

WiSAN-YEE1 45.4 - 85.4

WiSAT-YEE1 45.4 - 90.4

WiSAT-YEE1 FC 45.4 - 90.4



Sommario

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1. Unit capacities and external appearance

1.1 Heat Pump

Power supply : 380-415V/3Ph/50Hz

up to 150kW	up to 240kW
45.4 – 60.4	65.4 – 85.4
	

1.2 Cooling Only

Power supply : 380-415V/3Ph/50Hz

up to 150kW	up to 240kW
45.4 – 60.4	65.4 – 90.4
	

1.3 Free Cooling

Power supply : 380-415V/3Ph/50Hz

up to 120kW	up to 240kW
45.4 – 55.4	60.4 – 90.4
	

Capacity circuit 1+ circuit 2	Series HP	Series PRM CO	Series EXC CO	Series FC
60kW+60kW	45.4-50.4	45.4-50.4-55.4	45.4-50.4	45.4-55.4
60kW+90kW	55.4-60.4	60.4	55.4-60.4	-
90kW+90kW	65.4-70.4	65.4-70.4	65.4-70.4-75.4	60.4-70.4
130kW+130kW	75.4-80.4-85.4	75.4-80.4-85.4-90.4	80.4-85.4-90.4	75.4-90.4

2. Water outlet temperature range

Mode		Range	
		HP	CO/FC
Cooling	Normal	7-20°C (1)	-
	Low water outlet	0-20°C(reserved) (2)	Max [Tmin, Tsafe]-20°C
Heating	Normal	25-60°C	-

Notes:

- 1 When the ambient temperature is below 10°C, the water outlet temperature range is 10-20°C. When the ambient temperature is above 10°C, all the units water outlet temperature range is 7-20°C.
- 2 Use dial switch S5_1 on the main PCB to select the water outlet temperature range (only for heat pump series).

For CO/FC unit the Tmin is queried according to the following table based on the T4:

T4	T4<36	36≤T4<39	39≤T4<42	42≤T4<46	46≤T4
Tmin	-8	-6	-4	-2	0

The Tsafe is the freezing-safe-keeping temperature which is queried according the following table:

Percentage of glycol	<5%	<10%	<15%	<20%	<25%	<30%	<35%	<40%	<45%	<50%	≥50%
Lowest set point	5	3	1	-1	-4	-6	-8	-8	-8	-8	-8
Tsafe considered	3.5	1.5	-0.5	-2.5	-5.5	-7.5	-10	-13	-13	-13	-13

When the customer chooses the low Two mode for heat pump series, only after the installation is completed, the after-sales installer can adjust the Tsafe according to the percentage of glycol (users are prohibited from setting it themselves).

The value of Tsafe affects the operating logic such as set temperature and antifreeze.

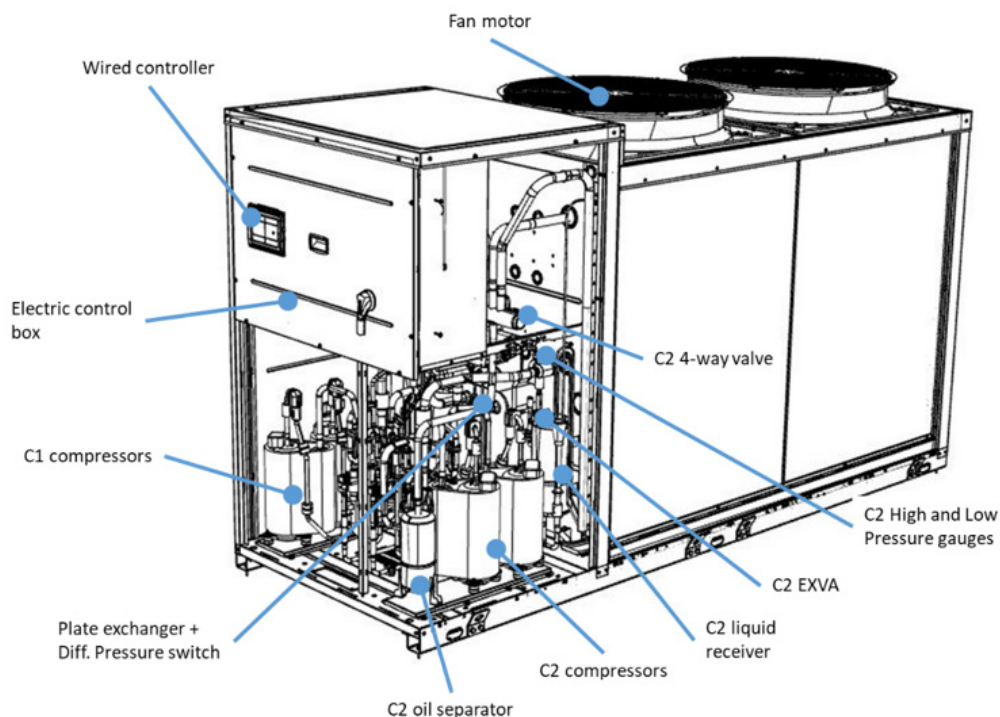
Both ethylene glycol and propylene glycol use same percentage and Tsafe value.

For CO/FC unit, there isn't Low Two mode, after setting the glycol percentage automatically Lowest set point and Tsafe considered is adjusted.

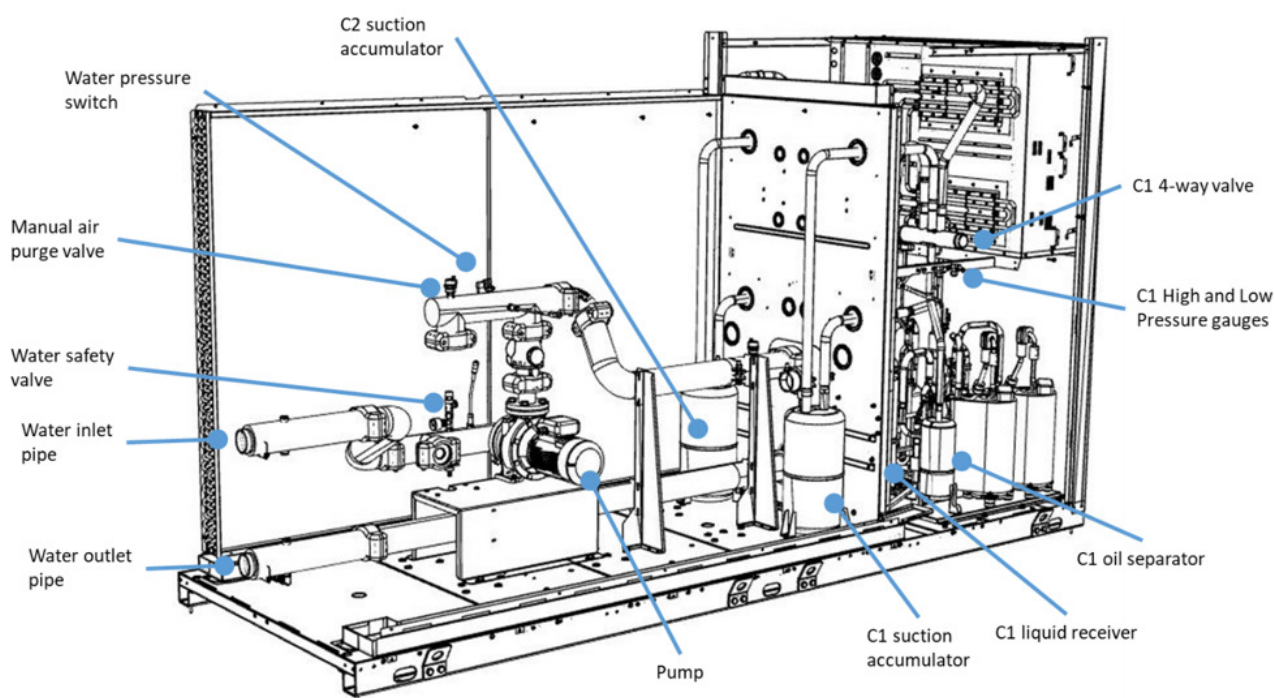
3. Layout of functional components

3.1 HP: Size 45.4 – 50.4 (60kW+60kW)

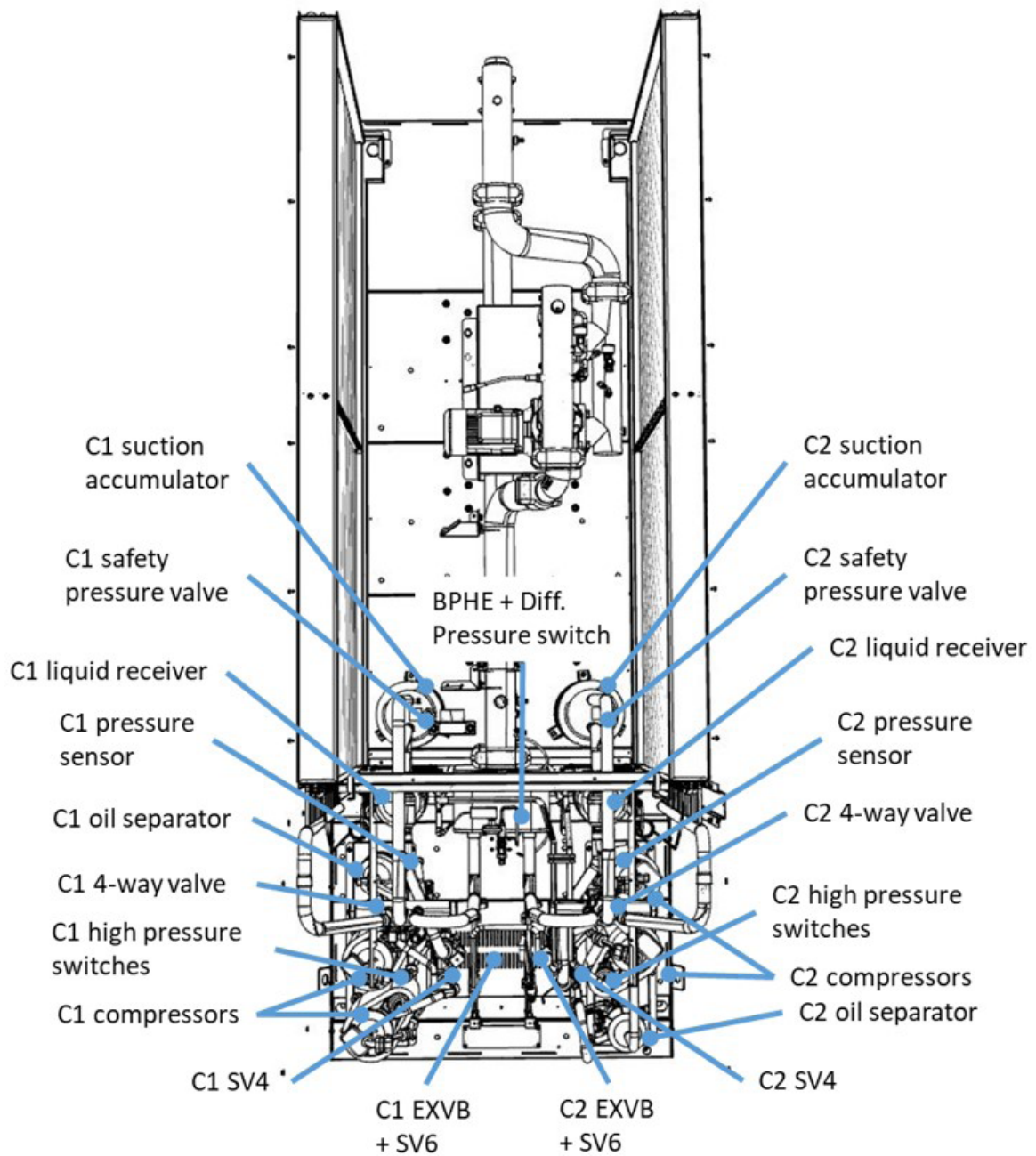
3.1.1 Front view



3.1.2 Rear view

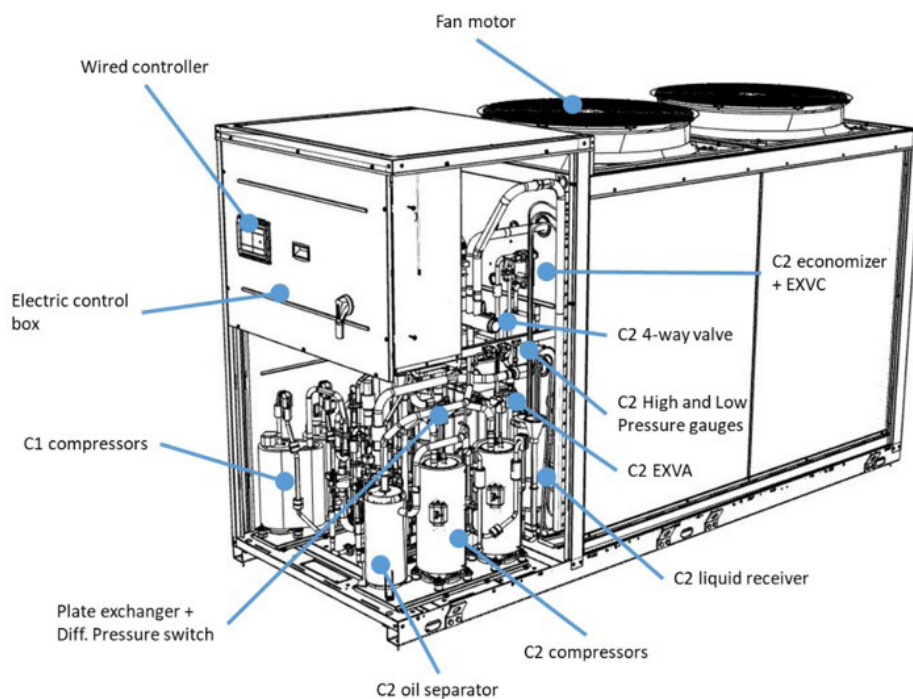


3.1.3 Top view

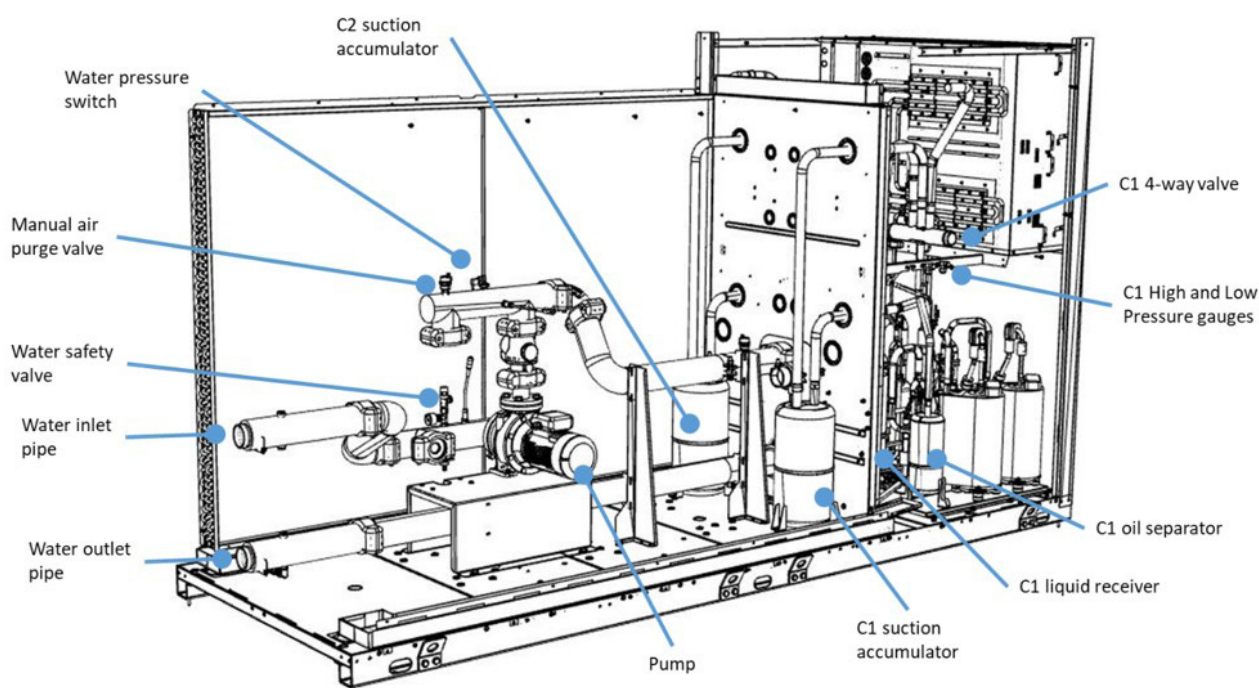


3.2 HP: Size 55.4 – 60.4 (60kW+90kW)

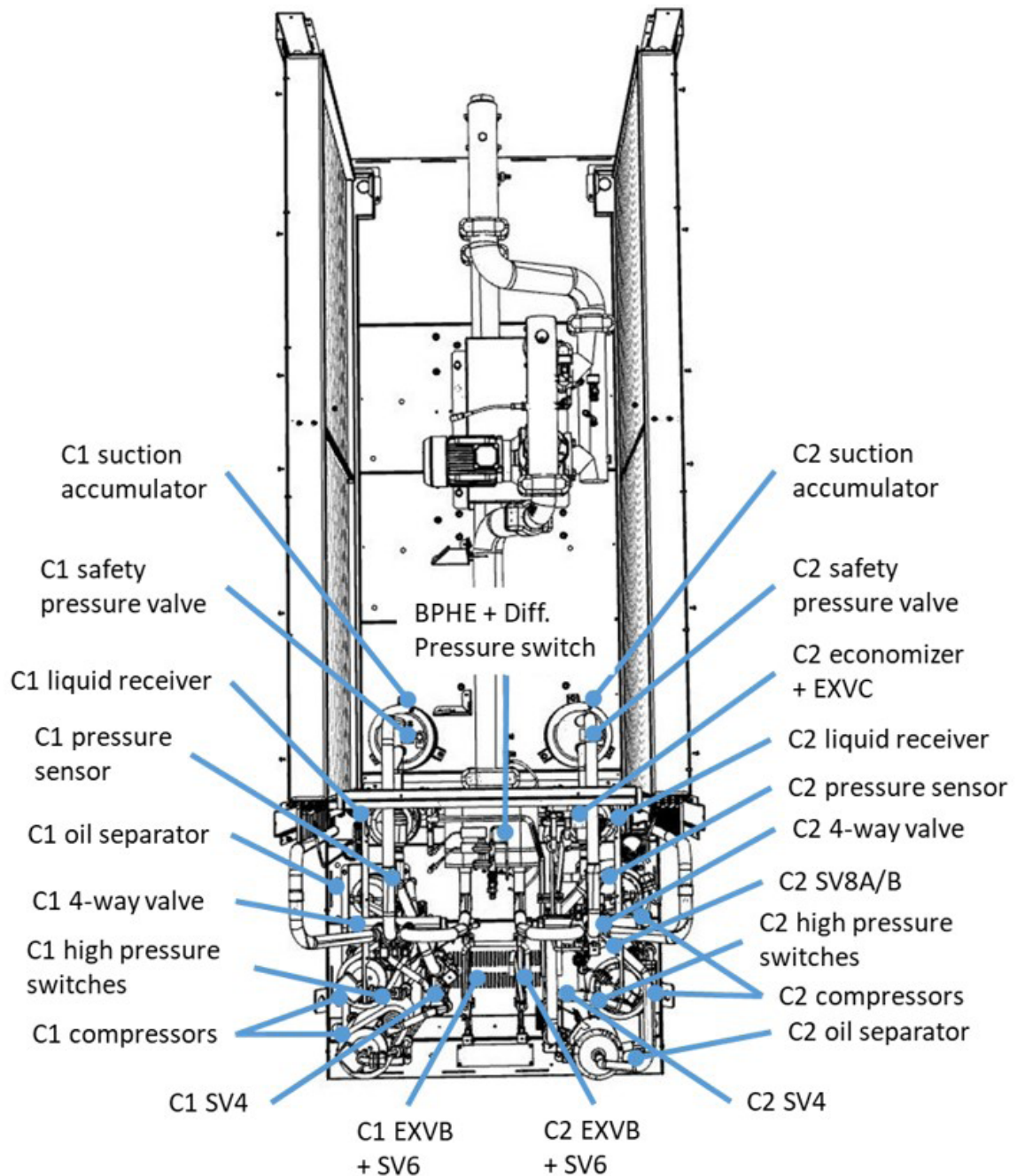
3.2.1 Front view



3.2.2 Rear view

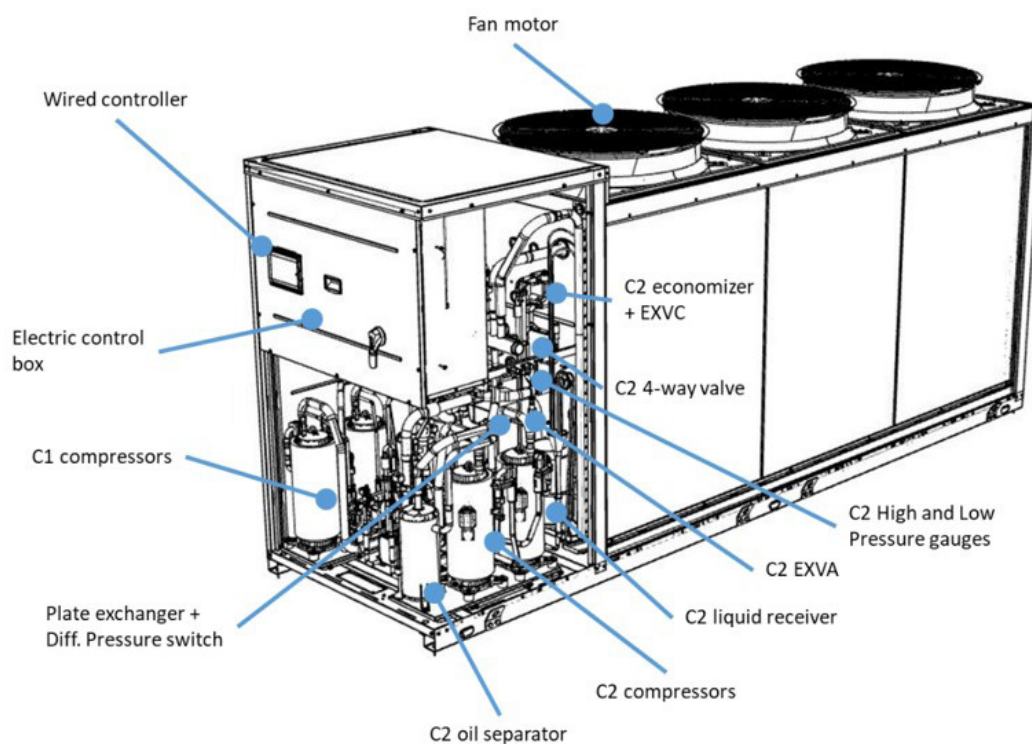


3.2.3 Top view

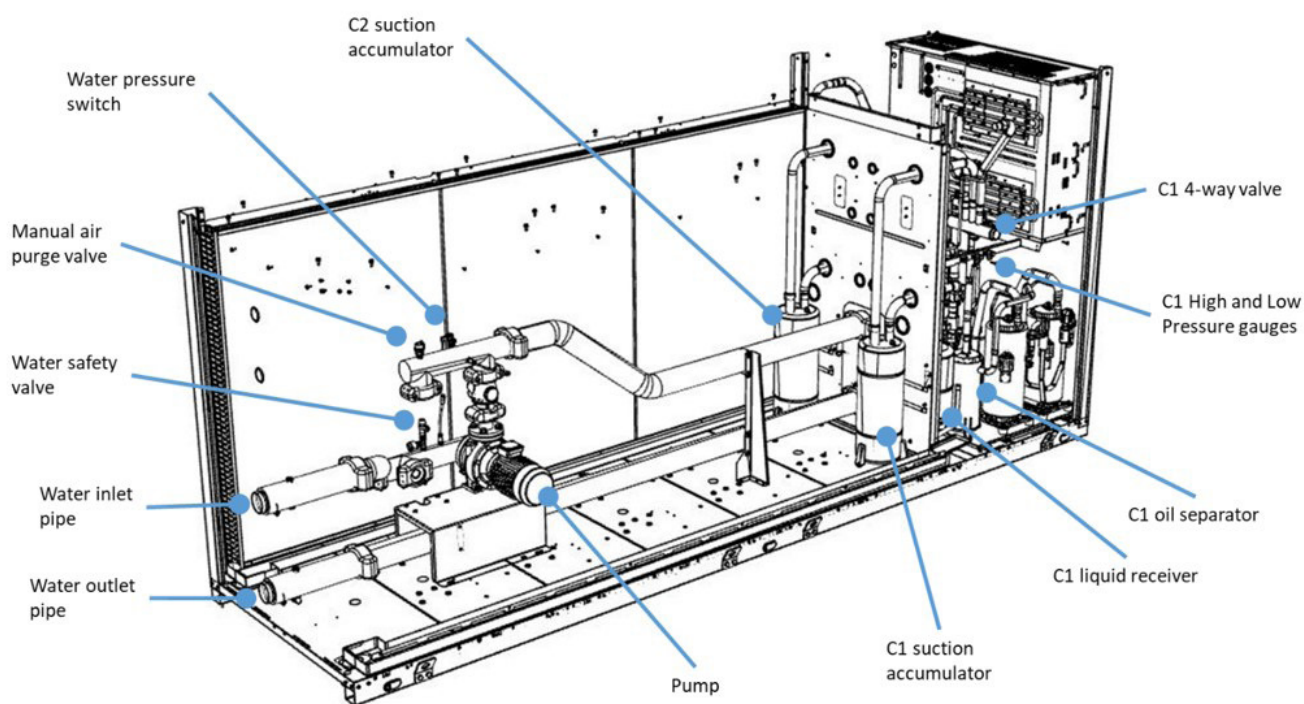


3.3 HP Size 65.4 – 85.4 (90kW+90kW/ 130kW+130kW)

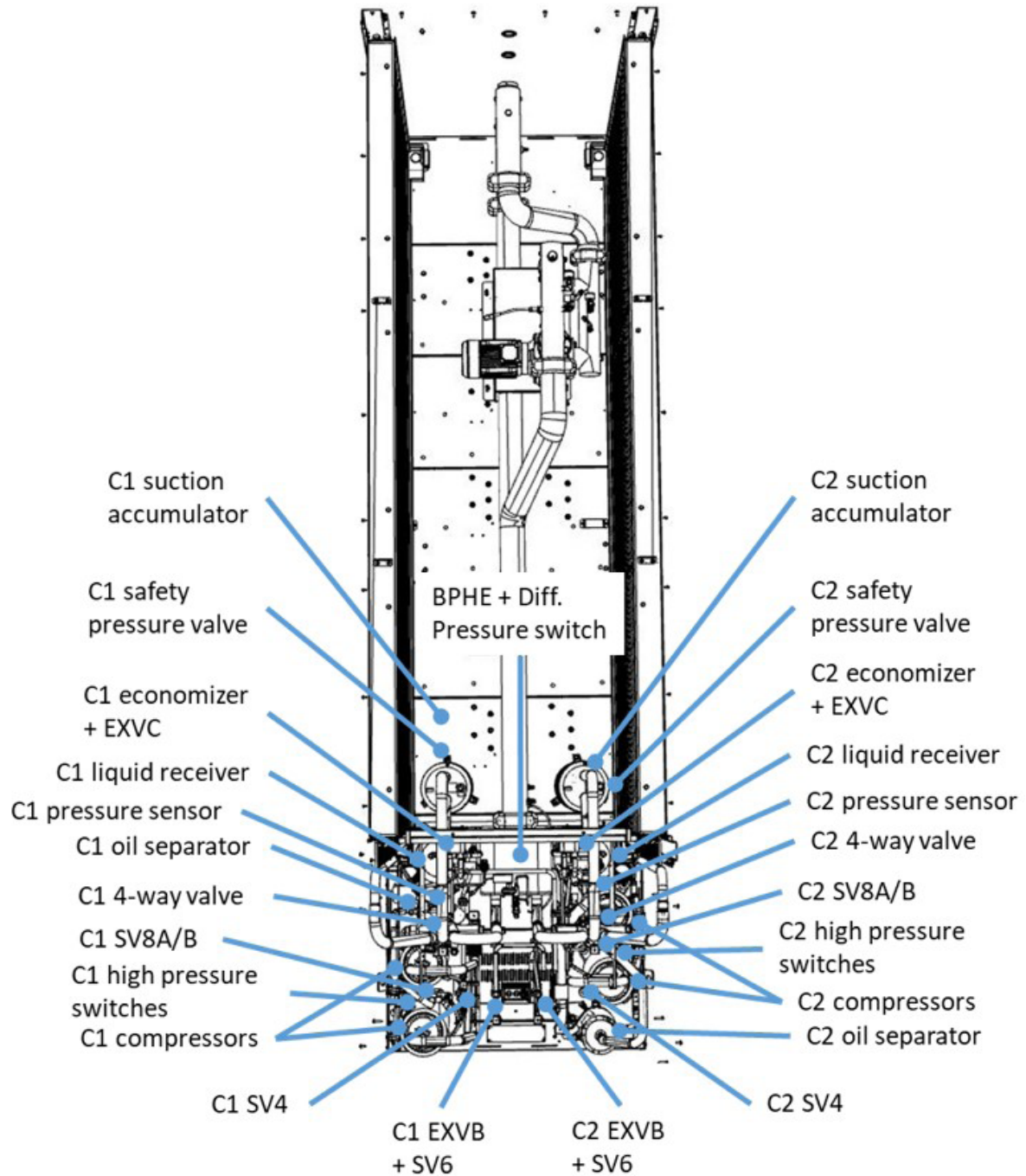
3.3.1 Front view



3.3.2 Rear view

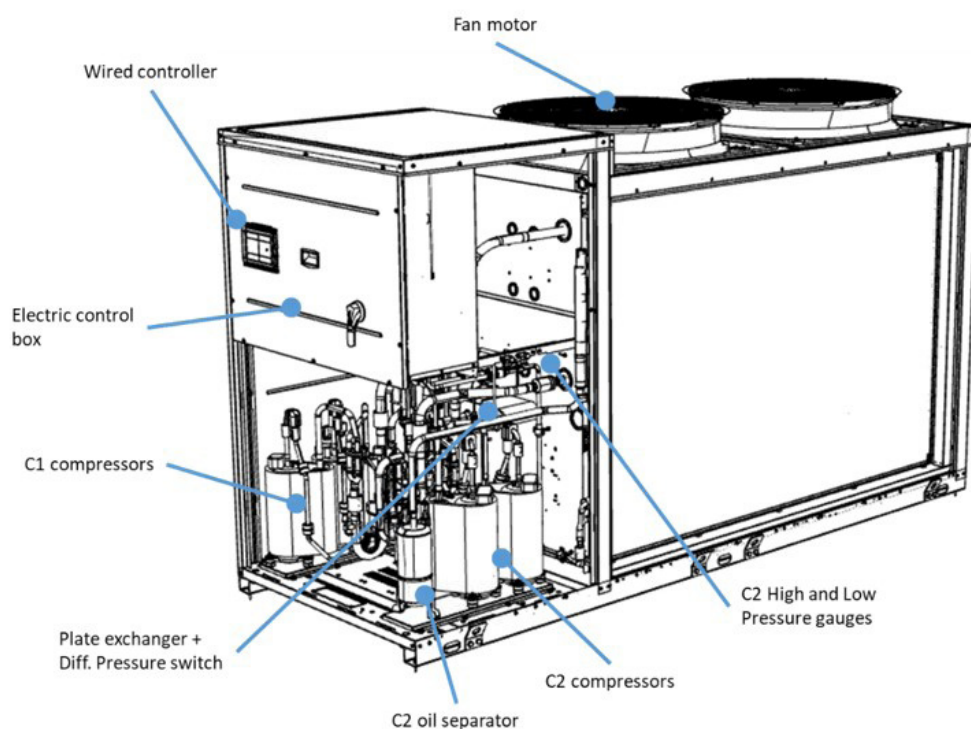


3.3.3 Top view

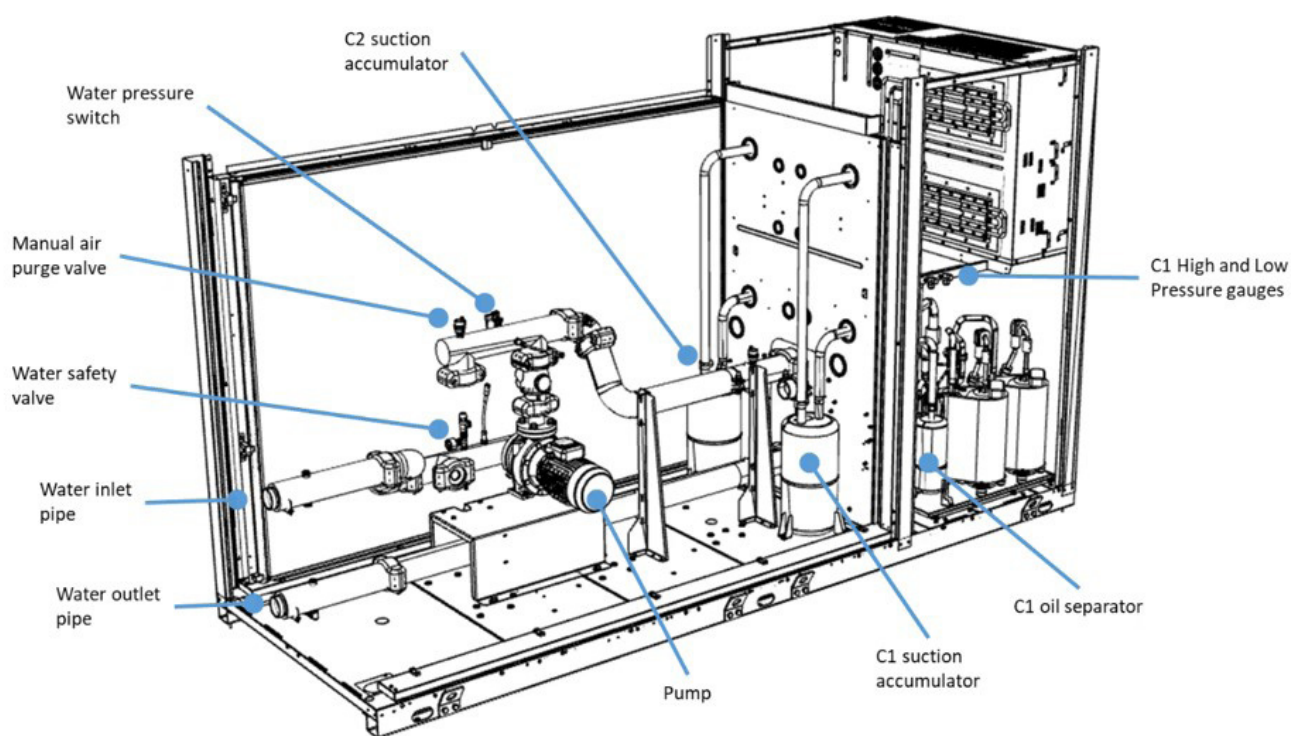


3.4 CO: Size EXC 45.4 – 50.4 / PRM 45.4 – 50.4 – 55.4 (60kW+60kW)

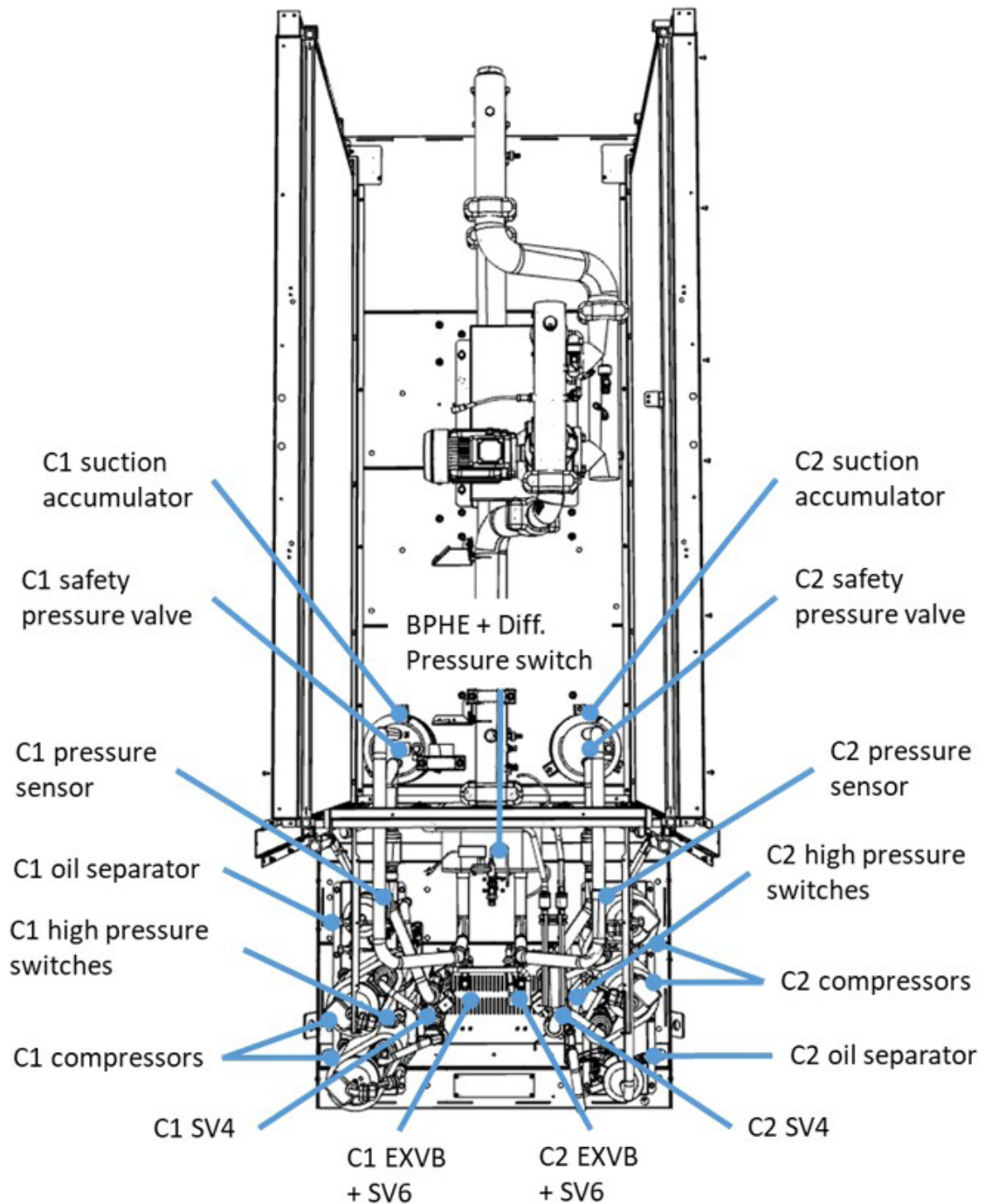
3.4.1 Front view



3.4.2 Rear view

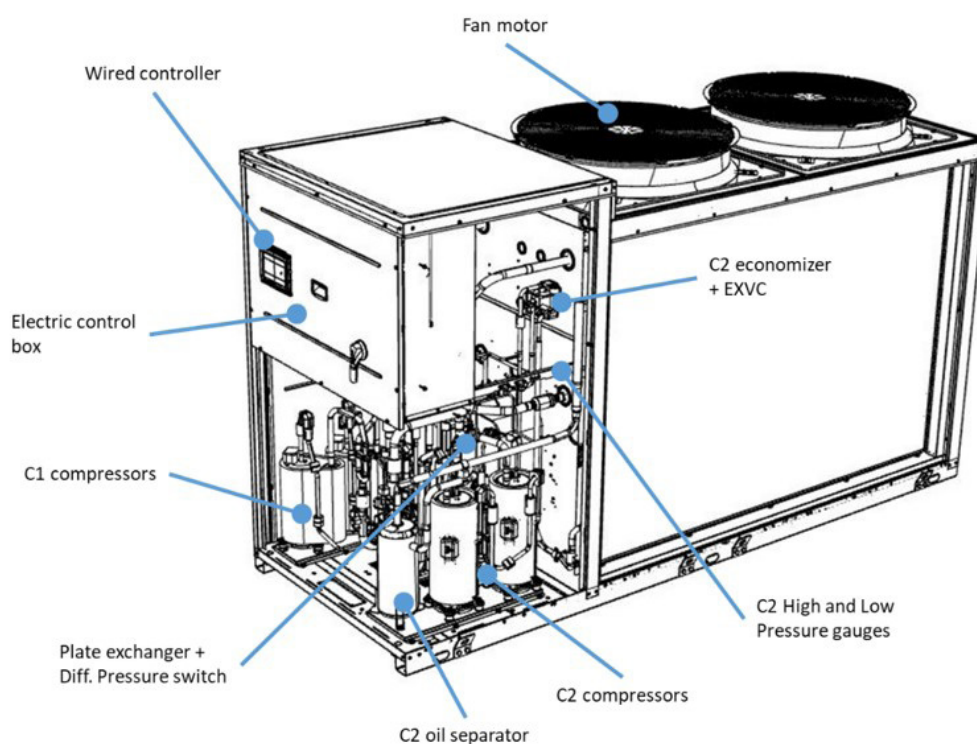


3.4.3 Top view

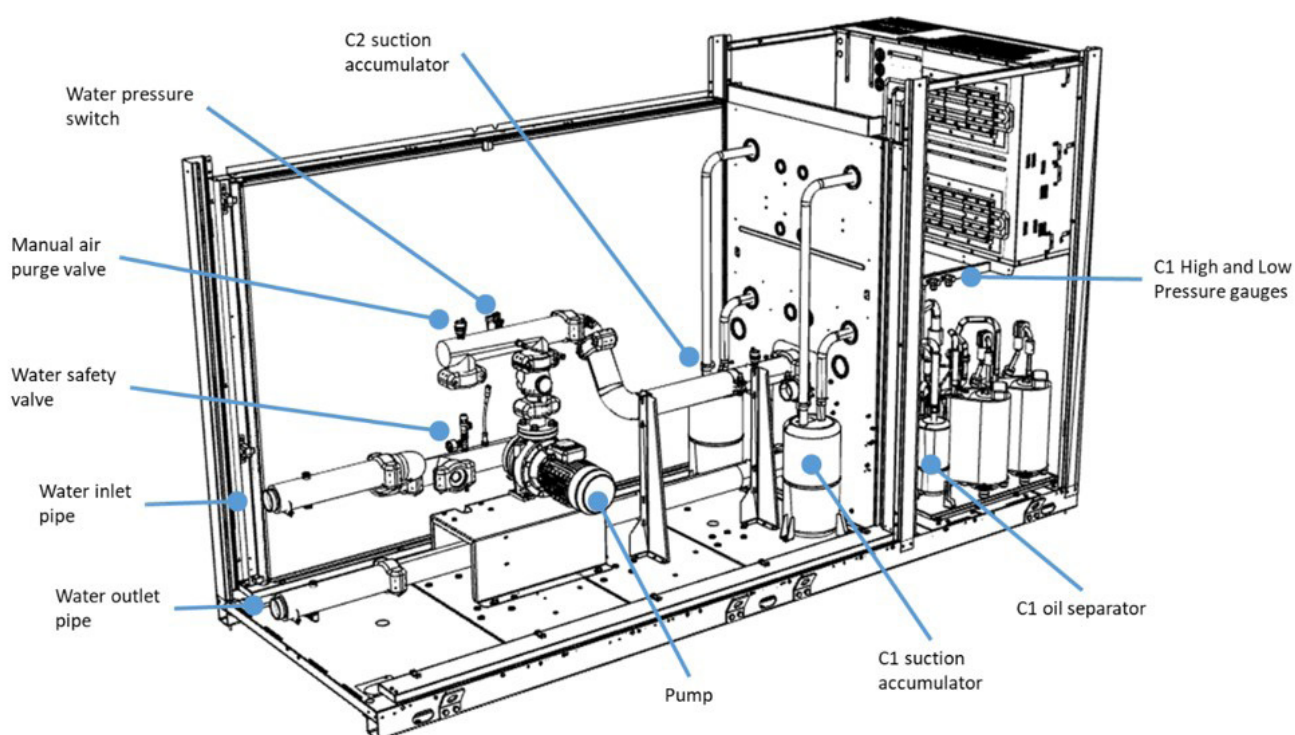


3.5 CO: Size EXC 55.4 – 60.4 / PRM 60.4 (60kW+90kW)

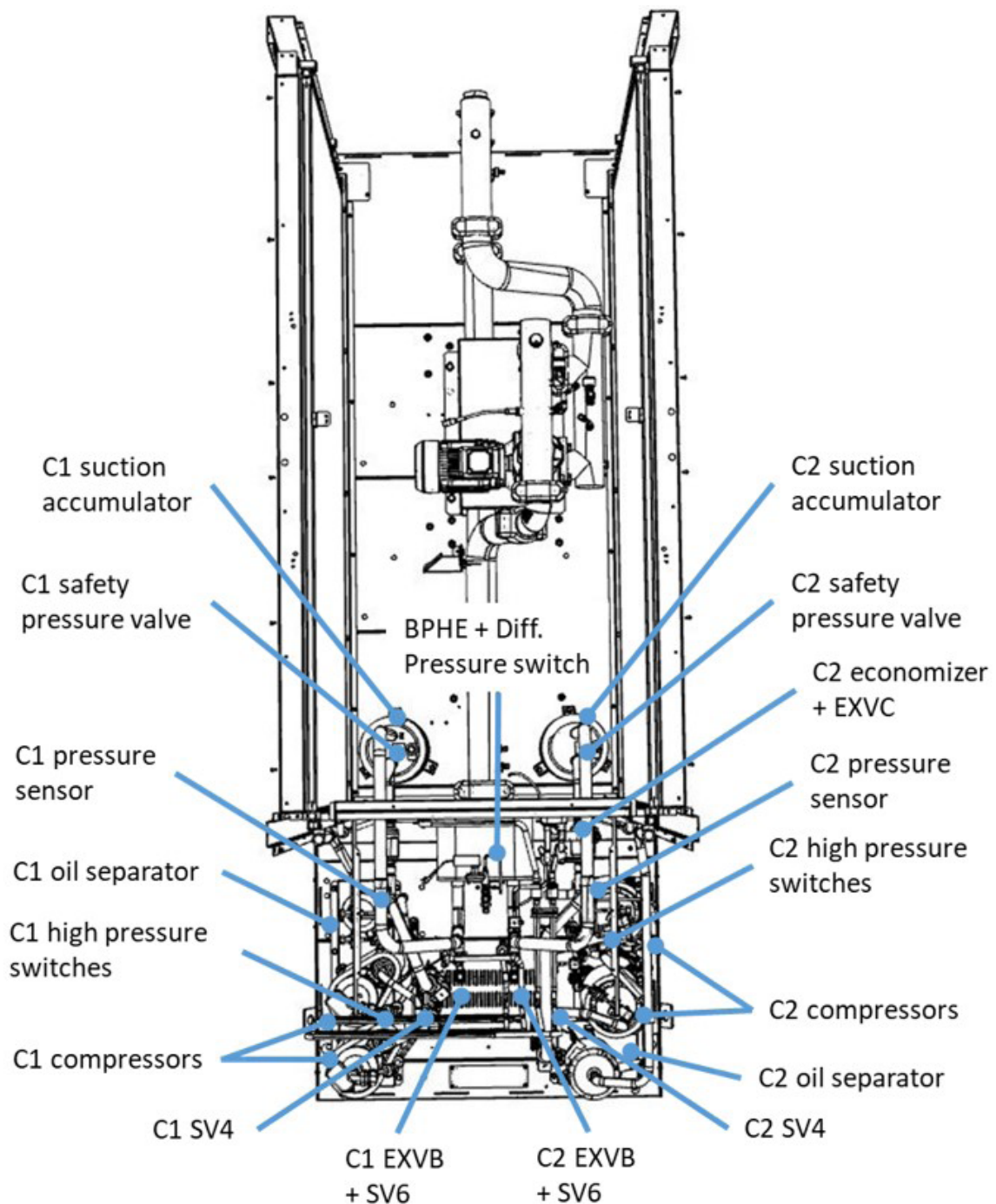
3.5.1 Front view



3.5.2 Rear view

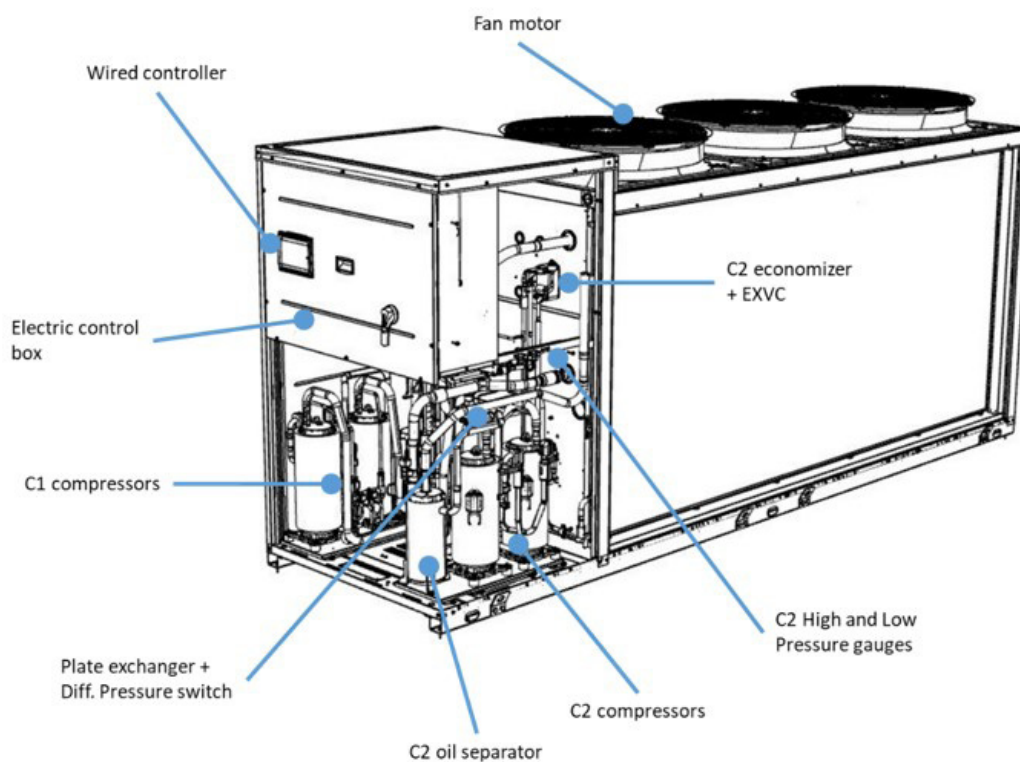


3.5.3 Top view

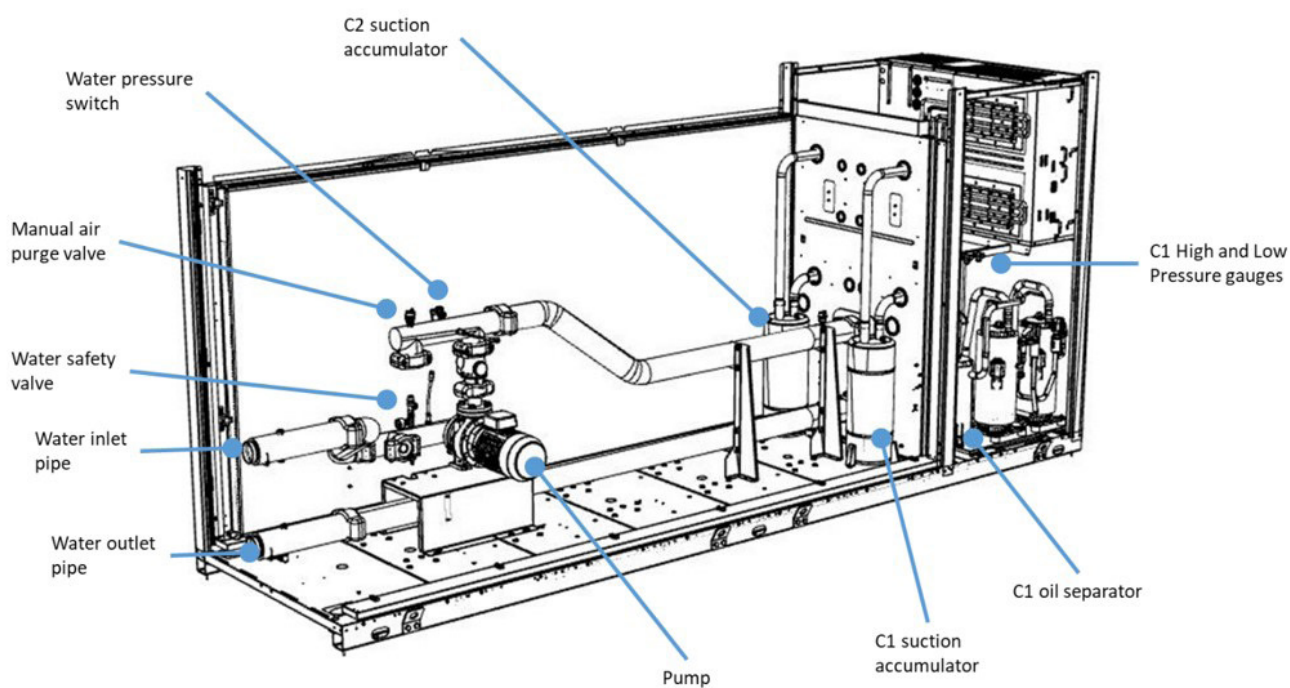


3.6 CO: EXC 65.4 – 90.4 / PRM 65.4 – 90.4 (90kW+90kW/ 130kW+130kW)

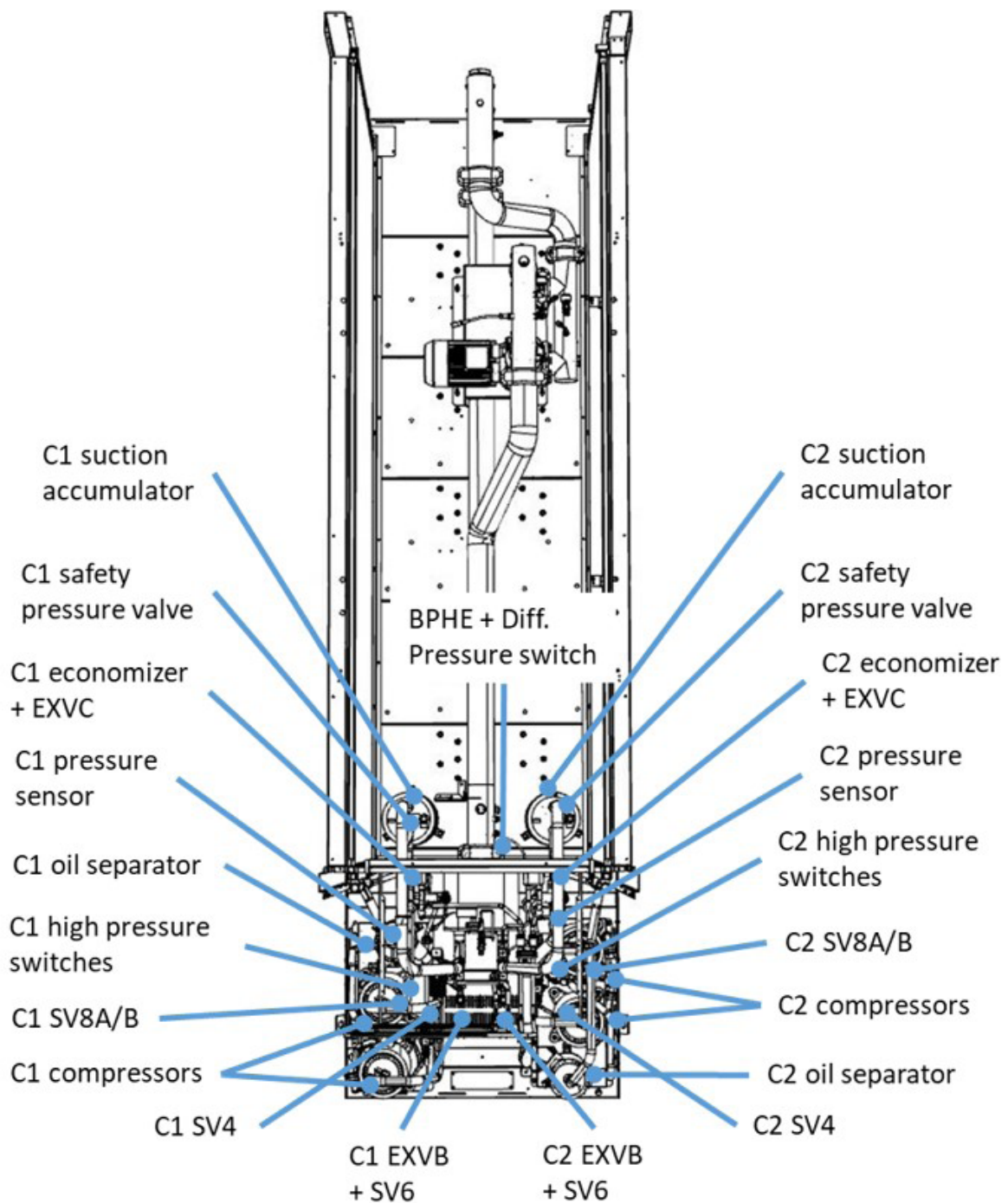
3.6.1 Front view



3.6.2 Rear view

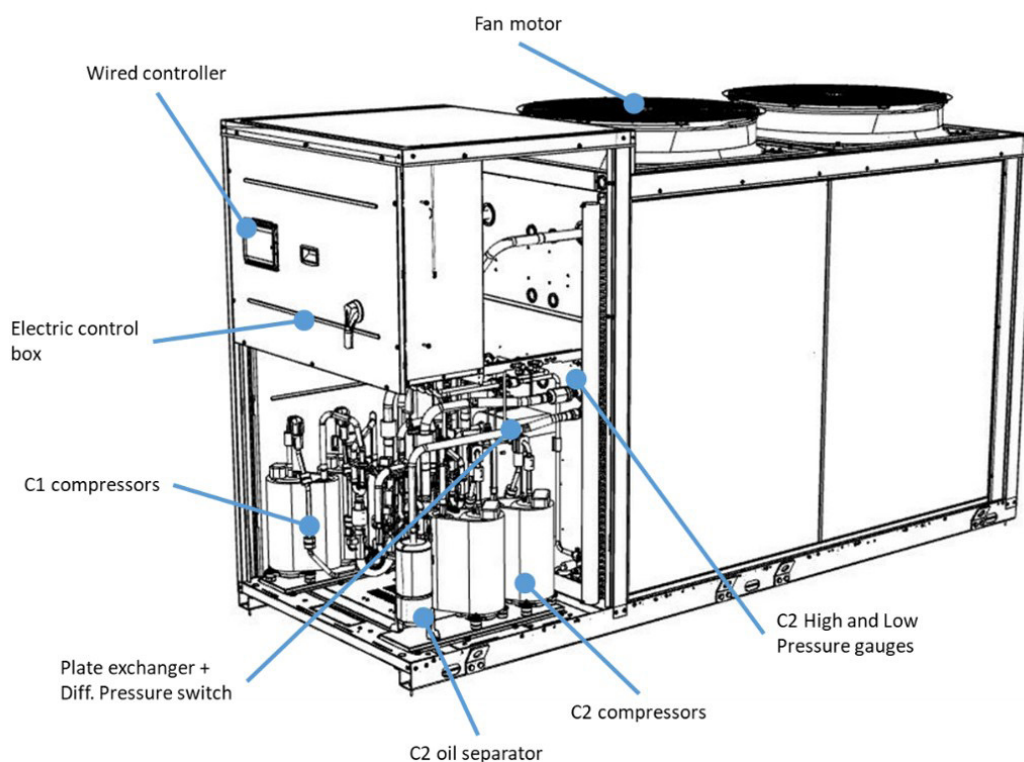


3.6.3 Top view

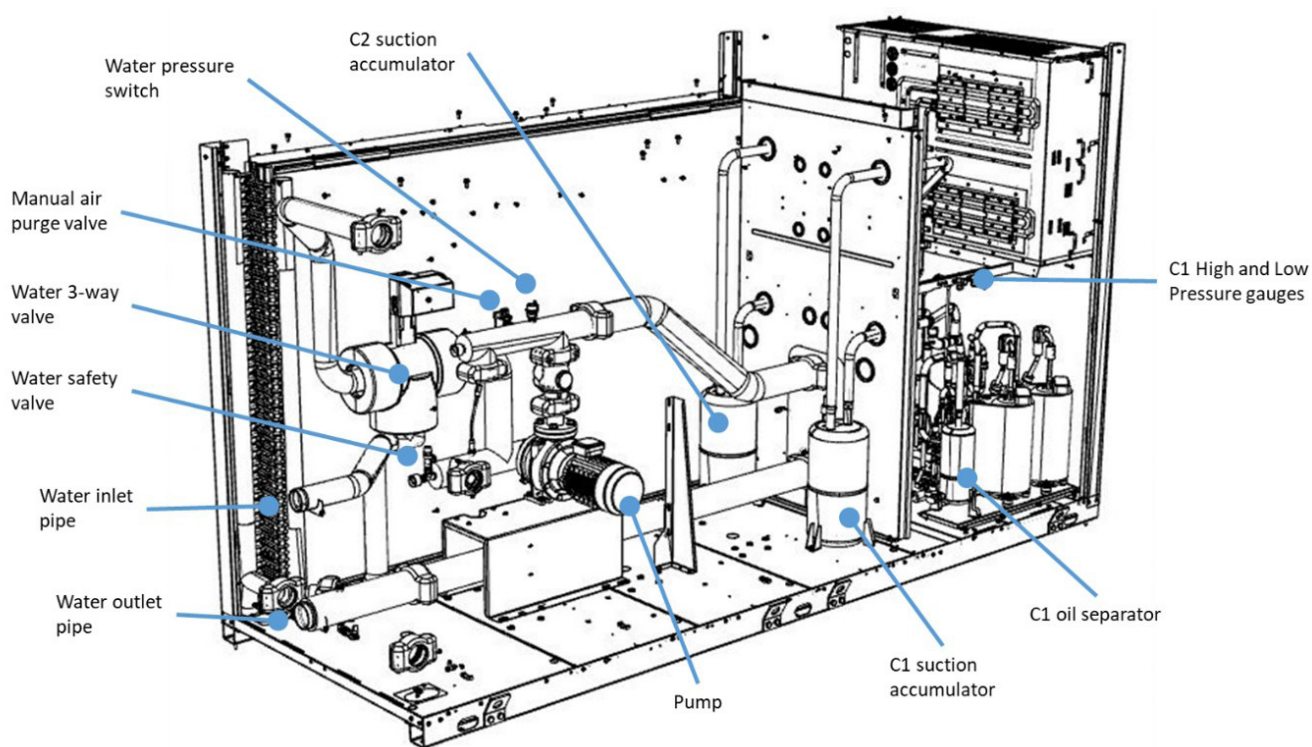


3.7 FC: Size 45.4 – 50.4 – 55.4 (60kW+60kW)

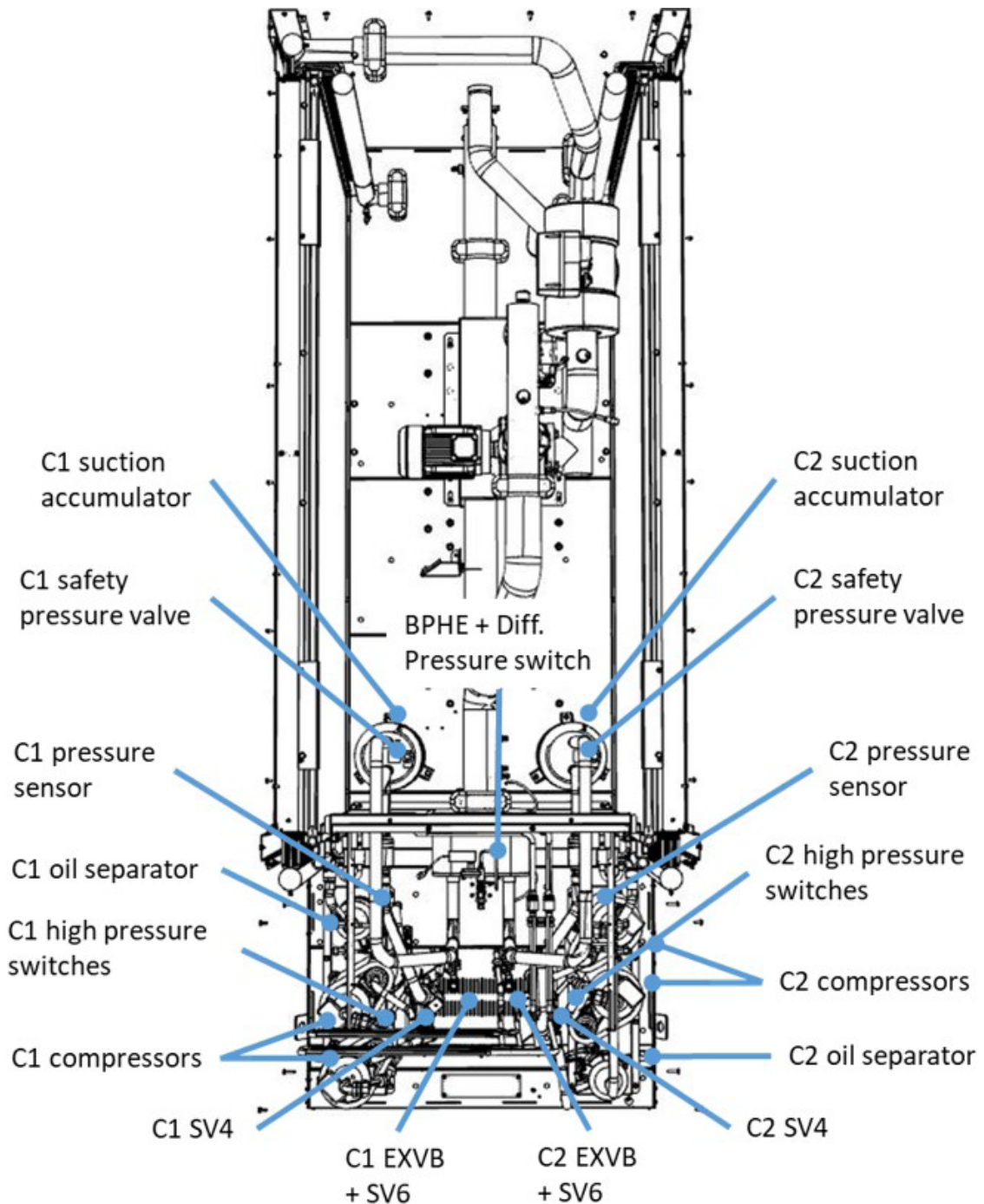
3.7.1 Front view



3.7.2 Rear view

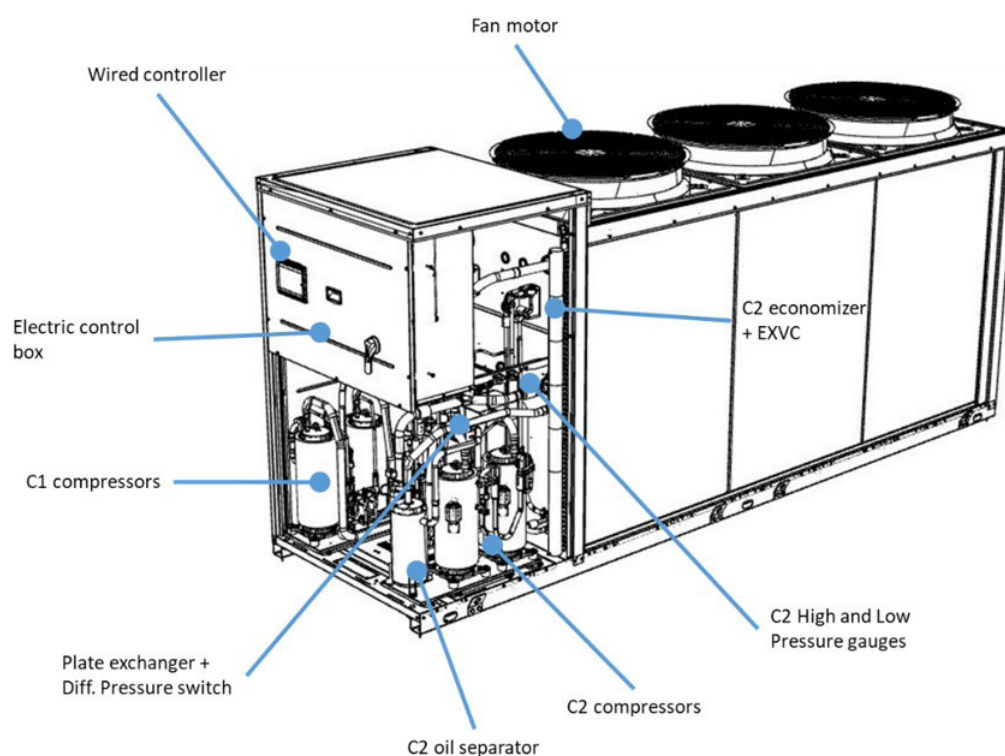


3.7.3 Top view

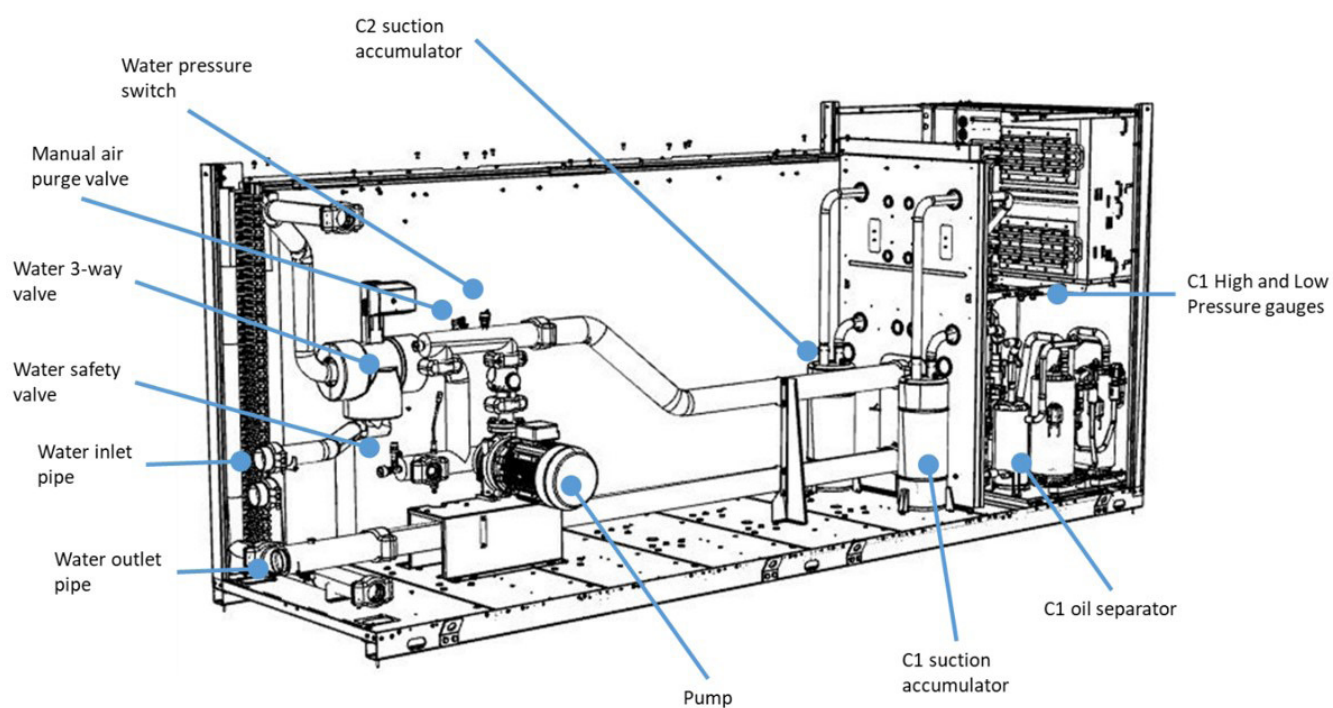


3.8 FC: Size 60.4 – 90.4 (90kW+90kW/ 130kW+130kW)

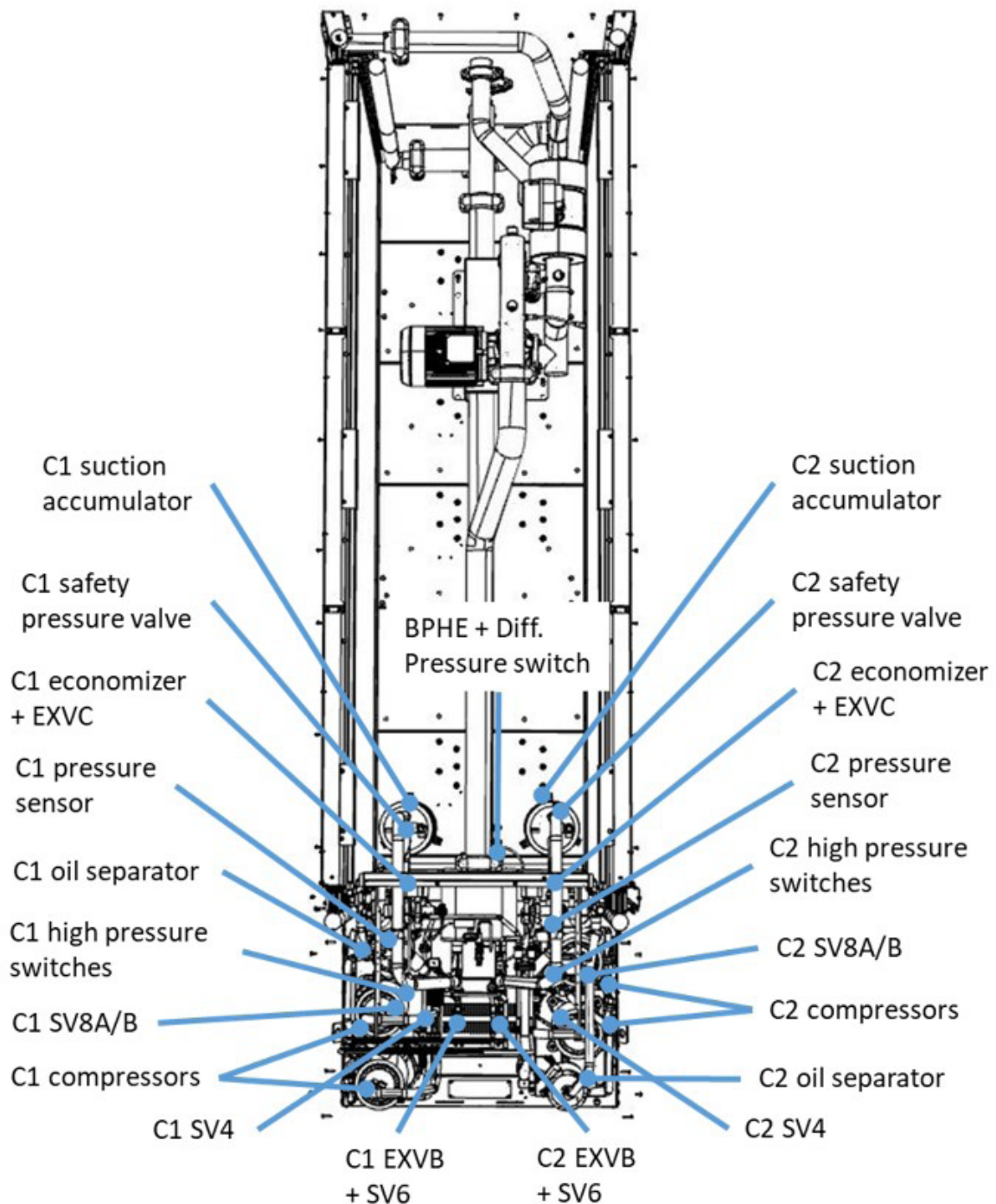
3.8.1 Front view



3.8.2 Rear view



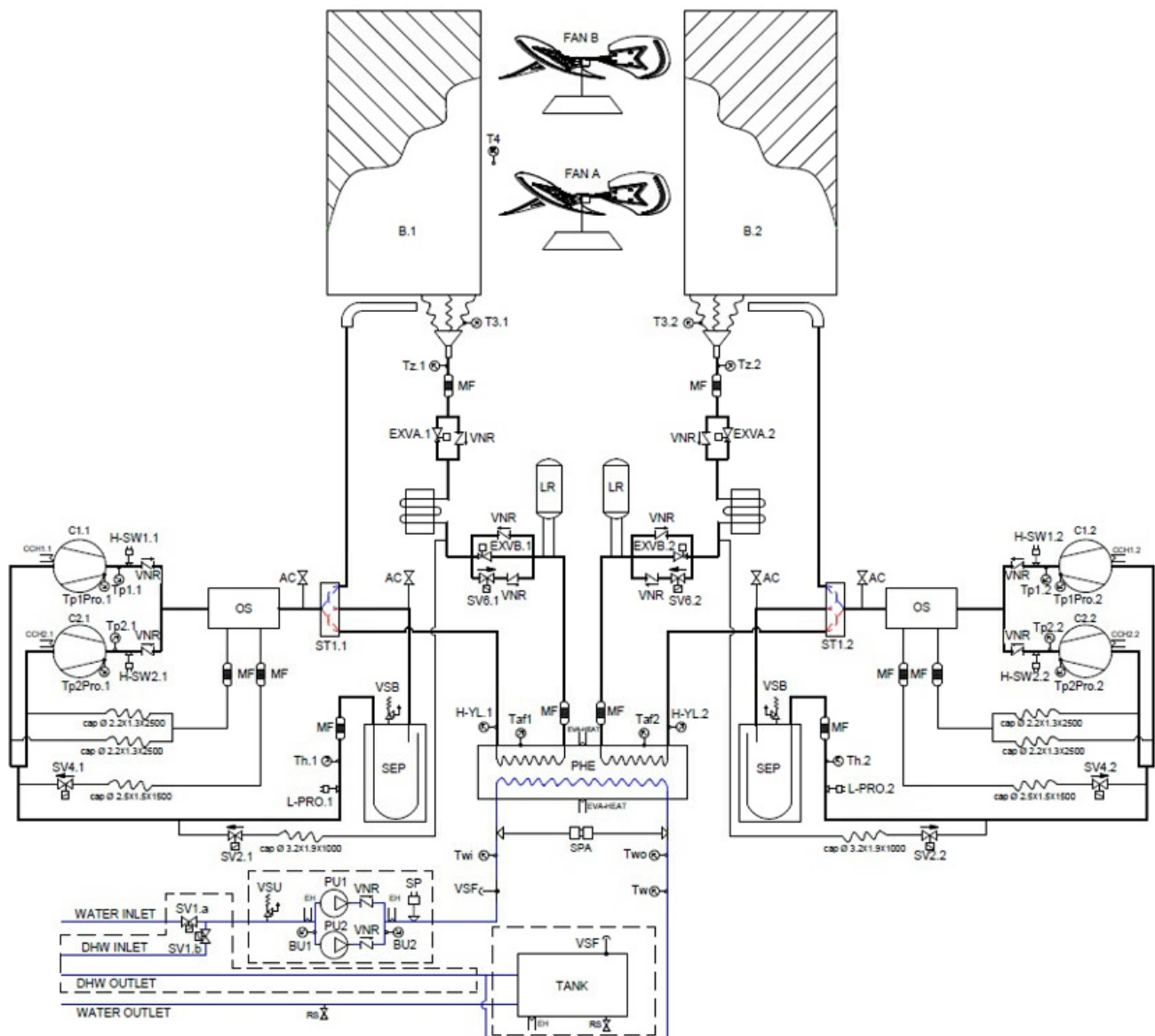
3.8.3 Top view



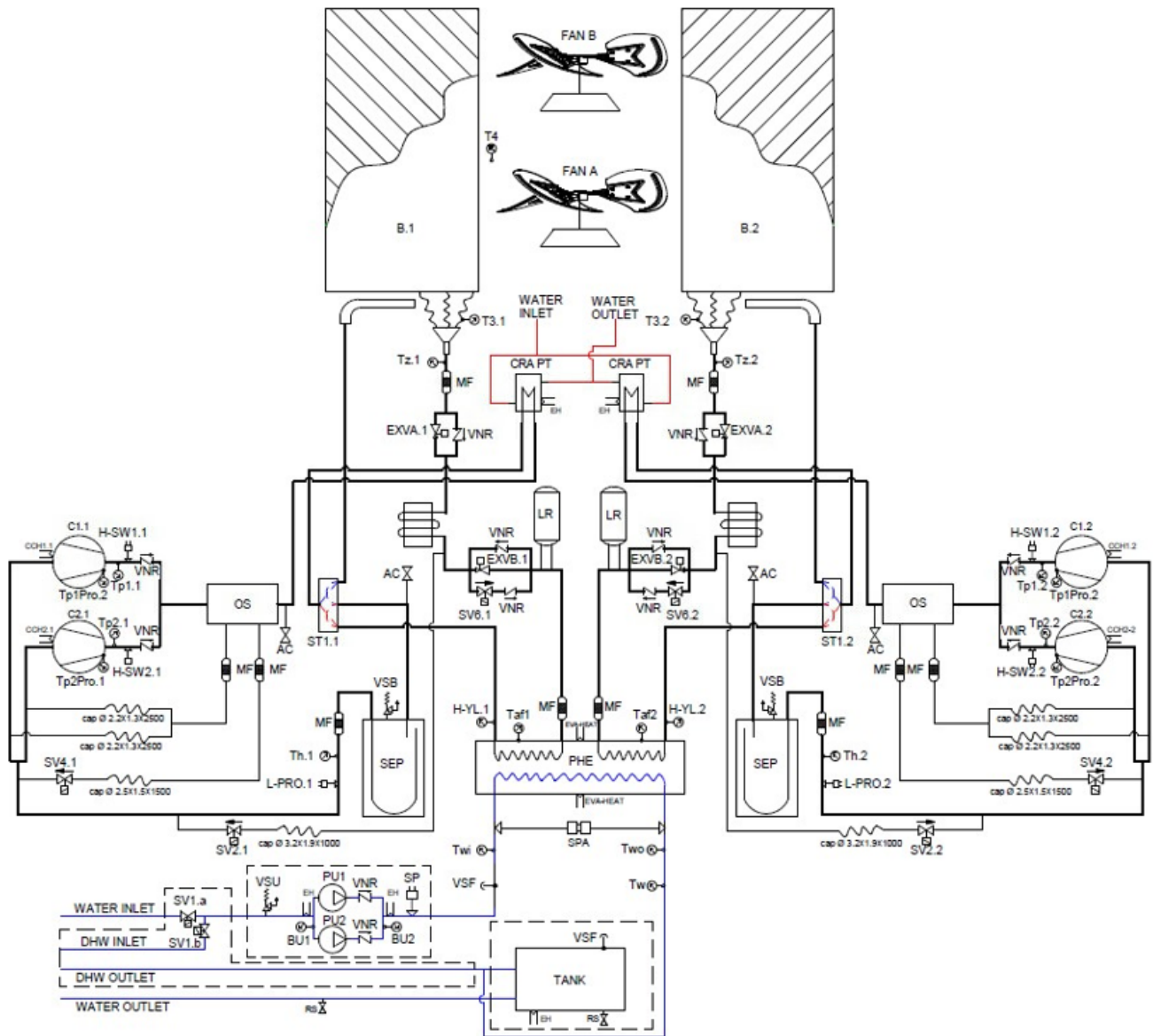
4. Piping diagrams

4.1 Up to 120kW Heat Pump (45.4 – 50.4)

4.1.1 HP standard unit

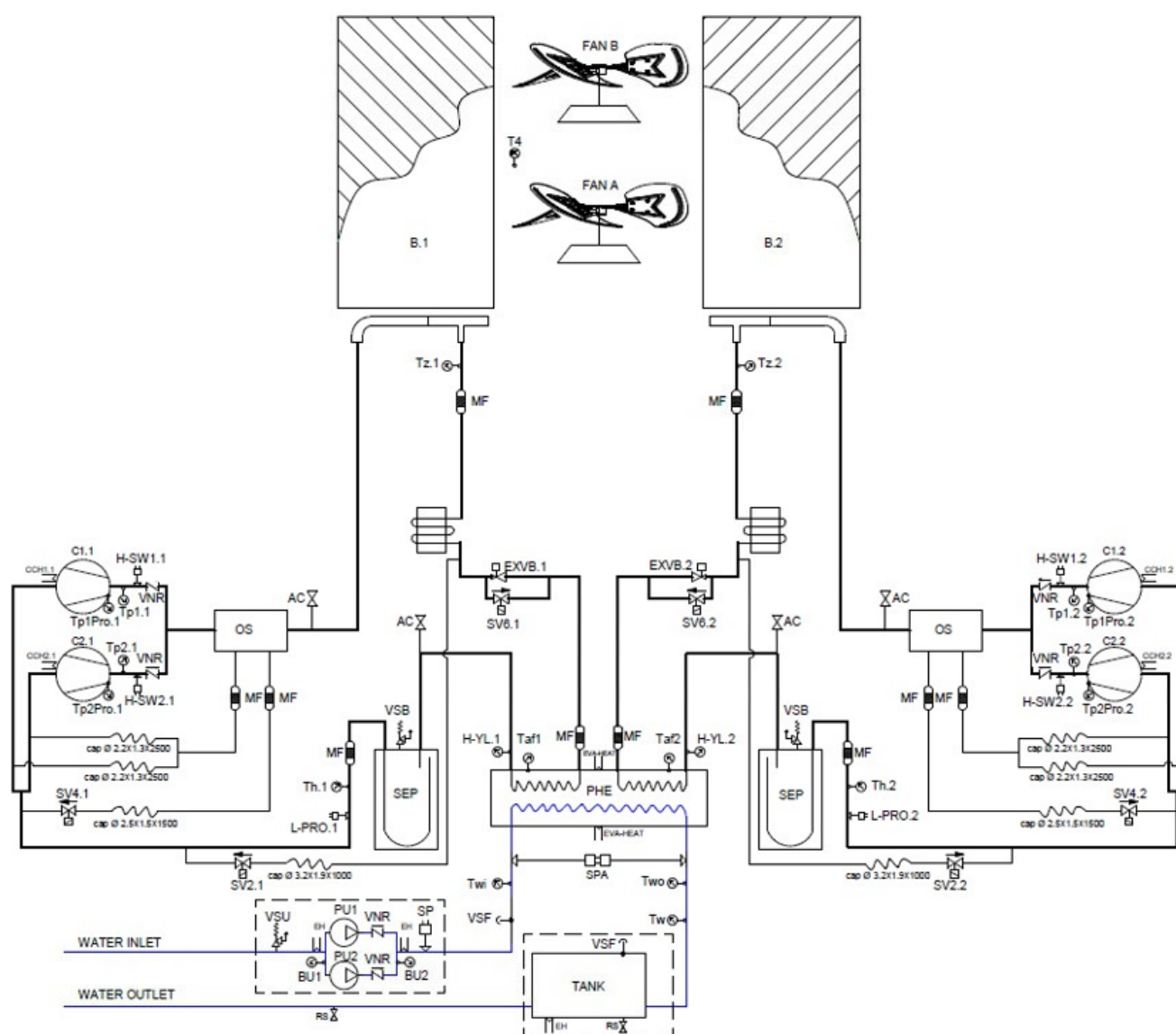


4.1.2 HP unit with partial heat recovery

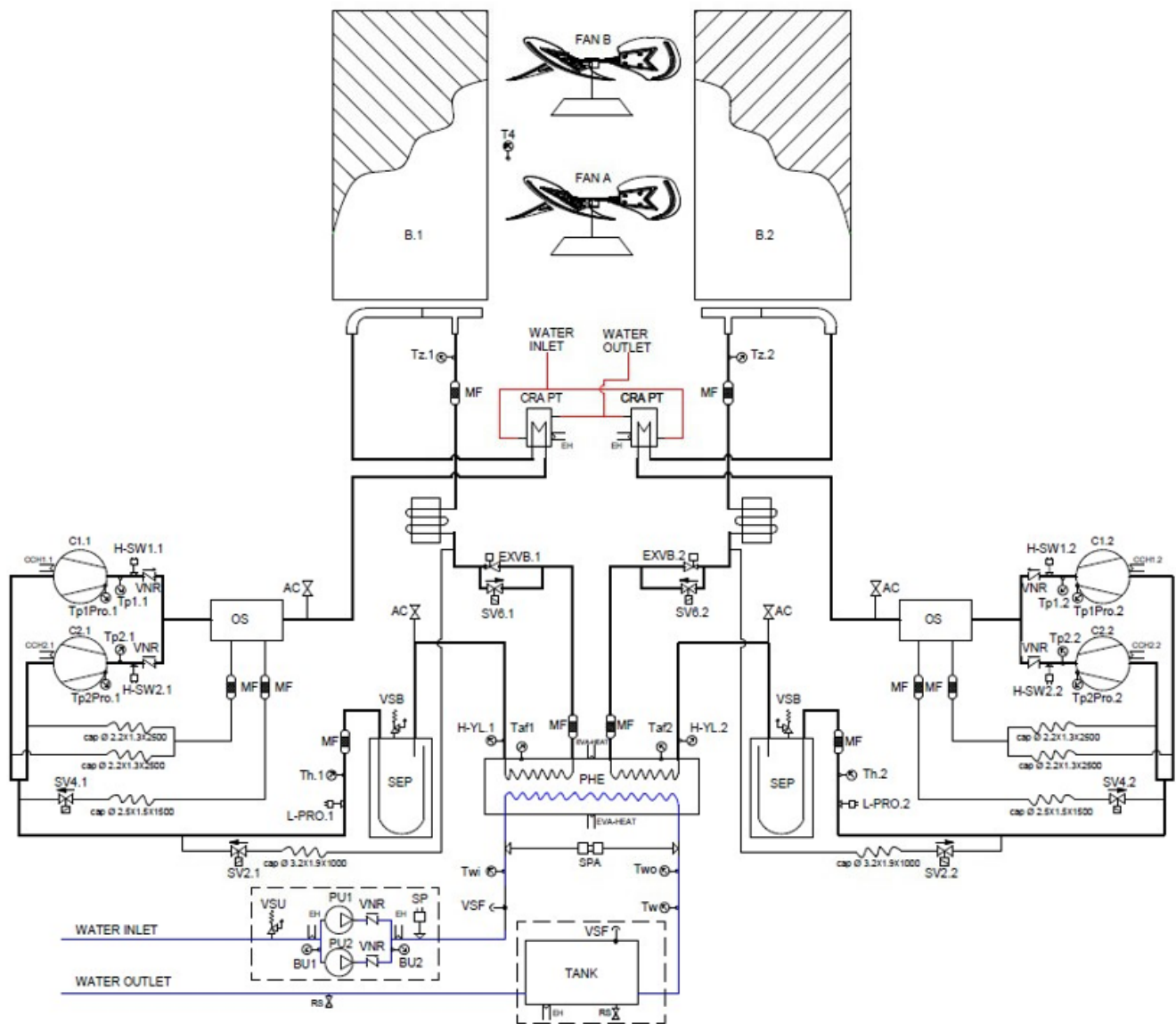


4.2 Up to 120kW Cooling Only (PRM: 45.4 – 50.4 – 55.4; EXC: 45.4 – 50.4)

4.2.1 CO standard unit

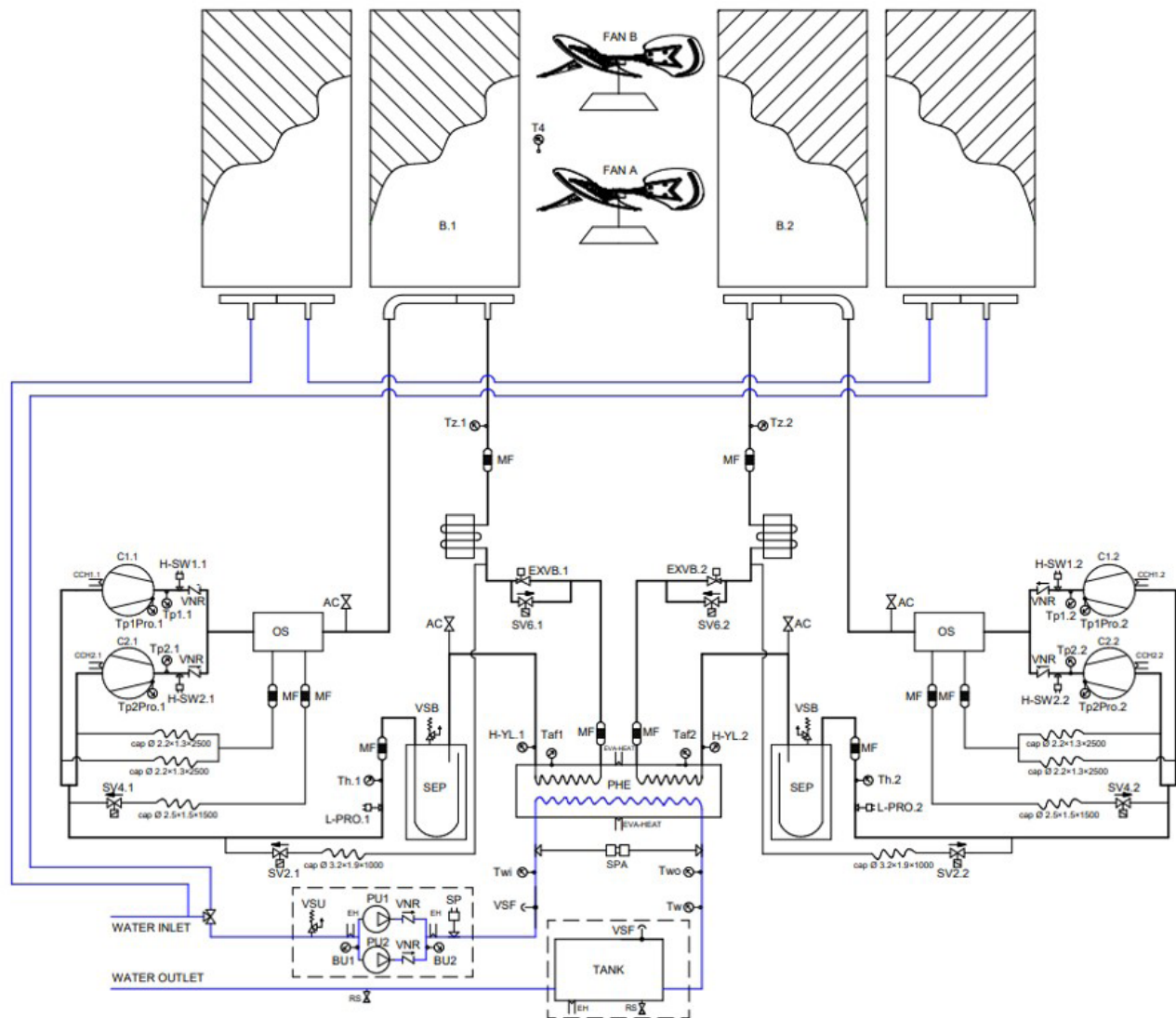


4.2.2 CO unit with partial heat recovery

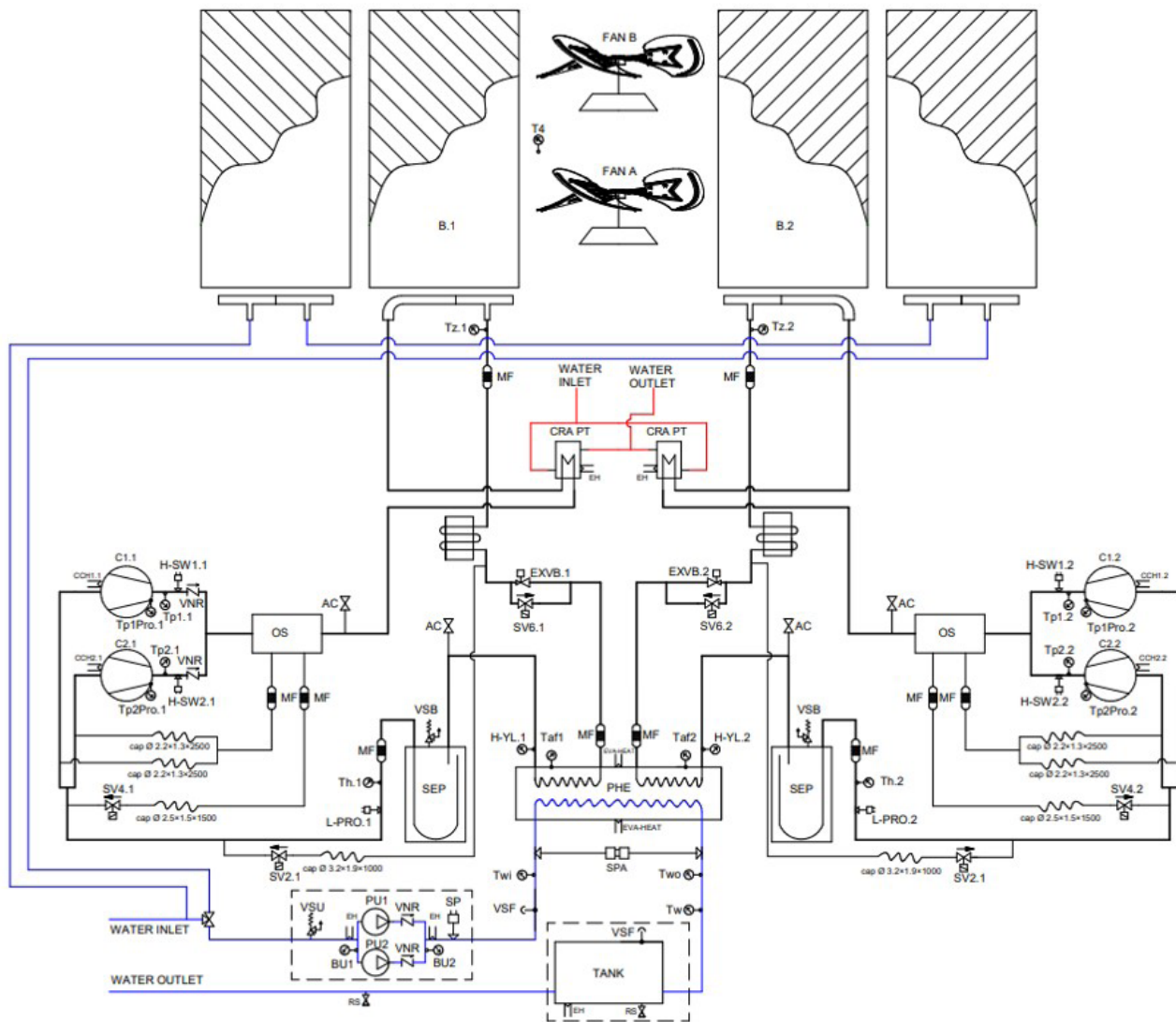


4.3 Up to 120 kW Free Cooling (45.4-55.4)

4.3.1 4.3.1 FC standard unit



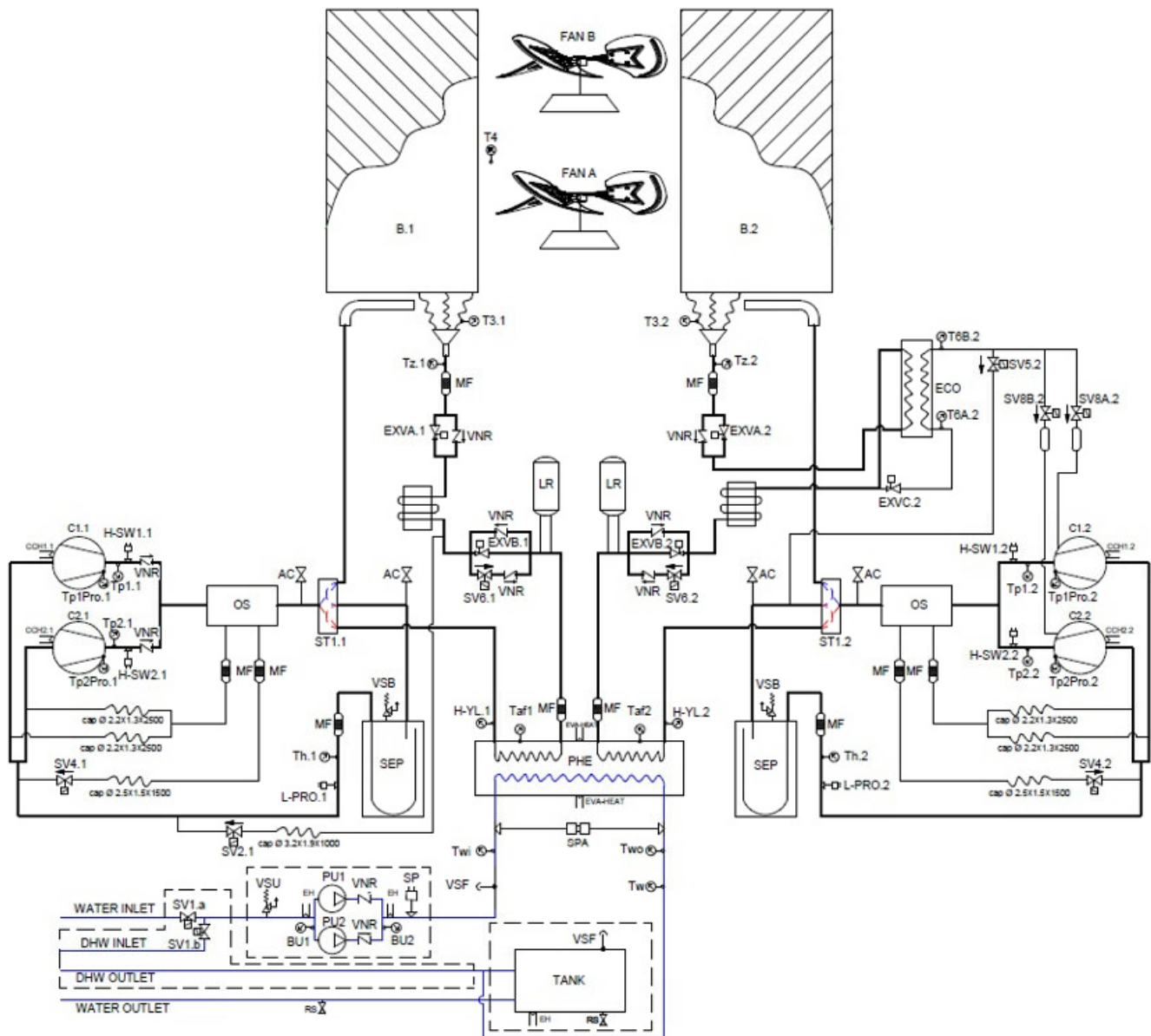
4.3.2 CO unit with partial heat recovery



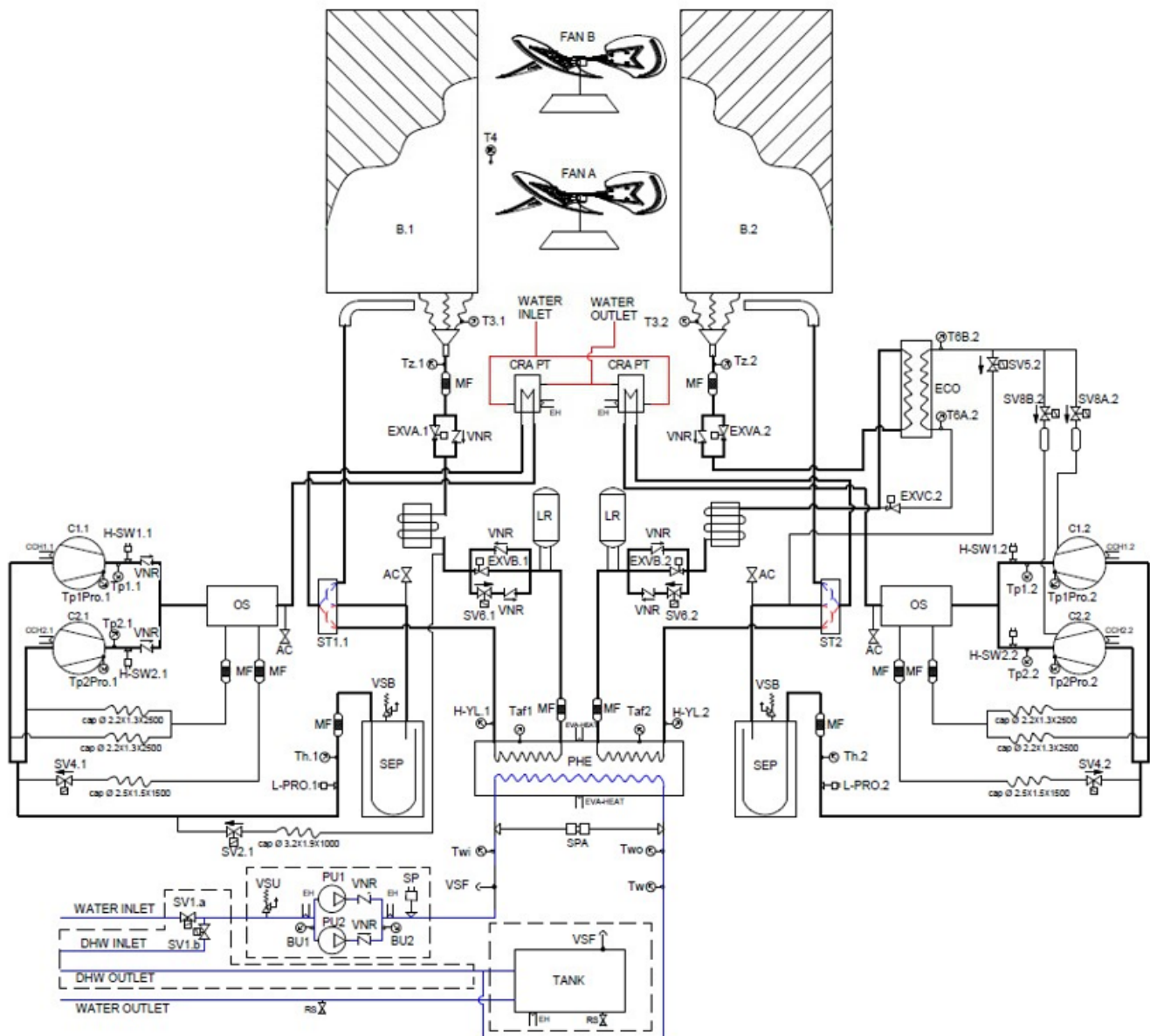
Functional components	
SYMBOLS	DESCRIPTION
AC	ATTACCO DI CARICA / CHARGE ACCESS
B	SCAMBIATORE A PACCO ALETTATO / FINNED PACK EXCHANGER
C	COMPRESSORE / COMPRESSOR
CAP	CAPILLARE / CAPILLARY
CCH	RESISTENZA CARTER / CRANCKCASE HEATER
ECO	ECONOMIZZATORE / ECONOMIZER
EVA-HEAT	RESISTENZA ELETTRICA EVAPORATORE / EVAPORATOR ELECTRIC HEATER
EH	RESISTENZA ELETTRICA / ELECTRIC HEATER
EXV	VALVOLA DI ESPANSIONE ELETTRONICA / ELECTRONIC EXPANSION VALVE
FAN	VENTILATORE / FAN
H-SW	PRESSOSTATO DI ALTA PRESSIONE / HIGH PRESSURE SWITCH
H-YL	TRASDUTTORE DI PRESSIONE / SYSTEM PRESSURE SENSOR
L-PRO	PRESSOSTATO DI BASSA PRESSIONE / LOW PRESSURE SWITCH
MF	FILTRO A MAGLIA / MESH FILTER
OS	SEPARATORE DI OLIO / OIL SEPARATOR
PHE	SCAMBIATORE A PIASTRE / PLATE EXCHANGER
SEP	SEPARATORE DI LIQUIDO / LIQUID SEPARATOR
SV	VALVOLA SOLENOIDE / SOLENOID VALVE
T3	SONDA TEMPERATURA USCITA SCAMBIATORE ALETTATO / FIN HEAT EXCHANGER OUTLET TEMP
T4	SONDA TEMPERATURA ARIA AMBIENTE / OUTDOOR AMBIENT TEMPERATURE PROBE
T6A-T6B	SONDA TEMPERATURA INGRESSO-USCITA ECONOMIZZATORE / ECONOMIZER IN/OUT TEMP. PROBE
Taf1-Taf2	SENSORE ANTIGELO ACQUA / WATER SIDE ANTIFREEZE TEMP.
Th	SONDA TEMPERATURA LINEA ASPIRAZIONE / SYSTEM RETURN REF. TEMPERATURE PROBE
Tp1-Tp2	SONDA TEMPERATURA SCARICO COMP. / COMPRESSOR DISCHARGE TEMP. PROBE
Tp1Pro-Tp2Pro	TERMOSTATO DI SICUREZZA COMPRESSORE / DISCHARGE TEMPERATURE CONTROL SWITCH
Tw	SONDA TEMPERATURA ACQUA / WATER TEMPERATURE PROBE
Twi	SONDA TEMPERATURA ACQUA IN INGRESSO / UNIT WATER INLET TEMPERATURE PROBE
Two	SONDA TEMPERATURA ACQUA IN USCITA / UNIT WATER OUTLET TEMPERATURE PROBE
Tz	SONDA TEMPERATURA USCITA CONDENSATORE / CONDENSER OUTLET TEMP. PROBE
VNR	VALVOLA DI NON RITORNO / NON-RETURN VALVE
VSB	VALVOLA DI SICUREZZA BASSA PRESSIONE / LOW PRESSURE SAFETY VALVE
SPA	PRESSOSTATO DIFFERENZIALE ACQUA / WATER DIFFERENTIAL PRESSURE SWITCH
VSF	VALVOLA DI SFIATO / RELIEF VALVE
VSU	VALVOLA DI SICUREZZA ACQUA / WATER SAFETY VALVE
BU	MANOMETRO ACQUA / WATER PRESSURE GAUGE
PU	POMPA UTILIZZO / USER PUMP
SP	PRESSOSTATO CARICO IMPIANTO / WATER PRESSURE SWITCH
RS	RUBINETTO DI SCARICO / DRAINAGE VALVE
TANK	SERBATOIO / WATER TANK

4.4 Up to 150 kW Heat Pump (55.4 – 60.4)

4.4.1 HP standard unit

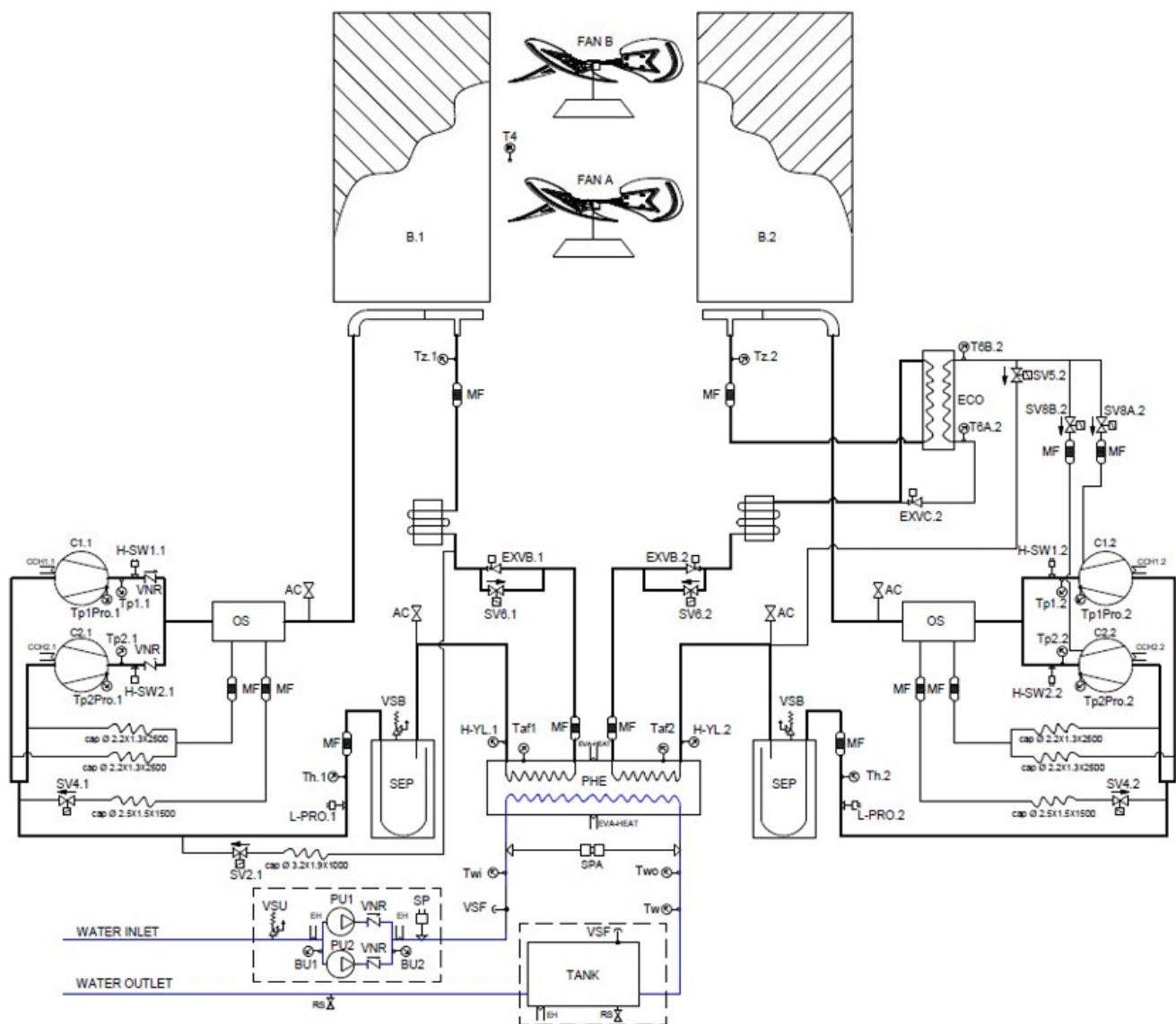


4.4.2 HP unit with partial heat recovery

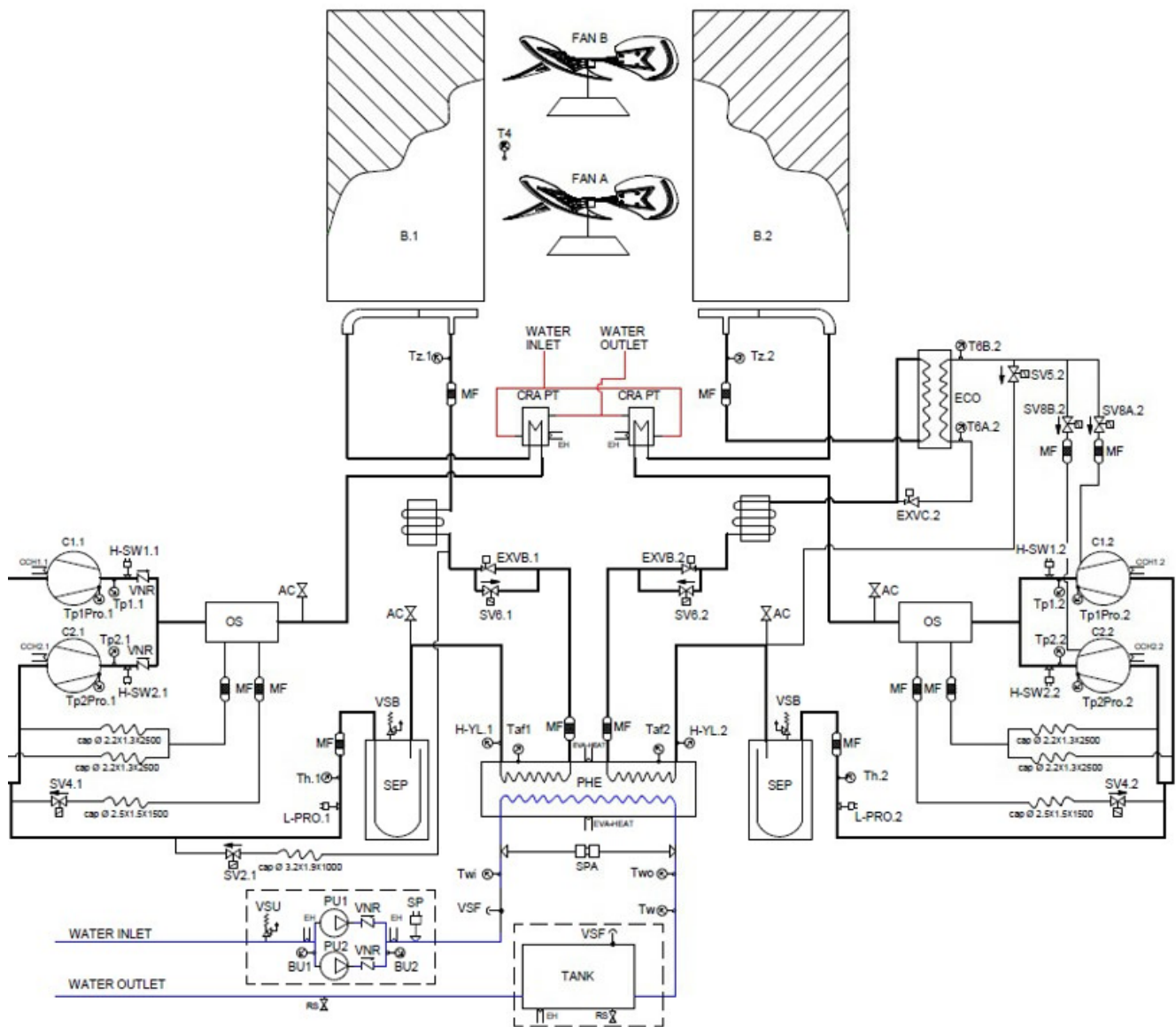


4.5 Up to 150 kW Cooling Only (PRM: 60.4; EXC: 55.4 – 60.4)

4.5.1 CO standard unit



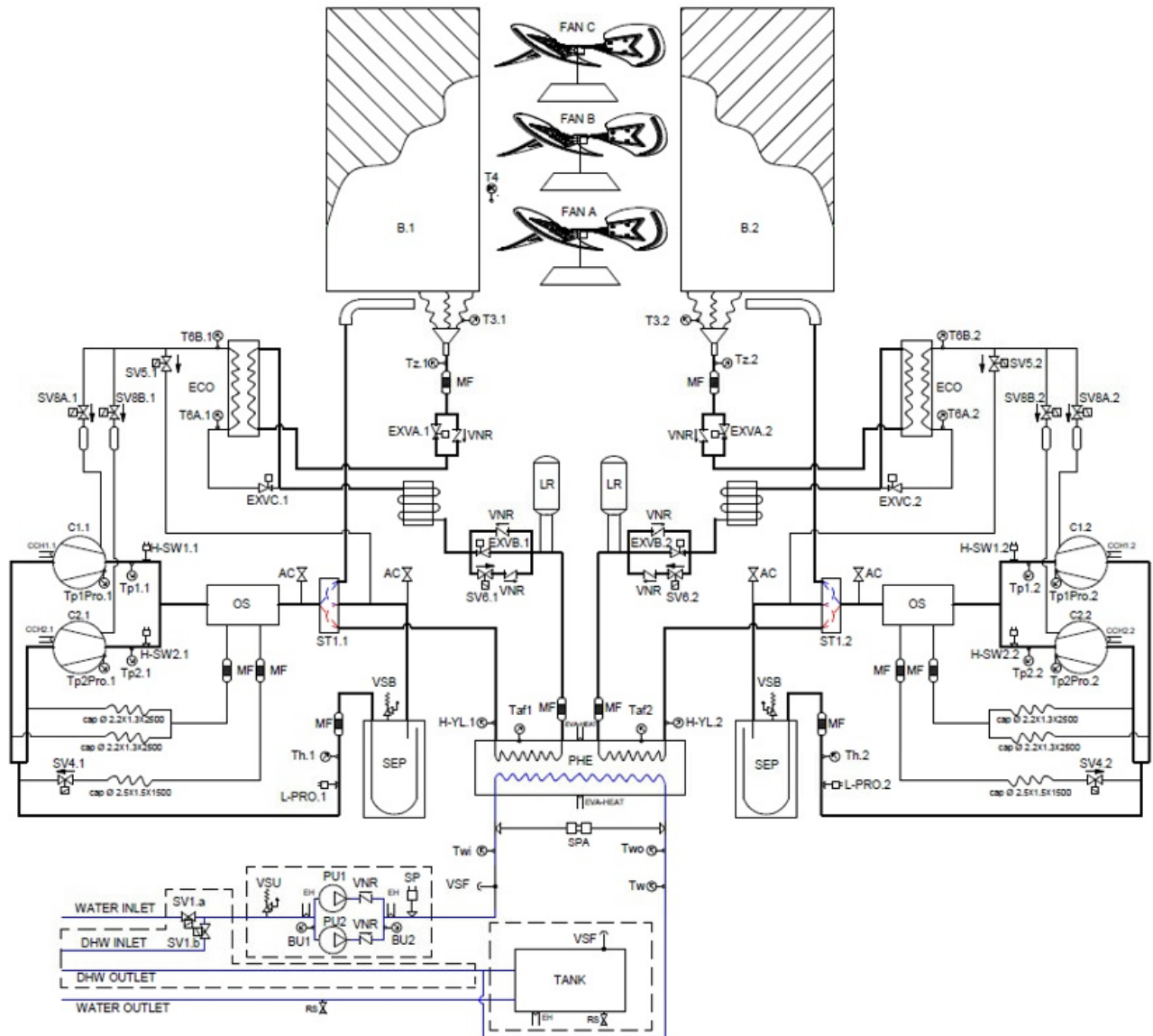
4.5.2 CO unit with partial heat recovery



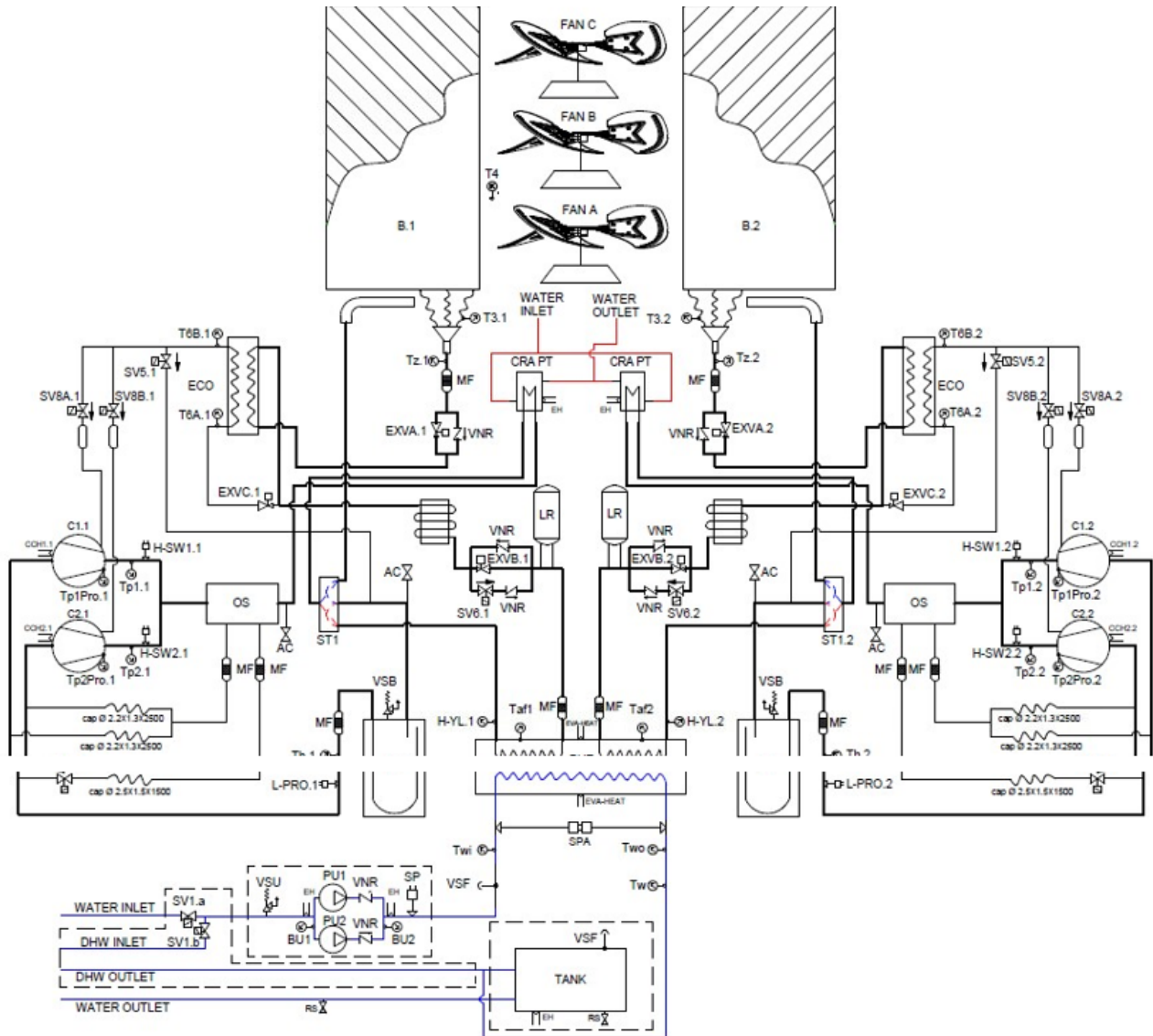
Functional components	
SYMBOLS	DESCRIPTION
AC	ATTACCO DI CARICA / CHARGE ACCESS
B	SCAMBIATORE A PACCO ALETTATO / FINNED PACK EXCHANGER
C	COMPRESSORE / COMPRESSOR
CAP	CAPILLARE / CAPILLARY
CCH	RESISTENZA CARTER / CRANCKCASE HEATER
ECO	ECONOMIZZATORE / ECONOMIZER
EVA-HEAT	RESISTENZA ELETTRICA EVAPORATORE / EVAPORATOR ELECTRIC HEATER
EH	RESISTENZA ELETTRICA / ELECTRIC HEATER
EXV	VALVOLA DI ESPANSIONE ELETTRONICA / ELECTRONIC EXPANSION VALVE
FAN	VENTILATORE / FAN
H-SW	PRESSOSTATO DI ALTA PRESSIONE / HIGH PRESSURE SWITCH
H-YL	TRASDUTTORE DI PRESSIONE / SYSTEM PRESSURE SENSOR
L-PRO	PRESSOSTATO DI BASSA PRESSIONE / LOW PRESSURE SWITCH
MF	FILTRO A MAGLIA / MESH FILTER
OS	SEPARATORE DI OLIO / OIL SEPARATOR
PHE	SCAMBIATORE A PIASTRE / PLATE EXCHANGER
SEP	SEPARATORE DI LIQUIDO / LIQUID SEPARATOR
SV	VALVOLA SOLENOIDE / SOLENOID VALVE
T3	SONDA TEMPERATURA USCITA SCAMBIATORE ALETTATO / FIN HEAT EXCHANGER OUTLET TEMP
T4	SONDA TEMPERATURA ARIA AMBIENTE / OUTDOOR AMBIENT TEMPERATURE PROBE
T6A-T6B	SONDA TEMPERATURA INGRESSO-USCITA ECONOMIZZATORE / ECONOMIZER IN/OUT TEMP. PROBE
Taf1-Taf2	SENSORE ANTIGELO ACQUA / WATER SIDE ANTIFREEZE TEMP.
Th	SONDA TEMPERATURA LINEA ASPIRAZIONE / SYSTEM RETURN REF. TEMPERATURE PROBE
Tp1-Tp2	SONDA TEMPERATURA SCARICO COMP. / COMPRESSOR DISCHARGE TEMP. PROBE
Tp1Pro-Tp2Pro	TERMOSTATO DI SICUREZZA COMPRESSORE / DISCHARGE TEMPERATURE CONTROL SWITCH
Tw	SONDA TEMPERATURA ACQUA / WATER TEMPERATURE PROBE
Twi	SONDA TEMPERATURA ACQUA IN INGRESSO / UNIT WATER INLET TEMPERATURE PROBE
Two	SONDA TEMPERATURA ACQUA IN USCITA / UNIT WATER OUTLET TEMPERATURE PROBE
Tz	SONDA TEMPERATURA USCITA CONDENSATORE / CONDENSER OUTLET TEMP. PROBE
VNR	VALVOLA DI NON RITORNO / NON-RETURN VALVE
VSF	VALVOLA DI SICUREZZA BASSA PRESSIONE / LOW PRESSURE SAFETY VALVE
SPA	PRESSOSTATO DIFFERENZIALE ACQUA / WATER DIFFERENTIAL PRESSURE SWITCH
VSB	VALVOLA DI SICUREZZA BASSA PRESSIONE / LOW PRESSURE SAFETY VALVE
VSU	VALVOLA DI SICUREZZA ACQUA / WATER SAFETY VALVE
BU	MANOMETRO ACQUA / WATER PRESSURE GAUGE
PU	POMPA UTILIZZO / USER PUMP
SP	PRESSOSTATO CARICO IMPIANTO / WATER PRESSURE SWITCH
RS	RUBINETTO DI SCARICO / DRAINAGE VALVE
TANK	SERBATOIO / WATER TANK

4.6 Up to 240 kW Heat Pump (65.4 – 85.4)

4.6.1 HP standard unit

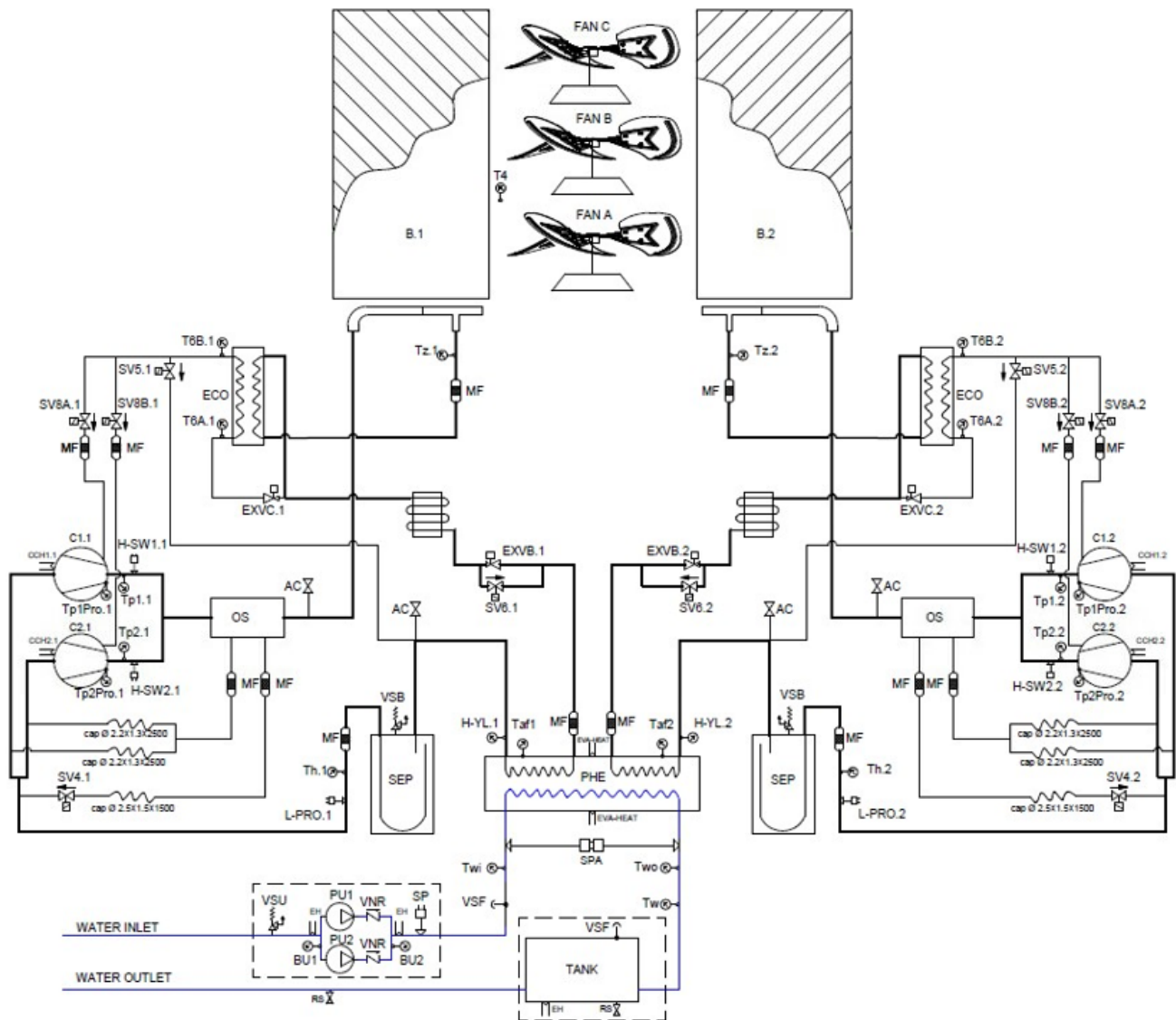


4.6.2 HP unit with partial heat recovery

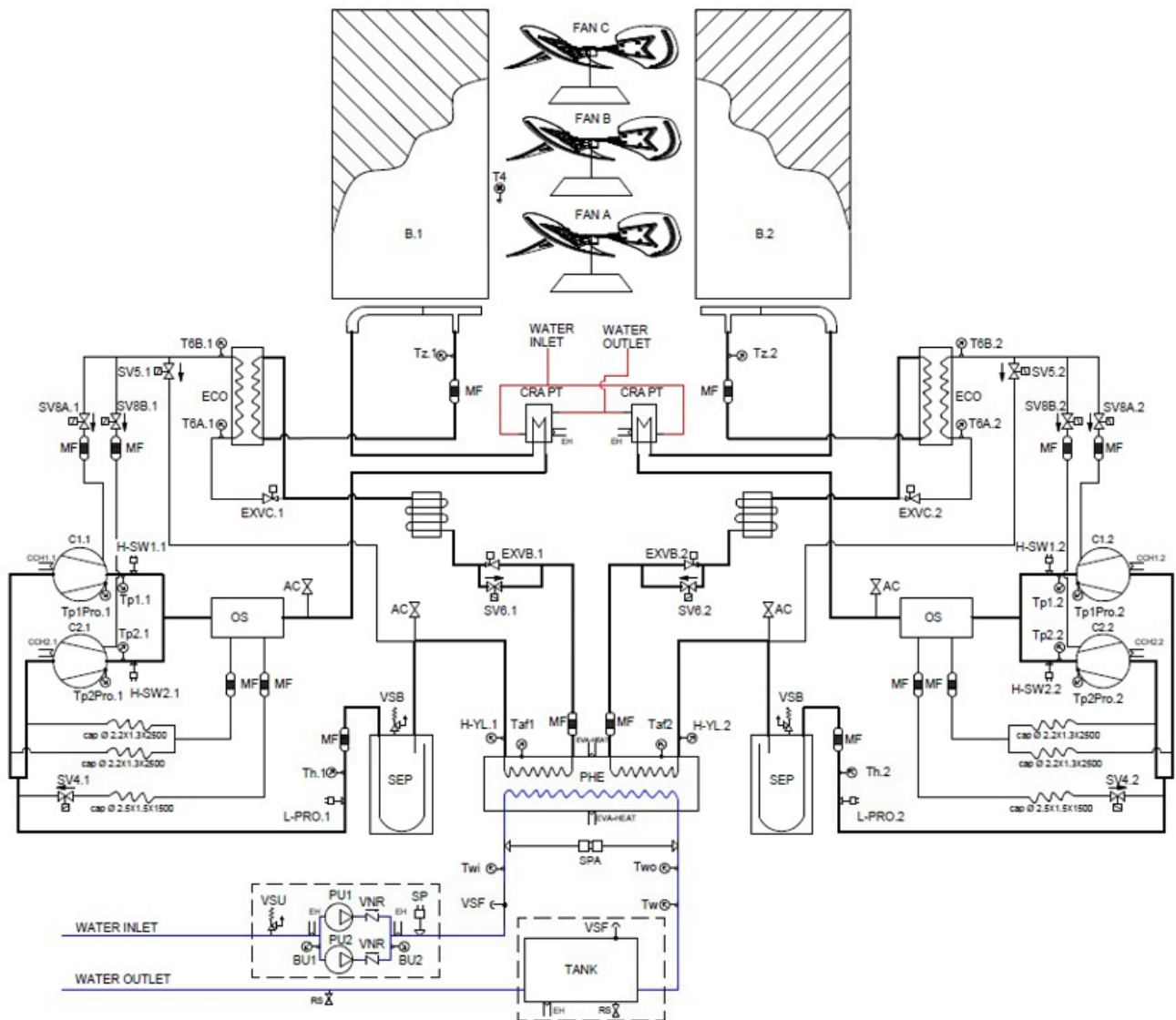


4.7 Up to 240 kW Cooling Only (PRM/ EXC: 65.4 – 85.4)

4.7.1 CO standard unit

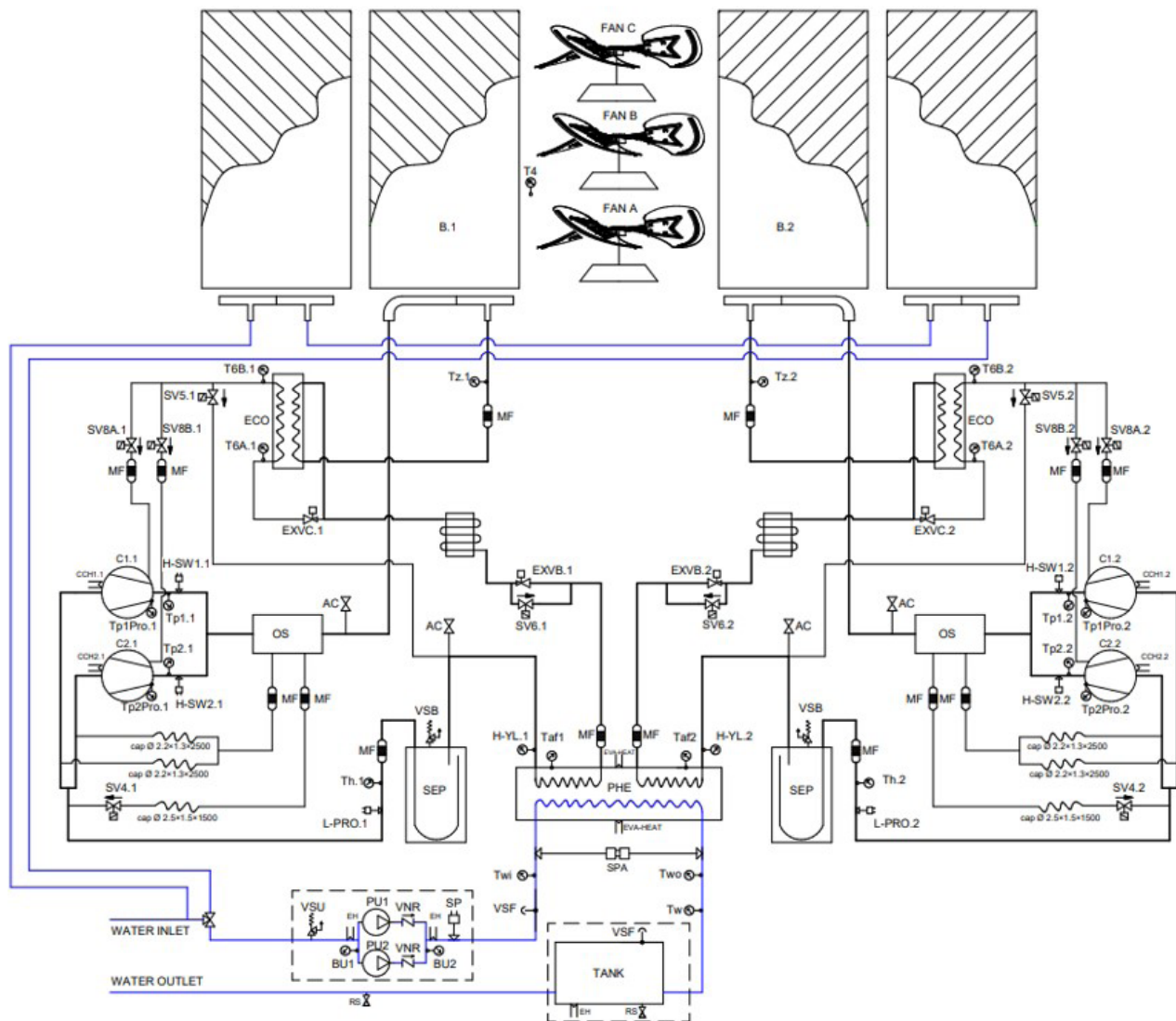


4.7.2 CO unit with partial heat recovery

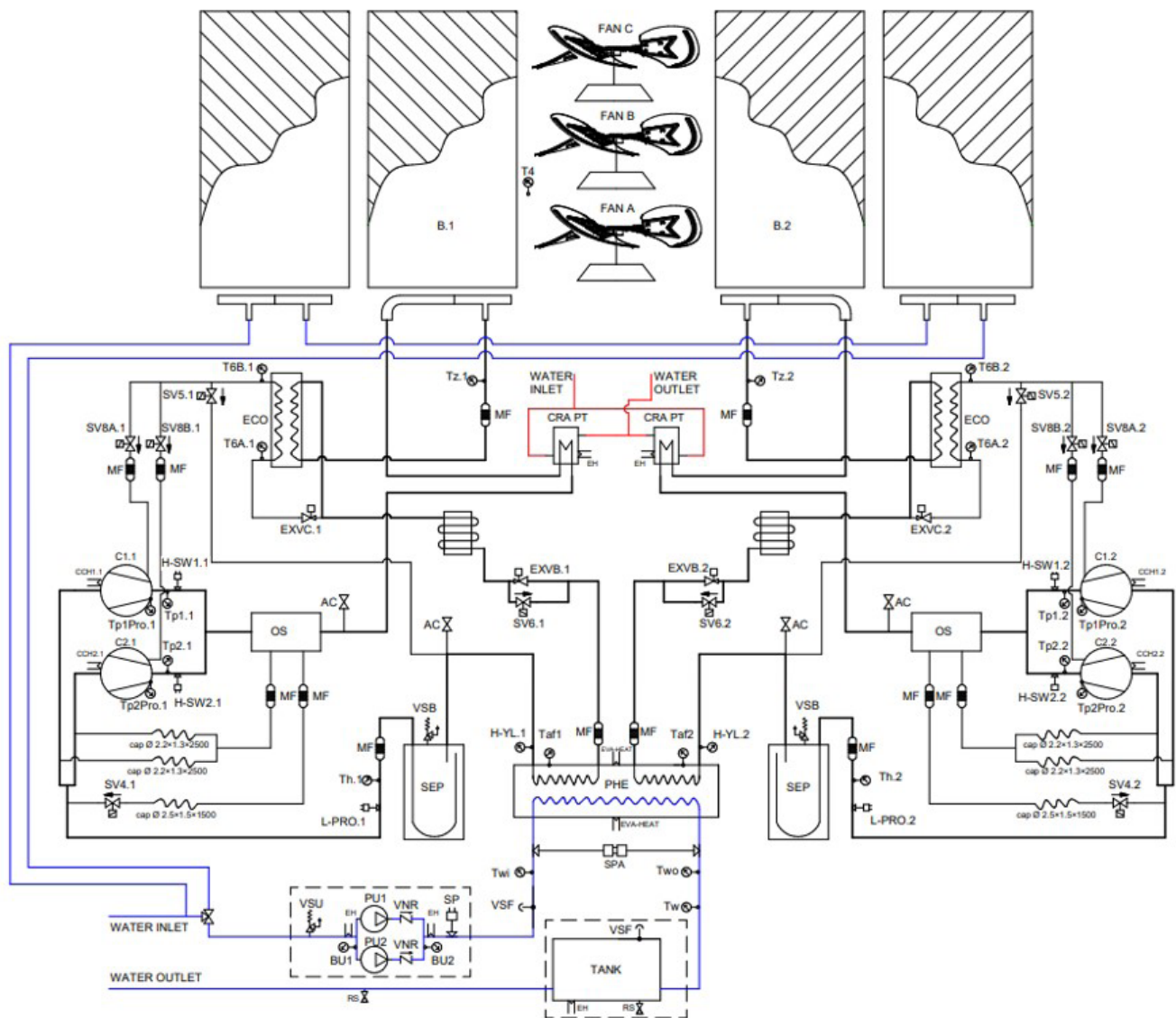


4.8 Up to 150kW Free Cooling (60.4-90.4)

4.8.1 FC standard unit



4.8.2 FC unit with partial heat recovery



Functional components	
SYMBOLS	DESCRIPTION
AC	ATTACCO DI CARICA / CHARGE ACCESS
B	SCAMBIATORE A PACCO ALETTATO / FINNED PACK EXCHANGER
C	COMPRESSORE / COMPRESSOR
CAP	CAPILLARE / CAPILLARY
CCH	RESISTENZA CARTER / CRANKCASE HEATER
ECO	ECONOMIZZATORE / ECONOMIZER
EVA-HEAT	RESISTENZA ELETTRICA EVAPORATORE / EVAPORATOR ELECTRIC HEATER
EH	RESISTENZA ELETTRICA / ELECTRIC HEATER
EXV	VALVOLA DI ESPANSIONE ELETTRONICA / ELECTRONIC EXPANSION VALVE
FAN	VENTILATORE / FAN
H-SW	PRESSOSTATO DI ALTA PRESSIONE / HIGH PRESSURE SWITCH
H-YL	TRASDUTTORE DI PRESSIONE / SYSTEM PRESSURE SENSOR
L-PRO	PRESSOSTATO DI BASSA PRESSIONE / LOW PRESSURE SWITCH
MF	FILTRO A MAGLIA / MESH FILTER
OS	SEPARATORE DI OLIO / OIL SEPARATOR
PHE	SCAMBIATORE A PIASTRE / PLATE EXCHANGER
SEP	SEPARATORE DI LIQUIDO / LIQUID SEPARATOR
SV	VALVOLA SOLENOIDE / SOLENOID VALVE
T3	SONDA TEMPERATURA USCITA SCAMBIATORE ALETTATO / FIN HEAT EXCHANGER OUTLET TEMP
T4	SONDA TEMPERATURA ARIA AMBIENTE / OUTDOOR AMBIENT TEMPERATURE PROBE
T6A-T6B	SONDA TEMPERATURA INGRESSO-USCITA ECONOMIZZATORE / ECONOMIZER IN/OUT TEMP. PROBE
Taf1-Taf2	SENSORE ANTIGELO ACQUA / WATER SIDE ANTIFREEZE TEMP.
Th	SONDA TEMPERATURA LINEA ASPIRAZIONE / SYSTEM RETURN REF. TEMPERATURE PROBE
Tp1-Tp2	SONDA TEMPERATURA SCARICO COMP. / COMPRESSOR DISCHARGE TEMP. PROBE
Tp1Pro-Tp2Pro	TERMOSTATO DI SICUREZZA COMPRESSORE / DISCHARGE TEMPERATURE CONTROL SWITCH
Tw	SONDA TEMPERATURA ACQUA / WATER TEMPERATURE PROBE
TwI	SONDA TEMPERATURA ACQUA IN INGRESSO / UNIT WATER INLET TEMPERATURE PROBE
Two	SONDA TEMPERATURA ACQUA IN USCITA / UNIT WATER OUTLET TEMPERATURE PROBE
Tz	SONDA TEMPERATURA USCITA CONDENSATORE / CONDENSER OUTLET TEMP. PROBE
VNR	VALVOLA DI NON RITORNO / NON-RETURN VALVE
VSF	VALVOLA DI SICUREZZA BASSA PRESSIONE / LOW PRESSURE SAFETY VALVE
SPA	PRESSOSTATO DIFFERENZIALE ACQUA / WATER DIFFERENTIAL PRESSURE SWITCH
VSF	VALVOLA DI SFIATO / RELIEF VALVE
VSU	VALVOLA DI SICUREZZA ACQUA / WATER SAFETY VALVE
BU	MANOMETRO ACQUA / WATER PRESSURE GAUGE
PU	POMPA UTILIZZO / USER PUMP
SP	PRESSOSTATO CARICO IMPIANTO / WATER PRESSURE SWITCH
RS	RUBINETTO DI SCARICO / DRAINAGE VALVE
TANK	SERBATOIO / WATER TANK

4.9 Key components

Key components:

Compressor

Maintains pressure differential between high and low pressure sides of the refrigerant system.

Fan:

Ventilates the air side heat exchanger.

Oil separator:

Separates oil from gas refrigerant pumped out of the compressor and quickly returns it to the compressor. Separation efficiency is up to 99%.

Liquid separator (suction accumulator):

Stores liquid refrigerant and oil to protect the compressor from liquid hammering.

Electronic expansion valve (EXVA/B/C):

Controls refrigerant flow and reduces refrigerant pressure.

Four-way valve:

Controls refrigerant flow direction. Closed in cooling mode and open in heating mode. When closed, the air side heat exchanger functions as a condenser and water side heat exchanger functions as an evaporator; when open, the air

side heat exchanger functions as an evaporator and water side heat exchanger function as a condenser.

High and low pressure switches:

Regulate refrigerant system pressure. When the refrigerant system pressure rises above the upper limit or falls below the lower limit, the high or low pressure switches turn off, stopping the compressor.

Discharge temperature switch:

Protects the compressor from abnormally high temperatures and transient spikes in temperature.

Air purge valve:

Automatically removes air from the water circuit.

Safety valve:

Prevents excessive water pressure by opening at 43.5psi (3bar) and discharging water from the water circuit.

Water differential pressure switch:

Detects water flow rate to protect the compressor and water pump in the event of insufficient water flow.

Water pump:

Circulates water in the water circuit.

Pressure sensor:

Measures refrigerant system pressure.

Crankcase heater:

Prevents refrigerant from mixing with compressor oil when the compressors are stopped.

Water side heat exchanger electric heater:

Protects the water side heat exchanger from ice formation.

Water flow switch electric heater:

Provides additional heating when heating capacity provided by the heat pump is insufficient due to low ambient temperatures, it also protects external water pipes from freezing.

Solenoid valve SV4:

Returns oil to the compressor. It opens after 19 minutes of compressor operation, closes after 1 minutes, then opens again for 1 minutes at 19 minute increments.

Plate heat exchanger:

In cooling mode, it can improve super-cooling degree and the super-cooled refrigerant can achieve better heat exchange in indoor side. In heating mode, the refrigerant comes from the plate heat exchanger going to the compressor can enhance the refrigerant enthalpy and improve the heating capacity in low ambient temperature. Refrigerant volume in plate heat exchanger is controlled according to temperature different between plate heat exchanger inlet and outlet.

Pressure gauge joint (high and low pressure side):

Charges or discharges refrigerant.

Capillary:

Throttles and reduces pressure in the liquid injection cooling pipe.

Solenoid valve SV2 (only for size 45.4-60.4):

Control the on-off of the liquid injection. It opens at the maximum discharge temperature reaching 103°C while it closes at the maximum discharge temperature below 95°C or both the maximum discharge temperature below 100°C and minimum discharge temperature below 90°C.

Partial heat recovery:

Heat exchanger between high temperature discharge gas and water. It recover partially the condensing heat to heating up the water.

SV1 solenoid valve:

DHW valve in HP unit (double 2-way valve) and 3-way water coil valve in FC unit.

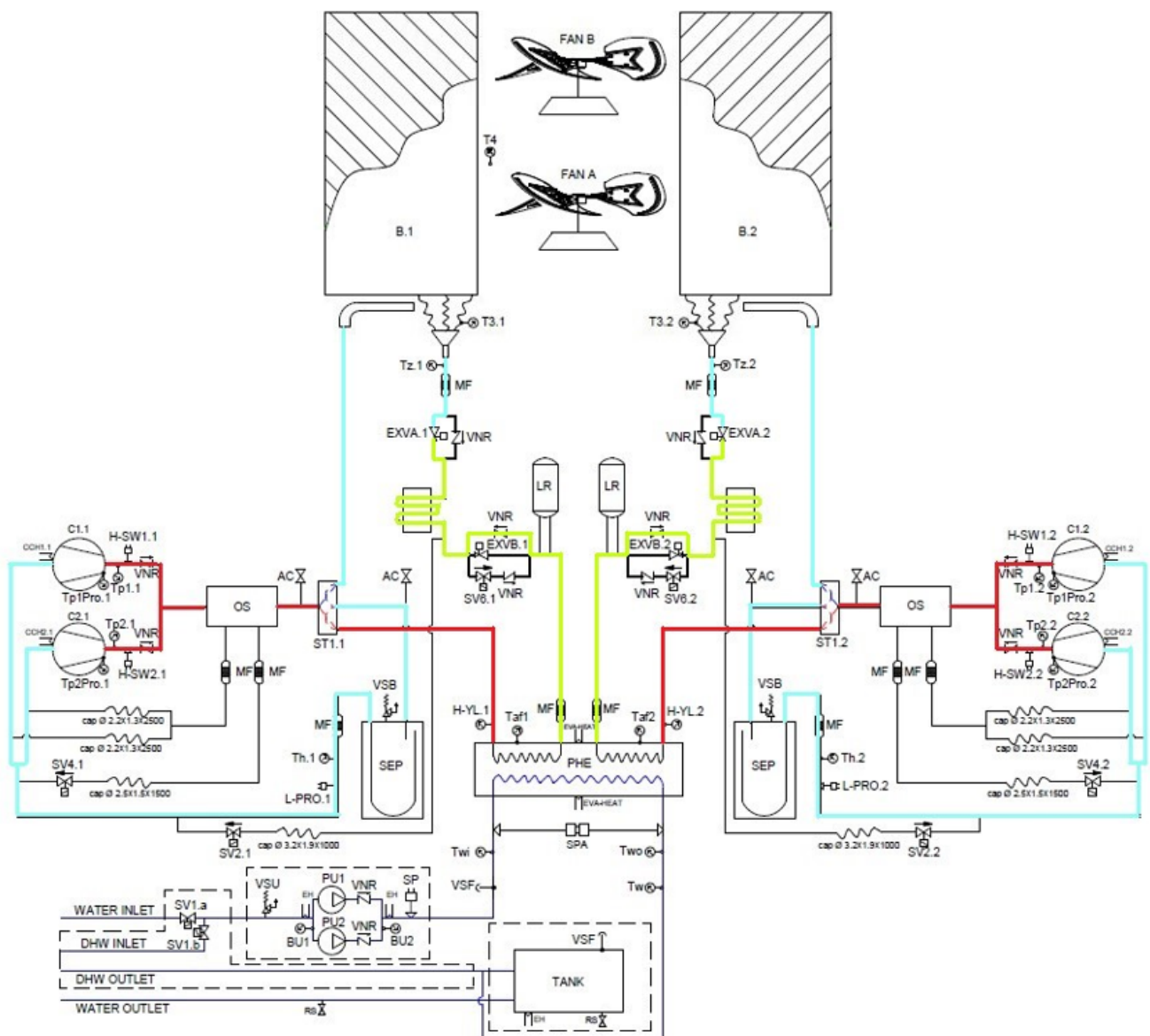
5. Refrigerants flow diagrams

- High temperature, high press gas
- High temperature, high press liquid
- Low temperature, low pressure

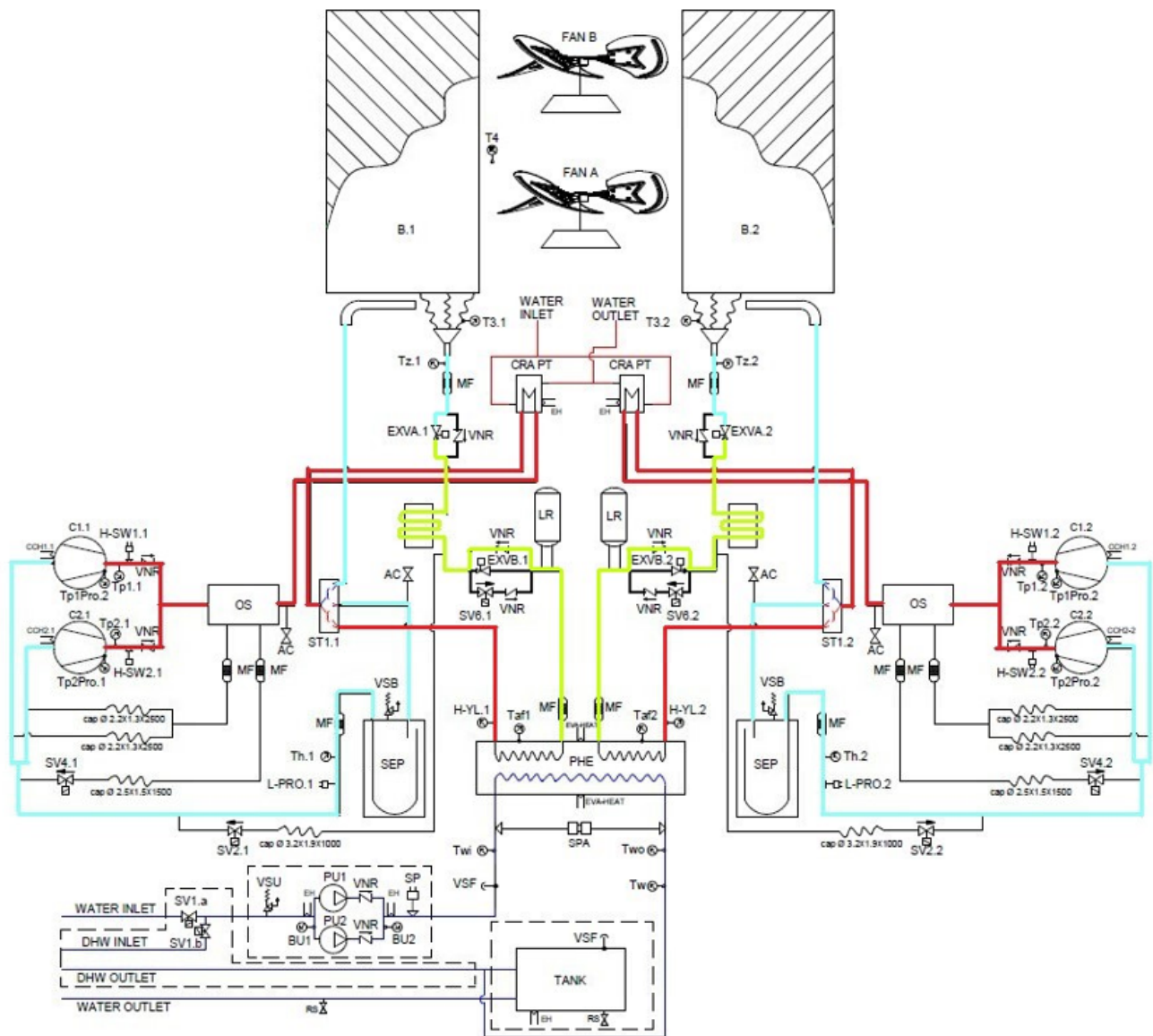
5.1 Heat Pump unit: Heating operation

5.1.1 Refrigerant flow during heating operation for sizes 45.4 – 50.4

5.1.1.1 HP standard unit

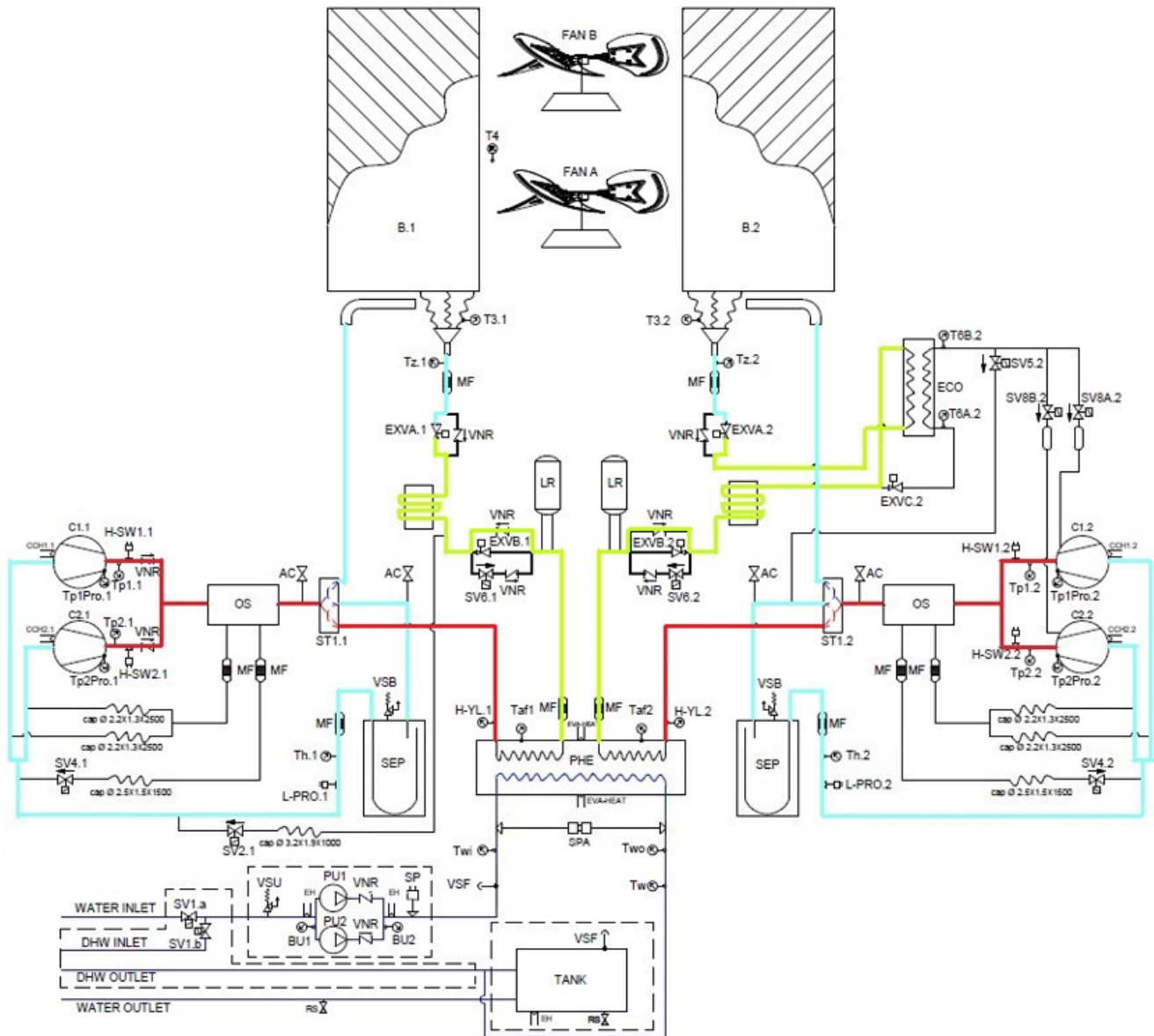


5.1.1.2 HP unit with partial heat recovery

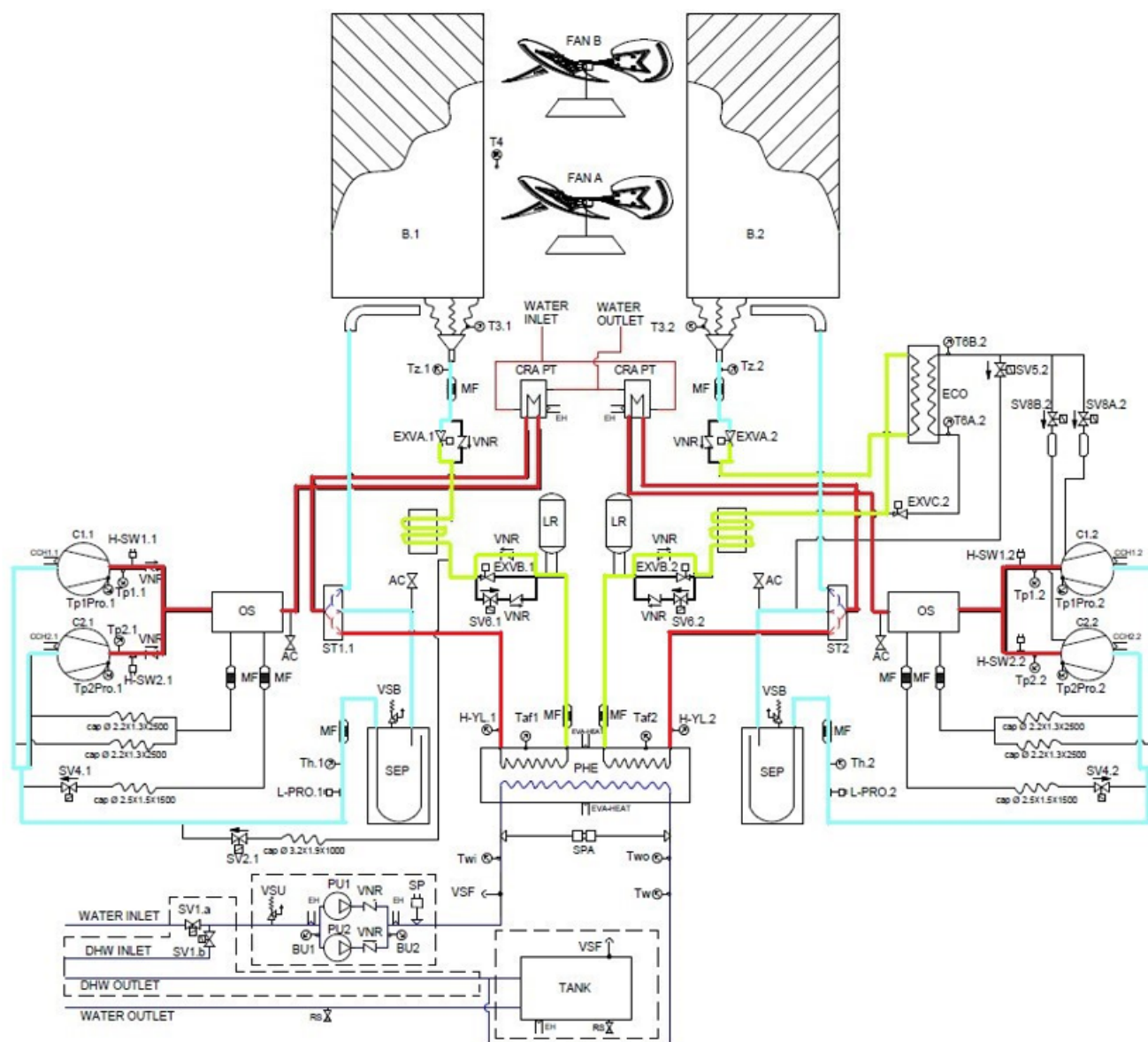


5.1.2 Refrigerant flow during heating operation for sizes 55.4 – 60.4

5.1.2.1 HP standard unit

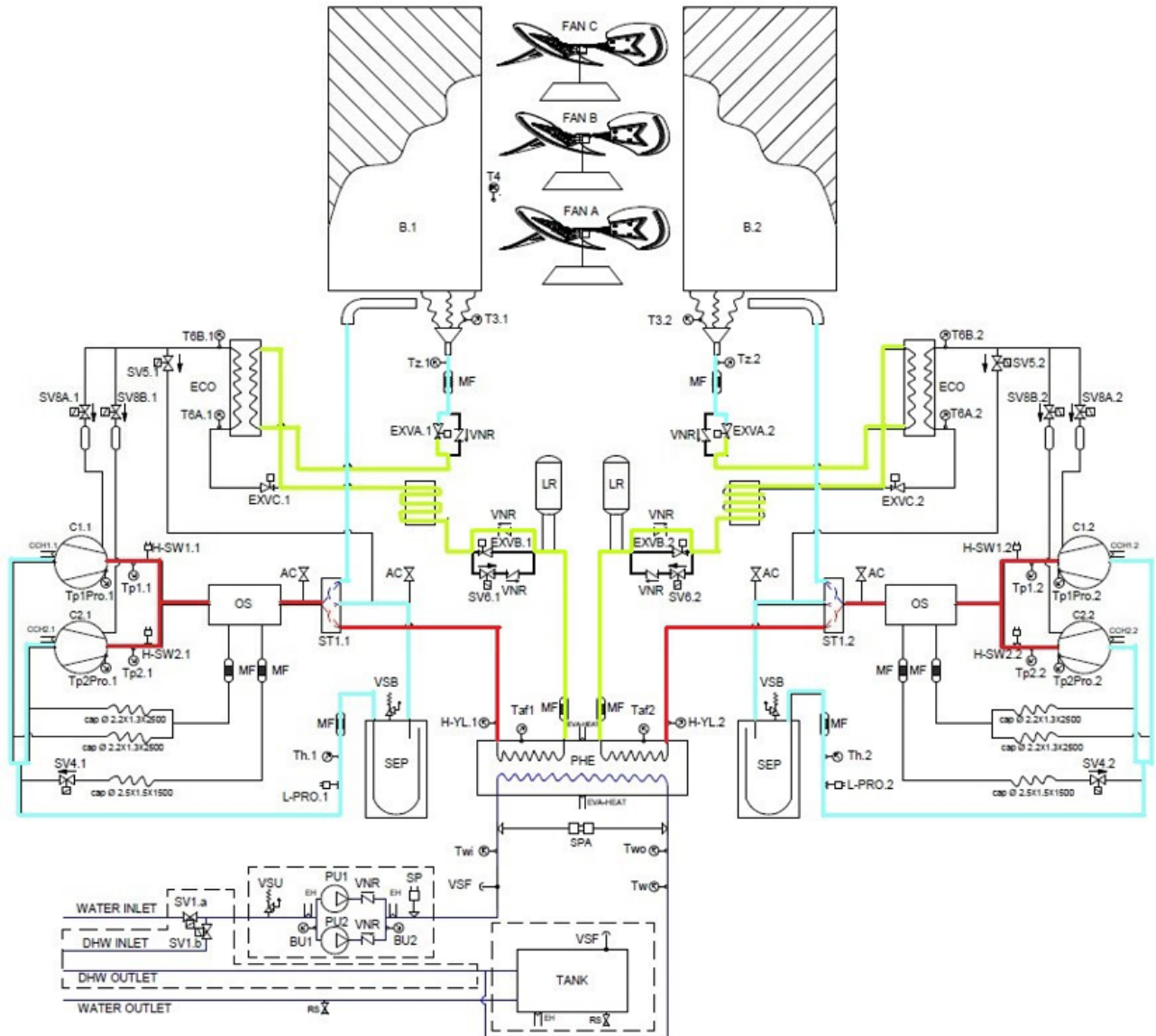


5.1.2.2 HP unit with partial heat recovery

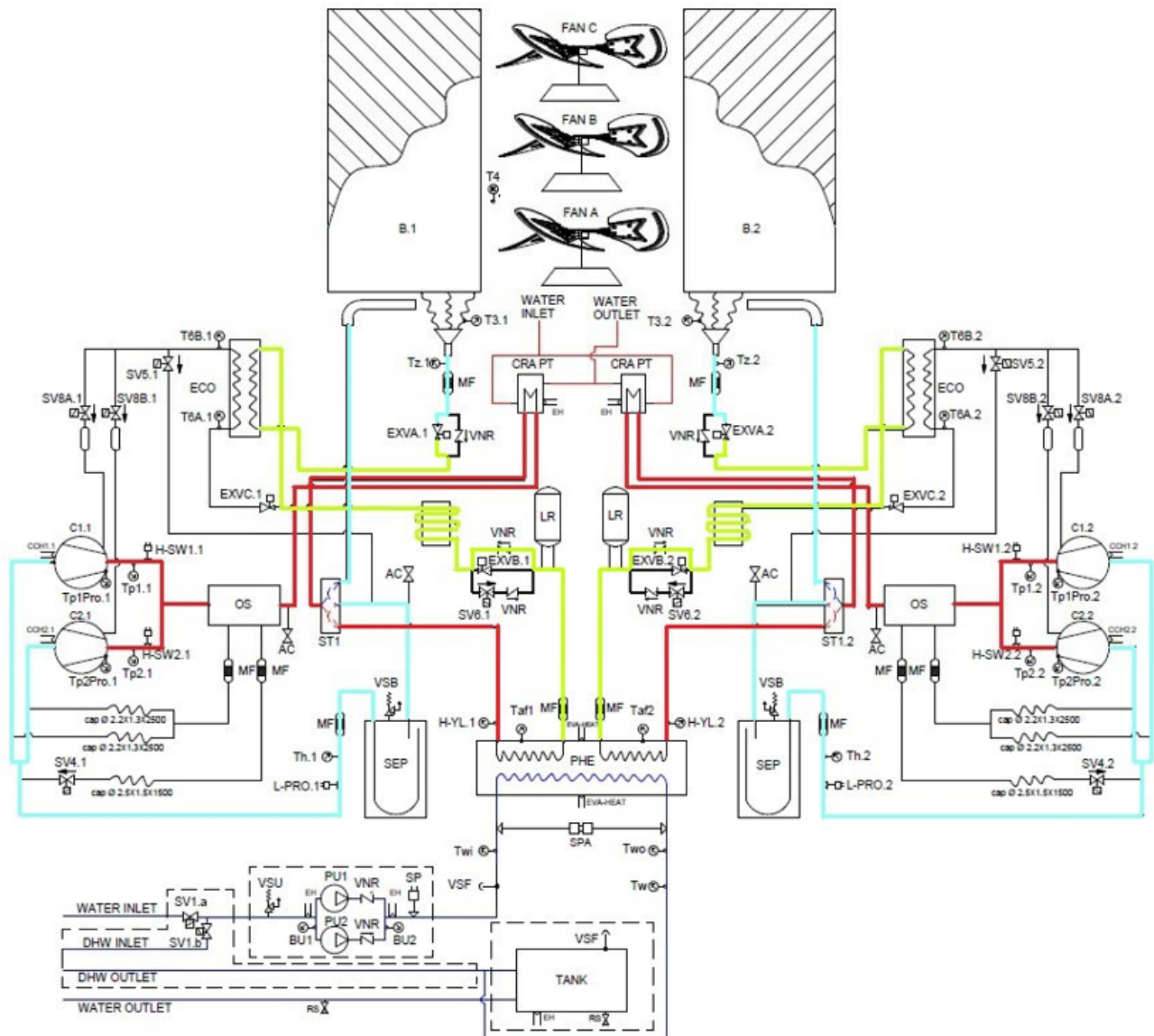


5.1.3 Refrigerant flow during heating operation for sizes 65.4 – 85.4

5.1.3.1 HP standard unit



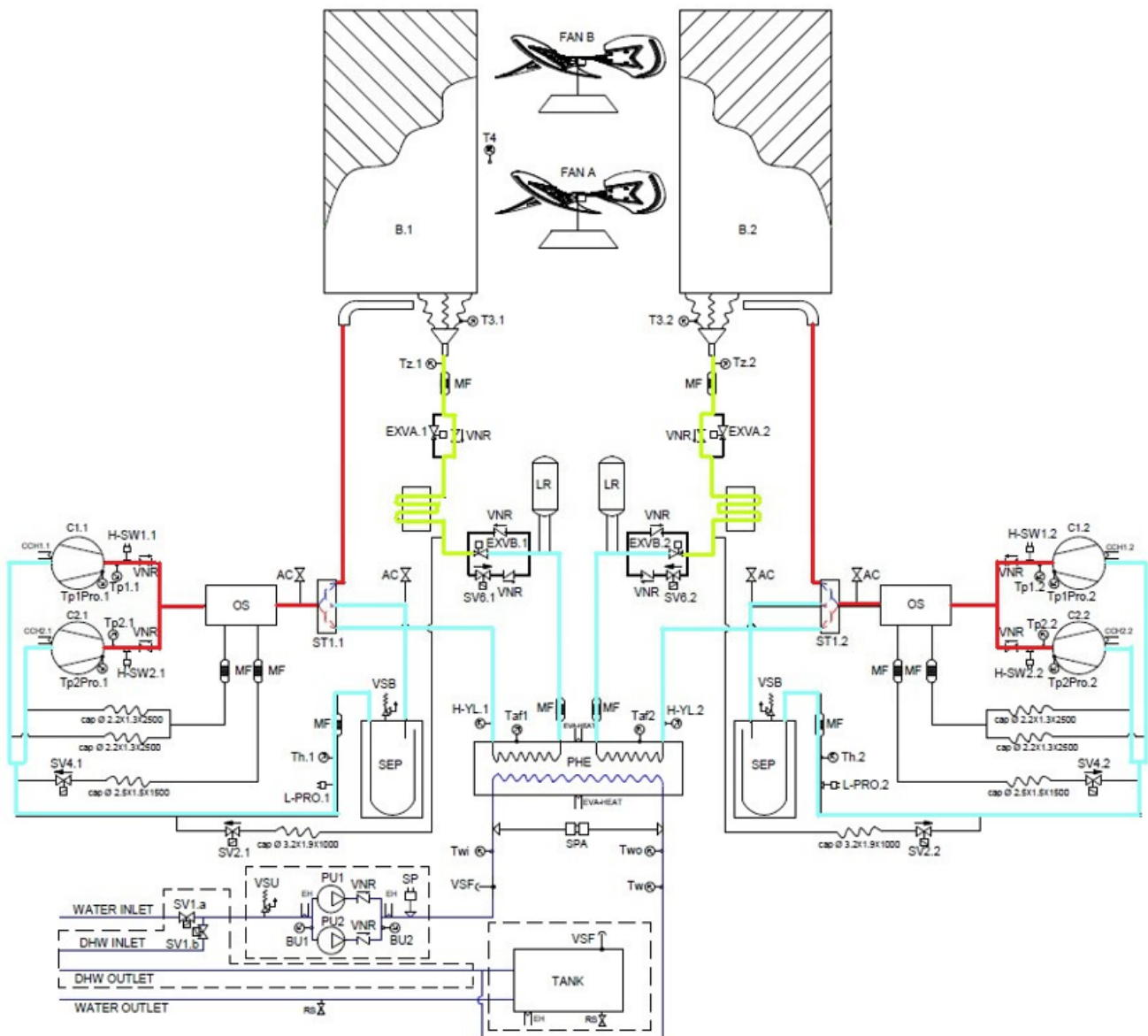
5.1.3.2 HP unit with partial heat recovery



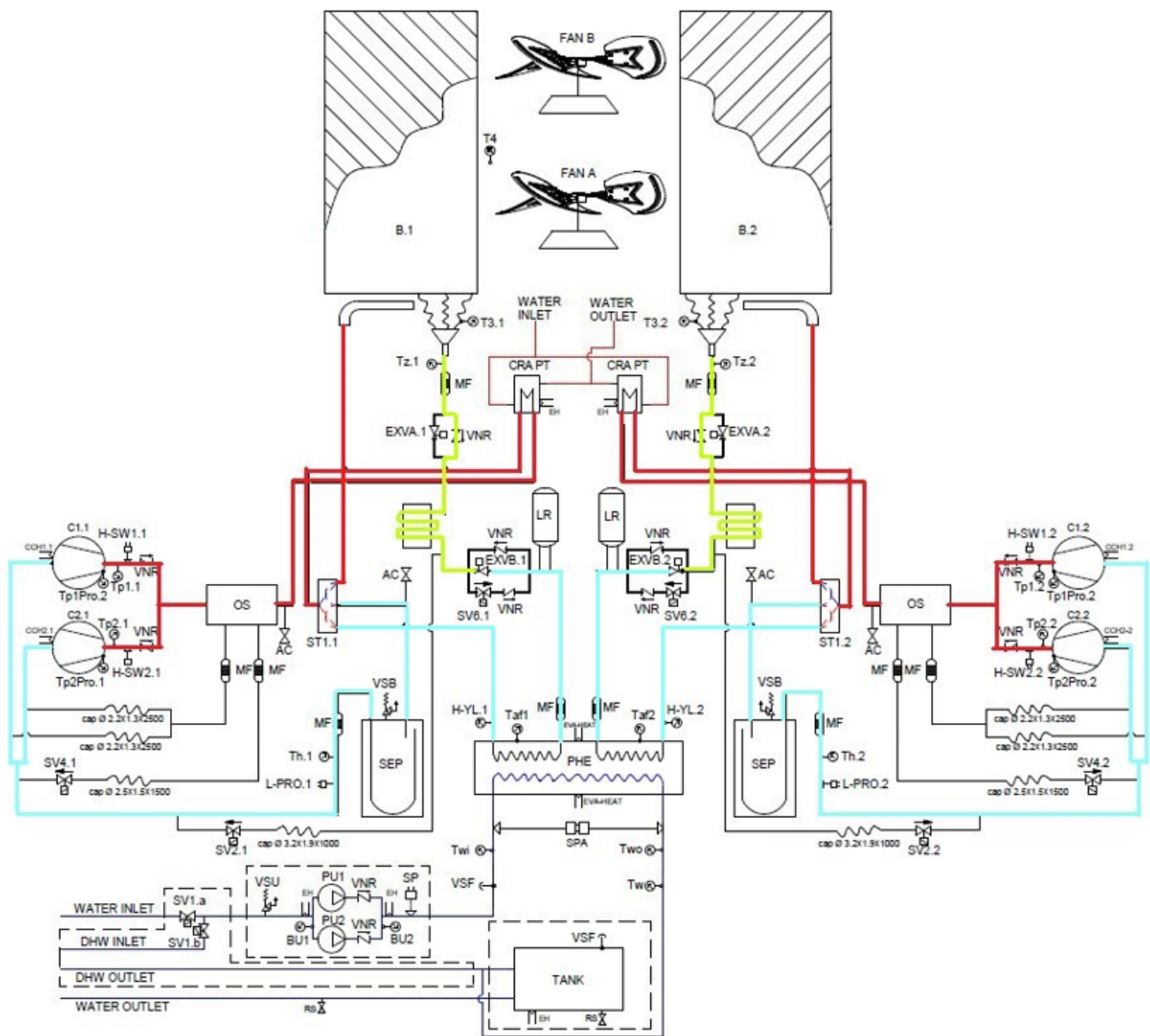
5.2 Heat Pump unit: Cooling and defrosting operation

5.2.1 Refrigerant flow during cooling operation for sizes 45.4 – 50.4

5.2.1.1 HP standard unit



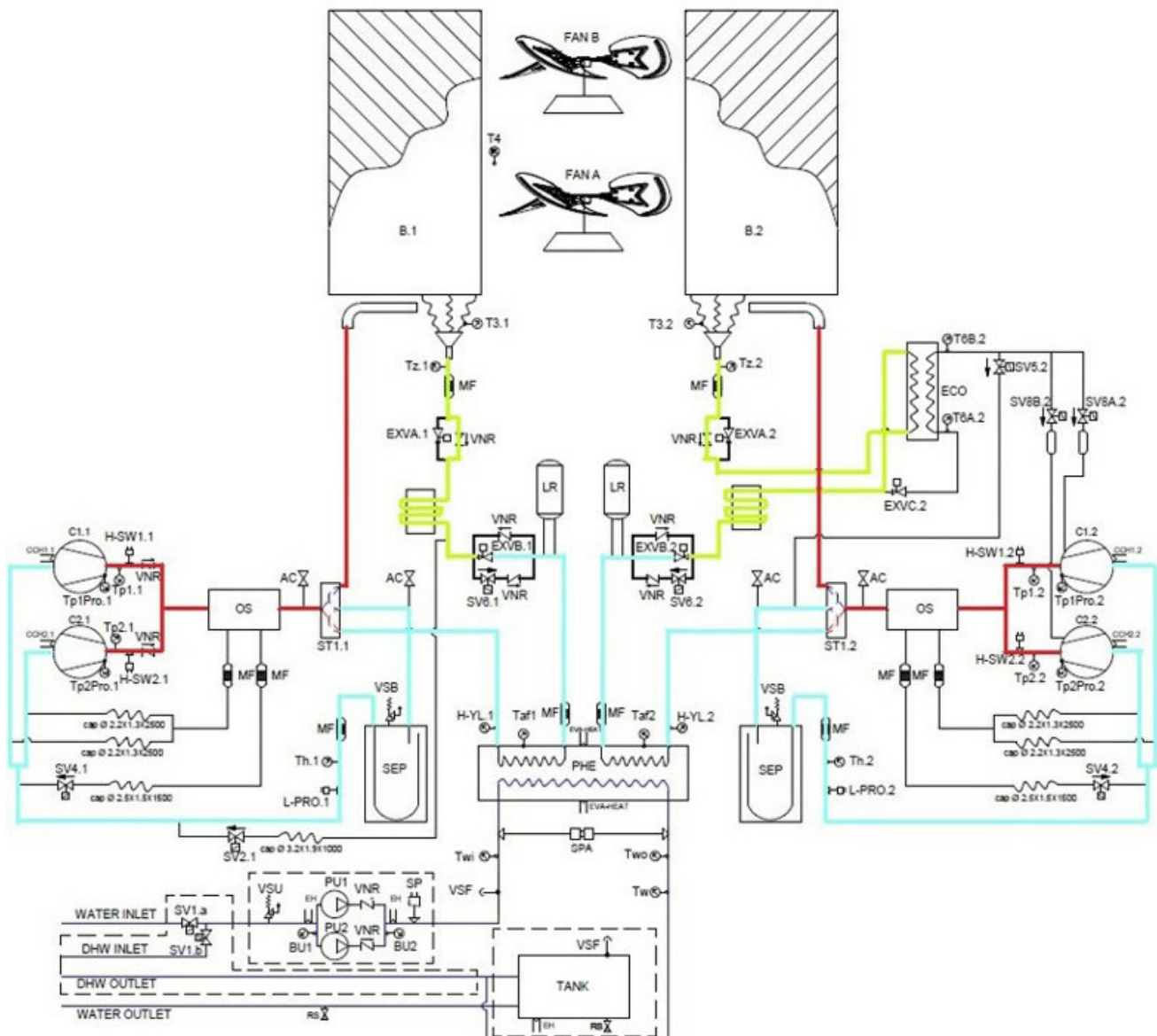
5.2.1.2 HP unit with partial heat recovery



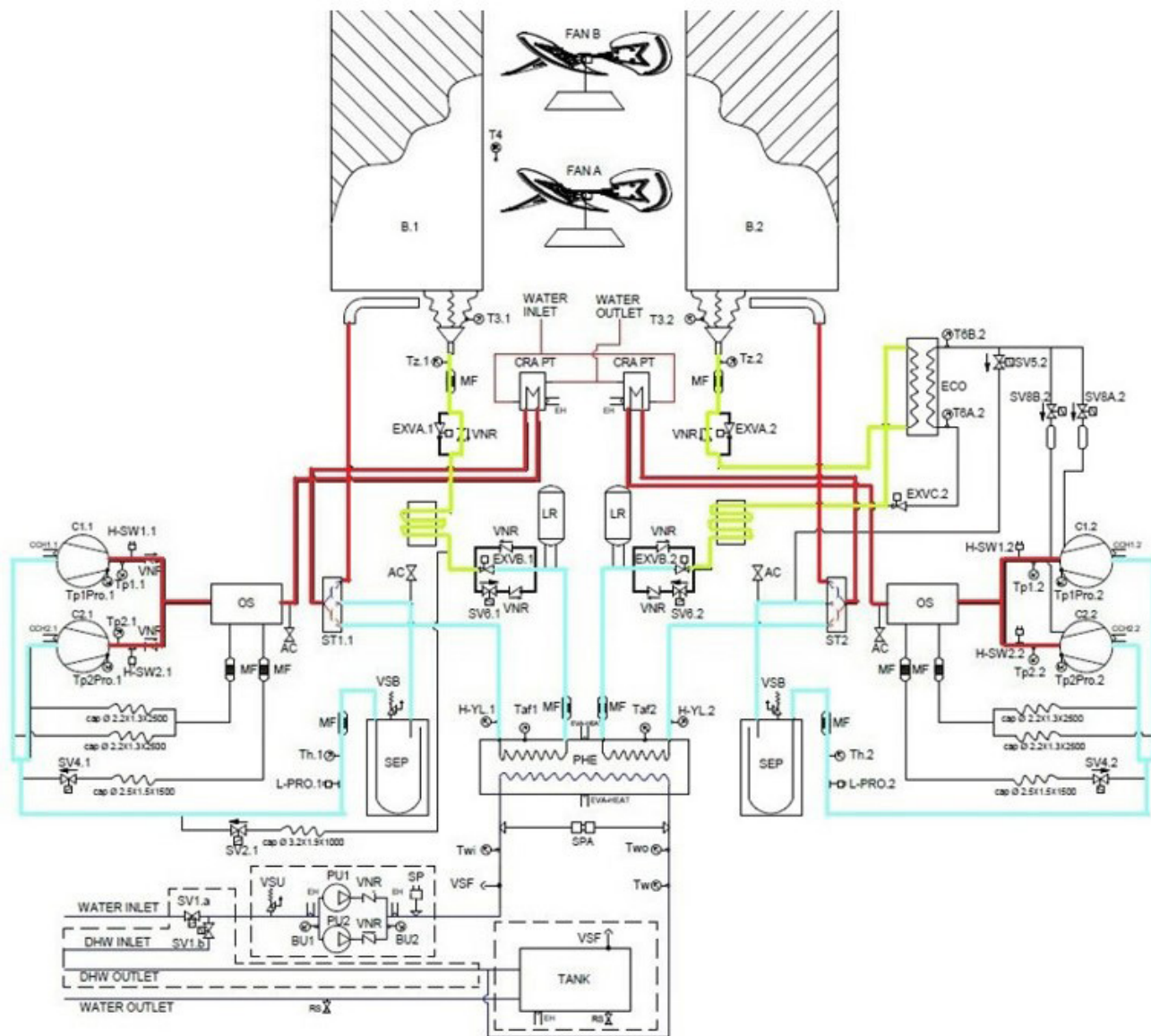
5.3 Heat Pump unit: Cooling and defrosting operation

5.3.1 Refrigerant flow during cooling operation for sizes 55.4 – 60.4

5.3.1.1 HP standard unit



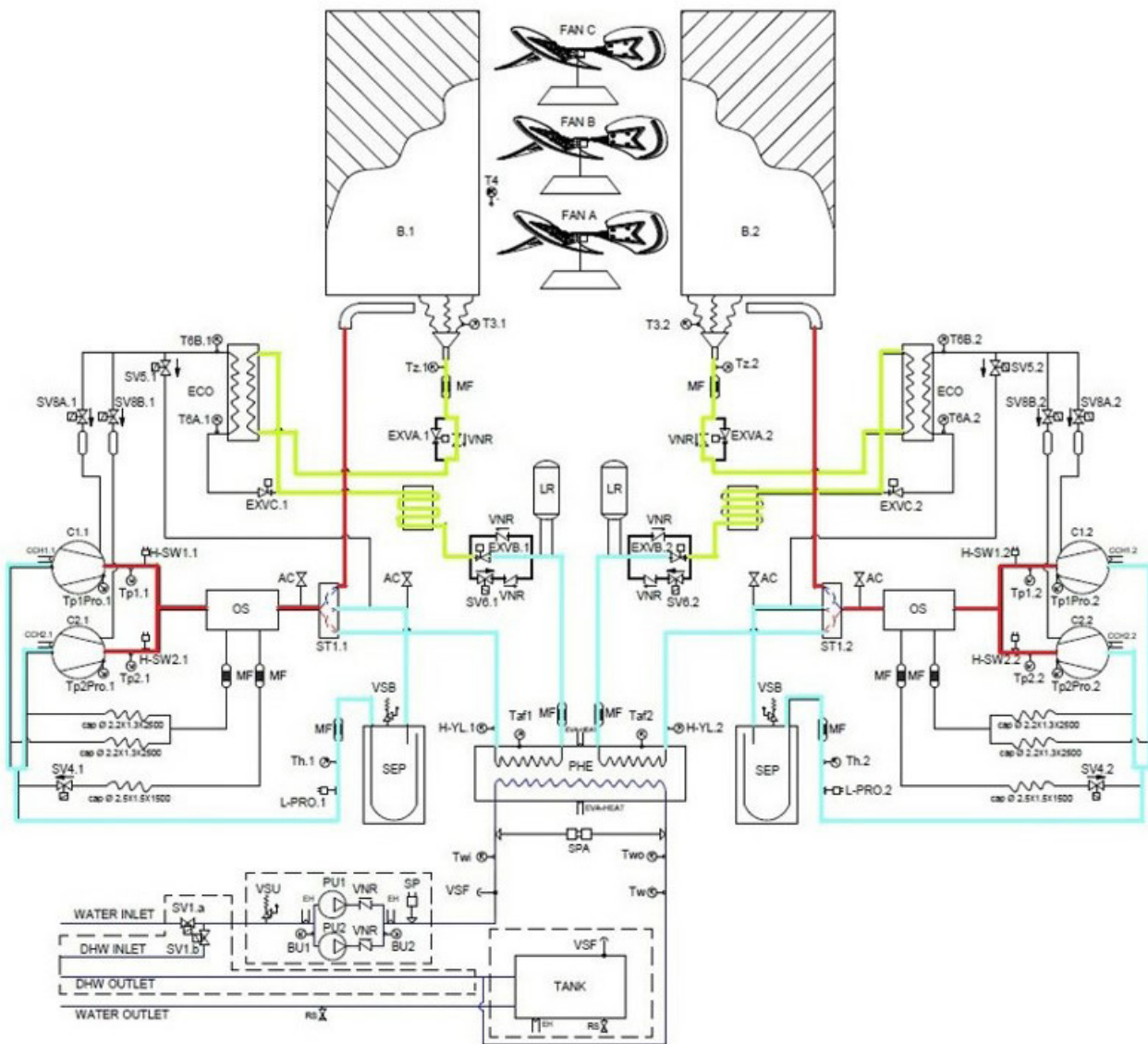
5.3.1.2 HP unit with partial heat recovery



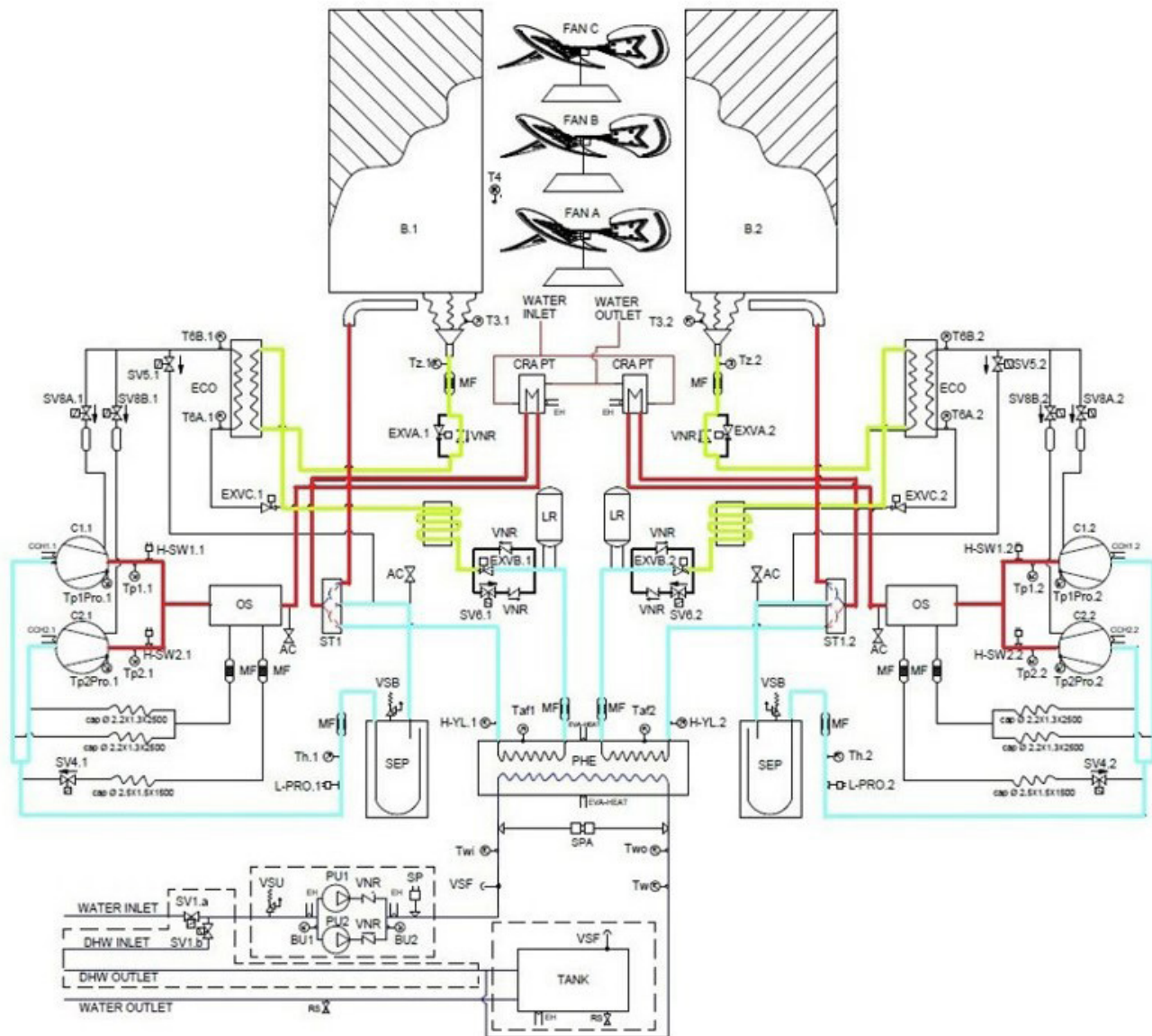
5.4 Heat Pump unit: Cooling and defrosting operation

5.4.1 Refrigerant flow during cooling operation for sizes 65.4 – 85.4

5.4.1.1 HP standard unit



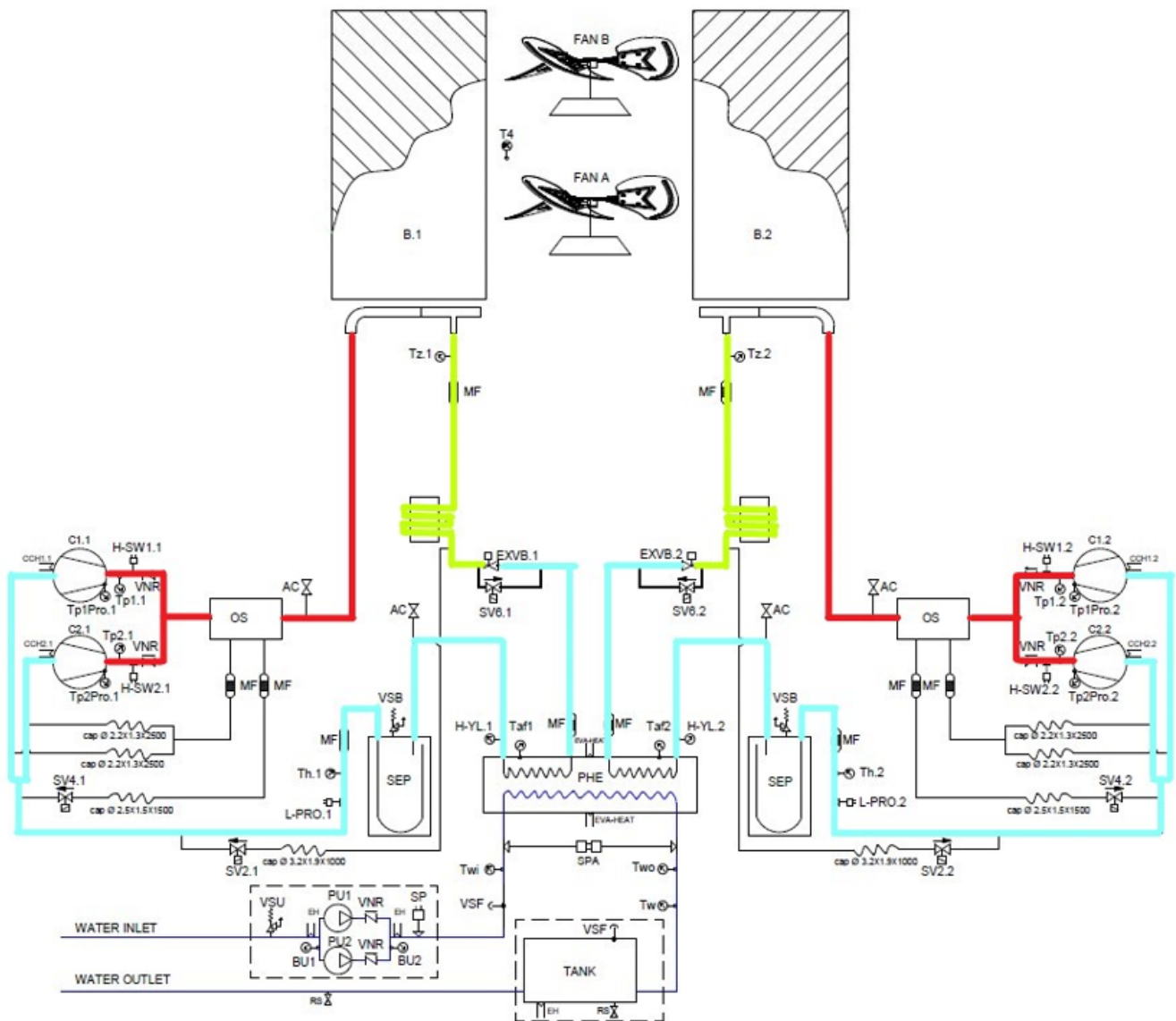
5.4.1.2 HP unit with partial heat recovery



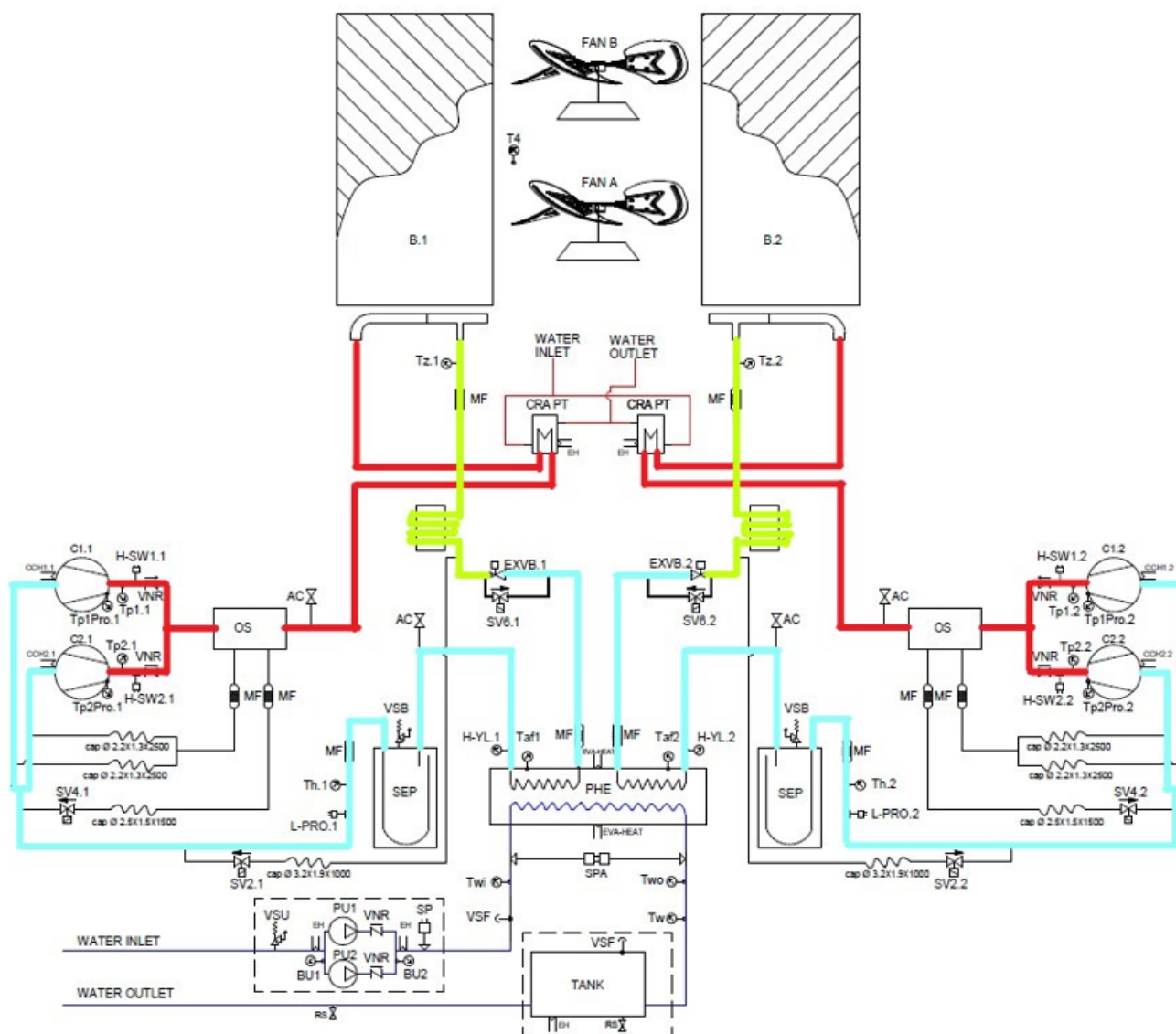
5.5 Cooling Only unit: Cooling operation

5.5.1 Refrigerant flow during cooling operation for sizes (45.4 – 50.4 – 55.4) PRM/ (45.4 – 50.4) EXC

5.5.1.1 CO standard unit



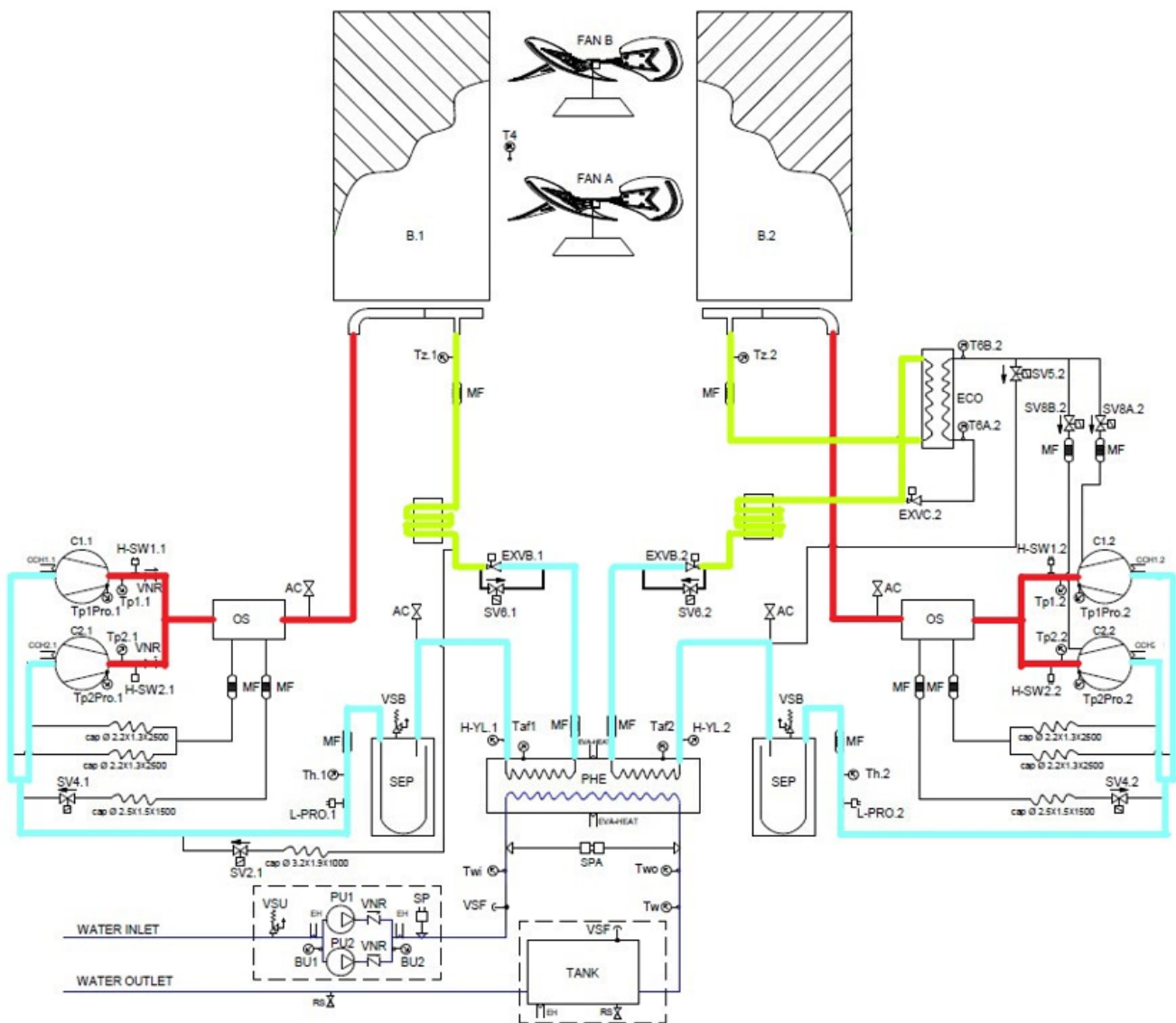
5.5.1.2 CO unit with partial heat recovery



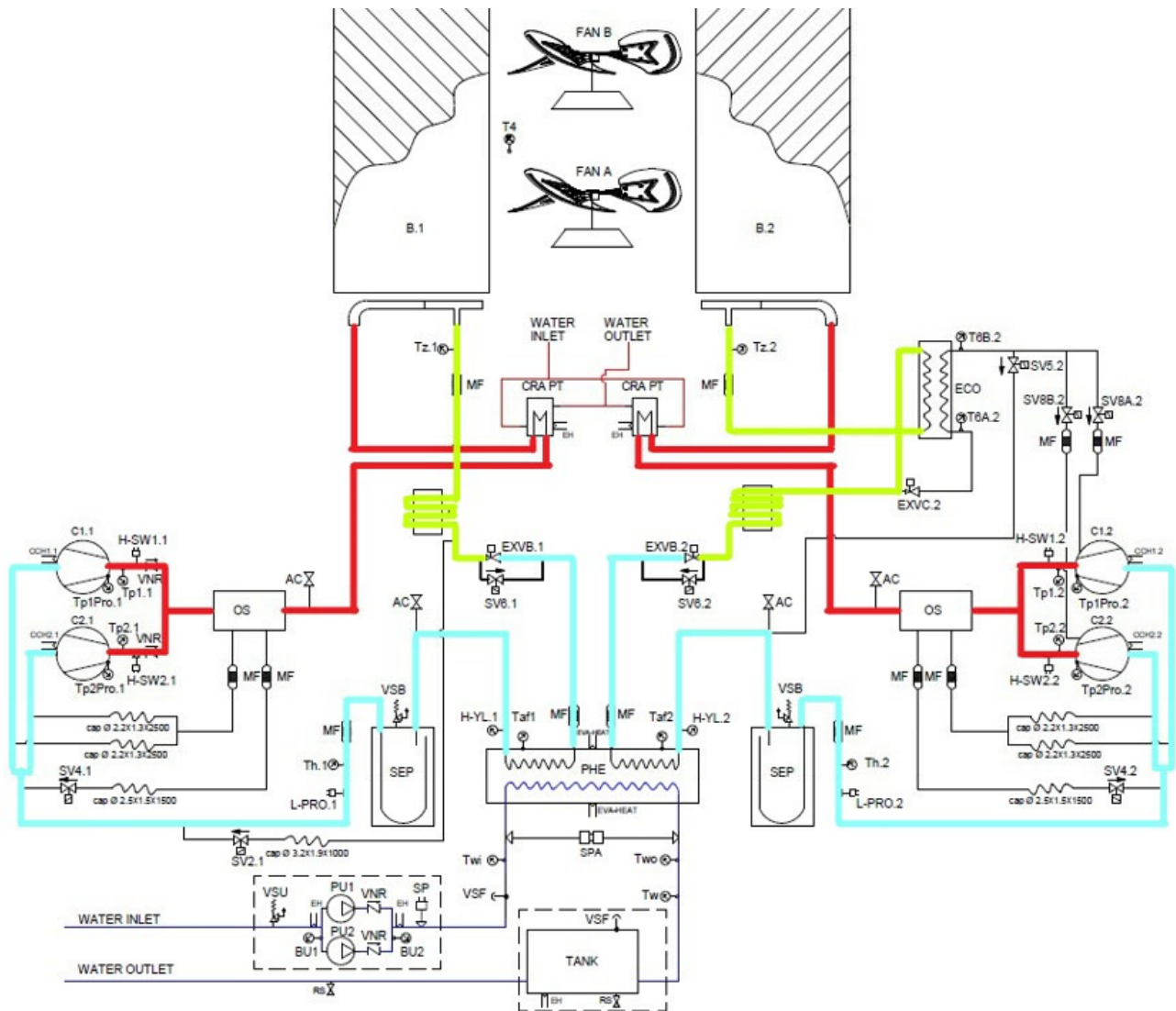
5.6 Cooling Only unit: Cooling operation

5.6.1 Refrigerant flow during cooling operation for sizes (60.4) PRM / (55.4 – 60.4) EXC

5.6.1.1 CO standard unit



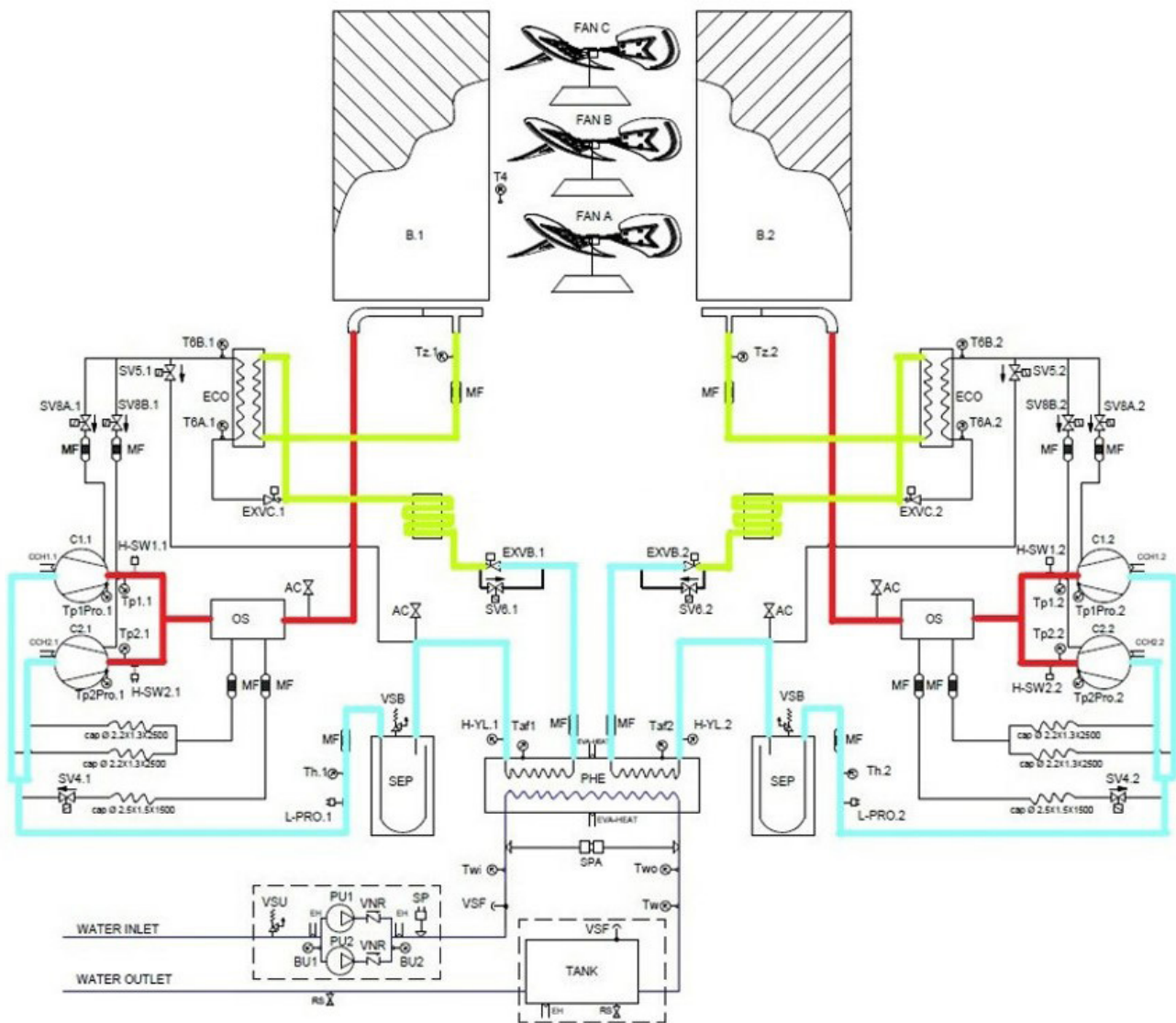
5.6.1.2 CO unit with partial heat recovery



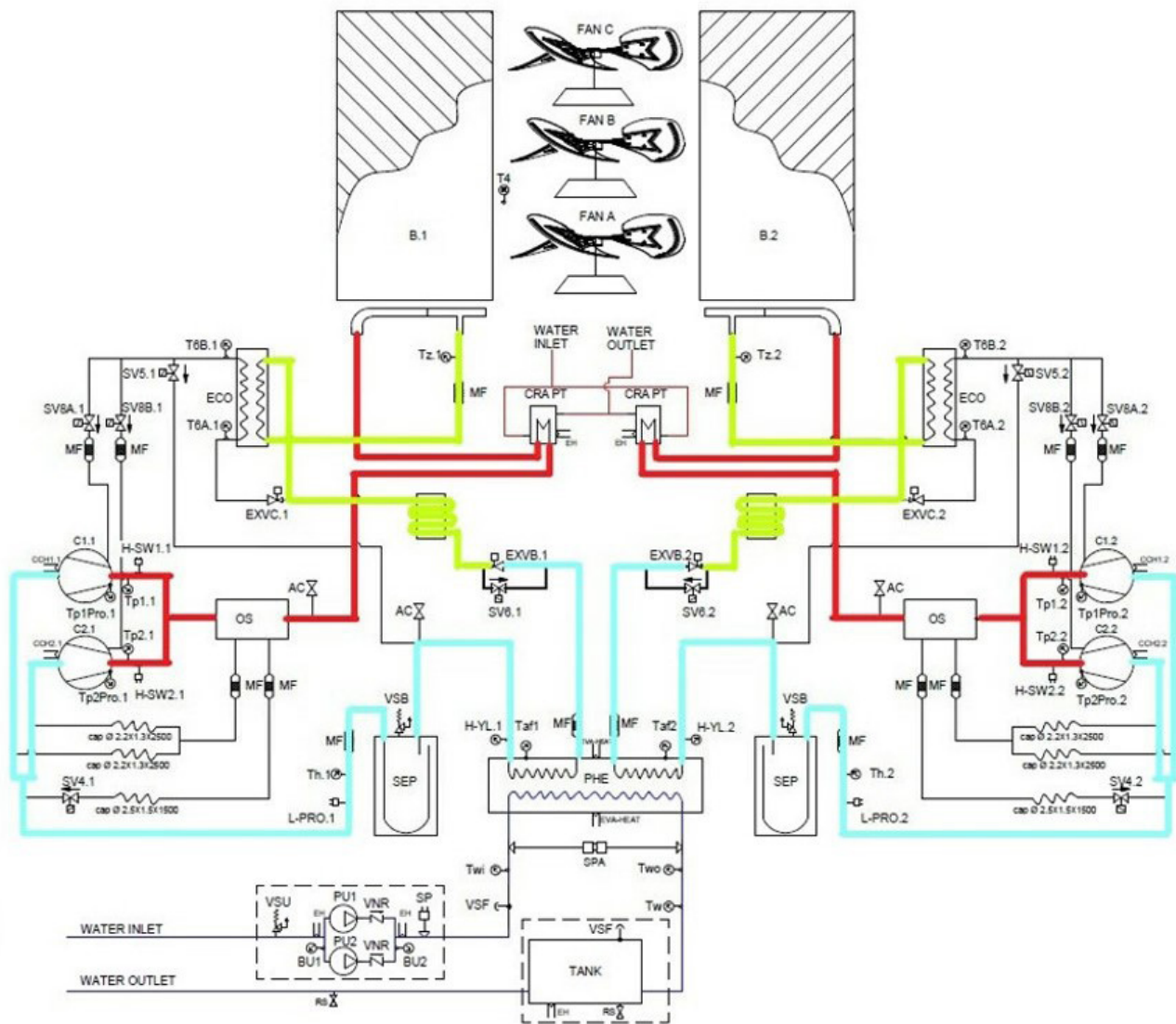
5.7 Cooling Only unit: Cooling operation

5.7.1 Refrigerant flow during cooling operation for sizes (65.4 – 85.4) PRM / EXC

5.7.1.1 CO standard unit



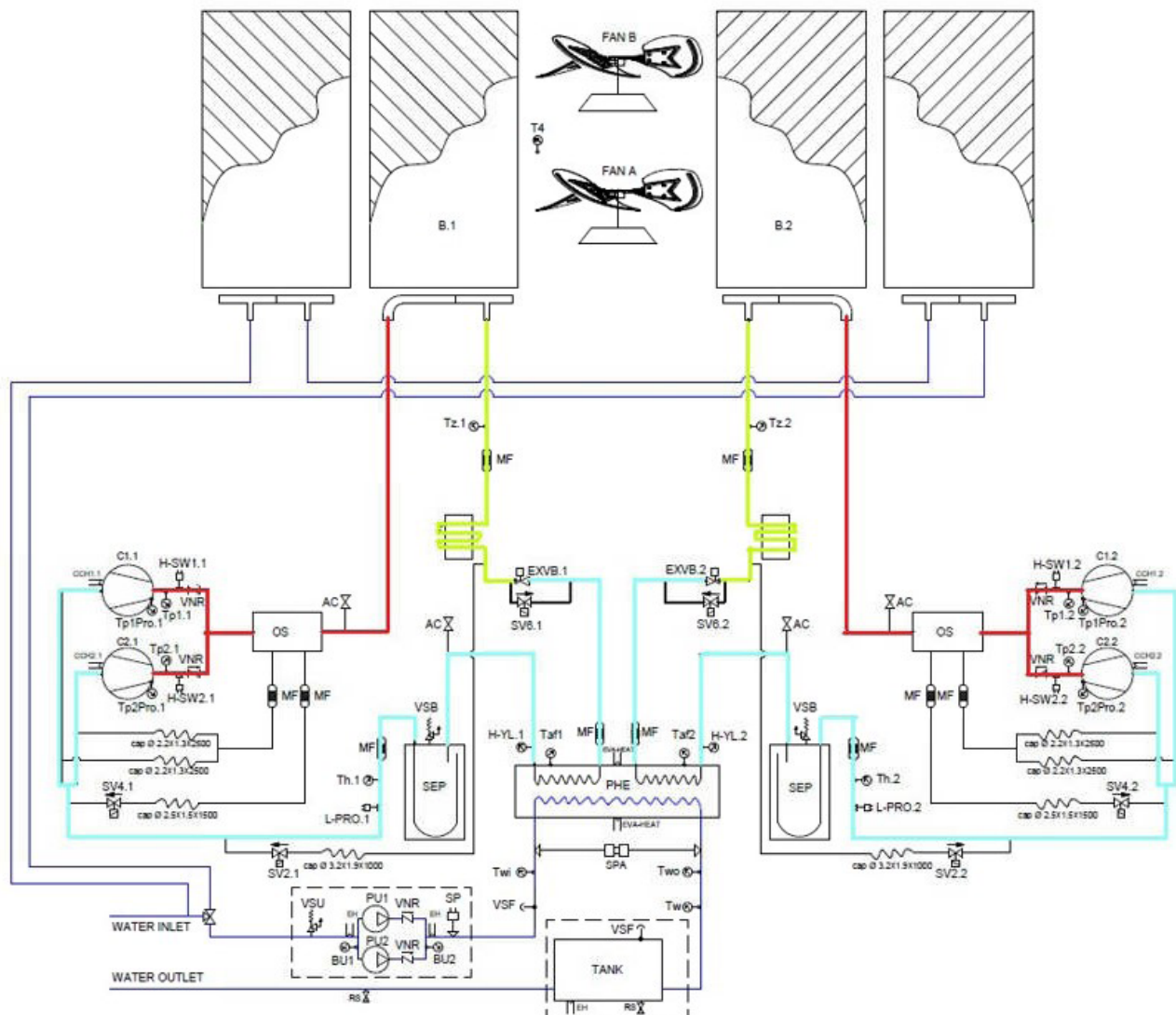
5.7.1.2 CO unit with partial heat recovery



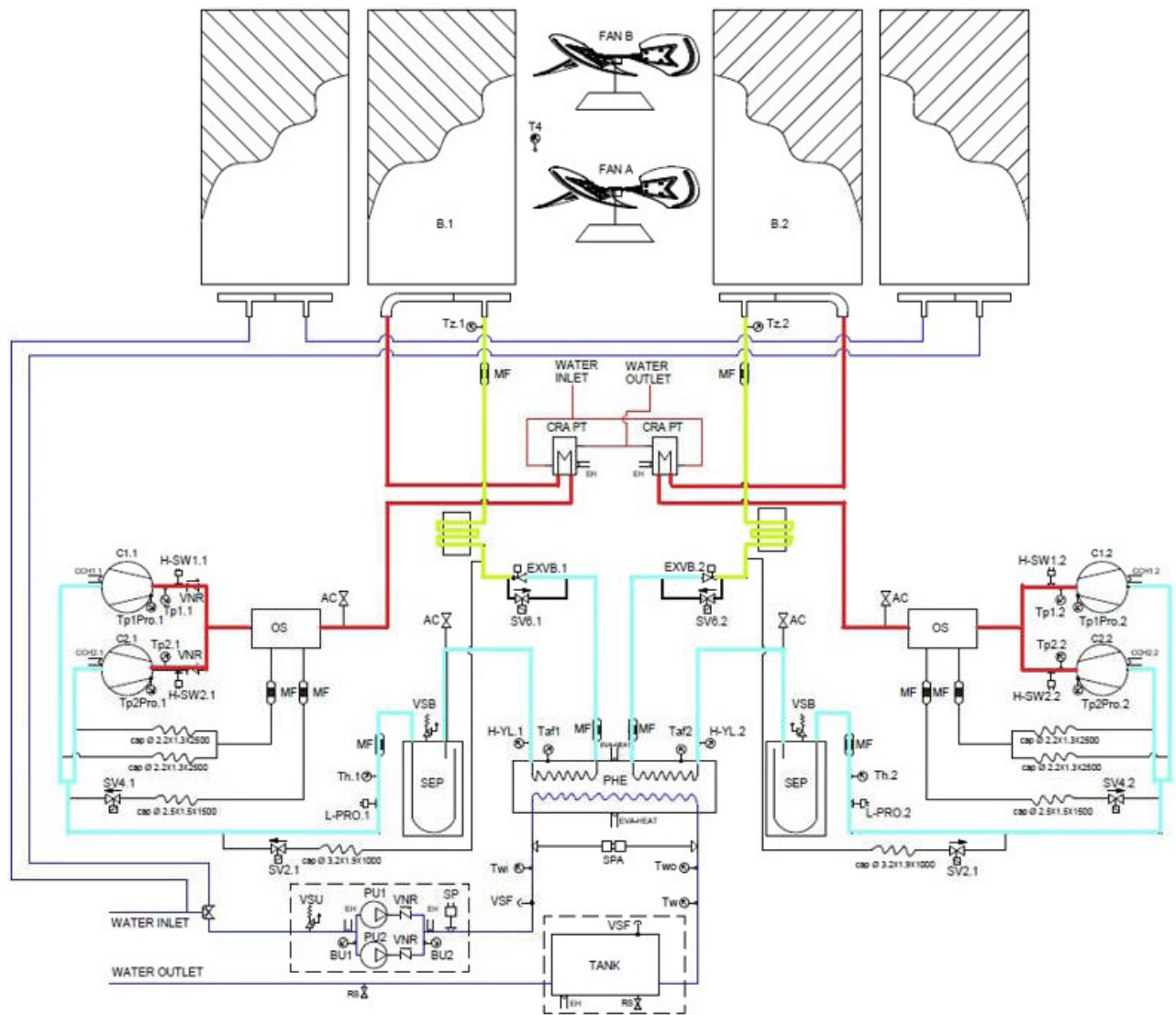
5.8 Free Cooling unit: Cooling operation

5.8.1 Refrigerant flow during cooling operation for sizes (45.4 – 55.4)

5.8.1.1 FC standard unit

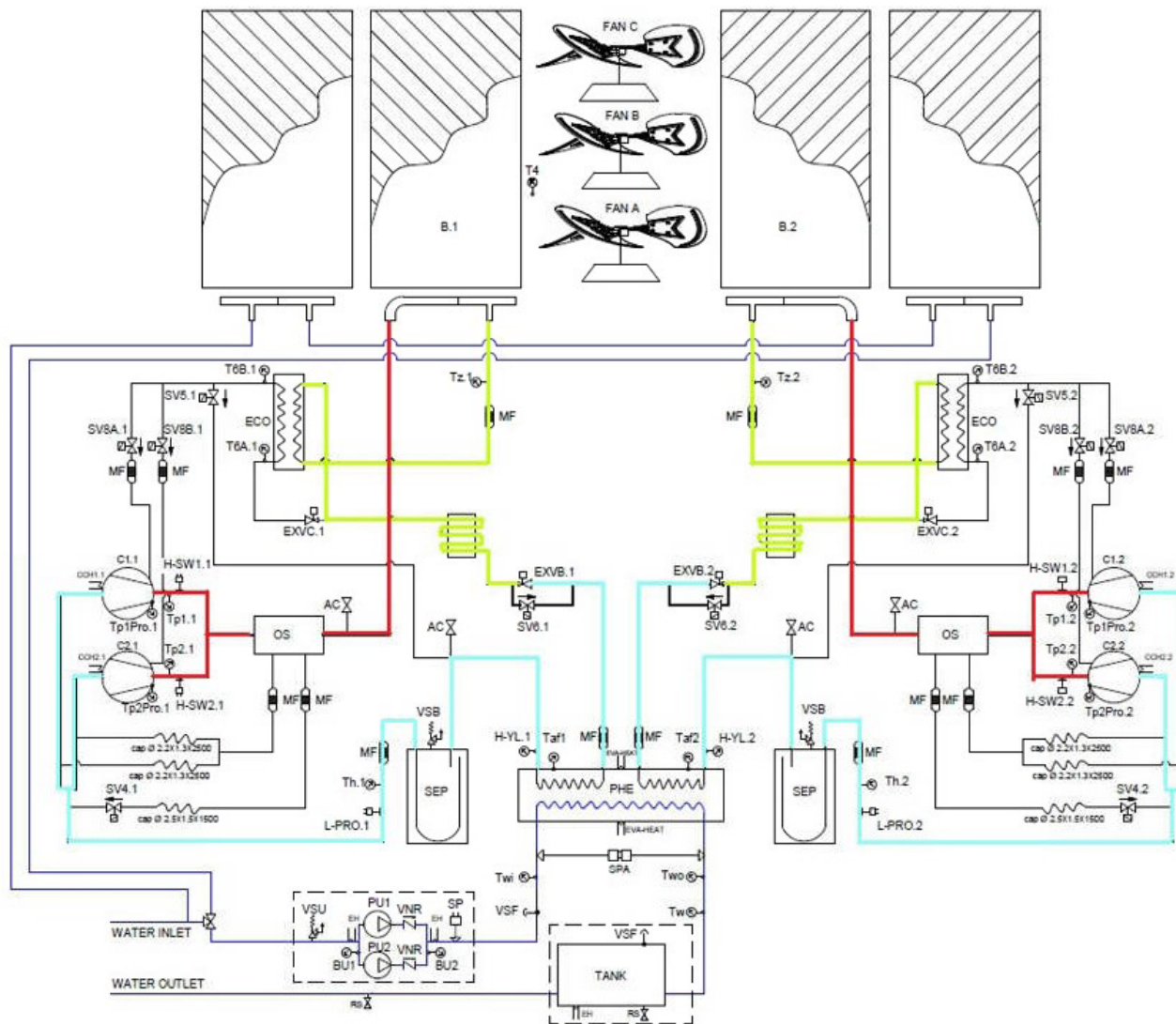


5.8.1.2 FC unit with partial heat recovery

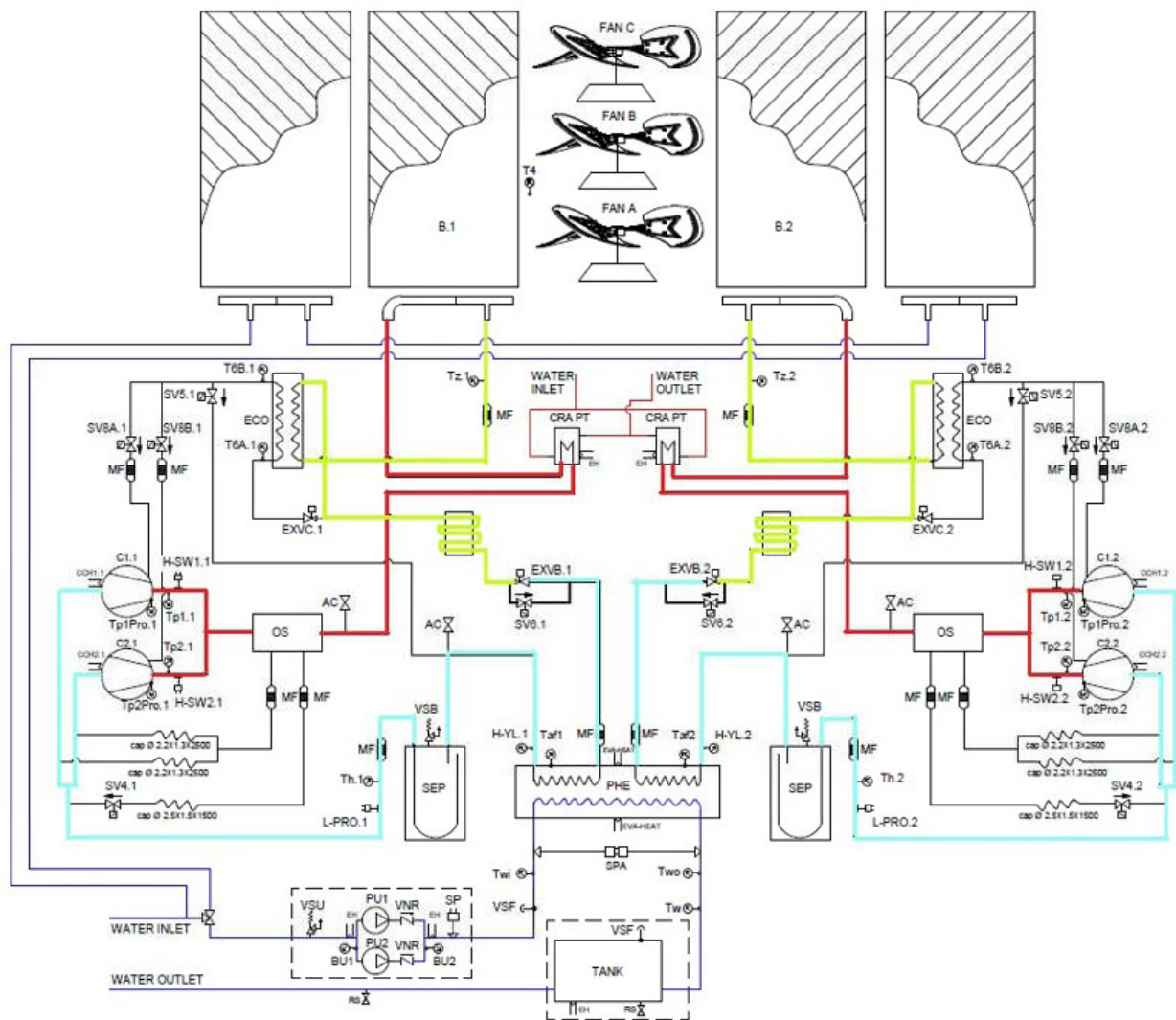


5.8.2 Refrigerant flow during cooling operation for sizes (60.4 – 90.4)

5.8.2.1 FC standard unit



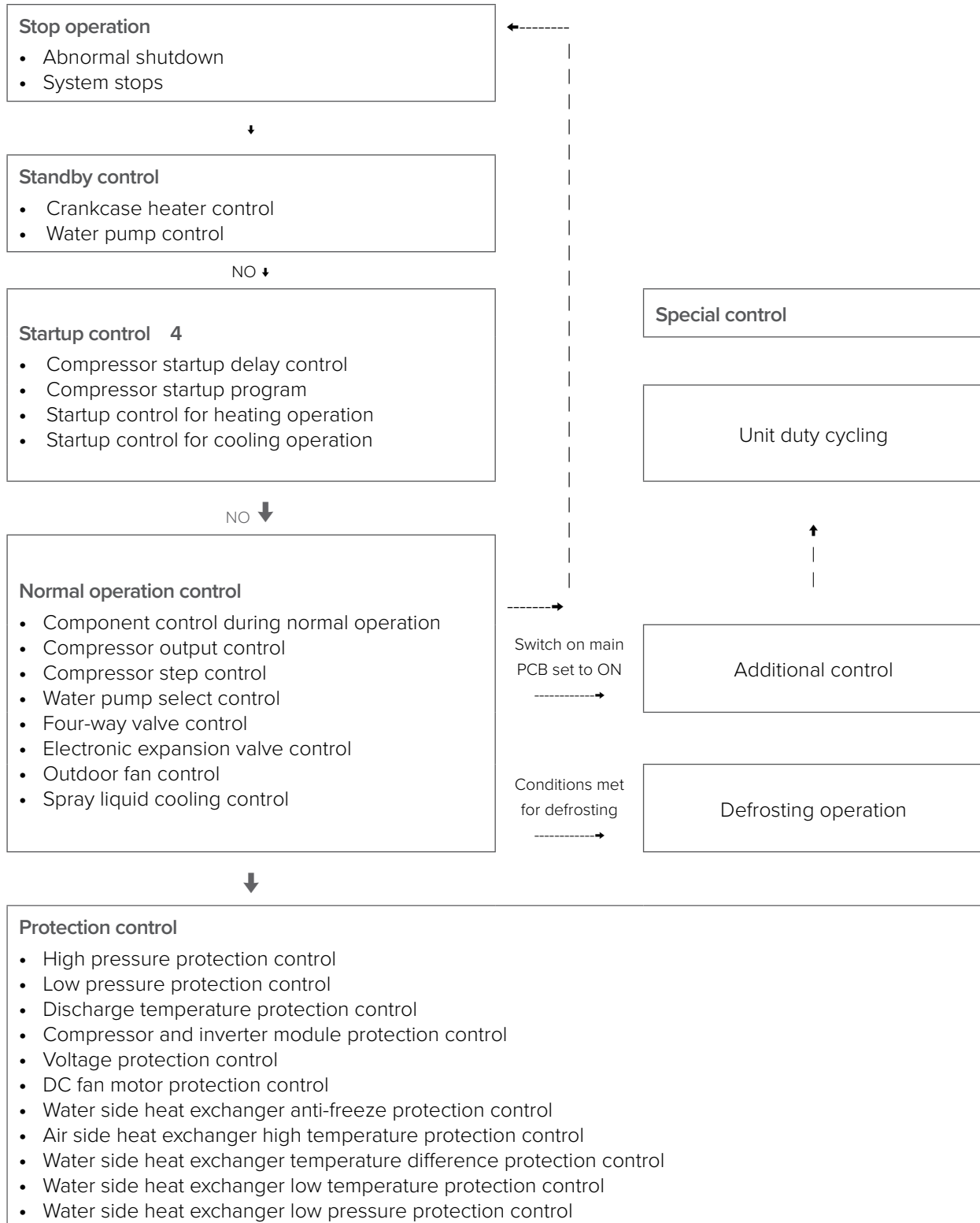
5.8.2.2 FC unit with partial heat recovery



6. Control

6.1 General Control Scheme Flowchart

The following pages detail when each of the controls in the flowchart below is activated.



Note:

1. Numbers in the top right-hand corners of boxes indicate the relevant section of text on the following pages.
2. S5_3 to set additional control.

6.2 Stop Operation

The stop operation occurs for one of the following reasons:

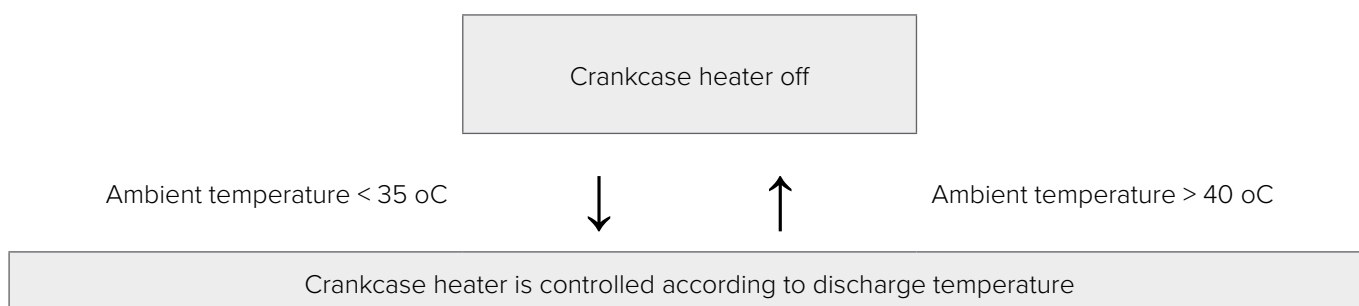
- 1 Abnormal shutdown: in order to protect the compressors, if an abnormal state occurs the system makes a stop with thermo off operation and an error code is displayed on the unit's PCB digital displays and on the user interface.
- 2 The system stops when the set temperature has been reached

6.3 Standby Control

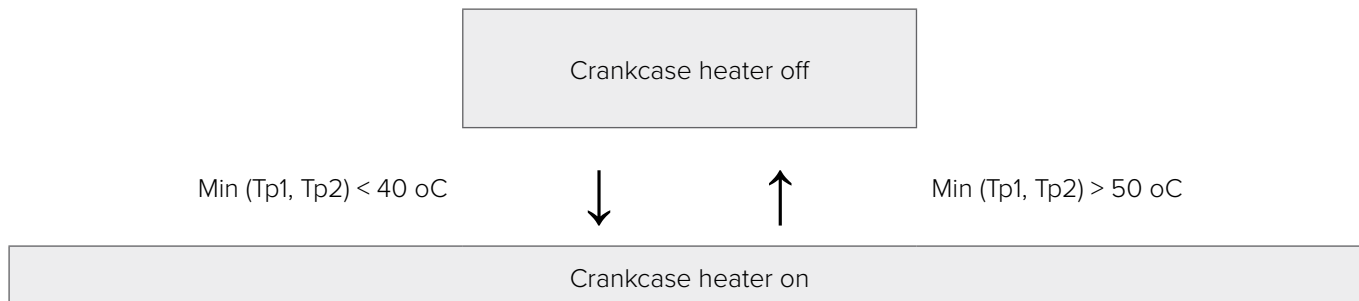
6.3.1 Crankcase Heater Control

The crankcase heater is used to prevent refrigerant from mixing with compressor oil when the compressors are stopped. The crankcase heater is controlled according to the outdoor ambient temperature and discharge temperature. When the outdoor ambient temperature is above 40°C, the crankcase heater is off; when the outdoor ambient temperature is below 35°C, the crankcase heater is controlled according to discharge temperature.

Crankcase heater controlled according to outdoor ambient temperature



Crankcase heater controlled according to discharge temperature



Notes:

1. Tp1: discharge temperature sensor 1, Tp2: discharge temperature sensor 2

6.4 Water Pump Control

When the unit is in standby, the circulator pumps run continuously or in according with dip switch S12-2 and/or with the pump ON-OFF time setted into the menu.

6.5 Startup Control

6.5.1 Compressor Startup Delay Control

In initial startup control and restart control (except in defrosting operation), compressor startup is delayed such that a minimum 7 minutes has elapsed since the compressor stopped, in order to prevent frequency compressor on/off and to equalize the pressure within the refrigerant system.

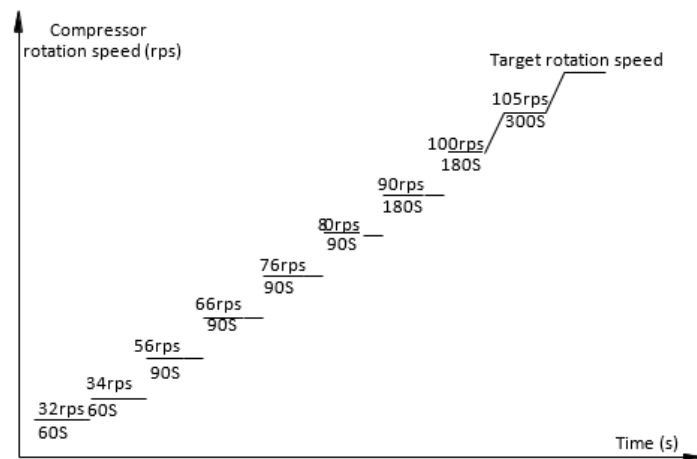
6.5.2 Compressor Startup Program

In initial startup control and in re-start control, compressor startup is controlled according to outdoor ambient temperature and leaving water temperature. Compressor startup follows one of two startup programs until the target rotation speed is reached.

During startup program all the limitations are available like power control according to setpoint, discharge temperature/pressure ecc.

6.5.2.1 60kW circuit - Compressor Start-up

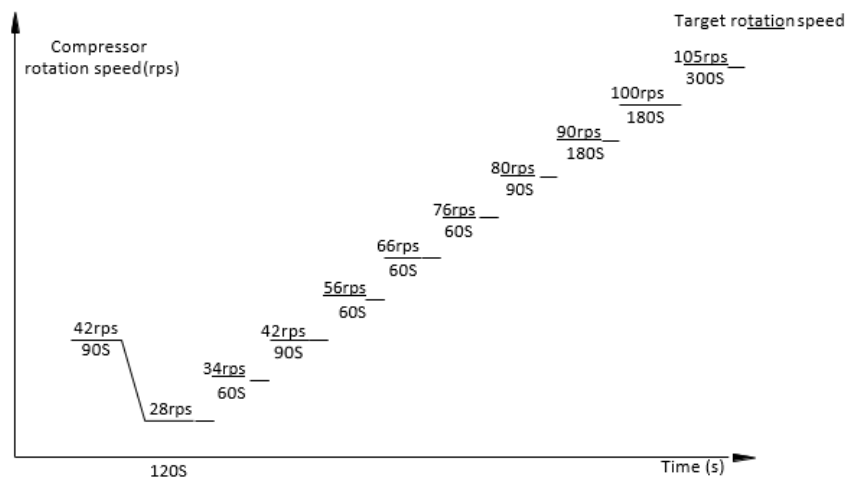
size 60KW compressor startup program1 when ambient temperature is above 10°C



Notes:

Once the first, 60-second stage of the program is complete, the program proceeds to the subsequent stages in a step-by-step fashion and exits when the target rotation speed has been reached.

size 45.4-50.4 and circuit 1 of 55.4-60.4 compressor startup program1 when ambient temperature is at or below 10°C



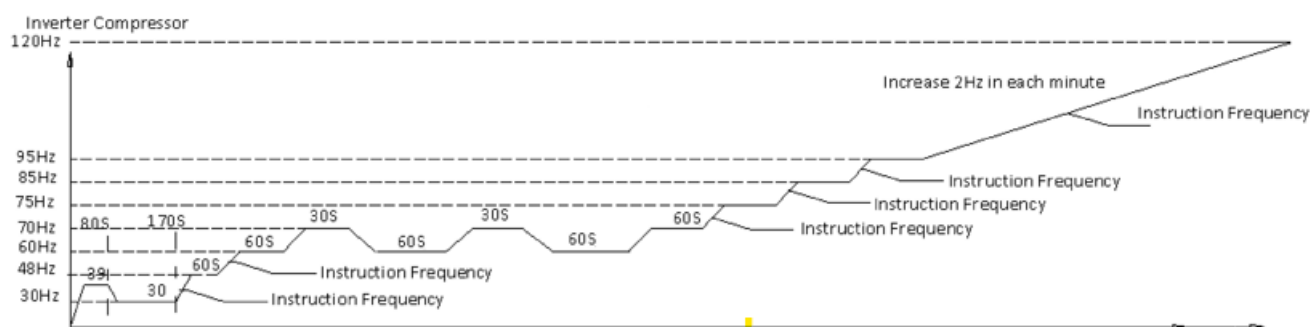
Notes:

1. Once the first, 90-second stage of the program is complete, the program proceeds to the subsequent stages in a step-by-step fashion and exits when the target rotation speed has been reached.
Target rotation speed: not a fixed value, it adjusts according to the logic.

6.5.2.2 90kW and 130kW circuit - Compressor Start-up

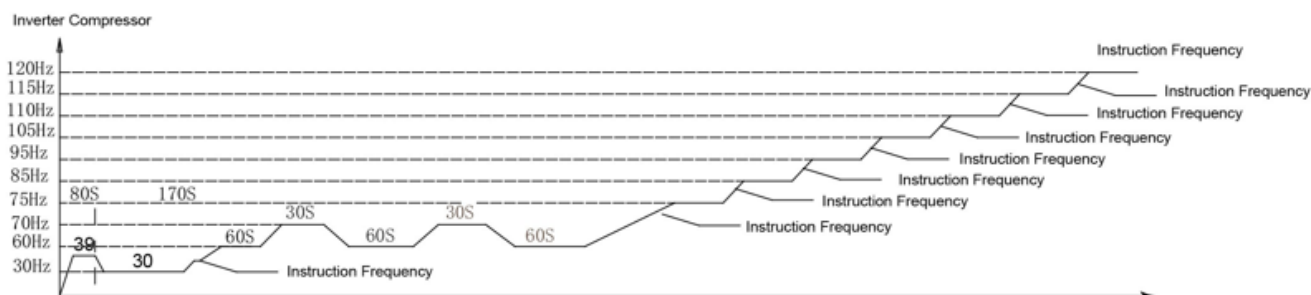
Cooling Start-up

System startup program: the following startup program is executed when the system is powered on:



Heating/Water Heating Start-up

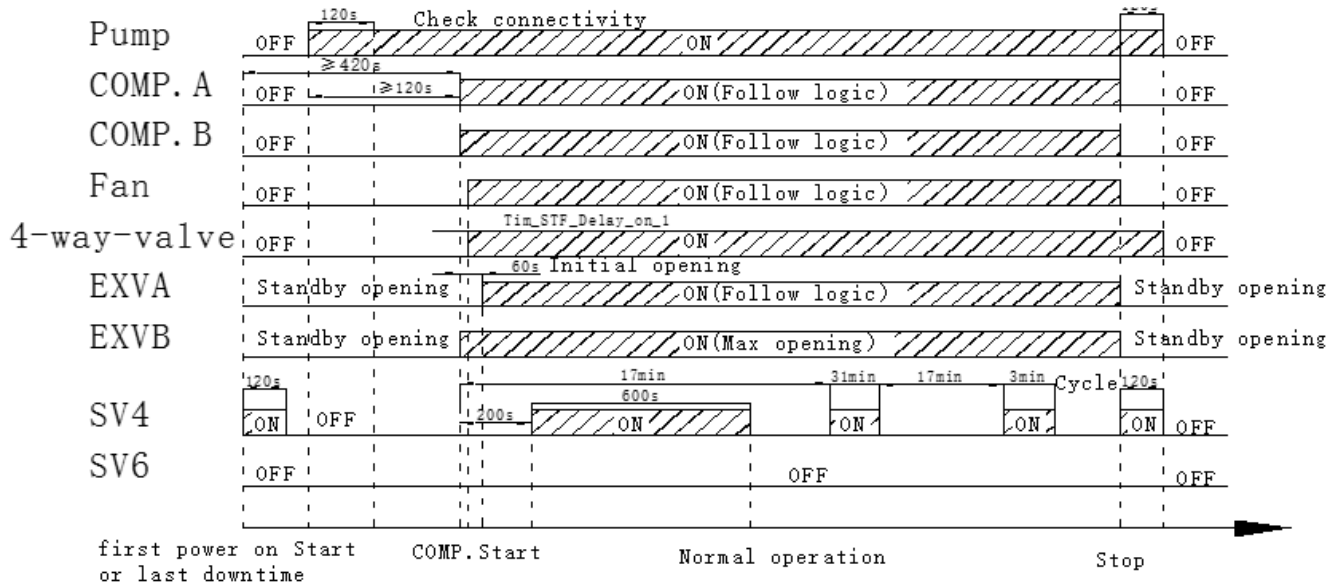
System startup program: the following startup program is executed when the system is powered on:



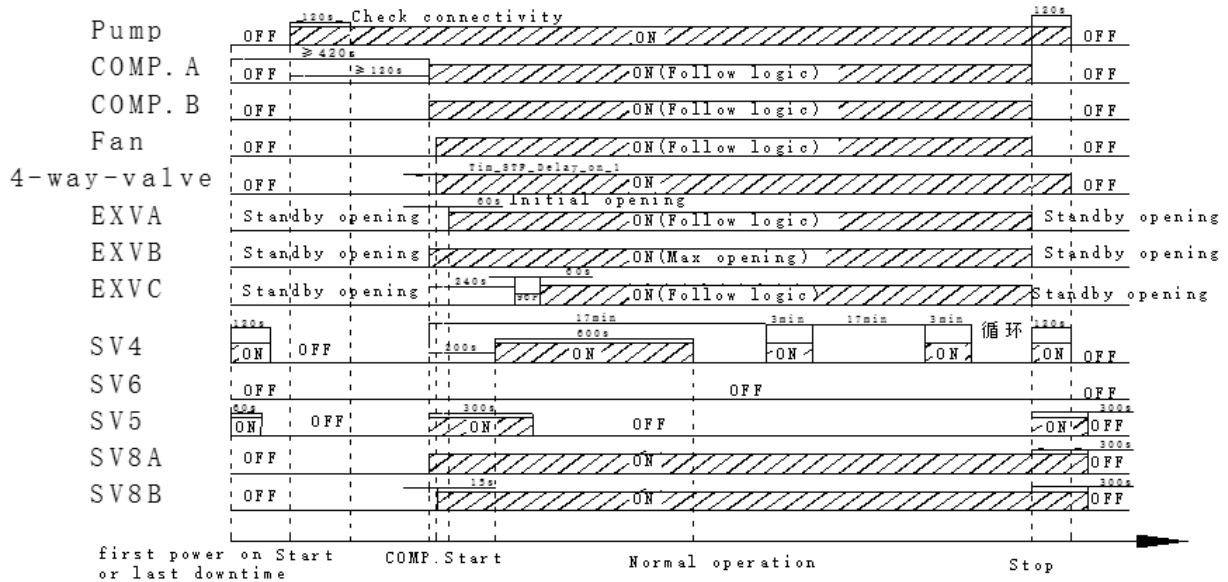
6.6 Normal Operation Control

6.6.1 Component Control for Heating Operation

6.6.1.1 Component control for heating operation of Large 60kW circuit

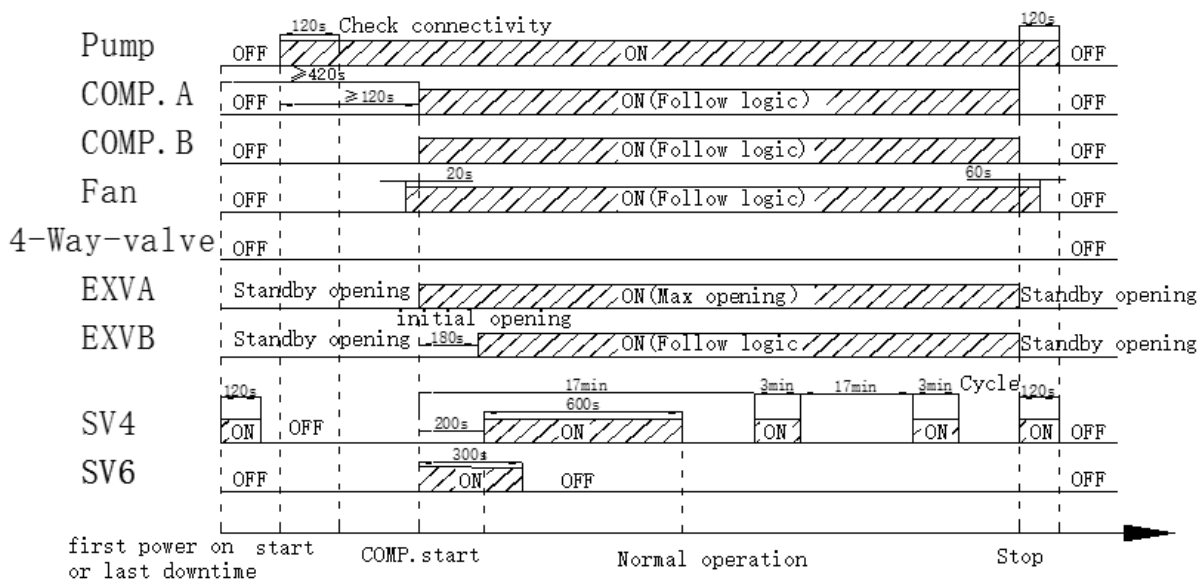


6.6.1.2 Component control for heating operation of Large 90kW and 130 kW circuit

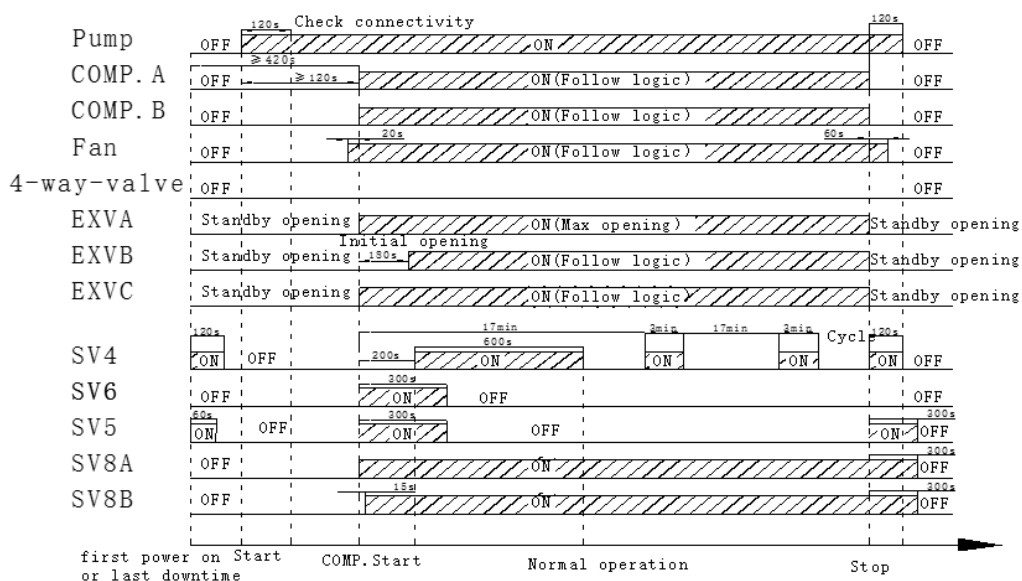


6.6.2 Component Control for Normal Cooling Operation

6.6.2.1 Component control normal cooling operation of Large 60kW circuit



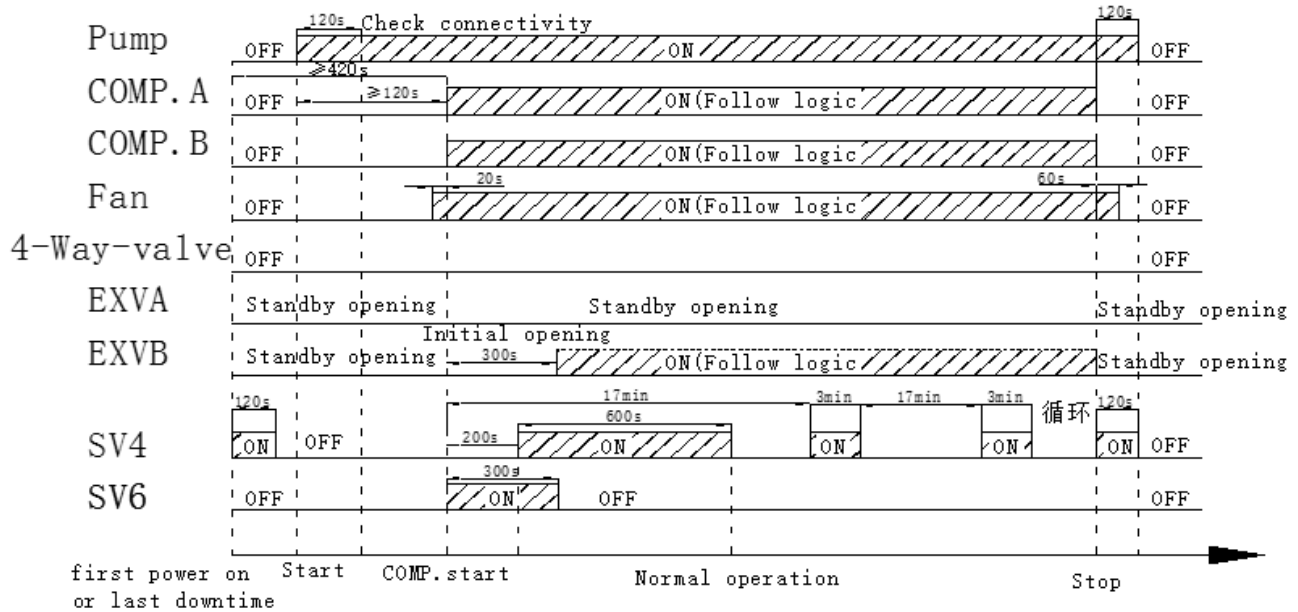
6.6.2.2 Component control normal cooling operation of Large 90kW and 130kW circuit



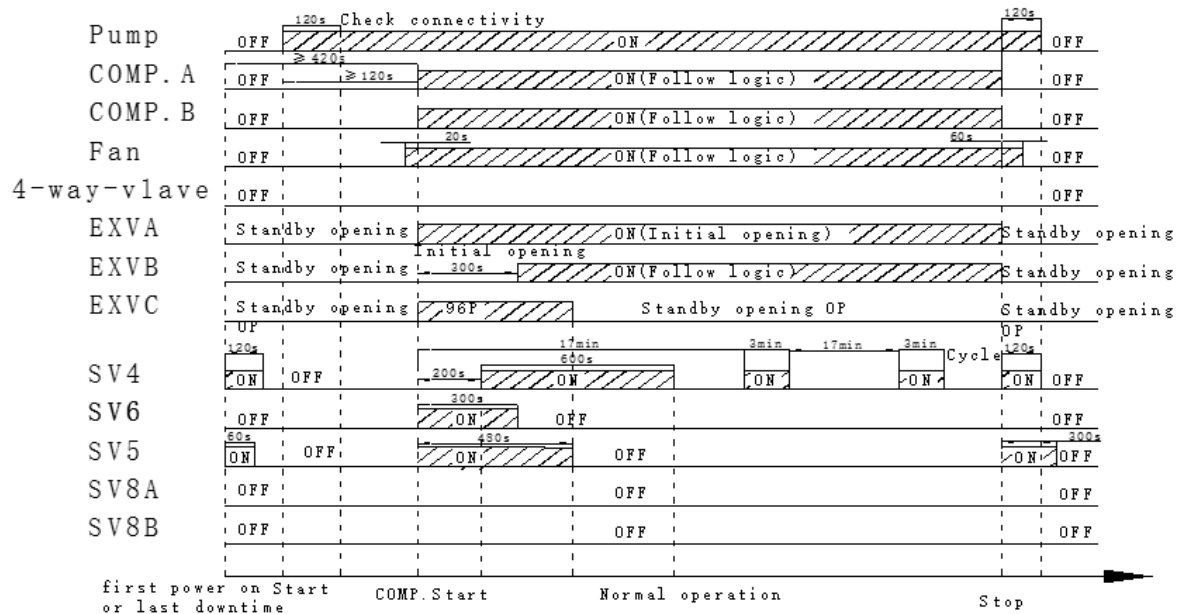
6.6.2.3 Component Control for Low T4 Cooling Operation

The unit will enter into this function automatically when the outdoor air temperature is under 10°C. Check the unit envelope to have a better understanding on the restriction for the working range of this unit.

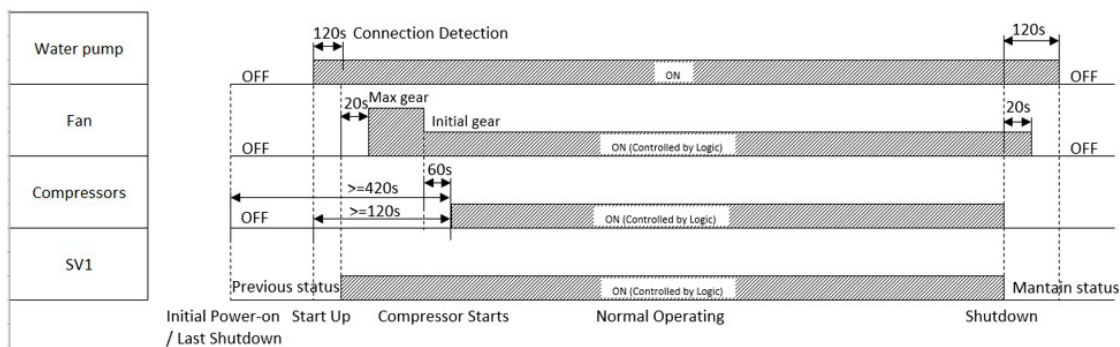
Component control for low T4 cooling operation for 60kW



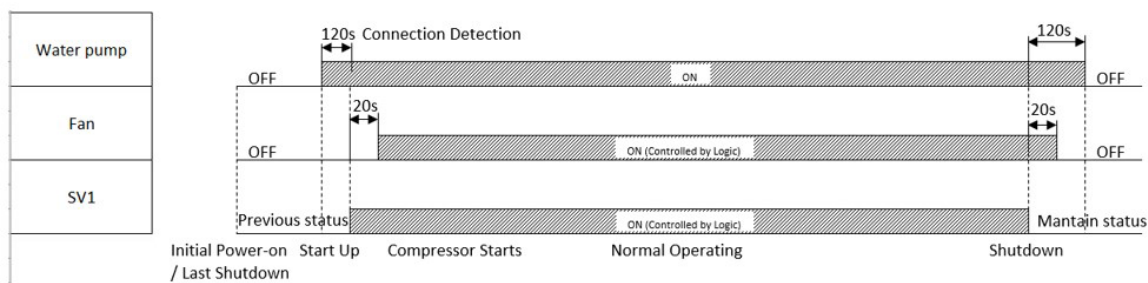
Component control for low T4 cooling operation for 90 kW and 130 kW circuit



6.6.3 Component control for Mixed Mode (FC unit)

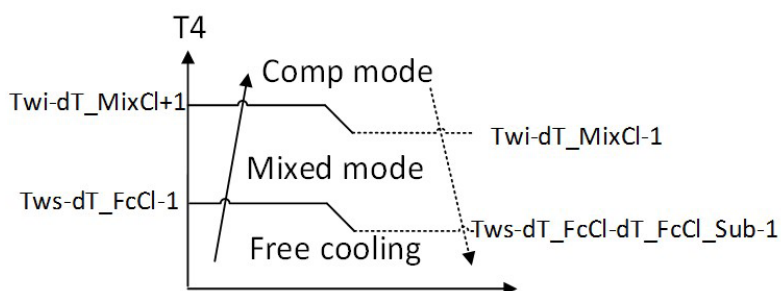


6.6.4 Component control for Free Cooling Mode (FC unit)



6.6.5 Operation mode switch in FC unit

When the unit receives the cooling start command, if $T_{wo} \geq T_{ws} + dT_{wo_CoolOn}$ (single system) / $T_w \geq T_{ws} + dT_{w_On} + 1$ (multiple systems), SV1 will be closed, the water pump (PumpRatio_Max) will be turned on first, and after 1 minute, the fan will be turned on (W32), after 1 minute, select the working mode according to T_4 and T_{wi} :



Parameters to be selected on HMI.

show item name	Predetermined area	Defaults	Adjustment range
dT_MixCl	1-3°C	2°C	1°C
dT_FcCl	1-15°C	3°C	1°C
dT_FcCl_Sub	1-3°C	1°C	1°C

6.6.6 Compressor Output Control

The compressor rotation speed is controlled according to the load requirement. Before compressor startup, the unit determines the compressor target speed according to outdoor ambient temperature, discharge temperature and

then runs the appropriate compressor startup program. Refer to Part “Compressor Startup Program”. Once the startup program is complete, the compressor runs at the target rotation speed.

The compressor speed is controlled according to Two parts in normal operation:

In cooling mode: In a single system, the compressor speed is controlled according to the water outlet temperature and Water outlet setting temperature. In a cascade system, the compressor of master unit is controlled according total water outlet temperature and water outlet setting temperature, the compressor of the slave unit is controlled according to water inlet and water outlet temperature. Both in a single system and cascade system, the compressor speed is limited by the inverter module temperature (Tf), ambient temperature (T4), discharge temperature (Tp1/Tp2), condensing temperature (Tz) and low pressure (Prs_MPa).

In heating mode: In a single system, the compressor speed is controlled according to the water outlet temperature and water outlet setting temperature. In a cascade system, all compressors are controlled according to the total water outlet temperature and the water outlet setting temperature. Both in a single system and cascade system, the compressor speed is limited by inverter module temperature (Tf), ambient temperature (T4), discharge temperature (Tp1/Tp2) and discharge pressure (Prs_MPa).

6.6.7 Compressor Step Control

The running speed of six-pole compressors in rotations per second (rps) is one third of the frequency (in Hz) of the electrical input to the compressor motor. The frequency of the electrical input to the compressor motors can be altered at a rate of 1Hz in two seconds.

The compressor capacity control is performed when frequency is stable for at least 5 min: the frequency is adjusted according to Tws and Two every 60s till reach stable condition.

6.6.8 Water pump select control

In a cascade system if the dial switch S12_2 on the main PCB is in ON position, means that each unit of the system is equipped with a pump, meanwhile if the dial switch S12_2 on the main PCB is in OFF position means that the system is equipped with a pump controlled by the Master unit.

S12_2 is switched OFF, the system runs “one large pump controlled by master unit” mode.

- One pump control: only the master unit output pump signal, no pump signal output on the slave units.
- Multiple pump control: output pump signal on all units.
- In the single pump system, the dial switch S12_2 must be set in the “OFF” position for each unit in the Master - Slave system otherwise the FP error (Dip-Switch compatibility) will be displayed.
- In case of a cascade system single pump configuration any alarm which occurs on the Master unit stop the system, if the alarm happens on a slave unit the system continues to work.
- In case of a cascade system multiple pump configuration any alarm which occurs on the unit stop only the unit not the entire system.

6.6.8.1 Backup pump

When into the unit is installed the backup pump, the dial switch S12_1 (for V12 software version), S12_3 (from V17 on software version) on both main and slave PCB is switched ON, the system rotate the operating pump to pump 1 and backup pump. When the dial switch S12_1 (for V12 software version) or S12_3 (from V17 on software version) on both main and slave PCB is OFF (default) the unit run with only main pump.

6.6.9 Four-way Valve Control

The four-way valve is used to change the direction of refrigerant flow through the water side heat exchanger in order to switch between cooling and heating operations.

During heating operation, the four-way valve is ON; during cooling and defrosting operation, the four-way valve is OFF.

6.6.10 7.2 Electronic Expansion Valve Control

The position of the electronic expansion valve (EXV) is controlled in steps from fully closed to fully open.

- At power-on:
 - The EXV first closes fully, then moves to the standby position (2000 (steps)). After 30seconds the EXV moves to an initial running position, which is determined according to the operating mode and outdoor ambient temperature.
- When the unit operate in cooling mode, after 60 seconds, the EXV is controlled according to suction superheat, water inlet temperature and compressor frequency.
- When the unit operates in heating mode, after a further 60 seconds, the EXV is controlled according to discharge superheat and compressor frequency, and uses the suction temperature, air side heater

exchanger temperature, discharge temperature to modify the control.

- When the unit is in standby:
- The EXV is at position 2000 (steps).
- When the unit stops:
- The EXV first closes fully, then moves to the standby position (2000 (steps)).

6.6.11 Outdoor Fan Control

The speed of the outdoor unit fan(s) is adjusted in steps, as shown in Table

Fan speed index	Outdoor Fan control (rpm)				
	60kW		90kW/130kW		
		FAN B	FAN A	FAN B	FAN C
0	0	0	0	0	0
1	0	150	0	150	0
2	0	190	0	190	0
3	0	210	0	230	0
4	0	230	0	270	0
5	0	250	0	330	0
6	150	150	150	150	150
7	150	170	150	170	150
8	150	190	150	150	170
9	170	190	190	170	190
10	210	190	210	190	210
11	230	210	230	210	230
12	250	230	250	230	250
13	270	250	270	250	270
14	290	270	290	270	290
15	310	290	310	290	310
16	330	310	330	310	330
17	350	330	350	330	350
18	370	350	370	350	370
19	400	370	400	370	400
20	430	400	430	400	430
21	470	430	470	430	470
22	510	470	510	470	510
23	550	510	550	510	550
24	600	550	600	550	600
25	650	600	650	600	650
26	700	650	700	650	700

27	750	700	750	700	750
28	800	750	800	750	800
29	830	800	820	820	820
30	850	830	840	840	840
31	870	850	860	860	860
32	890	870	880	880	880

6.6.12 Spray liquid cooling control

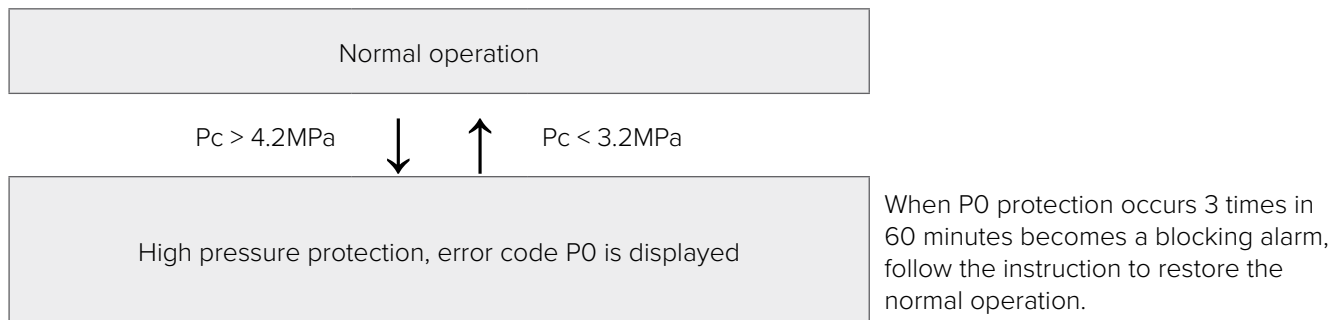
When the discharge temperature of compressor exceeds 103°C, the solenoid valve SV2 opens and the discharge temperature reduces. When the discharge temperature is below 90°C, the solenoid valve closes.

6.7 Protection Control

Note: Once the unit entered in a blocking alarm in order to restore the normal operation is necessary a manual restart of the unit or a reset of the blocking alarms from HMI (Service menu->Clear alarm history->Clear blocking alarms).

6.7.1 High Pressure Protection Control

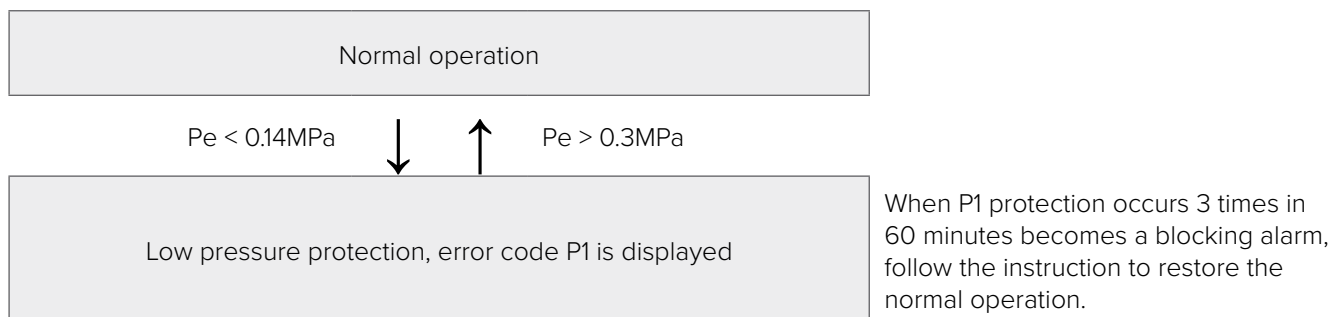
This control protects the refrigerant system from abnormally high pressure and temperature. Protects the compressor from transient spikes in pressure.



When the discharge pressure rises above 4.2MPa the system displays P0 protection and stop the faulty circuit. When the discharge pressure drops below 3.2MPa, the compressor enters re-start control.

6.7.2 Low Pressure Protection Control

This control protects the refrigerant system from abnormally low pressure and protects the compressor from transient drops in pressure.



When the suction pressure drops below 0.14MPa the system displays P1 protection and the unit stop running. When the suction pressure rises above 0.3MPa, the compressor enters re-start control.

P1 alarm is a mechanical protection meanwhile PC alarm is an electronic alarm.

6.7.3 6.3 Discharge Temperature Protection Control

This control protects the compressor from abnormally high temperatures and transient spikes in temperature.

Normal operation

Discharge temperature >
115°C



Discharge temperature <
90°C

LHigh discharge temperature protection, error code P0 is displayed

When P0 protection occurs 3 times in 60 minutes becomes a blocking alarm, follow the instruction to restore the normal operation.

When the discharge temperature rises above 115°C the system displays P0 protection and stop faulty circuit. When the discharge temperature drops below 90°C, the compressor enters re-start control.

6.7.4 6.4 Compressor and Inverter Module Protection Control

This control protects the compressors from abnormally high currents and protects the inverter modules from abnormally high temperatures. It is performed for each compressor and inverter module.

Normal operation

Current:
60kW > 24A
90kW > 33A
130kW > 55A



Current: 60kW < 24A
90kW < 33A
130kW < 55A

Compressor current protection, error code P4 or P5 is displayed

When P4/P5 protection occurs 3 times in 60 minutes becomes a blocking alarm, follow the instruction to restore the normal operation.

Notes:

P4 is the protection for the power supply phase B, P5 is the protection for the power supply phase C.

When the compressor current rises above limited value, the system displays P4 or P5 protection and the stop the faulty circuit. When the compressor current drops below limited value, the compressor enters re-start control.

6.7.5 Temperature inverter protection

When the compressor current rises above limited value, the system displays P4 or P5 protection and stop faulty circuit. When the compressor current drops below limited value, the compressor enters re-start control.

Normal operation

Tf1 or Tf2 > 96°C



Tf1 or Tf2: < 79°C

Inverter module temperature protection, error code PL is displayed

C7 is displayed when PL error occurs 3 times in 100 minutes. C7 is a blocking alarm, follow the instruction to restore the normal operation

Notes:

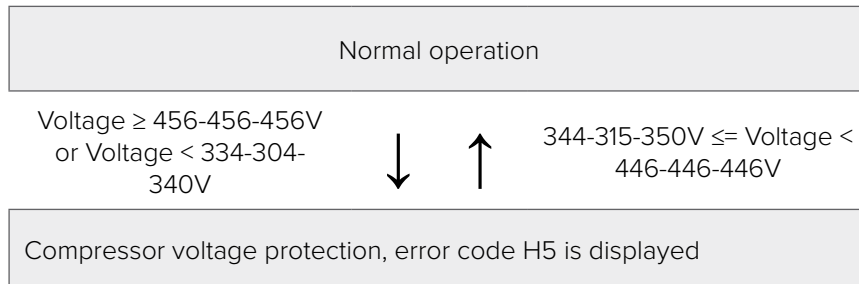
Tf1: Heat sink temperature 1; Tf2: Heat sink temperature 2

When the Tf1 or Tf2 temperature rises above upper limited value, the system displays PL protection and stop faulty circuit.

When the Tf1 and Tf2 temperature drops below lower limited value, the compressor enters re-start control.

6.7.6 Voltage Protection Control

This control protects the units from abnormally high or abnormally low voltages .
The check is done on each phase



When the phase voltage of AC power supply is at or above 456V for more than 30 seconds, the system displays H5 protection and all the units stop running. When the phase voltage drops below 446V for more than 30 seconds, the units restart once the compressor re-start delay has elapsed. When the phase voltage is below 334-304-340V for more than 30 seconds, the system displays H5 protection and all the units stop running. When the AC voltage rises to at or above 344-315-350V for more than 30 seconds, the refrigerant system restarts once the compressor re-start delay has elapsed.

6.7.7 DC Fan Motor Protection Control

This control protects the DC fan motors from abnormal power supply.

- The PU protection will be automatically cleared after 30 s of fan protection occurs;
 - When 10 times of PU protection occurs within 120 min, it will report FF fault (recovery from power failure);
 - If the main control and the fan drive module cannot communicate continuously for 2 min, it will report PU.
- FF is a blocking alarm, follow the instruction to restore the normal operation after solved the issue.

6.7.8 Water Side Heat Exchanger Anti-freeze Protection Control

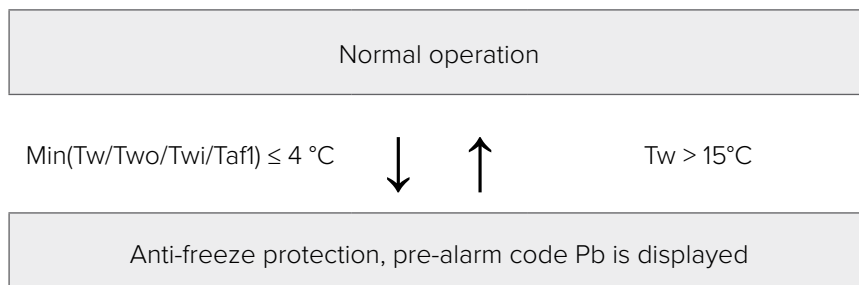
HP with software version V12

This control protects the water side heat exchanger from ice formation. The water side heat exchanger electric heater is controlled according to water side heat exchanger anti-freezing temperature (Taf), water inlet temperature (Twi), water outlet temperature (Two) and total water outlet temperature (Tw).

When water side heat exchanger anti-freeze protection occurs the system displays a pre-alarm code Pb and the unit will enter in anti-freeze protection logic.

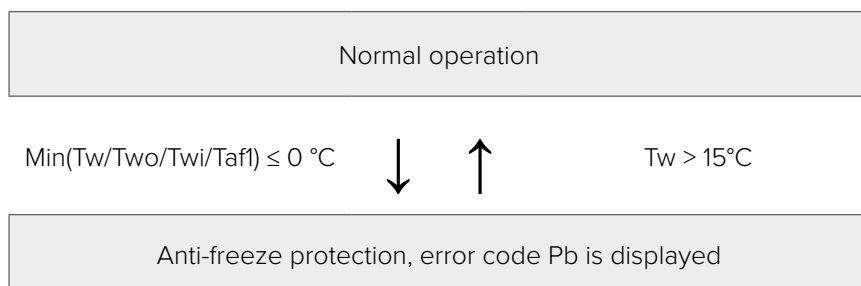
During anti-freeze operation the system can use heater onboard, use external additional heat source or run the unit in heating mode till the pre-alarm is restored. The operation can be different basing on the operating mode, dip-switch setting, system layout, antifreeze set.

: Anti-freeze protection control in normal cooling mode



Note: Taf include Taf1 and Taf2.

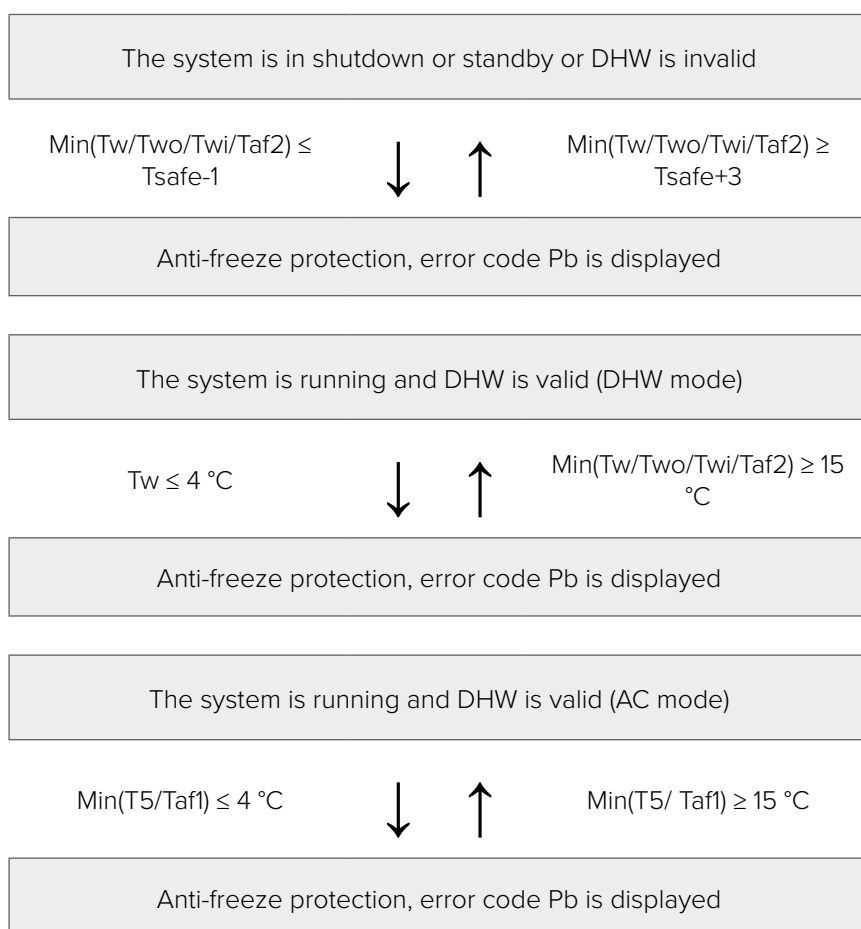
Anti-freeze protection control in low water outlet cooling mode



Note: Taf include Taf1 and Taf2.

If antifreeze is added in the system, the lower limit of starting antifreeze protection can be lowered.

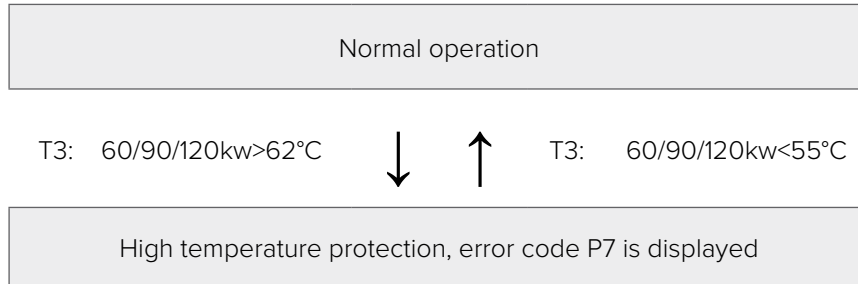
HP/CO/FC with software version from V17 on



6.7.9 Air Side Heat Exchanger High Temperature Protection Control

This control protects the air side heat exchanger from high temperature.

Air side heat exchanger high temperature protection control 1

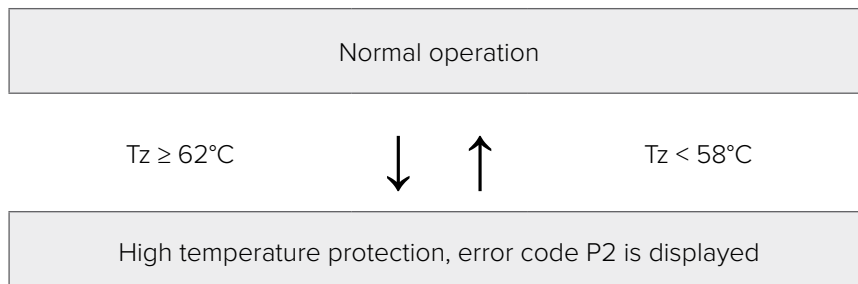


Note:

1. T3: Air side heat exchanger refrigerant outlet temperature

When the air side heat exchanger refrigerant outlet temperature (T3) rises above 60°C, the system displays P7 protection and the unit stop running. When the air side heat exchanger refrigerant outlet temperature (T3) drops below 50°C, the compressor enters re-start control.

Air side heat exchanger temperature protection control 2

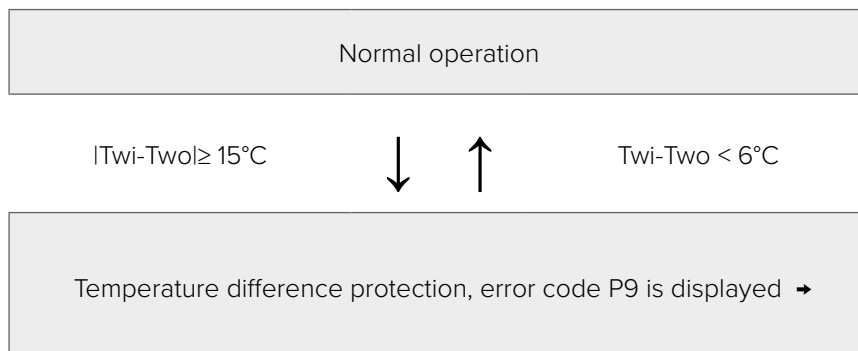


When the air side heat exchanger refrigerant total outlet temperature (Tz) temperature rises at or above 62°C, the system displays P2 protection and stop faulty circuit. When the air side heat exchanger refrigerant total outlet temperature (Tz) temperature drops below 58°C, the compressor enters re-start control.

6.7.10 Water Side Heat Exchanger Temperature Difference Protection Control

This control protects the water side heat exchanger from ice formation.

Water side heat exchanger temperature difference protection control



When P9 protection occurs 3 times in 60 minutes, it becomes a blocking alarm, follow the instruction to restore the normal operation

Notes:

1. Twi: Water side heat exchanger inlet temperature
2. Two: Water side heat exchanger outlet temperature
3. The value of |Twi-Twol| can be changed according to actual usage by HMI.

When the temperature difference rises at or above 15°C, the system displays P9 protection and the unit stop running.

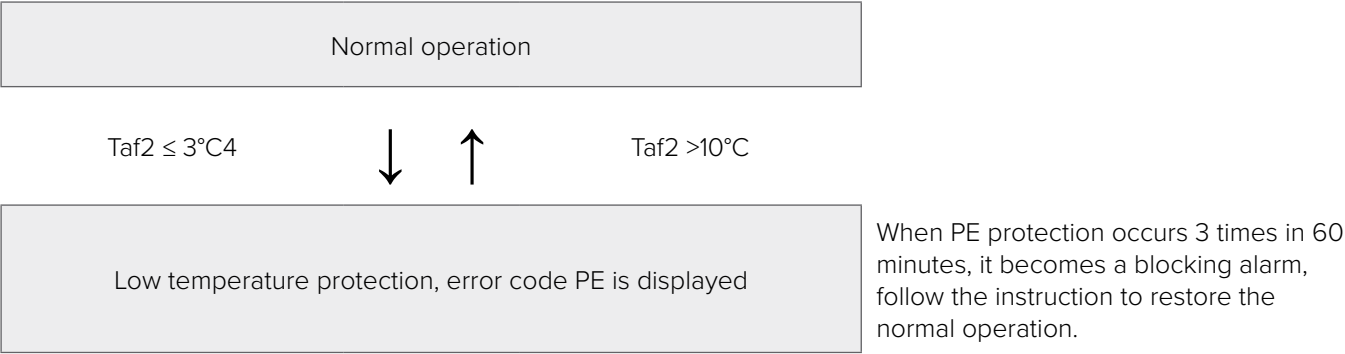
When the Temperature difference drops below 6°C, the compressor enters re-start control.

6.7.11 Water Side Heat Exchanger Low Temperature Protection Control

HP with software version V12

This control protects the water side heat exchanger from ice formation.

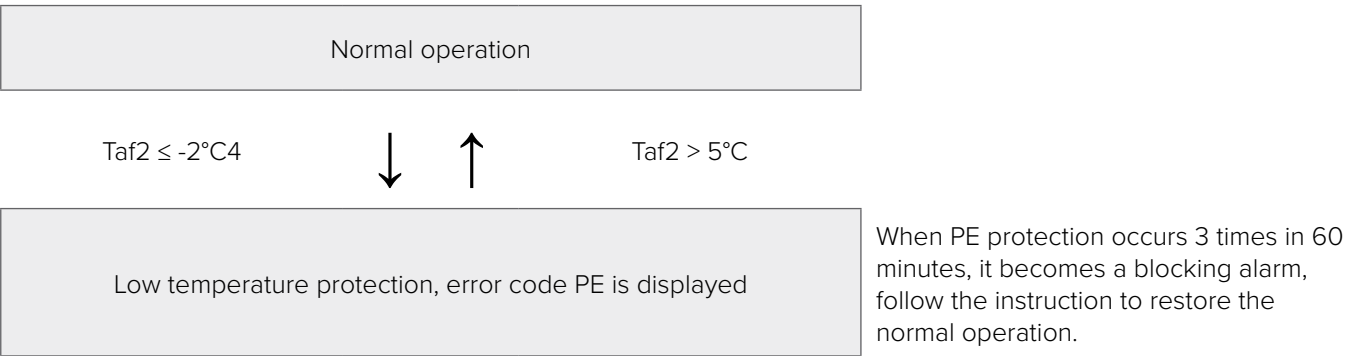
Water side heat exchanger low temperature protection control in normal cooling mode



Notes:

Taf2: Water side heat exchanger anti-freezing temperature
When water side heat exchanger anti-freezing temperature (Taf) is at or below 3°C for more than 3 seconds, the system displays PE protection and the corresponding unit stop running. When water side heat exchanger anti-freezing temperature (Taf) rise to 10°C or higher and downtime of more than 3 minutes, the compressor enters re-start control. Use the user interface to clear the error.

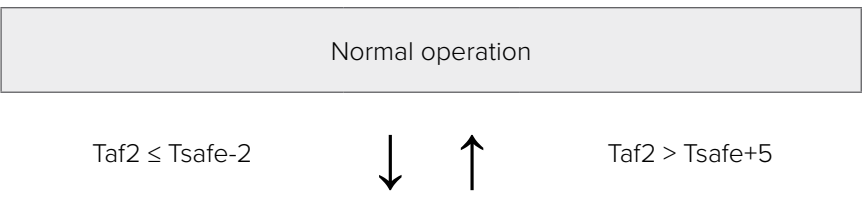
Water side heat exchanger low temperature protection control in low outlet water mode



When water side heat exchanger anti-freezing temperature (Taf) is at or below -2°C for more than 3 seconds, the system displays PE protection and orders the corresponding units to stop running. When water side heat exchanger anti-freezing temperature (Taf) rise to 5°C or higher and downtime of more than 7 minutes, the compressor enters re-start control. Use the user interface to clear the error.

Note: If antifreeze is added in the system, the lower limit of starting antifreeze protection can be lowered.

HP/CO/FC with software version from V17 on



Low temperature protection, error code PE is displayed

When PE protection occurs 3 times in 60 minutes, it becomes a blocking alarm, follow the instruction to restore the normal operation.

6.7.12 Water Side Heat Exchanger Low Pressure Protection Control

This control protects the water side heat exchanger from ice formation

Water side heat exchanger low pressure protection control in normal cooling mode

Normal operation

$P_e < 0.6\text{Mpa}$ for 30s



$P_e > 0.6\text{Mpa}$

Low pressure protection, error code PC is displayed

When system displays PC protection and a manual system restart is required before the system can resume operation.

Note: 1. P_e : Suction pressure

In normal cooling mode, when the suction pressure drops below 0.6Mpa for 30s, the system displays PC protection and the unit stop running. When the suction pressure is above 0.6Mpa, the compressor enters re-start control. It will not display the PC error when the suction pressure drops below 0.6Mpa for 30s for the first time until the suction pressure drops below 0.6Mpa for 30s for the second time in 30 minutes.

Water side heat exchanger low pressure protection control in low outlet water cooling mode

Normal operation

$P_e < 0.4\text{Mpa}$



$P_e > 0.4\text{Mpa}$

Low pressure protection, error code PC is displayed

When system displays PC protection and a manual system restart is required before the system can resume operation.

In low outlet water cooling mode, when the suction pressure drops below 0.4Mpa, the system displays PC protection the unit stop running. When the suction pressure is above 0.4Mpa, the compressor enters re-start control. It will not display the PC error when the suction pressure drops below 0.4Mpa for the first time until the suction pressure drops below 0.4Mpa for the second time in 30 minutes.

Normal operation

$P_e < 0.4\text{Mpa}$



$P_e > 0.4\text{Mpa}$

Low pressure protection, error code PC is displayed

When system displays PC protection and a manual system restart is required before the system can resume operation.

Notes: Pe: Suction pressure

In low outlet water cooling mode, when the suction pressure drops below 0.4Mpa, the system displays PC protection and all the units stop running. When the suction pressure is above 0.4Mpa, the compressor enters re-start control. It will not display the PC error when the suction pressure drops below 0.4Mpa for the first time until the suction pressure drops below 0.4Mpa for the second time in 30 minutes.

6.7.13 Leak Detector control

When leak detector is present it is in series to the phase sequence detector. If one circuit/unit is in leak detector output error all the unit or units in a cascade system stops. The E8 alarm referred to the leak detector is detected if there is a refrigerant leakage. However, anytime there is the leak detector installed in the unit, at startup the unit detects E8 in the first 4 minutes to initialize it, then it disappears automatically.

6.7.14 Tp probe failure or TDSH protection

After the compressor runs for 5 min, F2 is detected according to the following conditions:

- If $TDSH \leq 0$ last for 20 min, stop the unit and display F2
- If $TDSH \leq 5$ last for 60 min, stop the unit and display F2

During defrosting F2 is not detected.

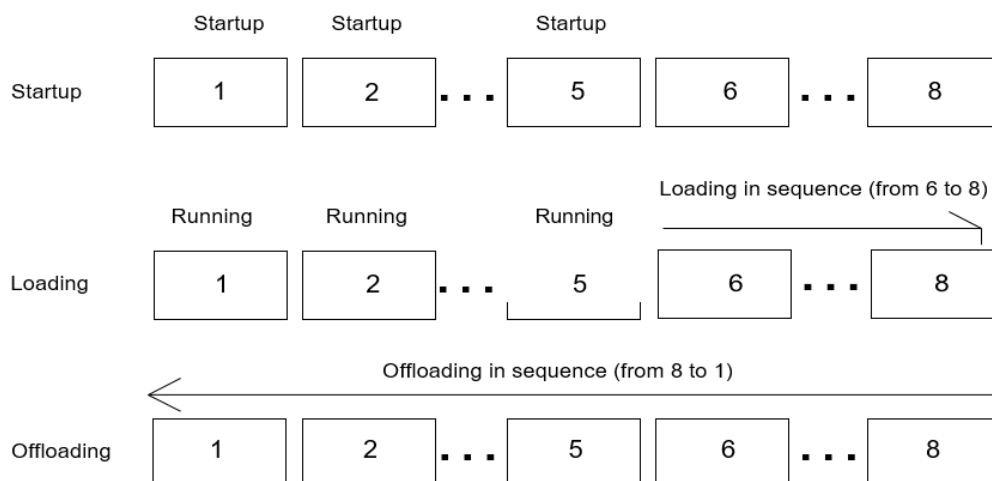
6.8 Special Control

6.8.1 Loading and offloading for multiple units system

In systems with multiple units ,

- When the units are powered on for the first time, if there is a load requirement, 50% of the units turn on, starting with the master unit. As the leaving water temperature approaches its set temperature, units shut down in succession, starting with the unit with the highest address. Once the set temperature has been reached, the master unit shuts down.
- The next time a load requirement exists, Start loading from the last one, and load in the order of addresses from large to small. When the unit satisfies the unloading conditions, the last-loaded unit will be unloaded first.

Bellow an example in a system with 8 units.



Note: Set the correct address on each unit. Address 0 for Master unit and from 1 to 16 for slaves units

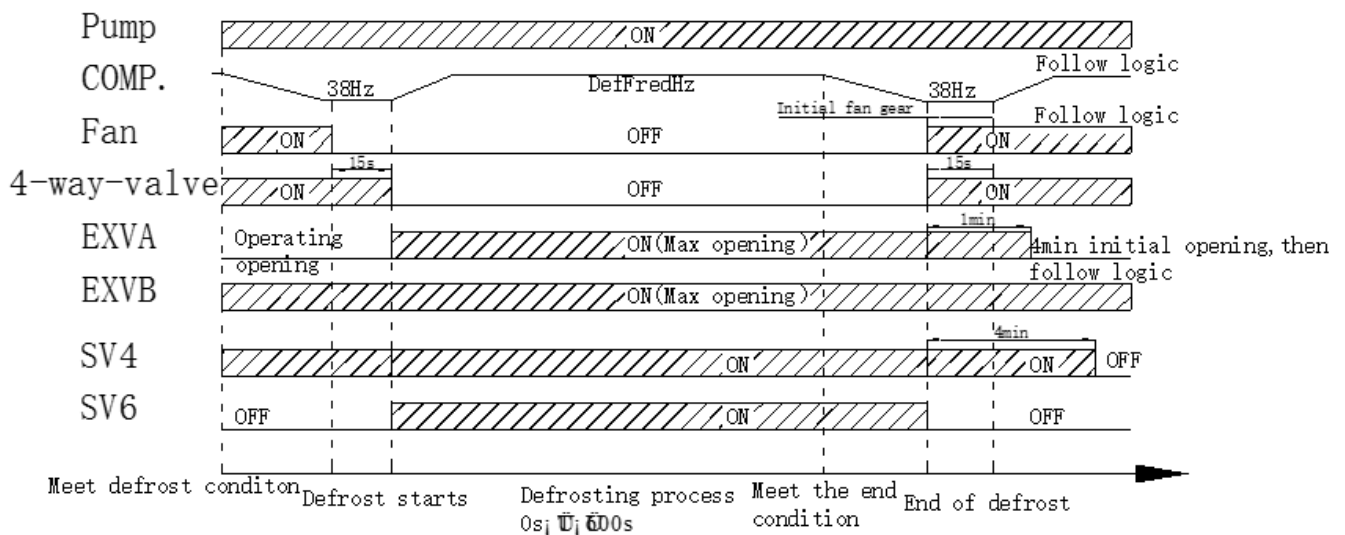
6.8.2 Defrosting Operation

In order to recover heating capacity, the defrosting operation is conducted when the unit air side heat exchanger is performing as an evaporator. The defrosting operation is controlled according to outdoor ambient temperature (T4), air side heat exchanger refrigerant outlet temperature (T3), the compressor running time and inlet water temperature (Twi). The condition to enter in defrosting mode are related to T3, Twi, time of operation: when $T3 < -2^{\circ}\text{C}$ for a defined time, the unit enter in defrosting mode. The counting time is related to Twi and T4.

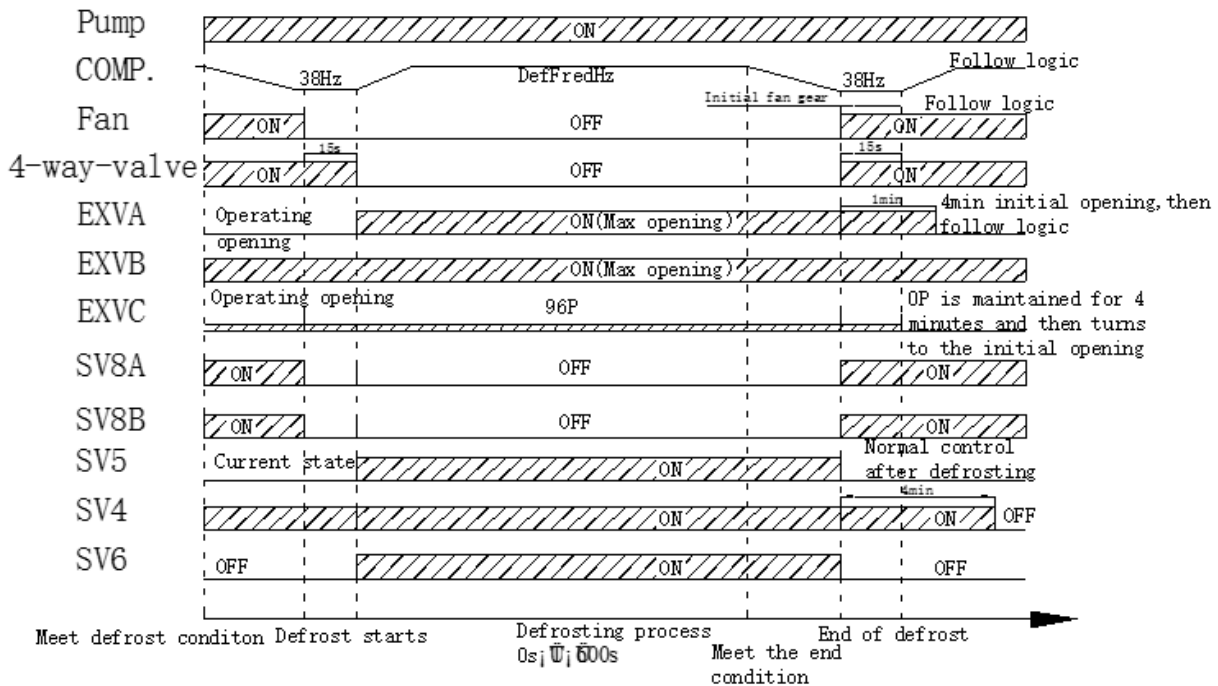
The defrosting operation ceases when any one of the following three conditions occurs:

- Defrosting operation duration reaches a maximum timing.
- The air side heat exchanger refrigerant outlet temperature reaches the target temperature ($T3 = 15^{\circ}\text{C}$).
- The water outlet temperature is at or below 5°C .

6.8.2.1 Component control during defrosting operation for Large 60kW circuit



6.8.2.2 Component control during defrosting operation for Large 90kW and 130 kW circuit



6.8.3 Additional control

When dial switch S5_3 on main PCB is switched ON, additional control HMI is valid. Connect a remote controller to command the unit. When dial switch S5_3 is switched OFF, additional control is invalid. Use HMI on-board to command the unit. In a cascade system only master unit have HMI that can command the system. In any case it's possible to run the system with a remote controller connected to the master if the master is configured with S5_3 ON.

When dial switch S5_3 is switched ON and disconnect a wired controller:

- The system ON/OFF state is controlled by the ON/OFF port (XT2 15-24 on the customer connections terminals). Close contact means system on, open contacts means system off.
- The mode of the system is controlled by the Cool/Heat port (XT2 15-24 on the customer connections terminals). Close contact means system running heating mode, open contacts means system system running cooling mode.
- The default water outlet temperature setting in heating mode is 45°C and in cooling mode is 7°C. The default hysteresis temperature setting is 2°C.

When dial switch S5_3 is switched ON and the unit is connected to a remote wired controller, the HMI on-board is not operative.

The double set point is controlled by the TEMP-SW port. Close the contact XT2 20-25 enable the second set point, open contact means the primary set point is valid.

6.9 Commissioning unit set up

6.9.1 Pump settings

It can be four configurations of the pump based on the system configuration.

6.9.1.1 Stand-alone configuration with an inverter pump.

- If the unit is equipped with an inverter pump on board, as a first check see if Dip-Switch S12-2 is set to ON (upward). In this case the unit will automatically control the pump, varying the flow rate, maintaining a $\Delta T = 5^\circ\text{C}$ (value that cannot be modified). In Menu → Project Menu (under password) → Inv. pump ratio the default values are Min. ratio = 80% Max. ratio = 100%. Once the unit has been installed, it is up to the ATC to properly evaluate the system pressure drops and consequently evaluate the Min.ratio value at which the inverter

pump must operate. This value is essential as it must indicate the minimum speed of the pump to guarantee the minimum water flow to the unit declared in the bulletin, otherwise flow alarms will occur when the unit limits the frequency of the compressors.

Periodic function setting

With Dip-Switch S12-2 set to ON Menu → Service Menu (under password) → Pump control → Pump on/off time. After reaching the set point and the post-pumping time, the unit switches off the pump for a time equal to Pump OFF Time and switches on again for a time equal to Pump ON Time. If during this period there is no request to switch on the compressors, the unit switches off the pump again. With Pump OFF Time = 0 the pump is always on.

- B If you want to have a fixed flow rate in the system, first check whether Dip-Switch S12-2 is set to ON (upwards).

In the Menu → Project Menu (under password) → Inv. pump ratio

Set the same value for Min. ratio and Max ratio. Min. ratio = Max. ratio The value must be defined in order to obtain the design delta T at nominal operating conditions.

6.9.1.2 Configuration of multiple units in cascade, where each unit is equipped with an on-board inverter pump.

- A Set Dip-Switch S12-2 in the ON position (upward) for each unit: refer to point 1

6.9.1.3 Configuring multiple units in cascade, with single pump in the system.

- A Set Dip-Switch S12-2 to the OFF position (down) for each unit. Menu → Service Menu (under service password) → Inv pump setting → Switch on the pump (set Yes) → Ratio Pump (set the pump speed according to the system pressure drops in order to guarantee a required flow rate (higher than the minimum flow required))

6.9.1.4 Stand alone or cascade unit configuration with ON-OFF pump on board

- A Check that Dip-Switch S12-2 is set in the ON position (upwards). In this case there will be no possibility of having a modulating flow rate to maintain $\Delta T=5^{\circ}\text{C}$.

General DIP switch setting overview:

	Single unit	Cascade system
Pump on board	S12_2 ON	S12_2 ON
External pump	S12_2 ON	S12_2 OFF

6.9.1.5 Periodic function setting

With Dip-Switch S12-2 set to ON Menu → Service Menu (under password) → Pump control → Pump on/off time. After reaching the set point and the post-pumping time, the unit switches off the pump for a time equal to Pump OFF Time and switches on again for a time equal to Pump ON Time. If during this period there is no demand to turn on the compressors, the unit turns off the pump again. With Pump OFF Time = 0 the pump is always on turned on.

Pump on/off time	
Pump on time	◀ 5 ▶ min
Pump off time	◀ 5 ▶ min
← Ok	▶▶▶

“Pump on time” sets the running time when the pump is forced on, the setting range is 5~60, the default is 5, and the adjustment range is 5; “Pump off time” sets the interval off time when the pump is forced off, The setting range is 0~60, the default is 0, and the adjustment range is 5

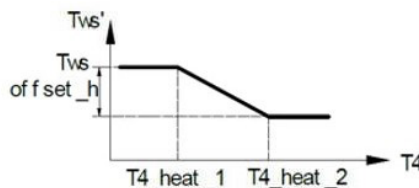
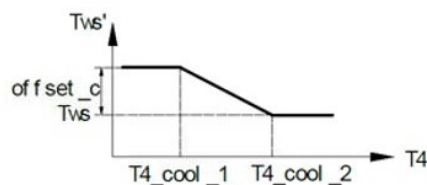
6.9.2 Temperature compensation (Under service password)

Temperature compensation

Press “▲” or “▼” to select “TEMPERATURE COMPENSATION ” under the “SERVICE MENU” page. Press “OK ” and enter submenu:

Temp. compensation	
Cool mode enable	◀Yes ▶
T4_Cool_1	◀25 ▶°C
T4_Cool_2	◀40 ▶°C
Offset_C	◀10 ▶°C
←Ok 1/2 ▶▶▶	

Temp. compensation	
Heat mode enable	◀Yes ▶
T4_Heat_1	◀-10 ▶°C
T4_Heat_2	◀15 ▶°C
Offset_H	◀10 ▶°C
←Ok 2/2 ▶▶▶	



Press “▲” or “▼” to select item and press “←” or “→” to set value. Then press “ ” to confirm
TwS – is not showed on the HMI display, check it in the User Menu

Title	Effect	Predetermined area	Defaults	Adjustment range
Cool mode enable	Cooling is effective	Yes/No	NO	/
T4_Cool_1	T4 temperature 1	15°C-30°C	25°C	1
T4_Cool_2	T4 temperature 2	35°C-45°C	40°C	1
Offset_C	return temperature	0°C-15°C	10°C	1
Heat mode enable	Heating is effective	Yes/No	NO	/
T4_Heat_1	T4 temperature 1	-15°C-10°C	5°C	1
T4_Heat_2	T4 temperature 2	15°C-30°C	15°C	1
Offset_H	return temperature	0°C-30°C	10°C	1

6.9.3 Auxiliary heaters settings Heat1 & Heat2

6.9.3.1 HEAT1 (system)

The following description is only valid for heat pump operation

Antifreeze electric Heating (Valid only with auxiliary heaters)

Function valid with Dip-Switch S6-1 in OFF position (downwards). In this case the electric heaters work as antifreeze protection. The heater activates once the Two<6°C and deactivate it for Two≥°C.

Auxiliary heater as integration of the heat pump

To activate the functions of the heat pump integration resistor you must make sure that the Dip-Switch S6-1 is in the ON position (upwards) in addition to the Dip-Switch make sure you have activated the Heat1 from the HMI Menu → Service Menu → Heat Control → Heat1 → Heat1 Enable (set Yes), as for the other parameters, they must be configured according to your needs once you understand their function that is described below. Within 2 minutes after switching on the pump the auxiliary heater control is kept in OFF after which the following cases may occur:

a. Operation of the auxiliary heater when the heat pump can't work

When the heat pump cannot work due to failure or is in alarm protection (not limitation of compressors) in this case the auxiliary heater intervenes in place of the heat pump when the water temperature is less than 3K compared to the set

point and turns OFF once the water temperature has exceeded the set point of 2K (Value adjustable by the HMI).

b. Force Heat1 in ON

To force the auxiliary heater follow the instruction: Menu → Service Menu → Heat Control → Heat1 → Heat1 Enable → Force Heat1 open (Set Yes). This will start the operation of the auxiliary heater manually. Once you reach the set point of the auxiliary heater it will turn off. The manual command is valid only once so even if the water temperature drops below the set point it will not start automatically and will need a new manual command to start.

c. Auxiliary heater with low outdoor air temperature

In case the unit is operating in heat pump with an air temperature lower than 5 ° C (Value adjustable by the HMI) but does not reach the set point within 90 min (value adjustable by HM) then the auxiliary heater is integrated with the heat pump.

d. Auxiliary heater when the heat pump capacity is insufficient

In case the set point is higher than the maximum set point of the unit envelope then the auxiliary heater is activated in integration with the heat pump.

Title	Effect	Predetermined Area	Default
Heat1 Enable	Auxiliary heater	No/Yes	No
T_Heat1_Delay	Activation time	60.....240 min	90 min
DT_Heat1_OFF	ΔT off as regards set point	2.....10°C	5 °C
T4_Heat1_ON	Outdoor air temperature under which auxiliary heater intervenes Heat1	-5.....13°C	5°C

6.9.3.2 HEAT2 (DHW – domestic hot water)

Activate the Heat2 from Menu → Service Menu → Heat Control → Heat2 → Heat2 Enable (set Yes). If the unit is in E6 protection (T5 error – DHW tank probe) or T5>71°C the electrical heater doesn't active.

a. Operation of the auxiliary heater when the heat pump can't work.

When the heat pump cannot work due to failure or is in alarm protection (not limitation of compressors) in this case the auxiliary heater intervenes in place of the heat pump when the water temperature is less than 5K (value settable by the HMI) compared to the set point and turns OFF once the water temperature has exceeded the set point of 5K (Value adjustable by the HMI).

b. Force Heat2 in ON.

To force the auxiliary heater follow the instruction: Menu → Service Menu → Heat Control → Heat2 → Heat2 Enable → Force Heat2 open (Set Yes). This will start the operation of the auxiliary heater manually. Once you reach the set point of the auxiliary heater it will turn off. The manual command is valid only once so even if the water temperature drops below the set point it will not start automatically and will need a new manual command to start.

c. Auxiliary heater with low outdoor air temperature.

In case the unit is operating in heat pump with an air temperature lower than 5 ° C (Value adjustable by the HMI) but does not reach the set point within 90 min (value adjustable by HM) then the auxiliary heater is integrated with the heat pump.

d. Auxiliary heater when the heat pump capacity is insufficient.

In case the set point is higher than the maximum set point of the unit envelope then the auxiliary heater is activated in integration with the heat pump.

e. Auxiliary operation when the tank temperature is too low.

This function activates when the tank temperature T5<15°C and continue to be activated until the T5>15°C.

f. Auxiliary operation with multiple ON/OFF of the compressor in DHW.

When there is a succession of ON-OFF cycles greater than 2 of the compressor in DHW mode, to avoid too many ON-OFF cycles the auxiliary heater intervenes.

Title	Effect	Predetermined Area	Default
Heat2 Enable	Auxiliary heater for DHW	No/Yes	No

T_Heat2_Delay	Activation time	60.....240 min	90 min
DT_Heat2_OFF	ΔT off as regards set point	2.....10°C	5 °C
T4_Heat2_ON	Outdoor air temperature under which auxiliary heater intervenes Heat2	-5.....13°C	5°C

	Parameter role	Predetermined area	Defaults	Adjustment range
Heat1 enable	Electric heating 1 enable	Yes/No	No	/
T-Heat1-Delay	Heat1 opening delay	60~240 min	90min	5min
dTw_Heat1_Off	Stop hysteresis temperature	2~10°C	5°C	1°C
T4_Heat1_On	T4 start temperature	-5~20°C	5°C	1°C [SF1]
All heat2 disable	All electric heating 2 are not allowed to be turned on	Yes/No	No	/
Select address	Unit address selection	0~15	0	1
Heat2-Enable	Current address Electric heating 2 is on	Yes/No	No	/
T_Heat2_Delay	Delay opening time	60~240min	90min	5min
dT5_Heat2_Off	Stop hysteresis temperature	2°C10°C	5V	1
T4_Heat2_On	T4 allow opening temperature	-5°C20°C	5°C	1
Select address	Address selection	0~15	0	1
Forced heat2 open	Force Heat2 on	Yes/No	No	/

[SF1]New items. Valid only when SW6-1 is ON

6.9.4 Silent function setting

This menu is used to configure parameters related to the mute function. After entering, the interface is shown below

Silent switch	
Select silent	◀ Night silent ▶
Current silent	Night silent
← OK →	

Switch to set the silent mode (Standard, Silent, Super silent, Night silent1). After the mute mode is turned on, the mute icon is illuminated.

6.9.5 Energy saving/demand limit setting from HMI

This menu is used to configure parameters related to system energy saving. After entering, the interface is shown below:

Energy saving switch	
Saving switch	◀80▶%
History setting	
06/06/2020 11:30a.m.	80 %
06/05/2020 11:30a.m.	80 %
06/04/2020 11:30a.m.	80 %
← Ok ▶▶	

Switch configuration items and modify setting values by selecting keys (default value Select address=00, DHW switch=No, DHW first=No). When the DHW switch of address X=Yes, the lower unit address displays white characters on a black background, otherwise it displays black characters on a white background.

Saving switch	100	90	80	70	60	50	40	40
energy saving mode	1 (reserved)	2	3	4	5	6	7	8 (reserved)

If the Energy Saving (Demand limit) control is enabled on the REMAU board it will overwrite the setting on the HMI.

6.9.6 Energy monitoring

From the user menu Menu → User Menu → Query → State query

This submenu is used to query the brief running status information of each unit. The interface is shown in figure.

At page 2 the current and the total capacity are shown as well as the current and the total power consumption and the current efficiency.

State query	
Select address	◀ 11 ▶ #
Operation state	standby
Running mode	cool
Current silent mode	super silent
← Back 1/3 ▶▶	

State query	
Current capacity	100 KW
Current power	50 KW
Current efficiency	2
Total capacity	100 MW
← Back 2/3 ▶▶	

State query	
Total power	50 MW
← Back 3/3 ▶▶	

6.9.7 DHW Management

6.9.7.1 DHW priority

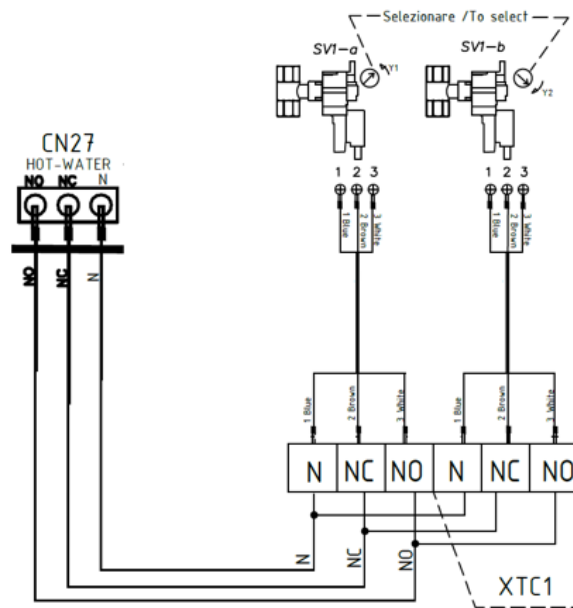
This menu is used to configure parameters related to hot water production. If the system has no hot water production function, you cannot enter this submenu. After entering, the interface is shown in Figure.

DHW switch	
Select address	◀ 11 ▶ #
DHW switch	◀ Yes ▶
DHW first	◀ Yes ▶
00 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15	
← OK ▶▶▶	

Switch configuration items and modify setting values by selecting keys (default value Select address=00, DHW switch=No, DHW first=No). When the DHW switch of address X=Yes, the lower unit address displays white characters on a black background, otherwise it displays black characters on a white background

6.9.7.2 DHW valve wiring connection

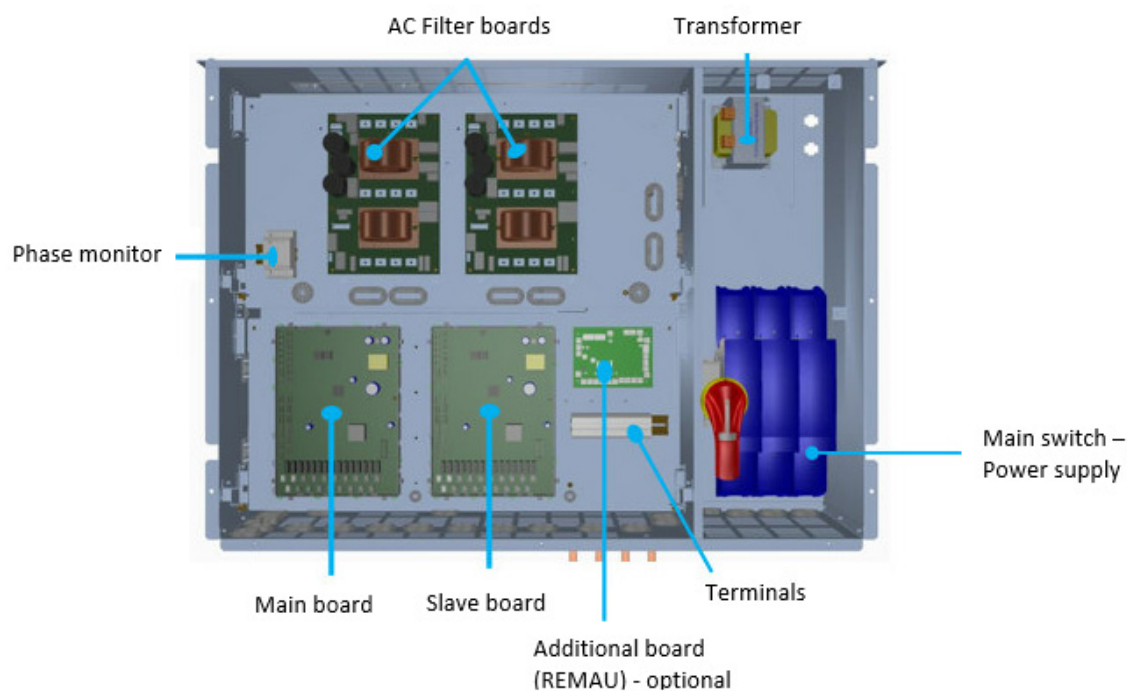
When the unit is configured with the DHW valve option, 2 two-way valves are installed to switch from system to DHW side. The electrical connection shall be done on the main circuit (circuit 1) PCB. The wiring connection are the following



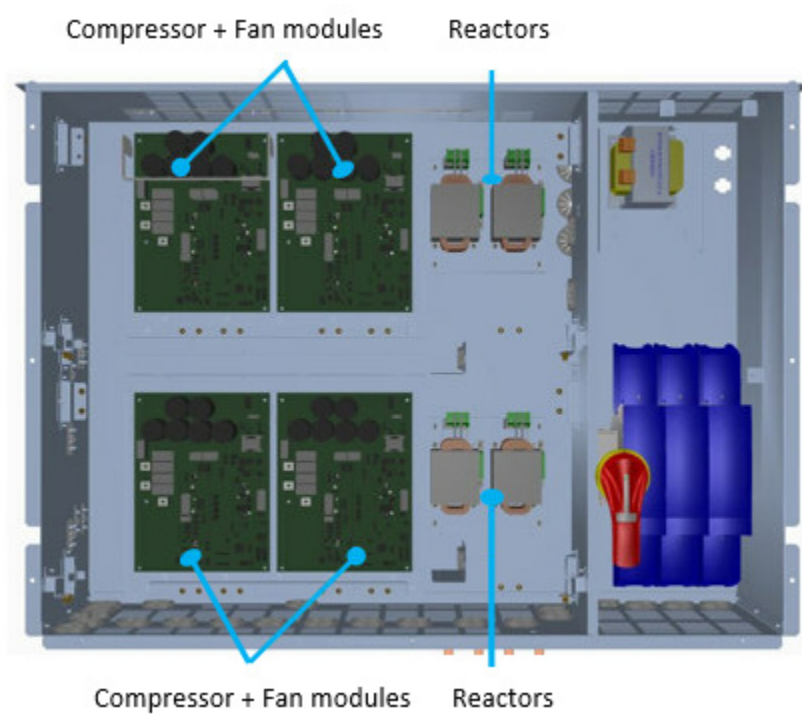
7. Troubleshooting

7.1 Unit Electric Control Box Layout

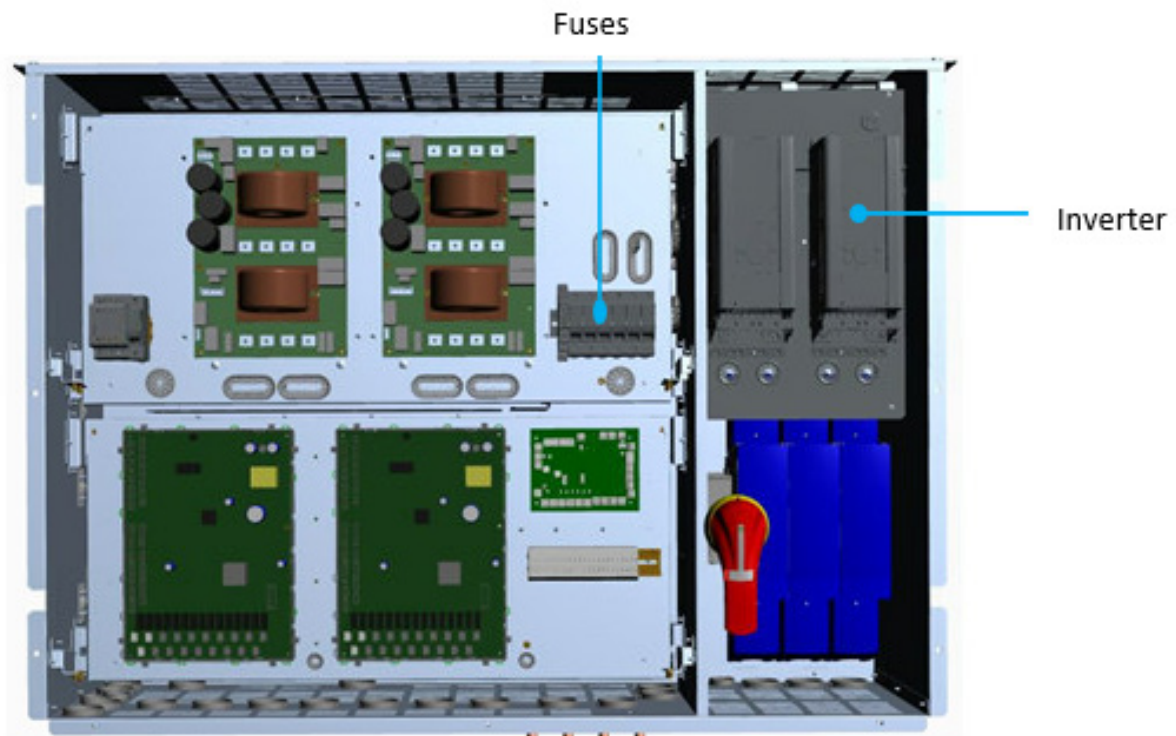
7.2 Electric control box front view- top layer



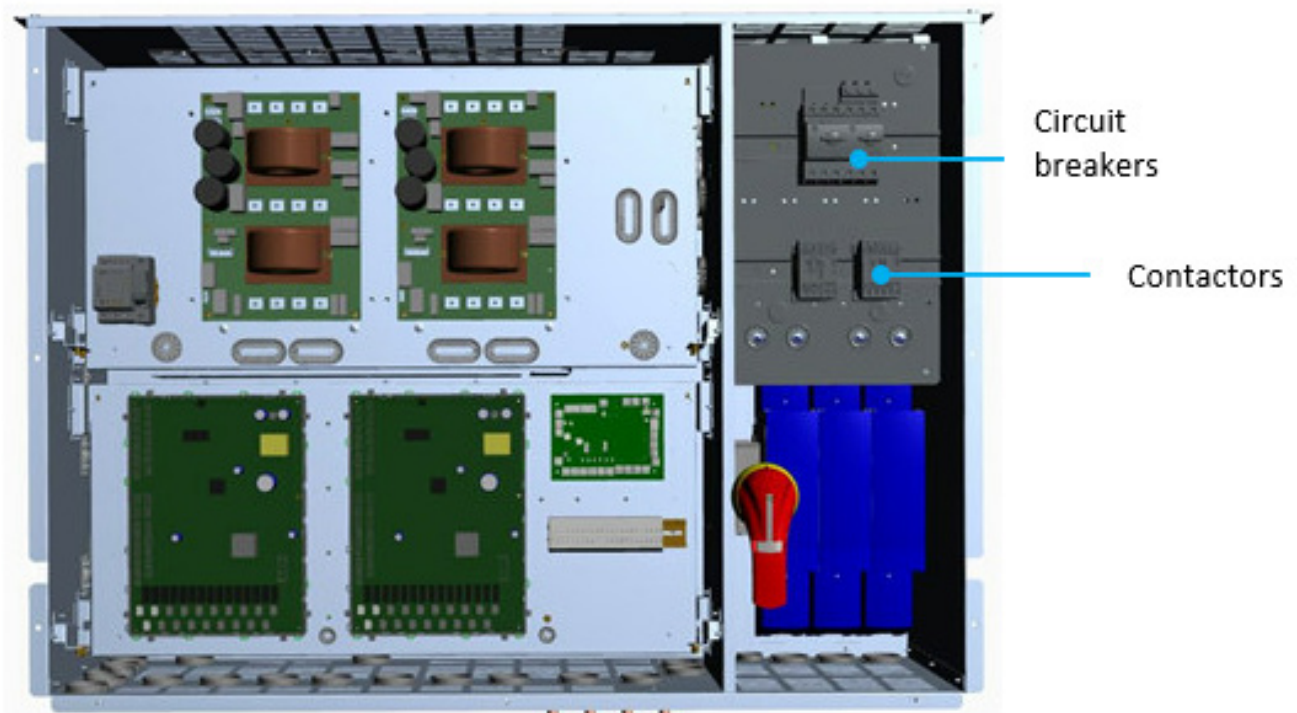
7.3 Electric control box front view-bottom layer



7.4 Electric control box front view- top layer with inverter pumps



7.5 Electric control box front view- top layer with on-off pumps



7.6 Unit PCBs

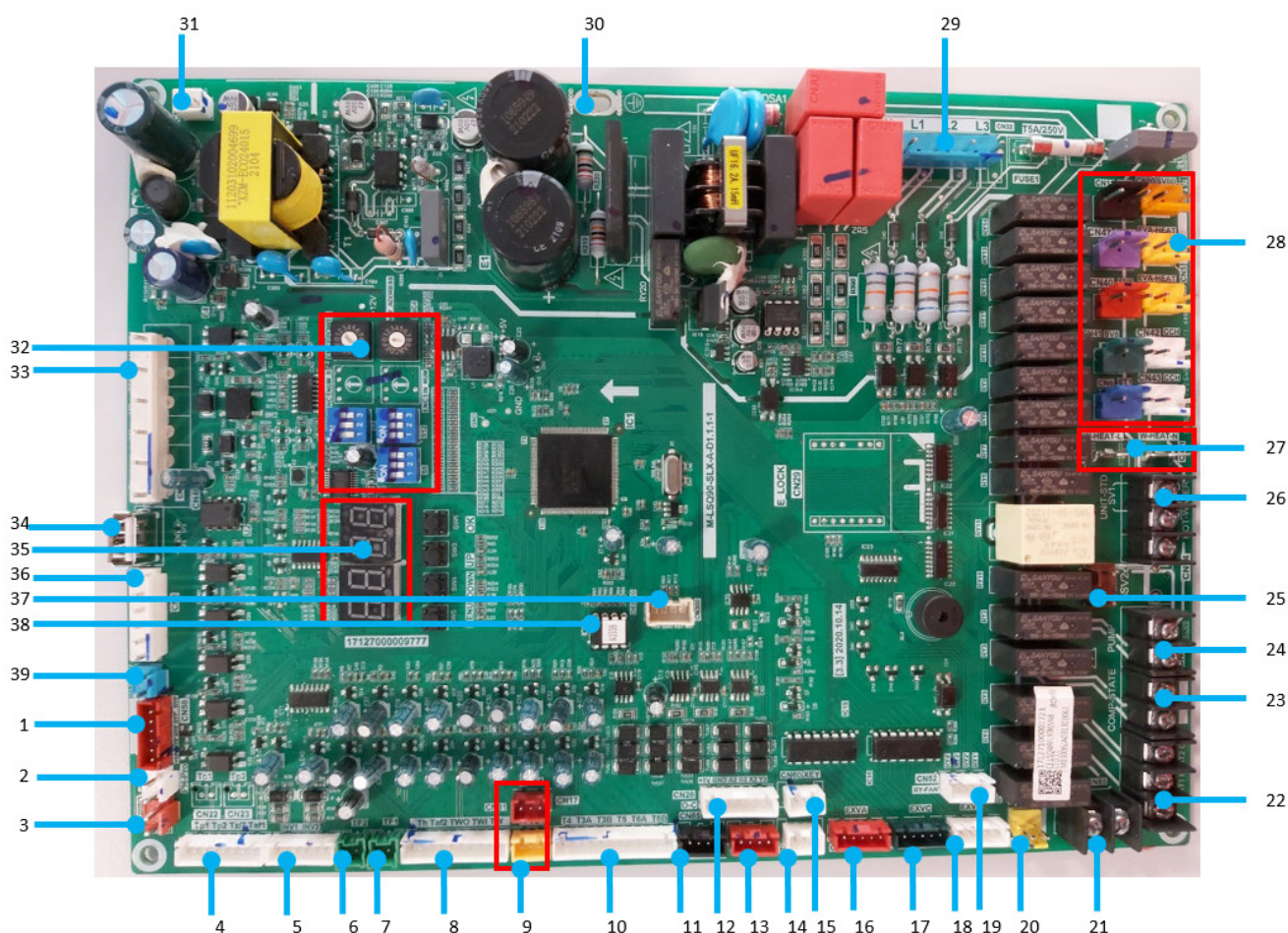
7.6.1 Types

The units have four PCBs – main control board, three phase AC filter board, DC fan inverter module board and compressor inverter module board.

The locations of each PCB in the unit electric control boxes are shown in “Unit Electric Control Box Layout”.

7.6.2 Main PCB

Unit main PCB



Label in Figure 4-2.1	Code	Content	Voltage
1	CN58	Signal output port for filter board relay	0 or 12V DC
2	CN91	Reserve port	0 or 12V DC
3	CN19	ON/OFF signal input port for system low pressure	0 or 5V DC
4	CN69	Temperature detection port (Tp1/Tp2/Tz/7/Taf1)	0~5V DC
5	CN15	Current inspection port of the inverter compressor A, compressor B	0~5V DC
6	CN10	Communication port between Main board and pump B motor protector	0~5V DC
7	CN3	Communication port between Main board and pump A motor protector	0~5V DC

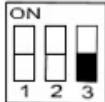
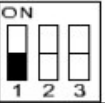
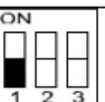
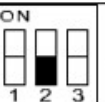
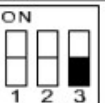
8	CN31	Temperature detection port (Th/Taf2/Two/Twi/Tw)	0~5V DC
9	CN16		
CN17	Input port for system high pressure detection		
Input port for system low pressure detection	0~5V DC		
10	CN1	Temperature detection port (T4/T3A/T3B/T5/T6A/T6B)	0~5V DC
11	CN65	Communication port between Main board and compressor inverter module	0~5V DC
12	CN28	Connection port of auxiliary board Reserve	0~5V DC
13	CN64	Communication port between Main board and fan inverter module	0~5V DC
14	CN61	Communication port between main board and HMI	0~5V DC
15	CN60	Communication port between units	0~5V DC
16	CN70	Actuation port of EXV A	0 or 12V DC
17	CN72	Actuation port of EXV C	0 or 12V DC
18	CN71	Actuation port of EXV B	0 or 12V DC
19	CN52	Signal output port for filter board relay	0 or 12V DC
20	CN20	ON/OFF signal input port for system discharge temperature	0 or 12V DC
21	CN85	Output port for alarm	0 or 230V AC
22	CN26	Output port for auxiliary heaters of pipeline	0 or 230V AC
23	CN33	Output port for compressor state	0 or 230V AC
24	CN25	Output port for pump	0 or 230V AC
25	CN86	Output port for valve SV2	0 or 230V AC
26	CN27 CN87	Output port for valve SV1	
Output port for Hot-Water	0 or 230V AC		
27	CN4 CN11	Output port for electrical heater of water switch	0 or 230V AC
28	CN5 CN13 CN42 CN43 CN6 CN41 CN40 CN47 CN12 CN80	Output port for valve and electrical heater of crankcase and plate exchanger	0 or 230V AC
29	CN32	Input of three-phase four-wire power supply	L1&N 230V AC L2&N 230V AC L3&N 230V AC
30	CN100	PE port	0V AC
31	CN74	The power supply port of the HMI (DC9V)	9V DC
32	ENC2 ENC4 S5 S6 S12	ENC2 – Unit size rotary switch ENC4 – Unit address rotary switch S5 - Unit configuration, check wiring diagram for more info S6 - Unit configuration, check wiring diagram for more info S12 - Unit configuration, check wiring diagram for more info	0 or 5V DC
33	CN48	CN48-5/6 Pump-V 0-10V output CN48-3/4 V1 V2 performance capacity limitation 0-10V input without polarity CN48-1/2 TEMP SWITCH on/off input	IN & OUT

34	CN18	USB INTERFACE for software updating	5V DC
35	DSP1 DSP2	Digital tube display	0 or 5V DC
36	CN8	Port for water flow switch	0 or 12V DC
37	CN300	Program burn in port(WizPro200RS programming device)	-
38	IC10	EEPROM	5V DC
39	CN21	Terminal for Water Pressure Switch	0 or 12V DC

7.6.2.1 Main PCB field setting

The units have 2 main PCBs: main and slave control board. The setting of the switch need to be the same on the master and slave board, with the exception of the ENC2 and ENC4

Main PCB switch settings for V12 software version

Switch		Description	Default factory Setting MASTER	Default factory Setting SLAVE
S5-1/2		Product configuration ¹ Heat pump normal cooling mode: OFF OFF Heat pump low-temperature cooling mode: ON OFF Cooling only: OFF ON (disabled) Free cooling: ON ON (disabled)	OFF OFF ²	
S5-3		OFF: Normal control	OFF	
		ON: Remote control ³		
S6-1		OFF: HEAT1 connect to Electric heating of pipes	OFF	
		ON: HEAT1 connect to Auxiliary electric heating or Gas Boiler		
S6-2/3		AC Current limiting for compressor 0: OFF OFF 1: OFF ON 2: ON OFF 3: ON ON	OFF OFF	
S12-1		OFF: without backup pump	Depend on unit option configuration ⁴	
		ON: with backup pump		
S12-2		OFF: Single water pump control	OFF	
		ON: Multiple water pumps control		
S12-3		Reserved	OFF	
ENC2		DIP switch of unit capacity 0,1,2,...F ⁵	0: - 1: - 2: - 3: - 4: 45.4 or 55.4 (50kW) 5: 50.4 or 60.4 (60kW) 6: - 7: 65.4 (80kW) 8: 70.4 (90kW) 9: 75.4 (100kW) A: 80.4 (110kW) B: 85.4 (120kW)	0: - 1: - 2: - 3: - 4: 45.4 (50kW) 5: 50.4 (60kW) 6: - 7: 55.4 or 65.4 (80kW) 8: 60.4 or 70.4 (90kW) 9: 75.4 (100kW) A: 80.4 (110kW) B: 85.4 (120kW)

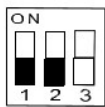
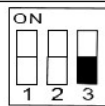
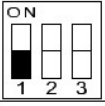
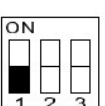
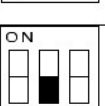
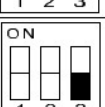
Note:

- The combination of S5-1 and S5-2 give the possibility to choose the typology of the unit (software of Heat pump, Cooling Only and Free Cooling units are the same). For Heat pump unit, move the DIP Switch S5-1

from OFF (down) to ON (up) to select the low water temperature operation. Low water outlet temperature range: 0°C to 20°C; normal water outlet temperature range: 5°C to 20°C.

- 2 Configuration of DIP Switch S5-1/2 from factory are: OFF-OFF for heat pump unit, OFF-ON for cooling only unit and ON-ON for free cooling unit.
- 3 Please refer to “Part 3, 7.3 Additional control” for detail operation method of using remote control.
- 4 If the unit is without pump or has installed only 1 pump the DIP switch S12-1 is setted OFF (down); if the unit is with 2 pump the DIP switch S12-1 is setted ON (up).
- 5 Is mandatory to keep the factory setting.
- 6 The master circuit need to be setted with even number (0,2,4,6,...,E) and slave circuit with the next uneven number (1,3,5,7,...,F). Example: 0 master + 1 slave. In cascade system the master unit has the addresses 0+1, the others has 2+3, 4+5, ..., E+F.

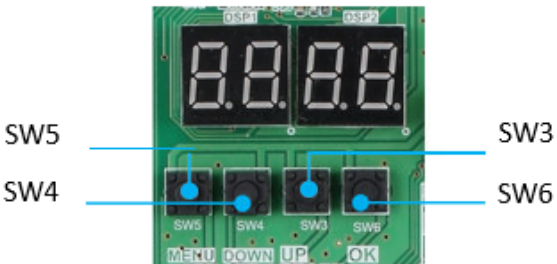
Main PCB switch settings from V17 software version

Switch		Description	Default factory Setting MASTER	Default factory Setting SLAVE
S5-1/2		Product configuration ¹ Heat pump normal cooling mode: OFF Heat pump low-temperature cooling mode: ON Cooling only: OFF ON (disabled) Free cooling: ON ON (disabled)	OFF	OFF ²
S5-3		OFF: Normal control ON: Remote control ³		OFF
S6-1		OFF: HEAT1 connect to Electric heating of pipes ON: HEAT1 connect to Auxiliary electric heating or Gas Boiler		OFF
S6-2/3		AC Current limiting for compressor 0: OFF OFF 1: OFF ON 2: ON OFF 3: ON ON	OFF	OFF
S12-1		HP reserved FC/CO OFF Premium series ON Excellence series		OFF
S12-2		OFF - single mode system ON - multi-mode system (factory default)		OFF
S12-3		OFF: without backup pump ON: with backup pump		Depend on unit option configuration ⁴

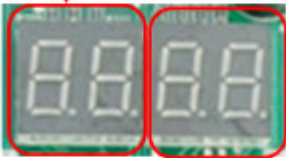
ENC2		DIP switch of unit capacity 0,1,2,...F ⁵	HP	0: - 1: - 2: - 3: - 4: 45.4 or 55.4 (50kW) 5: 50.4 or 60.4 (60kW) 6: - 7: 65.4 (80kW) 8: 70.4 (90kW) 9: 75.4 (100kW) A: 80.4 (110kW) B: 85.4 (130kW) C: - D: - E: - F: -	0: - 1: - 2: - 3: - 4: 45.4 (50kW) 5: 50.4 (60kW) 6: - 7: 55.4 or 65.4 (80kW) 8: 60.4 or 70.4 (90kW) 9: 75.4 (100kW) A: 80.4 (110kW) B: 85.4 (130kW) C: - D: - E: - F: -
			CO PRM	0: - 1: - 2: - 3: 45.4 (40kW) 4: 50.4 (50kW) 5: 55.4 or 60.4 (60kW) 6: - 7: 65.4 (80kW) 8: 70.4 (90kW) 9: 75.4 (100kW) A: 80.4 (110kW) B: 85.4 (120kW) C: 90.4 (130kW)	0: - 1: - 2: - 3: 45.4 (40kW) 4: 50.4 (50kW) 5: 55.4 (60kW) 6: - 7: 65.4 (80kW) 8: 60.4 or 70.4 (90kW) 9: 75.4 (100kW) A: 80.4 (110kW) B: 85.4 (120kW) C: 90.4 (130kW) D: -

				D: - E: - F: -	E: - F: -
			CO EXC	0: - 1: - 2: - 3: - 4: 45.4 (50kW) 5: 50.4 or 60.4 (60kW) 6: 65.4 (70kW) 7: 70.4 (80kW) 8: 75.4 (90kW) 9: - A: 80.4 (110kW) B: 85.4 (120kW) C: 90.4 (130kW) D: - E: - F: -	0: - 1: - 2: - 3: - 4: 45.4 (50kW) or 55.4 (60kW) 5: 50.4 (60kW) 6: 55.4 or 65.4 (70kW) 7: 60.4 or 70.4 (80kW) 8: 75.4 (90kW) 9: - A: 80.4 (110kW) B: 85.4 (120kW) C: 90.4 (130kW) D: - E: - F: -
			FC EXC/PRM	0: - 1: - 2: - 3: 45.4 (40kW) 4: 50.4 (50kW) 5: 55.4 (60kW) 6: 60.4 (70kW) 7: 65.4 (80kW) 8: 70.4 (90kW) 9: 75.4 (100kW) A: 80.4 (110kW) B: 85.4 (120kW) C: 90.4 (130kW) D: - E: - F: -	0: - 1: - 2: - 3: 45.4 (40kW) 4: 50.4 (50kW) 5: 55.4 (60kW) 6: 60.4 (70kW) 7: 65.4 (80kW) 8: 70.4 (90kW) 9: 75.4 (100kW) A: 80.4 (110kW) B: 85.4 (120kW) C: 90.4 (130kW) D: - E: - F: -
ENC4		DIP switch of unit network address ⁶ 0+1: master unit 2+3,4+5,...E+F: slave units		0	1

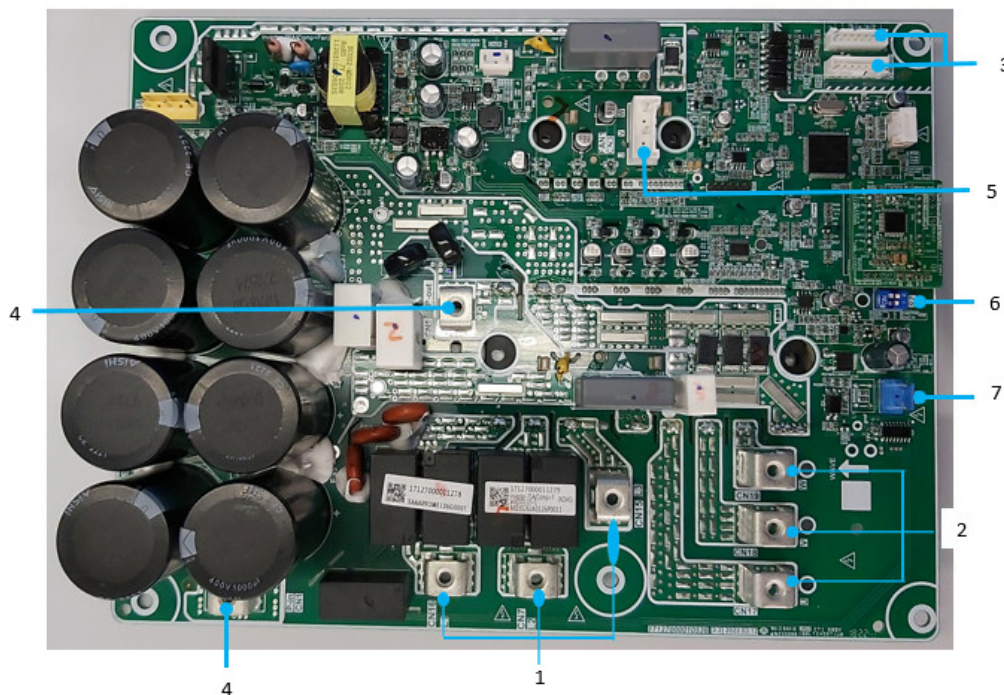
Function of buttons SW3 to SW6

Button	Function	
SW3	Up	
SW4	Down	
SW5	Menu	
SW6	Ok	

Digital display output

Unit state		Parameters displayed on DSP1	Parameters displayed on DSP2	
Standby		0	1	
Normal operation	For single compressor units	None	Running speed of compressor	
	For dual compressor units	Running speed of compressor A in rotations per second	Running speed of compressor B in rotations per second	
Error or protection		-- or placeholder	Error or protection code	

7.6.3 Compressor Inverter Module Board with integrated Fan module board C



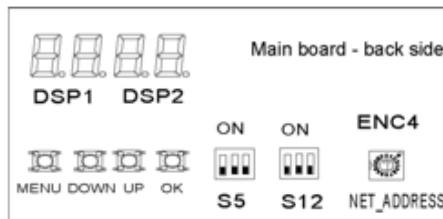
Label	Code	Content	Voltage
1	L1-L2-L3	Port for three-phase power supply of filter board	400V AC
2	U-V-W	Port for compressor connection	0~400V AC
3	CN8-CN9	Communication port between compressor invert modules or communication port between compressor invert module and main control board	0~5V DC
4	CN1-CN5	Port for electric reactor	560V DC
5	CN3	Port for fan connection	560V DC
6	S7	Dip switch for bus address	
7		Port for High pressure switch	

7.6.3.1 Compressor Inverter Module PCB field setting

Switch S7	Description
ON 	00: compressor 1 inverter module address setting
	01: compressor 2 inverter module address setting

7.6.3.2 STATUSES DISPLAY

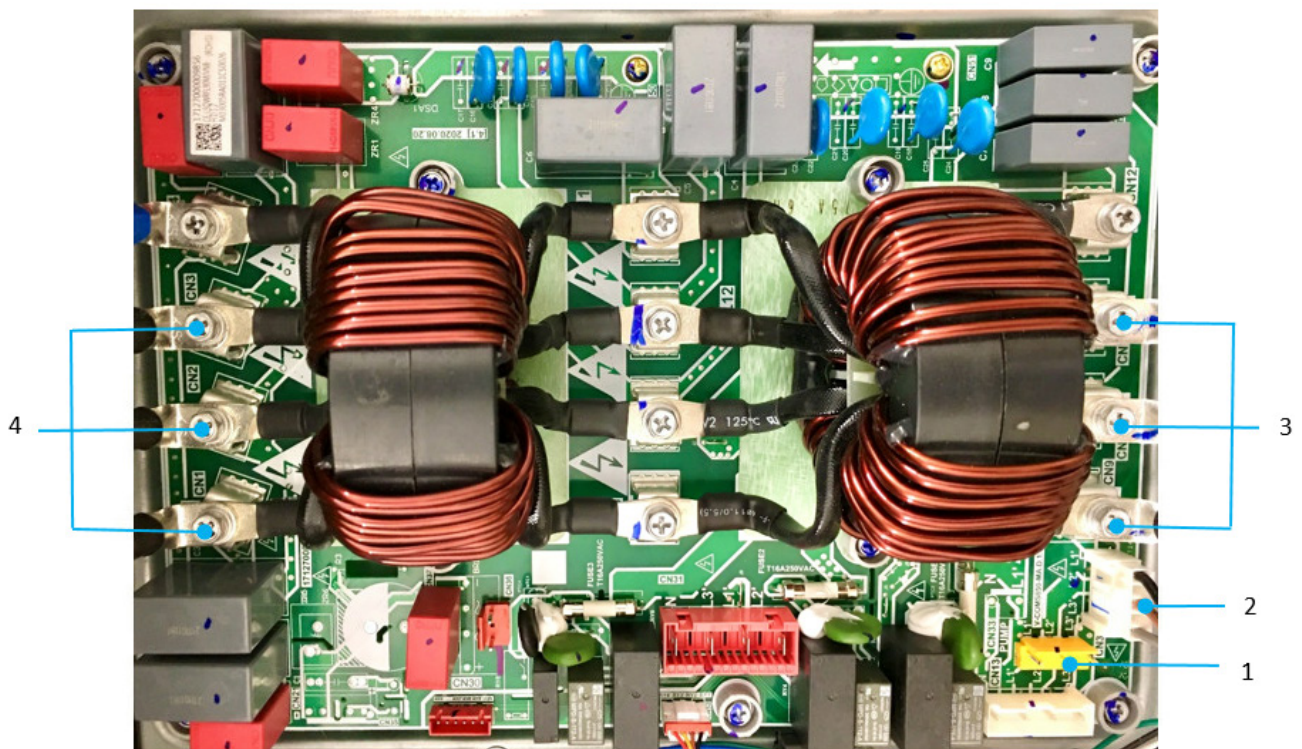
If the keyboard is remote, it is possible to read the unit statuses also from the display on the main board.
Press UP on the main board



	Standby: unit address (88 to the left) + online number (88 to the right) On: frequency defrosting: dFdF
0.xx	unit address
1.xx	capacity of unit
2.xx	number of units online
3.xx	T4 correction (reserved and display "1")
4.xx	Mode (8: Off; 0: Standby; 1: Cooling; 2: Heating)
5.xx	fan gear (0-35)
6.xx	fan gear (reserved and display "0")
7.xx	coil temperature: Min(T3a, T3b)
8.xx	T4: outside air temperature
9.xx	T5: DHW temperature
10.xx	Taf1: Water tank antifreeze temperature, antifreeze protection
11.xx	Taf2: exchanger outlet temperature, antifreeze protection
12.xx	Tw: common outlet water temperature, after the last unit
13.xx	Twi: inlet water
14.xx	Two: outlet water
15.xx	Tz: Total condenser outlet temperature
16.xx	Heat recovery sensor temperature (reserved to display "--")
17.xx	TP1 discharge temperature
18.xx	TP2 discharge temperature
19.xx	Tfin1 the temperature of driver board
20.xx	Tfin2 the temperature of driver board
21.xx	Tdsh discharge superheat
22.xx	Compressor current A
23.xx	Compressor current B
24.xx	Reserved display "--"
25.xx	electronic expansion valve opening A (/20)
26.xx	electronic expansion valve opening B (/20)

27.xx	electronic expansion valve opening C (/4)
28.xx	high pressure (heating mode)
L.xx	low pressure (cooling mode or standby mode)
30.xx	Tssh suction superheat
31.xx	Th suction temperature
32.xx	Silent mode
33.xx	static pressure (reserved)
34.xx	DC voltage A (reserved)
35.xx	DC voltage B (reserved)
xx.xx	Reason for frequency limitation: BIT0: T4 frequency limit BIT1: Tp frequency limit BIT2: Tz frequency limit BIT3: Tfin frequency limit BIT4: Two Frequency Limit in cooling mode BIT5: High pressure of system frequency limit in heating mode BIT6: Current Limit BIT7: Voltage limit BIT8: DC current of compressor limit BIT9: low pressure of system frequency limit in cooling mode BIT10: Two frequency limit in heating mode BIT11: Tdsh frequency limit in heating mode BIT12: Power Restriction Mode BIT13: Silent Mode BIT14: Reserved BIT15: Reserved
37.xx	defrosting status (1st digit: T4 selection solution; 2nd digit: at intervals; 3rd and 4th digit defrosting on timer)
39.xx	Defrosting plan
40.xx	initial frequency
41.xx	Tc: Saturation temperature corresponding to high pressure in heating mode
42.xx	Te: Saturation temperature corresponding to low pressure in cooling mode
43.xx	T6a: exchanger inlet temperature
44.xx	T6b: exchanger outlet temperature
45.xx	software version
46.xx	last error
47.xx	----

7.6.4 AC Filter Board



Label	Code	Content	Voltage
1	CN34	Terminal for transformer (only main circuit)	L1&L2:400V~ L2&L3:400V~ L3&L1:400V~
2	CN32	Terminal for three-phase monitor (only main circuit)	L1&L2:400V~ L2&L3:400V~ L3&L1:400V~
3	CN9 - CN10 CN11	Three-phase power output	L1&L2:400V~ L2&L3:400V~ L3&L1:400V~
4	CN1 - CN2 CN3	Three-phase power input	L1&L2:400V~ L2&L3:400V~ L3&L1:400V~

8. Error Code Table

Error code	Modbus error code (1)	Description	Toubleshooting		
			Stop the whole system	Stop the fault circuit	Stop the fault unit
E2	3	XYE communication failure	✓(master)		✓(slave)
E3	4	Tw failure (valid on the master)			
E4	5	Two failure			
E5	262	1E5 - T3A failure		✓	
	518	2E5 - T3B failure		✓	
E6	7	T5 failure	✓ (single pump)		✓ (multiple pump)
E7	8	T4 failure			✓
E8	9	Phase sequence detector alarm	✓ (master)		✓ (slave)
E9	10	E9 water flow detection failure	✓ (single pump)		✓ (multiple pump)
	522	2E9 water pressure detection failure			
xEb	268	1Eb - Taf1 failure			✓
	524	2Eb - Taf2 failure			✓
EC	13	Slave module reduction (detected on the HMI)	X(2)	X	X
Ed	14	Both A and B system Tp probe failure		✓	
xEE	271	1EE - T6A failure		✓	
	527	2EE - T6B failure			
EF	16	Tw failure			✓
EP	19	Tp failure		✓	
EU	20	Tz failure		✓	
P0	21	System high pressure protection or exhaust temperature protection		✓	
P1	22	System low pressure protection		✓	
P2	23	Tz too high protection		✓	
P3	24	Cooling T4 temperature over range protection			✓
P4	25	System A Current Protection		✓	
P5	26	System B Current protection		✓	
P7	28	T3 high temperature protection		✓	
P9	30	Inlet and outlet water temperature difference protection			✓

PA	31	Inlet and outlet water temperature difference protection			✓
xPb	32	Pb- Winter Freeze Protection	x	x	x
	288	1Pb-Winter anti-freeze protection electric heating insufficient			
	544	2Pb-Winter anti-freezing protection electric heating is seriously insufficient			
PC	33	Evaporator pressure too low during cooling		✓	
PE	35	Cooling evaporator low temperature antifreeze protection			✓
PH	37	Heating T4 temperature out of range protection			✓
PL	38	Tfin too high protection		✓	
1PU	296	1PU - DC fan A module protection			✓
2PU	552	2PU - DC fan B module protection			✓
H5	46	Voltage too high or too low		✓	
1H9	306	1H9 - A compressor model does not match			✓
2H9	562	2H9 - B compressor model does not match			
1HE	311	1HE - A valve not inserted failure		✓	
2HE	567	2HE - B valve not inserted failure			
3HE	823	3HE - C valve not inserted failure			
1FO	317	1FO - IPM module communication failure			✓
2FO	573				
F2	63	Tdsh insufficient protection or Tp sensor falling off		✓	
1F4	321	1F4 - System A 3 times of L0 or L1 protection within 60 minutes		✓	
2F4	577	2F4 - System B 3 times of L0 or L1 protection within 60 minutes			
1F6	323	1F6 - System A bus voltage failure (PTC)		✓	
2F6	579	2F6 - System B bus voltage failure (PTC)			
Fb	72	Pressure sensor failure		✓	
Fd	74	Th failure		✓	
FE	75	The backup pump configuration of the master-slave system of the unit does not match	x	x	x

1FF	332	1FF - DC fan A failure			✓
2FF	588	2FF - DC fan B failure			
3FF	844	3FF - DC fan B failure			
FP	79	Dial codes of pump number on master and slave units are inconsistent			✓
C0	81	Circuit model configuration error			✓
C1	82	X2Y2E communication failure			
C2	82	The unit types of cascade system are not matched with each other	✓		
C7	88	If PL occurs 3 times, the system reports the C7 failure		✓	
dF	136	Defrost reminder	x	x	x
dU	140	The warning to indicate T5s is not met but switching to AC	x	x	x
xL0	357	1L0 - board 1 failure, module protection		✓	
	613	2L0 - board 2 failure, module protection		✓	
xL1	358	1L1 - board 1 failure, low voltage protection		✓	
	614	2L1 - board 2 failure, low voltage protection		✓	
xL2	359	1L2 - board 1 failure, high voltage protection		✓	
	615	2L2 - board 2 failure, high voltage protection		✓	
xL4	361	1L4 - board 1 failure, MCE failure		✓	
	617	1L4 - board 2 failure, MCE failure		✓	
xL5	362	1L5 - board 1 failure, zero speed protection		✓	
	618	2L5 - board 2 failure, zero speed protection		✓	
xL7	364	1L7 - board 1 failure, phase loss		✓	
	620	2L7 - board 2 failure, phase loss		✓	
xL8	365	1L8 - board 1 failure, frequency changes over 15Hz		✓	
	621	2L8 - board 2 failure, frequency changes over 15Hz		✓	
xL9	366	1L9 - board 1 failure, frequency difference 15Hz		✓	
	622	2L9 - board 2 failure, frequency difference 15Hz		✓	

xLA	367	1LA - board 1 fauire, high pressure detected failure		✓	
	623	2LA - board 2 fauire, high pressure detected failure		✓	
xLn	376	1Ln - board 1 fauire, PFC failure		✓	
	623	2Ln - board 2 fauire, PFC failure		✓	
xLb	Other values	1Lb - board 1 fauire, other failures 2Lb - board 2 failure, other failures		✓	

Note:

- 1 When the error code appears, the error code corresponding to the error code can be obtained through the H1H2 port by using the host computer to query the wired controller register.
- 2 indicates that it is used for displaying the status and has nothing to do with the shutdown action.

9. Troubleshooting

Warning

All electrical work must be carried out by competent and suitably qualified, certified and accredited professionals and in accordance with all applicable legislation (all national, local and other laws, standards, codes, rules, regulations and other legislation that apply in a given situation).

Power-off the units before connecting or disconnecting any connections or wiring, otherwise electric shock (which can cause physical injury or death) may occur or damage to components may occur.

9.1 H9

Digital display output



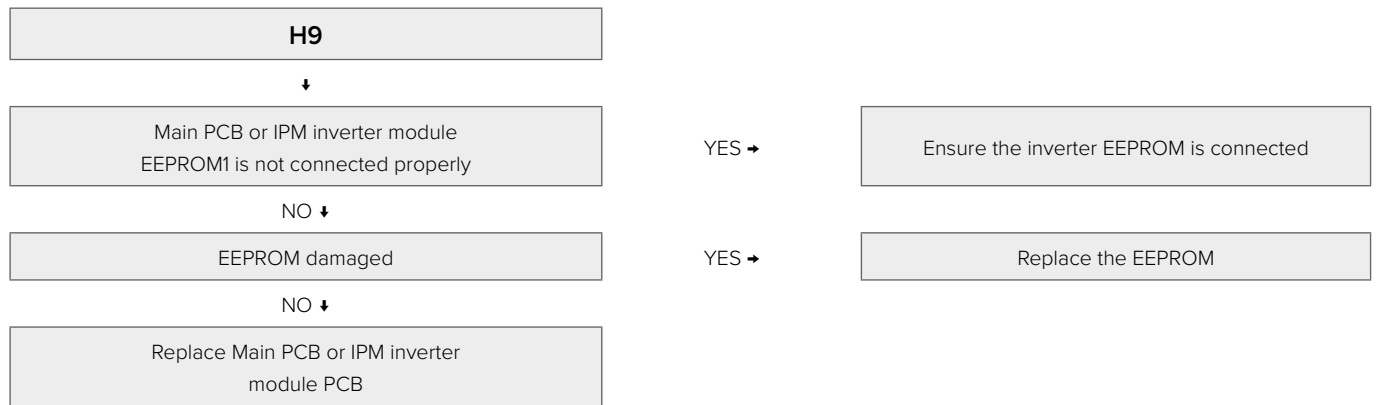
Description

- 1H9 indicates dial code drive (compressor A) model does not match.
- 2H9 indicates dial code drive (compressor B) model does not match.
- Error code is displayed on main PCB and user interface.

Possible causes

- IPM or EEPROM inverter module is not connected properly.
- IPM or EEPROM inverter module damaged.

Procedure



Notes:

- 1 Compressor inverter module PCB EEPROM is designated IC25 on compressor inverter module PCB (labeled 6 in Figure 4-2.2a and labeled 4 in Figure 4-2.2b in Part 4, 2.3 "Compressor inverter module PCB").

9.2 E2

Digital display output



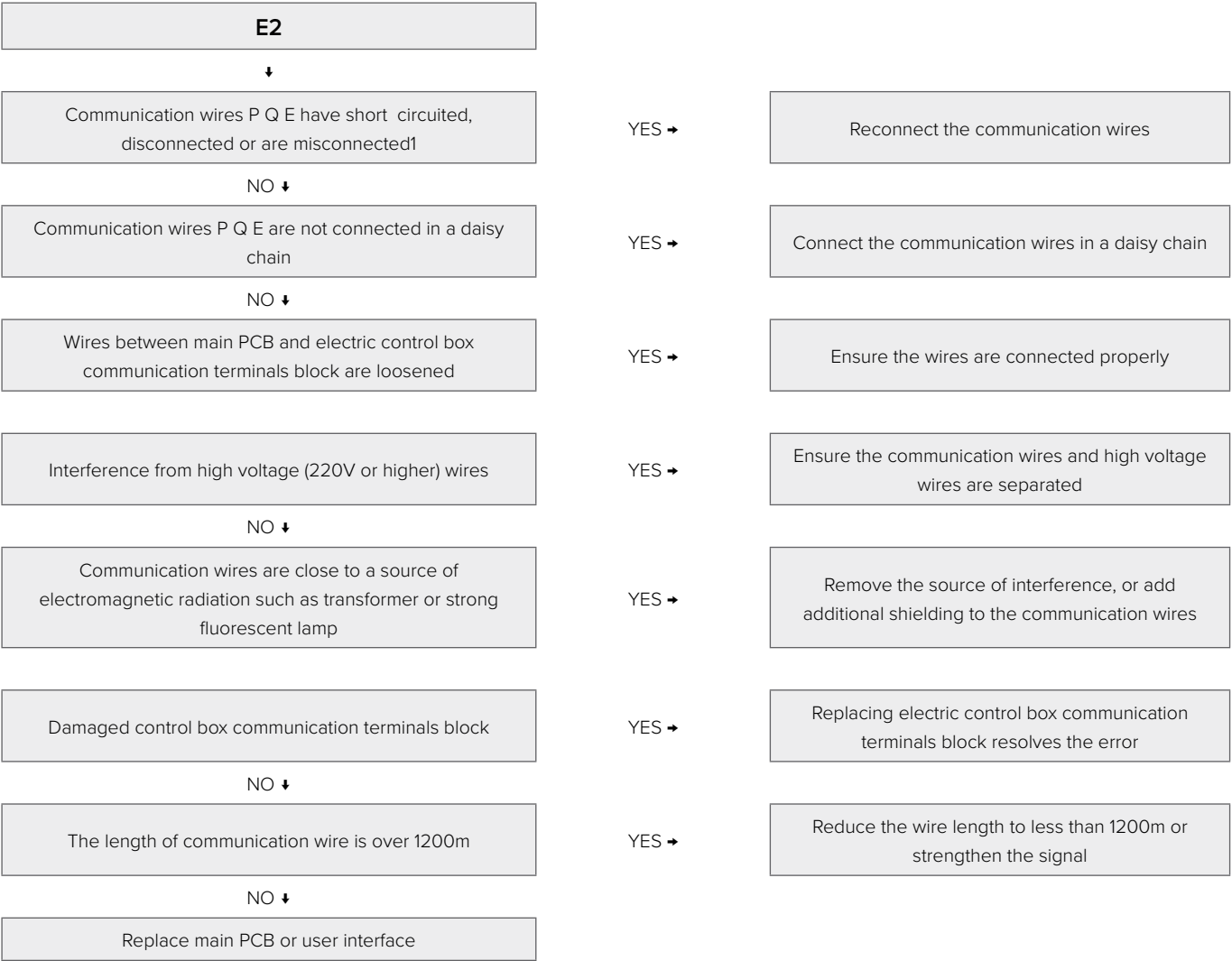
Description

- Communication error between unit and user interface.
- Error code is displayed on main PCB and user interface.

Possible causes

- Communication wires between unit and user interface are not connected properly.
- Communication wiring P Q E terminals misconnected.
- Loosened wiring within electric control box.
- Interference from high voltage wires or other sources of electromagnetic radiation.
- Communication wire is too long.
- Damaged main PCB, user interface or electric control box communication terminals block.

Procedure



Notes:

- 1 Measure the resistance among P, Q and E. The normal resistance between P and Q is 120Ω, between P and E is infinite, between Q and E is infinite. Communication wiring has polarity. Ensure that the P wire is connected to P terminals and the Q wire is connected to Q terminals.

9.3 E3, E4, E5, E7, Eb, Ed, EF, EP, EU, F9,Fb, Fd

4.5.1 Digital display output

88	E3	82	F9
88	E4	88	Fb
81	E5	88	Fd
88	E7		
82	Eb		
81	Ed		
82	EF		
88	EP		
88	EU		
81	F9		

Description

E3	indicates a combined water outlet temperature sensor error
E4	indicates a water outlet temperature sensor error
1E5	indicates an air side heat exchanger refrigerant outlet temperature sensor T3A error
E7	indicates an outdoor ambient temperature sensor error
1Eb	indicates a water side heat exchanger anti-freezing temperature sensor Taf1 error
2Eb	indicates a water side heat exchanger anti-freezing temperature sensor Taf2 error
Ed	indicates a discharge pipe temperature sensor error
EF	indicates a water inlet temperature sensor error
EP	indicates a discharge pipe temperature sensor failure alarm
EU	indicates an air side heat exchanger refrigerant total outlet temperature sensor Tz error
1F9	indicates inverter module temperature sensor(Tf1) error
2F9	indicates inverter module temperature sensor(Tf2) error
Fb	indicates a pressure sensor error
Fd	indicates an air suction temperature sensor error

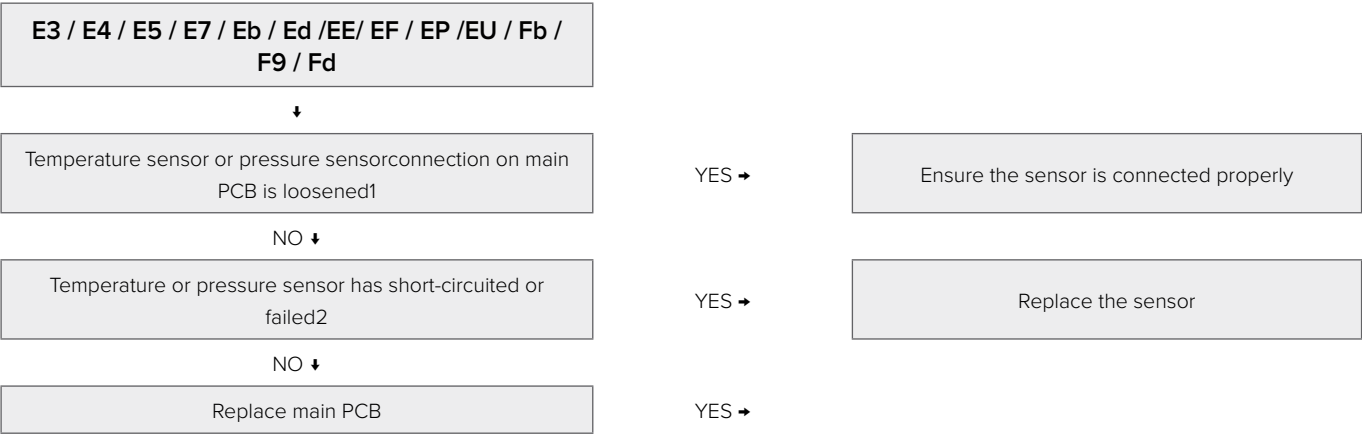
All stop running.

Error code is displayed on main PCB and user interface.

4.5.3 Possible causes

- Temperature sensor or pressure sensor are not connected properly or malfunctioned.
- Main PCB Damaged.

Procedure



Notes:

- 1 The sensors are connected to port CN1, CN16/CN17, CN31, CN3, CN10 and CN69 on the main PCB (labeled 10, 9, 8, 7, 6, 4 in figure “Main PCB”).
- 2 Measure sensor resistance. If the resistance is too low, the sensor has short-circuited. If the resistance is not consistent with the sensor’s resistance characteristics table, the sensor has failed. Refer to Table “Temperature Sensor Resistance Characteristics”.

9.4 E8

Digital display output



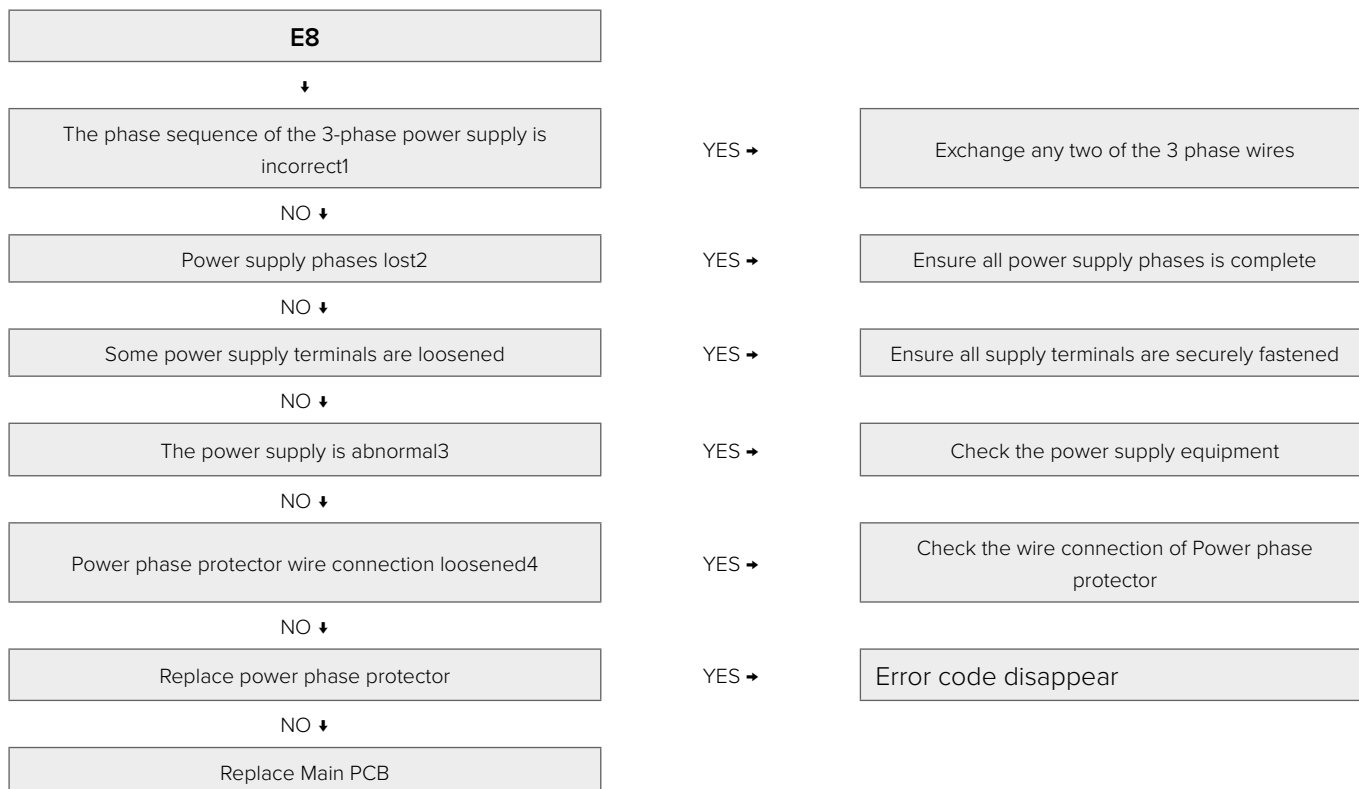
Description

- Power phase protector output error or leak detector output error (if leak detector is present).
- When this error occurs in the main unit, all units stop running. When this error occurs in the slave unit, the slave unit stop running.
- Error code is displayed on main PCB and user interface.

Possible causes

- Power supply phases not connected in correct sequence or lost.
- Power supply terminals or power phase protector wire connection loosened.
- Power supply abnormal.
- Damaged main PCB.
- Damaged power phase protector.
- Refrigerant leakage detected by leak detector.
- At start up the sensor of leak detector is not ready (wait 4 minutes to initialize the leak detector).

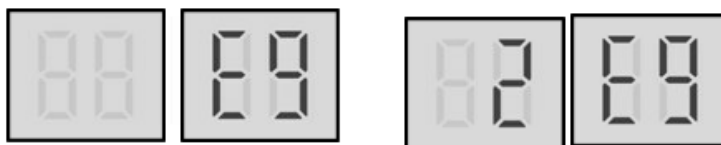
Procedure



- 1 The red LED on the power phase protector will on.
- 2 The red LED on the power phase protector will flash with 1HZ.
- 3 The red LED on the power phase protector will flash with 3HZ.
- 4 Loosened power supply terminals can cause the compressors to operate abnormally and compressor current to be very large.

9.5 E9

Digital display output



Description

- Water flow failure.
- E9 indicates a water differential pressure switch error. When an E9 error occurs 3 times in 60 minutes, a manual system restart is required before the system can resume operation.
- Error code is displayed on main PCB and user interface.

Possible causes

- The wire circuit is short connected or open.
- Water flow rate is too low.
- Water flow switch is damaged.
- Main PCB is damaged.

9.5.1 2E9

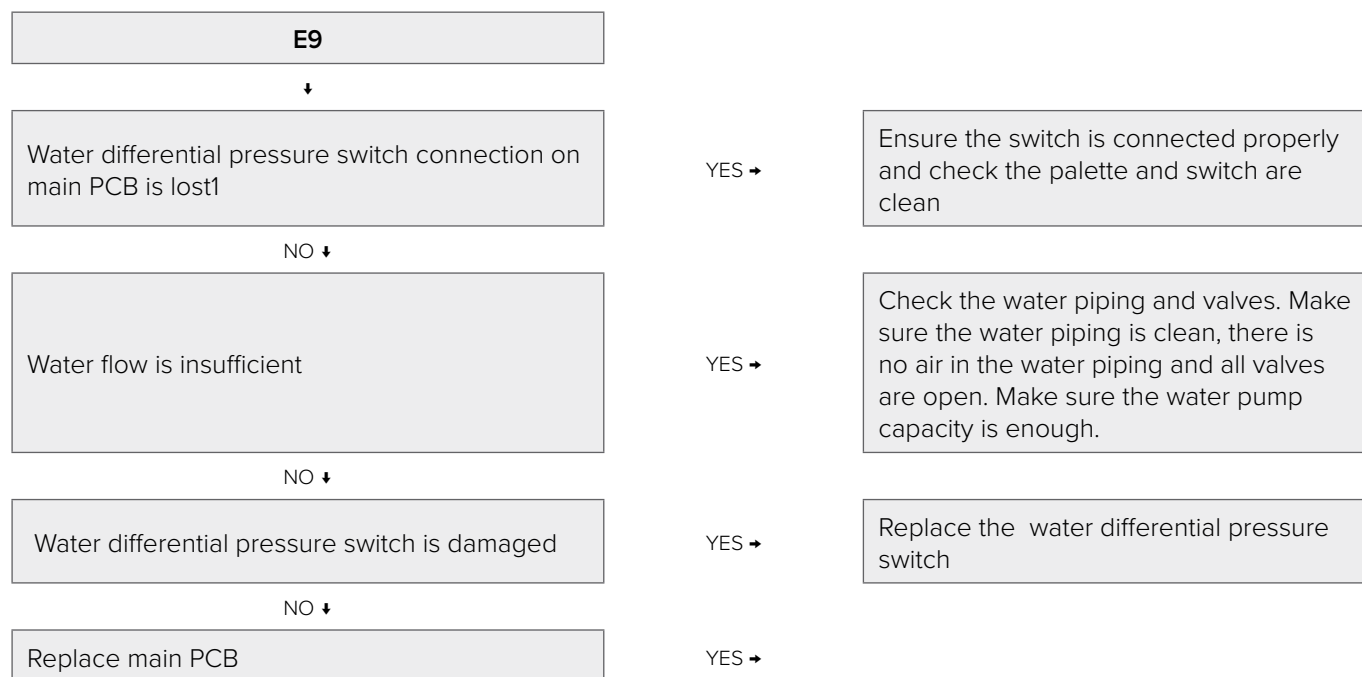
Description

- Water pressure failure.
- 2E9 indicates a water pressure switch error. When a 2E9 error occurs 3 times in 60 minutes, a manual system restart is required before the system can resume operation.
- Error code is displayed on main PCB and user interface.

Possible causes

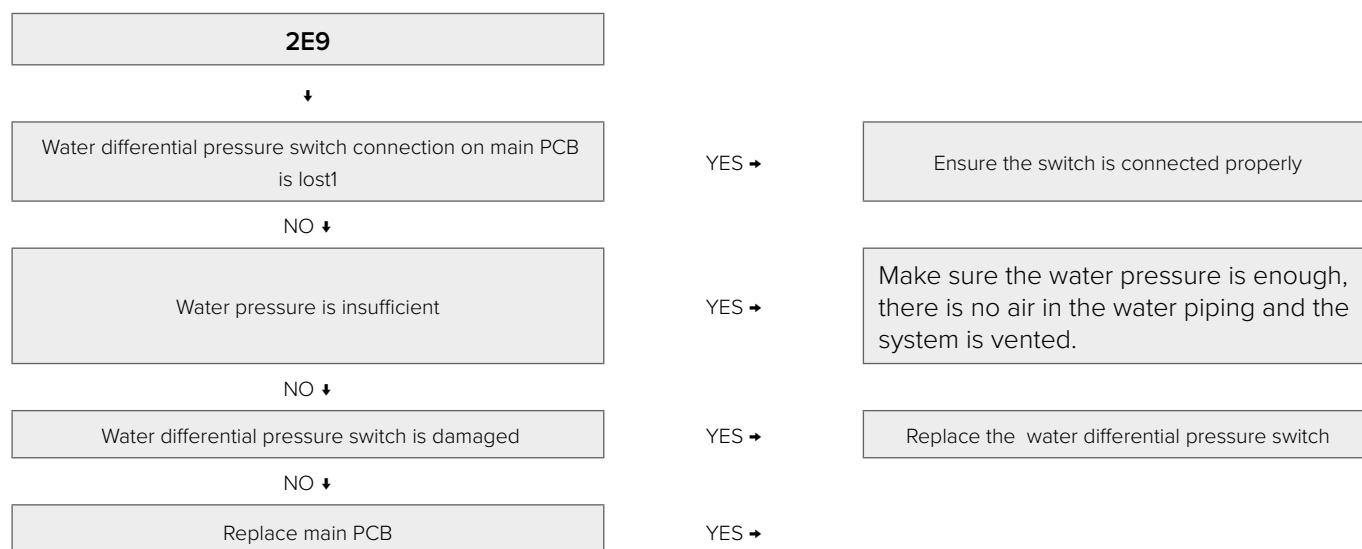
- The wire circuit is short connected or open.
- Water pressure in the system is too low.
- Water pressure switch is damaged.
- Main PCB is damaged

Procedure



Notes:

- 1 Water flow switch connection is port CN8 on the main PCB (labeled 36 in Figure “Main PCB”).



Notes:

- 1 Water differential pressure switch connection is port CN21 on the main PCB (labeled 39 in Figure “Main PCB”).

9.6 EC

Digital display output



Description

- EC indicates that the number of slave units detected by master unit has decreased.
- Error code is only displayed on the user interface.

Possible causes

- Some units are powered off.
- Power supply abnormal.
- Incorrect unit address setting.
- Communication wires between units not connected properly.
- Loosened wiring within electric control box.
- Damaged main PCB or electric control box communication terminals block.

Procedure



Notes:

- 1 Check digital display on the main PCB. If digital display is on, the main PCB is powered on, if digital display is off, the main PCB is powered off.
- 2 See Part “E2 Troubleshooting”.

9.7 P0

Digital display output

Description

- Discharge pipe high pressure or discharge temperature switch protection. When the discharge pressure rises above 4.2MPa or discharge temperature rises above 115°C, the system displays P0 protection and all units stop running. When the discharge pressure falls below 3.2MPa or discharge temperature fall below 90°C, P0 is removed and normal operation resumes. When P0 error occurs 3 times in 60 minutes, a manual system restart is required before the system can resume operation.
- Error code is displayed on main PCB and user interface.

Possible causes

- High pressure switch or discharge temperature switch not connected properly or has malfunctioned.
- Excess refrigerant for P0 related to the high discharge pressure or not enough refrigerant related to P0 due to high temperature discharge.
- High pressure side blockage.
- Poor condenser heat exchange.
- Main PCB is damaged.

Procedure

P0		
↓		
High pressure switch or discharge temperature switch connection on main PCB is lost ¹	YES →	Ensure High pressure switch or discharge temperature switch are connected properly
NO ↓		
High pressure switch or discharge temperature switch have short-circuited or failed ²	YES →	Replace the high pressure switch or discharge temperature switch
NO ↓		
The high pressure side is blocked, caused by crushed or bent pipe or blocked EXV3	YES →	Inspect the system and fix the error
NO ↓		
The heat exchange is poor ⁴	YES →	Inspect the system and fix the error
NO ↓		
The water flow rate is not sufficient in cooling mode	YES →	Inspect the water system and fix the error
NO ↓		
Replace main PCB	YES →	

Notes:

- 1 High pressure switch connection is CN23 on compressor board for size 16.2-35.2, or CN3 on the AC filter board for size 10.1-14.1 (labeled 3 and 2 in Figure 4-2.1 in Part 4, 2.2 "Main PCB").
- 2 Measure the resistance among the three terminals of the pressure sensor. If the resistance is of the order of mega Ohms or infinite, the pressure sensor has failed.
- 3 High pressure side blockage causes discharge temperature to be higher than normal, discharge pressure to be higher than normal and suction pressure to be lower than normal.
- 4 In heating mode check water side heat exchanger, water piping, circulator pumps and water flow switch for dirt/blockages. In cooling mode check air side heat exchanger, fan(s) and air outlets for dirt/blockages.

9.8 P1

Digital display output

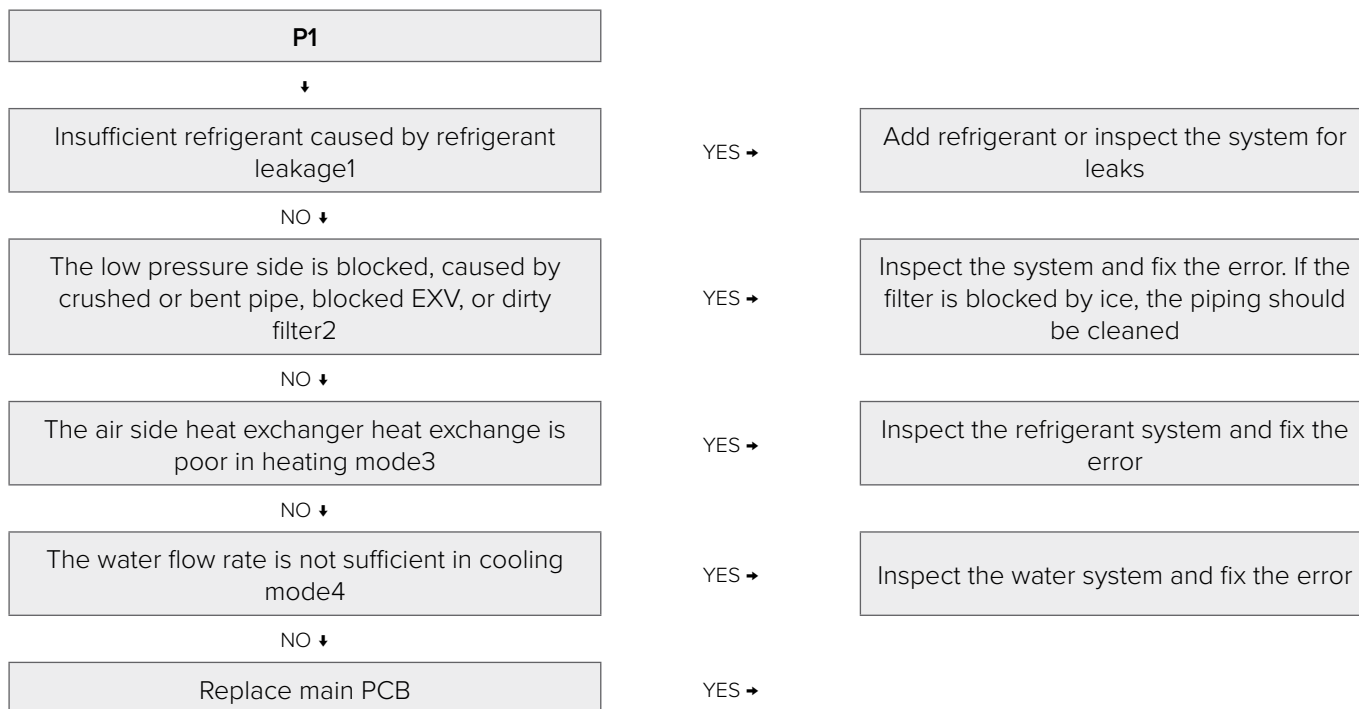
Description

- P1 indicates suction pipe low pressure protection. When the suction pressure falls below 0.14MPa, the system displays P1 protection and all units stop running. When the pressure rises above 0.3MPa, P1 is removed and normal operation resumes. When P1 error occurs 3 times in 60 minutes, a manual system restart is required before the system can resume operation.
- Error code is displayed on main PCB and user interface.

Possible causes

- Low pressure switch not connected properly or has malfunctioned.
- Insufficient refrigerant.
- Low pressure side blockage.
- Poor evaporator heat exchange in heating mode.
- Insufficient water flow in cooling mode.
- Main PCB damaged.

Procedure



Notes:

- 1 To check for insufficient refrigerant:
An insufficiency of refrigerant causes compressor discharge temperature to be higher than normal, discharge and suction pressures to be lower than normal and compressor current to be lower than normal, and may cause frosting to occur on the suction pipe. These issues disappear once sufficient refrigerant has been charged into the system.
- 2 A low pressure side blockage causes compressor discharge temperature to be higher than normal, suction pressure to be lower than normal and compressor current to be lower than normal, and may cause frosting to occur on the suction pipe. For normal system parameters.
- 3 Check air side heat exchanger, fan(s) and air outlets for dirt/blockages.
- 4 Check water side heat exchanger, water piping, circulator pumps and water flow switch for dirt/blockages.

9.9 P4, P5



Description

- P4 indicates current protection on Phase A of compressor A.
- P5 indicates current protection on Phase A of compressor B.
- When the compressor current rises above the protection value 24A, the system displays P4 or P5 protection and all units stop running. When the current returns to the normal range, P4 or P5 is removed and normal operation resumes. When P4 or P5 error occurs 3 times in 60 minutes, a manual system restart is required before the system can resume operation.
- Error code is displayed on main PCB and user interface.

Possible causes

- Power supply abnormal.
- Poor condenser heat exchange.
- High pressure side blockage.
- Excess refrigerant.
- Inverter module damaged.
- Compressor damaged.
- Main PCB damaged.

Procedure

P4 / P5		
↓		
The power supply is abnormal	YES →	Check the power supply equipment
NO ↓		
Excess refrigerant	YES →	Discharge part of the refrigerant. Add oil if it leaks during discharge process
NO ↓		
System contains air or nitrogen	YES →	Flush all refrigerant then vacuum the system and recharge refrigerant. Add oil to the system if it leaks
NO ↓		
The condenser heat exchange is poor ¹	YES →	Inspect the system and fix the error
NO ↓		
The condenser heat exchange is poor ¹	YES →	Inspect the system and fix the error
NO ↓		
Inverter module has short-circuited ³	YES →	Replace the inverter module
NO ↓		
Compressor has malfunctioned ⁴	YES →	Replace the compressor
NO ↓		
Replace main PCB		

Notes:

- 1 In heating mode check water side heat exchanger, water piping, circulator pumps and water flow switch for dirt/blockages. In cooling mode check air side heat exchanger, fan(s) and air outlets for dirt/blockages.
- 2 High pressure side blockage causes discharge temperature to be higher than normal, discharge pressure to be higher than normal and suction pressure to be lower than normal.
- 3 Set a multi-meter to buzzer mode and test any two terminals of P N and U V W of the inverter module. If the buzzer sounds, the inverter module has short-circuited.
- 4 The normal resistances of the inverter compressor are 0.3-2Ω among U V W and infinite between each of U V W and ground. If any of the resistances differ from these specifications, the compressor has malfunctioned.

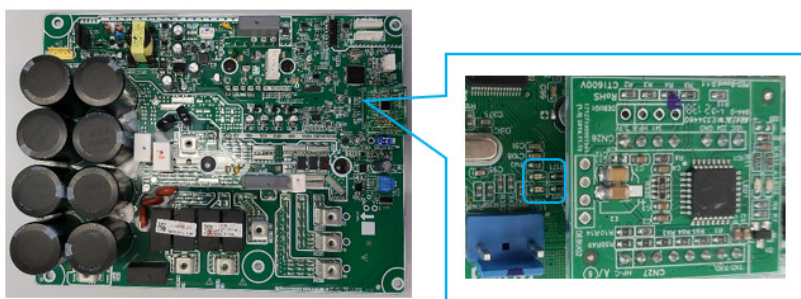
9.10 **P6****Digital display output****Specific error codes for inverter module protection**

Specific error code1	Content
xL0	Inverter module protection
xL1	DC bus low voltage protection
xL2	DC bus high voltage protection
xL4	MCE error
xL5	Zero speed protection
xL7	Phase sequence error
xL8	Compressor frequency variation greater than 15Hz within one second protection
xL9	Actual compressor frequency differs from target frequency by more than 15Hz protection

Notes:

- 1 'x' is a placeholder for the compressor system (compressor and related electrical components), with 1 representing compressor system A and 2 representing compressor system B.

The specific error codes xL0, xL1, xL2, xL4, xL5 and xL7 can be obtained from the inverter module LED indicators. If an inverter module error has occurred, LED1 flashes. Refer to Figure 4-4.2 and Table 4-4.2.

: LED indicators LED1 on main PCB

LED1 flashing pattern	Corresponding error
Flashes 8 times and stops for 1 second, then repeats	xL0 - Inverter module protection
Flashes 9 times and stops for 1 second, then repeats	xL1 - DC bus low voltage protection
Flashes 10 times and stops for 1 second, then repeats	xL2 - DC bus high voltage protection
Flashes 12 times and stops for 1 second, then repeats	xL4 - MCE error
Flashes 13 times and stops for 1 second, then repeats	xL5 - Zero speed protection

Flashes 15 times and stops for 1 second, then repeats

xL7 - Phase sequence error

9.10.1.1 First troubleshooting step

To troubleshoot xL errors, firstly ensure that the DC bus wire is connected correctly.

The DC bus wire should be connected to reactor tightly in serial, and check the sequence of 3 phase power input for compressor

DC detection wire connection method



9.10.1.2 xL0 troubleshooting

Step 1: Check inverter board

Change the inverter board setting, for example the alarm is 2L0 it means, inverter board is damage or the troubleshooting is related to the compressor. To exclude the compressor, change the address setting of the compressor 2 from 01 to 00 and the compressor 1 from 00 to 01 if the alarm is still displaying 2L0 check the inverter board 2 and go to step 3, vice versa if the displayed alarm is 1L0 check the compressor, step 2.

Switch	Description
	00: compressor 1 inverter module address setting (both on circuit 1 and 2)
	01: compressor 2 inverter module address setting (both on circuit 1 and 2)

Step 2: Check compressor

- Check that compressor wiring is all connected properly.
- The normal resistances of the inverter compressor are shown below among U V W and in MΩ range/ infinite between each of U V W and ground. If any of the resistances differ from these specifications, the compressor has malfunctioned.

Compressor	Resistance
LVB65F	0.50Ω ±10% (at 20°C)
DA80PHDG-D1Y6	0.40Ω ±7% (at 20°C)
DD110PHDG-D1Y6	0.30Ω ±7% (at 20°C)

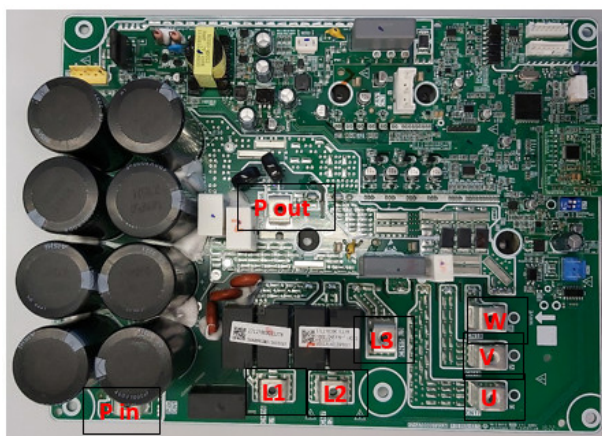
Measuring resistances among compressor terminals	Measuring resistances between compressor terminals and ground
	

- If the resistances are normal, go to Step 3.

Step 3: Check inverter module

- The DC voltage between terminals P1 and N1 should be 1.414 times the local power supply voltage. The DC voltage between terminals P and N should be 537-586V (power supply voltage specification: 380~415V 3N~). If either voltage is not in the normal range, troubleshoot as for xL1 or xL2 errors. Refer to Part 4, 4.13.7 “xL1/xL4 troubleshooting” or Part 4, 4.13.8 “xL2 troubleshooting”.
- Disconnect the terminals U, V, W from the inverter compressor. Measure the resistance among terminals P, N, U, V, W. All the resistances should be huge resistance (roughly up to several MΩ). If any of them are lower than tens of Kohm, the inverter module is damaged and should be replaced.

Inverter module terminals

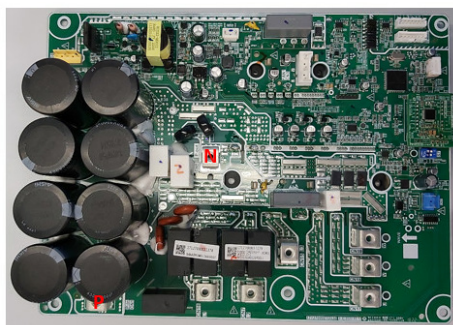


xL1/xL4 troubleshooting

Step 1: Check inverter module

- Check the DC voltage between terminals P and N. The normal value is 537-586V (power supply voltage specification: 380~415V 3N~). If the voltage is lower than 300V, go to Step 2.

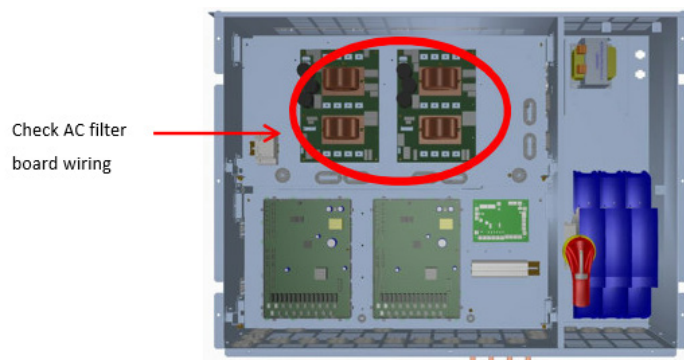
Inverter module terminals



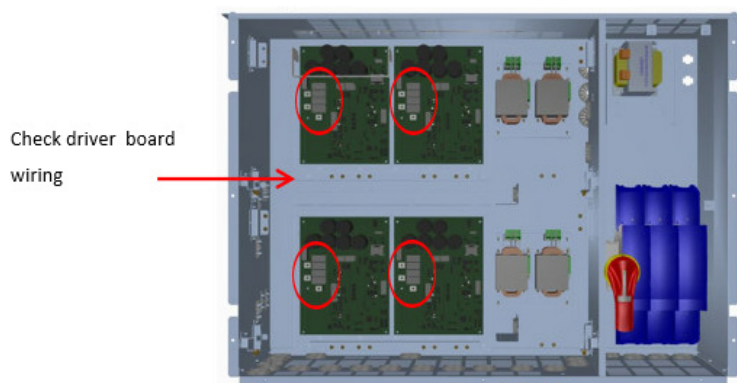
Step 2: Check rectifier wiring circuit

- If the wires are loosened, fasten the wires. If the wires are OK, replace the main PCB.

Rectifier and AC filter board in electric control box



Rectifier and AC filter board in electric control box

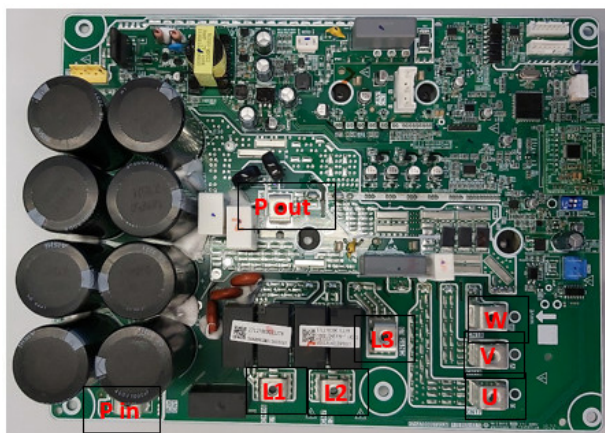


9.10.1.3 xL2 troubleshooting

Step 1: Check inverter module

- Check the DC voltage between terminals P and N. The normal value is 537-586V (power supply voltage specification: 380~415V 3N~), if the voltage is higher than 800V, go to Step 2.

Inverter module terminals



Step 2: Check inverter module

- Check the voltage between terminals P and N on the capacitor board. The normal value is 537-586V (power supply voltage specification: 380~415V 3N~). If the voltage is not in the normal range, there is a problem with the electrolytic capacitor power supply. Check the power supply for high or unstable voltage. If the power supply voltage value is normal, then the main PCB has malfunctioned and needs to be replaced.

9.10.1.4 xL8/xL9 troubleshooting

Step 1: Check compressor

- The normal resistances of the inverter compressor are 0.3-2Ω among U V W and in MΩ range/infinite between each of U V W and ground. If any of the resistances differ from these specifications, the compressor has malfunctioned.
- Refer to Figures in “xL0 troubleshooting”. If the resistance values are normal, go to Step 2.

Step 2: Check compressor and main PCB

- Replace the main PCB of the unit with the xL8/xL9 error and ensure the wiring is correct. If the compressor with the xL8/xL9 error runs normally, a fault with the main PCB was causing the xL8/xL9 error; if the compressor with the xL8/xL9 error still does not run normally, it needs to be replaced. Refer to “Compressor replacement procedure”.

9.10.1.5 Compressor replacement procedure

Step 1: Remove faulty compressor and remove oil

- Remove the faulty compressor from the unit.
- Before removing the oil, shake the compressor so as to not allow impurities to remain settled at the bottom.
- Drain the oil out of the compressor and retain it for inspection. Normally the oil can be drained out from the compressor discharge pipe..

Draining oil from a compressor



Step 2: Inspect oil from faulty compressor

- If the oil is clear and transparent, go to Step 6. Slightly yellow oil is not an indication of any problems.
- If the oil is dark, black or contains impurities, the system has problems and the oil needs to be changed and go to Step 3. (If the compressor oil has been spoiled, the compressor will not be being lubricated effectively. The moving parts will wear. Abrasion will lead to a larger load and higher current. More electric energy will get dissipated as heat and the temperature of the motor will become increasingly high. Finally, compressor damage or burnout will result)

Inspecting compressor oil

Oil is black: it has been carbonized		oil is a little yellow, but is clear and transparent and the condition is acceptable	
Oil is still transparent but there are impurities which may clog the filter			
Cloudy or gray oil indicates abnormal system operation		This oil contains particles of copper	

Step 3: Replace oil separator, accumulator and high pressure tank

- If the oil from a compressor is spoiled, replace oil separator, accumulator and high pressure tank.

Step 4: Check filter

- If the oil from a compressor is spoiled, check filters in the unit. If it is blocked, clean with nitrogen or replace.

Step 5: Clear the oil in the system

- If the oil from a compressor is spoiled, clear the oil in the system by nitrogen to ensure there is no spoiled oil in it.

Step 6: Replace compressor

- If the oil drained from the faulty compressor is clean and transparent in Step 2, replace the faulty compressor.
- If the oil drained from the faulty compressor is spoiled in Step 3, replace the faulty compressor and other compressor in the system.

Step 7: Vacuum drying and refrigerant charging

- Once all the compressors and other components have been fully connected, vacuum dry the system and recharge refrigerant.

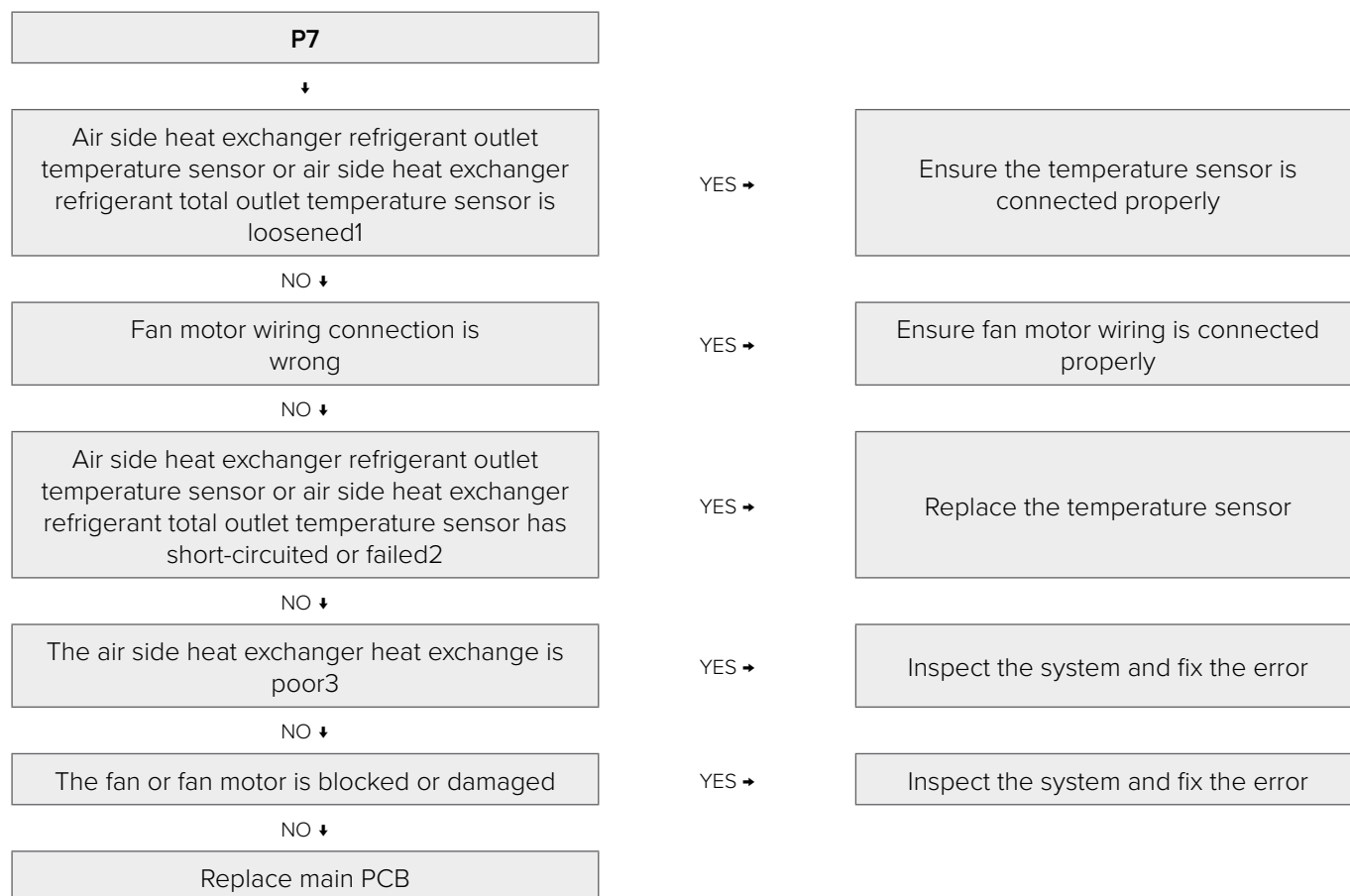
9.11 **P7****Description**

- Condensing temperature too high in cooling mode. When the Max(T3A;T3B) condensing temperature is higher than 62°C for more than 3 seconds, the system displays P7 protection the unit stop working. If the condensing temperature drops below 55°C P7 is removed and normal operation restore
- Error code is displayed on main PCB and user interface

Possible causes

- Condensing temperature sensor T3A or T3B not connected properly or has malfunctioned.
- Fan motor wiring connection is wrong.
- Poor condenser heat exchange.
- Fan motor damaged.
- Main PCB damaged.

Procedure



Notes:

- 1 Air side heat exchanger refrigerant outlet temperature sensor and air side heat exchanger refrigerant total outlet temperature sensor connection port is CN1 and CN69 on the main PCB (labeled 10 and 4 in Figure "Main PCB").
- 2 Measure sensor resistance. If the resistance is too low, the sensor has short-circuited. If the resistance is not consistent with the sensor's resistance characteristics table, the sensor has failed. Refer to Table 5-5.1 in Part 5, 5.1 "Temperature Sensor Resistance Characteristics".
- 3 Check air side heat exchanger, fan(s) and air outlets for dirt/blockages
The normal resistances of the inverter compressor are 0.3-2Ω among U V W and infinite between each of U V W and ground. If any of the resistances differ from these specifications, the compressor has malfunctioned.

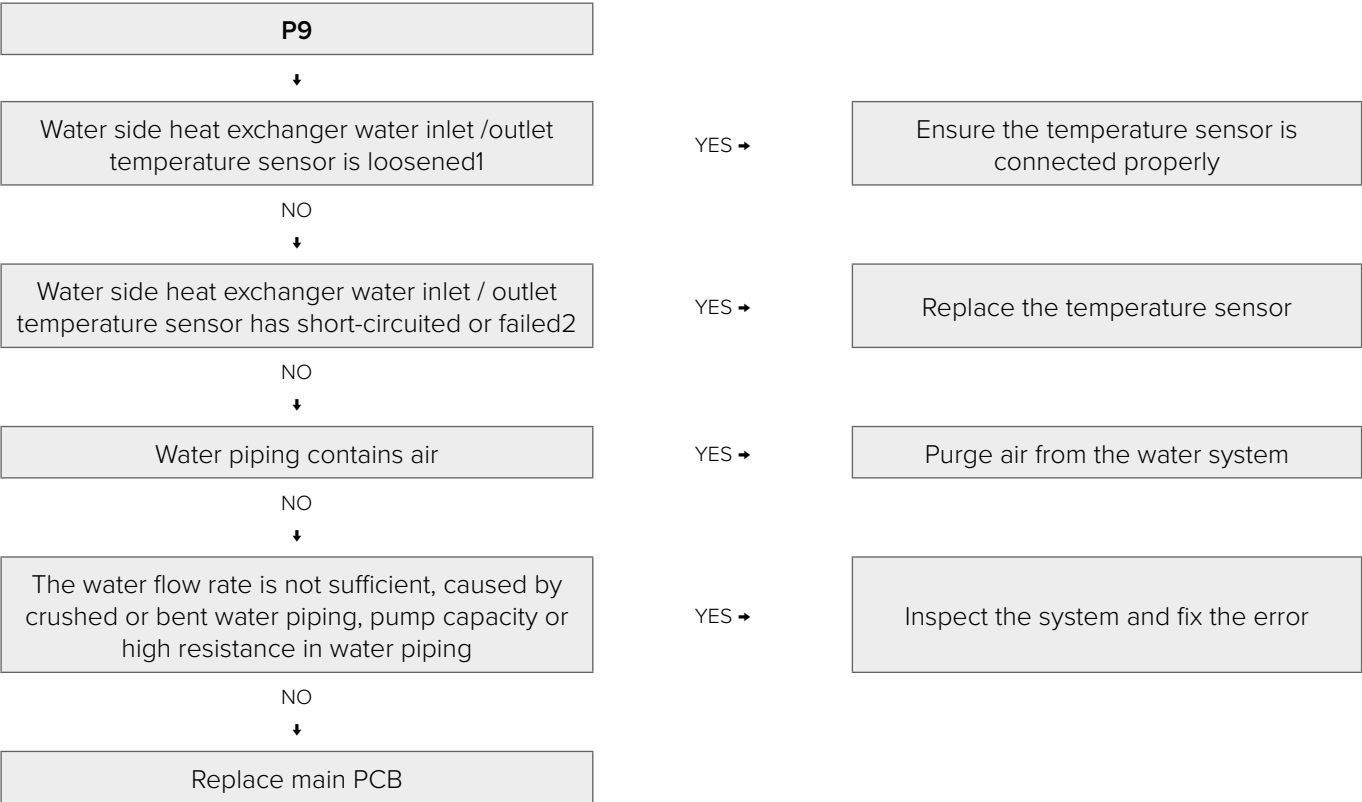
9.12 **P9****Description**

- High temperature difference between water side heat exchanger water inlet and water outlet temperatures protection
- Error code is displayed on main PCB and user interface

Possible causes

- Temperature sensor not connected properly or has malfunctioned.
- Water piping contains air.
- Insufficient water flow.
- Main PCB damaged.

Procedure



Notes:

- 1 Water side heat exchanger water inlet temperature sensor and water side heat exchanger water outlet temperature sensor connections are port CN31 on the main PCB (labeled 8 in Figure “Main PCB”).
- 2 Measure sensor resistance. If the resistance is too low, the sensor has short-circuited. If the resistance is not consistent with the sensor’s resistance characteristics table, the sensor has failed. Refer to Table in Part “Temperature Sensor Resistance Characteristics”.

9.13 PC



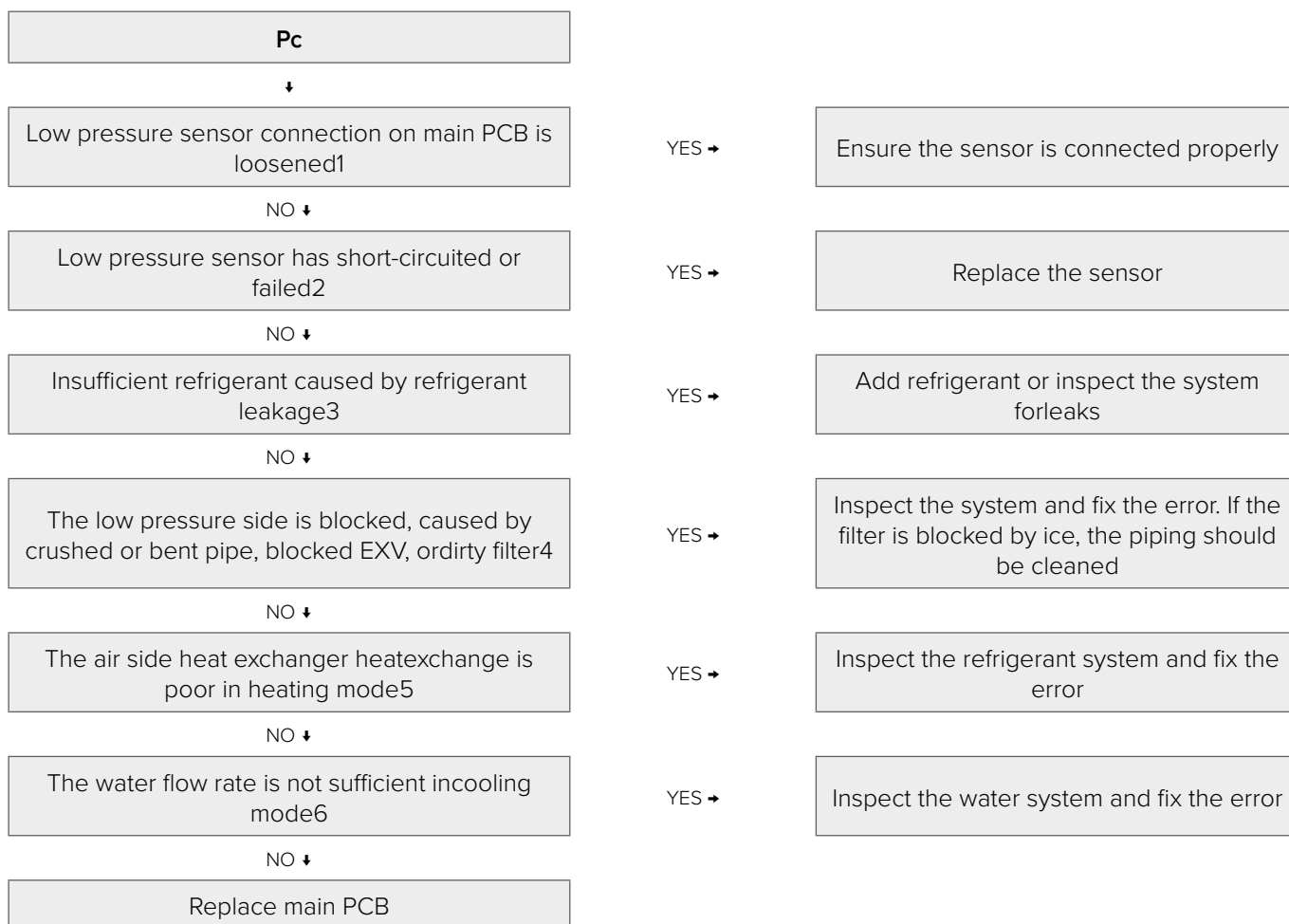
Description

- Water side heat exchanger low pressure protection
- Error code is displayed on main PCB and user interface

Possible causes

- Low pressure switch not connected properly or has malfunctioned.
- Insufficient refrigerant.
- Low pressure side blockage.
- Poor evaporator heat exchange in heating mode.
- Insufficient water flow in cooling mode.
- Main PCB damaged.

Procedure



Notes:

- 1 Low pressure sensor connection is port CN17 on the main PCB (labeled 9)
- 2 Measure the resistance among the three terminals of the pressure sensor. If the resistance is of the order of mega Ohms or infinite, the pressure sensor has failed.
- 3 To check for insufficient refrigerant: An insufficiency of refrigerant causes compressor discharge temperature to be higher than normal, discharge and suction pressures to be lower than normal and compressor current to be lower than normal, and may cause frosting to occur on the suction pipe. These issues disappear once sufficient refrigerant has been charged into the system.
- 4 A low pressure side blockage causes compressor discharge temperature to be higher than normal, suction pressure to be lower than normal and compressor current to be lower than normal, and may cause frosting to occur on the suction pipe. For normal system parameters.
- 5 Check air side heat exchanger, fan(s) and air outlets for dirt/blockages.
- 6 Check water side heat exchanger, water piping, circulator pumps and water flow switch for dirt/blockages

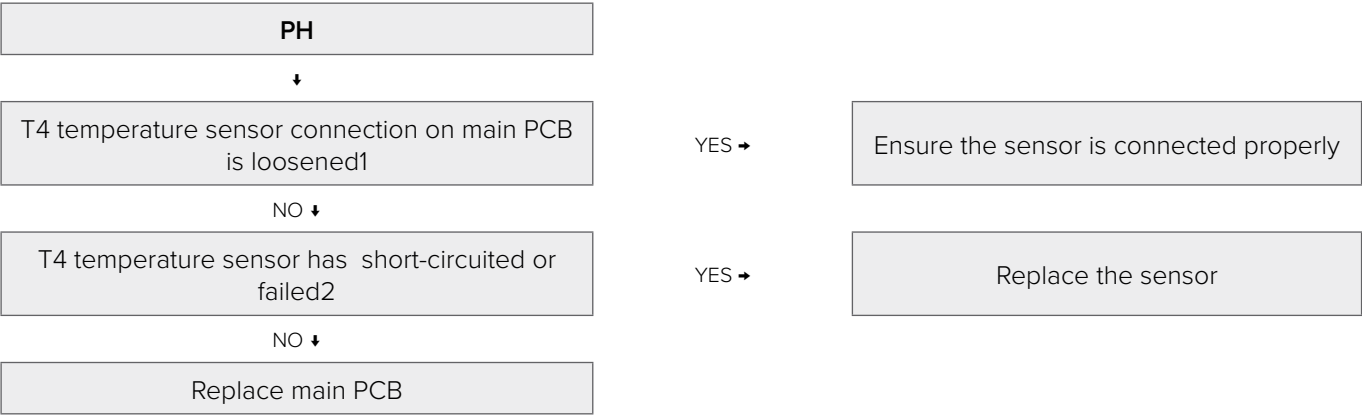
9.14 **PH****Description**

- Ambient temperature too high protection in heating mode.
- Error code is displayed on main PCB and user interface.

Possible causes

- Temperature sensor not connected properly or has malfunctioned.
- Actual ambient temperature is higher than 43°C.
- Main PCB damaged.

Procedure



Notes:

- 1 Temperature detection is port CN1 on the main PCB (labeled 10 in in Figure 4-2.1 in Part 4, 2.2 “Main PCB”) .
- 2 Measure sensor resistance. If the resistance is too low, the sensor has short-circuited. If the resistance is not consistent with the sensor’s resistance characteristics table, the sensor has failed. Refer to Table “Temperature Sensor Resistance Characteristics”

9.15 PE

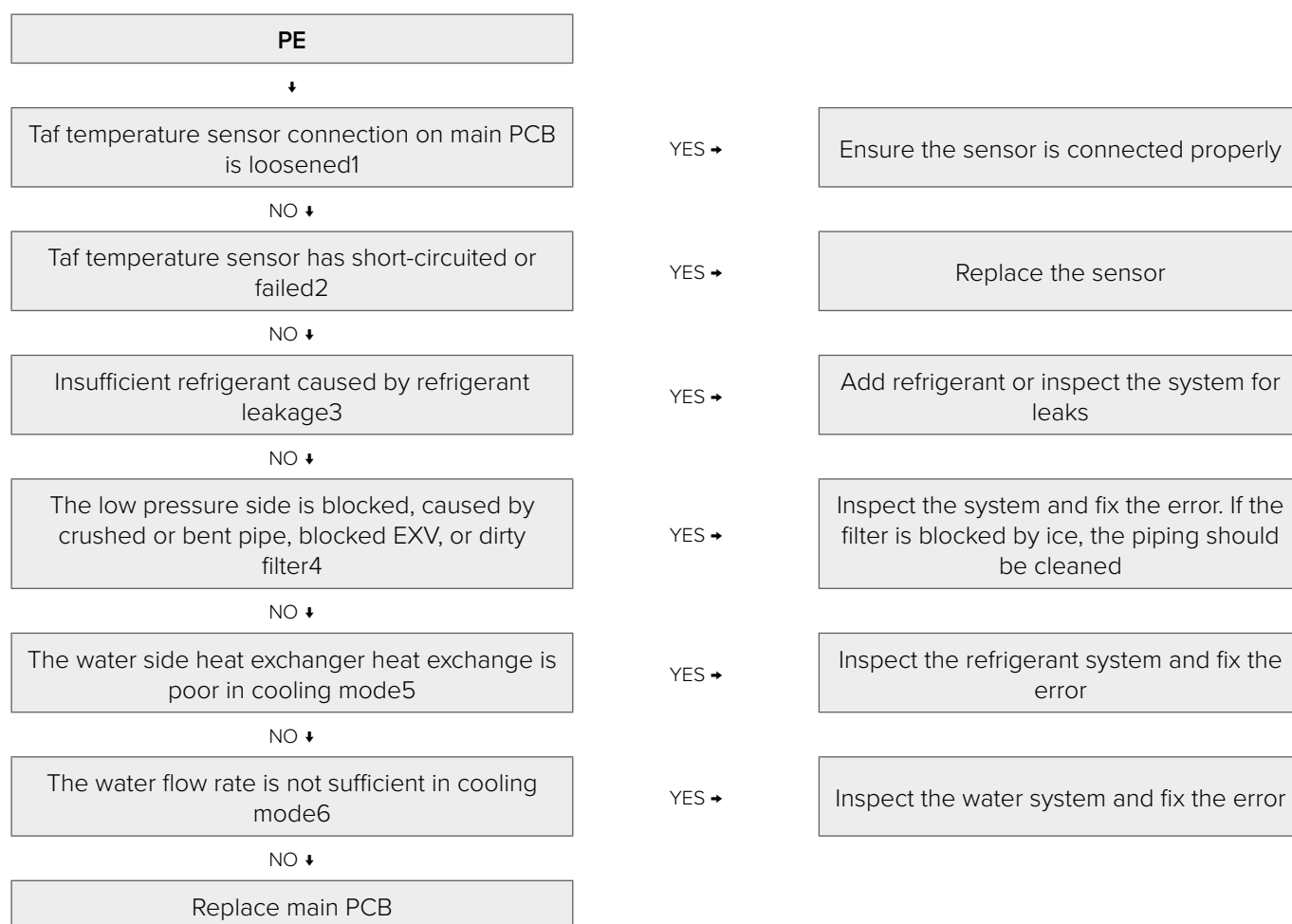
**Description**

- Low water temperature protection in cooling mode
- Error code is displayed on main PCB and user interface.
- V12 SW version: in low Two cooling PE alarm occurs when $T_{af2} \leq -2^{\circ}\text{C}$, last for 3s and recover once the water temperature $T_{af2} > 5^{\circ}\text{C}$ after 7 minutes.
- V12 SW version: Pin normal Two cooling PE alarm occurs when $T_{af2} \leq 3^{\circ}\text{C}$ last for 3s and recover once the water temperature $T_{af2} > 10^{\circ}\text{C}$ after 3 minutes
- From V17 sw version on: PE alarm occurs when $T_{af2} \leq T_{safe}-2$, last for 3s and recover once $T_{af2} > T_{safe}+5$
- If PE alarm is detected 3 times within 1h the fault will be locked and is necessary a manual restart of the unit or a reset of the blocking alarms

Possible causes

- Temperature sensor not connected properly or has malfunctioned.
- Insufficient refrigerant.
- Low pressure side blockage.
- Poor evaporator heat exchange in cooling mode.
- Insufficient water flow in cooling mode.
- Main PCB damaged

Procedure



Notes:

- 1 Water side heat exchanger anti-freezing temperature sensor (Taf, include Taf1 and Taf2) connection are ports CN69 and CN31 on the main PCB (labeled 4 and 8 in Part "Main PCB").
- 2 Measure sensor resistance. If the resistance is too low, the sensor has short-circuited. If the resistance is not consistent with the sensor's resistance characteristics table, the sensor has failed. Refer Table "Temperature Sensor Resistance Characteristics".
- 3 To check for insufficient refrigerant: an insufficiency of refrigerant causes compressor discharge temperature to be higher than normal, discharge and suction pressures to be lower than normal and compressor current to be lower than normal, and may cause frosting to occur on the suction pipe. These issues disappear once sufficient refrigerant has been charged into the system.
- 4 A low pressure side blockage causes compressor discharge temperature to be higher than normal, suction pressure to be lower than normal and compressor current to be lower than normal, and may cause frosting to occur on the suction pipe. For normal system parameters.
- 5 Check air side heat exchanger, fan(s) and air outlets for dirt/blockages.
- 6 Check water side heat exchanger, water piping, circulator pumps and water flow switch for dirt/blockages

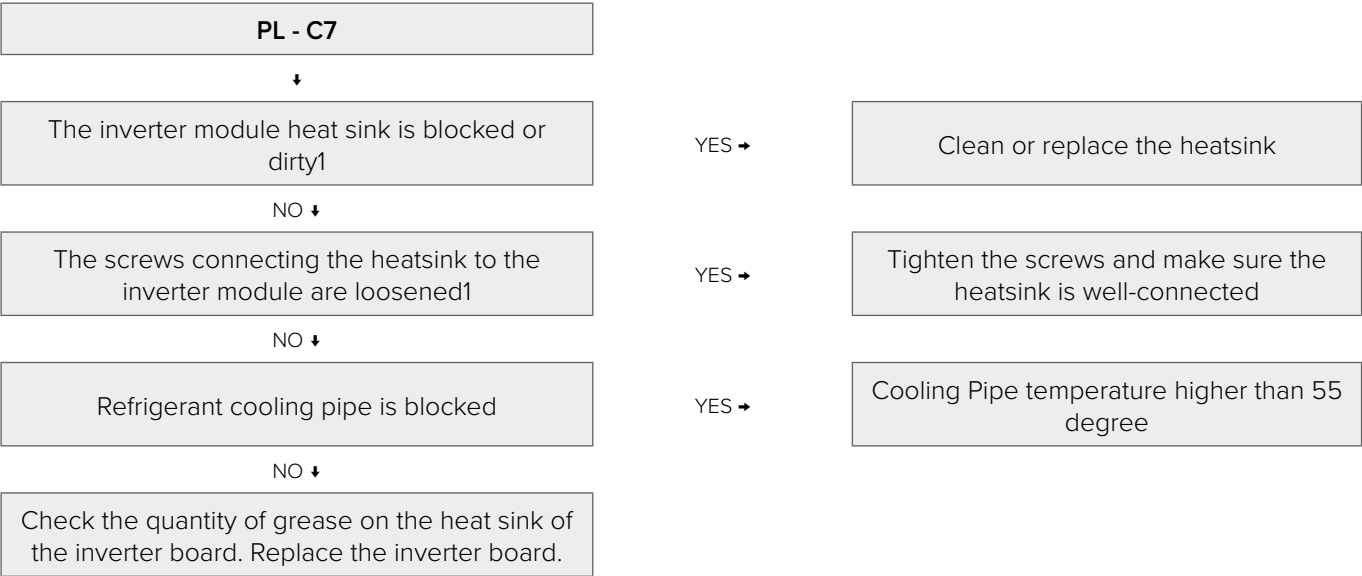
9.16 **PL / C7****Description**

- PL indicates inverter module temperature protection. When the main inverter module temperature rises above 100°C, the system displays PL protection and all the units stop running the unit stop running. When the inverter module temperature drops below 68°C for Sheen 30kW and respectively 78°C for Sheen 60/90/130kW, the unit recovers from the fault.
- If C7 alarm is detected 3 times within 100min the fault will be locked and is necessary a manual restart of the unit or a reset of the blocking alarms
- Error code is displayed on the main PCB and user interface.

Possible causes

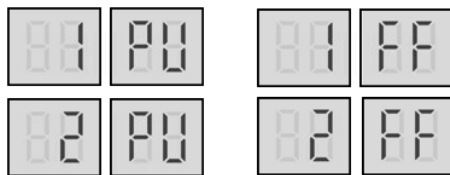
- Blocked, dirty or loose heat sink.
- Refrigerant cooling pipe is blocked
- Main PCB damaged.

Procedure



Notes:

- 1 Refer to Figures “Unit Electric Control Box Layout”.
- 2 Measure sensor resistance. If the resistance is too low, the sensor has short-circuited. If the resistance is not consistent with the sensor’s resistance characteristics table, the sensor has failed. Refer to Table “Temperature Sensor Resistance Characteristics”.

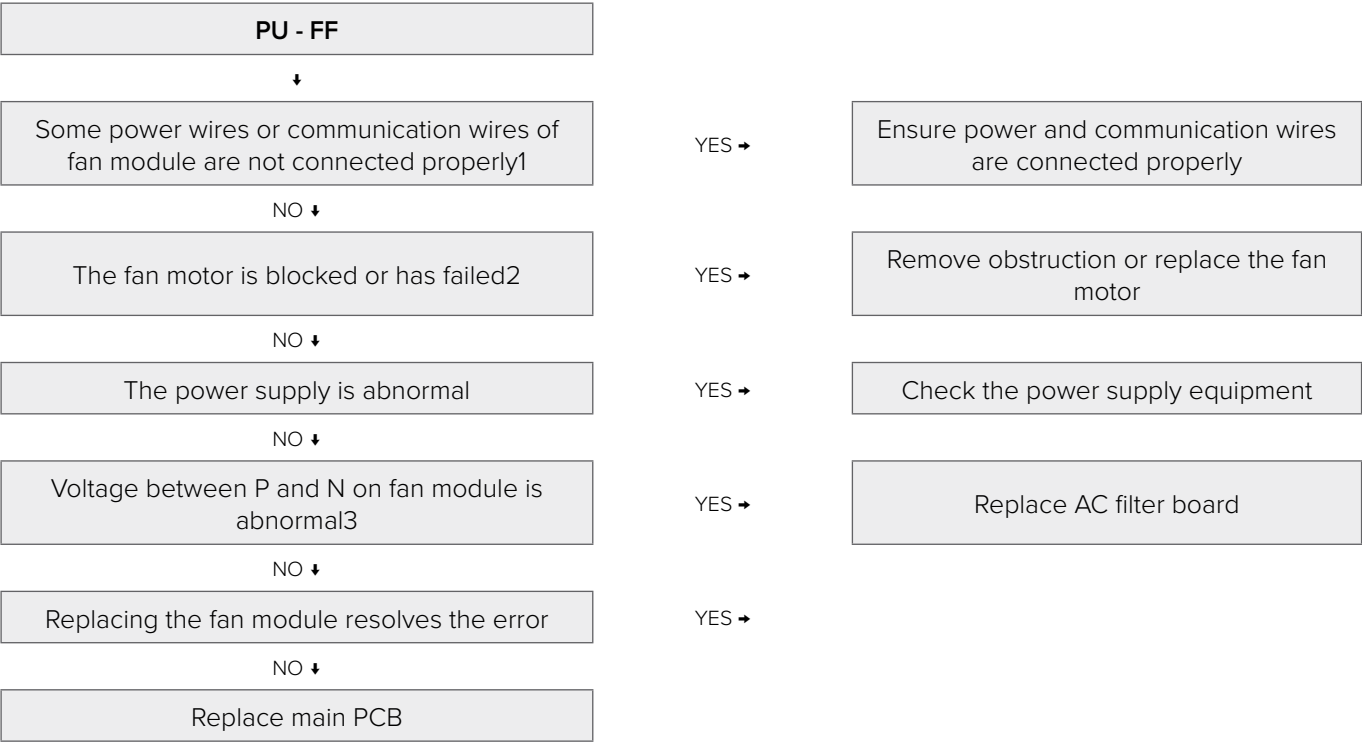
9.17 **PU - FF****Description**

- 1PU/1FF indicates fan module A protection.
- 2PU /2FF indicates fan module B or C protection.
- When PU error occurs 10 times in 120 minutes, FF will display, a manual system restart is required before the system can resume operation.
- Error code is only displayed on the main PCB and user interface.

Possible causes

- Switch SW1 incorrectly set.
- Power or communication wires not connected properly.
- Fan motor blocked or has failed.
- Power supply abnormal.
- AC filter board damaged.
- Fan module damaged.
- Inverter module PCB damaged

Procedure



Notes:

- 1 Refer to Figures “Unit Electric Control Box Layout”.
- 2 Refer to “Layout of Functional Components”.
- 3 The normal voltage between P and N on the fan module is 520~560V DC. Refer to Figures “Unit Electric Control Box Layout” and to Figure “Fan module power board”

9.18 **F0****Description**

- 1F0 indicates a communication error between the main control chip and the compressor 1 inverter driver chip.
- 2F0 indicates a communication error between the main control chip and the compressor 2 inverter driver chip.
- Error code is only displayed on the unit with the error

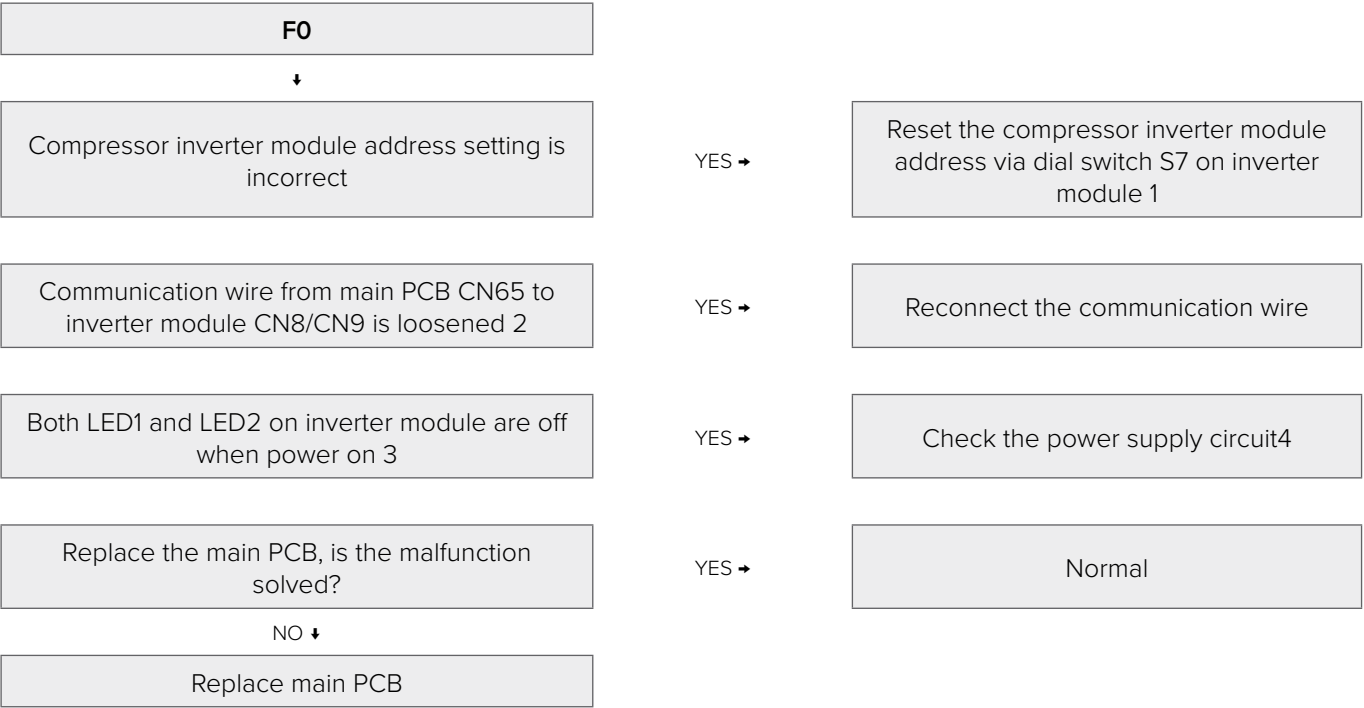
Trigger / recover condition

- Trigger condition: Main control chip and inverter driver chip cannot communication for 2 minutes.
- Recover condition: Communication go back to normal.
- Reset method: Resume automatically

Possible causes

- Incorrect compressor inverter module address setting.
- Loosened communication wiring from the main PCB to the inverter module.
- Bridge rectifier damaged.
- Main PCB damaged.
- Compressor inverter module damaged.

Procedure

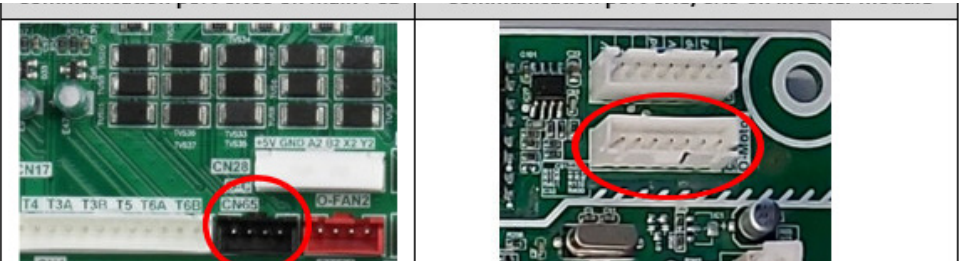


Notes:

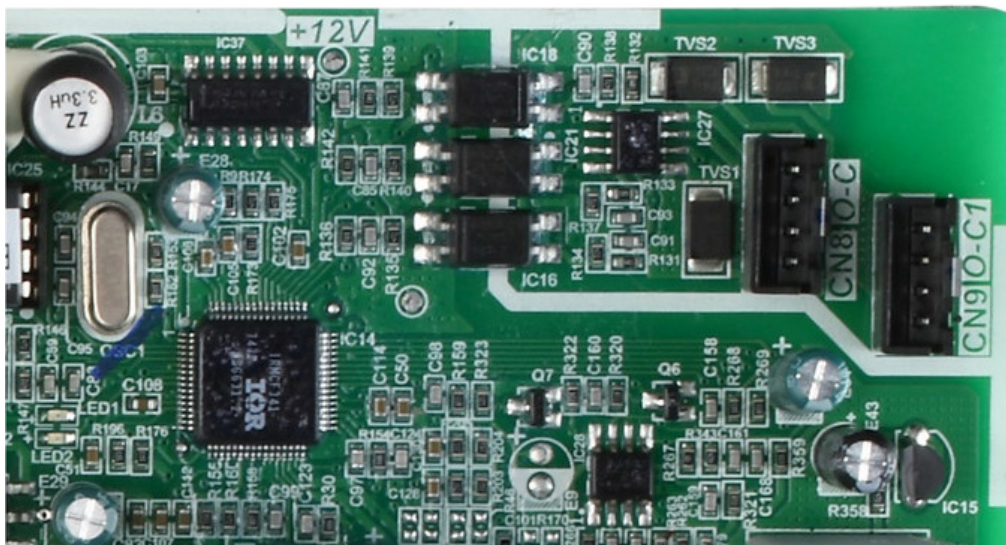
- 1
- Compressor inverter module address is set through dial switch S7 on the inverter module. The compressor inverter module A/B location refers to the wiring diagram

S7 on inverter module	Inverter module address
	00 for compressor inverter module 1
	01 for compressor inverter module 2

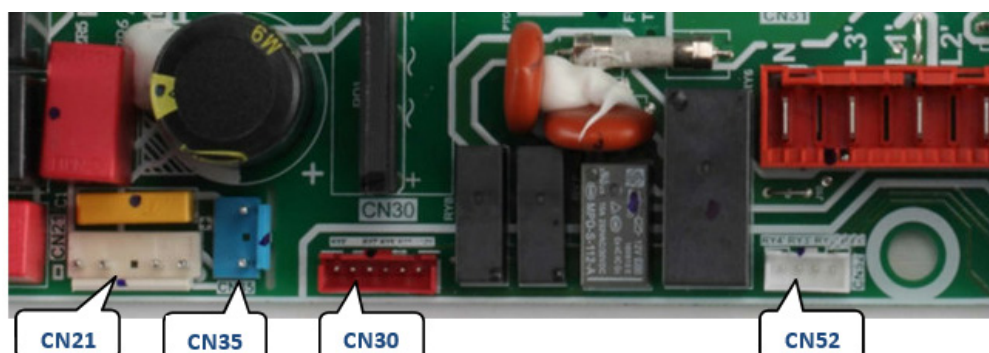
- 2
- Communication wire from main PCB CN65 to inverter module CN8/CN9.



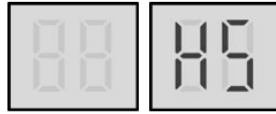
3 LED1/2 on inverter module



- 4 Check the power supply for the compressor inverter module, port CN21 on filter board, the normal voltage should be DC520~560V; check the high pressure switch connection port CN35 on filter board, the normal resistance should be zero; Check the connection cable from main PCB port CN58 to filter board port CN30 and check the connection cable from main PCB port CN52 to filter board port CN52.



9.19 H5



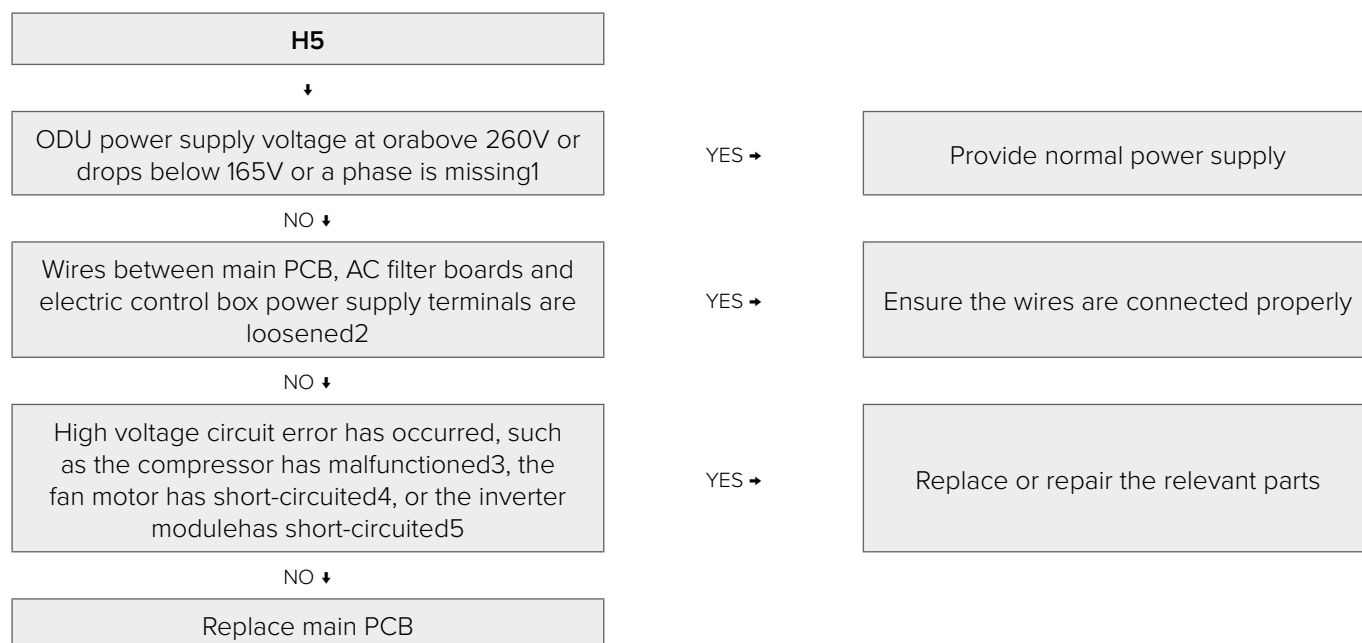
Description

- Abnormal power supply voltage.
- Error code is only displayed on main PCB and user interface

Possible causes

- Unit power supply voltage at or above 260V or drops below 165V or a phase is missing.
- Loosened wiring within electric control box.
- High voltage circuit error.
- Main PCB damaged.

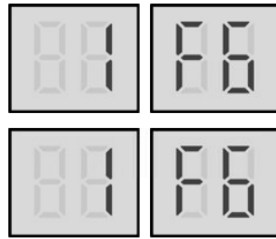
Procedure



Notes:

- 1 The normal voltage between A and N, B and N, and C and N is 165-265V, depends on the area the unit was installed
- 2 Refer to Figures "Unit Electric Control Box Layout".
- 3 The normal resistances of the inverter compressor are 0.3-2Ω among U V W and in MΩ range/infinite between each of U V W and ground. If any of the resistances differ from these specifications, the compressor has malfunctioned.
- 4 The normal resistances of the fan motor coil among U V W are less than 10Ω. If a measured resistance is 0Ω, the fan motor has short-circuited. Refer to "Layout of Functional Components".
- 5 Set a multi-meter to buzzer mode and test any two terminals of P N and U V W of the inverter module. If the buzzer sounds, the inverter module has short-circuited. Refer to "Unit Electric Control Box Layout".

9.20 F6



Description

- DC bus voltage protection.
- Only occurred in standby status.
- Error code is displayed on main PCB and user interface

Possible causes

- Abnormal power supply voltage
- Loosened wiring within electric control box.
- High voltage circuit error.
- AC filter board damaged.
- 3-phase bridge rectifier damaged.
- Compressor Inverter module damaged.

Procedure

F6 refer to P6 protection troubleshooting: xL1 and xL2.

9.21 HE



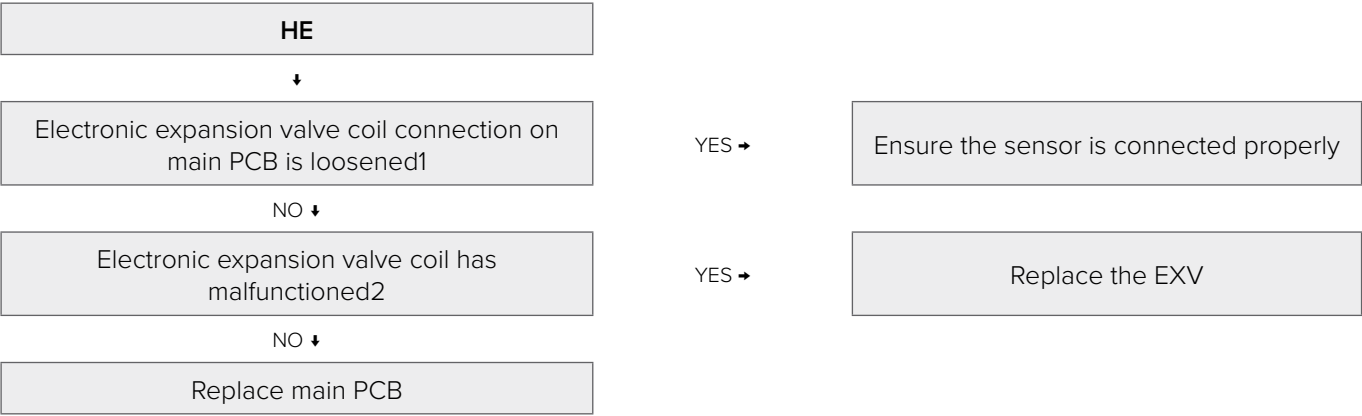
Description

- Electronic expansion valve connection error.
- Error code is only displayed on the unit with the error.

Possible causes

- Electronic expansion valve coil not connected properly or has malfunctioned.
- Damaged main PCB.

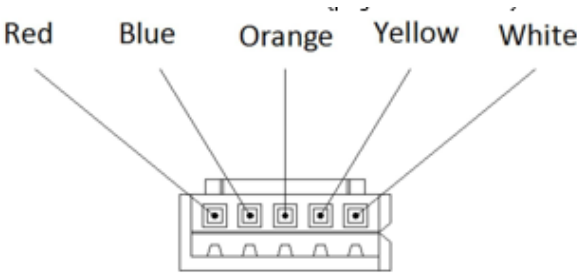
Procedure



Notes:

- 1 Electronic expansion valve coil connections are ports CN70 CN71 CN72 on the main PCB (labeled 16 in Figure “Main PCB”).
- 2 The normal resistances between EXV coil wiring terminals RED and white / yellow / orange / blue are 40-50Ω. If any of the resistances differ from the value, the EXV coil has malfunctioned

EXV coil wiring terminals:



9.22 F2



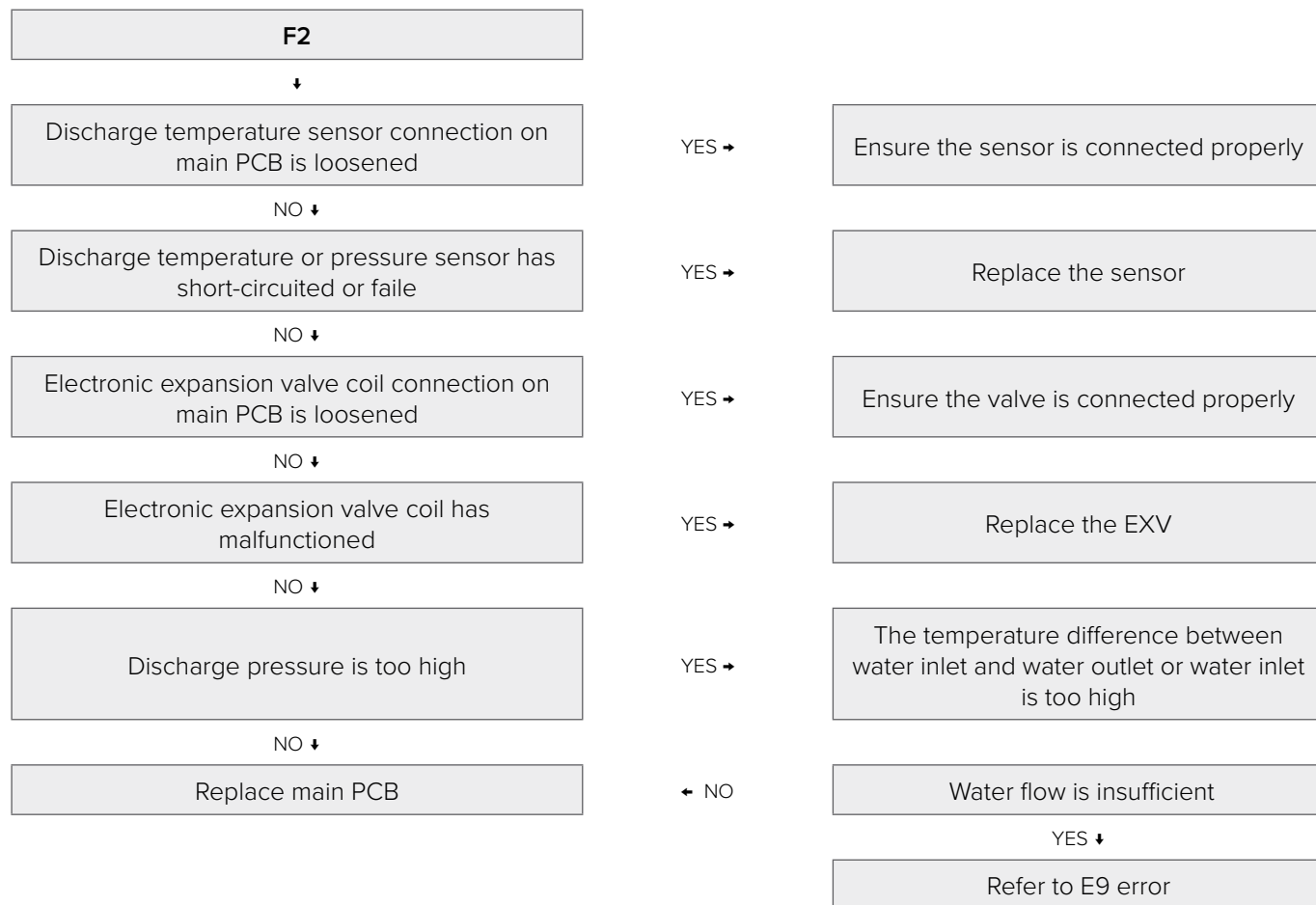
Description

- Insufficient protection of discharge superheat.
- Error code is only displayed on main PCB and user interface.

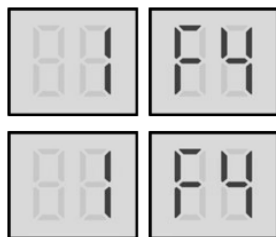
Possible causes

- Discharge pipe temperature sensor connected properly or has malfunctioned.
- Electronic expansion valve coil not connected properly or has malfunctioned.
- Check the refrigerant charge.
- Damaged main PCB.

Procedure



9.23 F4



Description

- When a L0 or L1 error occurs 3 times in 60 minutes, F4 will display, a manual system restart is required before the system can resume operation

Possible causes

- Refer to L0 or L1 error troubleshooting

Procedure

- Refer to L0 or L1 error troubleshooting.

9.24 **FP**



Description

- FP indicates pump in a system dial to different status. When the FP displayed, a manual system restart is required before the system can resume operation..
- Error code is only displayed on main PCB and user interface.

Possible causes

- The S12_2 of slave units is different with the master unit.
- Main PCB damaged.

Procedure



9.25 P3



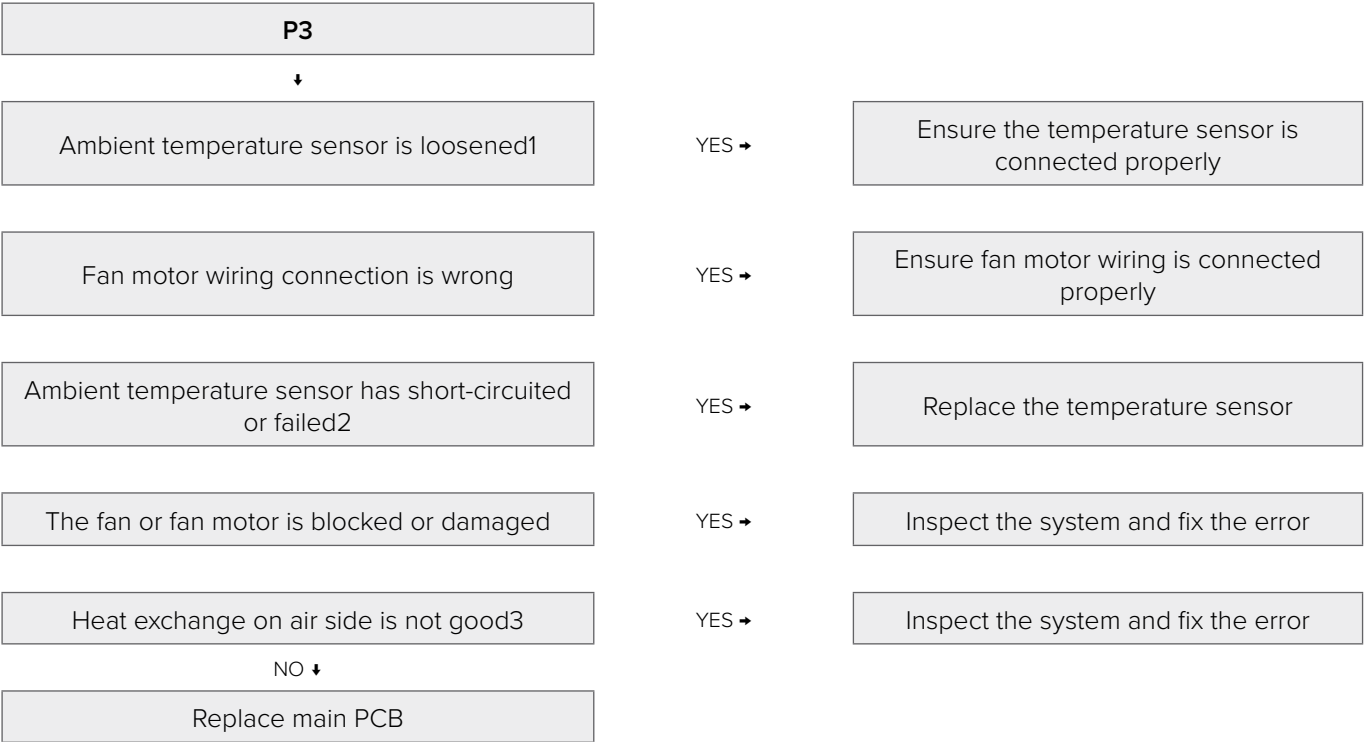
Description

- High temperature protection of ambient temperature sensor in cooling mode. When the ambient temperature is higher than 65°C, the system displays P3 protection and all units stop running. When the ambient temperature returns drops below 58°C, P3 is removed and normal operation resumes.
- Error code is displayed on main PCB and user interface.

Possible causes

- Ambient temperature sensor is not connected properly or has malfunctioned.
- Fan motor wiring connection is wrong.
- Poor condenser heat exchange.
- Fan motor damaged.
- Main PCB damaged.

Procedure



Notes:

- 1 Ambient temperature sensor connection port is CN1 on the main PCB (labeled 10 in Figure “Main PCB”).
- 2 Measure sensor resistance. If the resistance is too low, the sensor has short-circuited. If the resistance is not consistent with the sensor’s resistance characteristics table, the sensor has failed. Refer to Table “Temperature Sensor Resistance Characteristics”.
- 3 Check air side heat exchanger, fan(s) and air outlets for dirt/blockages.

10. Temperature Sensor Resistance Characteristics

10.1 Outdoor ambient temperature sensor - Outdoor heat exchanger - Plate heat exchanger temperature sensor resistance characteristics

Temperature °C	Resistance	Temperature °C	Resistance	Temperature °C	Resistance	Temperature °C	Resistance
-20	115.3	20	12.64	60	2.358	100	0.6297
-19	108.1	21	12.06	61	2.272	101	0.6115
-18	101.5	22	11.50	62	2.191	102	0.5939
-17	96.34	23	10.97	63	2.112	103	0.5768
-16	89.59	24	10.47	64	2.037	104	0.5604
-15	84.22	25	10.00	65	1.965	105	0.5445
-14	79.31	26	9.551	66	1.896	106	0.5291
-13	74.54	27	9.124	67	1.830	107	0.5143
-12	70.17	28	8.720	68	1.766	108	0.4999
-11	66.09	29	8.336	69	1.705	109	0.4860
-10	62.28	30	7.971	70	1.647	110	0.4726
-9	58.71	31	7.624	71	1.591	111	0.4596
-8	56.37	32	7.295	72	1.537	112	0.4470
-7	52.24	33	6.981	73	1.485	113	0.4348
-6	49.32	34	6.684	74	1.435	114	0.4230
-5	46.57	35	6.400	75	1.387	115	0.4116
-4	44.00	36	6.131	76	1.341	116	0.4006
-3	41.59	37	5.874	77	1.291	117	0.3899
-2	39.82	38	5.630	78	1.254	118	0.3796
-1	37.20	39	5.397	79	1.2133	119	0.3695
0	35.20	40	5.175	80	1.174	120	0.3598
1	33.33	41	4.964	81	1.136	121	0.3504
2	31.56	42	4.763	82	1.100	122	0.3413
3	29.91	43	4.571	83	1.064	123	0.3325
4	28.35	44	4.387	84	1.031	124	0.3239
5	26.88	45	4.213	85	0.9982	125	0.3156
6	25.50	46	4.046	86	0.9668	126	0.3075
7	24.19	47	3.887	87	0.9366	127	0.2997
8	22.57	48	3.735	88	0.9075	128	0.2922
9	21.81	49	3.590	89	0.8795	129	0.2848
10	20.72	50	3.451	90	0.8525	130	0.2777
11	19.69	51	3.318	91	0.8264	131	0.2708
12	18.72	52	3.192	92	0.8013	132	0.2641

13	17.80	53	3.071	93	0.7771	133	0.2576
14	16.93	54	2.959	94	0.7537	134	0.2513
15	16.12	55	2.844	95	0.7312	135	0.2451
16	15.34	56	2.738	96	0.7094	136	0.2392
17	14.62	57	2.637	97	0.6884	137	0.2334
18	13.92	58	2.540	98	0.6682	138	0.2278
19	13.26	59	2.447	99	0.6486	139	0.2223

10.2 Compressor top temperature sensor - Discharge pipe temperature sensor resistance characteristics

Temperature °C	Resistance	Temperature °C	Resistance	Temperature °C	Resistance	Temperature °C	Resistance
-20	542.7	20	68.66	60	13.59	100	3.702
-19	511.9	21	65.62	61	13.11	101	3.595
-18	483.0	22	62.73	62	12.65	102	3.492
-17	455.9	23	59.98	63	12.21	103	3.392
-16	430.5	24	57.37	64	11.79	104	3.296
-15	406.7	25	54.89	65	11.38	105	3.203
-14	384.3	26	52.53	66	10.99	106	3.113
-13	363.3	27	50.28	67	10.61	107	3.025
-12	343.6	28	48.14	68	10.25	108	2.941
-11	325.1	29	46.11	69	9.902	109	2.860
-10	307.7	30	44.17	70	9.569	110	2.781
-9	291.3	31	42.33	71	9.248	111	2.704
-8	275.9	32	40.57	72	8.940	112	2.630
-7	261.4	33	38.89	73	8.643	113	2.559
-6	247.8	34	37.30	74	8.358	114	2.489
-5	234.9	35	35.78	75	8.084	115	2.422
-4	222.8	36	34.32	76	7.820	116	2.357
-3	211.4	37	32.94	77	7.566	117	2.294
-2	200.7	38	31.62	78	7.321	118	2.233
-1	190.5	39	30.36	79	7.086	119	2.174
0	180.9	40	29.15	80	6.859	120	2.117
1	171.9	41	28.00	81	6.641	121	2.061
2	163.3	42	26.90	82	6.430	122	2.007
3	155.2	43	25.86	83	6.228	123	1.955
4	147.6	44	24.85	84	6.033	124	1.905
5	140.4	45	23.89	85	5.844	125	1.856
6	133.5	46	22.89	86	5.663	126	1.808
7	127.1	47	22.10	87	5.488	127	1.762
8	121.0	48	21.26	88	5.320	128	1.717
9	115.2	49	20.46	89	5.157	129	1.674
10	109.8	50	19.69	90	5.000	130	1.632
11	104.6	51	18.96	91	4.849		
12	99.69	52	18.26	92	4.703		

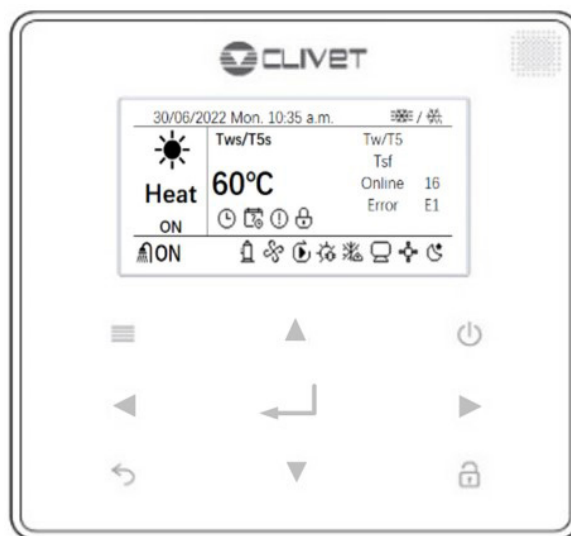
13	95.05	53	17.58	93	4.562		
14	90.66	54	16.94	94	4.426		
15	86.49	55	16.32	95	4.294		
16	82.54	56	15.73	96	4.167		
17	78.79	57	15.16	97	4.045		
18	75.24	58	14.62	98	3.927		
19	71.86	59	14.09	99	3.812		

10.3 Inverter module temperature sensor resistance characteristics

Temperature °C	Resistance	Temperature °C	Resistance	Temperature °C	Resistance	Temperature °C	Resistance
-30	971.4	10	109.0	50	19.70	90	5.000
-29	912.8	11	103.9	51	18.97	91	4.855
-28	858.2	12	99.02	52	18.26	92	4.705
-27	807.3	13	94.44	53	17.59	93	4.566
-26	759.7	14	90.11	54	16.94	94	4.431
-25	715.3	15	86.00	55	16.32	95	4.301
-24	673.6	16	82.09	56	15.73	96	4.176
-23	634.7	17	78.38	57	15.16	97	4.055
-22	598.2	18	74.87	58	14.62	98	3.938
-21	564.1	19	71.53	59	14.10	99	3.825
-20	532.2	20	68.36	60	13.60	100	3.716
-19	502.2	21	65.34	61	13.12	101	3.613
-18	474.1	22	62.47	62	12.65	102	3.514
-17	447.7	23	59.75	63	12.22	103	3.418
-16	423.0	24	57.17	64	11.79	104	3.326
-15	399.8	25	54.71	65	11.39	105	3.235
-14	378.0	26	52.36	66	10.99	106	3.148
-13	357.5	27	50.13	67	10.62	107	3.063
-12	338.2	28	48.01	68	10.25	108	2.982
-11	320.1	29	45.99	69	9.909	109	2.902
-10	303.1	30	44.07	70	9.576	110	2.826
-9	287.1	31	42.23	71	9.253	111	2.747
-8	272.0	32	40.48	72	8.947	112	2.672
-7	257.8	33	38.81	73	8.646	113	2.599
-6	244.4	34	37.23	74	8.362	114	2.528
-5	231.9	35	35.71	75	8.089	115	2.460
-4	220.0	36	34.27	76	7.821	116	2.390
-3	208.7	37	32.89	77	7.569	117	2.322
-2	198.2	38	31.58	78	7.323	118	2.256
-1	188.2	39	30.33	79	7.088	119	2.193
0	178.8	40	29.13	80	6.858	120	2.132
1	169.9	41	27.98	81	6.640	121	2.073
2	161.5	42	26.89	82	6.432	122	2.017

3	153.6	43	25.85	83	6.230	123	1.962
4	146.1	44	24.85	84	6.033	124	1.910
5	139.1	45	23.90	85	5.847	125	1.859
6	132.3	46	22.98	86	5.667		
7	126.0	47	22.10	87	5.492		
8	120.0	48	21.26	88	5.322		
9	114.3	49	20.47	89	5.159		

11. ADJUSTMENTS



 UNLOCK	To lockout / unlock.
 ▼▲	To modify current setpoint
 MENU	To open the various menus from the HOME screen
	To move the cursor, change the selection or change the set value. The parameter can be quickly changed with a long press.
 OK	To confirm an operation.
 ON/OFF	To set the ON / OFF function.
 BACK	To return to the previous level. Press to exit the current page and return to the previous page. Long press to return straight to the home screen.

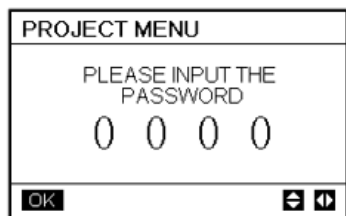
11.1 Menu STRUCTURE

Press “UNLOCK” for 3 seconds to unlock the keypad

11.1.1 Setting PROJECT MENU (pwd: 5432)

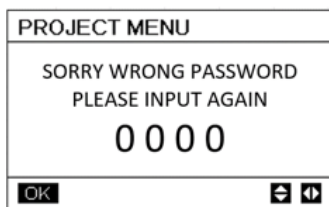
Entering the password:

Select “PROJECT MENU”, and press “OK” to enter the menu. The screen prompts the user to enter the password, as shown below



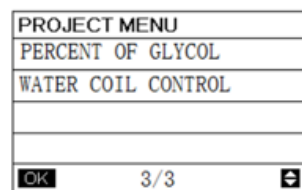
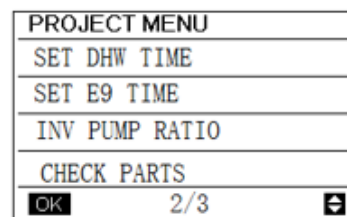
The initial password must be obtained by a professional. Press the “↑” and “↓” buttons to change the number to enter, and press the “←” and “→” buttons to change the bit code to enter. After the number is entered, the display is not changed. After entering the password, press the “OK” button to enter the interface; press the “BACK” button to go back to the previous interface; the display is as follows if the input is incorrect:

Non-professionals are not allowed to change the parameters, otherwise it may cause abnormal failures.



The query interface as follows is displayed if the input is correct:

Project menu	
Set unit-air conditioning	
Set parallel unit	
Set unit protection	
Set defrosting	
←Enter	1/3



11.1.1.1 Set unit air-conditioning:

Press “▼” and “▲” buttons to select the “SET UNIT AIR-CONDITIONING” in the “PROJECT MENU” interface, and press the “OK” button to enter the interface. The interface display is as follows:

SET UNIT	
TWO_COOL_DIFF	◀ 2 ▶°C
TWO_HEAT_DIFF	◀ 2 ▶°C
DT5_ON	◀ 8 ▶°C
DTIS5	◀ 10 ▶°C
DtTws	◀ 1 ▶°C
OK	◀ ▶

SET UNIT	
Dtmix	◀ 2 ▶°C
FCoffset	◀ 3 ▶°C
FChyser	◀ 1 ▶°C
OK	◀ ▶

Press “▲” or “▼” to select item and press “→” or “←” to set suitable temperature or time. Press “OK” to confirm. Back to homepage if there is no operation within 60s. Detailed setup information:

	Setting range	Default value	Adjustment value	Note
Two_COOL_DIFF	1~5°C	2°C	1°C	DHW
Two_HEAT_DIFF	1~5°C	2°C	1°C	
dT5_ON	2~10°C	8°C	1°C	
DtIs5	5~20°C	10°C	1°C	

11.1.1.2 Set parallel unit:

Select “SET PARALLEL UNIT” and press “ ” to entry. Display as follows:

SET PARALLEL UNIT		
TW_COOL-DIFF	◀ 2 ▶ °C	
TW_HEAT-DIFF	◀ 2 ▶ °C	
RATIO_COOL-FIRST	◀ 0 ▶ %	
RATIO_HEAT-FIRST	◀ 50 ▶ %	
OK ◀ ▶		

INV PUMP RATIO		
MIN RATIO	◀ 70 ▶ %	
MAX RATIO	◀ 100 ▶ %	
OK ◀ ▶		

Press “▲” or “▼” to select item to be set and press “→” or “←” to set value. Press “OK” to confirm. Back to homepage if there is no operation within 60s.
Detailed setup information:

	Setting range	Default value	Adjustment value	Note
Tw_Cool_diff	1~5°C	2°C	1°C	
Tw_Heat_diff	1~5°C	2°C	1°C	HP
Ratio_cool_first	0~100%	50%	5%	
Ratio_heat_first	0~100%	50%	5%	HP

11.1.1.3 DHW time setting:

Select “SET DHW TIME” and press “OK” to entry.
Display as follows:

SET DHW TIME		
SELECT ADDRESS	◀ 07 ▶ #	
COOL MIN TIME	◀ 0.5 ▶ h	
COOL MAX TIME	◀ 08 ▶ h	
HEAT MIN TIME	◀ 0.5 ▶ h	
HEAT MAX TIME	◀ 08 ▶ h	
OK 1/2 ◀ ▶		

SET DHW TIME		
DHW MIN TIME	◀ 0.5 ▶ h	
DHW MAX TIME	◀ 08 ▶ h	
OK 2/2 ◀ ▶		

Press “▲” or “▼” to select item to be set and press “→” or “←” to set value. Press “OK” to confirm. Back to homepage if there is no operation within 60s.
Detailed setup information:

	Setting range	Default value	Adjustment value	Note
SELECT ADDRESS	0~15	0	1	
COOL MIN TIME 0.5h	0.5~24h	0.5h	0.5h	
COOL MAX TIME	0.5~24h	8h	0.5h	
HEAT MIN TIME	0.5~24h	0.5h	0.5h	
HEAT MAX TIME	0.5~24h	8h	0.5h	
HOT WATER MIN TIME	0.5~24h	0.5h	0.5h	
HOT WATER MAX TIME	0.5~24h	2h	0.5h	

11.1.1.4 Inverter pump output setting:

Select “INV PUMP RATIO” and entry the following page to select pump: use in the case of multiple pumps, do not send instructions for single pump.

Press “▲” or “▼” to select item to be set and press “→” or “←” to set value. Press “OK” to confirm. Back to homepage if there is no operation within 60s. MINRATIO setting should ensure its flow meet the requirement of the whole unit, otherwise the unit may be damaged.

11.1.1.5 CHECK PARTS

Select “CHECK PARTS” and press “OK” to entry submenu.
Display as follows:

CHECK PARTS		
SELECT ADDRESS	◀ 07 ▶ #	
FIX PUMP STATE	OFF	
INV PUMP STATE	80%	
FOUR-WAY VALVE	OFF	
SV1 STATE	OFF	
BACK 1/3 ◀ ▶		

CHECK PARTS		
SV2 STATE	OFF	
SV4 STATE	OFF	
SV5 STATE	OFF	
SV6 STATE	OFF	
SV8A STATE	OFF	
BACK 2/3 ◀ ▶		

CHECK PARTS		
SV8B STATE	OFF	
HEAT1 STATE	OFF	
HEAT2 STATE	OFF	
COIL VALVE	OFF	
BACK 3/3 ◀ ▶		

Press “▲” or “▼” to view 13 state. Press “ ” to return to the previous page.

11.1.1.6 PERCENT OF GLYCOL

Applicable models: low temperature cooling only and FC models, (lower outlet water temperature); heat pump (water side, low temperature antifreeze)
Select “PERCENT OF GLYCOL” and press “OK” to entry submenu. Display as follows:

Percent of glycol		
Set the percent	◀ 80 ▶ %	
Tsafe	5°C	
Paf	0.7MPa	
ΔPaf	◀ 0 ▶ MPa	
← Ok 1/2 ◀ ▶		

Percent of glycol		
Historical setting		
06/06/2020 11:30a.m.	5	°C
06/05/2020 11:30a.m.	5	°C
06/04/2020 11:30a.m.	5	°C
06/03/2020 11:30a.m.	5	°C
← Ok 2/2 ◀ ▶		

Press “▲” or “▼” to select item to be set and press “→” or “←” to set value. Press “OK” to confirm. Back to homepage if there is no operation within 60s. Up to 16 historical setting records.

11.1.1.7 WATER COIL CONTROL

Control mode selection range: Auto, Manual on, Manual off. Default: Auto.

Manual on: to connect the water loop with the coil;

Manual off: to bypass the water loop from the coil, and go into the PHE directly.

After being in manually control for 8h it switch to automatic control.

Water coil control	
Select address	◀ 11 ▶ #
Coil control	◀ Auto ▶
← Ok	↕ ▶▶

SERVICE MENU	
STATE QUERY	
CLEAR HISTORY ERRORS	
SETTING ADDRESS	
HEAT CONTROL	
OK	1/4

SERVICE MENU	
TEMPERATURE COMPENSATION	
PUMP CONTROL	
MANUAL DEFROST	
LOW OUTLET WATER CONTROL	
OK	2/4

SERVICE MENU	
VACUUM SWITCH	
ENERGY SAVING SWITCH	
DHW ENABLE	
FACTORY DATA RESET	
OK	3/4

SERVICE MENU	
DHW DISINFECTION	
OK	4/4

11.1.2 Setting SERVICE MENU (pwd 234)

11.1.2.1 Entering the password:

Select “SERVICE MENU”, and press the “OK” button to enter the menu. The screen prompts the user to enter the password, as shown below:

SERVICE MENU	
PLEASE INPUT THE PASSWORD	
0 0 0	
OK	↕ ▶▶

Press “▲” and “▼” buttons to change the number to enter, and press “→” and “←” buttons to change the bit code to enter. After the number is entered, the display is not changed. After entering the password, press “OK” button to enter the interface or Press “BACK” button to go back to the previous interface. Display as follows if the input is incorrect:

SERVICE MENU	
SORRY WRONG PASSWORD PLEASE INPUT AGAIN	
0 0 0	
OK	↕ ▶▶

The query interface as follows is displayed if the input is correct:

11.1.2.2 State query

Press “▲” or “▼” to select “STATE QUERY” under “SERVICE MENU” page. Then press “OK” to enter submenu.

STATE QUERY	
SELECT ADDRESS	◀ 07 ▶ #
ODU MODEL	130 KW
COMP FREQUENCY	50 Hz
COMP1 CURRENT	20 A
COMP2 CURRENT	20 A
BACK	1/10

STATE QUERY	
H-P PRESSURE	3.83MPa
L-P PRESSURE	3.83MPa
TP1 DISCHARGE TEMP	30 °C
TP2 DISCHARGE TEMP	30 °C
TH SUCTION TEMP	-20 °C
BACK	2/10

STATE QUERY	
TZ TEMP	-20 °C
T3 TEMP	-20 °C
T4 TEMP	-20 °C
T6A TEMP	40 °C
T6B TEMP	40 °C
BACK	3/10

STATE QUERY	
TFIN1 TEMP	60 °C
TFIN2 TEMP	60 °C
TDSH	30 °C
TSSH	15 °C
TCSH	15 °C
BACK	4/10

STATE QUERY	
FAN1 SPEED	850 RPM
FAN2 SPEED	850 RPM
FAN3 SPEED	850 RPM
EXV A	1800 P
EXV B	1800 P
BACK	5/10

STATE QUERY	
EXV C	1800 P
Tw1 TEMP	30 °C
Two TEMP	30 °C
Tw2 TEMP	30 °C
TAF1 TEMP	30 °C
BACK	6/10

STATE QUERY	
TAF2 TEMP	30 °C
T5 TEMP	30 °C
COMP TIME 1	120 MIN
COMP TIME 2	120 MIN
COMP TIME 3	120 MIN
BACK	7/10

STATE QUERY	
COMP TIME	65535 H
FIX PUMP TIME	65535H
INV PUMP TIME	65535H
SG STATE	0
EVU STATE	0
BACK	8/10

STATE QUERY	
ODU SOFTWARE	V45
HMI SOFTWARE	V45
E2 SOFTWARE	V45
BACK	9/10

STATE QUERY	
DEFROSTING STATE	
00	01 02 03 04 05 06 07
08	09 10 11 12 13 14 15
END	
BACK	10/10

Press “→” or “←” to select the address of module to view (the offline address is skipped automatically). There are 11 pages and 49 state values. Press “▲” or “▼” buttons to select the different pages.

11.1.2.3 Clear history errors:

Press “▲” or “▼” to select “CLEAR HISTORY ERRORS” and confirm by “OK”.

SERVICE MENU	CLEAR HISTORY ERRORS
STATE QUERY	CLEAR UNIT HISTORY ERRORS
CLEAR HISTORY ERRORS	CLEAR ALL HISTORY ERRORS
SETTING ADDRESS	CLEAR LOCK ERROR
HEAT CONTROL	CLEAR RUN TIME
OK 1/4	OK

Press “▲” or “▼” to select “CLEAR UNIT HISTORY ERRORS” and press “OK” to confirm. Display as follows:

CLEAR UNIT HIS ERRS	
SELECT ADDRESS	◀ 07 ▶ #
DO YOU WANT TO CLEAR?	◀ YES ▶
OK	↩ ▶

Press “▲” or “▼” to select “SELECT ADDRESS” and press “→” or “←” to select address value. Press “▲” or “▼” to select clear or not, and press “→” or “←” to select YES or NO, and press “OK” to confirm. Press “▲” or “▼” to select “CLEAR ALL HIS ERRS” and press “OK” to confirm. Display as follows:

CLEAR ALL HIS ERRS	
DO YOU WANT TO CLEAR?	◀ YES ▶
OK	↩ ▶

Press “▲” or “▼” to select “CLEAR LOCK ERROR” and press “OK” to confirm. Display as follows:

CLEAR LOCK ERR	
DO YOU WANT TO CLEAR?	◀ YES ▶
OK	↩ ▶

Press “→” or “←” to select YES or NO, and press “OK” to confirm.

Press “▲” or “▼” to select “CLEAR RUN TIME” and press

“OK” to confirm. Display as follows:

CLEAR RUN TIME	
SELECT ADDRESS	◀ 07 ▶ #
CLEAR COMP TIME ?	◀ NO ▶
CLEAR FIX PUMP TIME?	◀ NO ▶
CLEAR INV PUMP TIME ?	◀ NO ▶
OK	↩ ▶

Press “▲” or “▼” to select “SELECT ADDRESS”, press “→” or “←” to select address value. Press “▲” or “▼” to select clear or not, and press “→” or “←” to select YES or NO, and press “OK” to confirm.

11.1.2.4 Setting address:

Press “▲” or “▼” under “SERVICE MENU” page to select “SETTING ADDRESS” (Can also enter by combining buttons pressing “MENU”, “→” for 3s). Press “OK” and enter submenu.

SERVICE MENU	SETTING ADDRESS
STATE QUERY	CONTROLLER ADDRESS
CLEAR HISTORY ERRORS	CONTROL ENABLE
SETTING ADDRESS	MODBUS ENABLE
HEAT CONTROL	MODBUS ADDRESS
OK 1/4	OK

Press “▲” or “▼” to select item and press “→” or “←” to set value. Then press “OK” to confirm and “BACK” to back.

11.1.2.5 Heat control

HEAT1 means pipe electric heating in cooling/heating mode. HEAT2 means tank electric heating or gas boiler in DHW mode.

Press “▲” or “▼” to select “HEAT CONTROL” under “SERVICE MENU” page. Press “OK” and enter submenu.

SERVICE MENU	HEAT CONTROL
STATE QUERY	HEAT1
CLEAR HISTORY ERRORS	HEAT2
SETTING ADDRESS	FORCED HEAT1 OPEN
HEAT CONTROL	FORCED HEAT2 OPEN
OK 1/4	OK

Press “▲” or “▼” to select item to be set. Press “OK” and enter submenu.

HEAT1 dial (S6-1 OFF):

HEAT1	
HEAT1-ENABLE	◀ NO ▶
OK 2/2	

HEAT1 dial (S6-1 ON):

HEAT1	
HEAT1-ENABLE	◀ NO ▶
T-HEAT1-DELAY	◀ 90 ▶ MIN
DTW-HEAT1-OFF	◀ 5 ▶ °C
T4-HEAT1-ON	◀ 5 ▶ °C
OK 2/2	

FORCED HEAT1 OPEN	
HEAT1-ENABLE	◀ NO ▶
OK 2/2	

HEAT2:

HEAT2	
ALLHEAT2 DISABLE	◀ YES ▶
SELECT ADDRESS	◀ 10 ▶ #
HEAT2-ENABLE	◀ NO ▶
T-HEAT2-DELAY	◀ 190 ▶ MIN
DT5-HEAT2-OFF	◀ 10 ▶ °C
OK 1/2	

HEAT2	
T4-HEAT2-ON	◀ 10 ▶ °C
OK 2/2	

FORCED HEAT2 OPEN	
SELECTED ADDRESS	◀ 10 ▶ #
FORCED HEAT2 OPEN	◀ NO ▶
OK 2/2	

Press “▲” or “▼” to select item and press “→” and “←” to set value. Then press “OK” to confirm and “BACK” to back.

11.1.2.6 TEMPERATURE compensation

Press “▲” or “▼” to select “TEMPERATURE COMPENSATION” under “SERVICE MENU” page. Press “OK” and enter submenu.:

SERVICE MENU	
TEMPERATURE COMPENSATION	
PUMP CONTROL	
MANUAL DEFROST	
LOW OUTLETWATER CONTROL	
OK 2/4	

TEMP COMPENSATION	
COOL MODE ENABLE	◀ YES ▶ °C
T4 COOL-1	◀ 15 ▶ °C
T4 COOL-2	◀ 08 ▶ °C
OFFSET-C	◀ 10 ▶ °C
OK 1/2	

TEMP COMPENSATION	
HEAT MODE ENABLE	◀ YES ▶ °C
T4 HEAT-1	◀ 15 ▶ °C
T4 HEAT-2	◀ 08 ▶ °C
OFFSET-H	◀ 10 ▶ °C
OK 2/2	

Press “▲” or “▼” to select item and press “→” and “←” to set value. Then press “OK” to confirm.

DHW enable:

Press “▲” or “▼” to select “DHW ENABLE” under “SERVICE MENU” page. Press “→” and enter submenu. Select “YES” to enable the DHW function then activate the DHW function and the “Priority” if necessary from User Menu.

DHW enable	
DHW enable	◀ No ▶
← Ok →	

11.1.2.7 Pump Control:

Press “▲” or “▼” to select “PUMP CONTROL” under “SERVICE MENU” page. Press “OK” and enter submenu

SERVICE MENU	
TEMPERATURE COMPENSATION	
PUMP CONTROL	
MANUAL DEFROST	
LOW OUTLETWATER CONTROL	
OK 2/4	

PUMP CONTROL	
FORCED PUMP OPEN	
INV PUMP SETTING	
PUMP ON/OFF TIME	
OK 2/4	

Press “▲” or “▼” to select “FORCED PUMP OPEN”
Press “OK” and enter submenu

Forced pump open	
Select address	◀ 7 ▶ #
Forced pump On	◀ No ▶
Forced pump Off	◀ Yes ▶
← Ok →	

Forced pump open	
Cannot control the pump before shutting down.	
← OK →	

Under “FORCED PUMP OPEN” page, press “▲” or “▼” to select item and press “→” and “←” to set value. Press “OK” to confirm or “BACK” to go back. If the unit at that address is ON, the pump cannot be controlled by the

wired controlled. Display as above. Under “INV PUMP OPEN” page, press “▲” or “▼” to select item and press “→” and “←” to set value. Press “OK” to confirm or “BACK” to go back.

Inv pump setting	
Select address	◀ 7 ▶ #
Switch on the pump	◀ Yes ▶
Ratio pump	◀ 100 ▶ %
← Ok →	

Note: Can only be set under a single pump. The setting range of RATIO-PUMP is 30%-100%. It should ensure its flow meet the requirement of whole unit, otherwise the unit may be damaged. Under “PUMP CONTROL” page, press “▲” or “▼” to select item and press “→” and “←” to set value. Press “OK” to confirm or “BACK” to back.

Parameter setting requirements are as follows:

Pump on/off time	
Pump on time	◀ 5 ▶ min
Pump off time	◀ 5 ▶ min
← Ok →	

	Set range	Default value	Adjustment range
PUMP ON TIME	5~60min	5	5
PUMP OFF TIME	0~60min	0	5

11.1.2.8 Manual defrost

Press “▲” or “▼” to select “MANUAL DEFROST” under “SERVICE MENU” page. Press “OK” and enter submenu.

SERVICE MENU	MANUAL DEFROST
TEMPERATURE COMPENSATION	SELECT ADDRESS ◀ 07 ▶ #
PUMP CONTROL	MANUAL DEFROST ◀ NO ▶
MANUAL DEFROST	
LOW OUTLETWATER CONTROL	
OK 2/4	OK

Press “▲” or “▼” to select item to be set and press “←” or “→” to set value. Press “ ” to confirm or “ ” to go

back. If the external unit successfully enters the defrost mode after the “MANUAL DEFROST” is turned on, the defrost icon will be displayed at homepage of the wired controller.

11.1.2.9 Low outlet water temperature control

Press “▲” or “▼” to select “LOW OUTLETWATER CONTROL” under “SERVICE MENU” page. Press “ ” and enter submenu. Suitable for HP-UNIT.

SERVICE MENU	LOW OUTLET WATER CTRL.
TEMPERATURE COMPENSATION	MIN TEMP FOR COOL ◀ 50°C ▶
PUMP CONTROL	HISTORICAL SETTING
MANUAL DEFROST	04/06/2020 11:30A 5°C
LOW OUTLETWATER CONTROL	04/06/2020 11:30A 5°C
OK 2/4	OK

Press “←” or “→” to set value. Press “ ” to confirm or “ ” to back. At this page, the historical minimum water outlet temperature setting (setting range 0-20°C) can be viewed. When the setting temperature is less than 5°C, a prompt box will pop up:

Low outlet water control
The setting temp. is below 5°C. Please confirm whether it is an antifreeze system.
← OK →

11.1.2.10 Energy saving mode

Press “▲” or “▼” to select “ENERGY SAVING SWITCH” under “SERVICE MENU” page. Press “ ” and enter submenu.

SERVICE MENU	ENERGY SAVING SWITCH
VACUUM SWITCH	SAVING SWITCH ◀ 80 ▶ %
ENERGY SAVING SWITCH	HISTORICAL SETTING
DHW ENABLE	04/06/2020 11:30A 80 %
FACTORY DATA RESET	04/06/2020 11:30A 80 %
OK 3/4	OK

Press “←” or “→” to set value. Press “OK” to confirm or “BACK” to go back

11.1.2.11 DHW ENABLE

Press “▲” or “▼” to select “DHW ENABLE” under “SERVICE MENU” page. Press “ ” and enter submenu.

SERVICE MENU		DHW ENABLE	
VACUUM SWITCH		DHW ENABLE	◀ NO ▶
ENERGY SAVING SWITCH			
DHW ENABLE			
FACTORY DATA RESET			
OK	3/4	OK	

Press “←” or “→” to set value. Press “OK” to confirm or “BACK” to go back.

Note: DHW Enable is only available for custom made DHW models.

11.1.2.12 FACTORY DATA RESET

Press “▲” or “▼” to select “FACTORY DATA RESET” under “SERVICE MENU” page. Press “OK” and enter submenu.

SERVICE MENU		FACTORY DATA RESET	
VACUUM SWITCH		DO YOU WANT TO	◀ YES ▶
ENERGY SAVING SWITCH		RESET?	
DHW ENABLE			
FACTORY DATA RESET			
OK	3/4	OK	

Press “▲” or “▼” to select corresponding item and press “←” or “→” to select restore or not. Press “OK” to confirm or “BACK” to go back.

11.1.2.13 DHW DISINFECTION

Press “▲” or “▼” to select DHW DISINFECTION on the SERVICE MENU interface. Press “OK” and enter submenu.

DHW disinfection	
Select address	◀ 0 ▶ #
Disinfection function	No
Day	Mon.
Time	24:00
Max running time	
← Ok ▶▶▶	

Press “▲” or “▼” to select the option to be set, and press “←” or “→” to set the desired value or state, and press the “←” key to confirm. When setting DISINFECTION FUNCTION to “YES” state, a prompt box will pop up:

DHW DISINFECTION	
Disinfection function can not be enabled. Please confirm whether Heat2 connects the TBH or Gas Boiler and Heat2 is “on” state.	
OK	◀ ▶

12. HMI

For HMI adjustment refers to HMI manual.

13. Double HMI

In case of more than one HMI connected on the unit only one is for control (usually address #0).

Connecting the HMIs in XYE connection as shown in electrical diagram. The remote HMI has an external power supply (already included in the PE).

How to configure single unit (1 unit and 2 PCBs) with 2 HMI.

- HMI: controller address #0 and control enable = YES;
- Second HMI: controller address different from 0 and control enable = NO.

How to configure cascade system: for example 2 unit (4 PCBs) and 3 HMI.

- HMI (master unit): controller address #0 and control enable = YES;
- HMI (slave unit): controller address #2 and control enable = NO;
- Other HMI: controller address different from 0 and control enable = NO.

14. REMAU

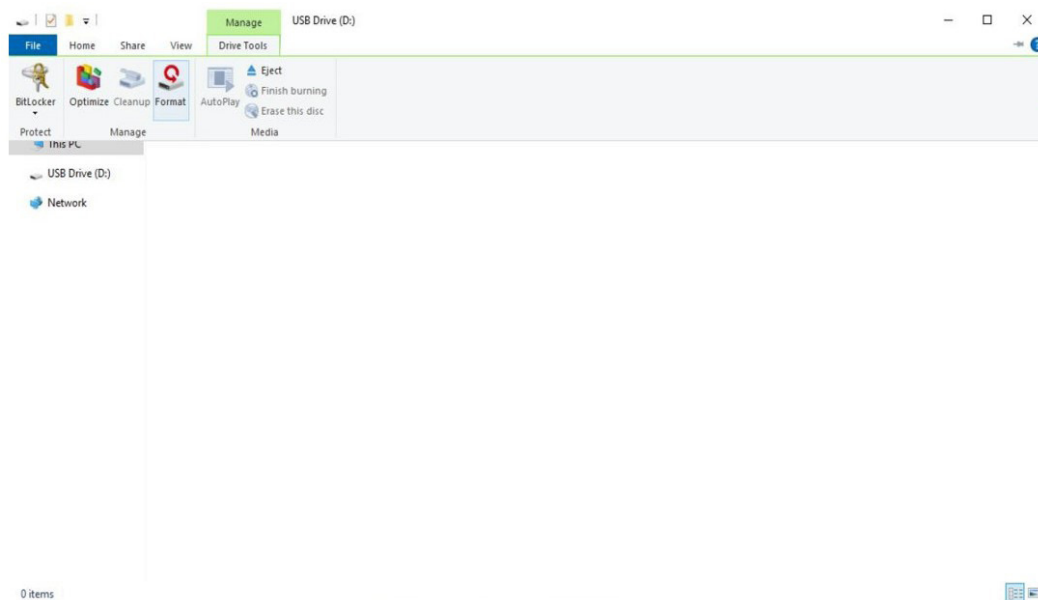
Refer to the updated REMAU manual available in Clivet World.

15. HOW TO UPDATE THE PCB BOARD FIRMWARE TROUGH THE USB PORT

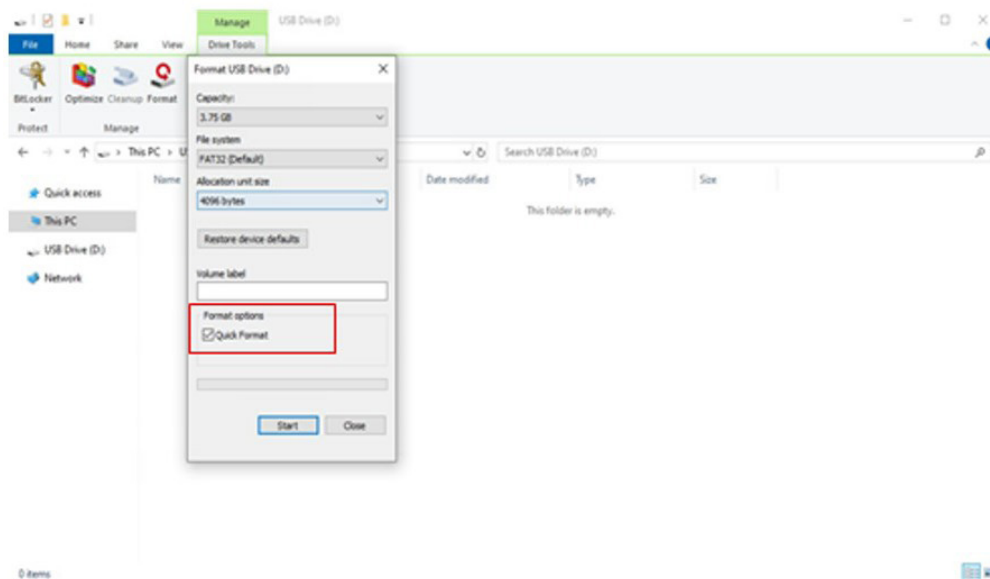
15.1 Formatting the USB flash drive

Using a FAT32 type Flash Drive with a maximum capacity of 8G, it is recommended to format the driver before use it. It is possible to do this following the steps below:

- Connect the flash drive to the laptop and open the device. Select Drive Tools to see the below window



- Selecting the Format icon will display the window below. Remember to remove the Quick Format flag and then start the procedure. It may take few minutes:



16. Get the latest or required firmware version

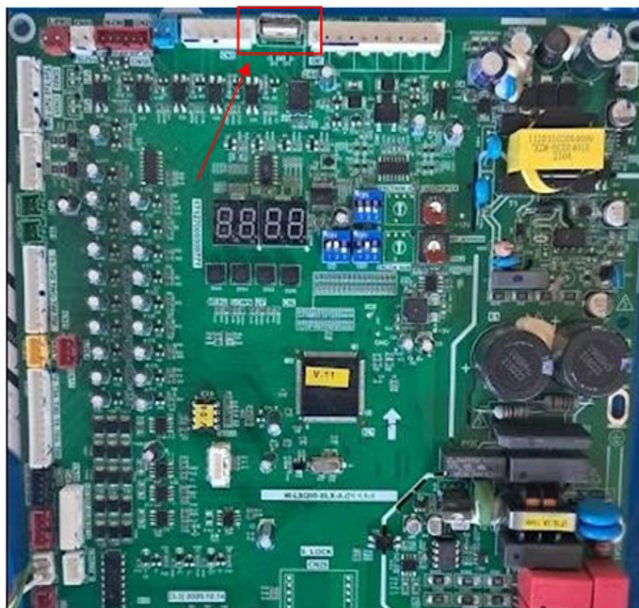
Using a laptop it is possible to access in Clivet World (<https://world.clivet.it/>). With your credentials and the serial number of the unit that needs to be updated it is possible to download the latest firmware version:

Matricola	Articolo prodotto	Informazioni	Documenti matricolari (3)	Dati (5)
	WISAN-YSE1 18.2 POMPA DI CALORE ARIA-ACQUA PER INSTALLAZIONE ESTERNA			
	Firmware (Ultima versione disponibile) [FM1295118-49] HMI SHEEN EVO 2.0/Large EVO [PD27120BN8W240221V49] FW22L0111-03	active		26/02/24
	Firmware (Ultima versione disponibile) [FM1295120-70] MAINBOARD SHEEN EVO 2.0 [HP 30-90kW - IRD21100010M240219V70] FW22L0121-05	active		21/02/24
	Lista Parametri macchina (Ultima versione disponibile) LPCAABU6H2M0004	active	Italiano	
	Lista Parametri macchina (Ultima versione disponibile) LPCAABU6H2M0004	active	English	
	Lista Parametri CLGate (Ultima versione disponibile) LPCGAABU6H2M0004	active	English	

It will be in a Zip folder and it will be necessary to extract it and upload only the firmware file to your USB stick.

16.1 Uploading of the new firmware version in the Main Board

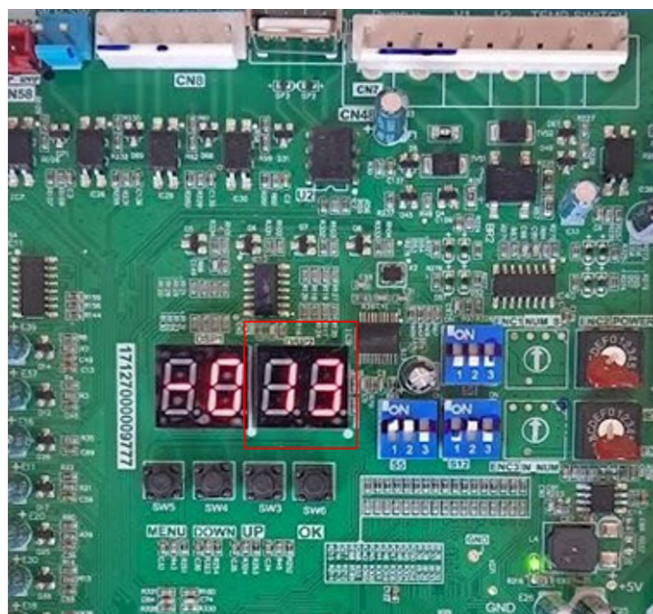
Once the USB drive with the firmware file inside is ready, it is possible to upload it to the Main Board of the unit. With the unit powered and in OFF mode, it is possible to insert the USB drive to the USB port present in the Main Board of the unit (see picture below). When the USB drive is connected, it is necessary to restart the unit by power OFF and power ON the unit waiting just 30 seconds.



It is necessary to repeat the above procedure for both Main and Slave board one after the other

16.2 Check if the update was successful

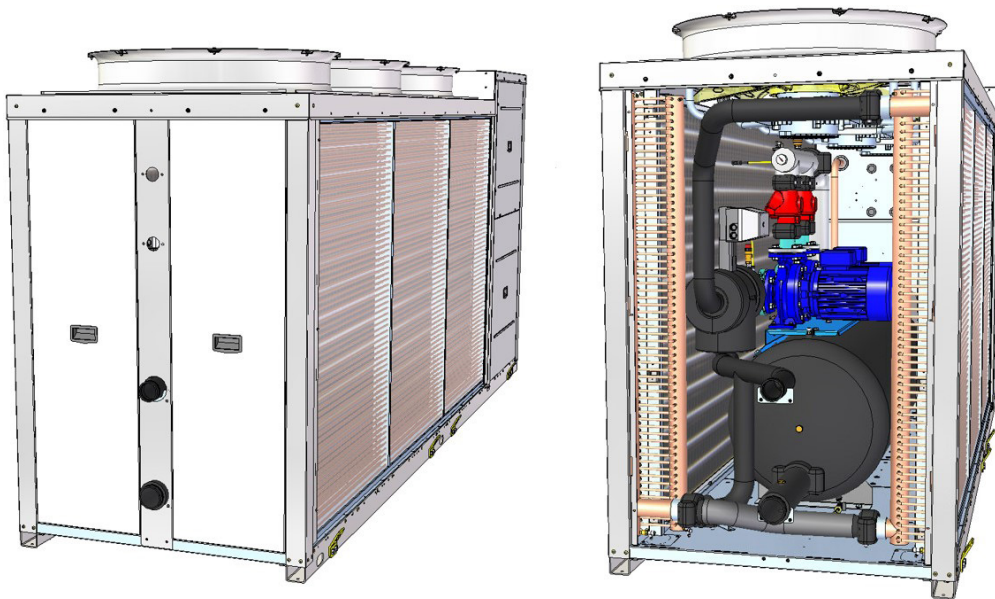
When the power supply is turned back ON, the loaded software version will appear in the right display of the updated Main Board. See an example below:



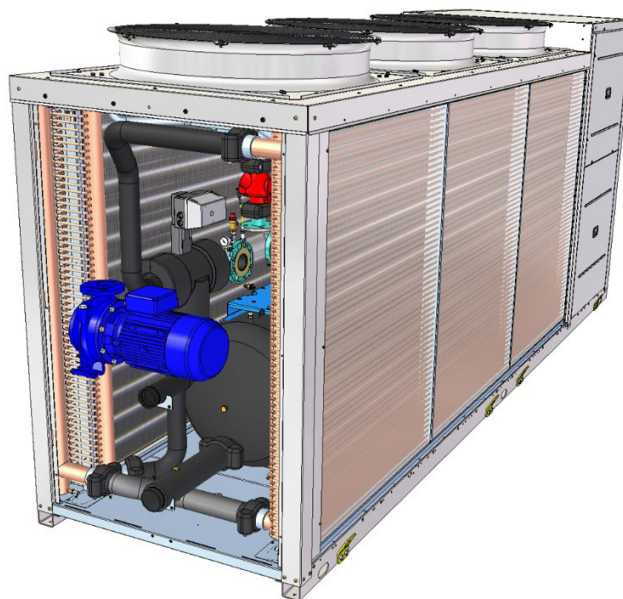
If the correct software version is displayed, it means that the update was successful and you can start the normal operation of the unit.

17. How to change pump

- 1 Draining the system.
- 2 Remove the panel and the mast.



- 3 Unscrew bolts and pump fixings and remove the pump.



How to install the Inverter board

- 1 Open the front panel of the electric control box and, before installing the Inverter board, take a picture of the original settings and wiring positions and record the position of the cables and the terminals;
- 2 Check whether the Midea code on the surface of the inverter is the same as that of the replaced inverter board;
- 3 Since different IPM modules have different mounting torques, check whether the IPM module is correct according to the unit model. The IPM module specification on Large unit, screw size and torque used by the unit are as follows:

model	IPM Specifications for compressor	Compressor IPM screw size	Fan IPM screw size	Compressor IPM → screw torque N.m	Fan IPM screw torque N.m	Compressor cable screw torque N.m
Large 120	50A*4	M4	M3	1.2- 1.5	1.0- 1.2	1.5-1.8
Large 150	50A*2+75A*2	M4	M3	1.2- 1.5	1.0- 1.2	1.5-1.8
Large 180	75A*4	M4	M3	1.2- 1.5	1.0- 1.2	1.5-1.8
Large 240	75A*4	M4	M3	1.2- 1.5	1.0- 1.2	1.5-1.8

- 4 Remove the Inverter board to be replaced and keep the cooling surface of the radiator clean without dust, impurities, etc. adhering to the surface;
- 5 The new inverter board must be placed according to the mounting holes on the radiator. When picking up the inverter board, pls hold board by the side of the PCB, and it is forbidden to grab the components on the board directly;
- 6 The surface of the IPM modules must be evenly coated with thermal conductive silicone grease. The operation method is as follows:

(A)

Before pouring thermal grease, please ensure that heat dissipation surface of the IPM modules and the surface of the radiator are free of impurities and the flatness and smoothness of the radiator are less than 30um. Spread the thermal grease evenly on the two heat dissipation surface sides with a thickness of thermal grease is 100 μm. It is not that the more you pour, the more heat is dissipated.



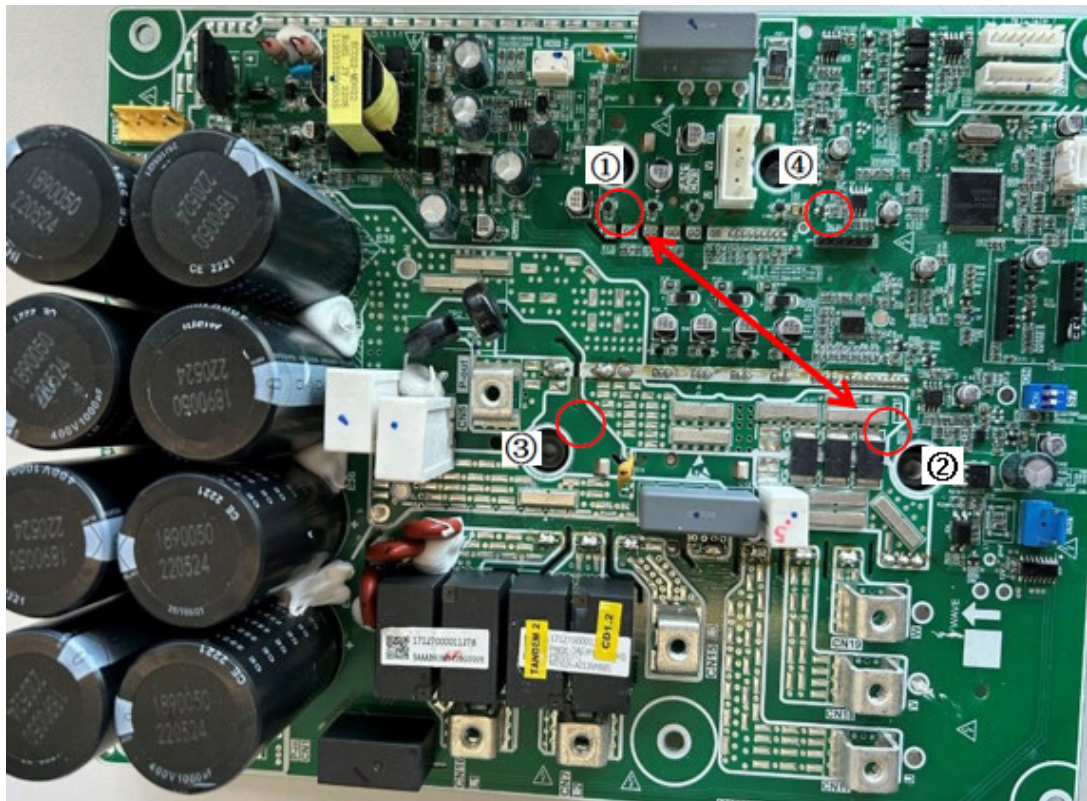
(B)

After coating the surface with thermal grease and before installation, please keep the two heat dissipation surfaces free from any contact to avoid impurities adhering to the heat dissipation surface and causing poor heat dissipation.

(C)

Every time an inverter board with thermal grease is installed, please clean both sides of the thermal grease before fixing the board, and re-lay the thermal grease. Do not let the heat sink surface come into contact with any other objects.

- 7 When assembling the screws, the screwdriver must be at 90° to the inverter board. First fix and tighten screws on IPM modules. Then fix the other screws on PCBA and sheet metal base; Prioritize the assembly of the two screws at the longer diagonal positions and engages in the pre-tightening.



Pre-tightened sequence: 1 → 2 → 3 → 4

Final fastening sequence: 1 → 2 → 3 → 4

The fixing torque value of wiring screw on board is determined according to the size of screw, where M4 reference torque 1.0- 1.2 Nm, M5 reference torque 1.5- 1.8 Nm.

The above torque requirements are tightening torques. If pre-tightening is required according to actual assembly requirements, the pre-tightening torque is 20%-30% of the tightening torque.

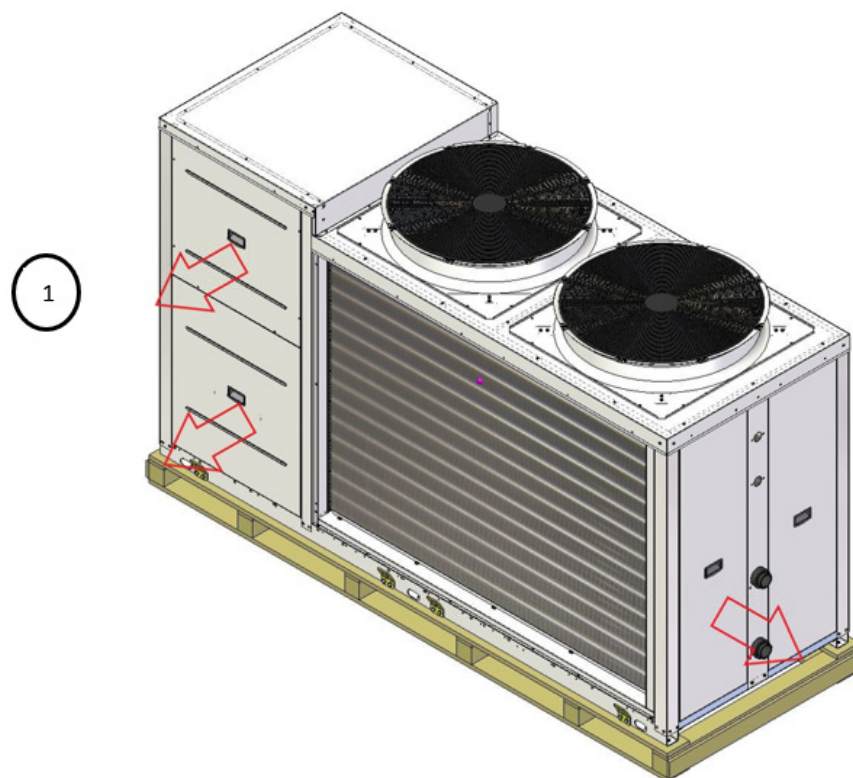
- 8 Refer to the guidelines on the wiring diagram to connect the force and weak cables, and the lugs are fixed to prevent pressing against raised platform of the terminal;
- 9 Refer to the picture in the 1st step, restore the wiring and settings, confirm the corresponding address of the board. After checking that everything is correct, close the upper front panel and fix the screws;

17.1 Precautions during disassembly and assembly of the Inverter board:

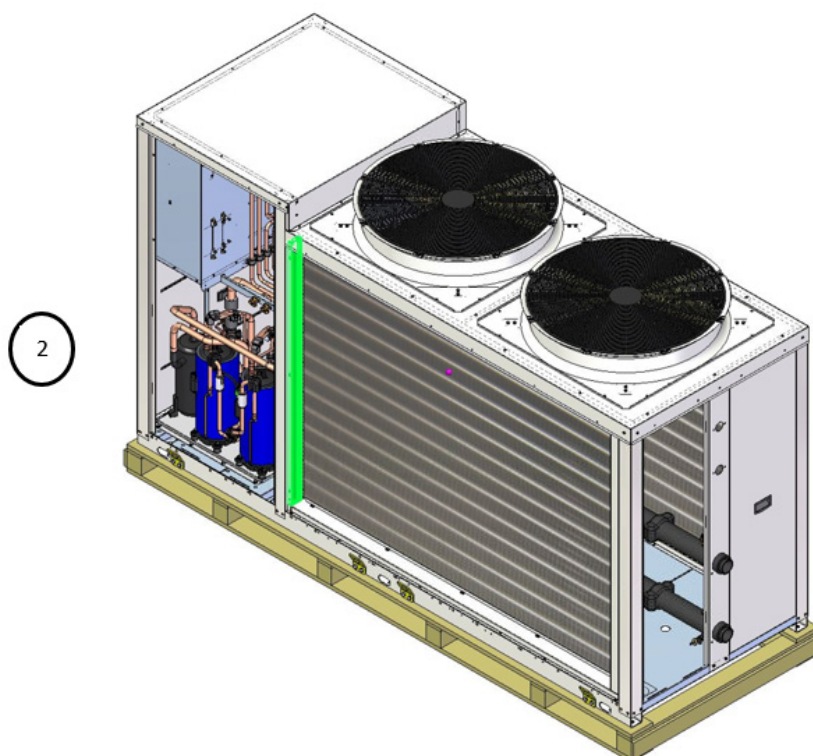
- 1 Power off for 10 minutes before removing the inverter board;
- 2 Do not press forcibly when disassembling or installing the Inverter board;
- 3 When installing the Inverter board, it is necessary to pay attention not to wrongly hide cables under the board, fix the IPM modules screws first in order 1 → 2 → 3 → 4 and then fix the PCB screws;
- 4 All the screws in the electric control box cannot be mixed with the screws from the other structural fixtures;
- 5 The wiring of the force electricity terminals on the board must be carefully and repeatedly confirmed and fake connections are prohibited!

18. How to remove microchannel in WiSAT-YEE

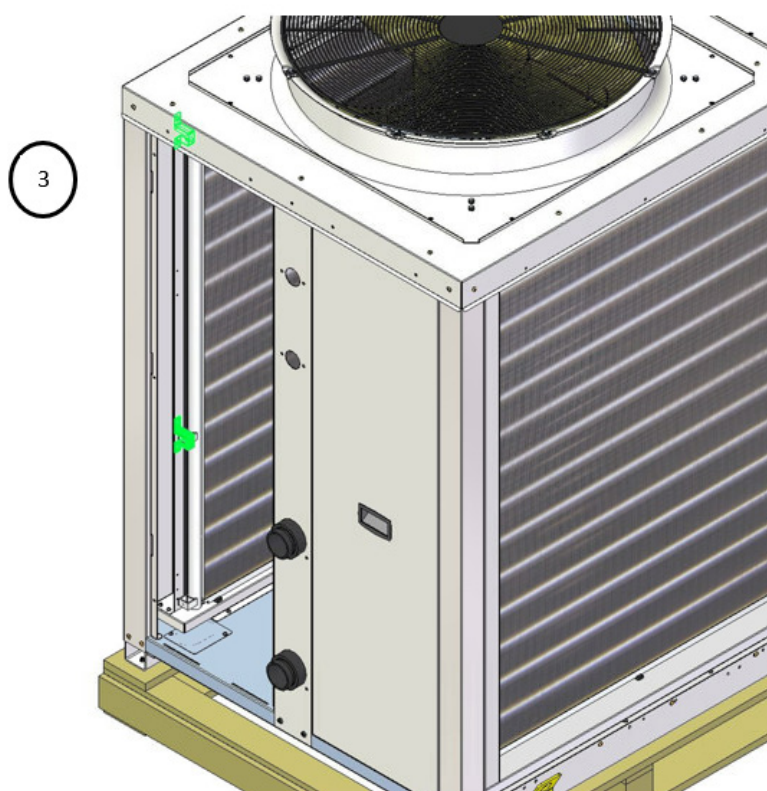
- 1 Remove lateral and back panels as in figure



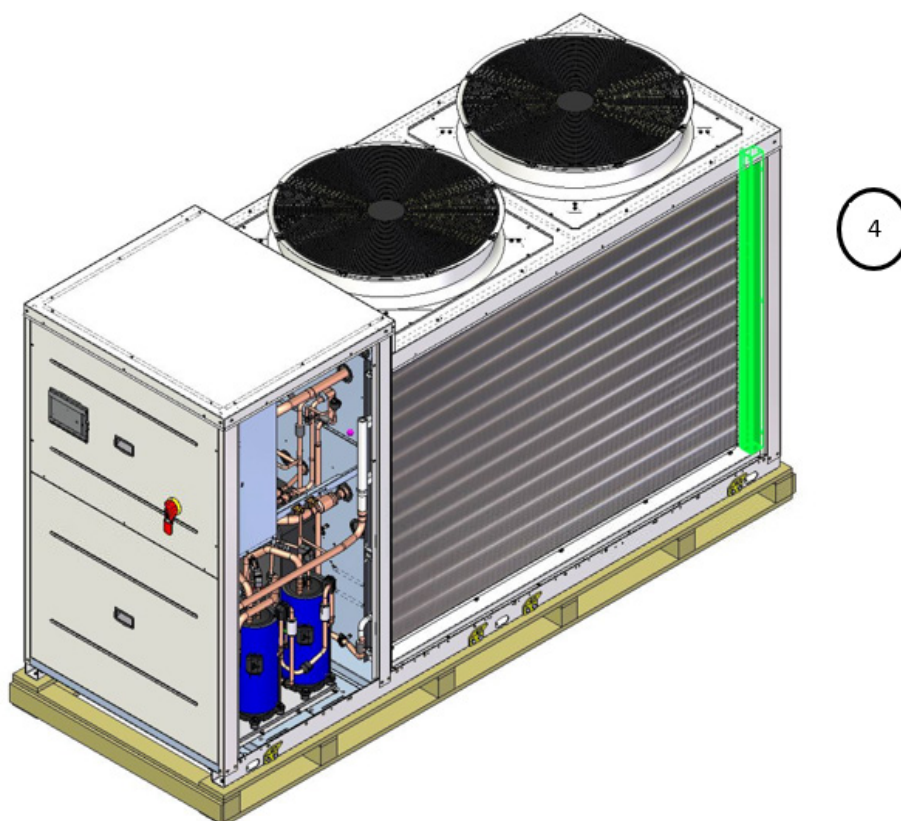
- 2 Remove the bar highlighted in green in figure



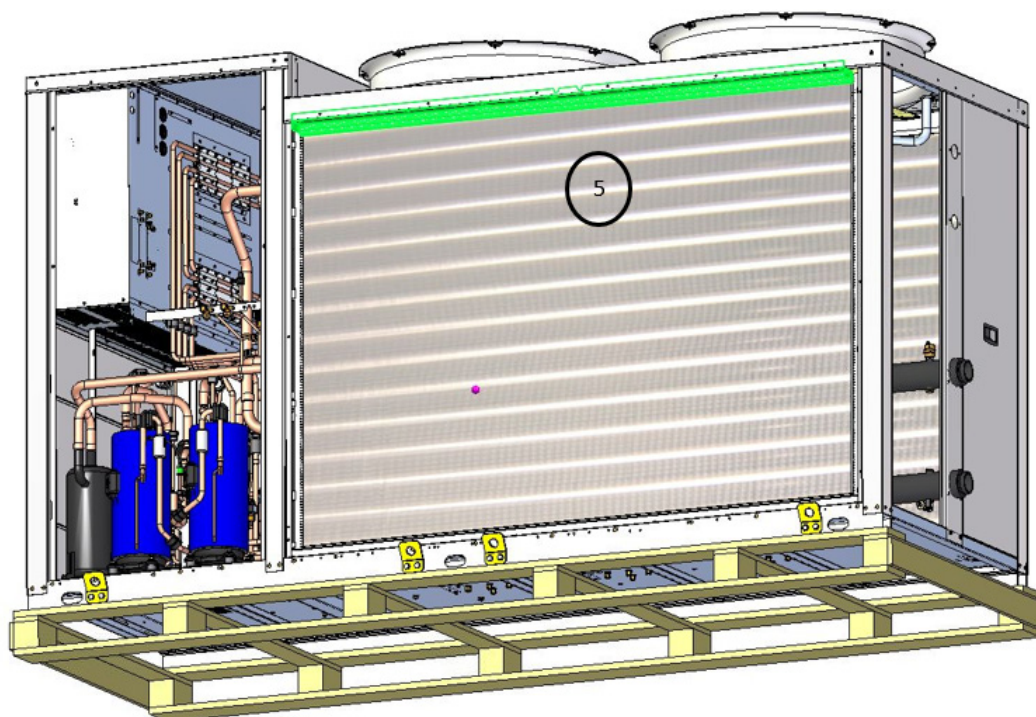
- 3 Remove the brackets highlighted in green in figure



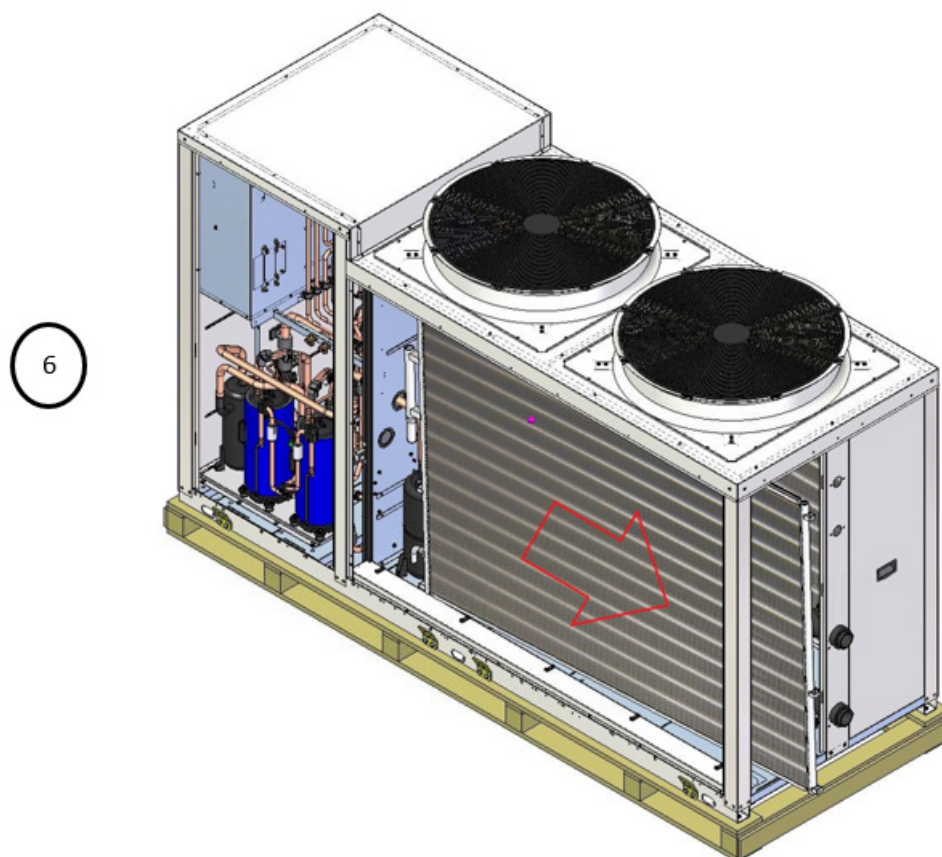
4. Remove the bar highlighted in green in figure

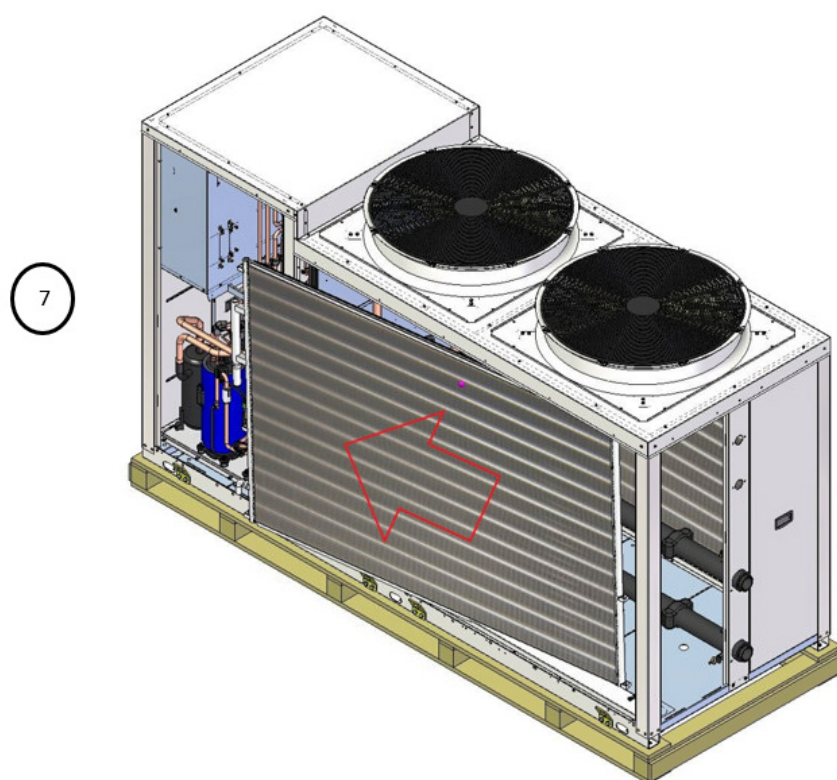


5. Remove the bar highlighted in green in figure



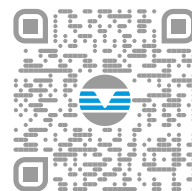
6. Move the microchannel in the way shown in figure





To install again microchannel, repeat the operations in reverse order.

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