000001065
64	Beam Assembly	1	12227000008016
65	Left Condenser Assembly	1	15827000000966
66	Control Box (Main)	1	17227000001938
66.1	Control Box Body Assembly	1	12227000004381
66.2	Mainboard Mounting Plate	1	12227000004373
66.3	Mainboard Bracket	1	12127000000320
66.4	Reactance	1	17400306000306
66.5	Bridge Rectifier	1	11201418000002
66.6	AC Filter Plate Assembly	1	17127000003296
66.7	Current Detection Board Assembly	2	17127000004257
66.8	Wire Holder	1	17400401000616
66.9	Inverter Module Assembly (Compressor)	1	17127000003299
66.10	Inverter Module Assembly (Brushless DC Motor)	2	17127000005816
66.11	Linear Transformer	1	11203103000813
66.12.	Wire Holder	1	17400401000636
66.13	Main Control Board Assembly	1	17127000006143
66.13	Main Control Board Assembly	1	17127000006137
66.13	Main Control Board Assembly	1	17127000006145
66.13	Main Control Board Assembly	1	17127000006139
66.13	Main Control Board Assembly	1	17127000006144
66.14	Terminal Block Board Main Control Board Assembly	1	17127000005136
67	Control Box (Auxiliary)	1	17227000001939
67.1	Control Box Body Assembly	1	12227000007695
67.2	Mainboard Mounting Plate	1	12227000005975
67.3	Bridge Rectifier	1	11201418000002
67.4	Reactance	1	17400306000543
67.5	Inverter Module Assembly (Compressor)	1	17127000003299
67.6	AC Filter Plate Assembly	1	17127000003296
67.7	Inverter Module Assembly (Brushless DC Motor)	1	17127000005816
68	Control Box (Auxiliary)	1	17227000001937
68.1	Control Box Body Assembly	1	12227000007692
68.2	Mainboard Mounting Plate	1	12227000005975

NUMBER	PART NAME	QUANTITY	BOM CODE
68.3	Bridge Rectifier	1	11201418000002
68.4	Reactance	1	17400306000543
68.5	Inverter Module Assembly (Compressor)	1	17127000003299
68.6	AC Filter Plat Assembly	1	17127000003296
68.7	Inverter Module Assembly (Brushless DC Motor)	1	17127000005816
69	Beam Assembly	1	12227000007676
70	Beam Assembly	1	12227000007672
71	Beam Assembly	1	12227000008015
72	Top Front Panel Assembly	2	12227000000850
73	Low Front Panel	2	12227000000779
74	Upright Post	1	12227000001037
75	Support Plate Assembly	2	12227000007682
76	Left Side Panel Assembly	1	12227000006792
77	Bracket Assembly	1	12227000008012
78	Network Controller	1	17211200000381
79	Sealing Gasket	1	12627000000306
80	Exhaust Temperature Controller	3	17400513000043
81	Temperature Sensor	1	11201007001640
82	Temperature Sensor	1	11201007000980
83	Temperature Sensor	1	11201007000979
84	Exhaust Temperature Sensor	3	11201007000759
85	Compressor Electric Heating Zone	2	17402001000049
86	Compressor Electric Heating Zone	4	17402001000379

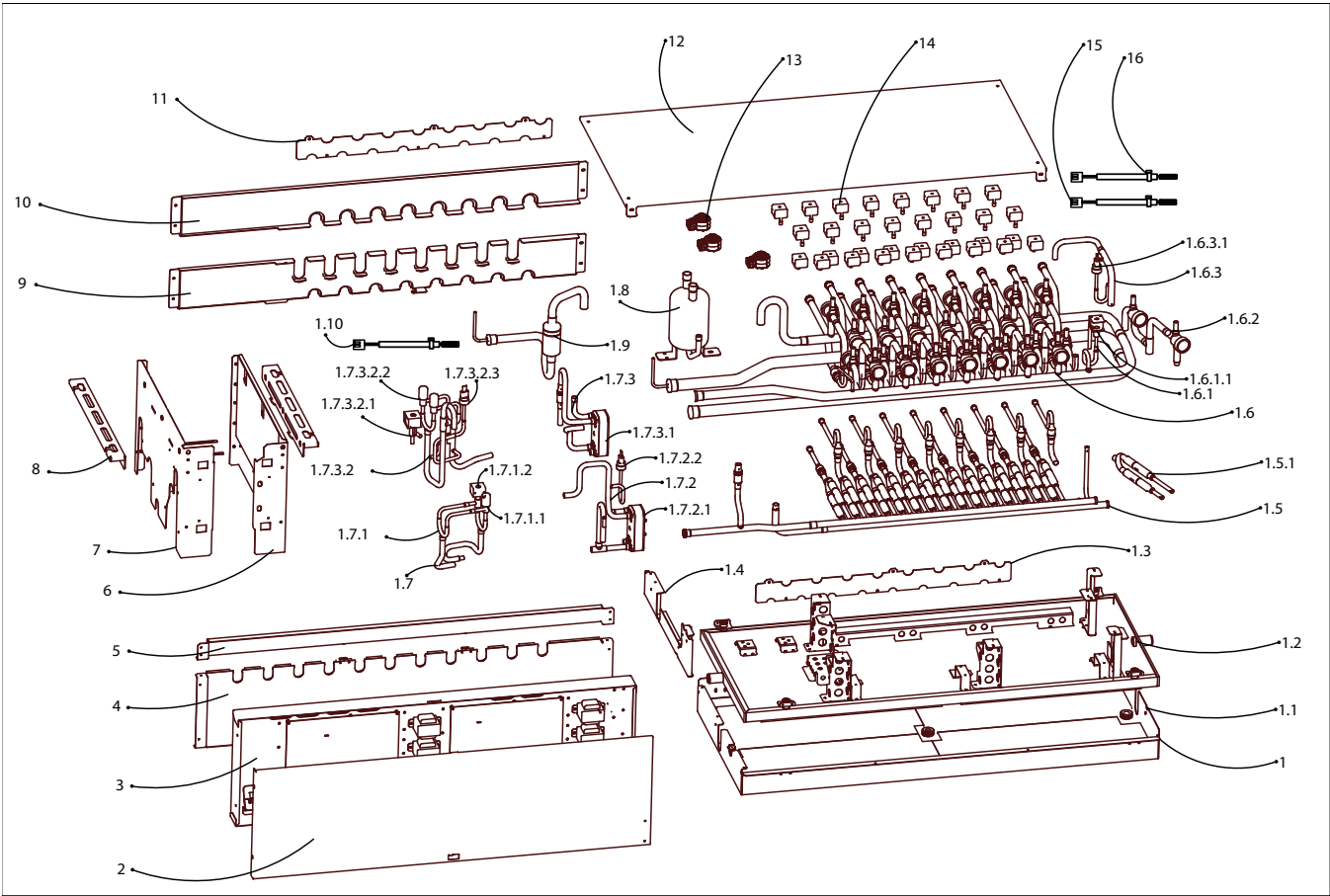


Fig. 157 —Exploded View

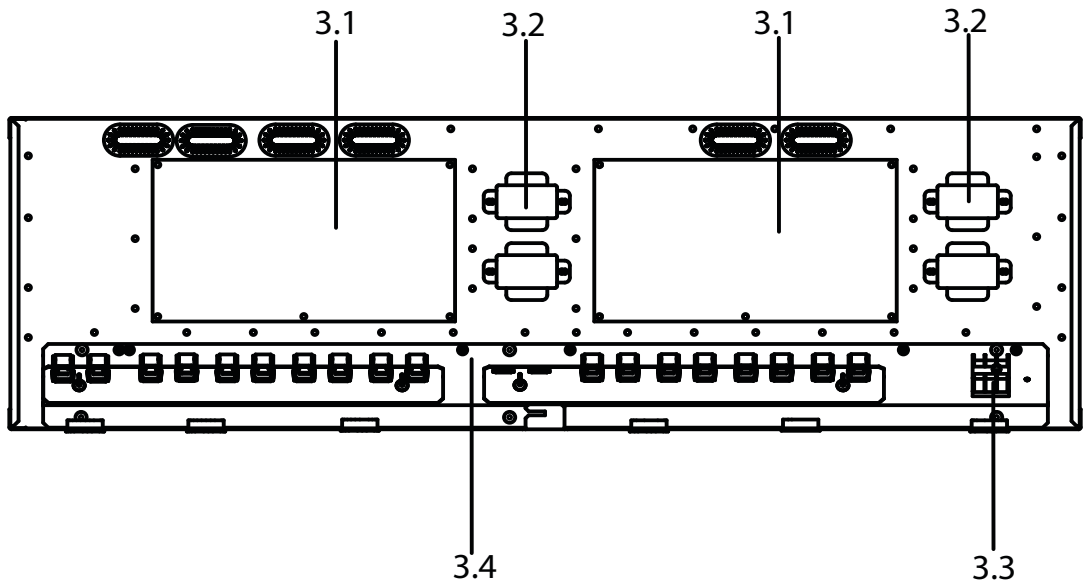


Fig. 158 —Control Board View

Table 76 —Parts Table

NUMBER	PART NAME	QUANTITY	BOM CODE
1	MS Components	1	15410200000294
1.1	Chassis Assembly	1	12210200000477
1.2	Drainage Pan Assembly	1	12210200000476
1.3	Baffle Assembly	1	12210200000475
1.4	Piping Assembly (One-Way Valve)	1	15410200000295
1.4.1	One-Way Valve Assembly	16	15410200000154
1.5	Piping Assembly (Solenoid Valve)	1	15410200000296
1.5.1	Single Pass Solenoid Valve Assembly	1	15410200000297
1.5.1.1	Single Pass Solenoid Valve Assembly	1	15500205000037
1.5.2	Solenoid Valve Assembly	16	15410200000134
1.5.3	Solenoid Valve Connecting Pipe Assembly	1	15410200000298
1.5.3.1	Pressure Sensor	1	11201008000032
1.6	Piping Assembly (Plate Heat Exchanger)	1	15410200000299
1.6.1	Electronic Expansion Valve Assembly	1	15410200000094
1.6.1.1	Electronic Expansion Valve	1	15500213000425
1.6.1.2	Single Pass Solenoid Valve Assembly	1	155002050000439
1.6.2	Plate Heat Exchanger Assembly	1	15710200000021
1.6.2.1	Plate Heat Exchanger	1	15700101000537
1.6.2.2	Pressure Sensor	1	11201008000033
1.6.3	Plate Heat Exchanger Assembly	1	15710200000022
1.6.3.1	Plate Heat Exchanger	1	15700101000536
1.6.3.2	Electronic Expansion Valve Assembly	1	15410200000300
1.6.3.2.1	Single Pass Solenoid Valve	1	155002050000619
1.6.3.2.2	Electronic Expansion Valve	1	15500213000156
1.6.3.2.3	Electronic Expansion Valve	1	15500213000425
1.6.3.2.4	Pressure Sensor	1	11201008000033
1.7	Separator	1	15500501000804
1.8	Pipe Assembly	1	15410200000301
1.9	Temperature Sensor	1	11201007000030
1.10	Sealing Plate	1	12210200000433
2	Cover Board of Electric Control Box	1	12210200000203
3	Electric Control Box Assembly	1	17226000002194
3.1	Indoor Unit Main Control Board	2	17126000002745
3.2	Transformer	4	11203103000225
3.3	Terminal Blocks	1	17400401000716
3.4	E-Part Box	1	12210200000173
4	Coil Cover Board Assembly I	1	12210200000481
5	Coil Cover Board Assembly II	1	12210200000479
6	Left Panel Assembly	1	12210200000242
7	Right Panel Assembly	1	12210200000473
8	Lifting Lug	2	12200203000278
9	Board for Liquid Pipe Crossing	1	12210200000480
10	Board for Gas Pipe Crossing	1	12210200000474
11	Sealing Plate	1	12210200000433
12	Cover Board Assembly	1	12210200000210
13	Electronic Expansion Valve Coil	1	17400302000025
14	Electronic Expansion Valve Coil	2	174003020000245
15	Solenoid Valve Coil	16	17400301000254
16	Temperature Sensor	1	112010070000382
17	Temperature Sensor	1	112010070000164

40VMD006M-3 (MDC Replacement Parts)

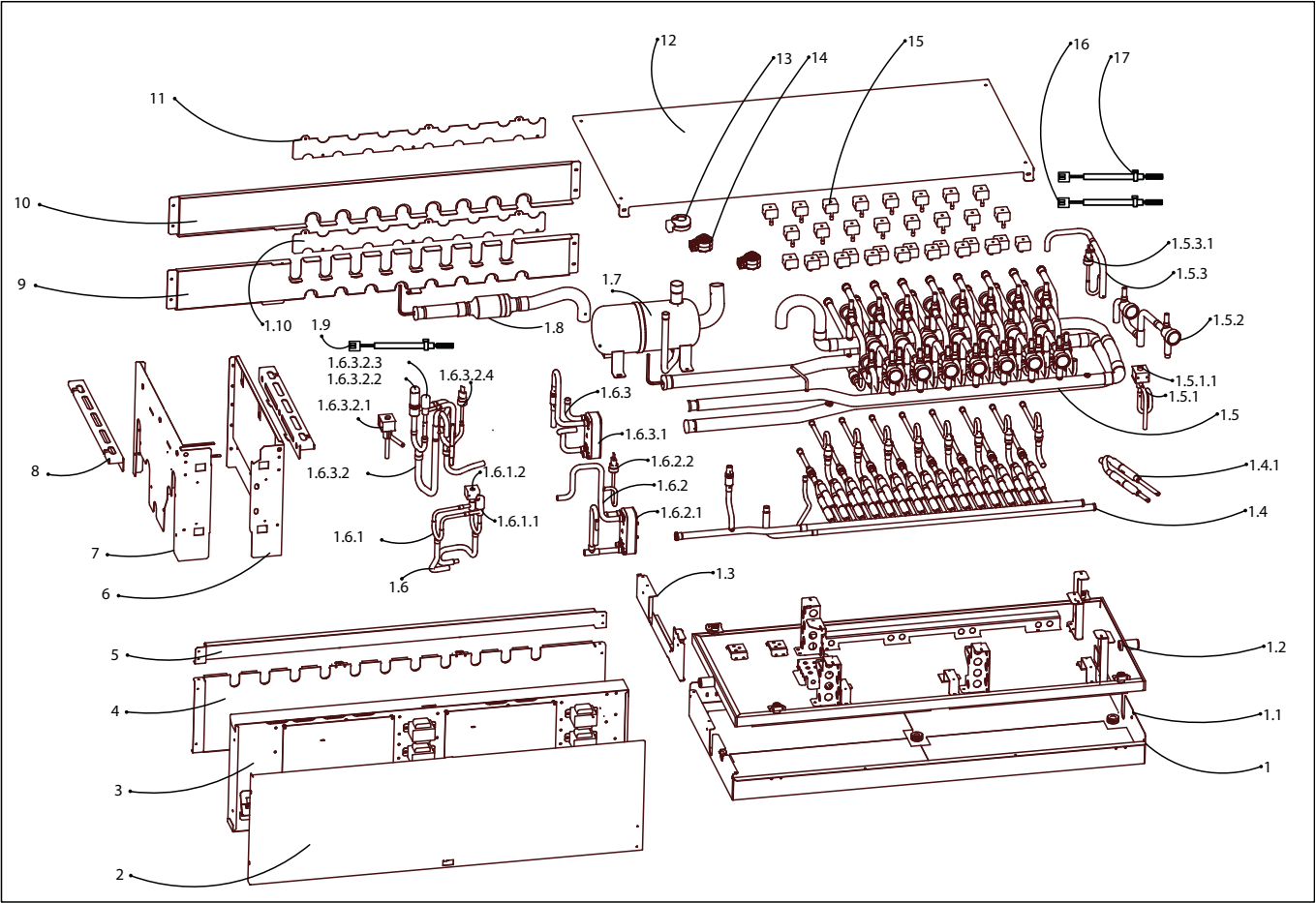


Fig. 159 —Exploded View

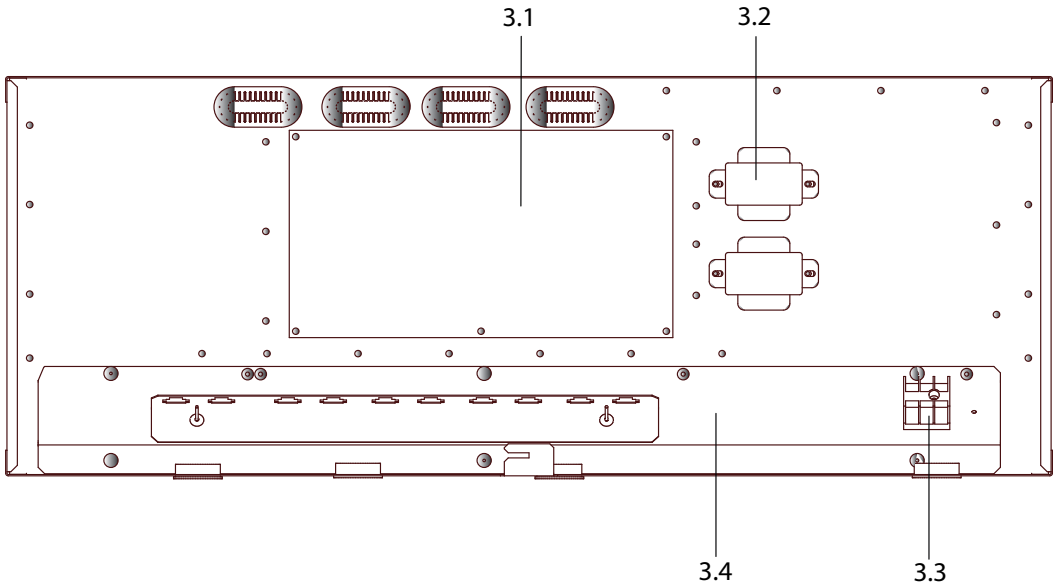


Fig. 160 —Control Board View

Table 77 —Parts Table

NUMBER	PART NAME	QUANTITY	BOM CODE
1	MS Components	1	12810200000009
1.1	Chassis Assembly	1	12210200000370
1.2	Drainage Pan Assembly	1	12210200000337
1.3	Sealing Plate II	1	12210200000359
1.4	Baffle Assembly	1	12210200000233
1.5	Piping Assembly (One-Way Valve)	1	15410200000160
1.5.1	One-Way Valve Assembly	6	15410200000154
1.6	Piping Assembly (Solenoid Valve)	1	15410200000159
1.6.1	Single Pass Solenoid Valve Assembly	1	15410200000099
1.6.1.1	Single Pass Solenoid Valve Assembly	1	15500205000559
1.6.2	Solenoid Valve Assembly	6	15410200000134
1.6.3	Solenoid Valve Connecting Pipe Assembly	1	15110200000074
1.6.3.1	Pressure Sensor	1	11201008000032
1.7	Piping Assembly (Plate Heat Exchanger)	1	15410200000095
1.7.1	Electronic Expansion Valve Assembly	1	15410200000094
1.7.1.1	Electronic Expansion Valve	1	15500213000425
1.7.1.2	Single Pass Solenoid Valve Assembly	1	15500205000439
1.7.2	Plate Heat Exchanger Assembly	1	15710200000002
1.7.2.1	Plate Heat Exchanger	1	15700101000176
1.7.2.2	Pressure Sensor	1	11201008000033
1.7.3	Plate Heat Exchanger Assembly	1	15710200000001
1.7.3.1	Plate Heat Exchanger	1	15700101000316
1.7.3.2	Electronic Expansion Valve Assembly	1	15410200000115
1.7.3.2.1	Single Pass Solenoid Valve	1	15500205000041
1.7.3.2.2	Electronic Expansion Valve	1	15500213000425
1.7.3.2.3	Pressure Sensor	1	11201008000033
1.8	Separator	1	15500501000404
1.9	Pipe Assembly	1	15110200000065
1.10	Temperature Sensor	1	11201007000030
2	Cover Board of Electric Control Box	1	12210200000313
3	Electric Control Box Assembly	1	17226000000817
3.1	Indoor Unit Main Control Board	1	17126000002385
3.2	Transformer	2	11203103000225
3.3	Terminal Blocks	1	17400401000716
3.4	E-Part Box	1	12210200000186
4	Coil Cover Board Assembly I	1	12210200000326
5	Coil Cover Board Assembly II	1	12210200000323
6	Left Panel Assembly	1	12210200000242
7	Right Panel Assembly	1	12210200000238
8	Lifting Lug	2	12200203000278
9	Board for Liquid Pipe Crossing	1	12210200000366
10	Board for Gas Pipe Crossing	1	12210200000363
11	Sealing Plate I	1	12210200000361
12	Cover Board Assembly	1	12210200000320
13	Electronic Expansion Valve Coil	3	17400302000245
14	Solenoid Valve Coil	6	17400301000254
15	Temperature Sensor	1	11201007000382
16	Temperature Sensor	1	11201007000164

40VMD008M-3 (MDC Replacement Parts)

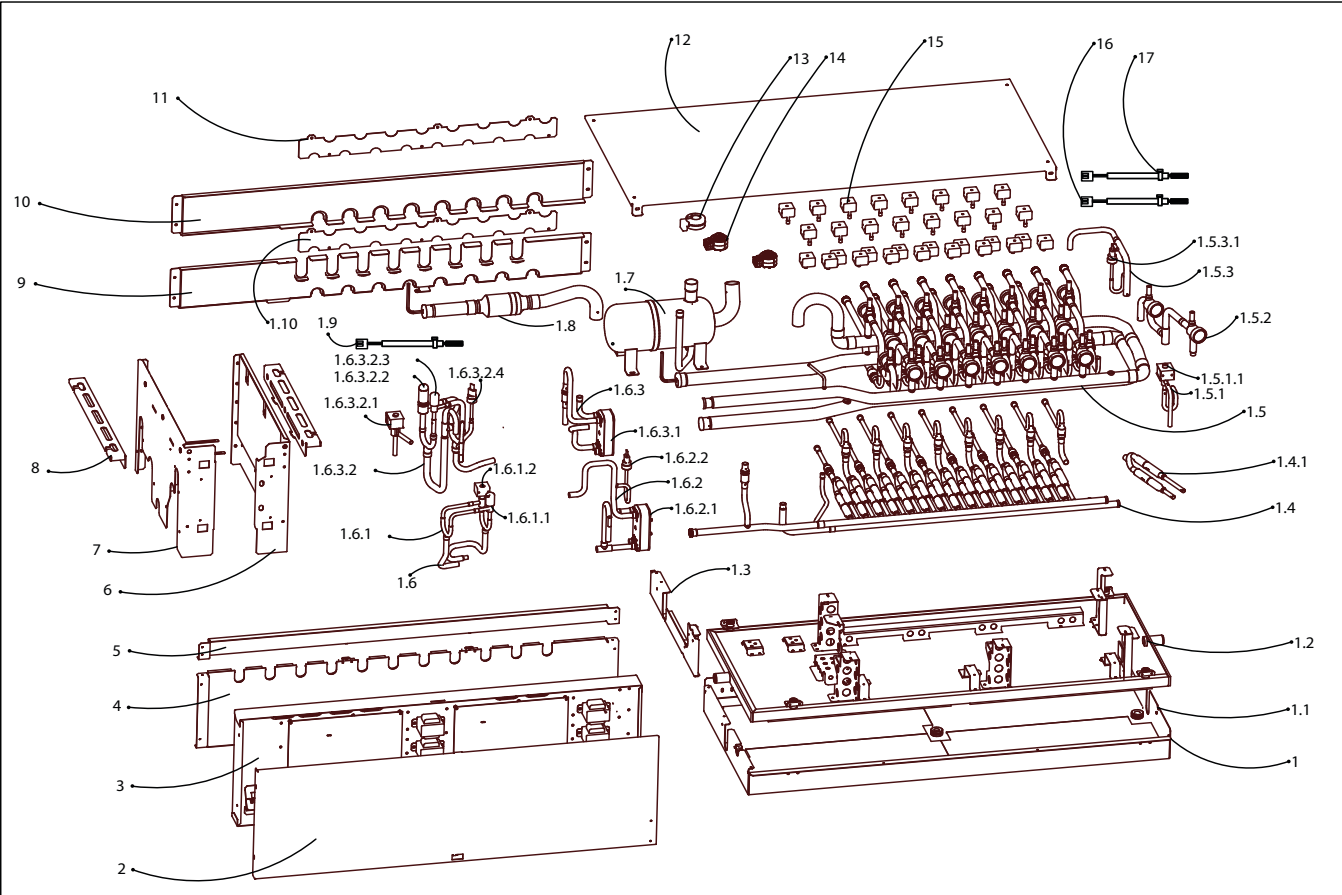


Fig. 161 —Exploded View

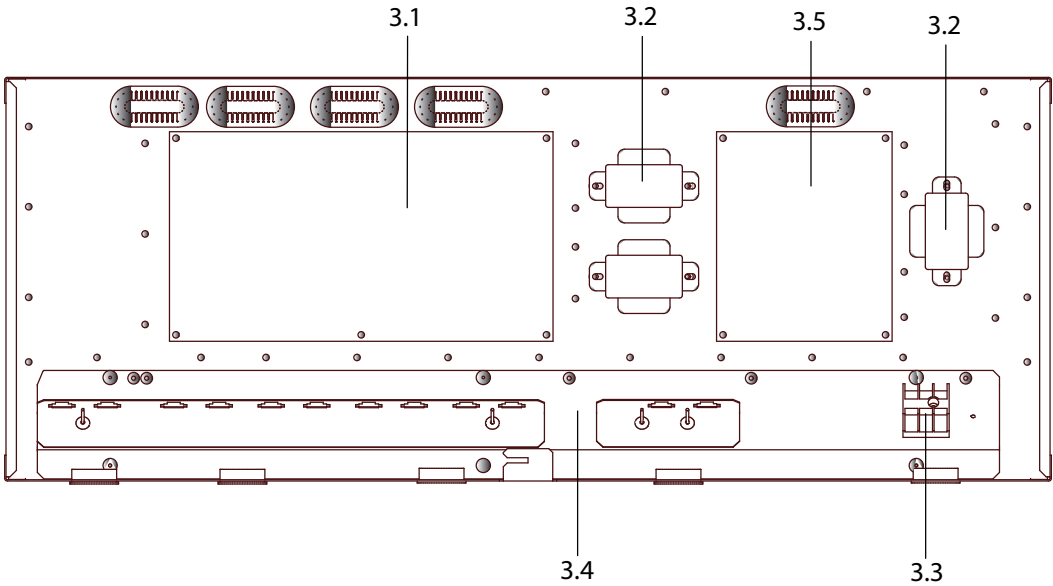


Fig. 162 —Control Board View

Table 78 —Parts Table

NUMBER	PART NAME	QUANTITY	BOM CODE
1	MS Components	1	12810200000010
1.1	Chassis Assembly	1	12210200000356
1.2	Drainage Pan Assembly	1	12210200000337
1.3	Sealing Plate II	1	12210200000345
1.4	Baffle Assembly	1	12210200000233
1.5	Piping Assembly (One-Way Valve)	1	15410200000158
1.5.1	One-Way Valve Assembly	8	15410200000154
1.6	Piping Assembly (Solenoid Valve)	1	15410200000157
1.6.1	Valve, One-Way Solenoid	1	15410200000099
1.6.1.1	Valve, One-Way Solenoid	1	15500205000559
1.6.2	Solenoid Valve Assembly	8	15410200000134
1.6.3	Solenoid Valve Connecting Pipe Assembly	1	15110200000074
1.6.3.1	Sensor, Pressure	1	11201008000032
1.7	Piping Assembly (Plate Heat Exchanger)	1	15410200000095
1.7.1	Electronic Expansion Valve Assembly	1	15410200000094
1.7.1.1	Valve, Electronic Expansion	1	15500213000425
1.7.1.2	Valve, One-Way Solenoid	1	15500205000439
1.7.2	Plate Heat Exchanger Assembly	1	15710200000002
1.7.2.1	Plate Heat Exchanger	1	15700101000176
1.7.2.2	Sensor, Pressure	1	11201008000033
1.7.3	Plate Heat Exchanger Assembly	1	15710200000001
1.7.3.1	Plate Heat Exchanger	1	15700101000316
1.7.3.2	Valve, Electronic Expansion	1	15410200000115
1.7.3.2.1	Valve, One-Way Solenoid	1	15500205000041
1.7.3.2.2	Valve, Electronic Expansion	1	15500213000425
1.7.3.2.3	Sensor, Pressure	1	11201008000033
1.8	Separator	1	15500501000404
1.9	Pipe Assembly	1	15110200000065
1.10	Sensor, Temperature	1	11201007000030
2	Cover, Control Box	1	12210200000313
3	Electric Control Box Assembly	1	17226000000816
3.1	Board, Main Control	1	17126000001545
3.2	Transformer	2	11203103000225
3.3	Block, Terminal	1	17400401000716
3.4	Box, Control	1	12210200000186
4	Coil Cover Board Assembly I	1	12210200000326
5	Coil Cover Board Assembly II	1	12210200000323
6	Panel, Right	1	12210200000242
7	Panel, Left	1	12210200000238
8	Mount, Ceiling	2	12200203000278
9	Panel, Liquid Line	1	12210200000352
10	Panel, Suction Line	1	12210200000349
11	Plate, Guide	1	12210200000347
12	Cover, Top	1	12210200000320
13	Solenoid, EXV	3	17400302000245
14	Solenoid, Valve	8	17400301000254
15	Sensor, Temperature	1	112010070000382
16	Sensor, Temperature	1	112010070000164

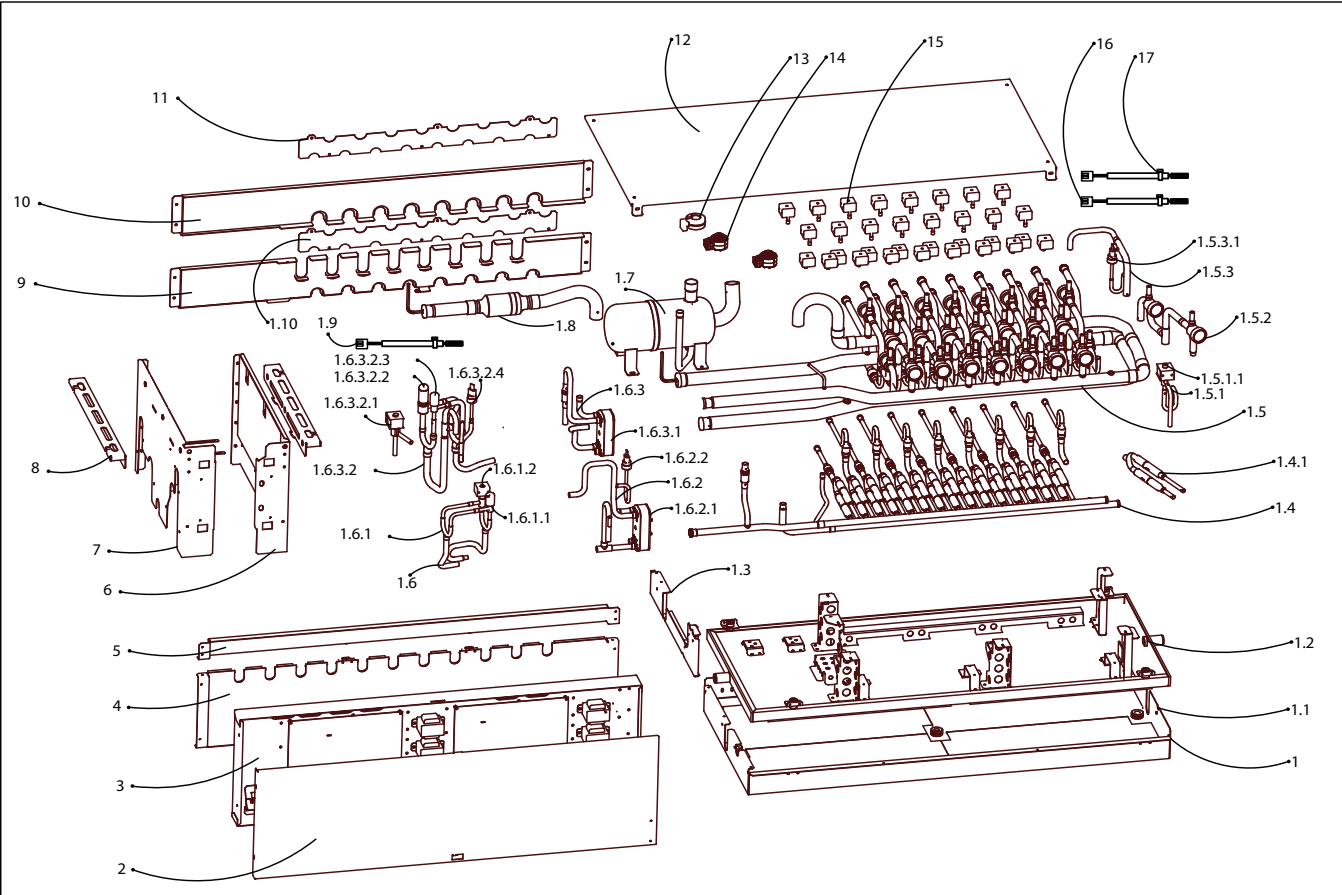


Fig. 163 —Exploded View

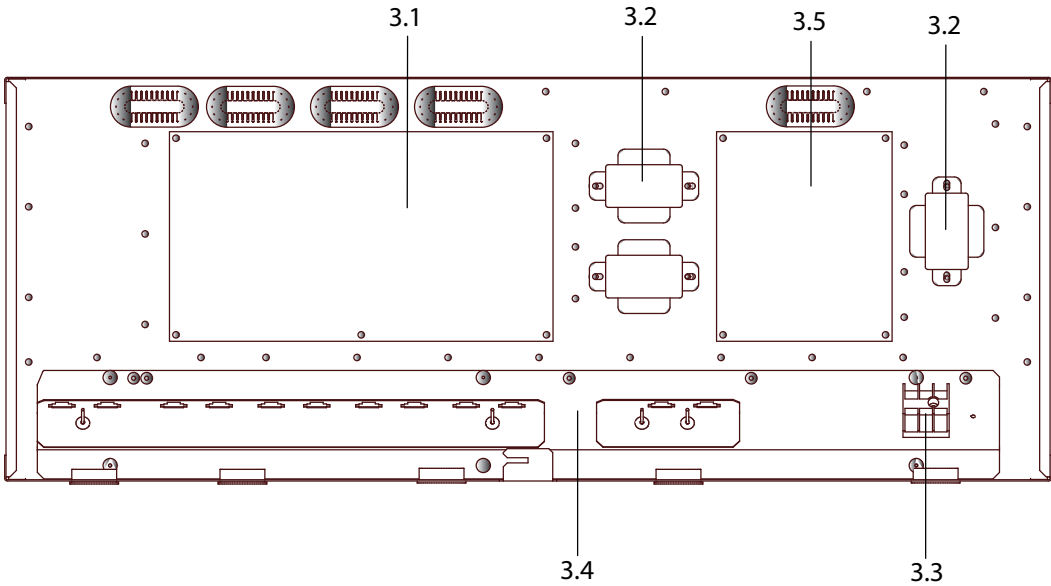


Fig. 164 —Control Board View

Table 79 —Parts Table

NUMBER	PART NAME	QUANTITY	BOM CODE
1	MS Components	1	12810200000010
1.1	Chassis Assembly	1	12210200000356
1.2	Drainage Pan Assembly	1	12210200000337
1.3	Sealing Plate II	1	12210200000345
1.4	Baffle Assembly	1	12210200000233
1.5	Piping Assembly (One-Way Valve)	1	15410200000158
1.5.1	One-Way Valve Assembly	8	15410200000154
1.6	Piping Assembly (Solenoid Valve)	1	15410200000157
1.6.1	Valve, One-Way Solenoid	1	15410200000099
1.6.1.1	Valve, One-Way Solenoid	1	15500205000559
1.6.2	Solenoid Valve Assembly	8	15410200000134
1.6.3	Solenoid Valve Connecting Pipe Assembly	1	15110200000074
1.6.3.1	Sensor, Pressure	1	11201008000032
1.7	Piping Assembly (Plate Heat Exchanger)	1	15410200000095
1.7.1	Electronic Expansion Valve Assembly	1	15410200000094
1.7.1.1	Valve, Electronic Expansion	1	15500213000425
1.7.1.2	Valve, One-Way Solenoid	1	15500205000439
1.7.2	Plate Heat Exchanger Assembly	1	15710200000002
1.7.2.1	Plate Heat Exchanger	1	15700101000176
1.7.2.2	Sensor, Pressure	1	11201008000033
1.7.3	Plate Heat Exchanger Assembly	1	15710200000001
1.7.3.1	Plate Heat Exchanger	1	15700101000316
1.7.3.2	Valve, Electronic Expansion	1	15410200000115
1.7.3.2.1	Valve, One-Way Solenoid	1	15500205000041
1.7.3.2.2	Valve, Electronic Expansion	1	15500213000425
1.7.3.2.3	Sensor, Pressure	1	11201008000033
1.8	Separator	1	15500501000404
1.9	Pipe Assembly	1	15110200000065
1.10	Sensor, Temperature	1	11201007000030
2	Cover, Control Box	1	12210200000313
3	Electric Control Box Assembly	1	17226000000816
3.1	Board, Main Control	1	17126000001545
3.2	Transformer	2	11203103000225
3.3	Block, Terminal	1	17400401000716
3.4	Box, Control	1	12210200000186
4	Coil Cover Board Assembly I	1	12210200000326
5	Coil Cover Board Assembly II	1	12210200000323
6	Panel, Right	1	12210200000242
7	Panel, Left	1	12210200000238
8	Mount, Ceiling	2	12200203000278
9	Panel, Liquid Line	1	12210200000352
10	Panel, Suction Line	1	12210200000349
11	Plate, Guide	1	12210200000347
12	Cover, Top	1	12210200000320
13	Solenoid, EXV	3	17400302000245
14	Solenoid, Valve	8	17400301000254
15	Sensor, Temperature	1	112010070000382
16	Sensor, Temperature	1	112010070000164

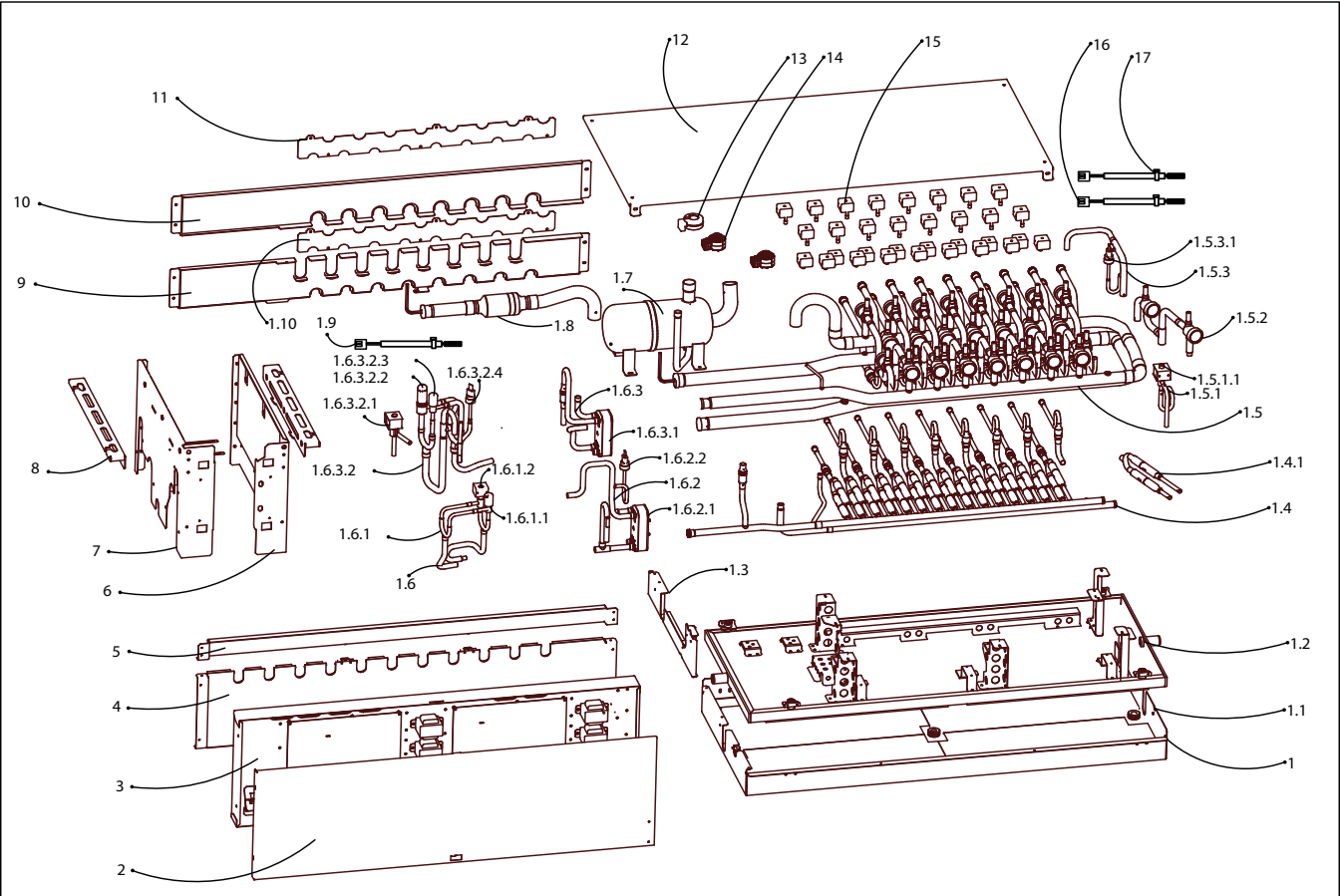


Fig. 165 —Exploded View

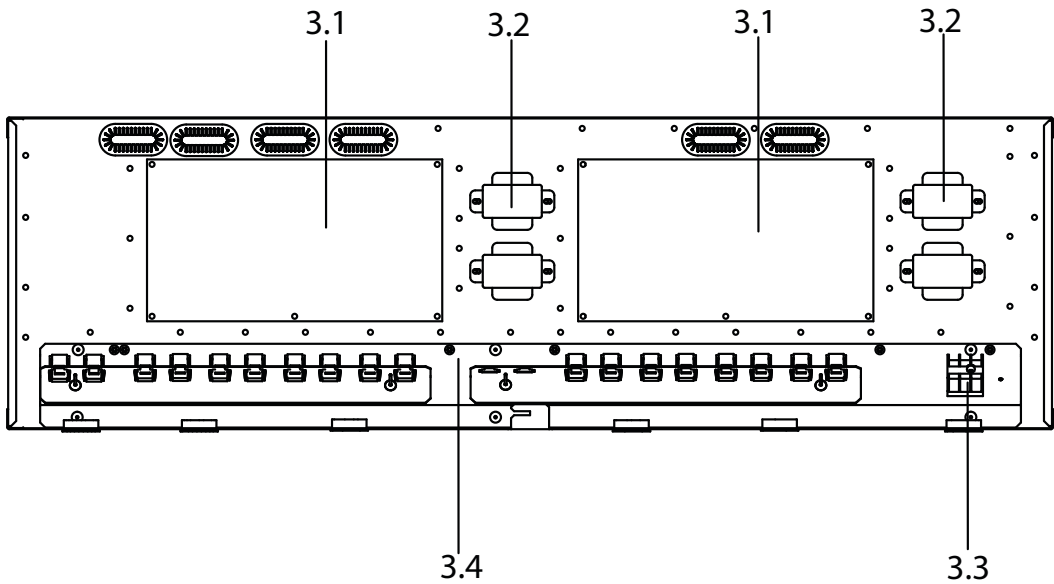


Fig. 166 —Control Board View

Table 80 —Parts Table

NUMBER	PART NAME	QUANTITY	BOM CODE
1	MS Components	1	12810200000012
1.1	Chassis Assembly	1	12210200000246
1.2	Drainage Pan Assembly	1	12210200000228
1.3	Sealing Plate II	1	12210200000206
1.4	Baffle Assembly	1	12210200000233
1.5	Piping Assembly (One-Way Valve)	1	15410200000100
1.5.1	One-Way Valve Assembly	16	15410200000154
1.6	Piping Assembly (Solenoid Valve)	1	15410200000097
1.6.1	Valve, One-Way Solenoid	1	15410200000099
1.6.1.1	Valve, One-Way Solenoid	1	15500205000559
1.6.2	Solenoid Valve Assembly	16	15410200000134
1.6.3	Solenoid Valve Connecting Pipe Assembly	1	15110200000074
1.6.3.1	Sensor, Pressure	1	11201008000032
1.7	Piping Assembly (Plate Heat Exchanger)	1	15410200000095
1.7.1	Electronic Expansion Valve Assembly	1	15410200000094
1.7.1.1	Valve, Electronic Expansion	1	15500213000425
1.7.1.2	Valve, One-Way Solenoid	1	15500205000439
1.7.2	Plate Heat Exchanger Assembly	1	15710200000002
1.7.2.1	Plate Heat Exchanger	1	15700101000176
1.7.2.2	Sensor, Pressure	1	11201008000033
1.7.3	Plate Heat Exchanger Assembly	1	15710200000001
1.7.3.1	Plate Heat Exchanger	1	15700101000316
1.7.3.2	Valve, Electronic Expansion	1	15410200000115
1.7.3.2.1	Valve, One-Way Solenoid	1	15500205000041
1.7.3.2.2	Valve, Electronic Expansion	1	15500213000425
1.7.3.2.3	Sensor, Pressure	1	11201008000033
1.8	Separator	1	15500501000404
1.9	Pipe Assembly	1	15110200000065
1.10	Sensor, Temperature	1	11201007000030
2	Cover, Control Box	1	12210200000203
3	Electric Control Box Assembly	1	17226000000814
3.1	Board, Main Control	2	17126000001545
3.2	Transformer	4	11203103000225
3.3	Block, Terminal	1	17400401000716
3.4	Box, Control	1	12210200000173
4	Coil Cover Board Assembly I	1	12210200000293
5	Coil Cover Board Assembly II	1	12210200000213
6	Panel, Right	1	12210200000242
7	Panel, Left	1	12210200000238
8	Mount, Ceiling	2	12200203000278
9	Panel, Liquid Line	1	12210200000221
10	Panel, Suction Line	1	12210200000218
11	Plate, Guide	1	12210200000208
12	Cover, Top	1	12210200000210
13	Solenoid, EXV	3	17400302000245
14	Solenoid, Valve	16	17400301000254
15	Sensor, Temperature	1	11201007000382
16	Sensor, Temperature	1	11201007000164

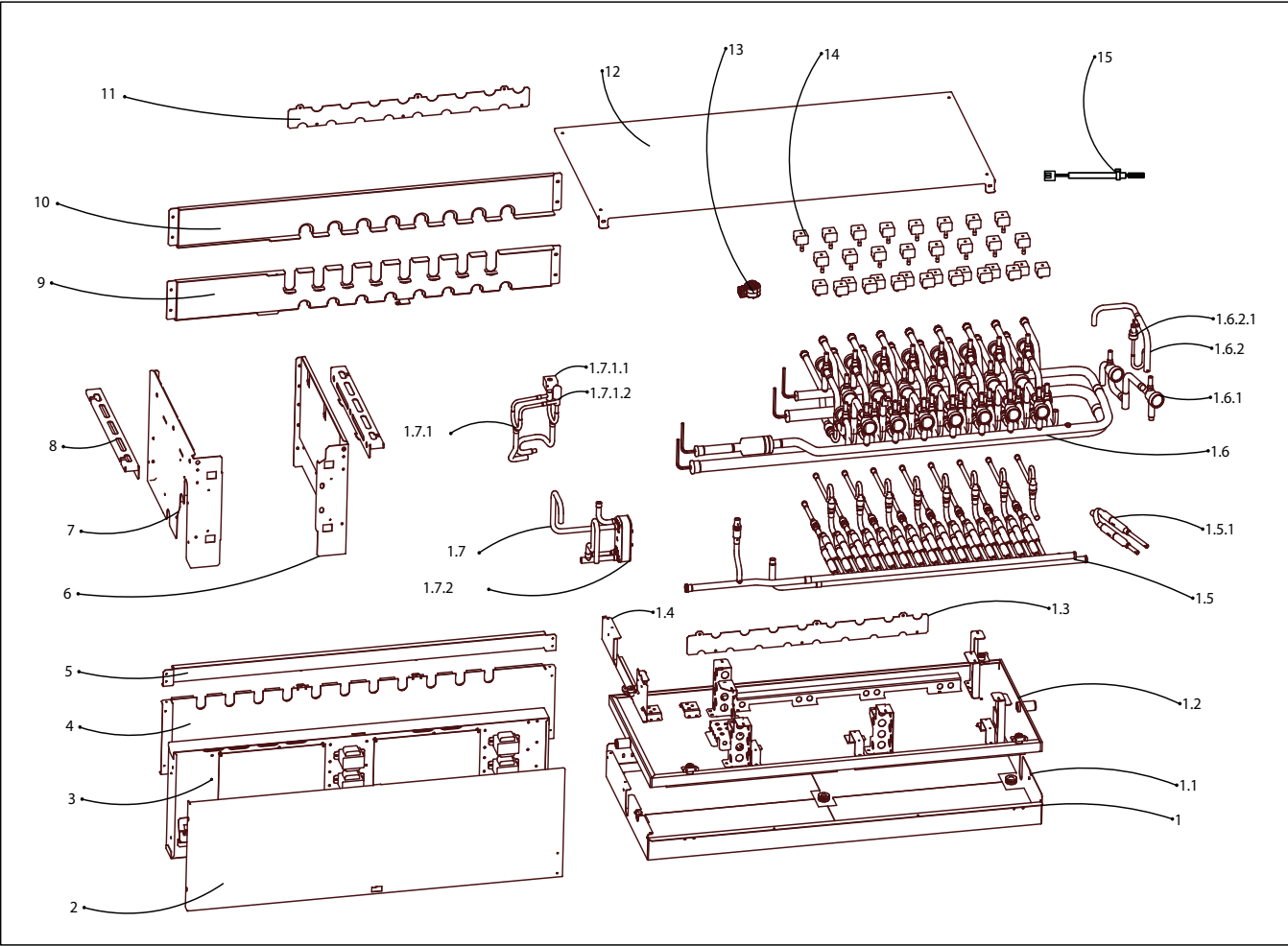


Fig. 167 —Exploded View

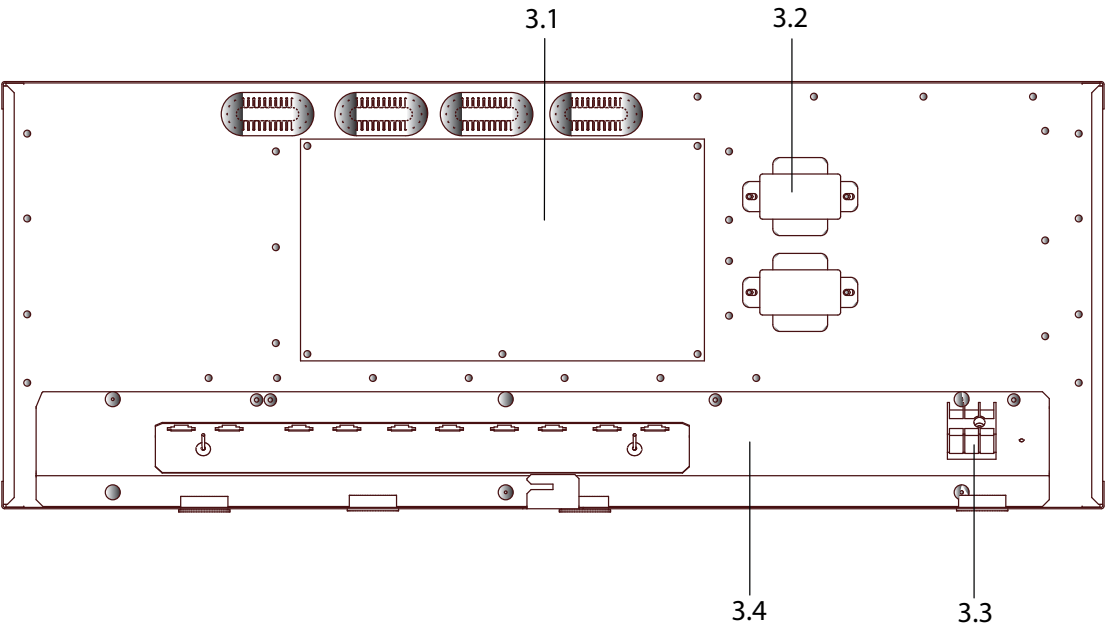


Fig. 168 —Control Board View

Table 81 —Parts Table

NUMBER	PART NAME	QUANTITY	BOM CODE
1	MS Components	1	15410200000257
1.1	Chassis Assembly	1	12210200000370
1.2	Drainage Pan Assembly	1	12210200000337
1.3	Sealing Plate II	1	12210200000359
1.4	Baffle Assembly	1	12210200000233
1.5	Piping Assembly (One-Way Valve)	1	15410200000238
1.5.1	One-Way Valve Assembly	6	15410200000154
1.6	Piping Assembly (Solenoid Valve)	1	15410200000234
1.6.1	Solenoid Valve Assembly	6	15410200000134
1.6.2	Solenoid Valve Connecting Pipe Assembly	1	15110200000074
1.6.2.1	Sensor, Pressure	1	11201008000032
1.7	Piping Assembly (Plate Heat Exchanger)	1	15410200000239
1.7.1	Electronic Expansion Valve Assembly	1	15410200000094
1.7.1.1	Valve, One-Way Solenoid	1	15500205000439
1.7.1.2	Electronic Expansion Valve	1	15500213000425
1.7.2	Plate Heat Exchanger	1	15700101000176
2	Cover, Control Box	1	12210200000313
3	Electric Control Box Assembly	1	17226000000817
3.1	Board, Main Control	1	171260000002385
3.2	Transformer	2	11203103000225
3.3	Block, Terminal	1	17400401000716
3.4	Box, Control	1	12210200000186
4	Coil Cover Board Assembly I	1	12210200000326
5	Coil Cover Board Assembly II	1	12210200000323
6	Panel, Right	1	12210200000242
7	Panel, Left	1	12210200000413
8	Mount, Ceiling	2	12200203000278
9	Panel, Liquid Line	1	12210200000366
10	Panel, Suction Line	1	12210200000363
11	Plate, Guide	1	12210200000361
12	Cover, Top	1	12210200000320
13	Solenoid, EXV	3	17400302000245
14	Solenoid, Valve	6	17400301000254
15	Sensor, Temperature	1	11201007000164

40VMD008S—3 (MDC Replacement Parts)

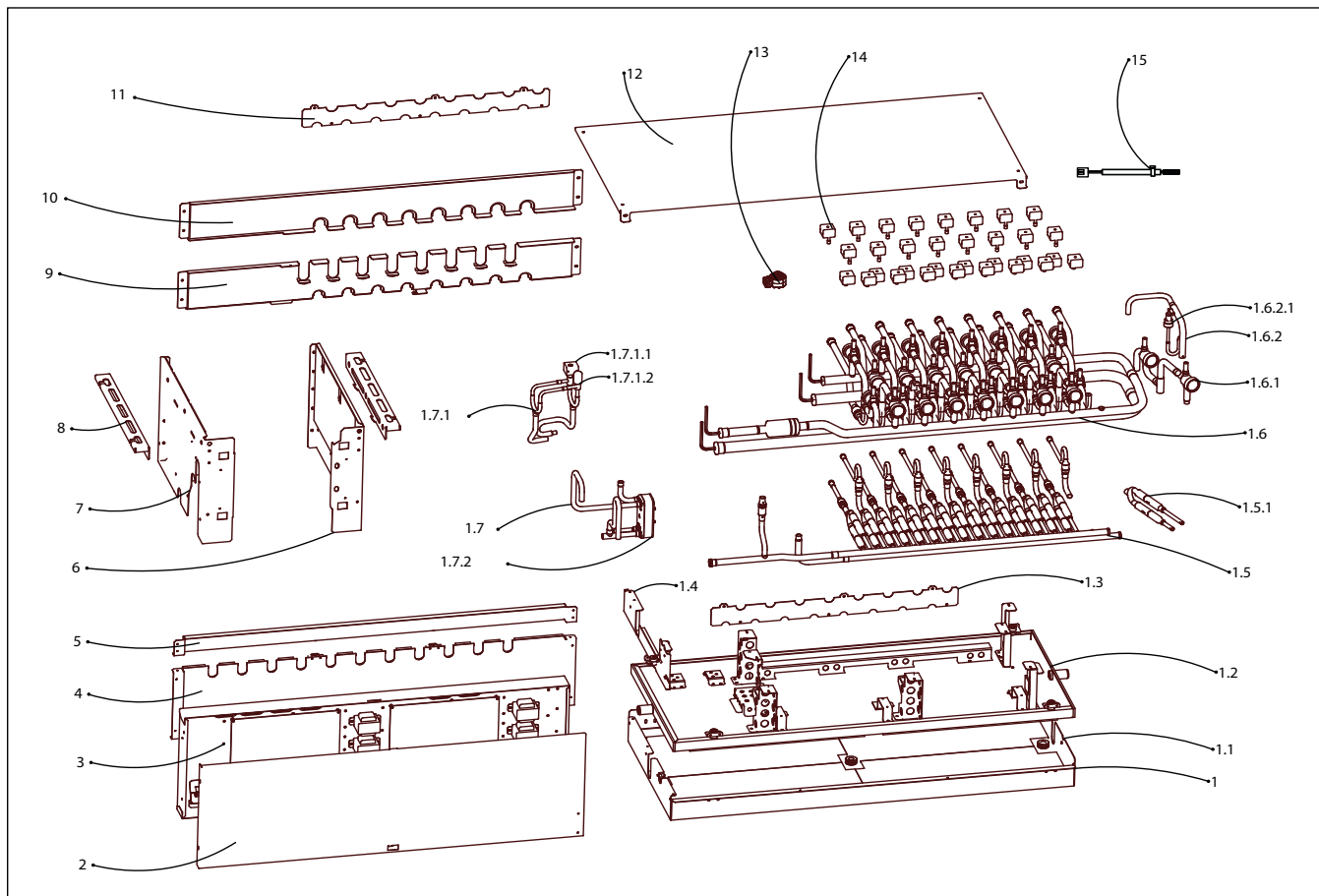


Fig. 169 —Exploded View

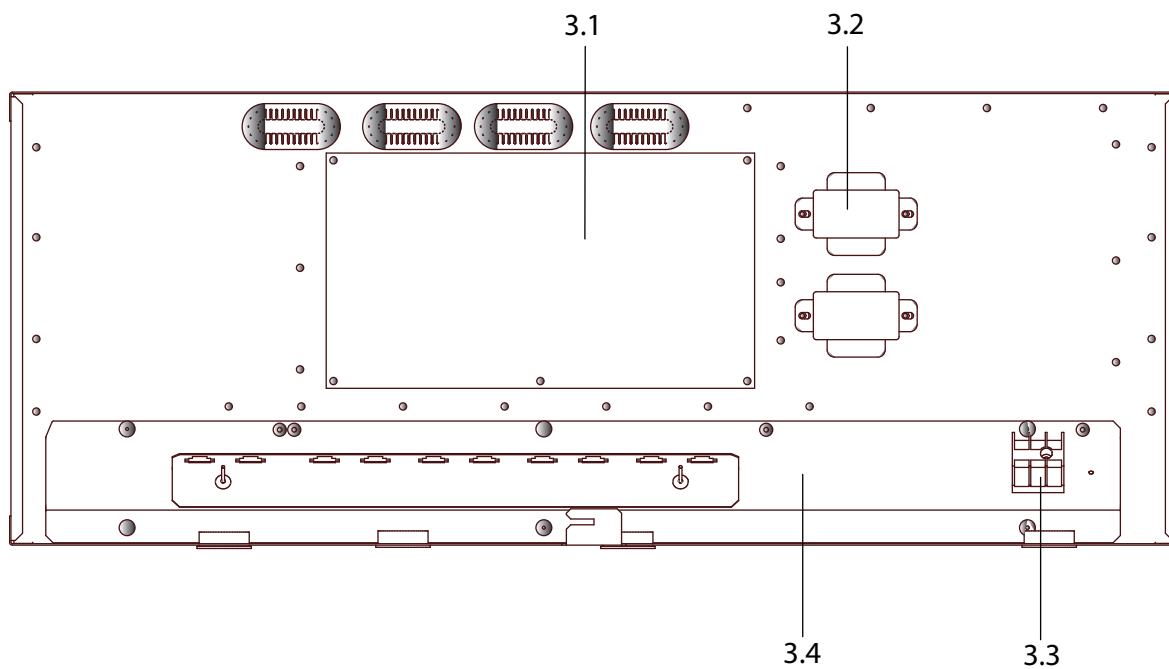


Fig. 170 —Control Board View

Table 82 —Parts Table

NUMBER	PART NAME	QUANTITY	BOM CODE
1	MS Components	1	15410200000256
1.1	Chassis Assembly	1	12210200000356
1.2	Drainage Pan Assembly	1	12210200000337
1.3	Sealing Plate II	1	12210200000345
1.4	Baffle Assembly	1	12210200000233
1.5	Piping Assembly (One-Way Valve)	1	15410200000237
1.5.1	One-Way Valve Assembly	8	15410200000154
1.6	Piping Assembly (Solenoid Valve)	1	15410200000236
1.6.1	Solenoid Valve Assembly	8	15410200000134
1.6.2	Solenoid Valve Connecting Pipe Assembly	1	15110200000074
1.6.2.1	Sensor, Pressure	1	11201008000032
1.7	Piping Assembly (Plate Heat Exchanger)	1	15410200000239
1.7.1	Electronic Expansion Valve Assembly	1	15410200000094
1.7.1.1	Valve, One-Way Solenoid	1	15500205000439
1.7.1.2	Electronic Expansion Valve	1	15500213000425
1.7.2	Plate Heat Exchanger	1	15700101000176
2	Cover, Control Box	1	12210200000313
3	Electric Control Box Assembly	1	17226000000816
3.1	Board, Main Control	1	17126000001545
3.2	Transformer	2	11203103000225
3.3	Block, Terminal	1	17400401000716
3.4	Box, Control	1	12210200000186
4	Coil Cover Board Assembly I	1	12210200000326
5	Coil Cover Board Assembly II	1	12210200000323
6	Panel, Right	1	12210200000242
7	Panel, Left	1	12210200000413
8	Mount, Ceiling	2	12200203000278
9	Panel, Liquid Line	1	12210200000352
10	Panel, Suction Line	1	12210200000349
11	Plate, Guide	1	12210200000347
12	Cover, Top	1	12210200000320
13	Solenoid, EXV	3	17400302000245
14	Solenoid, Valve	8	17400301000254
15	Sensor, Temperature	1	11201007000164

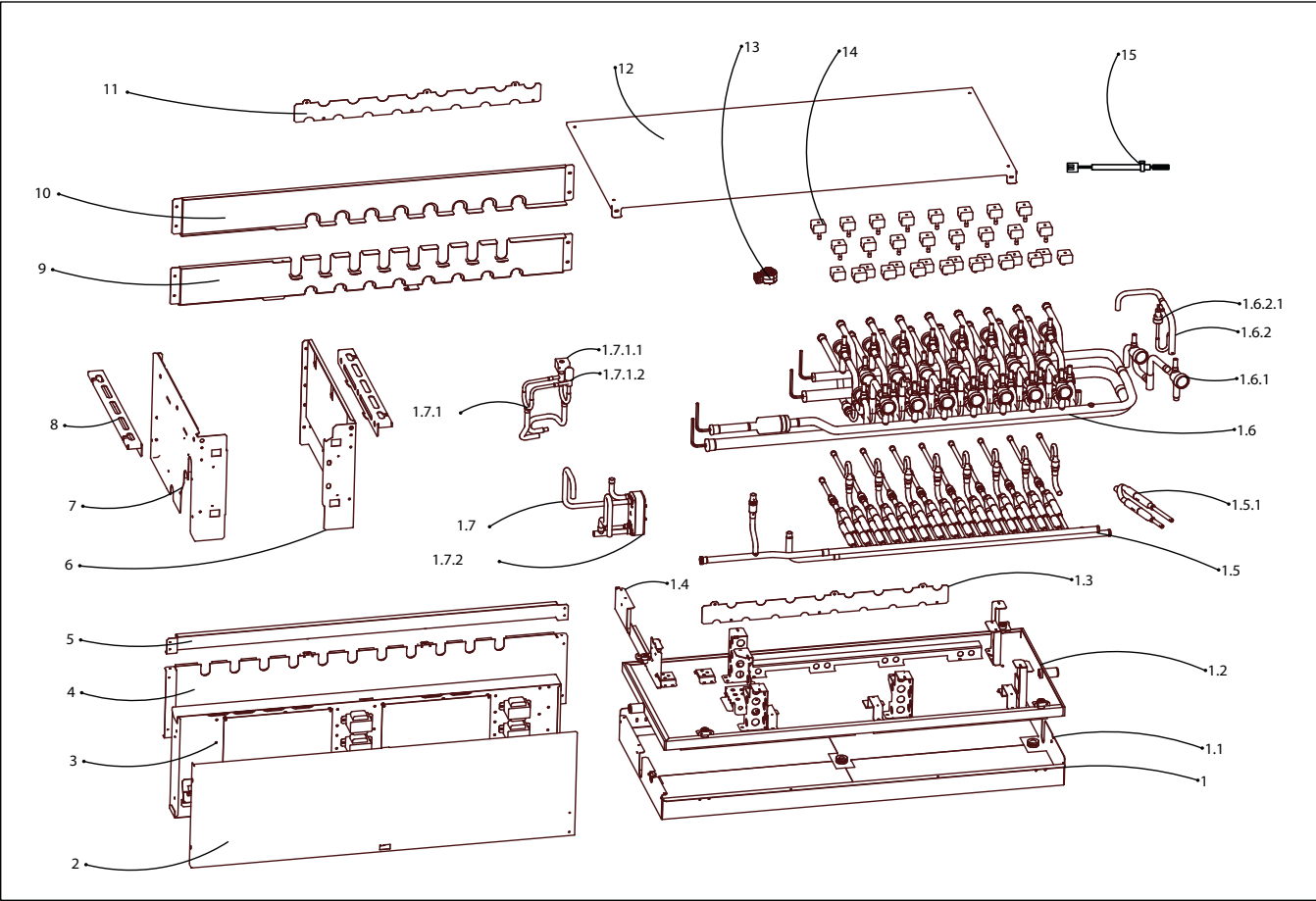


Fig. 171 —Exploded View

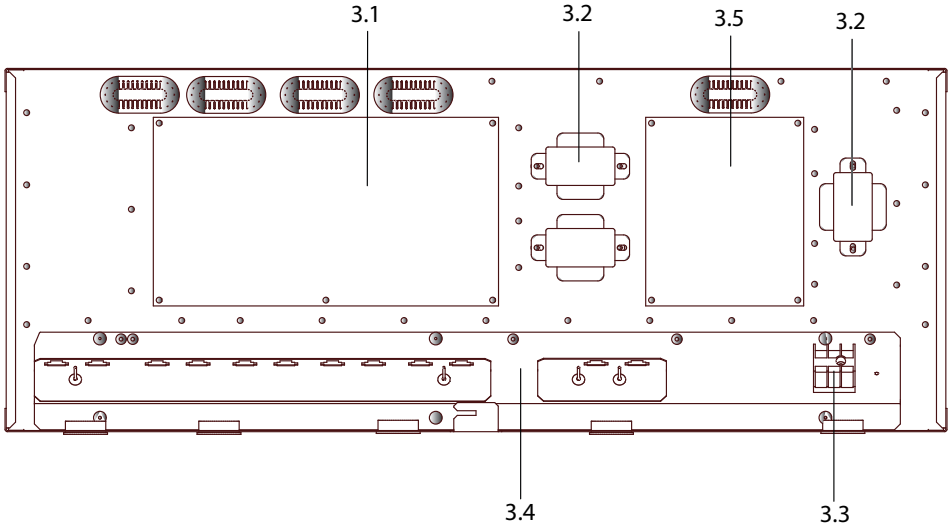


Fig. 172 —Control Board View

Table 83 —Parts Table

NUMBER	PART NAME	QUANTITY	BOM CODE
1	MS Components	1	15410200000255
1.1	Chassis Assembly	1	12210200000342
1.2	Drainage Pan Assembly	1	12210200000337
1.3	Sealing Plate II	1	12210200000315
1.4	Baffle Assembly	1	12210200000233
1.5	Piping Assembly (One-Way Valve)	1	15410200000241
1.5.1	One-Way Valve Assembly	10	15410200000154
1.6	Piping Assembly (Solenoid Valve)	1	15410200000235
1.6.1	Solenoid Valve Assembly	10	15410200000134
1.6.2	Solenoid Valve Connecting Pipe Assembly	1	15110200000074
1.6.2.1	Sensor, Pressure	1	11201008000032
1.7	Piping Assembly (Plate Heat Exchanger)	1	15410200000239
1.7.1	Electronic Expansion Valve Assembly	1	15410200000094
1.7.1.1	Valve, One-Way Solenoid	1	15500205000439
1.7.1.2	Electronic Expansion Valve	1	15500213000425
1.7.2	Plate Heat Exchanger	1	15700101000176
2	Cover, Control Box	1	12210200000313
3	Electric Control Box Assembly	1	17226000000815
3.1	Board, Main Control	1	17126000001545
3.2	Transformer	3	11203103000225
3.3	Block, Terminal	1	17400401000716
3.4	Box, Control	1	12210200000181
3.5	Board, Main Control	1	17126000002325
4	Coil Cover Board Assembly I	1	12210200000326
5	Coil Cover Board Assembly II	1	12210200000323
6	Panel, Right	1	12210200000242
7	Panel, Left	1	12210200000413
8	Mount, Ceiling	2	12200203000278
9	Panel, Liquid Line	1	12210200000332
10	Panel, Suction Line	1	12210200000329
11	Plate, Guide	1	12210200000318
12	Cover, Top	1	12210200000320
13	Solenoid, EXV	3	17400302000245
14	Solenoid, Valve	10	17400301000254
15	Sensor, Temperature	1	11201007000164

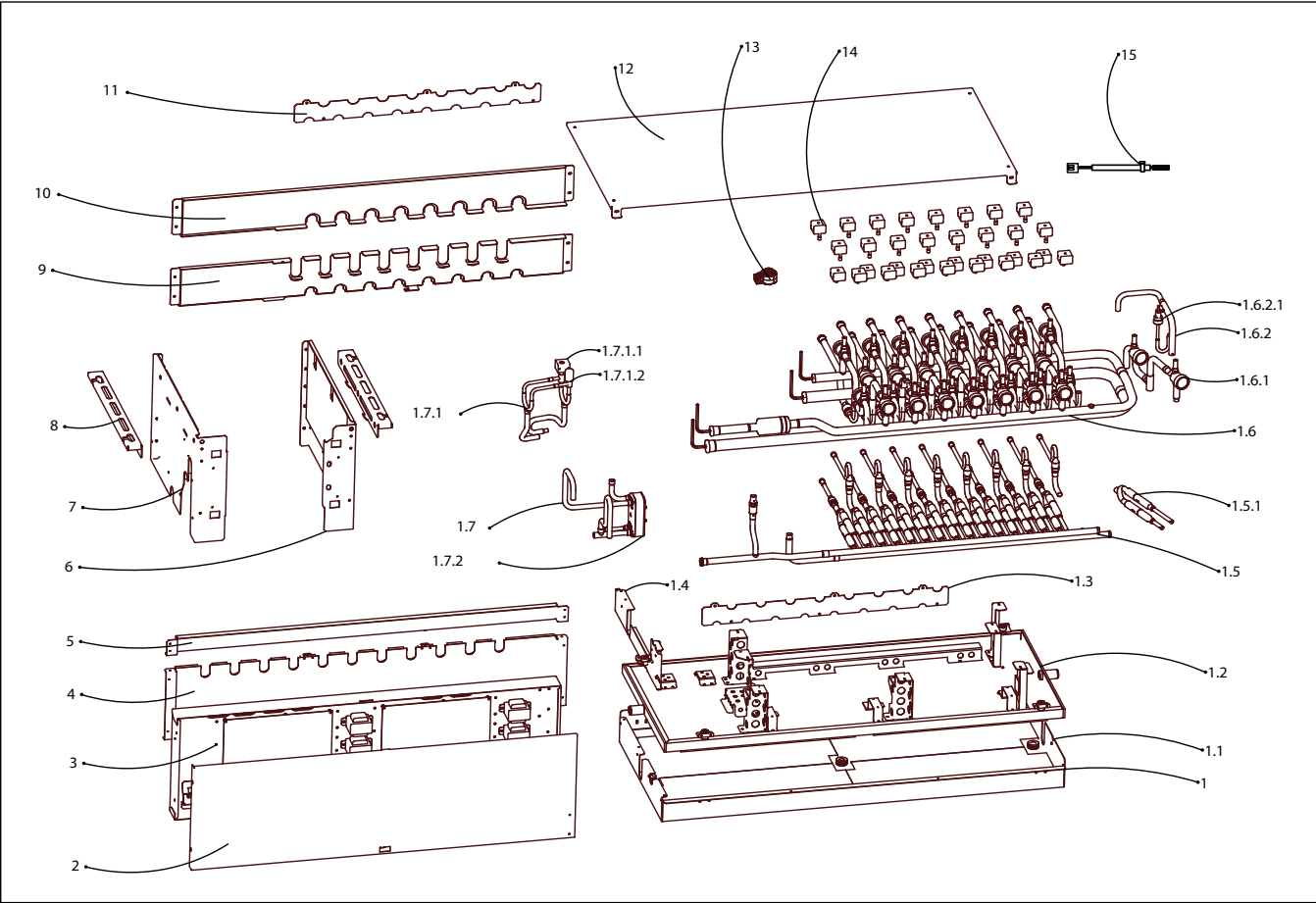


Fig. 173 —Exploded View

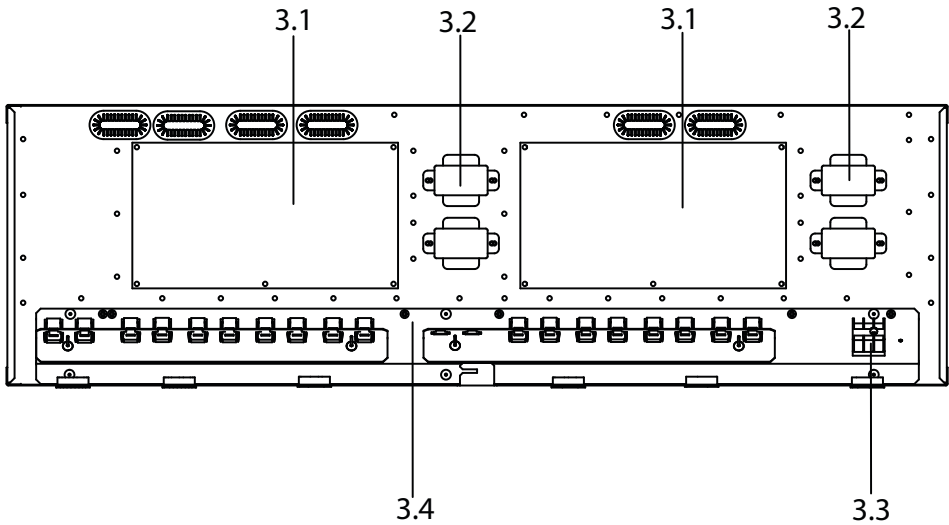


Fig. 174 —Control Board View

Table 84 —Parts List

NUMBER	PART NAME	QUANTITY	BOM CODE
1	MS Components	1	15410200000254
1.1	Chassis Assembly	1	12210200000246
1.2	Drainage Pan Assembly	1	12210200000228
1.3	Sealing Plate II	1	12210200000206
1.4	Baffle Assembly	1	12210200000233
1.5	Piping Assembly (One-Way Valve)	1	15410200000240
1.5.1	One-Way Valve Assembly	16	15410200000154
1.6	Piping Assembly (Solenoid Valve)	1	15410200000242
1.6.1	Solenoid Valve Assembly	16	15410200000134
1.6.2	Solenoid Valve Connecting Pipe Assembly	1	15110200000074
1.6.2.1	Sensor, Pressure	1	11201008000032
1.7	Piping Assembly (Plate Heat Exchanger)	1	15410200000239
1.7.1	Electronic Expansion Valve Assembly	1	15410200000094
1.7.1.1	Valve, One-Way Solenoid	1	15500205000439
1.7.1.2	Electronic Expansion Valve	1	15500213000425
1.7.2	Plate Heat Exchanger	1	15700101000176
2	Cover, Control Box	1	12210200000203
3	Electric Control Box Assembly	1	17226000000814
3.1	Board, Main Control	2	17126000001545
3.2	Transformer	4	11203103000225
3.3	Block, Terminal	1	17400401000716
3.4	Box, Control	1	12210200000173
4	Coil Cover Board Assembly I	1	12210200000293
5	Coil Cover Board Assembly II	1	12210200000213
6	Panel, Right	1	12210200000242
7	Panel, Left	1	12210200000413
8	Mount, Ceiling	2	12200203000278
9	Panel, Liquid Line	1	12210200000221
10	Panel, Suction Line	1	12210200000218
11	Plate, Guide	1	12210200000208
12	Cover, Top	1	12210200000210
13	Solenoid, EXV	3	17400302000245
14	Solenoid, Valve	16	17400301000254
15	Sensor, Temperature	1	11201007000164

